Response to Public Comment:
National Pollutant Discharge Elimination System
Final Regulations to Establish Requirements for Cooling Water Intake Structures at Existing Facilities and Amend Requirements at Phase I Facilities

(40 CFR Parts 122 and 125)

Docket # EPA-HQ-OW-2008-0667

United States Environmental Protection Agency
1200 Pennsylvania Avenue N.W.
Washington, DC 20460
May 19, 2014

Contents

Introduction

On April 20, 2011 EPA published a proposed rule to establish nationally applicable requirements under section 316(b) of the Clean Water Act (CWA) for existing power generating facilities and existing manufacturing and industrial facilities. EPA also proposed revisions to the Phase I new facility rule in response to the *Riverkeeper I* decision. On June 11 and 12, 2012, EPA published a pair of Notices of Data Availability (NODAs); the first regarding information on impingement mortality controls and the second regarding information on EPA's stated preference survey. Between the three notices, EPA received more than 63,000 comments under Docket ID EPA-HQ-OW-2008-0667.

EPA parsed comment letters into discrete sections according to the subject matter addressed in the given section of the letter (i.e., a comment letter may be broken into as many parts as there are issues raised). EPA then developed responses to each of these comments in the form of broad essays that address all of the comments within a subject matter area.

The final responses to comment document consists of the following:

- **Introductory Chapter:** Familiarizes commenters with the process EPA used to divide comments into similar issues for response and helps commenters learn how to find responses to their comments.
- **Response to Comment Essays:** Provides each of the comment response essays.

This Introductory Chapter describes the following:

A. Methodology EPA used to sort and code public comment letters
B. Locating your comments and EPA's response in the final document
C. Duplicates, attachments, mass mail campaigns, and keyword searches
D. Disclaimer

A. Methodology EPA Used to Sort and Code Public Comment Letters

In responding to public comments, EPA used the following methodology to sort and code comment letters into similar topics for response:

1. Assigned each letter an Author ID based on the number generated by the Federal Docket Management System (FDMS).
2. Reviewed each letter in its entirety, including any attachments.
3. Identified the major subjects addressed in each letter and assigned them to specific issue categories (also known as "comment coding"). For most letters, this results in multiple comments per letter.
4. Drafted a response in each issue category, using an essay format to address all comments within an issue category simultaneously.

B. Locating Your Comments and EPA's Response in the Final Document

All comments on the proposed rule and NODAs are available at http://www.regulations.gov/#!docketDetail;D=EPA-HQ-OW-2008-0667. An excerpt from Table 1 below illustrates that the table contains a list of the commenters, their affiliation, and their Document IDs. A full version of Table 1 is included at the end of the Introductory Chapter.

Table 1. Comments on the Proposed Rule and NODAs.

FDMS Document ID	First Name	Last Name	Organization
EPA-HQ-OW-2008-0667-1288	G.	Gries	
EPA-HQ-OW-2008-0667-1296	Mass Comment Campaign		Alliance for the Great Lakes
EPA-HQ-OW-2008-0667-1298	Mass Comment Campaign		Consumer Energy Alliance
EPA-HQ-OW-2008-0667-1299	P.	Warren	
EPA-HQ-OW-2008-0667-1300	F.	Caplan	
EPA-HQ-OW-2008-0667-1304	M.	W. Birch	
EPA-HQ-OW-2008-0667-1305	T.	E. McCloskey	
EPA-HQ-OW-2008-0667-1325	Elizabeth	Aldridge	Utility Water Act Group (UWAG)

The Table of Contents contains a list of the response to comment essays, which are divided into various subject areas. The essays address comments received on both the proposed rule and NODAs. Readers should simply refer to the Table of Contents to identify the subject area of interest and the corresponding essay.

Note that the numbering of the essays may not be sequential; there are gaps in the numbering. This resulted from some essays being combined with one another.

C. Duplicates, Attachments, Mass Mail Campaigns, and Keyword Searches

Duplicates

In rare cases, a comment letter was received more than once. When EPA determined that a comment letter was an exact duplicate of another comment letter, EPA did note code the duplicate letter.

Attachments

Some comment letters also contained attachments, such as biological studies or engineering cost estimates. EPA reviewed all letters for attachments and then reviewed all the attachments. Attachments that contained additional data directly relevant to the proposed rule (or NODAs) were coded using the same process as standard comments. If the attachment was not directly relevant (e.g., a commenter provided a generic newspaper article on the electric generating industry), EPA did note code the attachment. EPA considered all attachments in developing the final rule and responding to comments, but only coded those that were directly relevant.

Mass Mail Campaigns

EPA received comments through approximately 15 mass mail campaigns, totaling over 62,000 comments. EPA only coded those that were posted to www.regulations.gov as unique comment letters. EPA's Water Docket determined whether letters contained the same (or very similar) content as others and posted only those that are unique. For example, if two (or more) commenters submitted identical comments, the first letter received will appear under the name "Mass Comment Campaign" and any subsequent identical (or nearly identical) comments will be catalogued within the same record. Similarly, EPA's response to the "parent" letter applies to all of the form letters within that record. Form letters that provided additional substantive comments were addressed by responding to the unique material in the relevant response essay. This is consistent with EPA's goals in responding to public comments, as all of the letters received under "Mass Comment Campaign" are identical, thereby allowing EPA to respond to the group of letters collectively.

Keyword Searches

This document is in Adobe PDF format. Readers may perform word searches using the Acrobat Reader: use the Search button or SHIFT-CTRL-F.

D. Disclaimer

As a result of late changes made to the preamble and final rule prior to the Administrator's signature, and due to the volume of comments received, some responses in this document may not reflect the language in the preamble and final rule in every respect. Where this is the case, the language in the final preamble and rule controls and should be used for purposes of understanding the scope, requirements, and basis of the final rule.

Table 1. Comments on the Proposed Rule and NODAs

FDMS Document ID	First Name	Middle Name	Last Name	Organization
EPA-HQ-OW-2008-0667-1288	G.		Gries	
EPA-HQ-OW-2008-0667-1296	Mass Comment Campaign			Alliance for the Great Lakes
EPA-HQ-OW-2008-0667-1298	Mass Comment Campaign			Consumer Energy Alliance
EPA-HQ-OW-2008-0667-1299	P.		Warren	
EPA-HQ-OW-2008-0667-1300	F.		Caplan	
EPA-HQ-OW-2008-0667-1301	V.		Heying	
EPA-HQ-OW-2008-0667-1302	K.		Treacy	
EPA-HQ-OW-2008-0667-1303	D.		Bryson	
EPA-HQ-OW-2008-0667-1304	M.	and	W. Birch	
EPA-HQ-OW-2008-0667-1305	T.	and	E. McCloskey	
EPA-HQ-OW-2008-0667-1306	R.		Kane	
EPA-HQ-OW-2008-0667-1307	A.		Klein	
EPA-HQ-OW-2008-0667-1308	G.		French	
EPA-HQ-OW-2008-0667-1309	T.		Bauer	
EPA-HQ-OW-2008-0667-1310	M.		Wexler	
EPA-HQ-OW-2008-0667-1311	M.		Janowiak	
EPA-HQ-OW-2008-0667-1312	J.		Bussen	
EPA-HQ-OW-2008-0667-1313	K.		Megregian	
EPA-HQ-OW-2008-0667-1314	G.		Opem	
EPA-HQ-OW-2008-0667-1315	S.		Hughes	
EPA-HQ-OW-2008-0667-1316	J.		Gorham	
EPA-HQ-OW-2008-0667-1317	A.		Jenks	
EPA-HQ-OW-2008-0667-1318	Anonymous			
EPA-HQ-OW-2008-0667-1319	D.		Shwatal	
EPA-HQ-OW-2008-0667-1320	M.		Brower	
EPA-HQ-OW-2008-0667-1321	F.		Belogorsky	
EPA-HQ-OW-2008-0667-1322	D.		Shankland	
EPA-HQ-OW-2008-0667-1323	G.		Crouse	
EPA-HQ-OW-2008-0667-1324	E.	N.	Van Abel	
EPA-HQ-OW-2008-0667-1325	Elizabeth		Aldridge	Utility Water Act Group (UWAG)
EPA-HQ-OW-2008-0667-1326	E.		May	
EPA-HQ-OW-2008-0667-1327	Anonymous			
EPA-HQ-OW-2008-0667-1328	R.		Steiger	
EPA-HQ-OW-2008-0667-1329	D.		Shumaker	

FDMS Document ID	First Name	Middle Name	Last Name	Organization
EPA-HQ-OW-2008-0667-1330	W.		Brickenstein	
EPA-HQ-OW-2008-0667-1331	W.		Coles	
EPA-HQ-OW-2008-0667-1332	A.		Baratta	
EPA-HQ-OW-2008-0667-1333	H.		Neal	
EPA-HQ-OW-2008-0667-1334	S.		Schueler	
EPA-HQ-OW-2008-0667-1335	L.		Parker	
EPA-HQ-OW-2008-0667-1345	D.		Rousseau	
EPA-HQ-OW-2008-0667-1346	S.		Brower	
EPA-HQ-OW-2008-0667-1347	M.		Trost	
EPA-HQ-OW-2008-0667-1348	A.		Kardoff	
EPA-HQ-OW-2008-0667-1349	C.		Miller	
EPA-HQ-OW-2008-0667-1350	J.		Yount	
EPA-HQ-OW-2008-0667-1351	L.		Bond	
EPA-HQ-OW-2008-0667-1352	E.		McAndrew-Benavides	
EPA-HQ-OW-2008-0667-1353	N.		Lens	
EPA-HQ-OW-2008-0667-1354	M.		Greer	
EPA-HQ-OW-2008-0667-1355	B.		Cummings	
EPA-HQ-OW-2008-0667-1356	M.		Wisenburg	
EPA-HQ-OW-2008-0667-1357	M.		Paul	
EPA-HQ-OW-2008-0667-1362	R.		Termini	
EPA-HQ-OW-2008-0667-1363	M.		Dowd	
EPA-HQ-OW-2008-0667-1372	C.		Pixler	
EPA-HQ-OW-2008-0667-1373	A.		Ohlinger	
EPA-HQ-OW-2008-0667-1374	R.		Blankenship	
EPA-HQ-OW-2008-0667-1375	R.		Daniels	
EPA-HQ-OW-2008-0667-1468	Dr. D.		Hartel	
EPA-HQ-OW-2008-0667-1469	J.		Biss	
EPA-HQ-OW-2008-0667-1470	C.		Albee	
EPA-HQ-OW-2008-0667-1471	Dr. G.		Crouse	
EPA-HQ-OW-2008-0667-1472	S.		Hathaway	
EPA-HQ-OW-2008-0667-1473	H.		Chichester	
EPA-HQ-OW-2008-0667-1474	D.		Rosenberg	
EPA-HQ-OW-2008-0667-1475	J.		Commerford	
EPA-HQ-OW-2008-0667-1476	P.		Tullis	
EPA-HQ-OW-2008-0667-1477	N.		Stevens	
EPA-HQ-OW-2008-0667-1478	E.		Clark	
EPA-HQ-OW-2008-0667-1479	I.		Stover	
EPA-HQ-OW-2008-0667-1480	Dr. L.		Young	
EPA-HQ-OW-2008-0667-1481	V.		Whicker	

FDMS Document ID	First Name	Middle Name	Last Name	Organization
EPA-HQ-OW-2008-0667-1482	T.	E.	Robinson	
EPA-HQ-OW-2008-0667-1483	S.		Anderson	
EPA-HQ-OW-2008-0667-1484	B.		Anderson	
EPA-HQ-OW-2008-0667-1485	D.		Gordillo	
EPA-HQ-OW-2008-0667-1486	Dr. K. L.	and	J. Modesitt	
EPA-HQ-OW-2008-0667-1487	P.		Hanson	
EPA-HQ-OW-2008-0667-1488	A.		Carissimi	
EPA-HQ-OW-2008-0667-1489	T.		Piazzon	
EPA-HQ-OW-2008-0667-1490	M.		Roam	
EPA-HQ-OW-2008-0667-1491	L.		Grimes	
EPA-HQ-OW-2008-0667-1492	D.		Ellis	
EPA-HQ-OW-2008-0667-1493	D.		Shanklin	
EPA-HQ-OW-2008-0667-1494	L.		Kelly	
EPA-HQ-OW-2008-0667-1495	K.		Norton	
EPA-HQ-OW-2008-0667-1496	C.		Cox	
EPA-HQ-OW-2008-0667-1497	S.		Alex	
EPA-HQ-OW-2008-0667-1498	S.	and	J. Biller	
EPA-HQ-OW-2008-0667-1499	G.		Meindl	
EPA-HQ-OW-2008-0667-1500	M.		Mehlman	
EPA-HQ-OW-2008-0667-1501	E.		Purcell	
EPA-HQ-OW-2008-0667-1502	V.		Pilkington	
EPA-HQ-OW-2008-0667-1503	A.		Kelm	
EPA-HQ-OW-2008-0667-1504	S.		Brodhead	
EPA-HQ-OW-2008-0667-1505	E.		Perchonock	
EPA-HQ-OW-2008-0667-1506	J.		Sanborn	
EPA-HQ-OW-2008-0667-1507	G.		Garrison	
EPA-HQ-OW-2008-0667-1508	I.		Botvin	
EPA-HQ-OW-2008-0667-1509	S.		O-Ishi	
EPA-HQ-OW-2008-0667-1510	M.		Link	
EPA-HQ-OW-2008-0667-1511	D.		Flores	
EPA-HQ-OW-2008-0667-1512	M.		Well	
EPA-HQ-OW-2008-0667-1513	Rayburn	L.	Butts	NextEra Energy Inc.
EPA-HQ-OW-2008-0667-1514	C.		Burke	
EPA-HQ-OW-2008-0667-1515	D.		Mahle	
EPA-HQ-OW-2008-0667-1516	A.		Thornton	
EPA-HQ-OW-2008-0667-1517	J.	S.	Dandoval	
EPA-HQ-OW-2008-0667-1518	M.		Stemp	
EPA-HQ-OW-2008-0667-1519	D.		Parker	
EPA-HQ-OW-2008-0667-1520	L.		Champagne	

FDMS Document ID	First Name	Middle Name	Last Name	Organization
EPA-HQ-OW-2008-0667-1521	A.		Osmond	
EPA-HQ-OW-2008-0667-1522	R.		McIntire	
EPA-HQ-OW-2008-0667-1523	M.		Linvill	
EPA-HQ-OW-2008-0667-1524	S.		Mehrotra	
EPA-HQ-OW-2008-0667-1525	P.		Thomas	
EPA-HQ-OW-2008-0667-1526	P.		Sladek	
EPA-HQ-OW-2008-0667-1527	M.		Young	
EPA-HQ-OW-2008-0667-1528	A.		Cortese	
EPA-HQ-OW-2008-0667-1529	Maria		Valdez	The Dow Chemical Company
EPA-HQ-OW-2008-0667-1530	Mass Comment Campaign			Natural Resources Defense Council (NRDC)
EPA-HQ-OW-2008-0667-1531	D.		Johnson	
EPA-HQ-OW-2008-0667-1532	M.		Bartleman	
EPA-HQ-OW-2008-0667-1533	A.		Desai	
EPA-HQ-OW-2008-0667-1534	J.		Weller	
EPA-HQ-OW-2008-0667-1535	D.		Smith	
EPA-HQ-OW-2008-0667-1536	J.		Steitz	
EPA-HQ-OW-2008-0667-1537	J.		Scott	
EPA-HQ-OW-2008-0667-1538	M.		Hills	
EPA-HQ-OW-2008-0667-1539	P.		La Point	
EPA-HQ-OW-2008-0667-1540	P.		Johnston	
EPA-HQ-OW-2008-0667-1541	S.		Futrell	
EPA-HQ-OW-2008-0667-1542	B.		Flowers	
EPA-HQ-OW-2008-0667-1546	Dana		Wright	Tennessee Clean Water Network (TCWN)
EPA-HQ-OW-2008-0667-1547	Al Carlson	and	Tom Holbrook	National Conference of State Legislatures (NCSL)
EPA-HQ-OW-2008-0667-1548	J.		Capozzelli	
EPA-HQ-OW-2008-0667-1549	Al Carlson	and	Tom Holbrook	National Conference of State Legislatures (NCSL)
EPA-HQ-OW-2008-0667-1550	Mass Comment Campaign			Environmental Law and Policy Center
EPA-HQ-OW-2008-0667-1551	Mass Comment Campaign			Sierra Club
EPA-HQ-OW-2008-0667-1552	J.		Sorrells	
EPA-HQ-OW-2008-0667-1553	M.		Huff	
EPA-HQ-OW-2008-0667-1554	L.		Barrett	
EPA-HQ-OW-2008-0667-1555	C.		Piper	
EPA-HQ-OW-2008-0667-1556	D.		Robertson	
EPA-HQ-OW-2008-0667-1557	E.	B.	Robbins	
EPA-HQ-OW-2008-0667-1558	R.		Penney	
EPA-HQ-OW-2008-0667-1559	R.		Baker	

FDMS Document ID	First Name	Middle Name	Last Name	Organization
EPA-HQ-OW-2008-0667-1560	K.		Rowlett	
EPA-HQ-OW-2008-0667-1561	T.		Kruskie	
EPA-HQ-OW-2008-0667-1562	Dr. J.		Livingston	
EPA-HQ-OW-2008-0667-1563	Ed	and	S. Harney	
EPA-HQ-OW-2008-0667-1564	C.		Carter	
EPA-HQ-OW-2008-0667-1565	C.		Mies	
EPA-HQ-OW-2008-0667-1566	J.		Robinson	
EPA-HQ-OW-2008-0667-1567	A.		Murre	
EPA-HQ-OW-2008-0667-1568	J.		Rooks	
EPA-HQ-OW-2008-0667-1569	N.		Husnani	
EPA-HQ-OW-2008-0667-1570	B.		Wagman	
EPA-HQ-OW-2008-0667-1571	B.		Katakis	
EPA-HQ-OW-2008-0667-1572	E.		Lofftus	
EPA-HQ-OW-2008-0667-1573	K.		Davis	
EPA-HQ-OW-2008-0667-1574	C.		Jacob	
EPA-HQ-OW-2008-0667-1575	L.		Calleja	
EPA-HQ-OW-2008-0667-1576	M.		(no last name provided)	
EPA-HQ-OW-2008-0667-1577	D.	R.	Nelson	
EPA-HQ-OW-2008-0667-1578	R.		Kerrill	
EPA-HQ-OW-2008-0667-1579	B.		Eaton	
EPA-HQ-OW-2008-0667-1580	G.		Neumann	
EPA-HQ-OW-2008-0667-1581	M.		Menzel	
EPA-HQ-OW-2008-0667-1582	C.		May	
EPA-HQ-OW-2008-0667-1583	K.		Massanari	
EPA-HQ-OW-2008-0667-1584	R.		Heiser	
EPA-HQ-OW-2008-0667-1585	D.		Duda	
EPA-HQ-OW-2008-0667-1586	L.		Stevens	
EPA-HQ-OW-2008-0667-1587	N.		Dean	
EPA-HQ-OW-2008-0667-1588	N.		Bilheimer	
EPA-HQ-OW-2008-0667-1589	J.		Sorrells	
EPA-HQ-OW-2008-0667-1590	S.		Harris	
EPA-HQ-OW-2008-0667-1591	B.		Prewitt	
EPA-HQ-OW-2008-0667-1592	D.		Cohn	
EPA-HQ-OW-2008-0667-1593	Matthew		Bell	Regional Chamber of Northeast Indiana
EPA-HQ-OW-2008-0667-1594	Anonymous			
EPA-HQ-OW-2008-0667-1595	Scott		Manley	Wisconsin Manufacturers & Commerce (WMC)
EPA-HQ-OW-2008-0667-1596	Roger	E.	Nott	Georgia Canoeing Association, Inc.
EPA-HQ-OW-2008-0667-1597	N.		Wilson	

FDMS Document ID	First Name	Middle Name	Last Name	Organization
EPA-HQ-OW-2008-0667-1598	Donald	R.	Carlson	Kansas Department of Health and Environment (KDHE)
EPA-HQ-OW-2008-0667-1599	Alex		Levinson	Pacific Environment
EPA-HQ-OW-2008-0667-1600	M.		Aggar	
EPA-HQ-OW-2008-0667-1601	D.	K.	Oberlin Jr.	
EPA-HQ-OW-2008-0667-1602	K.		Fisher	
EPA-HQ-OW-2008-0667-1603	State Rep. Paul		Stam, et al.	North Carolina State House of Representatives
EPA-HQ-OW-2008-0667-1604	State Sen. Amy		Koch	Minnesota State Senate, District 19
EPA-HQ-OW-2008-0667-1605	W.		Hardman	
EPA-HQ-OW-2008-0667-1606	M.		Reback	
EPA-HQ-OW-2008-0667-1607	K.		Jackson	
EPA-HQ-OW-2008-0667-1608	J.		Conway	
EPA-HQ-OW-2008-0667-1609	L.		Langston	
EPA-HQ-OW-2008-0667-1610	L.		Perenne	
EPA-HQ-OW-2008-0667-1612	D.		Hibbs	
EPA-HQ-OW-2008-0667-1613	J.		Morris	
EPA-HQ-OW-2008-0667-1614	M.		Schindler-Ehrens	
EPA-HQ-OW-2008-0667-1615	S.		Pardo	
EPA-HQ-OW-2008-0667-1616	J.		Olson	
EPA-HQ-OW-2008-0667-1617	B.		Dixon-Smith	
EPA-HQ-OW-2008-0667-1618	A.		Howe	
EPA-HQ-OW-2008-0667-1619	E.		Daniel	
EPA-HQ-OW-2008-0667-1620	F.		Mead	
EPA-HQ-OW-2008-0667-1621	K.		Walker	
EPA-HQ-OW-2008-0667-1622	M.		Hower	
EPA-HQ-OW-2008-0667-1623	D.		Filipelli	
EPA-HQ-OW-2008-0667-1624	N.		Black	
EPA-HQ-OW-2008-0667-1625	S.		Chait	
EPA-HQ-OW-2008-0667-1626	T.		Sheffield	
EPA-HQ-OW-2008-0667-1627	P.		Lipari	
EPA-HQ-OW-2008-0667-1628	J.		Owen	
EPA-HQ-OW-2008-0667-1630	Anonymous			
EPA-HQ-OW-2008-0667-1631	Jeff		Udd	Minnesota Pollution Control Agency (MPCA)
EPA-HQ-OW-2008-0667-1632	Susan	R.	Nanney	Passaic River Coalition
EPA-HQ-OW-2008-0667-1633	M.		Allard	
EPA-HQ-OW-2008-0667-1634	D.		Goodman	
EPA-HQ-OW-2008-0667-1635	C.		Kutcher	
EPA-HQ-OW-2008-0667-1636	K.		Robinett	
EPA-HQ-OW-2008-0667-1637	State Rep. John	D.	Ragan	Tennessee State House of Representatives

FDMS Document ID	First Name	Middle Name	Last Name	Organization
EPA-HQ-OW-2008-0667-1638	Thomas	W.	Easterly	Indiana Department of Environmental Management (IDEM)
EPA-HQ-OW-2008-0667-1639	R.		Benson	
EPA-HQ-OW-2008-0667-1640	Blake		Jeffery	Indiana Cast Metals Association (INCMA)
EPA-HQ-OW-2008-0667-1641	Blake		Jeffery	Indiana Cast Metals Association (INCMA)
EPA-HQ-OW-2008-0667-1642	Fred		Abousleman	National Association of Regional Councils (NARC)
EPA-HQ-OW-2008-0667-1643	Robert	A.	Rio	Associated Industries of Massachusetts (AIM)
EPA-HQ-OW-2008-0667-1644	Barry	E.	Lamb	Friends of the Bay
EPA-HQ-OW-2008-0667-1645	Joaquin	C.	Flores	Guam Power Authority (GPA)
EPA-HQ-OW-2008-0667-1646	James	D.	Atterholt, et al.	Indiana Utility Regulatory Commission (IURC)
EPA-HQ-OW-2008-0667-1647	State Sen. Philip	E.	Berger, et al.	North Carolina State Senate
EPA-HQ-OW-2008-0667-1648	W.		Brickenstein	
EPA-HQ-OW-2008-0667-1649	S.		Black	
EPA-HQ-OW-2008-0667-1650	S.		Larson	
EPA-HQ-OW-2008-0667-1651	J.	R.	Bracken	
EPA-HQ-OW-2008-0667-1652	K.		Venditti	
EPA-HQ-OW-2008-0667-1653	S.		Wolf	
EPA-HQ-OW-2008-0667-1654	W.		Aldrich	
EPA-HQ-OW-2008-0667-1655	L.		Anderson	
EPA-HQ-OW-2008-0667-1656	M.		Yeager	
EPA-HQ-OW-2008-0667-1657	H.		Manzella	
EPA-HQ-OW-2008-0667-1658	E.	L.	Springer, Jr.	
EPA-HQ-OW-2008-0667-1659	K.		Rowlett	
EPA-HQ-OW-2008-0667-1660	T.		Row	
EPA-HQ-OW-2008-0667-1661	Dr. W.	H.	Hannum	
EPA-HQ-OW-2008-0667-1662	R.		Termini	
EPA-HQ-OW-2008-0667-1663	M.		Angwin	
EPA-HQ-OW-2008-0667-1664	M.		Hulet	
EPA-HQ-OW-2008-0667-1665	P.		Sicard	
EPA-HQ-OW-2008-0667-1666	R.		Hodge	
EPA-HQ-OW-2008-0667-1667	C.		Sekaer	
EPA-HQ-OW-2008-0667-1668	B.		Flowers	
EPA-HQ-OW-2008-0667-1669	F.		Brice	
EPA-HQ-OW-2008-0667-1670	J.		Vickerman	
EPA-HQ-OW-2008-0667-1671	M.		Paul	
EPA-HQ-OW-2008-0667-1672	State Sen. Paul	G.	Campbell, Jr.	South Carolina State Senate
EPA-HQ-OW-2008-0667-1673	N.	J.	Scanlon	
EPA-HQ-OW-2008-0667-1674	J.		Capozzelli	
EPA-HQ-OW-2008-0667-1675	H.		Thompsom	

FDMS Document ID	First Name	Middle Name	Last Name	Organization
EPA-HQ-OW-2008-0667-1676	J.		Sorrells	
EPA-HQ-OW-2008-0667-1677	F.		Stowell	
EPA-HQ-OW-2008-0667-1678	S.		Slawek	
EPA-HQ-OW-2008-0667-1679	J.		Dunkelberg	
EPA-HQ-OW-2008-0667-1680	G.		Burton	
EPA-HQ-OW-2008-0667-1681	J.		Fox	
EPA-HQ-OW-2008-0667-1682	L.		Bowdery	
EPA-HQ-OW-2008-0667-1683	T.		Volz-Bongar	
EPA-HQ-OW-2008-0667-1684	J.		Kellner	
EPA-HQ-OW-2008-0667-1685	T.		Smith	
EPA-HQ-OW-2008-0667-1686	M.		Magee	
EPA-HQ-OW-2008-0667-1687	S.		Prussman	
EPA-HQ-OW-2008-0667-1688	M.		Morey	
EPA-HQ-OW-2008-0667-1689	Rick		Wajda	Indiana Builders Association (IBA)
EPA-HQ-OW-2008-0667-1690	J.		Conlon	
EPA-HQ-OW-2008-0667-1691	Jon	H.	Harner	Donald C. Cook Nuclear Plant (Indiana Michigan Power Co.)
EPA-HQ-OW-2008-0667-1692	C.		Bergesen	
EPA-HQ-OW-2008-0667-1693	Anonymous			
EPA-HQ-OW-2008-0667-1694	J.	and	W. MacDonald	
EPA-HQ-OW-2008-0667-1695	G.		Spencer	
EPA-HQ-OW-2008-0667-1696	D.		Halbe	
EPA-HQ-OW-2008-0667-1697	H.		Hanna	
EPA-HQ-OW-2008-0667-1698	C.		Sims	
EPA-HQ-OW-2008-0667-1699	P.		Childs	
EPA-HQ-OW-2008-0667-1700	S.		Shaw	
EPA-HQ-OW-2008-0667-1701	State Sen. Brian		Schoenjahn	Iowa State Senate, District 12
EPA-HQ-OW-2008-0667-1702	State Rep. Gene		Pelowski, Jr.	Minnesota State House of Representatives, District 31A
EPA-HQ-OW-2008-0667-1703	Barry		Gullet	Catawba-Wateree Water Management Group
EPA-HQ-OW-2008-0667-1704	J.		Reynolds	
EPA-HQ-OW-2008-0667-1705	R.		Juras	
EPA-HQ-OW-2008-0667-1706	R.		Warren	
EPA-HQ-OW-2008-0667-1707	L.		Young	
EPA-HQ-OW-2008-0667-1708	J.		Wagner	
EPA-HQ-OW-2008-0667-1709	D.		Holland	
EPA-HQ-OW-2008-0667-1710	P.		Lawrence	
EPA-HQ-OW-2008-0667-1711	R.		Heron	
EPA-HQ-OW-2008-0667-1712	P.		Sladek	
EPA-HQ-OW-2008-0667-1713	P.		Bourgeois	

FDMS Document ID	First Name	Middle Name	Last Name	Organization
EPA-HQ-OW-2008-0667-1714	B.		Baker	
EPA-HQ-OW-2008-0667-1715	E.		Elder	
EPA-HQ-OW-2008-0667-1716	C.		Owen	
EPA-HQ-OW-2008-0667-1717	J.		Maisel	
EPA-HQ-OW-2008-0667-1718	J.		Bleyer	
EPA-HQ-OW-2008-0667-1719	A.		Mondragon	
EPA-HQ-OW-2008-0667-1720	F.		Taylor	
EPA-HQ-OW-2008-0667-1721	R.		Airborne	
EPA-HQ-OW-2008-0667-1722	B.		Flowers	
EPA-HQ-OW-2008-0667-1723	N.		Poore	
EPA-HQ-OW-2008-0667-1724	E.		Crow	
EPA-HQ-OW-2008-0667-1725	D.		Pino	
EPA-HQ-OW-2008-0667-1726	E.		Craig	
EPA-HQ-OW-2008-0667-1727	D.		Borton	
EPA-HQ-OW-2008-0667-1728	T.		Gillespie	
EPA-HQ-OW-2008-0667-1729	S.		Lannin	
EPA-HQ-OW-2008-0667-1730	W.		Brown	
EPA-HQ-OW-2008-0667-1731	M.		Colyar	
EPA-HQ-OW-2008-0667-1732	B.		Winholtz	
EPA-HQ-OW-2008-0667-1733	P.		Baum	
EPA-HQ-OW-2008-0667-1734	T.		Selle	
EPA-HQ-OW-2008-0667-1735	J.		Valek	
EPA-HQ-OW-2008-0667-1736	V.		Keramaty	
EPA-HQ-OW-2008-0667-1737	V.		Keramaty	
EPA-HQ-OW-2008-0667-1738	J.		Nappe	
EPA-HQ-OW-2008-0667-1739	M.		Sawyer	
EPA-HQ-OW-2008-0667-1740	M.		Wood	
EPA-HQ-OW-2008-0667-1741	H.		Pierson	
EPA-HQ-OW-2008-0667-1742	B.		O'Brien	
EPA-HQ-OW-2008-0667-1743	M.		Leonardi	
EPA-HQ-OW-2008-0667-1744	R.		Tice	
EPA-HQ-OW-2008-0667-1745	J.		Kieffer	
EPA-HQ-OW-2008-0667-1746	R.		Chong	
EPA-HQ-OW-2008-0667-1747	L.		Conklin	
EPA-HQ-OW-2008-0667-1748	M.		Cronin	
EPA-HQ-OW-2008-0667-1749	D.		Fulton	
EPA-HQ-OW-2008-0667-1750	C.		Nelson	
EPA-HQ-OW-2008-0667-1751	P.		Blochowiak	
EPA-HQ-OW-2008-0667-1752	T.	and	E. Kane	

FDMS Document ID	First Name	Middle Name	Last Name	Organization
EPA-HQ-OW-2008-0667-1753	T.		Brainerd	
EPA-HQ-OW-2008-0667-1754	K.		Tibbits	
EPA-HQ-OW-2008-0667-1755	C.		Jackson	
EPA-HQ-OW-2008-0667-1756	A.		Bowen	
EPA-HQ-OW-2008-0667-1757	P.		Shaw	
EPA-HQ-OW-2008-0667-1758	M.	M.	Switlik	
EPA-HQ-OW-2008-0667-1759	R.		Owen	
EPA-HQ-OW-2008-0667-1760	T.		Dessenberger	
EPA-HQ-OW-2008-0667-1761	P.		Lowe	
EPA-HQ-OW-2008-0667-1762	Bernadette		McNulty	
EPA-HQ-OW-2008-0667-1763	J.		Reinert	
EPA-HQ-OW-2008-0667-1764	P.		Trivelas	
EPA-HQ-OW-2008-0667-1765	J.		Wisboro	
EPA-HQ-OW-2008-0667-1766	L.		Winslow	
EPA-HQ-OW-2008-0667-1767	Gary		S.	
EPA-HQ-OW-2008-0667-1768	T.		Crockett	
EPA-HQ-OW-2008-0667-1769	C.		Hubbe	
EPA-HQ-OW-2008-0667-1770	N.		Tichi	
EPA-HQ-OW-2008-0667-1771	M.		Iorio	
EPA-HQ-OW-2008-0667-1772	J.		Knapp	
EPA-HQ-OW-2008-0667-1773	M.		Cittadino	
EPA-HQ-OW-2008-0667-1774	V.		Nguyen	
EPA-HQ-OW-2008-0667-1775	L.		Gieser	
EPA-HQ-OW-2008-0667-1776	C.		Ehrhardt	
EPA-HQ-OW-2008-0667-1777	C.		Roth	
EPA-HQ-OW-2008-0667-1778	V.		Calenda	
EPA-HQ-OW-2008-0667-1779	W.		Davis	
EPA-HQ-OW-2008-0667-1780	F.		Jakobcic	
EPA-HQ-OW-2008-0667-1781	J.		Cooke	
EPA-HQ-OW-2008-0667-1782	E.		Ungar	
EPA-HQ-OW-2008-0667-1783	L.	and	G. Cook	
EPA-HQ-OW-2008-0667-1784	A.		Manganelli	
EPA-HQ-OW-2008-0667-1785	G.		Lee	
EPA-HQ-OW-2008-0667-1786	K.		Merwin	
EPA-HQ-OW-2008-0667-1787	S.		Hathaway	
EPA-HQ-OW-2008-0667-1788	P.		Riggle	
EPA-HQ-OW-2008-0667-1789	M.	H.	Stokes	
EPA-HQ-OW-2008-0667-1790	R.		Stambaugh	
EPA-HQ-OW-2008-0667-1791	J.		Cunningham	

FDMS Document ID	First Name	Middle Name	Last Name	Organization
EPA-HQ-OW-2008-0667-1792	E.		Callenbach	
EPA-HQ-OW-2008-0667-1793	J.		Millikin	
EPA-HQ-OW-2008-0667-1794	M.		Pezzati	
EPA-HQ-OW-2008-0667-1795	E.		Schlaikjer	
EPA-HQ-OW-2008-0667-1796	J.		Chase	
EPA-HQ-OW-2008-0667-1797	G.		Hopkins	
EPA-HQ-OW-2008-0667-1798	A.		Heugel	
EPA-HQ-OW-2008-0667-1799	E.		Leviseur	
EPA-HQ-OW-2008-0667-1800	L.		Zeis	
EPA-HQ-OW-2008-0667-1801	N.		Reed	
EPA-HQ-OW-2008-0667-1802	B.		Hall	
EPA-HQ-OW-2008-0667-1803	C.		Willett	
EPA-HQ-OW-2008-0667-1804	L.		Carpenter	
EPA-HQ-OW-2008-0667-1805	L.		Wally	
EPA-HQ-OW-2008-0667-1806	K.		Young	
EPA-HQ-OW-2008-0667-1807	D.		Luck	
EPA-HQ-OW-2008-0667-1808	K.		Crane	
EPA-HQ-OW-2008-0667-1809	M.		Cleveland-Ryan	
EPA-HQ-OW-2008-0667-1810	D.		Cleveland-Ryan	
EPA-HQ-OW-2008-0667-1811	L.		Weinberg	
EPA-HQ-OW-2008-0667-1812	T.		MacKenzie	
EPA-HQ-OW-2008-0667-1813	M.	W.	Hutson	
EPA-HQ-OW-2008-0667-1814	V.		Azpuru	
EPA-HQ-OW-2008-0667-1815	S.		Kuticka	
EPA-HQ-OW-2008-0667-1816	Dr. C.		Blaisdell	
EPA-HQ-OW-2008-0667-1817	S.		Calender	
EPA-HQ-OW-2008-0667-1818	K.		Greenwald	
EPA-HQ-OW-2008-0667-1819	L.		Kostalik	
EPA-HQ-OW-2008-0667-1820	J.		Shields	
EPA-HQ-OW-2008-0667-1821	B.	De	Castro	
EPA-HQ-OW-2008-0667-1822	K.	A.	Irwin	
EPA-HQ-OW-2008-0667-1823	C.	W.	Gloger	
EPA-HQ-OW-2008-0667-1824	A.		Murphy	
EPA-HQ-OW-2008-0667-1825	M.		Swiger	
EPA-HQ-OW-2008-0667-1826	P.		Hopkins	
EPA-HQ-OW-2008-0667-1827	J.		Steitz	
EPA-HQ-OW-2008-0667-1828	L.		Lambeth	
EPA-HQ-OW-2008-0667-1829	T.	and	Y. Wootten	
EPA-HQ-OW-2008-0667-1830	T.	and	J. Greenwald	

FDMS Document ID	First Name	Middle Name	Last Name	Organization
EPA-HQ-OW-2008-0667-1831	P.		Matejcek	
EPA-HQ-OW-2008-0667-1832	J.	R.	Herron	
EPA-HQ-OW-2008-0667-1833	S.		Lilley	
EPA-HQ-OW-2008-0667-1834	D.		Phillips	
EPA-HQ-OW-2008-0667-1835	Dr. M.		Carlson	
EPA-HQ-OW-2008-0667-1836	M.		Leven	
EPA-HQ-OW-2008-0667-1837	P.		Check	
EPA-HQ-OW-2008-0667-1838	S.		Stevens	
EPA-HQ-OW-2008-0667-1839	C.	A.	Russell	
EPA-HQ-OW-2008-0667-1840	J.		Wanshel	
EPA-HQ-OW-2008-0667-1841	J.		Giambrone	
EPA-HQ-OW-2008-0667-1842	M.		Spilkowitz	
EPA-HQ-OW-2008-0667-1843	R.		Gentry	
EPA-HQ-OW-2008-0667-1844	J.		MacLean	
EPA-HQ-OW-2008-0667-1845	P.		Moctezuma	
EPA-HQ-OW-2008-0667-1846	M.		Halligan	
EPA-HQ-OW-2008-0667-1847	Anonymous			
EPA-HQ-OW-2008-0667-1848	M.		Culley	
EPA-HQ-OW-2008-0667-1849	C.		Schosser	
EPA-HQ-OW-2008-0667-1850	E.		Pimentel	
EPA-HQ-OW-2008-0667-1851	G.		Camhi	
EPA-HQ-OW-2008-0667-1852	W.		Southworth	
EPA-HQ-OW-2008-0667-1853	R.		Kofler	
EPA-HQ-OW-2008-0667-1854	D.		Graham	
EPA-HQ-OW-2008-0667-1855	M.		Finklea	
EPA-HQ-OW-2008-0667-1856	F.		Wade	
EPA-HQ-OW-2008-0667-1857	J.		Robbins	
EPA-HQ-OW-2008-0667-1858	E.		Sopoci	
EPA-HQ-OW-2008-0667-1859	H.		Whitson	
EPA-HQ-OW-2008-0667-1860	M.		Ajoie-Sanedroff	
EPA-HQ-OW-2008-0667-1861	D.		Campbell	
EPA-HQ-OW-2008-0667-1862	M.		Wood	
EPA-HQ-OW-2008-0667-1863	D.		Waldron	
EPA-HQ-OW-2008-0667-1864	S.		Ellis	
EPA-HQ-OW-2008-0667-1865	M.		Michaelis	
EPA-HQ-OW-2008-0667-1866	L.		Epstein	
EPA-HQ-OW-2008-0667-1867	P.		Burks	
EPA-HQ-OW-2008-0667-1868	A.		Dorsch	
EPA-HQ-OW-2008-0667-1869	B.		Renton	

FDMS Document ID	First Name	Middle Name	Last Name	Organization
EPA-HQ-OW-2008-0667-1870	A.		Jenkins	
EPA-HQ-OW-2008-0667-1871	M.		Bailey	
EPA-HQ-OW-2008-0667-1872	D.	R.	Nelson	
EPA-HQ-OW-2008-0667-1873	D.		Mitchell	
EPA-HQ-OW-2008-0667-1874	C.		Daly	
EPA-HQ-OW-2008-0667-1875	R.		Nydes	
EPA-HQ-OW-2008-0667-1876	M.		Hiatt	
EPA-HQ-OW-2008-0667-1877	M.		Johnson	
EPA-HQ-OW-2008-0667-1878	D.		Greene	
EPA-HQ-OW-2008-0667-1879	R.		DeLeo	
EPA-HQ-OW-2008-0667-1880	L.		Wilder	
EPA-HQ-OW-2008-0667-1881	G.		Crouse	
EPA-HQ-OW-2008-0667-1882	D.	and	S. Pettus	
EPA-HQ-OW-2008-0667-1883	C.		Buck	
EPA-HQ-OW-2008-0667-1884	E.		Fraser	
EPA-HQ-OW-2008-0667-1885	T.		Conroy	
EPA-HQ-OW-2008-0667-1886	A.		Lum	
EPA-HQ-OW-2008-0667-1887	M.		Rudinow	
EPA-HQ-OW-2008-0667-1888	T.		Brainerd	
EPA-HQ-OW-2008-0667-1889	A.		Genna	
EPA-HQ-OW-2008-0667-1890	J.		Ross	
EPA-HQ-OW-2008-0667-1891	C.	A.	Berg	
EPA-HQ-OW-2008-0667-1892	M.		Gallelli	
EPA-HQ-OW-2008-0667-1893	C.	D.	Cutshaw	
EPA-HQ-OW-2008-0667-1894	S.		Kuster	
EPA-HQ-OW-2008-0667-1895	L.		Corcoran	
EPA-HQ-OW-2008-0667-1896	N.		Vesel	
EPA-HQ-OW-2008-0667-1897	L.		Jaffee	
EPA-HQ-OW-2008-0667-1898	J.		Maron-Friend	
EPA-HQ-OW-2008-0667-1899	R.		Siegfried	
EPA-HQ-OW-2008-0667-1900	M.		Oka	
EPA-HQ-OW-2008-0667-1901	R.		Robinson	
EPA-HQ-OW-2008-0667-1902	C.		Bobertz	
EPA-HQ-OW-2008-0667-1903	B.		Taylor	
EPA-HQ-OW-2008-0667-1904	Anonymous			
EPA-HQ-OW-2008-0667-1905	M.		Moody	
EPA-HQ-OW-2008-0667-1906	J.		De Hawkhurst	
EPA-HQ-OW-2008-0667-1907	L.		Torrence	
EPA-HQ-OW-2008-0667-1908	M.		Sandel	

FDMS Document ID	First Name	Middle Name	Last Name	Organization
EPA-HQ-OW-2008-0667-1909	Michael	James	Long	
EPA-HQ-OW-2008-0667-1910	T.		Maresco	
EPA-HQ-OW-2008-0667-1911	S.		Uribe	
EPA-HQ-OW-2008-0667-1912	C.		Carey	
EPA-HQ-OW-2008-0667-1913	T.		Warmbrand	
EPA-HQ-OW-2008-0667-1914	R.	R.	Holt	
EPA-HQ-OW-2008-0667-1915	J.		Fletcher	
EPA-HQ-OW-2008-0667-1916	M.		Strawn	
EPA-HQ-OW-2008-0667-1917	M.		Ditlove	
EPA-HQ-OW-2008-0667-1918	R.		Leech	
EPA-HQ-OW-2008-0667-1919	P.		Sweeny	
EPA-HQ-OW-2008-0667-1920	J.		Colgan-Davis	
EPA-HQ-OW-2008-0667-1921	A.		Mcneese	
EPA-HQ-OW-2008-0667-1922	R.		Hosek	
EPA-HQ-OW-2008-0667-1923	S.		Cardwell	
EPA-HQ-OW-2008-0667-1924	M.		Bristow	
EPA-HQ-OW-2008-0667-1925	M.	and	A. Roberts	
EPA-HQ-OW-2008-0667-1926	G.		Collins	
EPA-HQ-OW-2008-0667-1927	S.		Stoudemire	
EPA-HQ-OW-2008-0667-1928	R.		Thornhill	
EPA-HQ-OW-2008-0667-1929	J.		Nappe	
EPA-HQ-OW-2008-0667-1930	C.		Sample	
EPA-HQ-OW-2008-0667-1931	L.		Bodiford	
EPA-HQ-OW-2008-0667-1932	D.		Solomon	
EPA-HQ-OW-2008-0667-1933	P.		Marriott	
EPA-HQ-OW-2008-0667-1934	J.		Delgado	
EPA-HQ-OW-2008-0667-1935	M.		McBride	
EPA-HQ-OW-2008-0667-1936	G.		Dev	
EPA-HQ-OW-2008-0667-1937	D.		Filipelli	
EPA-HQ-OW-2008-0667-1938	J.		Jensen	
EPA-HQ-OW-2008-0667-1939	D.		Douglas	
EPA-HQ-OW-2008-0667-1940	A.		Orange	
EPA-HQ-OW-2008-0667-1941	L.		Burns	
EPA-HQ-OW-2008-0667-1942	G.		Melzer	
EPA-HQ-OW-2008-0667-1943	R.		Huelsman	
EPA-HQ-OW-2008-0667-1944	C.		Dutka	
EPA-HQ-OW-2008-0667-1945	P.		Rorvik	
EPA-HQ-OW-2008-0667-1946	G.		Alderette	
EPA-HQ-OW-2008-0667-1947	T.		Kardos	

FDMS Document ID	First Name	Middle Name	Last Name	Organization
EPA-HQ-OW-2008-0667-1948	D.		Mullen	
EPA-HQ-OW-2008-0667-1949	P.		Chang	
EPA-HQ-OW-2008-0667-1950	L.		Isbell	
EPA-HQ-OW-2008-0667-1951	J.		Sorrells	
EPA-HQ-OW-2008-0667-1952	E.		Balgemann	
EPA-HQ-OW-2008-0667-1953	S.		Anderson	
EPA-HQ-OW-2008-0667-1954	L.		Guthrie	
EPA-HQ-OW-2008-0667-1955	G.		Sindelar	
EPA-HQ-OW-2008-0667-1956	M.	A.	Strom	
EPA-HQ-OW-2008-0667-1957	G.		Ayres	
EPA-HQ-OW-2008-0667-1958	A.		Collins	
EPA-HQ-OW-2008-0667-1959	E.		Lann-Clark	
EPA-HQ-OW-2008-0667-1960	Anitra	J.	Collins	Kapstone Paper Corporation
EPA-HQ-OW-2008-0667-1961	State Sen. Kathleen		Vinehout	Wisconsin State Senate, 31st District
EPA-HQ-OW-2008-0667-1962	Ernie		Aschenbach	Virginia Department of Game and Inland Fisheries (VA DGIF)
EPA-HQ-OW-2008-0667-1963	State Rep. Chris		Danou	Wisconsin State Assembly, 91st District
EPA-HQ-OW-2008-0667-1964	Debi Durham	and	Roger Lande	Iowa Partnership for Economic Progress/Iowa Department of Natural Resources (IA DNR)
EPA-HQ-OW-2008-0667-1965	Kevin	M.	Brinegar	Indiana Chamber of Commerce
EPA-HQ-OW-2008-0667-1966	Bill		Cunningham	Unions for Jobs and the Environment (UJAE)
EPA-HQ-OW-2008-0667-1967	State Sen. Dale	W.	Schultz	Wisconsin State Senate, District 17
EPA-HQ-OW-2008-0667-1968	D. Holtz-Eakin	and	S. Baskins	
EPA-HQ-OW-2008-0667-1969	Andrew		Fahlund	American Rivers
EPA-HQ-OW-2008-0667-1970	Mark	R.	Vickery	Texas Commission on Environmental Quality (TCEQ)
EPA-HQ-OW-2008-0667-1971	A.		Keesing	
EPA-HQ-OW-2008-0667-1972	W.	J.	Schreier	
EPA-HQ-OW-2008-0667-1973	S.		Lim	
EPA-HQ-OW-2008-0667-1974	R.		Downing	
EPA-HQ-OW-2008-0667-1975	R.		Leibowitz	
EPA-HQ-OW-2008-0667-1976	Dr. J.		Weinstein	
EPA-HQ-OW-2008-0667-1977	J.		Townsel	
EPA-HQ-OW-2008-0667-1978	M.		Alexander	
EPA-HQ-OW-2008-0667-1979	A.	I.	Aurelio	
EPA-HQ-OW-2008-0667-1980	P.		Johnson	
EPA-HQ-OW-2008-0667-1981	S.		Krauss	
EPA-HQ-OW-2008-0667-1982	H.	D.	Shumaker	
EPA-HQ-OW-2008-0667-1983	P.		Ide	
EPA-HQ-OW-2008-0667-1984	C.		Birch	

FDMS Document ID	First Name	Middle Name	Last Name	Organization
EPA-HQ-OW-2008-0667-1985	R.		Grover	
EPA-HQ-OW-2008-0667-1986	J.		Kozlowski	
EPA-HQ-OW-2008-0667-1987	J.		Black	
EPA-HQ-OW-2008-0667-1988	K.		Allison	
EPA-HQ-OW-2008-0667-1989	C.		VaJames	
EPA-HQ-OW-2008-0667-1990	C.		Crooke	
EPA-HQ-OW-2008-0667-1991	W.		Ip	
EPA-HQ-OW-2008-0667-1992	M.		Monma	
EPA-HQ-OW-2008-0667-1993	D., D., D. and B.		Poole	
EPA-HQ-OW-2008-0667-1994	E.		Omalley	
EPA-HQ-OW-2008-0667-1995	D.		Welsch	
EPA-HQ-OW-2008-0667-1996	K.		Arellanes	
EPA-HQ-OW-2008-0667-1997	D.	C.	Wilson	
EPA-HQ-OW-2008-0667-1998	C.		Burns	
EPA-HQ-OW-2008-0667-1999	M.		Rae	
EPA-HQ-OW-2008-0667-2000	T.		Frank	
EPA-HQ-OW-2008-0667-2001	Dr. K.		Gunter	
EPA-HQ-OW-2008-0667-2002	P.		Mccollim	
EPA-HQ-OW-2008-0667-2003	J.	K.	Hedges	
EPA-HQ-OW-2008-0667-2004	Garry A. Brown	and	Jeanne M. Fox	National Association of Regulatory Utility Commissioners (NARUC)
EPA-HQ-OW-2008-0667-2005	Cindy	B.	Miller	Florida Public Service Commission (PSC)
EPA-HQ-OW-2008-0667-2006	J.		Avery	
EPA-HQ-OW-2008-0667-2007	G.		Spencer	
EPA-HQ-OW-2008-0667-2008	Dr. J.		Tullis	
EPA-HQ-OW-2008-0667-2009	A.		Almirola	
EPA-HQ-OW-2008-0667-2010	M.		O'Brien	
EPA-HQ-OW-2008-0667-2011	M.		Thorne	
EPA-HQ-OW-2008-0667-2012	P.		Beattie	
EPA-HQ-OW-2008-0667-2013	B.		Gorman	
EPA-HQ-OW-2008-0667-2014	J.		Garibaldi	
EPA-HQ-OW-2008-0667-2015	S.		Michael	
EPA-HQ-OW-2008-0667-2016	P.		Jones	
EPA-HQ-OW-2008-0667-2017	Joe		Geever	Surfrider Foundation
EPA-HQ-OW-2008-0667-2018	D.		Shanaman	
EPA-HQ-OW-2008-0667-2019	A.		Wasgatt	
EPA-HQ-OW-2008-0667-2020	Ingrid		Setzler	Kansas City Board of Public Utilities (KCBPU)
EPA-HQ-OW-2008-0667-2021	K.		Benzel	
EPA-HQ-OW-2008-0667-2022	Dr. G.		Crouse	

FDMS Document ID	First Name	Middle Name	Last Name	Organization
EPA-HQ-OW-2008-0667-2023	C.		Ridenour	
EPA-HQ-OW-2008-0667-2024	M.		Bennett	
EPA-HQ-OW-2008-0667-2025	Dr. J.		Unruh	
EPA-HQ-OW-2008-0667-2026	T.		Spencer	
EPA-HQ-OW-2008-0667-2027	M.		Martin	
EPA-HQ-OW-2008-0667-2028	Dr. D.		Kramer	
EPA-HQ-OW-2008-0667-2029	I.		Shaw	
EPA-HQ-OW-2008-0667-2030	M.		Dzindzeleta	
EPA-HQ-OW-2008-0667-2031	M.		Miller	
EPA-HQ-OW-2008-0667-2032	L.		St. John	
EPA-HQ-OW-2008-0667-2033	L.		Robin	
EPA-HQ-OW-2008-0667-2034	J.		Laiti	
EPA-HQ-OW-2008-0667-2035	S.		Wiebe	
EPA-HQ-OW-2008-0667-2036	C.	Dukes	Scott	South Carolina Office of Regulatory Staff (ORS) (Duke Energy)
EPA-HQ-OW-2008-0667-2037	R.		Dimatteo	
EPA-HQ-OW-2008-0667-2038	M.		Scott	
EPA-HQ-OW-2008-0667-2039	A.		Payne	
EPA-HQ-OW-2008-0667-2040	T.	B.	Silverman	
EPA-HQ-OW-2008-0667-2041	S.		Lannin	
EPA-HQ-OW-2008-0667-2042	B.	P.	Gallagher	
EPA-HQ-OW-2008-0667-2043	L.		Godwin	
EPA-HQ-OW-2008-0667-2044	State Sen. Paul	G.	Campbell, Jr.	South Carolina State Senate (Duke Energy)
EPA-HQ-OW-2008-0667-2045	Robert	M.	Hitt III	South Carolina Department of Commerce (Duke Energy)
EPA-HQ-OW-2008-0667-2046	James	E.	Earl	Severstal Dearborn, LLC
EPA-HQ-OW-2008-0667-2047	James		Thate	Delta-Montrose Electric Association
EPA-HQ-OW-2008-0667-2048	Stephen	K.	Davis	Association of Illinois Electrical Cooperatives (AIEC)
EPA-HQ-OW-2008-0667-2049	Michael		Ralston	Iowa Association of Business and Industry (ABI)
EPA-HQ-OW-2008-0667-2050	Leonard	F.	Hopkins	Southern Illinois Power Cooperative (SIPC)
EPA-HQ-OW-2008-0667-2051	James	F.	Stine	National Rural Electric Cooperative Association (NRECA)
EPA-HQ-OW-2008-0667-2052	Lewis	F.	Gossett	South Carolina Manufacturers Alliance (SCMA)
EPA-HQ-OW-2008-0667-2053	State Rep. Chris		Danou	Wisconsin State Assembly, 91st District
EPA-HQ-OW-2008-0667-2054	Terry	M.	Hogan	Wabash Valley Power Association (WVPA)
EPA-HQ-OW-2008-0667-2056	R.		Stambaugh	
EPA-HQ-OW-2008-0667-2057	N.	H.	Gronlund	
EPA-HQ-OW-2008-0667-2058	J.		Tatarczuk	
EPA-HQ-OW-2008-0667-2059	J.		Archuleta	
EPA-HQ-OW-2008-0667-2060	H.		Blechar	
EPA-HQ-OW-2008-0667-2061	J.		Wheeler	

FDMS Document ID	First Name	Middle Name	Last Name	Organization
EPA-HQ-OW-2008-0667-2062	T.		Harris	
EPA-HQ-OW-2008-0667-2063	Susan	L.	Sylvester	Wisconsin Department of Natural Resources (WI DNR)
EPA-HQ-OW-2008-0667-2064	R.		Bloom	
EPA-HQ-OW-2008-0667-2065	State Sen. Mary	Jo	White, et al.	Pennsylvania State Senate and State House of Representatives
EPA-HQ-OW-2008-0667-2066	April		Ingle	Georgia River Network
EPA-HQ-OW-2008-0667-2067	State Sen. David	T.	Daniels	Ohio State Senate, 17th District
EPA-HQ-OW-2008-0667-2068	Gov. Mary		Fallin	State of Oklahoma
EPA-HQ-OW-2008-0667-2069	State Sen. Terry		Moulton	Wisconsin State Senate, 23rd District
EPA-HQ-OW-2008-0667-2070	John	W.	Dwyer	Lignite Energy Council (LEC)
EPA-HQ-OW-2008-0667-2071	State Rep. Edward		Brooks	Wisconsin State Assembly, 50th District
EPA-HQ-OW-2008-0667-2072	State Rep. Bill		Sandifer	South Carolina State House of Representatives
EPA-HQ-OW-2008-0667-2073	Gary Hanson	and	Chris Nelson	South Dakota Public Utilities Commission
EPA-HQ-OW-2008-0667-2074	Mass Comment Campaign			Unknown
EPA-HQ-OW-2008-0667-2075	Mass Comment Campaign			National Wildlife Federation Action Fund (NWF)
EPA-HQ-OW-2008-0667-2076	C.		Lish	
EPA-HQ-OW-2008-0667-2077	M.		Bushnell	
EPA-HQ-OW-2008-0667-2078	Nicholas	A.	Brown	Southwest Power Pool, Inc. (SPP)
EPA-HQ-OW-2008-0667-2079	Jeff	A.	McNelly	Anthracite Region Independent Power Producers Association (ARIPPA)
EPA-HQ-OW-2008-0667-2080	Rich		Cogen	Ohio River Foundation
EPA-HQ-OW-2008-0667-2081	Bill		Cunningham	Unions for Jobs and the Environment (UJAE)
EPA-HQ-OW-2008-0667-2082	Michael		Bradley	Clean Energy Group
EPA-HQ-OW-2008-0667-2083	J.		Evan	
EPA-HQ-OW-2008-0667-2084	K.		Wright	
EPA-HQ-OW-2008-0667-2085	A.		Acker	
EPA-HQ-OW-2008-0667-2086	L.		Greenawalt	
EPA-HQ-OW-2008-0667-2087	C.		Johnson	
EPA-HQ-OW-2008-0667-2088	M.		Pilley	
EPA-HQ-OW-2008-0667-2089	M.		Huddleston	
EPA-HQ-OW-2008-0667-2090	M.		Strawn	
EPA-HQ-OW-2008-0667-2091	A.		Pahl	
EPA-HQ-OW-2008-0667-2092	F.		Lamberts	
EPA-HQ-OW-2008-0667-2093	W.		Johnson	
EPA-HQ-OW-2008-0667-2094	S.		Reid	
EPA-HQ-OW-2008-0667-2095	E.		Thorpe	
EPA-HQ-OW-2008-0667-2096	T.		Bubul	

FDMS Document ID	First Name	Middle Name	Last Name	Organization
EPA-HQ-OW-2008-0667-2097	K.		Simmons	
EPA-HQ-OW-2008-0667-2098	C.		Ringgold	
EPA-HQ-OW-2008-0667-2099	P.		Nolte	
EPA-HQ-OW-2008-0667-2100	R.		Vandehey	
EPA-HQ-OW-2008-0667-2101	S.		Waldon	
EPA-HQ-OW-2008-0667-2102	David	K.	Perkins	SABIC Innovative Plastics
EPA-HQ-OW-2008-0667-2103	State Rep. Scott		Suder	Wisconsin State Assembly, 69th District
EPA-HQ-OW-2008-0667-2104	Gov. Scott		Walker	State of Wisconsin
EPA-HQ-OW-2008-0667-2105	State Sen. Pam Galloway	and	State Rep. Mary Williams	Wisconsin State Senate, 29th District and Wisconsin State Assembly, 87th District
EPA-HQ-OW-2008-0667-2106	Robert	F.	Powelson, et al	Pennsylvania Public Utility Commission
EPA-HQ-OW-2008-0667-2107	Mass Comment Campaign			Unknown
EPA-HQ-OW-2008-0667-2108	Scott		Davis	Arizona Public Service Company (APS)
EPA-HQ-OW-2008-0667-2109	Scott	J.	Nally	Ohio Environmental Protection Agency (EPA)
EPA-HQ-OW-2008-0667-2110	Stephen		Minick	Texas Association of Business
EPA-HQ-OW-2008-0667-2111	Ron		Flax-Davidson	Hudson River Sloop Clearwater, Inc.
EPA-HQ-OW-2008-0667-2112	Jeff	A.	McNelly	Anthracite Region Independent Power Producers Association (ARIPPA)
EPA-HQ-OW-2008-0667-2113	N.		Spitzfaden	
EPA-HQ-OW-2008-0667-2114	Willie	R.	Taylor	United States Department of the Interior (DOI)
EPA-HQ-OW-2008-0667-2115	State Sen. Bob		Rucho	North Carolina State Senate
EPA-HQ-OW-2008-0667-2116	State Sen. Dan		Sparks	Minnesota State Senate, District 27,
EPA-HQ-OW-2008-0667-2117	M.	A.	Link	
EPA-HQ-OW-2008-0667-2118	Trent A. Dougherty	and	Rachel L. Herbst	Ohio Environmental Council (OEC)
EPA-HQ-OW-2008-0667-2119	James	S.	Alves	Florida Electric Power Coordinating Group, Inc. (FCG)
EPA-HQ-OW-2008-0667-2120	State Sen. Bruce		Caswell	Michigan State Senate, District 16
EPA-HQ-OW-2008-0667-2121	Patrick		Bennett	Indiana Manufacturers Association (IMA)
EPA-HQ-OW-2008-0667-2122	J.		Capozzelli	
EPA-HQ-OW-2008-0667-2123	Angila	M.	Retherford	Vectren Corporation
EPA-HQ-OW-2008-0667-2124	Nysa	L.	Hogue	Indianapolis Power and Light Company (IPL)
EPA-HQ-OW-2008-0667-2125	J.	R.	DeFriece	
EPA-HQ-OW-2008-0667-2126	Craig		Bressan	Prairie State Generating Company LLC (PSGC)
EPA-HQ-OW-2008-0667-2127	State Sen. Julie Rosen	and	State Sen. Jeremy Miller	Minnesota State Senate, Districts 24 and 31
EPA-HQ-OW-2008-0667-2128	State Rep. Nan		Baker	Ohio State House of Representatives, District 16
EPA-HQ-OW-2008-0667-2129	D.		Canton	
EPA-HQ-OW-2008-0667-2130	C.		Laieski	
EPA-HQ-OW-2008-0667-2131	B.		Leonard	

FDMS Document ID	First Name	Middle Name	Last Name	Organization
EPA-HQ-OW-2008-0667-2132	Otis	B.	Rawl, Jr.	South Carolina Chamber of Commerce
EPA-HQ-OW-2008-0667-2134	Anthony	N.	Jacobs	International Brotherhood of Boilermakers, Iron Ship Builders, Blacksmiths, Forgers and Helpers, AFL-CIO (Boilermakers Union)
EPA-HQ-OW-2008-0667-2135	Steven	A.	Thompson	Oklahoma Department of Enviromental Quality (OK DEQ)
EPA-HQ-OW-2008-0667-2136	State Sen. John		Proos, et al.	Michigan State Senate
EPA-HQ-OW-2008-0667-2137	State Rep. Nelson	L.	Hardwick	South Carolina State House of Representatives
EPA-HQ-OW-2008-0667-2138	Gov. Haley		Barbour	State of Mississippi
EPA-HQ-OW-2008-0667-2139	William	L.	Kovacs	United States Chamber of Commerce
EPA-HQ-OW-2008-0667-2140	Ronald	R.	Cox	Hawaiian Electric Company
EPA-HQ-OW-2008-0667-2141	Jon	A.	Finlinson	Intermountain Power Service Corporation (IPSC)
EPA-HQ-OW-2008-0667-2142	Patrick	O.	Loughlin	Buckeye Power, Inc.
EPA-HQ-OW-2008-0667-2143	Frank		Prager	Xcel Energy, Inc.
EPA-HQ-OW-2008-0667-2144	Bruce	W.	Ramme	We Energies
EPA-HQ-OW-2008-0667-2145	Douglas	P.	Mauro	Rockland Capital Cape May Holdings (RCCMH)
EPA-HQ-OW-2008-0667-2146	Coleen	H.	Sullins	North Carolina Department of Environment and Natural Resources (NCDENR)
EPA-HQ-OW-2008-0667-2147	Todd	A.	Snitchler	Ohio Public Utilities Commission (PUC)
EPA-HQ-OW-2008-0667-2148	Anthony	N.	Jacobs	International Brotherhood of Boilermakers, Iron Ship Builders, Blacksmiths, Forgers and Helpers, AFL-CIO (Boilermakers Union)
EPA-HQ-OW-2008-0667-2149	Walter	L.	Baker	Association of State and Interstate Water Pollution Control Administrators (ASIWPCA)
EPA-HQ-OW-2008-0667-2150	Scott		Newberry	Florida Keys Electric Cooperative Association Inc (FKEC)
EPA-HQ-OW-2008-0667-2151	Randall	R.	LaBauve	NextEra Energy
EPA-HQ-OW-2008-0667-2152	Thomas	L.	Hernandez	Tampa Electric Company (TEC)
EPA-HQ-OW-2008-0667-2153	Pilar		Patterson	New Jersey Department of Environmental Protection (NJDEP)
EPA-HQ-OW-2008-0667-2154	JoAnne		Rau	The Dayton Power and Light Company (DP&L)
EPA-HQ-OW-2008-0667-2155	Mark	A.	Shepherd	Topaz Power Holding, LLC (TPH)
EPA-HQ-OW-2008-0667-2156	Thomas	R.	Kuhn	Edison Electric Institute (EEI)
EPA-HQ-OW-2008-0667-2157	Hal		Bozarth	Chemistry Council of New Jersey (CCNJ)
EPA-HQ-OW-2008-0667-2158	Robert	D.	Teetz	National Grid
EPA-HQ-OW-2008-0667-2159	C.		Lish	
EPA-HQ-OW-2008-0667-2160	Kevin		Wanttaja	Salt River Project (SRP)
EPA-HQ-OW-2008-0667-2161	Jay		Hudson	Santee Cooper
EPA-HQ-OW-2008-0667-2162	Keith		Stephens	PowerSouth Energy Cooperative
EPA-HQ-OW-2008-0667-2163	Scott		Wolff	Honeywell International, Inc.
EPA-HQ-OW-2008-0667-2164	State Rep. Lee		Nerison	Wisconsin State Assembly, 96th District

FDMS Document ID	First Name	Middle Name	Last Name	Organization
EPA-HQ-OW-2008-0667-2165	Julie	Meka	Carter	Arizona-New Mexico Chapter of the American Fisheries Society (AZ-NM Chapter)
EPA-HQ-OW-2008-0667-2166	John	T.	Graves	Minnkota Power Cooperative Inc.
EPA-HQ-OW-2008-0667-2167	George		Bakun	ConocoPhillips Company, Bayway Refinery
EPA-HQ-OW-2008-0667-2168	Jim Donofrio	and	Jim Hutchinson, Jr	Recreational Fishing Alliance (RFA) and the New York Sportfishing Federation (NYSF)
EPA-HQ-OW-2008-0667-2169	S.	L.	Dannhardt	STP Nuclear Operating Company (STPNOC)
EPA-HQ-OW-2008-0667-2170	Larry	J.	Koshire	Rochester Public Utilities (RPU)
EPA-HQ-OW-2008-0667-2171	Russell		Frye	Cooling Water Intake Structure Coalition
EPA-HQ-OW-2008-0667-2172	Edwin	D.	Hill	International Brotherhood of Electrical Workers (IBEW)
EPA-HQ-OW-2008-0667-2173	Sam	L.	Phillips	Louisiana Department of Environmental Quality (LDEQ)
EPA-HQ-OW-2008-0667-2174	Nancy	A.	Evans	PPL Corporation
EPA-HQ-OW-2008-0667-2175	Terry	P.	Jensky	Wisconsin Public Service Corporation (WPSC)
EPA-HQ-OW-2008-0667-2176	Maureen		Gannon	PNM Resources (PMNR)
EPA-HQ-OW-2008-0667-2177	Linda		Whelan	Dynegy Inc.
EPA-HQ-OW-2008-0667-2178	Shirley	M.	Ruffin	SCANA Corporation (SCANA)
EPA-HQ-OW-2008-0667-2179	Henry		Eby	Lower Colorado River Authority (LCRA)
EPA-HQ-OW-2008-0667-2180	Stephen		Donovan	Taunton Municipal Lighting Plant (TMLP)
EPA-HQ-OW-2008-0667-2181	Pamela	F.	Faggert	Dominion Resources
EPA-HQ-OW-2008-0667-2182	Bruce		Parker	Electric Energy, Inc. (EEI)
EPA-HQ-OW-2008-0667-2183	David		Friedman	National Petrochemical and Refiners Association (NPRA)
EPA-HQ-OW-2008-0667-2184	John	W.	Myers	Tennessee Valley Authority (TVA)
EPA-HQ-OW-2008-0667-2185	Brian	H.	Moeck	The Large Public Power Council (LPPC)
EPA-HQ-OW-2008-0667-2186	Jerry Bonanno	and	William Skaff	Nuclear Energy Institute (NEI)
EPA-HQ-OW-2008-0667-2187	Gov. Matthew	H.	Mead	State of Wyoming
EPA-HQ-OW-2008-0667-2188	James		Murphy	National Wildlife Federation (NWF), et al.
EPA-HQ-OW-2008-0667-2189	Douglas	J.	Fulle	Oglethorpe Power Corporation
EPA-HQ-OW-2008-0667-2190	Chris	M.	Hobson	Southern Company
EPA-HQ-OW-2008-0667-2191	Jeffrey	P.	deBessonet	South Carolina Department of Health and Environmental Control (SCDHEC)
EPA-HQ-OW-2008-0667-2192	Eric	B.	Svenson, Jr.	PSEG Services Corporation
EPA-HQ-OW-2008-0667-2193	John		Reese	Astoria Generating Company (AGC)
EPA-HQ-OW-2008-0667-2194	Henry	T.	Graham	Louisiana Chemical Association (LCA) (Kean Miller LLP)
EPA-HQ-OW-2008-0667-2195	David	M.	Fraley	City Utilities of Springfield, Missouri (CU)
EPA-HQ-OW-2008-0667-2196	Michael		Brom	PCS Nitrogen Fertilizer, L.P.
EPA-HQ-OW-2008-0667-2197	Roger	E.	Claff	American Petroleum Institute (API)
EPA-HQ-OW-2008-0667-2198	Ron		Shipman	Georgia Power Company
EPA-HQ-OW-2008-0667-2199	Erik		Silvola	Great River Energy (GRE)
EPA-HQ-OW-2008-0667-2200	Douglas	A.	Dixon	Electric Power Research Institute (EPRI)

FDMS Document ID	First Name	Middle Name	Last Name	Organization
EPA-HQ-OW-2008-0667-2201	Justin	G.	Johnson	Vermont Department of Environmental Conservation (VT DEC)
EPA-HQ-OW-2008-0667-2202	Shawn Seaman	and	Edwal Stone	Maryland Department of Natural Resources and Department of the Environment (MD DNR and DOE)
EPA-HQ-OW-2008-0667-2203	Gavin	J.	Donohue	Independent Power Producers of New York, Inc. (IPPNY)
EPA-HQ-OW-2008-0667-2204	William	C.	Herz	The Fertilizer Institute (TFI)
EPA-HQ-OW-2008-0667-2205	Thomas		Howard	California State Water Resources Control Board (CA SWRCB)
EPA-HQ-OW-2008-0667-2206	Douglas	W.	Craven	Little Traverse Bay Bands of Odawa Indians (LTBB)
EPA-HQ-OW-2008-0667-2207	Nancy	M.	Clark	American Chemistry Council (ACC)
EPA-HQ-OW-2008-0667-2208	Jeffrey	S.	Longsworth	Alcoa, Inc. (Barnes & Thornburg LLP)
EPA-HQ-OW-2008-0667-2209	Patricia D. Horn	and	Kenneth E. Raymond	Oklahoma Gas and Electric Company (OG&E)
EPA-HQ-OW-2008-0667-2210	James	N.	Christman	Utility Water Act Group (UWAG) (Hunton and Williams LLP)
EPA-HQ-OW-2008-0667-2211	Cathy	S.	Woolums	MidAmerican Energy Holdings Company
EPA-HQ-OW-2008-0667-2212	John	R.	Westendorf	Occidental Chemical Corporation (OxyChem)
EPA-HQ-OW-2008-0667-2213	Bobby		Byers	Texas Chapter of the Coastal Conservation Association (CCA Texas)
EPA-HQ-OW-2008-0667-2214	Patrick	O.	Loughlin	Buckeye Power, Inc.
EPA-HQ-OW-2008-0667-2215	Eric Myers	and	Nathan Craig	Duke Energy Business Services, LLC
EPA-HQ-OW-2008-0667-2216	Michael		Bradley	Clean Energy Group
EPA-HQ-OW-2008-0667-2217	William	J.	Donohue	Exelon Business Services Company
EPA-HQ-OW-2008-0667-2218	Maya	K.	van Rossum	Delaware Riverkeeper Network (DRN)
EPA-HQ-OW-2008-0667-2219	E.		Chase	
EPA-HQ-OW-2008-0667-2220	Gregory	W.	Baise	Illinois Manufacturer's Association (IMA)
EPA-HQ-OW-2008-0667-2221	Susanne	M.	Herald	GE Aviation
EPA-HQ-OW-2008-0667-2222	Matthew		Prine	Indiana Utility Shareholders Association
EPA-HQ-OW-2008-0667-2223	Steve		List	NewPage Corporation
EPA-HQ-OW-2008-0667-2224	Mark	A.	Hartle	The Pennsylvania Fish and Boat Commission (PFBC)
EPA-HQ-OW-2008-0667-2225	Richard	T.	Metcalf	Louisiana (LA) Mid-Continent Oil and Gas Association (LMOGA)
EPA-HQ-OW-2008-0667-2226	Douglas	P.	Mauro	Rockland Capital Cape May Holdings (RCCMH)
EPA-HQ-OW-2008-0667-2227	Gov. Beverly	Eaves	Perdue	State of North Carolina
EPA-HQ-OW-2008-0667-2228	Richard	G.	Burud	Nobles Cooperative Electric
EPA-HQ-OW-2008-0667-2229	Abbie		Krebsbach	Montana-Dakota Utilities Co.
EPA-HQ-OW-2008-0667-2230	MaryAnn	J.	Otter	Morro Coast Audubon Society
EPA-HQ-OW-2008-0667-2231	Fred	T.	Harnack	United States Steel Corporation (USS)
EPA-HQ-OW-2008-0667-2232	William		Creal	Michigan Department of Environmental Quality (MDEQ)
EPA-HQ-OW-2008-0667-2233	Jared		Morrison	Westar Energy, Inc.

FDMS Document ID	First Name	Middle Name	Last Name	Organization
EPA-HQ-OW-2008-0667-2234	Terry		Graumann	Otter Tail Power Company
EPA-HQ-OW-2008-0667-2235	Dustin		McDaniel	Arkansas Attorney General, et al.
EPA-HQ-OW-2008-0667-2236	Robert		Underwood	Delaware Department of Natural Resources and Environmental Control (DNREC)
EPA-HQ-OW-2008-0667-2237	Douglas	R.	Kopp	Alliant Energy Corporate Services, Inc.
EPA-HQ-OW-2008-0667-2238	Alan	R.	Wood	American Electric Power, Inc. (AEP)
EPA-HQ-OW-2008-0667-2239	Matthew	J.	Dunn	Illinois Attorney General's Office
EPA-HQ-OW-2008-0667-2240	Orjiakor	N.	Isiogu, et al.	Michigan Public Service Commission
EPA-HQ-OW-2008-0667-2241	Pamela	F.	Faggert	Dominion Resources
EPA-HQ-OW-2008-0667-2242	Jerry Bonanno	and	William Skaff	Nuclear Energy Institute (NEI)
EPA-HQ-OW-2008-0667-2243	Steven	L.	Kline	Pacific Gas and Electric Company (PG&E)
EPA-HQ-OW-2008-0667-2244	Caroline		Choi	Progress Energy
EPA-HQ-OW-2008-0667-2245	Basil	G.	Constantelos	Midwest Generation, Edison Mission Energy, LLC
EPA-HQ-OW-2008-0667-2246	Mark	P.	Thomasson	Florida Department of Environmental Protection (FL DEP)
EPA-HQ-OW-2008-0667-2247	Ann	W.	McIver	Citizens Energy Group
EPA-HQ-OW-2008-0667-2248	Michael	L.	Krancer	Pennsylvania Department of Environmental Protection (DEP)
EPA-HQ-OW-2008-0667-2249	Holly		Propst	Western Business Roundtable
EPA-HQ-OW-2008-0667-2250	Joe	L.	Citta, Jr.	Nebraska Public Power District
EPA-HQ-OW-2008-0667-2251	James	R.	Korpi	Cliffs Natural Resources Inc.
EPA-HQ-OW-2008-0667-2252	Ram		Madugula	ASME Knowledge and Community Power Division
EPA-HQ-OW-2008-0667-2253	Eric Miller	and	Shane Beck	MBC Applied Environmental Sciences (MBC)
EPA-HQ-OW-2008-0667-2254	Jerry		Purvis	East Kentucky Power Cooperative (EKPC)
EPA-HQ-OW-2008-0667-2255	Jeannine	M.	Hammer	FirstEnergy Corp. (FE)
EPA-HQ-OW-2008-0667-2256	Hanneke		Counts	Eastman Chemical Company
EPA-HQ-OW-2008-0667-2257	Steven	C.	Whitworth	Ameren Corporation
EPA-HQ-OW-2008-0667-2258	John		Humes	Hoosier Energy REC, Inc.
EPA-HQ-OW-2008-0667-2259	Dean	C.	DeLorey	The Amalgamated Sugar Company LLC (TASCO)
EPA-HQ-OW-2008-0667-2260	Christopher	A.	Amato	New York State Department of Environmental Conservation (NYSDEC)
EPA-HQ-OW-2008-0667-2261	Donald	R.	Schregardus	Department of The Navy, Department of Defense (DOD)
EPA-HQ-OW-2008-0667-2262	Daniel	C.	Esty	Connecticut Department of Energy and Environmental Protection (CT DEEP)
EPA-HQ-OW-2008-0667-2263	Donald		Neal	Calpine Corporation
EPA-HQ-OW-2008-0667-2264	Faith E. Bugel	and	Thomas Cmar	The Alliance for the Great Lakes, et al. (Environmental Law & Policy Center and Natural Resources Defense Council)
EPA-HQ-OW-2008-0667-2265	Paul	A.	Yost	National Association of Manufacturers (NAM)
EPA-HQ-OW-2008-0667-2266	Russ		Baker	Omaha Public Power District (OPPD)

FDMS Document ID	First Name	Middle Name	Last Name	Organization
EPA-HQ-OW-2008-0667-2267	Roger		Caiazza	Environmental Energy Alliance of New York, LLC
EPA-HQ-OW-2008-0667-2268	Verne		Shortell	NRG Energy, Inc.
EPA-HQ-OW-2008-0667-2269	Robert	D.	Bessette	Council of Industrial Boiler Owners (CIBO)
EPA-HQ-OW-2008-0667-2270	Glenda	L.	Dean	Alabama Department of Environmental Management (ADEM)
EPA-HQ-OW-2008-0667-2271	Thomas	E.	DuPlessis	NOVA Chemicals Inc. (NOVA)
EPA-HQ-OW-2008-0667-2272	Traylor		Champion	Georgia-Pacific LLC (GP)
EPA-HQ-OW-2008-0667-2273	E.	Mitchell	Roob, Jr.	Indiana Economic Development Corporation (IEDC)
EPA-HQ-OW-2008-0667-2274	Michael	G.	Cashin	Minnesota Power (ALLETE)
EPA-HQ-OW-2008-0667-2275	Mike		Godfrey	Alabama Power Company
EPA-HQ-OW-2008-0667-2276	Mark	J.	Sedlacek	Los Angeles Department of Water and Power (LADWP)
EPA-HQ-OW-2008-0667-2277	Berdell		Knowles	JEA
EPA-HQ-OW-2008-0667-2278	John	D.	Free	Alabama Public Service Commission (APSC)
EPA-HQ-OW-2008-0667-2279	Claire	M.	Olson	Basin Electric Power Cooperative
EPA-HQ-OW-2008-0667-2280	Gov. Eddie	Baza	Calvo	Island of Guam
EPA-HQ-OW-2008-0667-2281	Bobby		Byers	Texas Chapter of the Coastal Conservation Association (CCA Texas)
EPA-HQ-OW-2008-0667-2282	John Bentine	and	April Bott	American Municipal Power, Inc. (AMP)
EPA-HQ-OW-2008-0667-2283	Jon		Barrett	IPR-GDF SUEZ North America, Generation
EPA-HQ-OW-2008-0667-2284	Mindy		Lubber	Ceres
EPA-HQ-OW-2008-0667-2285	Bob		Martin	New Jersey Department of Environmental Protection (NJDEP)
EPA-HQ-OW-2008-0667-2286	Elizabeth		Wheeler	Clean Wisconsin
EPA-HQ-OW-2008-0667-2287	Douglas	R.	Larson	Dakota Electric Association (DEA)
EPA-HQ-OW-2008-0667-2288	Patricia D. Horn	and	Kenneth E. Raymond	Oklahoma Gas and Electric Company (OG&E)
EPA-HQ-OW-2008-0667-2289	Gov. Gary	R.	Herbert, et al.	State of Utah, et al.
EPA-HQ-OW-2008-0667-2290	Louisa		Eclarinal	CPS Energy
EPA-HQ-OW-2008-0667-2291	Maria		Valdez	The Dow Chemical Company
EPA-HQ-OW-2008-0667-2292	Thomas	C.	Perry	National Mining Association (NMA)
EPA-HQ-OW-2008-0667-2293	Adam	H.	Putnam	Florida Department of Agriculture and Consumer Services
EPA-HQ-OW-2008-0667-2294	Mike		Godfrey	Alabama Power Company (Balch & Bingham LLP)
EPA-HQ-OW-2008-0667-2295	Jolene	M.	Thompson	American Municipal Power, Inc. (AMP)
EPA-HQ-OW-2008-0667-2296	Mass Comment Campaign			Food & Water Watch
EPA-HQ-OW-2008-0667-2297	William	C.	Herz	The Fertilizer Institute (TFI)
EPA-HQ-OW-2008-0667-2298	John		Fainter, Jr.	Association of Electric Companies of Texas (AECT)
EPA-HQ-OW-2008-0667-2299	Bill		Matthews	Cleco Corporation
EPA-HQ-OW-2008-0667-2300	William	J.	Skrabak	City of Alexandria, Virginia
EPA-HQ-OW-2008-0667-2301	Gov. Eddie	Baza	Calvo	Island of Guam

FDMS Document ID	First Name	Middle Name	Last Name	Organization
EPA-HQ-OW-2008-0667-2302	Jim		Weeks	Michigan Municipal Electric Association (MMEA)
EPA-HQ-OW-2008-0667-2303	Nicholas	M.	Demik	Northern Indiana Public Service Company (NIPSCO)
EPA-HQ-OW-2008-0667-2304	John	A.	Gulvas	Consumers Energy
EPA-HQ-OW-2008-0667-2305	Nilaksh		Kothari	Manitowoc Public Utilities (MPU)
EPA-HQ-OW-2008-0667-2306	D.		Artemis	
EPA-HQ-OW-2008-0667-2307	W.		Richards	
EPA-HQ-OW-2008-0667-2308	R.	L.	Ramsay	
EPA-HQ-OW-2008-0667-2309	N.		Caswell	
EPA-HQ-OW-2008-0667-2310	K.		Manning	
EPA-HQ-OW-2008-0667-2311	Edward	R.	Griegel	Sunbury Generation LP
EPA-HQ-OW-2008-0667-2312	Theresa		Pugh	American Public Power Association (APPA)
EPA-HQ-OW-2008-0667-2313	Michael	L.	Krancer	Pennsylvania Department of Environmental Protection (DEP)
EPA-HQ-OW-2008-0667-2314	Shawn		Glacken	Luminant
EPA-HQ-OW-2008-0667-2315	Edward	R.	Griegel	Sunbury Generation LP
EPA-HQ-OW-2008-0667-2316	William	J.	Schulte	Delaware Riverkeeper, et al. (Eastern Environmental Law Center (EELC))
EPA-HQ-OW-2008-0667-2317	G.		Girard	
EPA-HQ-OW-2008-0667-2318	J.		Poirier	
EPA-HQ-OW-2008-0667-2319	L. Fronce	and	T. Hall	
EPA-HQ-OW-2008-0667-2320	L.		Fidell	
EPA-HQ-OW-2008-0667-2321	L.		Barrett	
EPA-HQ-OW-2008-0667-2322	J.		Schriebman	
EPA-HQ-OW-2008-0667-2323	P.		Haggard	
EPA-HQ-OW-2008-0667-2324	Dr. D.		Sain	
EPA-HQ-OW-2008-0667-2325	Dr. J.	G.	Garey	
EPA-HQ-OW-2008-0667-2326	C.		Krajnyk	
EPA-HQ-OW-2008-0667-2327	Mark		Zion	Texas Public Power Association (TPPA)
EPA-HQ-OW-2008-0667-2328	Michael	A.	Snyder	Water Task Force of the Ohio Utility Group (Shumaker, Loop & Kendrick, LLP)
EPA-HQ-OW-2008-0667-2329	R.		Atanasoff	
EPA-HQ-OW-2008-0667-2330	Paul J. Allen	and	Steven L. Miller	Constellation Energy Group, Inc. (CEG)/Constellation Energy Nuclear Group, LLC (CENG)
EPA-HQ-OW-2008-0667-2331	Scott		Terhune	C-Water Technologies
EPA-HQ-OW-2008-0667-2332	April	R.	Bott	City of Hamilton (Bott Law Group LLC)
EPA-HQ-OW-2008-0667-2333	D.		Giordano	
EPA-HQ-OW-2008-0667-2334	B.		Smith	
EPA-HQ-OW-2008-0667-2335	L.		Sturm	
EPA-HQ-OW-2008-0667-2336	William		Schulte	Jersey City Environmental Commission

FDMS Document ID	First Name	Middle Name	Last Name	Organization
EPA-HQ-OW-2008-0667-2337	Bob		Martin	New Jersey Department of Environmental Protection (NJDEP)
EPA-HQ-OW-2008-0667-2338	S.		Pena	
EPA-HQ-OW-2008-0667-2339	B.		Bean	
EPA-HQ-OW-2008-0667-2340	Corey	E.	Olsen	
EPA-HQ-OW-2008-0667-2341	H.		Wallof	
EPA-HQ-OW-2008-0667-2342	D.		Chary	
EPA-HQ-OW-2008-0667-2343	D.		Cutter	
EPA-HQ-OW-2008-0667-2344	H.		Sellers	
EPA-HQ-OW-2008-0667-2345	J.		Robinson	
EPA-HQ-OW-2008-0667-2346	M.		Kissinger	
EPA-HQ-OW-2008-0667-2347	Elise	N.	Zoli	Entergy Corporation (Goodwin Procter LLP)
EPA-HQ-OW-2008-0667-2348	Dr. R.		Ross	
EPA-HQ-OW-2008-0667-2349	H.		Carr	
EPA-HQ-OW-2008-0667-2350	A.		Ambler	
EPA-HQ-OW-2008-0667-2351	G.		Adams	
EPA-HQ-OW-2008-0667-2352	E.		Reiter	
EPA-HQ-OW-2008-0667-2353	K.		Wild	
EPA-HQ-OW-2008-0667-2354	B.		Jones	
EPA-HQ-OW-2008-0667-2355	J.		McCarthy	
EPA-HQ-OW-2008-0667-2356	Paul	M.	Ling	Kansas City Power & Light Company (KCP&L)
EPA-HQ-OW-2008-0667-2357	H.		Smith	
EPA-HQ-OW-2008-0667-2358	D.		Hodul	
EPA-HQ-OW-2008-0667-2359	P.		Baker	
EPA-HQ-OW-2008-0667-2360	M.		Saville	
EPA-HQ-OW-2008-0667-2361	B.		Grant	
EPA-HQ-OW-2008-0667-2362	M.		Brownlee	
EPA-HQ-OW-2008-0667-2363	Charles	F.	Brown	
EPA-HQ-OW-2008-0667-2364	N.		Paradiso	
EPA-HQ-OW-2008-0667-2365	M.		Sayre	
EPA-HQ-OW-2008-0667-2366	B.		Bean	
EPA-HQ-OW-2008-0667-2367	R.		Flower	
EPA-HQ-OW-2008-0667-2368	V.	and	B. Ulmer	
EPA-HQ-OW-2008-0667-2369	R.		Briand	
EPA-HQ-OW-2008-0667-2370	M.		Deradune	
EPA-HQ-OW-2008-0667-2371	C.		Willis	
EPA-HQ-OW-2008-0667-2372	Tom		Caprio	
EPA-HQ-OW-2008-0667-2373	R.		Smith	
EPA-HQ-OW-2008-0667-2374	David		Bittner	Delaware River Shad Fishermen's Association

FDMS Document ID	First Name	Middle Name	Last Name	Organization
EPA-HQ-OW-2008-0667-2375	R.		Bloomgarden	
EPA-HQ-OW-2008-0667-2376	M.		Herman	
EPA-HQ-OW-2008-0667-2377	E.	and	C. Fuller	
EPA-HQ-OW-2008-0667-2378	S.	F.	Giuffrida	
EPA-HQ-OW-2008-0667-2379	R.	R.	Holt	
EPA-HQ-OW-2008-0667-2380	C.		Schosser	
EPA-HQ-OW-2008-0667-2381	G.		Orbelian	
EPA-HQ-OW-2008-0667-2382	C.		Lester	
EPA-HQ-OW-2008-0667-2383	M.	and	I. Spiegelman	
EPA-HQ-OW-2008-0667-2384	S.		Day	
EPA-HQ-OW-2008-0667-2385	J.		Rosenthal	
EPA-HQ-OW-2008-0667-2386	Dr. J.		Aronfreed	
EPA-HQ-OW-2008-0667-2387	G.		Gorman	
EPA-HQ-OW-2008-0667-2388	L.		Ruberg	
EPA-HQ-OW-2008-0667-2389	P.		Prouty	
EPA-HQ-OW-2008-0667-2390	J.		Ashbaugh	
EPA-HQ-OW-2008-0667-2391	Reed	W.	Super	Riverkeeper, Inc., et al. (Super Law Group, LLC)
EPA-HQ-OW-2008-0667-2392	Gov. John	R.	Kasich	State of Ohio
EPA-HQ-OW-2008-0667-2393	Rebecca		Troutman	Riverkeeper, Inc., et al.
EPA-HQ-OW-2008-0667-2394	H.	Morriss	Barney IV	Texas Municipal Power Agency (TMPA)
EPA-HQ-OW-2008-0667-2395	D.	and	A. Arnason	
EPA-HQ-OW-2008-0667-2396	W.		Herke	
EPA-HQ-OW-2008-0667-2397	C.		Dontopoulos	
EPA-HQ-OW-2008-0667-2398	M.		Randall	
EPA-HQ-OW-2008-0667-2399	V.		Mosca-Clark	
EPA-HQ-OW-2008-0667-2400	M.		Wahl	
EPA-HQ-OW-2008-0667-2401	B.		Winholtz	
EPA-HQ-OW-2008-0667-2402	N.	J.	Mac	
EPA-HQ-OW-2008-0667-2403	D.		Givers	
EPA-HQ-OW-2008-0667-2404	A.		Garlan	
EPA-HQ-OW-2008-0667-2405	G.		Crouse	
EPA-HQ-OW-2008-0667-2406	C.		Heilman	
EPA-HQ-OW-2008-0667-2407	C.		Burns	
EPA-HQ-OW-2008-0667-2408	J.		McPeek	
EPA-HQ-OW-2008-0667-2409	L.		Green	
EPA-HQ-OW-2008-0667-2410	G. and D. Peters	and	D. Peters	
EPA-HQ-OW-2008-0667-2411	C.		Compton	
EPA-HQ-OW-2008-0667-2412	J.		Cunningham	
EPA-HQ-OW-2008-0667-2413	D.		Emard	

FDMS Document ID	First Name	Middle Name	Last Name	Organization
EPA-HQ-OW-2008-0667-2414	S.		Baker	
EPA-HQ-OW-2008-0667-2415	E.		Ogella	
EPA-HQ-OW-2008-0667-2416	J.		Fletcher	
EPA-HQ-OW-2008-0667-2417	K.	A.	Reynolds	
EPA-HQ-OW-2008-0667-2418	C.		Dzubak	
EPA-HQ-OW-2008-0667-2419	M.		Rudinow	
EPA-HQ-OW-2008-0667-2420	L.		Williams	
EPA-HQ-OW-2008-0667-2421	R.		Smith	
EPA-HQ-OW-2008-0667-2422	R.		Schutt	
EPA-HQ-OW-2008-0667-2423	Anonymous			
EPA-HQ-OW-2008-0667-2424	J.		Bradfield	
EPA-HQ-OW-2008-0667-2425	M.		Swanson	
EPA-HQ-OW-2008-0667-2426	S.		McAdam	
EPA-HQ-OW-2008-0667-2427	R.		Moody	
EPA-HQ-OW-2008-0667-2428	A.		Bauer	
EPA-HQ-OW-2008-0667-2429	W.		Eddleman	
EPA-HQ-OW-2008-0667-2430	M.		O'Rourke	
EPA-HQ-OW-2008-0667-2431	E.		Kaliss	
EPA-HQ-OW-2008-0667-2432	Jim		Littlefield	Surfers' Environmental Alliance (SEA)
EPA-HQ-OW-2008-0667-2433	S.		Hathaway	
EPA-HQ-OW-2008-0667-2434	G.		Payne	
EPA-HQ-OW-2008-0667-2435	S.		Sapier	
EPA-HQ-OW-2008-0667-2436	S.		Sapier	
EPA-HQ-OW-2008-0667-2437	Jack McCurdy	and	David Nelson	Coastal Alliance on Plant Expansion
EPA-HQ-OW-2008-0667-2438	D.		Ylvisaker	
EPA-HQ-OW-2008-0667-2439	G.		Lee	
EPA-HQ-OW-2008-0667-2440	J.		Adler	
EPA-HQ-OW-2008-0667-2441	C.		Head-Dylla	
EPA-HQ-OW-2008-0667-2442	J.		Wells	
EPA-HQ-OW-2008-0667-2443	A.		Long	
EPA-HQ-OW-2008-0667-2444	J.		Clemons	
EPA-HQ-OW-2008-0667-2445	M.		Ford	
EPA-HQ-OW-2008-0667-2446	J.		Meierotto	
EPA-HQ-OW-2008-0667-2447	M.		Wood	
EPA-HQ-OW-2008-0667-2448	J.		Quarles	
EPA-HQ-OW-2008-0667-2449	J.		Klein	
EPA-HQ-OW-2008-0667-2450	A.		Hengst	
EPA-HQ-OW-2008-0667-2451	M.	J.	Cittadino	
EPA-HQ-OW-2008-0667-2452	K.		Floyd	

FDMS Document ID	First Name	Middle Name	Last Name	Organization
EPA-HQ-OW-2008-0667-2453	B.		Coulson	
EPA-HQ-OW-2008-0667-2454	L.	M.	Conklin	
EPA-HQ-OW-2008-0667-2455	Dr. F.		Taylor	
EPA-HQ-OW-2008-0667-2456	Christina	T.	Wisdom	Texas Chemical Council (TCC)
EPA-HQ-OW-2008-0667-2457	Jonathan		Oliver	Arkansas Electric Cooperative Corporation (AECC)
EPA-HQ-OW-2008-0667-2458	Al		DePaoli	AES North America, L.P. (AES)
EPA-HQ-OW-2008-0667-2459	Michael	A.	Livermore, et al.	Institute for Policy Integrity, New York University School of Law
EPA-HQ-OW-2008-0667-2460	P.		Micklin	
EPA-HQ-OW-2008-0667-2461	C.		Koons	
EPA-HQ-OW-2008-0667-2462	C.		Miller	
EPA-HQ-OW-2008-0667-2463	K.		Aston	
EPA-HQ-OW-2008-0667-2464	D.		Halzack	
EPA-HQ-OW-2008-0667-2465	F.		Duschl	
EPA-HQ-OW-2008-0667-2466	F.		Boles	
EPA-HQ-OW-2008-0667-2467	J.		Holmes	
EPA-HQ-OW-2008-0667-2468	M.		Molina	
EPA-HQ-OW-2008-0667-2469	T.		Higgins	
EPA-HQ-OW-2008-0667-2470	D.		Lacey	
EPA-HQ-OW-2008-0667-2471	L.		Schlegel	
EPA-HQ-OW-2008-0667-2472	G.		Schmitz	
EPA-HQ-OW-2008-0667-2473	G.		Farm	
EPA-HQ-OW-2008-0667-2474	B.		Glassman	
EPA-HQ-OW-2008-0667-2475	H.		Gartsman	
EPA-HQ-OW-2008-0667-2476	B.		Crow	
EPA-HQ-OW-2008-0667-2477	J.		Ward	
EPA-HQ-OW-2008-0667-2478	P.		Totton	
EPA-HQ-OW-2008-0667-2479	Robert	H.	Reider	DTE Energy
EPA-HQ-OW-2008-0667-2480	Michalene		Reilly	Hoosier Energy REC, Inc.
EPA-HQ-OW-2008-0667-2481	Sara Barczak	and	Josh Galperin	High Risk Energy Choices/Southern Alliance for Clean Energy
EPA-HQ-OW-2008-0667-2482	A.		Ostrer	
EPA-HQ-OW-2008-0667-2483	D.		Bordenkircher	
EPA-HQ-OW-2008-0667-2484	B.		Ulbrich	
EPA-HQ-OW-2008-0667-2485	M.		Biernot	
EPA-HQ-OW-2008-0667-2486	L.		Wiener	
EPA-HQ-OW-2008-0667-2487	L.		Goin	
EPA-HQ-OW-2008-0667-2488	M.		Williams	
EPA-HQ-OW-2008-0667-2489	L.		Bagley	

FDMS Document ID	First Name	Middle Name	Last Name	Organization
EPA-HQ-OW-2008-0667-2490	G.		Schubert	
EPA-HQ-OW-2008-0667-2491	C.		Woodcock	
EPA-HQ-OW-2008-0667-2492	A.		Unger	
EPA-HQ-OW-2008-0667-2493	J.		Ramos	
EPA-HQ-OW-2008-0667-2494	J.		Scott	The Bayou Manchac Group
EPA-HQ-OW-2008-0667-2495	J.		Gregory	
EPA-HQ-OW-2008-0667-2496	P.		Manor	
EPA-HQ-OW-2008-0667-2497	C.		Shepard	Connecticut Resource Recovery Authority
EPA-HQ-OW-2008-0667-2498	M.		Stiefermann	Central Electric Power Cooperative (CEEP)
EPA-HQ-OW-2008-0667-2499	J.		Dillard	
EPA-HQ-OW-2008-0667-2500	Sen. James	M.	Inhofe	United States Senate
EPA-HQ-OW-2008-0667-2501	S.		Shields	
EPA-HQ-OW-2008-0667-2502	R.		Rolfe	
EPA-HQ-OW-2008-0667-2503	J.		Dunn	
EPA-HQ-OW-2008-0667-2504	L.		Lambeth	
EPA-HQ-OW-2008-0667-2505	S.		Nichols	
EPA-HQ-OW-2008-0667-2506	C.		Zook	
EPA-HQ-OW-2008-0667-2507	K.		Robinson	
EPA-HQ-OW-2008-0667-2508	B.		Duncan	
EPA-HQ-OW-2008-0667-2509	Mass Comment Campaign			Consumer Energy Alliance
EPA-HQ-OW-2008-0667-2510	J.		Bindel	Associated Electric Cooperative Inc. (AECI)
EPA-HQ-OW-2008-0667-2511	S.		De Vos	
EPA-HQ-OW-2008-0667-2512	K.		Russell	
EPA-HQ-OW-2008-0667-2513	M.		Hnatowich	
EPA-HQ-OW-2008-0667-2514	G.P.		Kollarson	
EPA-HQ-OW-2008-0667-2515	D.	R.	Nelson	
EPA-HQ-OW-2008-0667-2516	K.		Gibson	
EPA-HQ-OW-2008-0667-2517	Anonymous			
EPA-HQ-OW-2008-0667-2518	E.		Dieterle	
EPA-HQ-OW-2008-0667-2519	J.		Pisano	
EPA-HQ-OW-2008-0667-2520	J.		Corliss	
EPA-HQ-OW-2008-0667-2521	W.		Wilgus	
EPA-HQ-OW-2008-0667-2522	J.		Phillips	
EPA-HQ-OW-2008-0667-2523	M.		Stone	
EPA-HQ-OW-2008-0667-2524	M.		Karp	
EPA-HQ-OW-2008-0667-2525	A.		Cockrell	
EPA-HQ-OW-2008-0667-2526	D.		Worden	
EPA-HQ-OW-2008-0667-2527	S.		Pyle	

FDMS Document ID	First Name	Middle Name	Last Name	Organization
EPA-HQ-OW-2008-0667-2528	E.		Craig	
EPA-HQ-OW-2008-0667-2529	M.		Hoffman	
EPA-HQ-OW-2008-0667-2530	N.		Bartol	
EPA-HQ-OW-2008-0667-2531	S.		Vilen	
EPA-HQ-OW-2008-0667-2532	S.		Young	
EPA-HQ-OW-2008-0667-2533	D.		Artley	
EPA-HQ-OW-2008-0667-2534	K.		Lieber	
EPA-HQ-OW-2008-0667-2535	J.		Emerson-Cobb	
EPA-HQ-OW-2008-0667-2536	J.		van Luik	
EPA-HQ-OW-2008-0667-2537	S.		Young	
EPA-HQ-OW-2008-0667-2538	A.		Nowicki	
EPA-HQ-OW-2008-0667-2539	Eric	J.	Brown	Connecticut Business & Industry Association (CBIA)
EPA-HQ-OW-2008-0667-2540	David		Holt	Consumer Energy Alliance (CEA)
EPA-HQ-OW-2008-0667-2541	Charles		Furst	Delaware River Shad Fisherman's Association (DRSFA)
EPA-HQ-OW-2008-0667-2542	Richard	G.	Burud	Federated Rural Electric Association
EPA-HQ-OW-2008-0667-2543	Douglas		Fingerson	Goodhue County Cooperative Electric (GCCE)
EPA-HQ-OW-2008-0667-2544	Kris		Ingenthron	McLeod Cooperative Power Association
EPA-HQ-OW-2008-0667-2545	L.	David	Glatt	North Dakota Department of Health (ND DOH)
EPA-HQ-OW-2008-0667-2546	S.		Foku	
EPA-HQ-OW-2008-0667-2547	Kavan	L.	Stull	The Empire District Electric Company
EPA-HQ-OW-2008-0667-2548	Jonathan		Scott	The Bayou Manchac Group
EPA-HQ-OW-2008-0667-2549	Amy		Goldsmith	New Jersey Environmental Federation
EPA-HQ-OW-2008-0667-2550	Michael	M.	Hertel	Southern California Edison (SCE)
EPA-HQ-OW-2008-0667-2551	Doug		Whitley	Illinois Chamber of Commerce
EPA-HQ-OW-2008-0667-2552	Gov. Eddie	Baza	Calvo	Island of Guam
EPA-HQ-OW-2008-0667-2553	Gov. John	H.	Lynch	State of New Hampshire
EPA-HQ-OW-2008-0667-2554	K.		Ferguson	
EPA-HQ-OW-2008-0667-2555	E.		Nickelson	
EPA-HQ-OW-2008-0667-2556	S.		Richards	
EPA-HQ-OW-2008-0667-2557	M.		Stinner	
EPA-HQ-OW-2008-0667-2558	S.		Mehrotra	
EPA-HQ-OW-2008-0667-2559	J.		Burgess	
EPA-HQ-OW-2008-0667-2560	Mass Comment Campaign			Unknown
EPA-HQ-OW-2008-0667-2561	Mass Comment Campaign			Unknown
EPA-HQ-OW-2008-0667-2562	Mass Comment Campaign			Unknown
EPA-HQ-OW-2008-0667-2563	P.		Angelo	

FDMS Document ID	First Name	Middle Name	Last Name	Organization
EPA-HQ-OW-2008-0667-2564	J.		Link	
EPA-HQ-OW-2008-0667-2565	J.		Benson	
EPA-HQ-OW-2008-0667-2566	J.		Steitz	
EPA-HQ-OW-2008-0667-2567	T.		Sherman	
EPA-HQ-OW-2008-0667-2568	Reed	W.	Super	Riverkeeper, Inc., et al. (Super Law Group, LLC)
EPA-HQ-OW-2008-0667-2569	Reed	W.	Super	Riverkeeper, Inc., et al. (Super Law Group, LLC)
EPA-HQ-OW-2008-0667-2570	Reed	W.	Super	Riverkeeper, Inc., et al. (Super Law Group, LLC)
EPA-HQ-OW-2008-0667-2571	Reed	W.	Super	Riverkeeper, Inc., et al. (Super Law Group, LLC)
EPA-HQ-OW-2008-0667-2572	Reed	W.	Super	Riverkeeper, Inc., et al. (Super Law Group, LLC)
EPA-HQ-OW-2008-0667-2573	Reed	W.	Super	Riverkeeper, Inc., et al. (Super Law Group, LLC)
EPA-HQ-OW-2008-0667-2574	State Rep. Gregory	M.	Davids	Minnesota State House of Representatives
EPA-HQ-OW-2008-0667-2575	J.		Miner	
EPA-HQ-OW-2008-0667-2576	B.		Russell	
EPA-HQ-OW-2008-0667-2577	T.		Lowell	
EPA-HQ-OW-2008-0667-2578	B.		Bender	
EPA-HQ-OW-2008-0667-2579	L.		Smith	
EPA-HQ-OW-2008-0667-2580	W.		Hodges	
EPA-HQ-OW-2008-0667-2581	John	G.	Valeri Jr.,	Wolff and Samson (PSEG Fossil LLC and PSEG Nuclear LLC)
EPA-HQ-OW-2008-0667-2582	John		Rogers	Union of Concerned Scientists (UCS)
EPA-HQ-OW-2008-0667-2584	H.		Scanlon	
EPA-HQ-OW-2008-0667-2585	J.		Bulger	
EPA-HQ-OW-2008-0667-2907	John	W.	Myers	Tennessee Valley Authority (TVA)
EPA-HQ-OW-2008-0667-2908	John	W.	Myers	Tennessee Valley Authority (TVA)
EPA-HQ-OW-2008-0667-2909	John	J.	Novak	National Rural Electric Cooperative Association (NRECA)
EPA-HQ-OW-2008-0667-2910	Erik		Silvola	Great River Energy (GRE)
EPA-HQ-OW-2008-0667-2911	David		Anderson	Passavant Geiger
EPA-HQ-OW-2008-0667-2912	Shirley	M.	Ruffin	SCANA Corporation
EPA-HQ-OW-2008-0667-2913	Michael	J.	Smith	Capital Power Corporation (Murtha Cullina LLP)
EPA-HQ-OW-2008-0667-2914	John	T.	Graves	Minnkota Power Cooperative, Inc.
EPA-HQ-OW-2008-0667-2915	JoAnne		Rau	The Dayton Power & Light Company (DP&L)
EPA-HQ-OW-2008-0667-2916	Nick		Schroeck	Great Lakes Environmental Law Center (GLELC)
EPA-HQ-OW-2008-0667-2917	Mark		Thoma	Otter Tail Power Company
EPA-HQ-OW-2008-0667-2918	Dan		Sutter	The George Washington University Regulatory Studies Center
EPA-HQ-OW-2008-0667-2919	Winston	K.	Borkowski	Florida Electric Power Coordinating Group, Inc. (FCG) (Hopping Green and Sams)
EPA-HQ-OW-2008-0667-2920	Kathleen		Moser	New York State Department of Environmental Conservation (NYSDEC)

FDMS Document ID	First Name	Middle Name	Last Name	Organization
EPA-HQ-OW-2008-0667-2921	Maria		Valdez	The Dow Chemical Company
EPA-HQ-OW-2008-0667-2922	Robert		Rapenske	Eagle Point Power Generation, LLC (EPPG)
EPA-HQ-OW-2008-0667-2923	Douglas		Mauro	Rockland Capital Cape May Holdings, LLC (RCCMH)
EPA-HQ-OW-2008-0667-2924	Steven	C.	Whitworth	Ameren Corporation
EPA-HQ-OW-2008-0667-2925	Ronald	R.	Cox	Hawaiian Electric Company
EPA-HQ-OW-2008-0667-2926	J.	Michael	Brown	Ohio Valley Electric Corporation (OVEC) and Indiana-Kentucky Electric Corporation (IKEC)
EPA-HQ-OW-2008-0667-2927	John	M.	MacDonald	Public Service of New Hampshire (PSNH)
EPA-HQ-OW-2008-0667-2928	John	J.	Novak	National Rural Electric Cooperative Association (NRECA)
EPA-HQ-OW-2008-0667-2929	Randall	R.	LaBauve	NextEra Energy
EPA-HQ-OW-2008-0667-2930	Kathleen		Moser	New York State Department of Environmental Conservation (NYSDEC)
EPA-HQ-OW-2008-0667-2931	Melissa		Lavinson	Pacific Gas and Electric Company (PG&E)
EPA-HQ-OW-2008-0667-2936	Patrick		O'Loughlin	Buckeye Power, Inc.
EPA-HQ-OW-2008-0667-2937	Pam		Faggert	Dominion Resources Services, Inc.
EPA-HQ-OW-2008-0667-2938	Basil	G.	Constantelos	Midwest Generation, Edison Mission Energy, LLC
EPA-HQ-OW-2008-0667-2939	Patrick		Blachard	Calpine Corporation
EPA-HQ-OW-2008-0667-2940	Alan	R.	Wood	American Electric Power (AEP)
EPA-HQ-OW-2008-0667-2941	Hanneke		Counts	Eastman Chemical Company
EPA-HQ-OW-2008-0667-2942	William J. Donohue	and	Amy M. Trojecki	Exelon Corporation
EPA-HQ-OW-2008-0667-2943	Russell		Frye	Cooling Water Intake Structure Coalition
EPA-HQ-OW-2008-0667-2944	Joe	L.	Citta, Jr.	Nebraska Public Power District (NPPD)
EPA-HQ-OW-2008-0667-2945	Russell	J.	Furnari	PSEG Power LLC
EPA-HQ-OW-2008-0667-2946	Cari		Boyce	Duke Energy Business Services, LLC
EPA-HQ-OW-2008-0667-2947	Basil	G.	Constantelos	Midwest Generation, Edison Mission Energy, LLC
EPA-HQ-OW-2008-0667-2948	Roger	E.	Claff	American Petroleum Institute (API)
EPA-HQ-OW-2008-0667-2949	Roger	E.	Claff	American Petroleum Institute (API)
EPA-HQ-OW-2008-0667-2950	Kevin	M.	Brinegar	Indiana Chamber of Commerce
EPA-HQ-OW-2008-0667-2951	Pamela	F.	Faggert	Dominion Resources Services, Inc.
EPA-HQ-OW-2008-0667-2952	Michael		Bradley	Clean Energy Group
EPA-HQ-OW-2008-0667-2953	Chad		Miller	Montana-Dakota Utilities Co.
EPA-HQ-OW-2008-0667-2954	Patrick		Flowers	Xcel Energy, Inc.
EPA-HQ-OW-2008-0667-2955	Mike		Godfrey	Alabama Power Company (APC)
EPA-HQ-OW-2008-0667-2956	Louisa		Eclarinal	City Public Service of San Antonio (CPS Energy)
EPA-HQ-OW-2008-0667-2957	Ronald	R.	Cox	Hawaiian Electric Company
EPA-HQ-OW-2008-0667-2958	J.	Michael	Brown	Ohio Valley Electric Corporation (OVEC) and Indiana-Kentucky Electric Corporation (IKEC)
EPA-HQ-OW-2008-0667-2959	Michael	L.	Krancer	Pennsylvania Department of Environmental Protection (DEP)

FDMS Document ID	First Name	Middle Name	Last Name	Organization
EPA-HQ-OW-2008-0667-2960	Patrick		Flowers	Xcel Energy, Inc.
EPA-HQ-OW-2008-0667-2961	Alexandra	Dapolito	Dunn	Association of Clean Water Administrators (ACWA)
EPA-HQ-OW-2008-0667-2962	Douglas	A.	Dixon	Electric Power Research Institute (EPRI)
EPA-HQ-OW-2008-0667-2963	Theresa		Pugh	American Public Power Association (APPA)
EPA-HQ-OW-2008-0667-2964	Curtis	Q.	Wagner	Arkansas Electric Cooperative Corporation (AECC)
EPA-HQ-OW-2008-0667-2965	Maria		Valdez	The Dow Chemical Company
EPA-HQ-OW-2008-0667-2966	Randall	R.	LaBauve	NextEra Energy
EPA-HQ-OW-2008-0667-2967	Kavan	L.	Stull	The Empire District Electric Company
EPA-HQ-OW-2008-0667-2968	Edward	R.	Griegel	Sunbury Generation LP (Manko, Gold, Katcher & Fox, LP)
EPA-HQ-OW-2008-0667-2969	Pilar		Patterson	New Jersey Department of Environmental Protection (NJDEP)
EPA-HQ-OW-2008-0667-2970	Brendan		Mascarenhas	American Chemistry Council (ACC)
EPA-HQ-OW-2008-0667-2971	Fred	T.	Harnack	United States Steel Corporation (USS)
EPA-HQ-OW-2008-0667-2972	Cari		Boyce	Duke Energy Business Services, LLC
EPA-HQ-OW-2008-0667-2973	David	M.	Fraley	City Utilities of Springfield, Missouri (CU)
EPA-HQ-OW-2008-0667-2974	Robert Matty	and	Angela M. Grooms	Utility Water Act Group (UWAG) (Hunton & Williams LLP)
EPA-HQ-OW-2008-0667-2975	Jerry		Purvis	East Kentucky Power Cooperative (EKPC)
EPA-HQ-OW-2008-0667-2976	Thomas	R.	Kuhn	Edison Electric Institute (EEI)
EPA-HQ-OW-2008-0667-2977	Hanneke		Counts	Eastman Chemical Company
EPA-HQ-OW-2008-0667-2978	Robert	A.	Reich	DuPont Safety, Health and Environment (SHE) & Sustainable Growth Center
EPA-HQ-OW-2008-0667-2979	Mark	J.	Sedlacek	Los Angeles Department of Water and Power (LADWP)
EPA-HQ-OW-2008-0667-2980	Claire	M.	Olson	Basin Electric Power Cooperative
EPA-HQ-OW-2008-0667-2981	Bill		Matthews	Cleco Corporation
EPA-HQ-OW-2008-0667-2982	Gary	A.	Dawson	Consumers Energy
EPA-HQ-OW-2008-0667-2983	Shawn		Glacken	Luminant
EPA-HQ-OW-2008-0667-2984	Melissa		Lavinson	Pacific Gas and Electric Company (PG&E)
EPA-HQ-OW-2008-0667-2985	Michael	G.	Cashin	Minnesota Power (ALLETE)
EPA-HQ-OW-2008-0667-2986	Nicholas	M.	Demik	Northern Indiana Public Service Company (NIPSCO)
EPA-HQ-OW-2008-0667-2987	Verne		Shortell	NRG Energy, Inc.
EPA-HQ-OW-2008-0667-2988	Kay	L.	Nelson	Northwest Indiana Forum
EPA-HQ-OW-2008-0667-2989	Chris	M.	Hobson	Southern Company
EPA-HQ-OW-2008-0667-2990	Cheri	A.	Budzynski	Ohio Utility Group (OUG) (Shumaker, Loop & Kendrick, LLP)
EPA-HQ-OW-2008-0667-2991	Christina	T.	Wisdom	Texas Chemical Council (TCC)
EPA-HQ-OW-2008-0667-2994	Mike		Godfrey	Alabama Power Company (APC)
EPA-HQ-OW-2008-0667-2995	Chris	M.	Hobson	Southern Company
EPA-HQ-OW-2008-0667-2996	Henry		Eby	Lower Colorado River Authority (LCRA)
EPA-HQ-OW-2008-0667-2999	Jerry Bonanno	and	William Skaff	Nuclear Energy Institute (NEI)

FDMS Document ID	First Name	Middle Name	Last Name	Organization
EPA-HQ-OW-2008-0667-3000	Chris	M.	Hobson	Southern Company
EPA-HQ-OW-2008-0667-3001	Patrick		Blachard	Calpine Corporation
EPA-HQ-OW-2008-0667-3002	Michael		Bradley	Clean Energy Group
EPA-HQ-OW-2008-0667-3004	Jerry Bonanno	and	William Skaff	Nuclear Energy Institute (NEI)
EPA-HQ-OW-2008-0667-3005	Christina	T.	Widsom	Texas Chemical Council (TCC)
EPA-HQ-OW-2008-0667-3006	Elise	N.	Zoli	Entergy Corporation (Goodwin Procter LLP)
EPA-HQ-OW-2008-0667-3007	H.	Morriss	Barney, IV	Texas Municipal Power Agency (TMPA)
EPA-HQ-OW-2008-0667-3008	Brendan		Mascarenhas	American Chemistry Council (ACC)
EPA-HQ-OW-2008-0667-3009	Joseph		Dominguez	Exelon Corporation
EPA-HQ-OW-2008-0667-3010	Reed	W.	Super	Riverkeeper, Inc. et al. (Super Law Group, LLC)
EPA-HQ-OW-2008-0667-3011	Russell		Frye	Cooling Water Intake Structure Coalition
EPA-HQ-OW-2008-0667-3012	Thomas R. Kuhn	and	Christopher M. Crane	Edison Electric Institute (EEI) and Exelon Corporation
EPA-HQ-OW-2008-0667-3013	R. Matty, A. M. Grooms,	and	C. R. Bozek	Utility Water Act Group (UWAG) and Edison Electric Institute (EEI) (Hunton and Williams LLP)
EPA-HQ-OW-2008-0667-3014	Robert	H.	Reider	DTE Energy
EPA-HQ-OW-2008-0667-3015	Jeannine	M.	Hammer	FirstEnergy Corp. (FE)
EPA-HQ-OW-2008-0667-3016	Nysa		Hogue	Indianapolis Power & Light Company (IPL)
EPA-HQ-OW-2008-0667-3017	Mark	J.	Sedlacek	Los Angeles Department of Water and Power (LADWP)
EPA-HQ-OW-2008-0667-3018	Sam	L.	Phillips	Louisiana Department of Environmental Quality (LDEQ)
EPA-HQ-OW-2008-0667-3019	William		Creal	Michigan Department of Environmental Quality (MDEQ)
EPA-HQ-OW-2008-0667-3020	Reed	W.	Super	Riverkeeper, Inc. et al. (Super Law Group, LLC)
EPA-HQ-OW-2008-0667-3021	Reed	W.	Super	Riverkeeper, Inc. et al. (Super Law Group, LLC)
EPA-HQ-OW-2008-0667-3022	Brendan		Mascarenhas	American Chemistry Council (ACC)
EPA-HQ-OW-2008-0667-3023	Chris	M.	Hobson	Southern Company
EPA-HQ-OW-2008-0667-3024	Shawn		Glacken	Luminant
EPA-HQ-OW-2008-0667-3025	G.		Adams	
EPA-HQ-OW-2008-0667-3026	J.		Bagatta	
EPA-HQ-OW-2008-0667-3027	J.		Valentine	
EPA-HQ-OW-2008-0667-3028	I.		Rabois	
EPA-HQ-OW-2008-0667-3029	P.		Brocious	
EPA-HQ-OW-2008-0667-3030	M.		Owen	
EPA-HQ-OW-2008-0667-3031	W.		Fast	
EPA-HQ-OW-2008-0667-3032	K.		Hughes	
EPA-HQ-OW-2008-0667-3033	J.	W.	Soffler	
EPA-HQ-OW-2008-0667-3034	L.	A.	Gianella	
EPA-HQ-OW-2008-0667-3035	T. and D.		Merritts	
EPA-HQ-OW-2008-0667-3036	L.		Perret	
EPA-HQ-OW-2008-0667-3037	E.	H.	Oblas	
EPA-HQ-OW-2008-0667-3038	Anonymous			

FDMS Document ID	First Name	Middle Name	Last Name	Organization
EPA-HQ-OW-2008-0667-3039	Peggy		Cullen	
EPA-HQ-OW-2008-0667-3040	Anonymous			
EPA-HQ-OW-2008-0667-3041	B.		Vaughn	
EPA-HQ-OW-2008-0667-3042	M.		Williams	
EPA-HQ-OW-2008-0667-3043	E.		Butler	
EPA-HQ-OW-2008-0667-3044	K.		Garton	
EPA-HQ-OW-2008-0667-3045	K.	A.	Barry	
EPA-HQ-OW-2008-0667-3046	C.	E.	Arkema	
EPA-HQ-OW-2008-0667-3047	J.		Tavares	
EPA-HQ-OW-2008-0667-3048	K.		Spath	
EPA-HQ-OW-2008-0667-3049	N.		Gibbs	
EPA-HQ-OW-2008-0667-3050	T.		Linter	
EPA-HQ-OW-2008-0667-3051	Anonymous			
EPA-HQ-OW-2008-0667-3052	D.		Caraballo	
EPA-HQ-OW-2008-0667-3053	C.		Skibell	
EPA-HQ-OW-2008-0667-3054	J.		McDermott	
EPA-HQ-OW-2008-0667-3055	A.		Oppenheim	
EPA-HQ-OW-2008-0667-3056	V.		Keramaty	
EPA-HQ-OW-2008-0667-3057	J.		Rigney	
EPA-HQ-OW-2008-0667-3058	J.		Ashton	
EPA-HQ-OW-2008-0667-3059	D.		Weinstein	
EPA-HQ-OW-2008-0667-3060	L.		Flanagan	
EPA-HQ-OW-2008-0667-3061	A.		Brana	
EPA-HQ-OW-2008-0667-3062	Anonymous			
EPA-HQ-OW-2008-0667-3063	M.		Malina	
EPA-HQ-OW-2008-0667-3064	Mass Comment Campaign			Riverkeeper
EPA-HQ-OW-2008-0667-3065	J.	E.	Fletcher	
EPA-HQ-OW-2008-0667-3066	Anonymous			
EPA-HQ-OW-2008-0667-3067	W.	D.	Rizer	
EPA-HQ-OW-2008-0667-3068	Anonymous			
EPA-HQ-OW-2008-0667-3069	D.		Dutelle	
EPA-HQ-OW-2008-0667-3070	R.		Capozzi	
EPA-HQ-OW-2008-0667-3071	C.		Curtin	
EPA-HQ-OW-2008-0667-3072	Anonymous			
EPA-HQ-OW-2008-0667-3073	S.		Didrichsen	
EPA-HQ-OW-2008-0667-3074	C.		Schmidt	
EPA-HQ-OW-2008-0667-3075	D.		Tignanelli	
EPA-HQ-OW-2008-0667-3076	A.		Zito	

FDMS Document ID	First Name	Middle Name	Last Name	Organization
EPA-HQ-OW-2008-0667-3077	M.		Lynn	
EPA-HQ-OW-2008-0667-3078	S.		Eisenstark	
EPA-HQ-OW-2008-0667-3079	D.		Douglas	
EPA-HQ-OW-2008-0667-3080	Patricia D. Horn	and	Kenneth E. Raymond	Oklahoma Gas and Electric Company (OG&E)
EPA-HQ-OW-2008-0667-3081	P.		Packer	
EPA-HQ-OW-2008-0667-3082	B.		Buttacavoli	
EPA-HQ-OW-2008-0667-3083	M. and S.		Patterson	
EPA-HQ-OW-2008-0667-3084	Anonymous			
EPA-HQ-OW-2008-0667-3085	Anonymous			
EPA-HQ-OW-2008-0667-3086	M.	N.	Perskin	
EPA-HQ-OW-2008-0667-3087	M.		Sims	
EPA-HQ-OW-2008-0667-3088	E.		Pasquale	
EPA-HQ-OW-2008-0667-3089	B.		Kanninen	
EPA-HQ-OW-2008-0667-3090	Mass Comment Campaign			Sierra Club
EPA-HQ-OW-2008-0667-3091	A.		Violi	
EPA-HQ-OW-2008-0667-3092	K.		Gluth	
EPA-HQ-OW-2008-0667-3093	Daisy		Hoyt	
EPA-HQ-OW-2008-0667-3094	L.		Neiman	
EPA-HQ-OW-2008-0667-3095	V.		Gilbert	
EPA-HQ-OW-2008-0667-3096	F.		Stearney	
EPA-HQ-OW-2008-0667-3097	Anonymous			
EPA-HQ-OW-2008-0667-3098	K.		Sherwood	
EPA-HQ-OW-2008-0667-3099	S.		Rose	
EPA-HQ-OW-2008-0667-3100	S.	W.	Sabath	
EPA-HQ-OW-2008-0667-3101	G.		Morotti	
EPA-HQ-OW-2008-0667-3102	Mass Comment Campaign			Unknown
EPA-HQ-OW-2008-0667-3103	R.	L.	Adzema	
EPA-HQ-OW-2008-0667-3104	N.		Mantas	
EPA-HQ-OW-2008-0667-3105	A.		Montapert	
EPA-HQ-OW-2008-0667-3106	W.	G.	Murtha	
EPA-HQ-OW-2008-0667-3107	A.		Smock	
EPA-HQ-OW-2008-0667-3108	J.	M.	Naples	
EPA-HQ-OW-2008-0667-3109	L.	B.	Miller	
EPA-HQ-OW-2008-0667-3110	M.		Sonderskov	
EPA-HQ-OW-2008-0667-3111	T.	E.	Webb	
EPA-HQ-OW-2008-0667-3112	R.		Feldman	
EPA-HQ-OW-2008-0667-3113	M.		Half	

FDMS Document ID	First Name	Middle Name	Last Name	Organization
EPA-HQ-OW-2008-0667-3114	R.	B.	Hare	
EPA-HQ-OW-2008-0667-3115	K.		Maher	
EPA-HQ-OW-2008-0667-3116	J.		Rosenthal	
EPA-HQ-OW-2008-0667-3117	F. and J.		Fusco	
EPA-HQ-OW-2008-0667-3118	J.		Papandrea	
EPA-HQ-OW-2008-0667-3119	Anonymous			
EPA-HQ-OW-2008-0667-3120	S.		Rose	
EPA-HQ-OW-2008-0667-3121	Anonymous			
EPA-HQ-OW-2008-0667-3122	Anonymous			
EPA-HQ-OW-2008-0667-3123	L.		D'Arco	
EPA-HQ-OW-2008-0667-3124	N.		Weber	
EPA-HQ-OW-2008-0667-3125	C.		Delfeld	
EPA-HQ-OW-2008-0667-3126	Anonymous			
EPA-HQ-OW-2008-0667-3127	J.	R.	Pitcher, Jr.	
EPA-HQ-OW-2008-0667-3128	T.		Brown	
EPA-HQ-OW-2008-0667-3129	S.		Sobanski	
EPA-HQ-OW-2008-0667-3130	J.		Ramos	
EPA-HQ-OW-2008-0667-3131	P.		Wolf	
EPA-HQ-OW-2008-0667-3132	M.		Ricapito	
EPA-HQ-OW-2008-0667-3133	N.		Castaldo	
EPA-HQ-OW-2008-0667-3134	A.		Havan	
EPA-HQ-OW-2008-0667-3135	D.		Moderacki	
EPA-HQ-OW-2008-0667-3136	N.		Neumann	
EPA-HQ-OW-2008-0667-3137	Patrick	R.	Varekamp	
EPA-HQ-OW-2008-0667-3138	B.	L.	Close	
EPA-HQ-OW-2008-0667-3139	A.		Vrankovic	
EPA-HQ-OW-2008-0667-3140	Dr. J.		Olejak	
EPA-HQ-OW-2008-0667-3141	Anonymous			
EPA-HQ-OW-2008-0667-3142	R.		Lebensold	
EPA-HQ-OW-2008-0667-3143	S.		Etherton	
EPA-HQ-OW-2008-0667-3144	C.		Accorsi	
EPA-HQ-OW-2008-0667-3145	N.		Valenti	
EPA-HQ-OW-2008-0667-3146	Tom	J.	Mulford	Electric Power Research Institute (EPRI)
EPA-HQ-OW-2008-0667-3147	Anonymous			Alcoa - Warrick Operations
EPA-HQ-OW-2008-0667-3148	Richard		Schneider	Coalition to Protect Fisheries
EPA-HQ-OW-2008-0667-3149	Tom	J.	Mulford	Electric Power Research Institute (EPRI)

Response to Comment Essays

Essay 1: General Support of the 316(b) Existing Facilities Rule

EPA acknowledges your support for promulgating a strong rule under section 316(b) of the Clean Water Act (CWA) that establishes national requirements for existing power generating facilities and existing manufacturing and industrial facilities that withdraw water from waters of the U.S. for cooling purposes. These national requirements apply to the location, design, construction, and capacity of cooling water intake structures (CWIS) at regulated facilities by setting requirements that reflect the best technology available (BTA) for minimizing adverse environmental impact on aquatic organisms and ecosystems.

This essay addresses comments from the public expressing support for the proposed rule and possible revisions to the final rule that were discussed in the NODAs. In the proposed rule and the notices of data availability (NODAs), EPA considered a variety of options for establishing requirements for existing power generating and manufacturing and industrial facilities that withdraw water from waters of the U.S. exclusively for cooling purposes. In many cases, commenters advocated that EPA take a strong stance for protecting the environment in strictly regulating facilities withdrawing cooling water, with particular attention to regulating nuclear facilities (generally, these commenters were private citizens or environmental groups). Many commenters expressed particular support of the possible rule revisions discussed in the NODAs, noting the flexibility and site-specific approaches provided in the possible revisions (generally, these commenters were representatives of state and local governments (i.e. municipally owned utilities) or industry groups). Some commenters expressed support for portions of the rule, but suggested specific modifications to other parts of the rule (these commenters were also representatives of utilities or industry groups). These commenters proceeded to detail their specific modification suggestions in later comments that are addressed in other essays responding to comments.

With today's rule, EPA is promulgating a rule that completes the Agency's regulations under section 316(b) of the CWA. Please see the preamble for the final rule for EPA's rationale in developing the final rule requirements.

Essay 2: General Opposition of the 316(b) Existing Facilities Rule

This essay addresses comments from the public expressing opposition to the proposed rule and possible revisions to the final rule that were discussed in the NODAs. In the proposed rule and the notices of data availability (NODAs), EPA considered a variety of options for establishing requirements under section 316(b) of the Clean Water Act (CWA) for existing power generating and manufacturing and industrial facilities that withdraw water from waters of the U.S. exclusively for cooling purposes. In general, commenters expressed concern about the provisions of the proposed rule, with many commenters emphasizing the economic burden on affected facilities and poor cost-benefit return in implementing the rule as written (these commenters were mostly representatives of utilities, industry groups, and government agencies). A small number of commenters opposed the rule because they felt it is not sufficiently stringent and allows affected facilities to continue to cause unacceptable adverse impacts on the environment (these comments were all from environmental groups). Several commenters opposed EPA regulation in general (these comments were all from private citizens). Some commenters suggested specific modifications to parts of the rule. These commenters proceeded to detail their specific modification suggestions in later comments that are addressed in other essays.

Today, EPA promulgates a final rule that completes the Agency's regulations under section 316(b) of the CWA. Please see the preamble for the final rule for EPA's rationale in developing the final rule requirements.

Essay 4: Background Information about Commenter

EPA appreciates all comments on its rulemaking process. The Agency received comments from a diverse group of stakeholders, including concerned industry, environmental group, private citizen, and academic representatives, as well as comments from all levels of local, state, and federal government. Today's final rulemaking will apply to the majority of the existing U.S. power generation fleet as well as certain manufacturing facilities. Based on its calculations, EPA has determined that the final rule will have relatively minor economic impacts on the regulated facilities, the entities that own them, and the overall electric power sector, which encompasses a large portion of the facilities that may be subject to today's rule. See the preamble for the final rule and the EA for EPA's analysis of costs and economic impacts (including electricity supply).

This essay addresses public comments providing background information about the commenters. Within the background information presented, some commenters expressed concerns about the proposed rule or the notices of data availability (NODAs). In general, these comments expressed that the rule should be (or concern that it is not) cost-effective, feasible, and/or use a site-specific approach to meet environmental objectives, or made broad suggestions about how the rule could be so. These types of comment were only submitted by industry commenters. A few commenters expressed support for the rule or the need for a strong rule. These comments were submitted by environmental organizations and private citizens. The vast majority of the comments simply presented background information about the commenter, expressed the commenter's appreciation for the opportunity to comment, stated that the rule will affect commenter, and/or comprised in-text editorial or summary remarks that did not contain substantive content. All types of commenters submitted these kinds of remarks.

In developing today's final rule, EPA collected and analyzed a substantial amount of information regarding cooling water intake structures, their biological impacts, available technologies to reduce those impacts, the potential impacts and costs of utilizing those technologies, and other relevant subjects, including information submitted by stakeholders, industry groups, technology vendors, and environmental organizations. The Agency has met with representatives from facilities and affected industries on topics including the latest advancements in fish protection technologies, permitting experience, and the feasibility and cost of installing technologies at various types of facilities. EPA conducted site visits at over 50 power plants and manufacturing sites to: gather information on the intake technologies and cooling water systems in place at a wide variety of existing facilities; gather performance data for technologies and affected biological resources; and listen to perspectives from industry representatives. EPA has continued to exchange information with various stakeholders in the development of today's final rule.

The Agency has reviewed and analyzed data from all types of facilities and situations that will be affected by the rule and developed compliance options that provide sufficient flexibility to the regulated community. EPA considered a variety of considerations (such as possible differences between generators and manufacturers, between manufacturing facilities in different sectors, among facilities in diverse geographical locations, and between facilities that do or do not withdraw very large volumes of cooling water) but ultimately rejected most subcategories as inappropriate. See Essays 14, 19 and the Technical Development Document (TDD) for more information. EPA has also reviewed data and comment submitted in response to the proposed rule and NODAs and incorporated the information into the development of BTA requirements and compliance alternatives. Today's final rule is both reasonable and scientifically sound. Today's final rule reflects the best technology available for minimizing adverse environmental impacts associated with cooling water intake structures and allows the regulated universe the flexibility to meet critical environmental objectives through reasonable and cost effective compliance options. The flexibility and compliance schedule in the rule allows facilities to undertake necessary upgrades without affecting reliability of energy delivery. Today's final rule will improve the quality of our nation's waters by minimizing adverse environmental impacts associated with cooling water intake structures by substantially reducing the mortality of aquatic organisms due to impingement and entrainment, provide a national framework for compliance, at an affordable cost to affected facilities and ratepayers.

Please refer to Essay 19 for a discussion of regulatory options.

Essay 5: Form Letters 1-14, Addressing Form Letters from the Alliance for the Great Lakes, Consumer Energy Alliance, Natural Resources Defense Council, Environmental Law and Policy Center, Sierra Club, National Wildlife Federation Action Fund, Food and Water Watch, Surfrider, Riverkeeper, and Other Unknown Organizations

This essay addresses private citizens that participated in form letter campaigns for various organizations. The majority of these comments were from environmental organizations in support of a strong national rule requiring closed-cycle recirculating systems (CCRS) as best-technology available. Commenters indicated that closed-cycle cooling is readily available. EPA also received form letters from the Consumer Energy Alliance, which supported site-specific standards, cost-benefit analyses for determining appropriate implementation measures, and maximizing implementation flexibility of the rule. Form letters submitted on behalf of the Consumer Energy Alliance stated that 316(b) regulations would cause "catastrophic" effects for consumers. Some commenters included additional comments with their form letters. Many of these additional comments were background, nonsubstantive, specific to individual facilities, or not relevant to the 316(b) regulation and require no further response from EPA than provided here. Some commenters were concerned about nuclear or fossil-fuel-powered generating facilities and/or thermal pollution from generators' discharges.

EPA agrees with the need for promulgating a strong rule under section 316(b) of the Clean Water Act (CWA) that establishes national requirements for existing power generating facilities and existing manufacturing and industrial facilities that withdraw water from waters of the U.S. for cooling purposes.

EPA has promulgated final regulations that will provide consistency and aid in minimizing adverse environmental impacts associated with cooling water intake structures by substantially reducing the mortality of aquatic organisms due to impingement and entrainment. EPA estimates that the final rule will achieve significant monetized benefits to society through protection of commercially and recreationally harvested fish while incurring relatively minor economic impact on regulated facilities, the entities that own them, and the overall electric power sector and electricity consumers.

EPA agrees that flexibility is important, and EPA has promulgated a final rule that addresses commenter concerns about implementation flexibility and site-specific approaches, provides the desired flexibility for both the permittee and the Director to determine the most appropriate and cost-effective means for meeting the requirements of today's rule while maintaining performance standards that will minimize adverse environmental impacts.

For the reasons explained in the preamble and Essay 15, EPA does not agree with commenters that stated that closed-cycle is readily available.

This rule, which implements section 316(b) of the Clean Water Act, will provide effective and efficient progress towards restoring, maintaining and protecting, the physical, chemical and biological integrity of our nation's waters. It establishes national BTA standards for impingement mortality and entrainment: impingement mortality standards at all existing facilities that withdraw over 2 mgd DIF that include seven compliance alternatives; an entrainment standard based on site-specific entrainment controls determined by the EPA or the State NPDES permitting authority for existing facilities (other than new units) that withdraw over 2 mgd DIF. See the preamble and Essay 19.

EPA does not agree with the comment that today's final rule would cause "catastrophic" effects for consumers. As stated in the preamble, and as explained in economic support documents in the record for the rule, the final regulation will result in only modest impacts to consumers. For responses to the form letter from Consumer Energy Alliance, also see Essay 15.

Issues regarding the use of nuclear or fossil fuels in generating power and other concerns not relevant to the section 316(b) regulation are beyond the scope of this rulemaking. Issues regarding concerns about thermal pollution from electricity generation facilities are outside the scope of this rulemaking as they are addressed in regulations related to section 316(a) of the Clean Water Act.

Essay 6: Comment Period, Schedule for Final Rule

This essay addresses public comments on the comment period for the proposal and the schedule for the final rule related to the notices of data availability (NODAs) for today's final rule. EPA received requests from 9 commenters for EPA to ask the federal district court to extend the deadline for completing the rulemaking. These commenters expressed concern that the time allotted would be insufficient for EPA to adequately review and respond to the comments submitted on the NODAs. EPA received requests from two commenters for 60-day comment period extensions for the proposal comment period. Additionally, two commenters thought the public had been denied the opportunity to comment on actual monetized benefits of proposed rule, because the analysis of benefits was not complete at proposal. Also, one commenter asked if there would be opportunity to comment on revised IM standards prior to finalization of rule. Finally, one commenter expressed concern about the transparency of the rulemaking process, stating that EPA did not comply with the Office of Management and Budget's Executive Order 13563 for the NODAs.

EPA Provided an Adequate Opportunity to Comment

EPA provided an adequate opportunity to comment on the proposed rule. EPA provided an opportunity to comment on the proposal and as a result, decided to issue for public comment a notice of data availability seeking additional comment on certain issues raised in the initial comment period, particularly with respect to impingement mortality. In addition, this rulemaking has been ongoing for over ten years and the interested persons are well aware of the issues. EPA notes that at least 725 of the 1833 documents (approximately 40 percent, and including both technical and economic documents), included in the proposed rule record have appeared in the record of previous 316(b) rulemakings. In addition, a significant percentage of record documents were publicly available prior to the publication of the proposed rule on April 20, 2011; up to 25 percent of the record was posted by March 2011, with almost 200 new documents having been made available as early as 2009 and over 300 new documents available by the end of 2010. The extensive nature of the comments also indicates the adequacy of the comment period. On the proposed rule EPA provided a comment period from April 20, 2011 until August 18, 2011 (which included an extension of 30 days). EPA published the Notice of Data Availability Related to Impingement Mortality Control Requirements in the Federal Register (FR) on June 11, 2012, and the Notice of Data Availability Related to the EPA Stated Preference Survey on June 12, 2012. The comments periods for these NODAs closed on July 11 and July 12, 2012, respectively, allowing for a 30-day comment period for each publication.

Even in cases involving complex subjects, courts have routinely held that comment periods of 45 days and less are reasonable. See, e.g., Connecticut Light & Power Co. v. NRC, 673 F.2d 5252, 534 (D.C. Cir. 1982)(30-day comment period); Omnipoint Corp. v. FCC, 78 F.3d 620, 629-30 (D.C. Cir. 1996)(7-day comment period); Florida Power & Light Co. v. United States, 846 F.2d 765, 772 (D.C. Cir. 1988)(15-day comment period); North Am. Van Lines v. ICC, 666 F.2d 1087, 1092 (7th Cir. 1981)(45-day comment period); Phillips Petroleum Co. v. EPA, 803 F.2d 545, 558-59 (10th Cir. 1986)(45-day comment period). Comment periods are deemed reasonable where, as here, the public comments were numerous and extensive, and the comments had an effect on the final agency action.

In response to particular comments about the ability to comment on benefits of the rule, EPA disagrees that the public had been denied the opportunity to comment on actual monetized benefits of proposed rule. As explained in the preamble to the final rule, EPA did not use the results of the stated preference survey in the final rule; EPA has not accounted for values estimated from the survey in the quantitative comparison of costs and benefits. EPA notes that the stated preference survey instrument was also provided for public comment under a separate Federal Register notice and Information Collection Request (ICR). Please refer to Essay 77 and the preamble for the final rule for further discussion of EPA's inclusion of the stated preference survey results in the benefits analysis in the final rule.

With respect to the final 12-month percent survival IM performance standard, EPA provided the analytical approach that it used in calculating it as well as all of the studies that EPA considered in developing the standard in the public docket for the proposed rule (including the NODA). See Essay 16A. As such, EPA has provided all of the necessary materials for the public to review the calculation of the 12-month percent survival IM performance standard in the final rule, and additional opportunities for comment are not appropriate.

In response to comments concerning the schedule for taking final action, the schedule is governed by a settlement agreement that resolved two separate mandatory suits against the Agency. It is in the public interest for EPA to agree to a deadline for final action in order to resolve the disputes at issue in the two suits given that EPA had originally agreed to a court-ordered deadline through a consent decree to conduct rulemaking in three Phases in the late 1990s. EPA has amended the settlement agreement several times in order to accommodate additional time needed for the final rule.

EPA Complied with EO 13563

EPA disagrees with one commenter that the Agency has not adequately complied with the Office of Management and Budget's Executive Order 13563 implementation guidance regarding public participation. EPA conducted the rulemaking process in accordance with the standard of "transparency" prescribed by Executive Order 13563. As such, EPA has established an official public docket for this action under Docket ID EPA-HQ-OW-2008-0667. The official public docket consists of the documents specifically referenced in today's rulemaking action, any public comments received, and other information related to this action. Confidential business information and other information, the disclosure of which is restricted by statute, are a part of the official record for the rule, though this information is not available in the public docket. The Agency made every effort possible to accommodate requests for confidential and copyrighted information used in this rulemaking consistent with law. Given the longstanding discussions of issued related to 316(b) over many years, sufficient time was provided for the regulated community to review and comment on these materials and their potential effects on EPA's selection of regulatory options. EPA has made substantial efforts to help explain the complex issues involved with 316(b), and conducted a great deal of public outreach, including responding to comments, creating a publicly available record, and hosting meetings and conference calls with stakeholders. This outreach is detailed in section III.A (76 FR 22184) of the preamble for the proposed rule, in the Essay 58, and in the preamble and record for the final rule. EPA responded to information requests and has made every effort possible to provide assistance to the public to access and understand data used, to the extent allowed by the confidential business information requirements at 40 CFR Part 2, to support today's final rule.

Essay 7: Seafood Processing, Offshore Oil and Gas, and LNG Terminals

In the proposed rule, NODAs, as well as the TDD for the proposed and final existing facilities rule, EPA provides descriptions of the power generation industry and sectors of the manufacturing industry and how compliance requirements, technologies, and costs apply to each. This essay addresses public comments regarding the entities regulated by today's rule that are not addressed in other essays.

One commenter noted that some smaller electric utilities more closely resemble manufacturing companies in terms of cooling water characteristics than larger electric utilities. EPA has determined there are not significant differences between generators and manufacturers with respect to the design and functionality of cooling water intakes. See Essay 14 for a more detailed discussion on this topic.

Another commenter was concerned that the proposed rule did not adequately state that only offshore seafood processing facilities, not onshore facilities, are exempt from the rule. The EPA's final action regarding existing offshore oil and gas facilities, seafood processing facilities and LNG import terminals is the same as EPA proposed (76 FR 22195). Such facilities are subject to 316(b) on a best professional judgment basis. The EPA already addressed new offshore oil and gas facilities, seafood processing facilities and LNG import terminals in the Phase III rule. EPA did not propose any changes for such new facilities, nor did EPA reopen the Phase III rule for new offshore facilities. Some commenters mistakenly assumed the proposed rule (and therefore the final rule) does not apply to existing onshore locations of these types of facilities, or commented that onshore facilities should be exempt from any requirements. EPA disagrees, noting that such facilities are in scope if they meet the proposed applicability criteria in § 125.91. The final rule does not change this position from proposal. For onshore facilities lower than the threshold established in today's rule, such facilities will be subject to 316(b) requirements on a case-by-case, best professional judgment basis. The final regulatory language at § 125.91(d) reflects this intent. The preamble to today's final rule explains that EPA is not including existing offshore oil and gas facilities, offshore seafood processing facilities, and offshore liquefied natural gas import terminals; a summary of EPA's rationale follows.

In the Phase III rule, EPA studied offshore oil and gas facilities and offshore seafood processing facilities and could not identify any technologies (beyond the protective screens already in use) that are technically feasible for reducing impingement or entrainment in such existing facilities. As discussed in the Phase III rule preamble, known technologies that could further reduce impingement or entrainment would result in unacceptable changes in the envelope of existing platforms, drilling rigs, mobile offshore drilling units, offshore seafood processing facilities, and similar facilities as the technologies would project out from the hull, potentially decrease the seaworthiness, and potentially interfere with structural components of the hull. It is also EPA's view that for many of these facilities, the cooling water withdrawals are most substantial when the facilities are operating far out at sea and, therefore, not withdrawing from a water of the United States. EPA is aware that LNG facilities may withdraw hundreds of million gallons per day of seawater for warming (re-gasification). However, some existing LNG facilities might still withdraw water where 25 percent or more of the water is used for cooling purposes on an actual intake flow basis. EPA has not identified a uniformly applicable and available technology for minimizing impingement mortality and entrainment at these facilities, nor did commenters provide any new data or information upon which the EPA could establish uniform requirements for all such facilities. Any existing facility with a NPDES permit and that withdraws any volume of water for cooling purposes, but that is not subject to the national BTA standards under today's final rule, is subject to site-specific, BPJ BTA determinations.

For additional discussion on this topic, also see Essay 14.

Essay 8: Purpose of the NODAs, Introduction

This essay addresses the public comments received regarding the purpose of the two notices of data availability (NODAs) that further clarified EPA's approach to today's final existing facilities section 316(b) rule. Most of these comments responded to the Notice of Data Availability Related to Impingement Mortality Control Requirements published on June 11, 2012. A few comments addressed in this essay referenced the Notice of Data Availability Related to the EPA Stated Preference Survey published on June 12, 2012, but none made substantive comments on this NODA. Essay 77 responds to substantive comments received related to the Stated Preference Survey. All of the comments addressed in this essay were submitted by industry stakeholders except for one comment from an environmental organization. Nine of the commenters (all industry commenters) expressed approval with EPA for considering additional information/soliciting comment on these topics to increase compliance flexibility for impingement mortality control. One commenter (Riverkeeper) was against any revisions that would decrease stringency from the compliance options outlined in the proposed rule. Also, many of these comments provided introductory material (in-text editorial or summary remarks that did not contain substantive content) to substantive comments or summarized the purpose of the NODA. These commenters proceeded to detail their specific issues in later comments that are addressed in other essays responding to comments.

Notice of Data Availability Related to Impingement Mortality Control Requirements

This NODA described flexibilities EPA considered for the impingement mortality control requirements post-proposal. EPA notes that the final rule includes flexibility to comply with the national BTA standard for impingement mortality by including seven alternatives which EPA has determined will meet or exceed the performance of the BTA technology. See the preamble for additional discussion. Please refer to Essay 16A and the preamble for the final rule for discussion of EPA's consideration of additional data in its calculation of the final 12-month percent survival IM performance standard. Essay 16 and the preamble for the final rule also address Riverkeeper's concern that the final rule would be less stringent than the proposed rule.

Essay 10: Legal Authority, Purpose, and Background

The final rule implements section 316(b) of the CWA for existing facilities. Section 316(b) provides that any standard established pursuant to section 301 or 306 of the CWA and applicable to a point source must require that the location, design, construction and capacity of cooling water intake structures (CWISs) reflect the best technology available (BTA) for minimizing adverse environmental impact. The final rule also makes limited amendments related to the Phase I CWA section 316(b) rule for new facilities (consisting of two technical corrections and removal of restoration provisions; see preamble for details). The final rule establishes requirements that represent BTA for minimizing adverse environmental impacts that EPA has identified as associated with CWISs, including impingement mortality and entrainment. EPA has previously implemented section 316(b) on a site-specific basis for existing facilities and issued a new facility rule in 2001. The preamble to the final rule provides a detailed discussion of the legal authority, purpose, and background of the final 316(b) existing facility rule.

Some commenters asserted that EPA's application of the rule to existing facilities lacks a basis in the CWA, and that section 316(b) only authorizes a one-time, preconstruction review of CWIS location, design, construction, and capacity.

EPA disagrees with both points. There is no support in the language of section 316(b) indicating that it applies only to new facilities. The statutory language refers to point sources, and cross references the technology standards applicable to existing sources (section 301) and new point sources (section 306). Thus it is reasonable for EPA to interpret section 316(b) as applicable to existing facilities. Since the CWA provision was adopted in 1972, EPA has been applying section 316(b) to existing as well as new facilities or new sources.[1] Section 316(b) requirements apply in part to standards established under CWA section 301, and section 301 requires establishment of effluent limitations guidelines for existing facilities. Thus, EPA has authority to apply 316(b) requirements to existing facilities. EPA has fully explained its interpretation of its authority previously (see 69 FR 41629), and the Second Circuit has upheld EPA's interpretation of the CWA. *Riverkeeper, Inc. v. USEPA*, 475 F. 3d 83, 121-122 (2nd Cir. 2007). The Supreme Court did not grant cert on this issue. The basis for the final rule is fully discussed in the legal authority and basis sections of the preamble to the final rule.

Some commenters asserted that EPA is only allowed to regulate the four statutory elements of CWISs specified in section 316(b) and that, with regard to any standard for impingement mortality, the CWA doesn't permit the imposition of a performance standard. Other commenters argued that EPA lacks the authority to require existing facilities to retrofit to closed-cycle cooling or to dictate when or how a facility can operate. They observed that the installation of cooling towers can require extensive redesign and reconstruction of an existing facility, which the statute does not authorize EPA to require. They also asserted that closed-cycle cooling is not a CWIS technology and cannot be required under 316(b).

[1] A new source is a source for which a 306 new source performance standard is applicable. New facilities are a set of facilities as defined in EPA's Phase I new facility rule. The terms are not synonyms.

EPA does not agree that the language of section 316(b), including the four elements associated with CWISs described in the statute (i.e., CWIS location, design, construction and capacity), limit the approaches EPA can take to regulation of cooling water intakes or limits the standards to the four aspects of CWISs identified in the statute as long as a requirement minimizes impingement and or entrainment of the cooling water intake. In *Entergy*, the Supreme Court stated that "As we have described, *§ 1326(b)* instructs the EPA to set standards for cooling water intake structures that reflect "the best technology available for minimizing adverse environmental impact." In Riverkeeper I, the Second Circuit held that "the statute allows the EPA to regulate the operation of cooling water intake structure, as the word 'design' can reasonably be read to embrace the methods used in running a structure as well as its physical layout and technical specifications." 358 F.3d 174, 198 (2nd Cir. 2004). EPA often uses performance standards to provide maximum flexibility to the regulated community with regard to how they choose to meet applicable requirements. Here, EPA's BTA impingement mortality standard represents permissible regulation of CWIS design and capacity. EPA would note that this rule does not require all existing facilities to retrofit to closed-cycle cooling or dictate what technologies a facility must adopt to meet the IM standard or when or how a facility may operate. Rather, for impingement mortality, the BTA standard requires compliance with one of seven alternatives, one of which includes use of a closed-cycle recirculating system. For entrainment, the rule adopts a site-specific approach except for new units. New units are subject to requirements based on closed-cycle cooling, but such new units typically do not involve retrofitting. With regard to the rule's inclusion of closed-cycle cooling (or the reduction in entrainment comparable to closed-cycle cooling) as the basis for new unit requirements, EPA has established and continues to maintain that flow volume is one aspect of the "design" and "capacity" of a CWIS and, as such, it may be addressed under 316(b). (See the discussions of EPA authority at 66 FR 65313-65314 (Phase I); and 69 FR 41629-41630 (Phase II).) The Phase I rule requirements are based in significant part on reductions in flow volume and that rule (except for restoration) was upheld by the Second Circuit in *Riverkeeper v. EPA*, 358 F.3d 174 (2nd Cir. 2004).

Environmental commenters including Riverkeeper, Inc., Natural Resources Defense Council, Sierra Club, Waterkeeper Alliance, Earthjustice, Environmental Law and Policy Center, Clean Air Task Force, Network for New Energy Choices, California Coastkeeper, Alliance, Soundkeeper, Inc., Delaware Riverkeeper Network, Save the Bay – Rhode Island, Friends of Casco Bay, NY/NJ Baykeeper, Hackensack Riverkeeper, Santa Monica Baykeeper, San Diego Baykeeper, Scenic Hudson, American Littoral Society, and Conservation Law Foundation (hereafter referred to as Riverkeeper) took a contrary view to the comments against the use of closed-cycle cooling presented above and maintained that in amending the CWA Congress was aware of the damage caused by once-through cooling, that EPA must establish BTA standards based on closed-cycle cooling , and the amended CWA establishes a technology-forcing framework that requires per Congress's specific intent uniform standards based on the performance of optimally operating plants (citing *Kennecott v. EPA*, 780 F. 445, 448 (4th Cir. 1985)). Riverkeeper further commented and cited cases in support of the assertion that it is permissible for BTA to have economic impacts and that standards are economically achievable even if they result in a high rate of closure. Other commenters asserted that EPA's 316(b) requires BTA, which consists of closed-cycle systems, and as such most power plants are in violation of the CWA.

EPA agrees that, in establishing section 316(b) requirements, EPA should take account of Congress' technology-forcing objectives. See *Entergy,* 556 U.S. 208, 235 (2009), J. Breyer concurring.[2] EPA also agrees that BTA regulations may impose some economic costs on a facility but does not agree that section 316(b) *mandates* closed-cycle systems for all existing facilities. As discussed in the preamble, the language of section 316(b) is silent regarding specifically how stringently cooling water intake structures must be controlled, only that their adverse environmental impacts be "minimized" and the Supreme Court has held that this gives EPA discretion to consider many factors. See *Entergy,* 556 U.S. at 222[3] in establishing 316(b) standards. And a standard that requires the establishment of BTA entrainment requirements in a site-specific proceeding fulfills EPA's mandatory duty to implement section 316(b) as held by the court that entered the original consent decree in the original mandatory duty case. Cronin v. Browner, 898 F.Supp. 1052, 1062 (In rejecting Intevernors' opposition to entry of the decree on the grounds that it would force EPA to propose generally applicable rules, thereby precluding EPA from determining that controls should be determined on a case-by-case basis, the Court disagreed saying "under the decree EPA could, if otherwise appropriate, propose and issue regulations that do not embody a generally applicable rule.") Based on the ambiguous language of 316(b) and its limited legislative history, EPA does not agree that Congress has expressed a clear and specific intent that 316(b) requirements must be expressed only as uniform national categorical technology-based standards. In *Entergy*, the Supreme Court held that the silence in section 316(b) conferred discretion on the Agency, not a prohibition to consider any particular factor.

Nothing in the CWA requires EPA to abandon a site-specific approach to 316(b) standard-setting. As the Second Circuit has made clear in the new facility Phase I rule, the agency was upheld on a case-by-case approach to standards for those facilities below the rule's 2 mgd DIF applicability. The court stated that 316(b) "…does not compel the EPA to regulate either by one overarching regulation, or based on categories of sources … or on a case-by-case basis…" *Riverkeeper, Inc. v. USEPA*, 358 F. 3d 174, 203 (2nd Cir. 2004). The court went on to observe that "[t]he Clean Water Act does not forbid the EPA from addressing certain environmental problems on a case-by-case basis where categorical regulation is not technologically feasible, or when it does not violate the statute's language and is otherwise consistent with Congress's overriding goal of improving the quality of the nation's waters" (internal citation omitted here). *Riverkeeper, Inc. v. USEPA*, 358 F. 3d at 203. This rule determines BTA for existing facilities and new units at existing facilities. Such BTA is based on the most effective technologies available to the extent that EPA was able based on the record to identify such technologies. As explained generally in the basis section of the preamble to this final rule, closed-cycle cooling is

---

[2] "The EPA's reading of the statute would seem to permit it to describe environmental benefits in non-monetized terms and to evaluate both costs and benefits in accordance with its expert judgment and scientific knowledge. The Agency can thereby avoid lengthy formal cost-benefit proceedings and futile attempts at comprehensive monetization, see *69 Fed. Reg. 41661*-41662 (2004); take account of Congress' technology-forcing objectives; and still prevent results that are absurd or unreasonable in light of extreme disparities between costs and benefits. This approach, in my view, rests upon a "reasonable interpretation" of the statute--legislative history included. Hence it is lawful."

[3] "The inference that respondents and the dissent would draw from the silence is, in any event, implausible, as *§ 1326(b)* is silent not only with respect to cost-benefit analysis but with respect to all potentially relevant factors. If silence here implies prohibition, then the EPA could not consider *any* factors in implementing *§ 1326(b)* --an obvious logical impossibility. It is eminently reasonable to conclude that *§ 1326(b)*'s silence is meant to convey nothing more than a refusal to tie the agency's hands . . ."

not the best technology available for existing facilities on a national basis based on consideration of all relevant factors. As described in the option selection discussion in the preamble, while EPA did consider costs, costs were not a dispositive factor in the decision to reject closed-cycle cooling as the basis for a uniform national BTA standard. EPA did not reject closed-cycle cooling here either because it was not economically achievable or because the costs of closed-cycle would exceed its benefits. Instead, EPA rejected closed-cycle cooling as the technology basis for a uniform national BTA entrainment standard based on a combination of three factors: land availability, air emissions, and remaining useful plant life. Further, once EPA has found that a "one-size-fits-all" approach is not feasible, it is appropriate to assess the required controls on a site-specific basis, including a consideration of costs and benefits. See *Entergy* 556 U.S. at 225-226, "But whether it is "reasonable" to bear a particular cost may well depend on the resulting benefits; if the only relevant factor was the feasibility of the costs, their reasonableness would be irrelevant."

Based on the performance capabilities of closed-cycle cooling, this rule does include closed-cycle cooling as a compliance alternative and the rule requires new unit performance to be consistent with closed-cycle cooling systems for the reasons explained in the preamble.

Riverkeeper in comments further argued that EPA's interpretation of "available" is unlawful because it is not permissible for EPA to reject any technology because it is not available to all facilities (citing 76 FR 22,203), as well as that EPA impermissibly rejected closed-cycle cooling as BTA and 0.5 ft/sec as a national impingement mortality standard because these were not available at all facilities.

EPA does not agree with these comments. As discussed in the proposed (76 FR 22196-22212) and final rule (see the legal authority and basis sections) preambles, EPA considered many factors in determining the BTA standards, including availability, feasibility, efficacy, costs (including economic impacts), and the location, age, size, and type of facility, as well as non-water quality effects of various technologies on energy production and availability, electricity reliability, and potential adverse environmental effects. EPA's consideration of these factors reflect the Agency's authority under section 316(b) and, as discussed in the proposed and final rule preambles, EPA has considerable discretion in balancing these factors. EPA has explained in the basis section of the preamble to the final rule that closed-cycle cooling is not the best technology available on a national basis because of land availability, increased air emissions and remaining useful life. Low velocity is also not the best technology available for reducing impingement mortality because it is not widely available. As noted, however, closed-cycle cooling is one of several technologies included to meet the impingement mortality standards of the rule, as is low velocity.

Riverkeeper comments maintained that regulation on a case-by-case basis has resulted in industry using its resources to overwhelm regulators, and assert that the case-by-case approach has generally prevented, delayed and weakened regulation, and ultimately perpetuated a status quo that is contrary to the goals of the CWA and requirements of 316(b). Riverkeeper comments suggested the case-by-case approach is arbitrary because it perpetuates an ineffective approach and that EPA's approach is not consistent with Congress's shift in focus in the CWA (and earlier water protection laws) from water quality to technology-based standard setting.

The final rule establishes BTA standards for impingement mortality and entrainment on a national basis. After careful analysis, EPA did not identify one technology or a combination of technologies that could or should uniformly be established as the technology basis for all facilities to minimize entrainment at existing facilities (see TDD Chapter 5). Consequently, EPA did not base the BTA standard for entrainment on a specific technology or technologies. See the preamble to the final rule.

As explained in EPA's option selection discussion in the preamble, for entrainment, there are a number of factors that make no one technology appropriate for all cooling water intakes. In many instances, technologies are simply not widely available. And since implementation of the Phase II rule that was remanded by the Second Circuit, EPA has learned that many of technology basis for that rule's entrainment requirements are not as effective as once thought for minimizing entrainment (see 76 FR 22185 discussing entrainment exclusion versus entrainment survival). Also see Section VI.E in today's preamble. The Phase II rule in large part was based on EPA's conclusion that there were, in addition to closed-cycle cooling, a number of other technologies that would achieve reductions in entrainment that were comparable to that achieved by closed-cycle cooling. Consequently, EPA required compliance with closed-cycle or achievement of a performance equivalent to that technology. As explained in the final preamble, since the Phase II rule, EPA has learned that the gap between the performance of the most effective entrainment reduction technologies (closed-cycle) and other less expensive technologies has widened significantly. Also see Essay 18. In the Phase II rule, EPA identified a suite of intermediate performing technologies that could be used to reduce entrainment. This suite of technologies included a wide variety of fine mesh exclusion technologies such as traveling screens, wedgewire screens and other passive screens, and filter barriers. While available performance data for entrainment reduction at that time were not as comprehensive as impingement data, EPA found that fine mesh wedgewire screens and fine mesh traveling screens have been shown to reduce entrainment compared to once-through cooling systems by 60 to 90 percent. EPA acknowledged that screening to prevent entrainment may cause impingement of those organisms instead. 69 FR 41599.

Since the final Phase II rule (2004) EPA has obtained additional performance data including studies documenting the survival of entrainable organisms that were impinged, or "converts." First, EPA found an average of 87 percent exclusion of eggs could be achieved by fine mesh screens of 0.5 mm slot size. The available data shows mesh sizes of 2.0 mm or greater were found to have no effect on exclusion of eggs. In response to comments, industry provided data showing limited select species of fish may have eggs near the 2.0 mm size. While EPA appreciates the data, the record still shows the overwhelming majority of eggs are collected by 0.5 mm mesh, and a negligible quantity of eggs are collected on a 2.0 mm mesh (see Essay 16 for more details). As discussed in the TDD Chapter 6, fine mesh is not feasible for many facilities, as replacement of coarse mesh by 0.5 mm fine mesh would require an increase in screen area of 5.2 to 10.3 times depending on intake velocity. Second, EPA found the performance of fine mesh screens to be generally poor for larvae, ranging from 15 to 23 percent exclusion, and with an average survival rate of roughly 10 percent. See TDD Chapter 6.2 for more information. EPA further found that intake velocity alone had low impact on survival of eggs and larvae because such early life stages have no avoidance response, little or no skeletal structure, and lack capability for mobility. In other words, eggs can't swim. Some commenters have hypothesized that low intake velocity could set up flow gradients where eggs are diverted around the CWIS. EPA disagrees, first noting that the density of eggs is so close to that of water that differential flow patterns are improbable. Second, based on technical survey data, the average intake velocity and intake volume are both sufficiently large that any diversion through differential flow would be irrelevant. However, to date EPA is not aware of any real data supporting the theory, and the commenter's theory is therefore rejected. In summary, EPA found that there are no high-performing or intermediate-performing technologies on which to base national entrainment requirements, and no entrainment control technologies that are widely available and feasible.

There is a second additional consideration that further required EPA to focus renewed attention on how widely available closed-cycle cooling in fact was. The Second Circuit decision in the Phase II rule removed restoration as a compliance option that EPA could consider. The decision underscored that restoration measures – one compliance option included in the Phase II rule – were not an available tool for complying with any 316(b) standard. However, at the time of the Phase II promulgation, EPA expected some facilities would use restoration in lieu of closed-cycle cooling, thus making closed-cycle or reductions commensurate with closed-cycle feasible (76 FR 41609). With the court decisions that restoration was not an available tool for compliance, compliance with a standard based on closed-cycle cooling alone is thus less feasible than EPA had expected at the time of the Phase II promulgation.

The changed landscape has narrowed markedly EPA's range of options with respect to the technology basis for today's BTA standards. The gap between the performance of the most effective entrainment reduction technologies (closed-cycle) and other less expensive technologies has widened significantly. EPA's narrowed range of compliance technology choices required EPA to look even more closely at the feasibility of closed-cycle cooling and reduced flow. As the Second Circuit has noted, EPA is clearly entitled to make its choice among alternative BTA technologies based on more factors other than just a technology's effectiveness in reducing impingement and entrainment. *id*. at 196. As noted, EPA has identified a combination of three factors as significant in its decision to reject closed-cycle cooling as the sole technology basis for a national BTA entrainment standard. Given that EPA has not identified a technology or combinations of technologies that EPA concluded is "best technology available" for minimizing entrainment at existing units, EPA has determined that a site-specific approach to regulating these facilities considering all relevant factors is the best solution for implementing section 316(b). Thus, to the extent possible based on the record, EPA has established national requirements that implement section 316(b).

EPA acknowledges that implementing aspects of the 316(b) regulations on site-specific basis presents certain challenges but does not agree that such an approach is ineffective. EPA adopted its BTA entrainment standard because it concluded that the appropriate way to determine that BTA entrainment requirements for a particular facility is after a structured, site-specific analysis of a number of factors, including, but not limited to, technical feasibility, costs, benefits, and non-water quality environmental impacts. Consequently, the final rule at 40 CFR 125.98(f)(2) requires the Director to consider, among other factors, the number and type of entrained organisms, technical feasibility, impact of changes in particulate emissions, land availability, remaining useful plant life and quantified social benefits and costs in determining appropriate BTA entrainment requirements. In addition, under 40 CFR 125.98(f)(3), the Director may consider other factors in establishing BTA entrainment requirements such as thermal discharge impacts, impacts on reliability of energy deliveries in the immediate area and others to the extent the permit applicant submitted information on these. The final rule establishes a structure for decision-making, information requirements, decision criteria, schedule and an overall process for assessing entrainment that will serve to guide permittees and permitting authorities in implementing the rule requirements and as a result EPA expects that the BTA standard's site-specific requirements can be implemented effectively. Additionally, EPA can develop additional guidance if necessary as rule implementation goes forward.

EPA is not responding here to each of the 46 "incorrect" arguments the comment indicates industry puts forth as part of 316(b) permitting because these arguments do not address specific aspects of the final rule but appear to address 316(b) permitting prior to this rule, but notes that this rule, provides a structured, transparent and fair way for all of the arguments presented by the commenters to be assessed by the permitting authority and will require the permitting authority to explain the factors that led to the permitting decision. EPA notes that some of these arguments pertain to section 316(a), which is not addressed in this rule. Also, EPA has tried, to the extent possible under a case-by-case approach, to shift the workload from the permitting authority. For example, for existing facilities that withdraw greater than 125 mgd AIF, the rule requires peer review of the technical feasibility and cost study, the benefits valuation study, and the non-water quality environmental and other impacts study to ensure their accuracy. Finally, EPA does not agree that this rule is so similar to the water quality approach used prior to the current CWA as to be ineffective. This rule specifies technology-based performance where reasonable and for site-specific determinations includes detailed information and performance requirements, as well as a decision-making process, evaluation criteria, and documentation requirements all of which is subject to NPDES public participation and administrative provisions. In addition, given the unique focus and objective of section 316(b) the rule's requirements will make clear to the permitting authority the environmental impacts posed by the particular CWIS at issue along with the costs of technologies and other relevant factors at the site.

Some commenters stated that, as proposed, impingement mortality requirements apply even if a facility has or proposes closed-cycle cooling. The commenters asserted that this appears unnecessary and redundant, since a closed-cycle cooling system will reduce impingement mortality and should constitute BTA. These concerns are addressed in the final rule. The final rule provides that a properly operated closed-cycle recirculating system meets the impingement mortality requirements.

Commenters also expressed some concerns regarding the definitions of certain terms. Some asserted that EPA's expansion of the definition of cooling water intake structure (CWIS), by saying that the CWIS extends up to and including "but not limited to" the intake pumps, results in a definition that is unlimited (i.e., could include the entire facility), is not explained (it is characterized as the same as the Phase I definition). Additionally, some commenters observed that the proposed definition of closed-cycle recirculating system (CCRS) is different than and far more restrictive than the definition used in the Phase I rule and thus us inconsistent with that definition and confusing. Commenters noted that the definition of CCRS includes only systems that withdraw makeup flow intermittently, are designed to operate above minimum cycles of concentration, reduce flow by a specified percentage (depending on whether salt of fresh water), and do not include cooling ponds that are waters of the U.S. These concerns are addressed in the final rule. The final definition of CWIS mirrors the Phase I rule and does not include the "but not limited to" language.

With regard to the definition of CCRS, the definition of CCRS in this final rule has changed somewhat from proposal. Under 40 CFR 125.92(c)(1), CCRS includes a facility with wet, dry, or hybrid cooling towers, a system of impoundments that are not waters of the United States, or any combination thereof. A properly operated and maintained closed-cycle recirculating system withdraws new source water (makeup water) only to replenish losses that have occurred due to blowdown, drift, and evaporation. If waters of the United States are withdrawn for purposes of replenishing losses to a closed-cycle recirculating system other than those due to blowdown, drift, and evaporation from the cooling system, the definition makes it clear that the Director may still determine a cooling system is a closed-cycle recirculating system if the facility demonstrates to the satisfaction of the Director that makeup water withdrawals attributed specifically to the cooling portion of the cooling system have been minimized. Under 40 CFR 125.92(c)(2),the definition clarifies that CCRS can include impoundments are not waters of the U.S. provided such impoundments were constructed prior to the effective date of the rule and must have been constructed for the purpose of a cooling system. The definition specifies appropriate documentation of the impoundment's purpose must be demonstrated to the satisfaction of the Director.

Based on public comments received by EPA, the final rule definition of CCRS does not prohibit continuous intake flows of water, as was proposed. EPA's intent is to make sure that closed-cycle systems not just built but then operated as a once through system (with the exception of impoundments which must have the project purpose documented as described above). The final rule definition does not include the proposed examples of flow reduction percentages (compared to a once-through system) and cycles of concentration (for cooling towers) that constitute minimized makeup and blowdown for salt and freshwater, respectively. While these examples should help permitting authorities assess a variety of cooling systems, and are therefore included in the preamble, the key evaluation is that a properly operated and maintained closed-cycle recirculating system withdraws new source water (makeup water) only to replenish losses that have occurred due to blowdown, drift, and evaporation. The final rule definition states this. The final rule definition of closed-cycle cooling also provides the permitting authority with some flexibility to determine that a cooling system that needs replenishment for losses other than those due to blowdown, drift, and evaporation from the cooling system, still comprises a closed-cycle recirculating system provided the facility demonstrates to the satisfaction of the Director that makeup water withdrawals attributed specifically to the cooling portion of the cooling system have been minimized. EPA concluded that these clarifications help define when cooling systems constitute a CCRS.

EPA received comments from Riverkeeper asserting that the Agency has a duty, under the Endangered Species Act (ESA) to consult with the Departments of Interior and Commerce to ensure that the 316(b) rule "is not likely to jeopardize the continued existence of any threatened and endangered (T&E) species or result in the destruction or adverse modification of critical habitat of such species." This essay responds to Riverkeeper's comments.

Under section 7 of the Endangered Species Act, each Federal Agency must insure that any action authorized, funded, or carried out by the agency "is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary, after consultation as appropriate with affected States, to be critical. . . .” In the case of any agency action that is likely to jeopardize an endangered species or result in destruction of critical habitats, the agency must consult with the concerned offices with responsibilities under the ESA, in particular, the National Marine Fisheries Services (NMFS) and the U.S. Fish and Wildlife Services (FWS) (collectively referred to as the Services).

In compliance with its obligations under the ESA, in July 2012, EPA began informal consultation with the NMFS about its proposed section 316(b) regulations. In October 2012, EPA began informal consultation with the FWS. As part of the informal consultation, EPA prepared a draft biological evaluation of the effects of this rule on T&E species. EPA concluded in the draft biological evaluation that the rule was not likely to adversely affect listed species or designated critical habitat due to the many beneficial effects on species, and concluded that the rule was not likely to adversely affect listed species or designated critical habitat. EPA, however, did not receive the Services’ concurrence with the Agency’s “not likely to adversely affect” finding. Consequently, on June 18, 2013, EPA requested formal consultation with the Services and submitted a final biological evaluation.

The Services’ final biological opinion found that the rule will not jeopardize the continued existence of threatened or endangered species or destroy or adversely modify a critical habitat. The final biological opinion is available in the record for today’s rule.

For additional information about the elements of the rule that protect listed species, please see the “Memorandum to the Record of EPA’s Final Regulations to Establish Requirements for Cooling Water Intake Structures at Existing Facilities and Amend Requirements at Phase I Facilities” (DCN 12–4543).

Finally, some commenters suggested that it is inappropriate to automatically give endangered and threatened species elevated status and consideration under the rule and that benefits to any threatened and endangered species should not be considered. These commenters argued that EPA has no basis for incorporating ESA requirements into the rule and regulating ESA species under the NPDES program (they maintained that the ESA operates independently).

EPA disagrees with these commenters. As threatened and endangered species and designated critical habitat (e.g., prey base) are among the species that can be impinged and entrained, EPA considers threatened and endangered species and designated critical habitat as relevant factors in case-by-case decision-making under section 316(b). EPA is not requiring state NPDES Directors to undergo ESA consultation for permit issuance; however, a fair consideration of costs and benefits by permitting authorities should include a consideration of the effects of impingement and entrainment on listed species and designated critical habitat (e.g., prey base). Protecting those species is a relevant benefit of controls. The rule does not give these species elevated status, but requires the permitting authority to consider those effects, along with other environmental effects as a relevant factor along with other relevant factors. In addition, the rule does not regulate ESA species under the NPDES program; instead, the rule addresses threatened and endangered species to the extent necessary to ensure this action is consistent with both the ESA, CWA section 316(b) and Administrative Procedure Act requirements. The ESA states that

Federal agencies shall, in consultation with the Service(s), insure that any action the agency authorizes, funds, or carries out is not likely to jeopardize any threatened or endangered species or result in the destruction or adverse modification of critical habitat. EPA consulted with the Services on this Federal action and as the Services concluded in their joint Biological Opinion, today's rule is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of designated critical habitat. As explained earlier, section 316(b) provides that any standard established pursuant to section 301 or 306 of the CWA and applicable to a point source must require that the location, design, construction and capacity of CWISs reflect the BTA for minimizing adverse environmental impact. Impingement and entrainment mortality have the potential to harm and kill threatened or endangered species and such impacts are clearly adverse environmental impacts, particularly given the protected status of these species. EPA's rule will be subject to the Administrative Procedure Act's standard of review - whether the rule is arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law. Therefore the provisions of the rule related to species exist to set forth a framework for decision-making that includes listed species and designated critical habitat as a relevant factor in case-by-case decision-making.

Essay 11: Proposed Amendments Related to the Phase I Rule

Introduction

Today's existing facility 316(b) final rule removes the restoration-based compliance alternative and the associated monitoring and demonstration requirements from the Phase I, new facility rule, and does not include restoration as a compliance alternative for existing facilities subject to regulation under section 316(b). These actions are based on the Second Circuit Court of Appeal's decisions in *Riverkeeper, Inc. v EPA*, 358 F.3d 174 (2nd Cir., 2004) and *Riverkeeper, Inc. v EPA*, 475 F.3d 83 (2nd Cir., 2007), both of which held in relevant part that EPA exceeded its authority by allowing Phase I (new facilities) and Phase II (large power producers) facilities to comply with section 316(b) through restoration measures.

Under compliance Track II in the Phase I (new facility) rule, a facility has the option of demonstrating to the Director that the control measures it employs will reduce the level of adverse environmental impact (AEI) caused by its cooling water intake structures (CWISs) to a comparable level to what would be achieved by meeting the Track I requirements. As part of this demonstration, Track II previously allowed a facility to make use of restoration measures. Today's rule removes that portion of 40 CFR 125.84(d)(1) and 125.89(b)(1)(ii) that allow for the consideration of restoration measures in demonstrating that impacts under Track II will be comparable to Track I. This change to the Phase I rule is based on the Second Circuit Court of Appeal's decision in *Riverkeeper, Inc. v EPA*, 358 F.3d 174, 191 (2nd Cir., 2004), which found that restoration corrects, but does not minimize AEI in the first place, and that it is not sufficiently related to the location, design, construction or capacity of CWISs to constitute best technology available (BTA). As a result, the Second Circuit held, in relevant part, that EPA exceeded its authority by allowing new facilities to comply with section 316(b) through restoration measures. The Supreme Court did not address the issue of restoration in *Entergy v EPA*, 556 U.S. 208, 129 S. Ct. 1498 (2009), thus, EPA is bound by the Second Circuit's decision on this issue. Today's rule also removes 40 CFR 125.86(c)(2)(iv)(C) [evaluation of proposed restoration measures], and 125.86(c)(2)(iv)(D)(2) [verification monitoring] since these are unnecessary given the removal of the restoration provision from the Phase I rule. Today's final existing facility rule does not include restoration as a compliance alternative for meeting BTA for the same reasons that it is being removed from the Phase I rule—EPA lacks authority to allow existing facilities to comply with section 316(b) through restoration measures.

Phase I

Commenters addressed certain aspects of the Phase I rule. Some commenters supported the change to the Phase I rule and stated the law is clear and restoration has not worked. Riverkeeper commented that it is not appropriate to use 90 percent of the level of performance achieved by a closed-cycle recirculating cooling water system as the benchmark for BTA and then allow an additional margin of error in measuring compliance with that benchmark. They asserted that a facility must aim for 100 percent of the performance level goal and that it would be acceptable if they only achieve between 90 and 100 percent of that goal. Other commenters suggested that EPA adopt the impingement mortality intake velocity standard and entrainment mortality closed-cycle cooling standard as BTA in the Phase I rule. Still other commenters asserted that, although

EPA indicated that under the proposal the provisions in the Phase I rule associated with restoration were removed, § 125.86(c)(2)(ii) has not been removed.

EPA is removing the restoration provision from the Phase I rule pursuant to the Second Circuit decisions discussed above. Comments that it is not appropriate to use 90 percent of the level of performance of achieved by a closed-cycle recirculating cooling water system as the benchmark for BTA, and that EPA should adopt the impingement mortality intake velocity standard and entrainment mortality closed-cycle cooling standard as BTA in the Phase I rule, are beyond the scope of today's final rule. The only aspects of the Phase I rule addressed by today's final rule are those provisions that address the use of restoration as BTA (under Track II). This rule does not reopen or alter the BTA standard established in the Phase I rule (EPA notes that the existing Phase I rule under Track I includes an intake flow and an intake velocity requirement). EPA notes that all other aspects of the Phase I rule were upheld in *Riverkeeper, Inc. v EPA*, 358 F.3d 174 (2nd Cir., 2004). With regard to § 125.86(c)(2)(ii), this sub-section has not been removed from the Phase I rule since it is not exclusively associated with restoration.

Restoration for Phase II and Existing Facilities

Some commenters suggested that restoration be allowed in a range of situations, including where a nuisance species is a problem that will get worse with the use of CWIS technology, where impacted species are not species of concern in man-made lakes, and to reduce the cost of meeting 316(b) requirements (i.e., offset losses).

Given the adverse court decisions in Riverkeeper I and II, EPA is not including restoration as a technology for meeting section 316(b) requirements. As discussed in the legal authority and basis sections of the preamble to the final rule, the Second Circuit twice found that EPA exceeded its authority by allowing facilities subject to 316(b) to comply with section 316(b) through restoration measures and, thus, regardless of these situations, EPA lacks authority to identify restoration as a compliance alternative for meeting 316(b) requirements. EPA notes that this rule does not focus on species of concern and that the impingement and entrainment requirements in this rule offer sufficient flexibility to address issues such as nuisance species (for example see § 125.92(b)) in the most effective manner possible.

Other commenters suggested that for existing facilities, the use of restoration should be allowed in conjunction with CWIS technology as a method for meeting the impingement mortality and entrainment mortality standards. Suggestions included that EPA allow a state to set or adjust site-specific impingement mortality standards that consider restoration projects. Commenters indicated that such an approach would avoid identifying restoration as CWIS technology (i.e., BTA) and would supplement technologies designed to minimize AEI. They maintained that restoration could be used to determine the extent of minimization required. In situations where impingement levels are low, the rule also could require a fee to fund habitat enhancement or the creation of hatcheries. Some commenters observed that a California Supreme Court decision (*Voices of the Wetlands v. State Water Resources Board, et al*., 257 P.3d 81 (August 15, 2011) [attached to original comments]) upholds the use of restoration not as BTA but to supplement technology and minimize AEI.

EPA does not agree that it can set standards based on restoration. EPA disagrees with comments that the combined use of technology and restoration is consistent with the Second Circuit decision. EPA acknowledges states may implement such measures in their programs (such as NJ) to supplement the final section 316(b) rules; such programs are beyond the scope of this rulemaking. EPA has set national impingement mortality requirements based on technologies that are well-demonstrated, available, and feasible based on information and data in the rulemaking record. As articulated by the Second Circuit, restoration is not a CWIS technology, it does not minimize AEI in the first instance, and it is not sufficiently related to the location, design, construction or capacity of CWISs to constitute BTA. Even where impingement levels are low[4], the Second Circuit has made it clear that restoration cannot constitute BTA regardless of the rate of impingement. Thus, restoration is not an appropriate basis for complying with either the impingement mortality or the entrainment standards.

Some commenters suggested that, for existing facilities, EPA should allow for restoration as part of a cost-benefit site-specific variance or a BTA variance procedure for impingement controls. These commenters encouraged EPA to allow for the use of restoration when the costs of meeting 316(b) requirements are wholly disproportionate to the benefits of doing so. Such commenters suggested that EPA provide a variance to those facilities unable to meet the impingement mortality requirements without incurring costs that are wholly disproportionate to the benefits of meeting the impingement mortality requirements and that such a variance allow for the consideration of restoration. They also suggest that EPA include in the rule a variance for facilities that have implemented restoration.

EPA does not agree that it has authority to allow restoration measures. Therefore any standard that includes restoration, such as the commenter's suggested approach in conjunction with a cost-benefit variance for impingement controls, is not authorized. EPA does not agree additional variances are warranted or necessary. For IM, EPA does not agree that additional variances are necessary because there are technologies that are demonstrated, available, and feasible. For entrainment at existing facilities, the Director must establish site-specific requirements at § 125.98(f) after reviewing the information submitted under § 122.21(r) and § 125.95. The Director must, under § 125.98(f)(2), consider quantified and qualitative social benefits and costs of available entrainment technologies when such information on both costs and benefits is of sufficient rigor to make a decision. To the extent the commenter is further suggesting cost-benefit be considered as a variance, see Essay 15. For new units and existing facilities, today's final rule at § 125.98(b)(7) allows the Director to establish alternative requirements the same way in which Phase I facilities may request alternative requirements. EPA concludes that any additional rule-specific variance would be superfluous.

Commenters also asserted that because under *Entergy* costs and benefits can be considered in determining the requirements that constitute BTA, the 316(b) standards may not actually result in application of the very best technology available and, thus, such commenters suggested that mitigation should be allowed to fill the gap. Other commenters argued that the Second Circuit's

[4] EPA notes that the impingement mortality performance standard in the final rule can apply to both low and high-flow in-scope facilities, and that the rule includes provisions that provide for no additional controls in situations where the Director finds that based on a review of site-specific data that there is a de minimis rate of impingement. EPA expects the provision will be rarely used. In contrast to Phase II where restoration was assumed to be a key component of the BTA standards, in today's final rule cost analysis EPA has not assumed any facilities would comply with the BTA standards through the de minimis provision.

analysis of restoration is incorrect, and the Supreme Court's *Entergy* decision provides EPA with some discretion to consider restoration as part of BTA.

EPA disagrees with both points. Today's rule establishes BTA for existing facilities based on EPA's consideration of all permissible factors, including cost and benefits. A facility subject to today's rule must meet these requirements to the extent applicable and, if it does so, it will fulfill the requirements of section 316(b). Whether a state chooses to require restoration measures in addition to the requirements of today's rule is beyond the scope of this rulemaking. The Agency does not agree that the Supreme Court's *Entergy* decision provides EPA with authority to consider restoration as BTA. The only issue reviewed and decided by the Supreme Court in *Entergy* was whether EPA could consider cost and benefits in determining applicable standards under 316(b). The issue of restoration was not accepted for review nor decided by the Supreme Court and, as a result, EPA is bound by the Second Circuit's decision with regard to restoration.

Commenters also asserted that for existing facilities, restoration should be a factor considered in the development of case-by-case entrainment standards. Commenters noted that the proposed entrainment standard identifies a minimum of nine factors that must be considered, including the impact of entrainment on the waterbody, and suggested that EPA should allow restoration to address entrainment impacts. Commenters stated that the proposed rule appears to allow for the consideration of restoration in the Benefits Valuation Study (§ 122.21(r)(11), see sub-section (iii)). They suggested that EPA should state that restoration should be considered in a cost-benefit analysis for entrainment reduction, and that the effects of restoration could be a factor considered in determining the technologies needed to address entrainment impacts.

Based on the Second Circuit Court of Appeal's decisions in *Riverkeeper, Inc. v EPA*, 358 F.3d 174 (2nd Cir., 2004) and *Riverkeeper, Inc. v EPA*, 475 F.3d 83 (2nd Cir., 2007), restoration cannot be used as a technology or requirement that is implemented under a NPDES permit to meet the BTA standards in section 316(b). This is separate and distinct from requirements to assess waterbody conditions and gather data to properly inform decisions regarding case-by-case entrainment requirements. Today's final rule provides for a case-by-case determination of BTA for minimizing entrainment. Such a case-by-case determination must reflect "…the Director's determination of the maximum reduction in entrainment warranted after consideration of the relevant factors as specified in § 125.98." One of the factors that may be considered under § 125.98 is "[e]ntrainment impacts on the waterbody." This is a reference to the entrainment associated with the CWISs at the relevant facility, and the impact such entrainment has on the aquatic health of the associated waterbody. Waterbody conditions may further be impacted by other uses of the source waterbody. The information requirements included in the rule require a description of the condition of the waterbody and, as an appropriate part of that description, would identify information regarding past mitigation efforts. Any such restoration or mitigation efforts cannot constitute, substitute for, or be a condition of BTA. EPA notes that § 122.21(r)(11)(iii) [Benefits Valuation Study] requires consideration of mitigation effort completed prior to the effective date of the final rule. This is because the focus of this assessment and the entrainment-related adverse impact is on the baseline waterbody condition, and therefore necessarily includes past mitigation efforts.

Some commenters requested that EPA clarify that mitigation is permissible outside of the BTA determination.

This comment is beyond the scope of this rule. EPA reiterates that this rule establishes requirements for meeting BTA requirements of CWA section 316(b). NPDES permit requirements beyond BTA are determined by other aspects of the NPDES program. Requirements or provisions beyond those imposed under the NPDES program are not the focus of this rule.

One commenter suggested that that excluding cooling water that is reused from section 316(b) requirements under § 125.91(c) and § 125.92 creates a loophole in the rule that is contrary to the objectives of section 316(b). This commenter raised this in the context of a desalinization plant co-located with a power plant in Carlsbad CA. The commenter asserts that routing water from a desalinization plant to a power plant indirectly allows after-the-fact restoration and it should be prohibited since restoration is not allowed under 316(b) and the biological impacts of intakes do not differ based on whether the intake is associated with a power plant or manufacturing facility. The commenter refers to information in its comment letter that indicates that the desalinization plant is permitted to withdraw more seawater (304 mgd) than the AIF of the power plant.

The language of the comment seems to indicate that in one example (Carlsbad CA) the desalinization plant withdraws water and provides water to a power plant, although this is somewhat unclear. A second example (Huntington Beach CA) follows EPA's general understanding that typically water that is reused goes from a power plant to a desalinization plant to allow the desalinization process to benefit from the heated water. A basic flow diagram of the Carlsbad facilities indicates flow (100 mgd) from the power plant to the desalinization plant (http://carlsbaddesal.com/desalination-plant). This also indicates a flow of 600 mgd into the power plant. Also see, http://www.waterboards.ca.gov/sandiego/board_decisions/adopted_orders/2006/R9-2006-0065_May_2010.pdf

Today's final rule promotes several forms of water reuse for the reasons discussed in the preamble. EPA does not agree that the provisions in § 125.91(c) and § 125.92 create a loophole that defeat the objectives of the rule since overall the amount of water reuse is limited relative to the amount of cooling water flow. Such reuse avoids new water withdrawals and therefore reduces the associated AEI. EPA disagrees this is restoration, as the water withdrawn for cooling purposes results in an actual reduction in AEI, and does not represent a mitigation effort. Based on the flow diagram referenced above, the Carlsbad power plant has 500 mgd of flow that is not reused by the desalinization plant and, thus is likely to remain subject to this rule. It is important to recognize that a desalinization plant that withdraws water is not subject to section 316(b), which focuses on cooling water intake structures. Thus, in the case of a stand-alone desalinization plant that facility would not be subject to water intake controls under this rule despite any AEI it may pose. Under today's rule the power plant could reuse the water from a desalinization plant, and in doing such would not be causing additional AEI.

Essay 12: New Data Used In Developing the Rule

EPA received numerous comments and data on specific aspects of EPA's analyses. These comments are addressed in other essays. This essay addresses comments received that provided highly specific corrections to data or documents provided in EPA's record, such as corrections to EPA's interpretation of state 316(b) policies and revised information on information collected during EPA's site visits or by the industry questionnaire, that are not addressed elsewhere. EPA also notes that it received data submitted by various stakeholders throughout the rulemaking process; refer to the docket for the final rule.

EPA appreciates the commenters' submittals and has either incorporated the revisions into the final rule or has considered the materials in its analyses for the final rule. More specific responses to some comments are provided below.

EPA appreciates the supplemental information provided regarding NJDEP's permitting program and NYSDEC's BTA policy. This information was not included in the preamble to the final rule, but has been corrected (as needed) in the support documents.

EPA also appreciates the information provided regarding specific facilities. Each of the comments has been addressed, as described below.

- Westchester RESCO's wedgewire screens: As the commenter noted, the TDD states the incorrect mesh size, but EPA's site visit report (DCN 10-6517) is correct. The error has been corrected in the final TDD. EPA has generally considered any mesh size 2.0 mm or smaller to be considered fine mesh, so the correction does not appreciably change EPA's characterization of this facility.
- LADWP's revisions to the site visit reports: EPA appreciates the commenter's additional revisions to the reports. Revised versions of these reports will be posted to the docket for the final rule.
- Technical information for the AES facilities: EPA notes that, in developing the engineering costs and determining a compliance response for model facilities, the data used were derived directly from the industry questionnaires, using information provided by the facility and reflective of operations at that time. However, two of the facilities mentioned by the commenter (Harding Street and Eagle Valley) completed a short technical questionnaire and any corrections to the facility data would not affect the costs for the final rule, as that data was not used in estimating compliance costs. (Please see the TDD for more information on how EPA used data from the detailed technical questionnaires to develop costs for model facilities.) For the third facility (Petersburg), EPA reviewed the industry questionnaire and confirmed that the survey marked the cooling system as "once-through only," although it appears that a checkbox for "once-through with non-recirculating towers" was whited out. A review of the facility's flow diagram confirms that Units 3 and 4 appear to use cooling towers, but also indicates that the makeup water withdrawals for those units comes from the discharge canal for the once-through units; as a result, EPA has updated its characterization of the facility from a

once-through cooling system to a combination cooling system. However, there is no resulting change in the estimation of compliance costs for this facility, as the number of intakes (one) and the volume of water withdrawn from the surface water is unaffected. Lastly, the actual intake flow (AIF) used for Petersburg was also taken from the questionnaire. This data was for the years 1998-2000 and varies by only 23.5 million gallons per day (approximately 7 percent of the AIF), which is not a sufficient difference to appreciably affect EPA's estimates of the compliance costs.

Essay 13: Possible Differences between Generators and Manufacturers

Many manufacturing stakeholder commenters expressed concern that EPA failed to take into consideration many of the differences between power generators and manufacturers during the development of the proposed rule.

Introduction

In the proposed rule and NODAs, as well as the TDD for the proposed rule, EPA provided descriptions of the power generation industry and sectors of the manufacturing industry and how the compliance requirements, technologies, and costs apply to each. This essay addresses public comments regarding the description of the industry, the differences between power generators and manufacturers, and the application of compliance requirements, technologies and compliance cost assumptions. In particular, many manufacturing industry commenters were concerned that EPA relied upon data from the power industry and simply transferred many of the compliance and costs assumptions originally applied to generating facilities in the now-withdrawn Phase II rule to manufacturing facilities without consideration of the differences between these industries. The main thrust of the arguments is that EPA must allow for sufficient flexibility in application of the final existing facility rule to account for differences in operation and water use between power industry and manufacturers and between different manufacturing sectors. Commenters maintain that simply stating a water intake is a water intake is not sufficient.

EPA has considered the differences between generators and manufacturers and has addressed these differences by (1) using a model facility approach in developing the compliance costs, and; (2) by allowing facilities the choice of complying with the impingement mortality BTA standard at the facility level or by individual intakes, and; (3) by providing compliance flexibility by identifying several alternatives that have each been demonstrated to achieve or exceed the impingement mortality BTA standard. Further, for entrainment, the final rule establishes a BTA standard for entrainment that requires the determination of required entrainment reduction measures in a structured site-specific permitting proceeding. EPA disagrees that there are numerous significant differences between power plants and manufacturing facilities; see TDD for a profile of cooling systems, types of intake structures, and technologies in place. EPA has determined there are not significant differences between generators and manufacturers with respect to the design and functionality of cooling water intakes. When manufacturers withdraw cooling water for the purposes of power generation, there are no significant differences. Where cooling water is withdrawn by manufacturers for process cooling, some minor differences may be observed and are generally related to factors such as the intake water volume, changes in volume requirements over time, and subsequent (i.e., “downstream” of the intake structure) uses and are not related to factors that affect the ability to comply with the final rule requirements. EPA considered and evaluated subcategorization based on industry type and found that manufacturers use essentially the same intake technologies and cooling system types as electric generators and concluded that there are no data suggesting that manufacturers should be addressed separately on the basis of intake or cooling system technologies or availability. In site visits and through data collection, EPA found manufacturers more often withdraw water for non-contact cooling water purposes (e.g., contact cooling water or process water) from the same intake structure. Since contact cooling and process water use may not be amenable to flow reduction through a technology such as closed-cycle cooling, entrainment requirements for flow reduction can only apply to non-contact cooling water; the final rule does not apply to contact cooling or process water withdrawals. See TDD Chapters 4 and 5 for additional discussion of differences and similarities between generators and manufacturers.

EPA has provided sufficient flexibility and site-specific considerations within the compliance options available in the final rule to accommodate any minor differences between generators and manufacturers and between manufacturing facilities in different sectors. In fact, many manufacturers may have more compliance strategies available to them than power generators because they have the ability to reduce cooling water withdrawals by reusing cooling water as process water; generators typically have smaller process water requirements and would therefore not be able to achieve a significant reduction in withdrawals through water reuse. With respect to entrainment, the entrainment requirements will be established on a site-specific basis, allowing the Director to take into consideration the sort of facility and site-specific circumstances and differences cited by the comments.

Background/History

Under the 316(b) Phase I New Facilities Rule, both new electric generating facilities and new manufacturing facilities with a design intake flow greater than 2 mgd and cooling water comprising greater than 25 percent are required to comply with the rule requirements and are regulated in a similar manner. In response to the remand of the Phase II and Phase III Rules, EPA revisited the regulations for existing facilities and decided to regulate both large flow and small flow electric generating facilities and all manufacturing facilities under this single Existing Facility Rule. See Section II of the final preamble for a more detailed discussion. Throughout the regulatory effort the primary difference between electric generating and manufacturing facilities with regard to cooling water intakes and impingement mortality and entrainment mortality observed by EPA is the different distribution of intakes by size.

Analysis of Information for the Existing Facilities Rule

Some commenters expressed concern that EPA had visited many power generating facilities but not many manufacturing facilities and that it was unclear how many manufacturing facilities EPA had visited. EPA disagrees that it did not visit many manufacturing facilities. During 2009 and 2010, EPA visited eight manufacturing facilities in order to better understand the cooling water intake structure (CWIS) technologies in use at manufacturing facilities, including the site-specific characteristics of each facility and how these may affect the selection and performance of CWIS technologies. EPA also visited these facilities to better understand cooling water use and specific issues or technologies that can affect 316(b) compliance. The different types of industrial facilities visited included petroleum refining, steel manufacturing, chemical manufacturing, and food processing. EPA also collected additional data for pulp and paper manufacturing and aircraft engine manufacturing during meetings with facility representatives at EPA Headquarters. These site visits and meetings provided EPA with additional knowledge of any potential differences between power generating and manufacturing facilities, the differences between different types of manufacturing facilities, the unique circumstances relevant to each type of manufacturing facility, and how each factor could play a role in determining BTA. As a result of this effort, EPA gained a thorough understanding of the differences between how water is used at power generating and different types of manufacturing facilities and also confirmed that the intakes themselves and the technologies used did not differ significantly in design, operation, or function. EPA considered this information during the development of the final rule. For more information regarding the site visits conducted and information obtained see TDD Chapter 2.

EPA's data shows that many manufacturers use cooling water exclusively for power generation, and in such cases generators and manufacturers are virtually identical. In other cases, power generating and manufacturing facilities may use water differently (e.g., manufacturing facilities tend to use more process water and contact cooling water) and may have different operational considerations. However, all cooling water intakes serve a similar function and EPA found that the intake designs and technologies used at electric generating facilities were also found to be used at manufacturing facilities and vice versa. For example, three fourths of both generators and manufacturers use a single cooling water system (TDD 4-13). EPA further found that relative intake flows for generators and manufacturers are similar (59 percent and 54 percent of DIF withdrawn, respectively) (TDD 4-4). See TDD Chapter 4.0 for further examples and detailed analysis. The differences in water use do not impact the availability of certain types of controls that serve as the basis for the impingement mortality controls, mortality reduction technologies or their efficacy. For example, screening technologies are used by over 1000 generators and manufacturers alike, see TDD 4-19. The small differences in water use may impact the availability of certain flow reduction operational measures and technologies, such as closed-cycle cooling[5]. According to EPA's survey, the most pronounced difference EPA observed between power generating and manufacturing facilities is that manufacturing plants were less likely to have any technologies to reduce impingement and entrainment. The second observation EPA made regarding intake characteristics was that a larger proportion of manufacturing facilities had smaller design intake flow volumes and were more likely to have a lower intake velocity (TDD 4-17, see below for more discussion). However, not all manufacturing facility intakes have lower flows, as EPA has estimated that the average manufacturing facility design intake flow is still more than 94 mgd (see TDD Exhibit 4-5). Just like power plants, there is a wide range of intake flows observed at manufacturing facilities. Manufacturing facility intakes also tended to have lower through-screen velocities, fewer systems with fish returns and employed more passive screen technologies (see TDD Exhibits 4-17 and 4-19). EPA notes that controls on smaller intakes will tend to cost less and may give the facility greater opportunities to use alternative compliance technologies[6]. Intakes with lower screen velocities may be more capable of meeting the low velocity IM compliance alternative. Passive screens however, may be more costly to upgrade to traveling screens since there may be significant engineering necessary to convert from passive screens to traveling screens. EPA included these considerations in the development of the compliance costs estimates (see TDD Chapter 8).

[5] For example, process and contact cooling water generally are not amenable to flow reduction through closed-cycle cooling. However, higher proportions of process and contact cooling water at manufacturing facilities do provide greater opportunity for employment of water re-use flow reduction strategies. See also additional discussion in the TDD, for example at 5.3.2 and 8.3.1.

[6] For example, the availability of low velocity intake technology such as T- screens, expanded intakes, additional offshore intakes, and wedgewire screens may be greater since the footprint and water depth requirements of smaller intakes would allow placement near or adjacent to shore where additional screens or intakes would be easier to install and less likely to interfere with navigation.

Several commenters pointed out that EPA has ignored the differences between the power industry and manufacturing industries that justified EPA's different compliance approaches in Phases II and Phase III. They stated that EPA has provided no new justification for altering the previous approach and request that manufacturers should continue to be regulated on a site-specific basis as in Phase III suggesting that EPA should drop manufacturing facilities from the scope of the rule. They also note that total industrial water use on a percentage basis is small enough not to have an overall adverse environmental impact in the U.S. They also note that the costs of the impingement mortality controls and entrainment requirements are wholly disproportionate to the benefits. EPA disagrees with commenter assertions that applying the existing facility rule BTA requirements to both manufacturing and generating facilities is not justified. EPA did, in fact, consider a compliance option at proposal (Option 4) that was modeled on such an approach that would have established site-specific BTA requirements for the majority of manufacturing facilities which have a design intake flow (DIF) of less than 50 mgd. The two main differences between Option 4 and today's final regulatory option for existing facilities are that today's' rule requires facilities subject to this rule to meet IM performance standards and that the site-specific entrainment determination be performed in a structured way with consideration of appropriate information and specific factors. With respect to the requirement to meet the IM performance standard, EPA based the BTA IM standard on the performance of traveling screens for all facilities subject to today's rule (i.e., in scope generators and manufacturers). EPA concluded that this technology is effective, widely available, feasible, and does not lead to unacceptable non-water quality impacts. Furthermore, the inclusion of seven IM compliance alternatives provides a high degree of flexibility. For more discussion, see Essay 19. With respect to the structured site-specific entrainment determination, EPA similarly finds that approach is flexible enough to apply to all facilities subject to today's rule.

EPA disagrees that total industrial water use on a percentage basis is small enough not to have an overall adverse environmental impact in the U.S., as EPA has already identified numerous case studies where a single facility was causing an adverse environmental impact. In addition, at least 14 percent of manufacturers below 50 mgd withdraw more than 5 percent of the mean annual flow (MAF) river; in Phase II, the 5 percent MAF criteria was used as one indicator of cooling water intake structures having an adverse environmental impact. Even at 20 mgd, there are 17 facilities that withdraw more than 5 percent MAF, and another 11 which withdraw from small unnamed or unknown source waters. Thus one fourth of the 116 facilities under 20 mgd exceed 5 percent MAF. The EPA concludes that such flows are not small flows or low flows. Further, cumulative impacts of facilities with DIF below 50 mgd are significant in most of the U.S. At least 54 percent of withdrawals by just those facilities with DIF below 50 mgd are cumulative withdrawals, i.e., there are withdrawals by more than one facility on the same river segment. See TDD Chapter 4 GIS overlays of co-located facility intakes, Essay 14, and TDD Chapter 5 for more information.

Commenters have asserted that EPA has relied mostly upon data and analyses for power plants and have simply applied the results to manufacturers without considering the differences. They assert that EPA has established separate effluent guidelines for the many different industries included in this rule as well as different electricity-generating power plants and that this rule essentially lumps them all into one without consideration of the differences. EPA agrees that many of the intake technology applications and cost modules used for the installation and operation and maintenance of the technologies upon which the impingement mortality requirements were based in the final rule were adapted from those developed for the Phase II Rule. EPA found that manufacturers use essentially the same intake technologies and cooling system types as electric generators (see TDD Chapters 4 and 5) and commenters have not presented any specific data explaining why the technologies used at generating facility intakes cannot be used at manufacturing facility intakes. The primary reason that the same technologies are used at both generating and manufacturing facilities is that at both types of facilities the intakes serve the same function and purpose. In all cases, the primary function and purpose is to make available a continuous supply of water that is relatively free of debris that may interfere with downstream uses of the water. EPA agrees that there are small differences between power generating intakes and manufacturing intakes with regard to the frequency and distribution of technologies used, but no single intake technology is unique to one or the other. EPA recognizes that the availability, efficacy, and relative cost of each technology will vary from site to site and accounted for this variation by providing facilities with multiple alternatives for complying with the impingement mortality BTA standard that allows a facility to choose from a wide variety and mix of technologies and operational measures (see Section VI of the preamble). EPA also accounted for these differences in the compliance cost analysis. Compliance technologies are selected for the model facilities based on site-specific parameters (see TDD Chapter 8). Differences in the distribution and availability of technologies prompted EPA to revise the cost methodology to reflect these differences. EPA found that manufacturing intakes tended to use passive technology more frequently and traveling screens less frequently. Originally, in the proposed compliance cost estimates, EPA assumed that even facilities without traveling screens could easily upgrade to traveling screens. EPA realized that intakes that do not currently use traveling screens may not be able to simply replace existing screens with traveling screens and revised the technology selection methodology for the costs estimates such that a more costly technology such as new larger intake or wedgewire screens would be selected at any intake that did not have existing traveling screens. See Essay 21 and TDD section 8.2.2.1 for a more detailed discussion. With respect to the comment that EPA extrapolated the environmental impacts of larger flow power plants to manufacturing facilities, EPA disagrees. EPA has more than 40 biological studies from facilities below 50 mgd in the record.

Several commenters expressed concern that EPA did not consider that manufacturers cannot simply stop production or curtail operations the way power generating facilities that operate on the "grid" can. EPA agrees that the ability to avoid interruptions in plant operation due to construction downtime can be site-specific. In most instances, EPA found that plant operators would develop specific solutions in the event any downtime is necessary. For example, some manufacturers can coordinate installation downtime with other scheduled outages, can purchase or obtain power and/or steam from other nearby sources at a cost far less than stopping production, and can stockpile intermediate products to allow a phased approach to installing control technologies at individual unit operations. During site visits and in discussions with plant operators, EPA confirmed that for most manufacturing plants, a solution can be engineered that would avoid any incremental downtime at most sites. Further, where necessary, such interruptions can be taken into account by the permit writer in its site-specific consideration of entrainment controls. In terms of compliance with the IM requirements, EPA expects this downtime, if any, is addressed by the timelines contemplated by the rule. During the period when the facility is collecting and submitting materials under this timeline, the final rule at § 122.21(r)(8) ensures both the owner or operator and the Director will have an understanding of future operational schedules and can coordinate the installation of technologies with planned shutdown activities. Also see Essay 35.

Commenters have noted that total manufacturing facility withdrawals are only about 10 percent of the total for the electric generating industry. EPA agrees with this estimate but has determined that this factor does not warrant separate treatment with regard to regulating impingement and entrainment. There are large and small intakes within both groups and EPA has concluded that size alone does not always correlate to relative impacts. As already discussed above a manufacturer could be located on smaller water where even a smaller amount of intake will have some environmental impact. Commenters also neglected to acknowledge cumulative impacts from multiple users of a given source waterbody.

Commenters noted that manufacturing facilities which compete in a global economy cannot pass costs on to consumers as readily as power generators can. EPA acknowledges these concerns and did treat manufacturing facilities differently in the economic analyses. In the economic analysis EPA assumed no cost pass through for all manufacturing facilities (see Essay 47). Even under such conservative assumptions, the EPA found that only one facility experienced a cost to revenue ratio greater than 1 percent. For generating facilities, EPA took different approaches concerning cost pass through depending on the analysis being performed. See the EA for a more detailed description.

EPA also addressed the differences between power generating and manufacturing facilities in assessing the impact of social costs in the economic analysis. See the EA for a more detailed discussion of social costs.

A commenter noted that flow reduction may create problems with concentration based compliance limits for mixed cooling and process water discharges. EPA agrees that there may be a limited number of instances where such a problem may be encountered but notes that NPDES permit limits tend to use mass-based limits in order to avoid discouraging flow reduction or encouraging dilution. EPA notes that facilities have seven IM compliance alternatives and that flow reduction is not required by any facility, unless it elects to comply via that approach. The Director has been given wide discretion with regard to entrainment reduction requirements and EPA would expect Director's to include consideration of this issue in the determination of flow reduction requirements.

A commenter noted that the steam electric industry has significant experience with CWIS issues, including a wealth of site-specific data, while the other segments typically do not. EPA agrees that there may be significant differences in the amount of technical knowledge and biological data collected between these industries, especially between power generators covered by the Phase II Rule and manufacturers. Recognizing that some facilities may need additional time to conduct technology assessments and collect biological data, the rule included several provisions that provide flexibility for the permit application requirements. See Section VIII for more details. On the other hand, EPA's compliance costs for manufacturers may be overstated since the industries will be able to benefit from cost effective solutions already developed or under development by power generators.

One commenter noted that the proposal preamble at page 22190 incorrectly stated that the Effluent Guidelines for the Steelmaking subsector of the Iron and Steel ELG require no discharge of process pollutants. They point out that only EAF utilizing semi-wet gas cooling systems are restricted to no discharge and suggest that EPA perform additional evaluation of the steel industry, and other non-electrical generating industries to better understand water use. Since proposal as described above, EPA visited numerous manufacturing facilities of different types including two steel making facilities. EPA has revised the preamble discussion regarding steelmaking regulations and water use and considered the information obtained from the site visits during the development of the final rule.

One manufacturing commenter stated that they spent over $250,000 (not including I&E or thermal studies) amassing information requested as part their NPDES permit renewal and despite the data submitted the permitting authority compared their small generating unit to a large generating plant in the region and reached incorrect conclusions regarding the feasibility of closed-cycle cooling as an entrainment control option. EPA notes that the commenter is describing a site-specific determination of entrainment requirements conducted by the permitting authority and that today's final rule provides a structured approach that will allow a manufacturing facility to provide information specific to it and for the Director, as appropriate, to consider the information. A commenter stated that EPA admits that it does not fully understand key issues associated with manufacturing sites citing EPA's statement that "EPA has observed significant water reuse at manufacturing facilities, but has not developed national level data for such reuse due to the range of different manufacturing sectors and the significant variability in manufacturing processes (during site visits, it was observed that complex facilities have found it difficult to assess their specific water reuse)." EPA disagrees that failure to develop national level data for water reuse practices means that EPA is unable to make policy decisions about the appropriate way to control cooling water intakes at manufacturing facilities. As discussed in the proposal 76 FR 22200 and the final rule preamble section VI, EPA has sufficient information in the record to demonstrate the widespread use of these technologies. For example, 313 facilities have intake velocity below 0.5 fps; 1054 facilities already employ some form of traveling screen plus 168 of these facilities already have a fish handling and return system; 235 use passive screen technologies; 80 facilities already have behavioral deterrent systems; 400 facilities already have closed-cycle cooling. See TDD Chapter 4 for more information. For specific information regarding achievability of the IM performance standard using modified traveling screens, see the TDD Chapter 11 and the June 2012 NODA.

EPA notes that the degree of water reuse can be relevant in determining whether a facility meets the 25 percent cooling water criterion for facilities that fall within scope of the rule[7] and in assessing flow reduction in determining entrainment reductions. Under the final rule these determinations are performed on a site-specific basis and therefore the specific situation at each facility will be assessed independently at that time. The degree and nature of water reuse downstream of the cooling water intake generally does not provide any less opportunity for a manufacturing facility to comply with the impingement mortality BTA requirements than a generating facility with similar intake characteristics. In fact, since manufacturing facilities tend to have greater opportunities to employ water reuse than generating facilities, they also tend to have greater opportunity to utilize compliance strategies that rely upon flow reduction which

[7] Cooling water that is reused for another purpose is excluded from the definition of cooling water.

may assist in complying with the IM low velocity compliance alternative or provide credit for reduction under the system of technologies compliance alternative.

A commenter submitted the report, "Freshwater Use by U.S. Power Plants: Electricity's Thirst for a Precious Resource." EPA welcomes this data and assessment of current and future water use by power generators in the United States. The report does suggest that water stress related to water consumption could be an issue in the future at many locations but the report does not comment on the rule and EPA finds nothing in this report that is in disagreement with EPA's general assessment or regulatory approach. With respect to the site-specific evaluation of controls for entrainment, the rule provides for consideration of consumption issues. (See Essays 17A and 19, as well as DCN 12-6673.)

Where difference may exist, EPA has taken into consideration the differences between generators and manufacturers and differences between manufacturing sectors by structuring the final rule to account for the wide variety of site-specific technology designs by allowing for IM compliance flexibility enabling each facility (each intake if necessary) to tailor the compliance technologies to specific site conditions. IM compliance alternatives include several compliant technologies (closed-cycle, low intake screen velocity, existing offshore velocity caps), streamlined monitoring for modified traveling screens, and employment of a system of technologies in which the aggregate combined performance are demonstrated to be equivalent to the BTA technology. Facilities may also choose to comply with the IM numerical limit via biological monitoring. See Essay 16 and Section VI of the preamble for more details. Also, manufacturing facilities that are able to increase cooling water reuse such that more than 75 percent of the water withdrawn is not used for cooling purposes[8], may no longer fall within the scope of the final regulation and would not be subject to the requirement of the final rule. Those manufacturing facilities that employ cooling water reuse may take credit for this reuse through the "system of technology" compliance alternative.

In developing the compliance cost estimates EPA used the model facility approach to address the differences between facility intakes. EPA did address the differences in costing approach for CCRS, downtime, default values, and new units. See Essay 21 for a discussion of manufacturing facility closed-cycle costs and Essay 35 for a discussion of manufacturing construction downtime.

In conclusion, the final rule has carefully included consideration of the differences between power generation facilities, manufacturing facilities and the differences within the manufacturing sector as well with regard to water use, intake design and technologies, operational considerations, economic considerations and ability to comply with the rule. By providing flexibility with regard to compliance alternative, EPA has enabled facilities with different facility-specific conditions to choose a compliance option that best suits the unique conditions at each facility.

[8] Note that cooling water that is reused for non-cooling purposes does not meet the definition of cooling water.

Essay 14: Scope and Applicability

Introduction

The scope, applicability, and basis for the final rule are largely unchanged from that of the proposed rule. In response to comments, the final rule does, however, include some minor changes to regulatory definitions that clarify the scope of this rule.

As discussed in the preamble to the final rule and provided in Subpart J at 40 CFR 125.91, this rule applies to existing facilities (as defined in 40 CFR 125.92(k)) that are point sources under the Clean Water Act, use or propose to use one or more cooling water intake structures (defined at 40 CFR 125.92(f)) with a cumulative design intake flow (DIF) of greater than 2 million gallons per day (mgd), that withdraw water from waters of the United States, and use twenty-five percent or more of the water withdrawn exclusively for cooling purposes on an actual intake flow (AIF) basis. The rule defines DIF and AIF at 40 CFR 125.92.

In general, an "existing facility" means any facility that commenced construction on or before January 17, 2002, (or July 17, 2006 for an existing offshore oil and gas extraction facility) and any modification of, or any addition of a unit at such a facility. Today's final action does not affect the scope and applicability of Subpart N (new offshore oil and gas extraction facilities) or Subpart I (new facilities). Subpart J applies to all existing facilities meeting the definition in this subpart. The applicability provision at 40 CFR 125.91(d) makes it clear that Subpart J does not apply to existing facilities that are seafood processing facilities, offshore liquified natural gas terminals, and offshore oil and gas extraction facilities. The final rule also defines new units at existing facilities. See Essay 20 for response to comments on the technology requirements for new units.

See the preamble to the final rule for a detailed discussion of the scope of this rule, including the following subject areas: general applicability, existing facility, cooling water, cooling water intake structures (CWIS), point source discharger, withdrawals from waters of the United States, use of independent suppliers, intake flow thresholds, existing offshore oil and gas facilities, existing offshore seafood processing facilities, liquefied natural gas (LNG) terminals, and new units.

General Applicability

Clarify Applicability /Exclusions

Commenters requested that, in the final rule, EPA clarify certain basic aspects of the applicability of the rule. Some commenters requested that EPA clarify the applicability provisions of the rule, specifically whether the rule is limited to steam electric and manufacturing facilities or also includes facilities such as hospitals and schools. Some asked how facilities with multiple units with different types of cooling are addressed (including with one or multiple CWISs). Some commenters want EPA to clarify that the rule applies only to cooling water intake structures that are actually used to withdraw cooling water. Commenters also suggested that EPA clearly state that portions of a CWIS that are downstream of a screen with through screen velocity less than 0.5 ft/sec are not subject to the rule. Some asked EPA to clarify whether monitoring provisions (§ 125.96(a)(1)) authorize multiple compliance points or whether the NPDES permitting authority has discretion in establishing monitoring points. Some commenters also requested that EPA define the terms “unit,” “operating unit,” “contact,” “non-contact,” and “process water.”

EPA has described the applicability of the existing facility rule in the scope section of the preamble to the final rule. The regulation at § 125.91(d) clearly specifies which existing facilities are not subject to Subpart J. This rule applies to any facility that meets the applicability criteria for the rule at § 125.91(a) and therefore it is not limited to steam electric and manufacturing facilities.

In cases where a facility has multiple cooling water intake structures, under 40 CFR 122.21(r)(6) of the permit application, the owner or operator must identify the chosen impingement compliance method for the entire facility under 40 CFR 125.94(c) or alternatively, the permit application must identify the chosen compliance method under for each cooling water intake structure at the facility. Each intake used for cooling water withdrawals is subject to section 316(b). The rule includes several alternatives for meeting impingement mortality requirements. In the case of the impingement mortality performance standard alternative, the standard may be implemented on a facility or intake basis. Thus the rule provides flexibility to an in-scope facility to select an impingement compliance approach that accounts for multiple units or multiple intakes.

The rule does not require the all facilities to identify entrainment controls in the permit application because the BTA for entrainment will be determined by the Director on a case-by-case basis. The final rule establishes a framework for facilities to submit studies to the Director to inform the determination of BTA for entrainment. In the case of facilities with AIF greater than 125 mgd, however, such facilities must provide relevant information on candidate entrainment control technologies and information on entrainment measures already in place with at their facilities. Such information is required under § 122.21(r)(9)-(12). For facilities below this threshold, the Director has the discretion to request whatever information is necessary to make the entrainment determination.

All facilities that have a cooling water intake structure are subject to section 316(b) of the CWA. Existing facilities that are not subject to the national BTA standards at 40 CFR 125.94 must meet requirements under section 316(b) that are established by the NPDES permitting Director on a case-by-case, best professional judgment basis as the final rule at 40 CFR 125.90 makes clear. The final rule establishes national BTA standards for existing facilities that use one or more CWISs to withdraw greater than 2 mgd of cooling water and meet other criteria. As discussed in more detail below, EPA established this threshold for applicability of the final rule BTA based on data showing a 2 mgd threshold addresses the vast majority of cooling water flows (i.e., 99.7 percent). The record shows that the BTA standard for impingement mortality controls is achievable for all in-scope facilities and controls to meet the standard are widely available; see the preamble for more details. Certain aspects of the rule are addressed to facilities with the largest intake structures and largest cooling water intake flows. For example, there are more detailed permit application requirement for facilities above 125 mgd. The additional data required for these permits is necessary to assist the Director in the site-specific decision-making required by the BTA standard for entrainment to develop the specific entrainment requirements applicable to such facilities. Facilities withdrawing fewer than 125 mgd are not required to submit this information unless it is requested by the Director. In the case of these smaller flow facilities, the EPA concluded that the Director would not necessarily need this additional information in order to establish BTA entrainment requirements.

With regard to an intake that does not withdraw any cooling water but is at an in-scope facility, EPA agrees such an intake is not subject to requirements under this rule as long as it does not withdraw cooling water. For example, an intake that does not withdraw water for cooling, such as an auxiliary intake used exclusively for fire suppression, is not subject to section 316(b).

Some commenters appear to be confused about the difference between section 316(b) requirements and the uniform requirements established by this rule. Section 316(b) of the CWA requires that all intakes at existing facilities that withdraw water for cooling are subject to section 316(b) requirements. Only those facilities meeting the applicability criteria at 40 CFR 125.91(a), however, are subject to the standards established in the final rule. All other existing facilities that do not meet the applicability criteria at § 125.91(a) will continue to be subject to section 316(b) requirements developed by the NPDES permitting authority on a case-by-case, BPJ basis.

EPA disagrees that a facility with low intake velocity should be automatically exempted from the rule. While low intake velocity is a compliance alternative for the IM performance standard, EPA's record shows that low intake velocity has no significant effect on entrainment. In particular, eggs and early life stages of larvae have no avoidance response or mobility, therefore a low velocity is not protective of these organisms. The Director must consider whether additional controls for entrainment still need to be developed at a facility that already meets the IM performance standards when the Director is making the site-specific determination of BTA entrainment requirements required by this rule.

Under the final rule, portions of a CWIS that are downstream of a screen with through-screen velocity less than 0.5 ft/sec would be able to comply with the IM performance standard via the low velocity compliance alternative. EPA has removed the additional provisions for entrapment from the final rule. However, where a facility elects to comply with the IM BTA standard via the IM performance standard compliance alternative, any entrapped organisms must still be counted as mortality; see 40 CFR 122.94(6)(i)(F). Similarly, facilities that elect to comply with one of the IM compliance alternatives that requires an optimization study must consider entrapped organisms as mortality. The rule provides for monitoring and reporting to make sure that this requirement is met and to provide transparency to the affected communities that the facility is meeting this requirement. Facilities should also not be exempted because the Director may determine that further requirements beyond velocity controls for IM (or entrainment controls) are necessary for threatened and endangered (T&E) species, shellfish, or fragile species; see 40 CFR 125.94(c)(8) and (9) and 40 CFR 125.98(f). These additional requirements may include controls for impingement, entrainment, or both. All facilities with cooling water intakes, even low intake velocity facilities, remain subject to all applicable portions of the rule and applicable NPDES permit provisions, including all requirements for compliance monitoring, data gathering, and submission of certain studies.

Some commenters raised questions concerning monitoring for multiple compliance points with the BTA impingement mortality standard. Compliance with certain of the alternatives for the impingement mortality standard (e.g., combination of technologies at 40 CFR 125.94(c)(6)) requires submission of a performance optimization study with a minimum of two years of biological data gathering/collection in order for the Director to determine whether the controls represent BTA impingement mortality control. The system of technologies may involve, for example, reductions in impingement due to intake location, flow reduction, or behavioral deterrents. The system may also include screens or other technologies. Therefore, the performance optimization study necessarily involves multiple monitoring points. The permit must then contain narrative requirements that ensure each technology is operated in an optimized manner, consistent with the demonstrated performance. Other impingement mortality compliance alternatives include the minimum monitoring provisions at 40 CFR 125.96. There may also be additional impingement mortality monitoring requirements established pursuant to 40 CFR 125.96(a)(1). This provision authorizes the Director to require additional compliance monitoring requirements such as biological monitoring, intake velocity and flow measurements. EPA expects that such monitoring will correspond to application of the rule's impingement mortality requirements and thus would depend on the configuration of the facility and compliance alternative adopted and could encompass multiple monitoring points. As with all NPDES permits, monitoring data are used to inform the Director and to assess compliance. Additional discussion of multiple compliance points may be found below in the Point of Compliance section of this comment response.

EPA is defining key terms for the final rule in 40 CFR 125.92, revising these definitions from the proposal where changes provide clarity or are otherwise appropriate. EPA did not further define "new unit" by including a definition of the terms such as "unit" and "operating unit" because these terms are widely understood. Certain other terms are not defined specifically in this rule because already defined in EPA's regulations. For example, the term "non-contact cooling water" is defined in 40 CFR 401.11. Similarly, the term "process wastewater" is defined 40 CFR 122.2. There was no reason to define these terms differently for the purposes of cooling water intakes. EPA is confident that by reviewing existing definitions that are applicable to the NPDES program and the special definitions provided in the final rule, stakeholders can understand and apply the requirements of the rule.

Commenters also suggested that EPA exempt certain facilities from the rule. Some commenters stated that EPA should exempt small and infrequently used (less than 30 days a year) intakes from the rule's requirements. Some commenters recommended that EPA exempt utilities that generate less than 100 megawatts from the final rule's requirements. Other commenters maintained that EPA should exempt from the rule once-through facilities that provide fresh water diversions to help rebuild wetlands and rebuild ecosystems in Louisiana (to create an incentive for such activities).

EPA decided not to adopt the suggestion that the rule exempt facilities that operate infrequently for several reasons. First, some electric generating facilities functioning as peaking plants are still likely to affect aquatic organisms adversely. Many operate during biologically important periods of the year, e.g., spawning, early life stage or migration periods. Moreover, many peaking facilities continue to withdraw significant volumes of cooling water even when the facility is not producing power. In other cases, water is withdrawn to reduce startup times, avoid pump cavitations, or to keep the cooling water intake system primed. Therefore facilities may operate their cooling water intake structures even when electricity or manufactured goods are not being produced. Other facilities may withdraw water for relatively short periods of time, but such withdrawals may coincide with spawning seasons or other biologically important periods. Such withdrawals may still pose an adverse environmental impact. Therefore EPA disagrees that infrequently operated facilities should be categorically exempted from compliance with the BTA impingement mortality and entrainment standards. However, the final rule does include provisions that may provide relief from impingement mortality controls in those instances where infrequently used facilities are not causing significant adverse environmental impact. The final rule provides flexibility for the Director to decide not to require impingement controls where rates of impingement are exceptionally low as to be de minimis. In the case of infrequently used facilities, the facility can take credit for reductions in cooling water withdrawals as part of their system of technologies; see the Implementation section of the preamble and the NODA at 77 FR 34324 for examples. The rule does not exempt power facilities with lower power generation rates for the same reasons discussed above. In addition, a low power facility does not always mean low intake flows. A low power facility could, for example, generate steam in addition to electric power. The final rule does, however, include a provision for low capacity utilization power generation units that allows the Director to establish less stringent impingement mortality requirements in those instances where the facility can demonstrate no adverse environmental impacts. Further, the Director may factor into the site-specific determination of BTA for entrainment that a facility's limited usage of that intake. The final rule does not exclude once-through facilities that divert water to rebuild wetlands since section 316(b) addresses the withdraw of cooling water, and such diverted water does not reduce the withdraw of cooling water. Also see Essay 19.

Point of Compliance

Numerous commenters addressed the need for a clear point of compliance for the rule requirements. Some commenters stated that EPA should define CWIS to make the point of first withdrawal from a water of the United States the single point of compliance for 316(b), even where impoundments are part of the CWIS and are themselves waters of the United States. Comments to the contrary indicated that the point of intake from a water of the United States for makeup water provided to a cooling pond or reservoir should be the point of compliance. Some commenters stated that if a cooling pond is water of the United States, then withdrawal of water for a pond is merely a water transfer and that the point of compliance should be for water that goes from a pond to a facility. Commenters also suggested that EPA clarify one point of compliance per CWIS or risk multiple internal points of compliance with added costs not addressed by EPA. Some commenters observed that it is important to avoid multiple compliance points. Other comments suggested site-specific factors should be considered, but there should be a single point of compliance. Some commenters suggested that EPA allow flexibility to select an appropriate point of compliance. Commenters observed that it is important to clarify the applicability of the rule requirements (i.e., point of compliance) in specific situations, for example when an intake is used to withdraw water from a river and deposit it in an impoundment, holding or storage lake, basin, or cooling pond, or when an intake is used to withdraw water from an impoundment and provide that water to a cooling unit. Some suggested that a water supply intake that pumps water to a cooling pond/ reservoir/ lake should not be subject to the rule since the intake pump has no discharge to a water of the United States. Some commenters asked that EPA clarify the point of compliance for the velocity requirements. These commenters observed that the point of compliance could be the mouth of the intake or the screen. Some asked for clarification of the point of compliance for intake tunnels and the use of a forebay. Finally, commenters asked whether the new unit provisions at 40 CFR 125.94(e) indicates multiple compliance points.

As noted, the final rule establishes the BTA standards for impingement mortality and entrainment. What specific impingement mortality and entrainment controls will be required in the case of individual facilities as a result of the final rule will be determined in individual permit proceeding. How and where compliance with these requirements should be measured will necessarily depend on the nature of the particular controls required as a result of the permitting process. Thus, the point of compliance is a function of the BTA compliance alternative being implemented in a permit and the elements of the CWIS, possibly including associated constructed waterways, subject to BTA requirements or monitoring provisions. Further, in some cases it is necessary to allow for more than one point of compliance to accommodate the difference in control technologies that reduce mortality and the control technologies that reduce numbers of organisms impinged and entrained in the first place. In other cases, facilities have more than one intake structure, thus the final rule must be able to accommodate multiple points of compliance. EPA notes that the rule streamlines or eliminates biological compliance monitoring for many of the alternatives for IM. As discussed in the preamble, in most cases no biological compliance monitoring is required. EPA's decision to adopt this approach is further supported by the large number of commenters pointing out the variations in intake structure locations, multiple appropriate points of compliance, and the specific situations that warrant a site-specific decision on the point of compliance. In any event, the EPA disagrees that multiple compliance points will result in costs not considered by the EPA. While the majority of facilities have single intake structures (67 percent of generators have a single intake structure and 76 percent of manufacturers have a single intake structure; see TDD Chapter 4), EPA included compliance costs for every intake at a facility; in some cases EPA included costs for more than 5 intakes at a single facility for compliance with the final rule.

As an example, the Director may determine that, in the case of an existing CCRS using wet cooling towers, compliance should be measured at the point at which makeup water for the cooling towers is withdrawn. This point could be a water of the U.S., the point of withdrawal for an impoundment, or another entity providing treated wastewater to be reused as cooling water. EPA acknowledges that the point of compliance for facilities with an impoundment may also vary depending on the nature of the impoundment and whether the facility withdraws from a water of the United States. It is important to note that CCRS requirements focus on reuse, minimized makeup and blowdown, makeup to replace only blowdown, drift and evaporation, and performance criteria for fresh and salt water intakes. However, EPA also acknowledges that an intake structure may be used for more than just cooling purposes, and that more than one intake may be utilized. Each of these intake points would need to be accounted for.

With respect to intake velocity, EPA disagrees with the comment that the mouth of the canal should be the sole compliance point. The final rule at 40 CFR 125.94(c)(2) and (3) makes it clear that the through-screen intake velocity is a point at which compliance would be measured. In a situation where a facility choosing to comply with the actual velocity requirement, the intake canal may have a velocity at the mouth of the canal that is less than 0.5 fps. However, the facility still must meet the 0.5 fps standard at the screens. As discussed in the TDD, fish must be able to escape from impingement on the screen, forebay, or intake area, even though the velocity at the mouth of the canal is low enough to allow fish freedom of movement. The Director may determine it is appropriate to establish permit conditions that require velocity monitoring at both locations.

For an existing offshore velocity cap, the cap location (relative to shoreline and the littoral zone) and its design must meet the definition in the rule and, as a result, the compliance is measured primarily at the velocity cap. This is likely the case regardless of any cooling water system downstream from the velocity cap (assuming the downstream system is not used to meet the rule requirements). For example, while an offshore velocity cap typically supplies water to a forebay or canal used for a reliable level cooling water supply, the primary point of compliance for the impingement mortality requirements of the rule is the offshore cap, even though traveling screens are in place in the forebay.

As noted, an existing facility that intends to meet the impingement mortality requirements of the rule through installing and operating modified traveling screens must ensure that the screens and fish returns meet the definition at § 125.92. Compliance for this impingement mortality alternative requires operation of the facility in compliance with permit conditions that will ensure the modified traveling screens are operated so as to obtain the optimum performance that the Director determined is the best technology available for impingement reduction at the site. The primary compliance point for this requirement may include the traveling screens, but also includes elements of the fish return. Thus the Director may reasonably establish permit conditions that require visual monitoring at multiple points of compliance. Similarly, the systems of technologies alternative is expected to result in multiple points at which compliance must be measured. For example, a facility employing a particular technology that the Director has determined is BTA at the site for reducing impingement, such as a barrier net or an acoustic deterrent, may need to demonstrate that the performance of the technology is optimized consistent with the data reviewed by the Director. In the case of the Director's approval of the use of variable speed drives or seasonal operation at a particular site as part of the BTA impingement mortality controls, the Director may require both biological data and volumetric flow measurements be taken at the intake structure, and may include further seasonal or otherwise intermittent monitoring requirements. Once the facility has demonstrated to the satisfaction of the Director that the system is BTA for that CWIS, EPA expects the Director would establish operational measures as permit conditions.

Each facility will have to meet any applicable entrainment requirements, as well as other typical permit requirements (e.g., BMPs, monitoring, reporting, and recordkeeping). Compliance with entrainment requirements will depend on the specific requirements established (e.g., flow reduction, re-location of intake, etc.). A facility that chooses to demonstrate entrainment survival after passage through the facility would necessarily need to measure organism counts both before and after the intake structure. Similarly, other permit requirements may result in additional compliance measures and combinations of technology requirements may result in required measurement for compliance at many different points.

If the new unit construction is associated with a new intake structure, it is likely that a single point of compliance will be established in the permit to measure performance commensurate with closed-cycle cooling. For new units complying under § 125.94(e)(2), or for new units using an existing intake structure, the use of multiple compliance points would be the same as discussed above.

EPA has estimated costs for the rule including but not limited to costs for meeting BTA standards for IM, monitoring, recordkeeping and reporting, plus additional studies and monitoring for purposes of determining BTA for entrainment. While EPA acknowledges that some facilities will likely install additional technologies as a result of the framework that requires the Director to establish the BTA entrainment requirement for a facility based on site-specific data, EPA appropriately did not include costs for entrainment technologies. This is because EPA cannot predict with confidence the outcome of the site-specific BTA entrainment standard-setting proceedings, and therefore, which facilities will undertake such installations and/or what installations they may undertake. As EPA indicated in the preamble, while not available nationally, EPA finds that closed-cycle cooling is the most effective technology for reducing entrainment. EPA notes that it did analyze[9] Option 2 which would have required flow reduction commensurate with closed-cycle at all facilities with 125 mgd or greater (Proposal Option 2), which account for 90 percent of actual flows. As indicated above, EPA cannot determine which facilities could not install CCRS, however Option 2 assumes all facilities not already CCRS would retrofit to CCRS. So, EPA can look to the costs of this Option and the projected impacts as an overestimated upper end bound of potential entrainment technology costs that could result from the site-specific determinations. See the EA and Essay 37. As explained in Essay 37, EPA determined the costs of Option 2 would not be large enough to adversely affect the economy. In addition, at proposal, EPA presented two hypothetical scenarios concerning additional costs some facilities might incur as a result of today's BTA entrainment standard and we solicited comments on it. See 76 FR 22262-22263. EPA did not receive any comments or data showing that any of these hypothetical scenarios would adversely impact the economy.

Definition of Existing Facility

Some commenters stated that all new modifications should be regulated as new facilities, since such modifications allow a facility to upgrade cooling technology.

EPA's Phase I rule established 316(b) standards for new facilities and defines facilities subject to that rule, including the circumstances where modifications to an existing facility are a new facility and when they do not. This final rule does not modify the definitions of new facility in the Phase I rule. This final rule establishes the BTA standards for existing facilities, including requirements for new units at such existing facilities. For further discussion see the preamble to the final rule.

EPA does not agree with the comment that all modifications allow a facility to upgrade cooling technology. For example, a Type 3 "extended power" uprate at a nuclear facility may require significant modifications to the transformer or generator, and these major facility components have nothing to do with the existing cooling water intake structure system. Such modifications do not pose an opportunity for the facility to upgrade their cooling system technology.

[9] EPA rejected closed-cycle as BTA (upon which Option 2 is largely based) based on three factors. See the preamble and Essay 19 for additional information.

<u>CWIS</u>

Some commenters asserted that the use of condenser cooling water from another unit is not using a CWIS. Some stated that the "not limited to" language in the proposed definition of CWIS means that the definition could include an entire facility, and suggested that EPA revise the definition to support one clear point of compliance. Some commenters stated that EPA has defined CWISs too broadly, including artificially constructed structures that have a low amount of aquatic life due to natural barriers, water depth, current and other factors.

The comment does not make it clear how condenser cooling water from another unit would be reused. The rule provides that the recycling of treated effluent as cooling water does not constitute use of a cooling water intake structure (see 40 CFR125.91(c); also see the definition of "cooling water" in § 125.92). EPA disagrees with the approach that would define a single point of compliance for the reasons described above. As explained above, compliance is measured at a point depending on the impingement mortality and entrainment controls required for a particular facility. For the proposal, EPA defined CWIS broadly so as to able to address the full range of configurations and physical settings employed by existing facilities. EPA agrees, however, that it may have been overbroad and consequently has removed the "not limited to" language from the proposed definition of CWIS. As a result, the definition of CWIS is the same as the Phase I definition. The definition is consistent with the variety of technological configurations used by facilities that withdraw water through intake structure for use as cooling water in their operations.

Definition of Cooling Water Intake

<u>Twenty-five (25) Percent Water Used for Cooling Purposes</u>

Comments on the definition of cooling water addressed both the 25 percent water used for cooling purposes and the exemption of certain sources of cooling water. With regard to the 25 percent requirements, some commenters stated that EPA should only regulate CWISs that withdraw exclusively cooling water (i.e., 100 percent cooling water). These commenters asserted that EPA lacks the authority to regulate process water intakes. Other commenters argued that a CWIS should not be regulated unless at least half (50 percent or greater) of the intake water is used for cooling (based on actual intake flow over 3-year operating basis). These commenters maintained that below 50 percent an intake is not a CWIS. Commenters stated that EPA needs to justify the 25 percent threshold for existing facilities, and noted that the 1977 guidance uses 50 percent or greater. Commenters noted that at 25 percent (of 2 mgd) the threshold for rule applicability is in their view low (500,000 gpd) and further asserted that limited or no impact occurs at that level. Some argued that EPA's rule is not consistent with the intent of section 316(b) by including intakes that withdraw a majority of non-cooling water. Some argued that the threshold for cooling water use should be 5 or 10 percent, not 25 percent, since this would protect multi-purpose intakes. Some commenters suggested using AIF for percentage cooling water use to capture more CWISs.

Some commenters asserted that an individual CWIS that withdraws less than 25 percent cooling water should not be subject to the rule requirements since the intake is not a cooling water intake. Some suggested that when assessing the 25 percent criterion, EPA should assess each CWIS individually. These commenters noted that the preamble supports this, although the rule indicates the 25 percent criterion is applied facility-wide. In contrast, some commenters observed that it would be a burden to consider CWISs individually. Commenters also suggested that EPA should allow engineering estimates to determine 25 percent cooling water use since manufacturing industries do not always measure cooling water flow. Some commenters argued that EPA should allow a representative annual average over the previous 5 years to determine the 25 percent cooling water use.

EPA does not agree with comments stating that the 25 percent threshold is inappropriate. As indicated in the preamble to this rule, EPA proposed, took comment, and finalized the 25 percent threshold in the Phase I, Phase II, and Phase III rules and has not received new information that supports changing this approach. As discussed in the preambles to the Phase I and Phase II rules (66 FR 65287-65288, December 18, 2001; 69 FR 41581 and 41611, July 9, 2004), EPA chose the 25 percent threshold to ensure that almost all cooling water withdrawn from waters of the United States is addressed under this section 316(b) regulation because cooling water withdrawals via CWISs is associated with adverse environmental impact. The preamble to the final rule explains in detail the nature of these effects. In addition, the EPA received extensive materials from commenters amplifying on the significant harm associated with the withdrawal of water for cooling. EPA consequently concluded that it is not reasonable to exclude from national regulations facilities that use significant quantities of cooling water and, as a result, impinge and entrain large numbers of aquatic organisms.

EPA notes that it has provided incentives in the final rule to encourage recycle and reuse of water for cooling purposes. While a facility adopting some of these practices is still subject to requirements under section 316(b), in some cases these reuse measures alone could result in compliance with the BTA standard for impingement mortality. In other cases a facility could be out of scope (for example the facility no longer withdraws from a waters of the U.S.) and therefore is no longer subject to this rule because the definition of CWIS is not met. The EPA disagrees that the approach to multiple intakes poses excessive burden. More than 96 percent of existing facilities have 3 or fewer intake structures, and the vast majority of existing facilities only have a single CWIS; see TDD 4.1.5 and the discussion above on multiple points of compliance. Further, the facility has the option to comply on an intake basis or on a facility basis, as discussed above. The EPA disagrees that a CWIS must withdraw 100 percent of the water for cooling; such a requirement poses a loophole whereby a facility need use a small amount of water for some alternative purpose and thus be exempted from any requirements. The final rule provides that twenty-five percent or more of the water the facility withdraws on an actual intake flow (AIF) basis be used exclusively for cooling purposes. The rule defines AIF as an annual average over a specified time period (the three years preceding promulgation of the rule until five years after promulgation of the rule, at which time, the intake is averaged over the past five years).

EPA notes that facilities that withdraw cooling water from waters of the United States and use less than 25 percent of water withdrawn for cooling still remain subject to 316(b) requirements established on a case-by case, best professional judgment (BPJ) basis. These facilities use cooling water and the intake of such cooling water may result in adverse environmental impacts. EPA notes that the Second Circuit has upheld the use of BPJ-based requirements for below-threshold intake structures in its decision in *Riverkeeper v. EPA,* 338 F.3d 174, 203 (2d Cir. 2004).

Scope of Exemption for Certain Waters

With regard to rule provisions that exclude certain water from the definition of cooling water, commenters offered different views. Some commenters asserted that exempting water from a public water system (PWS), reclaimed, treated effluent, or water used in a manufacturing process before or after use for cooling from the definition of cooling water for purposes of the 25 percent threshold is unacceptable because the overbroad exemption negates 316(b) protection wherever there is dual use, promotes energy intensive practices such as desalination, puts pressure on limited water resources, and violates restrictions on the use of restoration as an alternative to cooling water intake requirements. Some argued that excluding water from a PWS may shift the burden of regulation onto municipalities, who lack adequate resources.

Some commenters recommended eliminating § 125.91(c) and § 125.92, which could function to narrow the scope of the rule some by providing that obtaining cooling water from certain sources (a public water system, using reclaimed water from wastewater treatment facilities or desalination plants, or recycling treated process wastewater effluent) does not constitute use of a cooling water intake structure. Similarly, one commenter argued that excluding water subsequently used for desalination from the definition of cooling water allows both the power plant and desalination plant to avoid regulation of water intakes altogether resulting in harm to aquatic organisms -- in California desalination plants are permitted assuming co-location with power plants subject to 316(b) -- and that water used for cooling remains cooling water. EPA disagrees that these provisions reduce the scope of the rule. These provisions do, however, function to ensure that water withdrawn exclusively for cooling is addressed, and by providing clarity as to how other sources of water used for cooling will be addressed by the rule. EPA has further made it clear that water obtained from these alternate sources (as well as cooling water used in a manufacturing process either before or after it is used for cooling) is considered process water, not cooling water, for the purposes of calculating the percentage of a facility's intake flow that is used for cooling purposes (see § 125.92 – definition of "cooling water").

In contrast, some commenters maintained that the exemption for reused water is not broad enough. They indicated that process water from power stations, treated effluent from ash ponds, once used cooling water, reclaimed acid mine discharge, and treated effluent from wastewater treatment operations should also be excluded from being considered cooling water.

Some commenters argued that reuse of cooling water that would otherwise be discharged from another unit is not using water for cooling purposes under this rule. They stated that EPA should exclude (in § 125.91(c) and § 125.92) all recycled effluent used as cooling water, not just treated effluent used by manufacturing and electric power facilities. Some commenters asked for EPA to clarify § 125.91(c). Others suggested that the rule should include a short term exclusion from rule requirements for times when reuse of water for cooling is not possible because such water is unavailable. This would avoid the need to shut down.

Some commenters observed that EPA has not indicated how much time a facility has to adjust water use to potentially meet the reuse exclusion and get cooling water intake below the 25 percent flow criterion.

Some commenters asserted that the exemption in § 125.94(d)(3) should apply to existing facilities and new units and address impingement and entrainment. Some asserted that dilution water should not be considered cooling water.

Section 125.91(c) of the final rule provides that obtaining cooling water from a public water system, using reclaimed water from wastewater treatment facilities or desalination plants, or recycling treated effluent as cooling water does not constitute use of a cooling water intake structure for purposes of Part 125 subpart J. Section 125.92 provides that cooling water obtained from a public water system, reclaimed water from wastewater treatment facilities or desalination plants, treated effluent from a manufacturing facility, or cooling water that is used in a manufacturing process either before or after it is used for cooling as process water, is not considered cooling water for the purposes of calculating the percentage of a facility's intake flow that is used for cooling purposes. EPA does not agree that these provisions are overbroad or negate 316(b) protection. After thorough consideration of the wide range of comments received on this issue, EPA determined these provisions do not exempt water withdrawn for cooling purposes from regulation. Rather, these provisions promote the reuse of water as cooling water and thus reduce the total amount of water withdrawn from waters of the U.S. solely for the purpose of once-through cooling and any environmental impacts associated with the withdrawal of additional water. In addition, some facilities already reuse water and EPA does not want this rule to discourage such beneficial reuse.

With regard to reuse of cooling water by a desalination facility, EPA does not agree that the provisions in § 125.91(c) and § 125.92 are compliance alternatives that constitute after-the-fact restoration or that such reuse renders the rule ineffective. As discussed in the preamble, restoration as a measure to comply with BTA is not authorized under the Clean Water Act; therefore the final rule does not offer restoration as a compliance alternative. These provisions help define the applicability of the rule and, as noted, promote water reuse.

This final rule does not apply to desalination plants that provide desalinated water to another facility as a source of cooling water. Regarding the reference to desalinization plants in § 125.91(c), the EPA's authority is limited to cooling water intakes and thus does not otherwise apply to desalination plants where they do not withdraw water for cooling purposes. EPA notes that typically a desalination facility will reuse cooling water from a power plant after it has served its cooling function (energy conservation is achieved through the reuse of heated water). The regulation simply explains that (under the statute) a desalinization plant's use of water is not for cooling, and although the water was once used for cooling, the water is not subject to 316(b) when it is accepted by the desalination plant. See the Big Bend (Tampa Bay, Florida) Site Visit Report (DCN 10-6502).

In addition to PWS and desalination plants discussed above, other sources of water may be available for reuse or recycle as cooling water such as treated effluent from a manufacturing facility or a municipal wastewater treatment plant. Today's final rule specifies that using treated effluent (such as wastewater treatment plant gray water) as cooling water does not constitute use of a CWIS for purposes of this rule. As a point of clarification, facilities subject to today's rule may choose to use another entity's treated wastewater as a source of cooling water, thereby reducing cooling water withdrawals and associated impingement and entrainment. EPA notes that because the entity providing the wastewater for cooling has already treated it to meet any applicable discharge requirements (e.g., otherwise applicable effluent limitations guidelines and standards, water quality standards, etc.), EPA is not concerned that this provision will lead to pollutant discharges that would not have occurred if the treated effluent had been discharged by the other entity.

As explained above, treated effluent from a manufacturing facility, or cooling water that is used in a manufacturing process either before or after it is used for cooling as process water, is not considered cooling water for the purposes of calculating the percentage of a facility's intake flow that is used for cooling purposes in 40 CFR 125.91(a)(3). Using treated process wastewater or recycling treated process wastewater effluent as cooling water does not constitute use of a cooling water intake structure under this rule. Electric generating facilities that withdraw or use treated effluent from ash ponds for use as cooling water may not be subject to this part for that volume of cooling water reused. Section 125.91(c) could include power station process water that is reused for cooling, although the quantities of such process water are typically too small to replace a power plant's needs for cooling water. It is not clear in the comments if the reclaimed acid mine discharge is first treated, but EPA expects the provisions can be applied to any reclaimed water that meets the definitions and requirements of Part 125.

In addition, in the definition of cooling water at § 125.92, EPA specifically addressed the use of cooling water in manufacturing processes before or after cooling because this is the most prominent reuse of water, and this reuse is the most likely to involve significant volumes of water reused for cooling purposes. Under this final rule, less water would be withdrawn overall as manufacturers would not need to withdraw water solely for the purposes of cooling, reducing the environmental impacts associated with the additional water withdrawals for cooling. EPA disagrees that such a provision would allow manufacturers to avoid regulation, as manufacturing facility discharges are already subject to effluent guidelines, water quality standards, and other state and local requirements. Such discharge standards, in combination with the cost of treating water for use as process water, form a strong disincentive for process water withdrawals beyond what is minimally necessary at a given manufacturing facility. Further, EPA found in site visits that many manufacturers conduct water and energy audits, and subsequently found that some manufacturing industries have significantly reduced water flows; see 76 FR 22189 for further discussion of the paper and the iron and steel industries. Upon consideration of each of these rationales, EPA has finalized a definition of cooling water at 40 CFR 125.92 to provide further incentives for reusing and recycling water flows.

The final rule specifies that the schedule for compliance with permit requirements implementing the BTA standards for impingement and entrainment will be determined by the Director. The various permit application requirements at 40 CFR 122.21, 125.94 and 125.98, in some cases, require development of studies that may take months or years of collecting and compiling data; see preamble section on Implementation. As discussed in the preamble, this may be as short as 6 months to compile existing data and submit required reports. This period may be as long as 45 months for full permit application materials at some facilities, such as those that need to develop a plan for sampling, conduct the sampling, and generate a peer-reviewed final report. In the case of permits issued before 45 months after the effective date of the final rule, the rule at 40 CFR 125.98(b)(5) provides the Director with the discretion to establish an alternate schedule for submission of the required elements of the permit application. All permit application materials must be submitted with the permit application, however, under § 125.95(a)(2) the owner or operator applying for a permit expiring prior to a date 45 months after the effective date of this rule may request an alternate schedule for the submission of the required information. For specific discussion of each of the main permit application requirements, see the implementation section in the final preamble.

The final rule does not specifically address situations where a facility that normally reuses water cannot do so for a temporary period of time and as a result may meet an applicability threshold. It should be noted that the 25 percent cooling water use requirement is based on AIF, and AIF is defined on an average annual basis over five years. Commenters did not provide data showing situations where temporary changes in AIF would tip the facility over the applicability threshold so as to make it subject to the final rule's requirements.

Some commenters asserted that industrial customers of a city (or a private) raw water surface supply system (with CWIS) should not be subject to the rule just because they have a NPDES permit for wastewater discharge. EPA disagrees. A third party supplier is withdrawing cooling water and these withdrawals have the same deleterious effect on the waterbody as any other intake structure. Under the rule, a facility is "using a cooling water intake structure" and potentially subject to the final rule if it obtains cooling water by contract or arrangement with one or more independent suppliers of cooling water if the independent supplier withdraws water from waters of the United States but is not itself a new or existing facility as defined in 40 CFR Part 125 subparts I or J. This is intended to prevent an owner or operator of an existing facility from circumventing the rule requirements by creating arrangements to receive cooling water from an entity that is not itself a facility subject to subparts I or J. See the preamble for additional discussion.

Applicability to Point Source Discharges

Some commenters asserted that the rule requirements should not apply to facilities that do not have a NPDES permit for a discharge to water of the United States. Other commenters argued that the rule should not apply if the only NPDES permit held by a facility is for stormwater.

EPA disagrees with the comments. Section 316(b) states, in full:

> Any standard established pursuant to section 301 or section 306 of [the Clean Water] Act and applicable to a point source shall require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact.

As noted, the final rule applies to specified facilities that, among other things, are a point source as defined in CWA section 502 and in the EPA's NPDES regulations at 40 CFR 122.2. Necessary conditions to implement the final rule must be included in the NPDES permit of facilities subject to the rule. The independent supplier provisions in the rule prevents circumvention of the rule requirements by a facility making arrangements to receive cooling water from an entity that is not itself a facility subject to 40 CFR 125 subparts I or J. With regard to facilities with only stormwater permits, EPA has determined that given the requirements of section 316(b) and the fact that the referenced standards are implemented through NPDES permits, it is appropriate to implement the requirements of the final rule to any a facility with a

NPDES permit where the facility uses a CWIS to withdraw cooling water from a water of the United States and is otherwise subject to the rule. The final rule establishes requirements designed to minimize the adverse impacts associated with the use of cooling water. There is no demonstrated relationship between these adverse impacts caused by *intake* of cooling water and whether discharges are continuous or intermittent. There is no basis for not subjecting a facility that withdraws significant volumes of water for cooling from the final rule merely because it only discharges stormwater.

Least Energy Demanding Source of Water

Some commenters suggested that alternative sources of water used for closed-cycle cooling should be prioritized to require the least energy demanding source. The commenter did not provide data or specific suggestions on how to analyze such a requirement.

EPA does not agree that the requirements of the final rule should be further tailored in the manner suggested by certain commenters. EPA lacked adequate data to formally evaluate such an approach at this time. The EPA has concluded, however, that the final rule will promote water reuse consistent with achieving the authority objectives of section 316(b).

Exemptions

Some commenters requested that EPA exempt various intakes, structures, and waters. Commenters suggested that EPA exempt deep water CWISs, since in the commenter's view these cause very limited impact. Some comments requested that EPA exempt source waters that do not have aquatic and wildlife designated uses. For example, commenters pointed out that Phoenix Arizona irrigation canals are man-made lined canals that are waters of the United States but that do not have aquatic and wildlife designations (because they are not natural, they are cement lined, they dry up, and they are only used for domestic and agricultural uses) and, thus, CWISs located on these canals should not be subject to the rule. Other commenters asserted that EPA should exempt irrigation supply canals, hydroelectric supply canals, and other supply canals where CWIS impact is negligible, or allow the permit authority to either exempt these waters or to determine site-specific requirements. Some commenters suggested that EPA exempt quarries or other manmade structures used to access groundwater. Finally, some commenters asked EPA to exempt the use of any effluent, not just treated effluent.

EPA disagrees with the comment regarding deepwater CWISs. EPA notes the commenter did not include data supporting its assertion of limited impact. According to data in EPA's record, SEAMAP data showing that longer distances offshore (1) change the species subject to adverse environmental impact and, further; (2) on a organisms density basis, the aquatic life density is not adequately reduced by distance offshore. Also see the preamble for a discussion of why offshore velocity caps themselves do not minimize adverse effects to aquatic organism on the basis of intake location alone. After reviewing available data, the final rule, has not categorically exempted deep water CWISs from meeting applicable standards.

In the rule EPA has not exempted intakes on source waters that do not have aquatic and wildlife designated uses. EPA disagrees that source waters that do not have aquatic and wildlife designated uses should be exempt. EPA does not consider such an approach to be consistent with the objectives of the CWA, and further notes that waterbodies and waterbody classifications can evolve over time. However, the rule is sufficiently flexible to address these situations. For IM, facilities may have located the intake structure to reduce impingement in the first place; as discussed above, § 125.94(c)(6) "system of technologies" allows facilities to take credit for such reductions. Furthermore, the impingement mortality requirements include a de minimis rate of impingement provision that can allow the Director to determine that no additional controls where the documented rate of impingement is so low that no additional controls are warranted. The entrainment requirements for existing facilities are to be determined on a case-by-case basis; this allows the Director to consider any impacts of the CWIS. Such a determination could include consideration of technologies such as the intake location, as well as the relationship of costs to benefits.

With respect to quarries or other manmade structures used to access groundwater, EPA notes that the rule applies to the use of CWISs to withdraw water to be used for cooling from waters of the United States. Waters of the United States (WOUS) are defined at 40 CFR 122.2 and do not include ground water. As a point of clarification, groundwater itself is not a WOUS. But, for example, perennial streams are fed by groundwater and the perennial streams are WOUS (presuming flow into a traditional navigable water eventually). So, a quarry fed by groundwater could be a WOUS if it has a significant nexus to a traditional navigable water. A quarry that is truly isolated with no connection to a nearby tributary, would unlikely be a WOUS).

Public Water Systems

Commenters also addressed how water from public water systems is addressed under the rule. Some commenters stated that EPA should define and clarify the public water system (PWS) exception so that ownership and maintenance of pumps and related equipment at an intake owned and operated by a PWS does not negate the exception (clarify how the rule would apply where an intake is not owned by the facility but the pumping system is, and cooling water and other water is both used and shared with other entities). Some commenters asked that EPA not limit the definition of PWS to serving residential customers. They suggested that EPA define PWS as a public or quasi-public entity that provides water to the public or a subset of the public (not limited to residences). These commenters observed that there are many independent suppliers of water to manufacturers that do not supply potable water (multiple uses) and that this is not done to avoid regulation. Other commenters made a similar point in that PWS should include supplying water for purposes beyond drinking (e.g., irrigation canals). Some commenters asked whether EPA intends to use the SDWA definition of PWS.

Under § 125.91(c) and § 125.92 (definition of cooling water) the rule refers to PWSs. The term PWS is defined under the SDWA regulations and generally refers to drinking water systems of a certain size (see 40 CFR 142.2). EPA references PWSs in the above-referenced provisions because these are established terms and reflect potential reuse of PWS-derived water for cooling. EPA notes that the CWIS is defined as including the pumps. However, the split-ownership example is not sufficiently detailed to address here. The application of the rule in the commenter's example would have to be determined by the Director. Subsections 125.91(c) and 125.92 address the reuse of cooling water before or after manufacturing, so there is no need to expand the definition of PWS under this rule to include entities that provide non-potable water to manufacturers. Systems used to supply irrigation water only are not PWSs. Such systems could potentially constitute an independent supplier.

Commenters also raised several additional points. Some commenters indicated that § 125.91(c) exempts CWIS where once-through treated effluent is used for makeup water. Some asserted that only intakes on the same source waterbody should be counted together to determine if a facility meets the flow threshold, since impacts are waterbody-specific. Some commenters observed that the rule may promote use of groundwater for cooling, which conflicts with Louisiana's efforts to use groundwater for potable water. Commenters also sought clarification about the status of treated WWTP effluent that is not de-chlorinated.

One commenter suggested that EPA should prohibit use of freshwater for once-through cooling and should define BTA to require use of reclaimed water since such reuse is a proven beneficial technology, reclaimed water is widely available at once-through facilities, EPA's concerns about reclaimed water availability are unsupported and unwarranted, and the use of reclaimed water at closed-cycle facilities addresses consumption issues. At a minimum, the comment suggested that the rule could create a preference for reclaimed water similar to a California program. Other commenters pointed out that a sufficient quantity of water that can be recycled may not be available, and that recycling should not be mandated but should be driven by local economics.

Finally, some commenters suggested that EPA should provide flexibility to use BPJ when permitting shared intakes used by co-located entities. Commenters asserted co-located entities were not addressed by the proposed rule.

Subsection 125.91(c) in part provides that the use of treated process wastewater effluent is not considered cooling water for purposes of determining whether a facility is subject to this rule. However, under this provision the CWIS is not exempt as indicated in the comment; rather, the water used for cooling is not considered cooling water for purposes of determining the applicability of the rule. With regard to the assertion that the applicability threshold should be applied on a waterbody-specific basis, EPA disagrees. EPA maintains that the threshold reflects a level of adverse impact and it is important to have a single, consistent threshold for applicability of the rule. Establishing waterbody-specific thresholds would introduce a further measure of complexity that is not necessary. In addition, such an approach could result in a facility with multiple intakes where each intake is located in a different waterbody, or through creation of multiple smaller intakes in lieu of one single intake.

The final rule is not intended to, and does not promote the use of, groundwater for cooling. Rather the EPA recognizes that, in particular circumstances, there may be different sources of cooling water, and this rule preserves the flexibility of existing facilities to avail themselves of difference sources for cooling water while providing incentives for use of certain forms of water reuse. States can and are in a better position to promote the use and protection of groundwater resources.

As discussed in the preamble to the final rule, EPA has not adopted closed-cycle recirculating (including dry cooling) as BTA entrainment standard on a national basis. EPA has determined closed-cycle is not BTA on a national basis for the reasons specified in section VI of the preamble. Moreover, the availability or non-availability of reclaimed water is not one of the factors EPA concluded was a determining factor in its decision not to establish a national standard for entrainment based on closed-cycle recirculating systems. Even if sufficient volumes of reclaimed water were available, and the reclaimed water meets the quality of water needed by facilities for cooling, closed-cycle is still not BTA on a national basis. Therefore, EPA disagrees that it is a feasible option for BTA for entrainment based on a prohibition on the use of surface water withdrawals for once-through cooling and rely solely on reclaimed water. Some facilities that need cooling water are not located near a source of reclaimed water, or the source may be insufficient quantity or quality for use as cooling water.

EPA agrees that the use of reclaimed water for cooling should be encouraged. This rule is structured to allow and promote the use of alternative sources. EPA acknowledges that in some geographical areas a sufficient surface water supply may not always be available (e.g., see record for examples of recent facilities using ground water, dry cooling, etc.) and alternatives must be used. With regard to a preference for reclaimed water, this rule includes provisions (§ 125.91(c) and § 125.92 (definition of cooling water)) that may reduce the applicability of the rule based on the use of reclaimed, reused, or recycled water. EPA maintains that this is a significant incentive to use such sources of water. In addition, water reuse must be considered as on element under the rules permit application requirements for large flow facilities. Additional water reuse can be achieved by existing facilities, and this rule promotes such reuse. Thus, the use of reclaimed water should be considered, particularly in states or regions that have limited surface waters and/or a preference for the use of reclaimed water. However, based on present cooling water demand, EPA disagrees that sufficient quantities of reclaimed water exist that can be recycled to satisfy the demand of all existing facilities subject to 316(b). As discussed above, even if such quantity and quality of reclaimed water was available, it would not change EPA's basis for determining closed-cycle is not BTA. See also the discussion of reclaimed water in Essay 18.

Waters of the United States

Some commenters addressed the criterion of withdrawing cooling water from a water of the United States. Some indicated that EPA should explicitly state that the withdrawal of water from discharge canals, impoundments, quarries, municipal water, wells, and other waters that are not waters of the United States do not result in the use of a CWIS and are therefore not subject to rule. Other commenters observed that EPA's reliance on waters of the United States guidance is not appropriate since there are multiple guidance documents, such guidance often changes over time, and EPA has not provided sufficient notice of this approach and the guidance.

As explained in the preamble, the final rule applies only to withdrawals of cooling water from waters of the United States. This rule does not define, alter, or in any way change what constitutes a waters of the United States. The determination of what is and what is not a water of the United States is a site-specific determination that will be made based on applicable law, regulations, and legal decisions, as well as relevant guidance. This rule uses the term "waters of the United States" and that term is defined in EPA regulations (40 CFR 122.2). Any guidance that is used to help determine what is a water of the United States is based on the applicable law and regulations.

Independent Supplier

Comments addressed the independent supplier provision in the proposed rule as well. Some commenters explicitly supported the applicability of the rule to independent suppliers. Some commenters suggested that EPA grandfather the use of independent suppliers since a facility lacks control of its water supplier and for a facility to avoid use of the supplier the facility would have to build a costly new intake. Other commenters stated that the implementation timing should be based on the independent suppliers permit renewal schedule.

Some commenters argued that EPA should exclude CWISs operated by independent suppliers. They asserted that a facility may not have authority over or access to an independent suppliers CWIS and therefore cannot control the independent supplier. Only facilities that own and operated CWIS should be subject to the rule. Commenters asserted that EPA cannot regulate a third party supplier through a NPDES permit for a 316(b) facility. Some commenters sought clarification for when an independent supplier does not meet applicability criteria (e.g., has NPDES permit but itself uses less than 2 mgd).

Some commenters argued that EPA should regulate PWSs, or exclude independent suppliers, for logical consistency. These commenters stated that PWSs cause AEI too. Other commenters observed that to achieve consistency, the definition of independent supplier should exclude PWS. Some argued that because PWSs cause AEI they should not be excluded.

As explained in the final rule, EPA included the independent supplier provision to prevent existing facilities from attempting to circumvent the rule by creating arrangements to receive cooling water from an entity that is not itself a facility subject to Part 125 subparts I or J. The 316(b) standards for new facilities include a similar provision. The final rule does not grandfather independent suppliers and EPA does not agree that this provision requires existing facilities to build new intakes. Rather, existing facilities should ensure that independent suppliers meet applicable permit requirements including requirements applicable to in-scope CWISs. Similarly, the timing of the rule is based on the permit issued or held by the existing facility, not the independent suppliers, since the rule focuses on water used for cooling at existing facilities. EPA recognizes that existing facilities may not always control an independent supplier. The existing facility remains responsible for ensuring that any CWIS used by the facility, including a CWIS operated by an independent supplier, meets the requirements of this rule as expressed in an NPDES permit. With regard to PWSs, EPA has concluded that it is not necessary to regulate PWSs or exclude independent suppliers under the rule. Although EPA recognizes the PWS intakes can cause adverse impacts, PWSs are not regulated under this rule because they do not withdraw water for cooling. Section 316(b) requires EPA only to establish standards to address the intake of cooling water under 316(b). See previous discussion regarding language of section 316(b). EPA allows the reuse of water from a PWS because such reuse reduces the overall need for additional water withdrawals that may be associated with adverse environmental impacts. In contrast, EPA has addressed the situation in which a facility obtains cooling water from an independent supplier under the rule because EPA does not want existing facilities to circumvent the rule by obtaining cooling water from another entity that is not subject to 316(b) requirements and that does withdraw cooling water. EPA has added language to the independent supplier definition that excludes PWSs from requirements applicable to cooling water intake structures. Further, the existing facility must meet the applicability criteria, not the independent supplier (assuming such supplier is not independently subject to 316(b) requirements). Thus, in the case of an independent supplier withdrawing more than 2 mgd for use by the existing facility then, assuming all other applicability criteria are met, the existing facility would be subject to 316(b) requirements under today's rule. If the independent supplier withdraws less than 2 mgd,), the permit writer will establish requirements for the facility using water from the third party supplier on a case-by-case (BPJ) basis.

Impoundments/Definition of CCRS

Commenters provided a range of comments regarding the definition of closed-cycle recirculating systems (CCRSs) and the use of impoundments. Some commenters requested that EPA clarify whether a cooling pond is a CCRS and the point of compliance for facilities that rely on impoundments for some or all of their cooling water. Other comments sought to clarify how the rule applies to a cooling pond with two sets of intake pumps (river to pond; pond to facility). Commenters also asked whether auxiliary intakes used during drought for makeup water are subject to the rule. Comments regarding point of compliance are discussed above in this essay. Comments specifically regarding impoundments are discussed below.

Closed-Cycle Cooling Definition is Too Narrow

Some comments argued that the proposed rule definition of a closed-cycle recirculating system is too narrow, thereby excluding many ponds and basins built for cooling. These commenters observed that the definition should allow for other uses of makeup water beyond "blowdown, drift and evaporation", such as water stored in impoundments. In addition, it should clearly allow other uses, including service water, emergency back-up and fire protection, facility maintenance and sanitary uses (also screen washing, air preheater washing, boiler makeup, wetlands rehydration). Some suggested that the EPA should clarify that the withdrawal of small amounts of service water is allowable.

Comments also addressed whether a closed-cycle system can be a water of the United States. Some commenters stated that a pond or reservoir should not be excluded from being a CCRS based on their classification as a water of the United States. Rather, commenters assert the definition should be broad and include impoundments and reservoirs regardless of their status as a water of the United States. Commenters argued that the waters of the United States restriction is unreasonable and likely to adversely affect public access to privately owned waters. Others argued that man-made lakes built to cool power stations do not constitute waters of the United States. Some commenters observed that converting impoundments built as closed-cycle cooling systems to open-cycle systems would increase costs and may constitute a taking under the Fifth Amendment. They noted that defining CCRS as excluding waters of the United States expands EPA jurisdiction over waters of the United States. Other commenters added that under EPA regulations water of the United States do not include "waste treatment systems" and EPA has recognized that the CWA does not require the application of technology-based requirements at the point of discharge into constructed waterways designed to serve as waste treatment systems. They stated that impoundments are designed to treat heat (a pollutant) as part of the NPDES system and that impoundments are waste treatment systems that are excluded from the definition of water of the United States. Some commenters maintained that EPA should state that the jurisdictional status of impoundments will not be reopened. Other similarly argued that impoundments that were not themselves waters of the United States when they were built should be defined as CCRS. Some went so far as to suggest that EPA require no controls for existing reservoirs constructed by power generators for cooling.

EPA does not agree that the definition of closed-cycle recirculating system (CCRS) is unduly narrow. The final rule definition includes impoundments that are not waters of the United States. This definition does not impose additional requirements on such impoundments; rather it acknowledges that the use of such impoundments as a properly operated closed-cycle system is deemed to meet certain requirements of the rule. Although the definition requires makeup be minimized and provides for the replacement of water lost due to evaporation, the final rule also allows for such systems to replace other water losses provided the facility demonstrates to the satisfaction of the Director that makeup water withdrawals attributed specifically to the cooling portion of the cooling system have been minimized. EPA acknowledges water may be used for purposes other than for cooling, and distinguishes between makeup water for cooling and water for other purposes. These provisions accommodate reasonable other uses of such ponds and basins, including secondary uses associated with facility support. See the final definition of CCRS.

EPA is aware of the language addressing waste treatment systems at the end of the definition of waters of the United States (40 CFR 122.2), including the fact that the definition of impoundments referenced no longer exists in section 423, and that the limitation of the exclusion to man-made bodies of water not created in a waters of the United States or resulting from the impoundment of a waters of the United States was suspended in 1980 (see note at end of § 122.2). Given the mandates of the CWA to protect jurisdictional waters, EPA does not view the waste treatment exclusion as applying to impoundments that otherwise meet the definition of waters of the United States. This determination will continue to be made on a case-by-case basis.

The definition of CCRS in the final rule includes impoundments that are not waters of the United States. A CCRS cannot include waters of the United States because protection of waters of the United States from adverse environmental impacts is the endpoint of the standards required by section 316(b). Under section 316(b), EPA must establishment requirements that ensure that the location, design, capacity and construction of CWISs reflect the best technology available to minimize adverse environmental impacts to waters of the United States. EPA has previously noted that, for purposes of section 316(b), the determination of what is and what is not a water of the United States is a case-by-case determination. EPA notes that whether or not a waterbody is man-made is not, in and of itself, a determinative factor in the definition of waters of the United States (e.g., the definition includes impoundments of waters otherwise defined as waters of the United States).

The EPA finds that many comments interchange the terms cooling pond and cooling lake, and for purposes of this essay EPA is not distinguishing between the two. A cooling pond is an impoundment used either in lieu of a cooling tower or as a supplement to a cooling tower to remove waste heat from the plant. Many power plants also use impoundments to reduce the temperature of the cooling water exiting the plant before it is discharged back into a receiving waterbody. The pond dissipates waste heat through the surface of the pond, resulting in some evaporative losses. Therefore, a cooling pond requires additional makeup water from another source. EPA's record shows the makeup water is frequently obtained from a water of the U.S.

(46 power plants and 34 manufacturers withdraw from a water of the U.S. as makeup water for a pond).

The EPA is not determining which ponds are waters of the U.S. in this rule. In the final rule, EPA assumed approximately 60 facilities with impoundments would meet the definition of CCRS, and therefore did not assign technology costs to these facilities. An additional 40 facilities use more than one cooling water system, and these facilities were assigned compliance technology costs. As a sensitivity analysis, EPA assigned all ponds with compliance technology costs. EPA notes these costs are a small portion of the total national rule costs because CCRSs using ponds comprise approximately 2 percent of all facilities (less than 7 percent of the 31 percent of existing facilities that currently use CCRSs, noting cooling towers comprise the other remaining 24 percent). See the memo to record entitled “Social Costs for Final Rule and Other Options Considered with and without Impoundments Provision” for more details.

EPA does not agree that this aspect of the rule constitutes a taking. The final rule does not result in taking any property from a facility for public use. Whether an impoundment is a CCRS, as well as whether the impoundment is a water of the U.S., does not affect whether a facility chooses to provide public access and use of that impoundment.

EPA does not agree that the definition of CCRS expands EPA’s jurisdiction over waters of the U.S. To the extent that some facilities have not treated certain impoundments as waters of the United States that are now subject to requirements as does not represent a change in or extension of the Agency’s jurisdiction under section 316(b).The determination of what requirements of this rule apply at a particular facility will be decided by a permit writer. In that proceeding, the permit writer may have to address whether use by a particular facility of an impoundment as part of its CCRS reflect use of waters of the U.S. or not.

Man-Made/Managed Impoundments

Numerous comments addressed man-made impoundments and impoundments. Several commenters maintained that the rule does not adequately address unique waterbodies resulting from man-made reservoirs built for use as cooling water impoundments. They argued that these waters are not comparable to natural lakes and reservoirs and that the rule applies excessive protection, considering the highly managed nature of these impoundments. Some commenters suggested that the rule should exempt man-made lakes. Others suggested the rule should allow for BPJ and/or flexibility for such impoundments. For example, commenters observed that Texas has 33 reservoirs created for cooling which are different than natural waterbodies although they are managed to serve multiple functions. They noted that some impoundments in Texas circulate their entire contents in 7-32 days and still maintain vibrant aquatic ecosystems. Some commenters stated that most ponds built for power plants in Texas meet the functional definition of CCRS but not the actual definition due to their status as waters of the United States. They asserted that EPA should identify these as providing BTA cooling water use or otherwise allow for their continued use. Commenters asserted that man-made off channel impoundments in Texas have created fishing resources and continue to function effectively despite use for cooling for many years. They also indicated that Texas data for inland facilities from 2005 to 2008 indicate that over 85 percent of impinged fish are threadfin shad (a stocked forage fish). Commenters stated that for this species, the proposed impingement rates would be unachievable. Some asserted that any AEI should be balanced against the biological communities created in many cooling impoundments. Others argued that the rule would regulate man-made waterbodies with very limited ecosystems that are inaccessible to the public and such regulation is of no benefit to the public. Additional flexibility (impingement and entrainment requirements, cost/ benefit) should be provided where a cooling pond is operated as a managed fishery. Impingement and entrainment standards should not be imposed on CWISs located on freshwater lakes with state managed fisheries.

EPA is aware that man-made impoundments and impoundments exist and that these impoundments vary in size and characteristics, with some managed for multiple uses (i.e., cooling and recreation). As discussed above, the CWA focuses on the protection of waters of the United States and, as a result, the definition of closed-cycle recirculating system in the rule does not include impoundments that are waters of the United States. The rule does not exempt man-made impoundments if such ponds meet the definition of waters of the United States. Nor does this rule alter the definition of waters of the United States.

EPA agrees that artificially managed reservoirs may be different than natural lakes, therefore, EPA has discussed in the preamble and provided in the final rule that the Director may waive some or all of the information requirements of 40 CFR 122.21(r) if the intake of concern is located in a manmade lake or reservoir, and the fisheries are stocked and managed by a State or Federal natural resources agency or the equivalent. Although this provision does not relieve any facility of the requirement to comply with the BTA standards of the rule, it does provide the Director with the ability in certain cases (e.g., where the biological characterization of the source water is significantly influenced by the actions of the natural resources agency) to reduce information required for the facility's permit application. EPA notes that the impingement mortality and entrainment requirements of the rule provide flexibility through compliance alternatives and site-specific entrainment determinations. Directors may use this flexibility to address man-made impoundments. For example, with regard to the impingement data from Texas, the rule includes six impingement compliance alternatives other than meeting the numeric mortality performance standard (e.g., a facility could meet the through-screen velocity or install any combination of technologies that the permit writer determines achieve a BTA impingement mortality performance for the site).

EPA disagrees that facilities on man-made or managed fresh water lakes and reservoirs could not meet the IM performance standard. The final rule replaces the species of concern approach from the proposed rule with a more precise and transparent definition for fragile species. Further, EPA has dropped the monthly limit from the final rule, and replaced the annual requirement with a 12-month percent survival. Requirements for threadfin shad (a fragile species) would be determined by the Director. As discussed above, the Director may reduce permit application studies and requirements where the freshwater lake/reservoir is managed by a state resource management agency. The final rule provision allows the Director to consider the value of biological studies of artificially managed ecosystems, particularly where the biological study is made obsolete by restocking of select fisheries. With respect to entrainment, the Director already will make a determination of BTA as discussed further below.

With regard to setting BTA based on balancing AEI with the recreational benefits of man-made reservoirs, such an approach is not consistent with section 316(b), which mandates that EPA establish standards representing the best technology to minimize AEI. However, under the final rule, the BTA standard for entrainment requires determination of site-specific entrainment controls in a structured proceeding that must take into account a number of factors including the costs and benefits of different approaches to entrainment reduction. Thus, certain benefits (e.g., benefits to recreational species, benefits to the environmental local communities) associated with entrainment reduction technologies and operational measures may be considered by the Director as a elements in evaluating BTA for entrainment. The final rule provides that the Director in evaluating available entrainment technologies may consider other relevant factors including social benefits under § 125.98(f)(4). In some circumstances, these benefits may be identified as part of the benefits valuation study required as part of the permit application for certain facilities at 40 CFR 122.21(r)(11). Where an impoundment is inaccessible, it is unclear whether such a waterbody would meet the definition of a water of the United States.

Intermittent Flow in a Closed-Cycle Recirculating System

Comments also addressed the intermittent flow provision in the definition of closed-cycle recirculating system. Some commenters asserted that a prohibition against any level of continuous flow is unreasonable. Commenters argued that some ponds withdraw a continuous flow because this protects the source waterbody. Commenters argued that there is no reason why a closed-cycle recirculating system has to have an intermittent flow of makeup water, but there are reasons why a consistent flow may be desirable. Commenters noted that limiting makeup water to replenishment of certain losses will interfere with common power plant practices.

The commenter appears to misunderstand the rule definition. The definition of closed-cycle recirculating system does not require an intermittent flow in the final rule. In addition, the final definition provides flexibility so that replenishment can extend to losses beyond blowdown, drift or evaporation in specified circumstances. Such replenishment is not prohibited by the final rule. Under the final rule, in evaluating whether a particular cooling water intake structure represents a CCRS, the Director will determine whether such withdraws are for cooling purposes and thus are attributable to a determination that the withdrawals constitute minimized makeup.

Additional Suggestions on Requirements for Closed-Cycle Recirculating Systems

Comments included numerous suggestions regarding requirements for closed-cycle systems. EPA notes that these suggestions assume that all impoundments comprise a closed-cycle system, a position with which EPA does not agree. Some commenters indicated that EPA should create reasonable presumptions that provide certainty for facilities that use impoundments. Some asserted that a cooling pond that functions as a closed-cycle recirculating system (water use reduced by 96.6 percent) should not be required to do more since any benefits do not justify the costs. Similarly commenters maintained that no additional controls should be required for facilities with constructed cooling reservoirs that use/are closed-cycle recirculating system since these are BTA. Commenters also asserted that EPA should exclude regulation of intakes in dedicated impoundments or allow for site-specific determination by permitting authority.

Some commenters asserted that EPA should eliminate the entrainment requirements if a cooling pond has a retention time of 7 days or more. Others suggested that the regulation of intakes for makeup water should be left to the states that are familiar with local water issues. Finally, some asked whether blowdown was intended to address overfilling a pond to reduce TDS and, if not, suggested that EPA modify the definition to include such an operational control.

EPA has made it clear that a facility that uses a closed-cycle recirculating system, as defined in the rule, would meet the rule requirements for impingement mortality at § 125.94(c)(1). This rule language specifically identifies closed-cycle as a compliance alternative for the IM performance standards. EPA expects the Director would conclude that such a facility would not be subject to additional entrainment controls to meet BTA.

EPA disagrees that impoundments with a specified retention time should be exempt from entrainment requirements. The commenter did not provide any data supporting the suggestion of 7 days retention time. The retention time is the volume of the aeration tank divided by the influent flow rate. Thus even a 100 million gallon pond would still withdraw 14 mgd. The rule does not categorically exclude from entrainment requirements a facility with an impoundment has a retention time of 7 days or more, requiring that the Director address entrainment by a site-specific assessment of entrainment impacts. In this assessment, the Director may potentially consider retention time to the extent retention time affects entrainment impacts.

With regard to makeup water, such withdrawals can be significant. U.S. Energy Information Administration (EIA) data for 2010 shows 110 power plants (12 percent of all plants) use impoundments (U.S. DOE, 2012). About 50 of these plants operated in once through mode and 60 used a closed-cycle mode. EPA also found in site visits that facilities with wet cooling towers did not operate the towers to minimize the withdrawal of makeup water. Therefore, in order for any given closed-cycle system to quality as a “closed-cycle recirculating system,” the final rule requires that the Director determine whether any specific impoundment, cooling tower, or other closed-cycle recirculating system, is properly operated and thus meets the definition of a CCRS under the rule. In addition, the states retain the ability to address local water issues. Finally, blowdown is included in the definition of a closed-cycle recirculating system to reflect the efficient use of cooling towers as part of the recirculating cooling system. EPA notes that the definition of a closed-cycle recirculating system in the preamble provides examples of proper operation, including flow reduction observed at power plants with well-operated cooling towers, as well as levels of the cycle of concentration found at manufacturing facilities with well-operated towers. These parameters generally represent minimized makeup and blowdown, with slightly different values for fresh and salt water sources of makeup water.

Flow Thresholds

Two MGD Applicability Threshold

Approach

Some commenters questioned EPA’s approach in determining the applicability of the rule. Some commenters indicated that facilities below the 2 mgd threshold should not be subject to any requirements or, alternatively, EPA should use a presumption of no requirements if below this threshold except for exceptional circumstances. Some suggested that if a facility is below 2 mgd, EPA should allow states to determine that no impingement mortality or entrainment mortality controls are needed. Some argued that for otherwise exempt CWISs, only BPJ-based requirements should apply when AEI is evident or highly likely. On the other hand, comments on behalf of a large umbrella group of environmental organizations supported the 2 mgd threshold because these facilities cause AEI and 2 mgd is consistent with Phase I. This commenter further suggested that if small facilities warranted different requirements, then the EPA should develop them rather than rely on establishment of BPJ controls for these facilities. Some commenters stated that 316(b) requires adverse impact and, lacking data for facilities with flow under 100 mgd, EPA has no authority to apply the rule to facilities with what the commenter's viewed as de minimis impacts. Some commenters suggested that EPA should use a presumption that AIF of 125 mgd or below reflects BTA and that further reductions do not justify the costs. Commenters also suggested that closed-cycle facilities should not be subject to additional requirements, and that EPA should also exempt short term withdrawals.

Facilities that withdraw 2 mgd or less are not subject to the national uniform standards for impingement and entrainment of this rule but, pursuant to this rule and section 316(b) of the CWA, remain subject to section 316(b) requirements determined on a case-by-case, best professional judgment, basis. The commenters did not provide any data showing any facilities smaller than 2 mgd have zero levels of impingement and entrainment. Therefore there is no record basis upon which to conclude that there is no potential for adverse environmental impact. Accordingly, EPA disagrees that any facilities should be exempt from section 316(b).

The use of BPJ is a standard approach for determining technology-based requirements under the NPDES program in the absence of national standards. Such case-by case determinations allow any requirements to reflect the impacts associated with a facility and the CWIS technologies available. EPA has established in the record for this rule and prior 316(b) rules that CWISs result in a range of adverse environmental impacts including impingement and entrainment. The Second Circuit has found both EPA's approach to AEI and EPA's use of BPJ similar to this rule to be reasonable (e.g., See, *Riverkeeper, Inc. v EPA*, 358 F.3d 174 (2nd Cir. 2004)).

EPA does not agree that all facilities below 100 mgd have de minimis impacts and can be excluded from the rule. Commenters did not provide any data showing any facilities with zero levels of impingement and entrainment. EPA further notes the commenter has provided no data to support the assertion that any levels of impingement and entrainment at such facilities have de minimis impacts. The record for this proceeding shows that there are identified studies impingement mortality and entrainment impacts associated with facilities, including those under 100 mgd. EPA's record indicates that the use of CWISs result in a range of adverse impacts including impingement and entrainment and that these impacts can and do occur at a range of flows based on a variety of factors (location, waterbody type, CWIS design, CWIS technology, seasonal factors, etc.). Thus, for the reasons discussed in the preamble, EPA has maintained the applicability threshold at greater than 2 mgd DIF. To address the range of impacts posed by different size and types of facilities subject to section 316(b) EPA has included considerable flexibility in the rule.

EPA has explained in the preamble why the rule uses greater than 2 mgd DIF as the applicability threshold as opposed to using an alternative such as AIF of 125 mgd. As indicated in the preamble, the threshold in the final rule ensures that the users of cooling water causing the most adverse environmental impact will be subject to the rule.

Under this rule, and as discussed above, EPA expects that facilities with properly operated closed-cycle recirculating systems generally will not be subject to additional impingement and entrainment requirements.

As for short term withdrawals, the final rule does not exempt short term withdrawals. The 2 mgd threshold for the design intake flow shows that the facility has the potential for significant withdrawals. Therefore facilities designed above this design threshold and use at least 25 percent of the water withdrawn for cooling are subject to the final rule requirements. The rule addresses short term withdrawals and intermittent withdraws by a compliance alternative at § 125.94(c)(6) that allows a facility to demonstrate credit for flow reductions.

Certain commenters argued that including small systems and applying one set of requirements tailored to large systems to all systems will over-regulate small systems and impose undue burdens for limited environmental gain. These commenters disagreed with a one size fits all approach and suggested that EPA should set different categories of applicability that reflect potential impacts.

EPA disagrees that 2 mgd is a small facility. For perspective, it would take four typical Olympic size swimming pools to provide two million gallons. EPA has addressed the concern over uniform requirements in the rule through flexible requirements including seven compliance alternatives, rather than the applicability provisions of the rule. The final rule's multiple compliance alternatives (including use of a system of technologies) for addressing impingement mortality, and further provides for site-specific determination of requirements for addressing entrainment (for other than new units). These provisions, which reflect the data evaluated by EPA, do not mandate one set of requirements for all facilities and are capable of reflecting the setting and the impacts posed by different facilities.

Some commenters asserted that limited use emergency or special circumstance intakes should not be subject to regulation because costs vastly outweigh benefits. Commenters noted that secondary sources of makeup water used not more than 30 days per year should be exempt. They also suggested that emergency flows should not be considered in determining applicability (e.g., 2 mgd).

The commenter did not provide data or identify special circumstance intakes. However, the commenter appears to be confused by the definitions in the rule. The definition of Design Intake Flow does not include emergency purposes, fire suppression, and back up pumps (redundant pumps). Intermittently used intakes are discussed above. The commenter did not provide data showing why secondary sources of makeup water should be exempt. As noted above, there is no record showing zero levels of impingement and entrainment. Thus there is the potential for adverse environmental impact, and EPA disagrees that secondary sources of makeup water should be exempt.

In the final rule EPA has provided that DIF does not include values associated with emergency and fire suppression capacity or redundant pumps (i.e., back-up pumps).

One state (LA) indicated that it has ample surface water and commented that the proposed rule does not promote the use of surface water. EPA agrees with the comment. As noted above, there is no record showing zero levels of impingement and entrainment. Thus there is the potential for adverse environmental impact, and EPA disagrees that surface water use should be promoted.

AIF as Metric for Threshold

Several commenters supported the use of AIF in determining applicability of the rule. Commenters stated that AIF should be used for the applicability threshold since AIF correlates with environmental impact. Commenters indicated that the use of DIF is unduly burdensome (i.e., costly, with disproportionate impact) for smaller facilities with minimal flows and has limited impact since the use of DIF will apply the same requirements to large and small facilities.

Commenters also pointed out that DIF penalizes facilities that have installed more efficient units or modifications that require less water, whereas, AIF promotes conservation. Commenters also indicated that DIF may be difficult to determine for existing and older facilities and may be significantly greater than the current AIF due to changes over time, particularly in manufacturing processes. Some maintained that applicability DIF should focus on current operation and capabilities, not original design or special circumstances. EPA could determine AIF based on flow data (based on one or a few flow monitors) and this approach provides more clarity since existing facilities are likely have many years of flow data. DIF may result in inconsistency because of different methods for determining DIF (i.e., DIF is difficult to determine). Some commenters asserted that it is inconsistent to base impingement mortality on DIF and entrainment mortality on AIF. Some commenters suggested that EPA use AIF that corresponds to 50 mgd DIF. Some argued that AIF encourages conservation and added that if DIF is used EPA should allow an estimate to be based on empirical data.

EPA has used DIF in the applicability threshold for the reasons stated in the preamble to the final rule. This approach was also adopted in the Phase I and Phase II rules. DIF reflects a reasonably well-defined criterion that does not vary widely over time and that reflects the potential for adverse environmental impacts. AIF can vary significantly over time and therefore is not ideal for determining rule applicability. Even if EPA had used AIF, it does not necessarily follow that EPA would have developed tiered levels of requirements based on different AIF thresholds. EPA disagrees with the comment that DIF is more burdensome than AIF; DIF is a fixed parameter that need be determined only once for purposes of rule applicability, whereas AIF must be frequently measured and reassessed. EPA's use of AIF in some parts of the rule may result in an incentive for some facilities to withdraw less cooling water, and EPA encourages such an outcome. Further, the final rule includes incentives for water reuse in lieu of water withdrawal.

To address comments concerning original DIF or a design basis that is outdated, in the final rule EPA has provided an opportunity in described circumstances for a facility to use an adjusted DIF. The revised DIF would reflect permanent changes to the maximum capabilities of the cooling water intake system to withdraw cooling water. This allows facilities that have made such changes credit for their actions. These circumstances may include removal of pumps permanently from service, flow limit devices (installed devices that act to restrict flow below design flows), and physical limitations on intake flow that result from piping restrictions. With regard to the ability to determine DIF, EPA maintains that existing facilities will have the information needed to determine the appropriate DIF. If changes have occurred, appropriate adjustments, as described above, can be made in that determination. The final rule requires the development of detailed information on entrainment in the permit application for facilities above the 125 mgd AIF threshold. The use of AIF rather than DIF is appropriate for this requirement because, as EPA has consistently indicated, entrainment impacts are generally correlated with intake flow. Further, in the final rule EPA has defined AIF as the average flow including a facility's days of zero flow.

DIF as Metric for Threshold

Other commenters supported the use of DIF in the applicability threshold for the rule or supported the use of DIF as the maximum volume of water a facility can withdraw. Some commenters suggested that EPA clarify the definition of DIF to allow for limiting flow in the NPDES permit. Still others supported the use of DIF for applicability and AIF for entrainment study required in the application requirements for 316(b) NPDES permits.

Some commenters suggested that the use of DIF for applicability should consider legally enforceable limitations on flow, including permit conditions. They asserted that this (activity constraints) is done under the Clean Air Act's Prevention of Significant (CAA/ PSD) program and creates an incentive to voluntarily reduce flows. These commenters suggested that EPA change the DIF definition to allow enforceable limits or legal controls on AIF (and make the rule not applicable if below 2 mgd). Other commenters asserted that DIF really should be "maximum intake flow" or "intake flow capacity" and should reflect all physical, structural, operational and engineering characteristics of the facility's cooling water system, as well as any legally binding limits on water withdrawal, use or discharge.

Some suggested that EPA give credit to a facility for operating below its DIF. Some comments went on to suggest that EPA define DIF so as to not penalize facilities for having more capacity than is needed or used based on good engineering practice. Others commented that use of DIF is acceptable provided facilities do not get credit for fictional flow reductions. Some suggested that the DIF should reflect the maximum amount of water that can be withdrawn by the plant. Some commenters suggested that EPA clarify whether there is a difference between a unit closure and a unit retirement, and whether a pump permanently removed from service is flow reduction or warrants an adjustment in the DIF. Some commenters suggested that, with regard to the 2 mgd applicability threshold, EPA must specify the timeframe for measuring DIF.

As discussed on the preamble, EPA has used "design intake flow" because it is an established and reasonably consistent metric that reflects the potential for AEI. EPA based its threshold for applicability of both the Phase I and development of the Phase II and Phase III rules on DIF. EPA has used the term DIF because it is a commonly used term with a clear meaning. The DIF does not need additional time frames because a permit is applicable for at most 5 years, and there is no evidence suggesting cooling water intakes are modified as frequently. The final rule's definition of DIF has been implemented for over 10 years and is understandable. This definition addresses those factors that affect the maximum rate of flow the facility is physically capable of withdrawing.

The final rule does provide that a facility's DIF may be adjusted to reflect permanent changes to the maximum capabilities of the cooling water intake system to withdraw cooling water, including pumps permanently removed from service, flow limit devices, and physical limitations of the piping. Consistent with this provision, any closure or retirement would have to result in permanent changes to a facility's DIF for it to warrant credit. DIF flow information must be submitted as part of permitting and this information, and the ability to obtain additional information, should prevent credit for fictional flow reductions. Finally, together the DIF definition and 2 mgd threshold sufficiently specify the timeframe for DIF.

However, design intake flow as defined in this rule does not reflect legally enforceable limits on flow since such flows can change and EPA has some concern regarding establishing permit limits that could unduly hinder facility operations without a permit reopening or renewal. For purposes of applicability, the rule does not provide a credit to a facility for operating below its design capacity, because all facilities operate at an AIF below their DIF. EPA's record shows facilities operate, on average, with an AIF of half of their DIF. This does not necessarily represent any reductions in flow, it merely describes the operation of a CIWS on an annual average basis. Credit for actual flow reductions is provided under the BTA requirements.

Basis for 2 MGD Threshold

Commenters challenged EPA's basis for the 2 mgd threshold. Some commenters asked for additional justification for the 2 mgd threshold. Some commenters did not understand that today's final rule considers both the Phase II and Phase III rules, instead commenting that this is a revised Phase II rule that covers more facilities than the 2004 Phase II rule. Some argued that studies from large power generating facilities cannot be used to justify the 2 mgd threshold for industrial facilities. Some argued that the 2 mgd DIF threshold is arbitrary because it fails to consider site-specific factors and different levels of impact. For example, some commenters argued that the threshold was arbitrarily too low because it could affect a facility that withdraws 0.000009 percent of Mississippi's 7Q10. Others noted that the effective threshold is 0.5 mgd (25 percent of 2 mgd), so the rule would cover more than 99.7 percent of cooling water intake flow as asserted and maintained that this is not justified by any technical or scientific analysis.

Commenters argued that the 2 mgd threshold would impact many small facilities including small businesses and that small facilities should not be subject to all the controls required for larger facilities. Some commenters suggested that if the threshold is not 50 mgd, it should be 5 mgd at a minimum. Others suggested that if the threshold is not 50 mgd DIF, then EPA should use AIF since AIF reflects impacts and the actual use of intake. Some suggested that EPA use an AIF threshold of 50 mgd, while some would limit this to impingement mortality only. Some commenters indicated that facilities below 50 mgd should be addressed using BPJ, whereas others suggested that such facilities should not be subject to the rule at all. Some argued that EPA should use 125 mgd to address 90 percent of cooling water flow and lower the cost of the rule. Some commenters indicated the basis for 125 mgd AIF monitoring and reporting threshold was unclear. Others noted that 2 mgd will capture some facilities that already have CCRS.

As previously discussed, all water withdraws for cooling water result in the potential for impingement and entrainment. The 2 mgd threshold was chosen because this threshold addresses 99.7 percent of the total flow and 62 percent of all in-scope facilities. EPA estimates that 58 percent of the manufacturers, 70 percent of the non-utilities, and 100 percent of the utilities will be regulated at the 2 mgd threshold. The final rule uses greater than 2 mgd as one of the applicability criteria to be consistent with the Phase I rule, and to ensure that the largest users of cooling water are subject to the rule. Section 316(b) of the CWA addresses cooling water intake structures generally, and EPA has examined the cooling water intake flow and the facilities captured in the context of the section 316(b) requirements. As EPA has discussed in the preamble and in this essay, CWIS technologies and the nature of associated impacts do not vary substantially between utility and industrial applications. Further, EPA agrees that adverse impacts can and do occur at various flows. Further, the less than 50 mgd facilities are twice as likely now to have no controls in place for impingement or entrainment as are the greater than 50 mgd facilities. The EPA has structured this final rule to be broadly applicable and to address different facilities and physical settings within the rule.

EPA disagrees that low flow correlates to small business. Nothing about the definition of small business includes cooling water withdraws. Further, there is no correlation between small businesses and facilities with the lowest flows. For example, while there are 34 facilities that are small businesses and withdraw less than 10 mgd, there are another 35 facilities that are small businesses and withdraw more than 50 mgd. None of the commenters alternative thresholds including 2 mgd, 10 mgd, 20 mgd, 25 mgd, and 50 mgd are supported by data, and EPA has no technical reason on which to base a different threshold. See EA for more information. EPA agrees that 2 mgd threshold will capture some facilities that already have CCRS. EPA's record shows that most facilities are in the less than 50 mgd category because they already have closed-cycle cooling. According to EPA's technical survey data from 2001, 51 percent of facilities with DIF below 50 mgd have closed-cycle cooling, and 33 percent of manufacturers with DIF below 50 mgd have closed-cycle cooling. See the TDD for more information. EPA notes the final rule streamlines the permit application process for facilities with closed-cycle.

The EPA disagrees that power plant intakes cannot be compared to manufacturing intakes. Intakes at power plants and manufacturers exist in a variety of sizes, use the same intake types and locations, and use the same technologies. At many manufacturing facilities, cooling water is withdrawn primarily or exclusively for power production. These intakes functions exactly like a power plant intake. EPA finds that there are no significant differences in CWIS or technologies between manufacturers and power generators. The technologies are available and feasible for all intake structures. See TDD Chapter 4 for more information. With respect to environmental impacts, aquatic organisms cannot distinguish what is behind an intake; there is no difference to a fish whether the user of the cooling water behind the screen is a power plant or a paper mill. In many cases, power plant intakes and manufacturing facility intakes occur in close proximity on the same source waterbody; see EBA for more information. Financial impacts of the final rule were considered separately for each industry; see the EA for more information.

EPA agrees that small withdrawal may pose a significant adverse environmental impact, both when the source waterbody has a low flow and when there are cumulative withdraws (multiple users) of the same reach of a source waterbody. At least 14 percent of manufacturers below 50 mgd withdraw more than 5 percent of the mean annual flow of the fresh water sources on which they are located (based on unweighted data from surveyed facilities; actual number would be higher when all in-scope facility locations are considered). Furthermore, facilities in aggregate may withdraw greater than 100 percent of the river on which they are located. For example, all facilities combined on the upper reaches of the Monangahela River withdraw 526 percent of the mean annual flow of the river, and the facilities on the lower reach withdraw an *additional* 474 percent of the mean annual flow. The record further shows cumulative impacts of facilities with DIF below 50 mgd are significant in most of the U.S.; see GIS mapping in the EBA. The analysis shows at least 54 percent of withdrawals by just those facilities with DIF below 50 mgd are cumulative withdrawals, i.e., there are withdrawals by more than one facility on the same river segment. For example, 5 known facilities with DIF below 50 mgd withdraw 45 percent of the mean annual flow of the Delaware River. The potential impacts are greater when facilities with large flow withdraws are included in the analysis. For example, there are 8 known facilities with DIF below 50 mgd that withdraw 3 percent of the mean annual flow of the Columbia River. This increases to 8 percent of the river MAF when the large flow facilities (those greater than 50 mgd) are included. For all of these reasons, no facilities in scope of the rule are exempt from IM or E requirements to minimize adverse environmental impacts.

EPA does not agree that the intake flow threshold in the applicability portion of this rule must be based on prior determinations of the degree of environmental impact caused by a specific facility or specific cooling water intake structure. Further, EPA disagrees that EPA has no data for lower flow facilities demonstrating an adverse environmental impact. Sizeable numbers of fish impinged by lower flow facilities, including more than 40 studies from less than 50 mgd facilities. Greater than 82 percent of impinged fish mortality would be prevented by this rule.

As discussed above, lower intake flow does not mean low impact to the source water, and cumulative withdrawals can cause compound impacts. Section 316(b) applies to any facility that uses a cooling water intake structure and is a point source subject to standards imposed under CWA section 301 or 306. EPA has included a flow threshold to provide some reasonable limit on the scope of the national requirements imposed under today's rule. The Agency has concluded that those existing facilities having withdrawals that are at or below a two mgd threshold are generally the smaller intakes that may face issues of cost effectiveness, feasibility, and achievability and are therefore more appropriately addressed by establishing BPJ section 316(b) controls as provided for in 40 CFR Part 125.

The impingement and entrainment provisions of this rule are flexible and thus can be effectively applied to address different types and sizes of facilities and different facility settings. While 25 percent of 2 mgd is 0.5 mgd, this does not mean that final rule would apply to a facility with an intake flow threshold of 0.5 mgd. The rule only applies to facilities with an intake flow threshold of greater than 2 mgd. A facility with a lesser flow all of which was used for cooling water would still not be subject to the categorical requirements of this rule. In addition, impacts generally are associated with the total intake flow of a CWIS. EPA considered alternative thresholds as part of rulemaking development and is using the 2 mgd threshold for the reasons discussed above and in the final rule preamble. As explained in the preamble, the 125 mgd AIF threshold focuses on facilities with higher flow since such facilities result in greater potential for adverse impacts, especially entrainment impacts. EPA data indicate that this threshold captures a significant percentage of cooling water flow associated with adverse effects to the aquatic ecosystem while it reduces the number of facilities subject to the more detailed permit applications requirements for entrainment characterization. EPA expects that, in most instances, facilities that already have CCRS are unlikely to be subject to further requirements.

Burden/Cost

Commenters also express concern regarding the cost of the rule. Some commenters questioned EPA's basis for the 2 mgd threshold and suggested that the cost and benefit analysis supports a different threshold. Commenters asserted that a 50 mgd threshold (Option 4) is more appropriate and supported by the benefits analysis (the cost of the rule would be much lower; the benefits would only be slightly lower; 50 mgd captures a significant percentage of the cooling water flow yet it omits smaller facilities, resulting in a justification based on a cost-benefit basis). Some commenters pointed to Phase III, stating that the costs were not justified. Some pointed out that increasing the threshold from 2 to 50 mgd will reduce the proposed rule costs by $57 million and only reduce benefits by $1 million.

Some commenters stated that lower thresholds will exponentially increase the burden on the state (affecting 30 percent of majors and 3 percent of minor permitted industrial facilities). They questioned whether meaningful environmental benefits will result from the rule. Other argued that at 2 mgd the costs of the rule are wholly disproportionate to its benefits. Some argued that EPA has underestimated the true costs of various control technologies by a factor of 2 by not considering facility modifications and ancillary equipment, and therefore that EPA should adopt proposed Option 4.

Although EPA clearly may consider costs and benefits in establishing 316(b) standards, as discussed in the preamble to the final rule, EPA's determination of the BTA standards is also based on factors other than costs and the relationship of costs to benefits (see the discussion of legal authority in the preamble). Furthermore, EPA retains discretion with regard to how to balance these factors. As such, selection of the applicability threshold is not a simple cost-benefit calculation. In addition, limitations of the cost and benefit analyses should be acknowledged. One limitation on the use of cost-benefit is the fact that, as discussed in the preamble, relatively few benefits associated with this rule have been or can easily be quantified and monetized. To the extent commenters believe cost-benefit analysis should only reflect monetized benefits, EPA disagrees.

With respect to comments comparing this rule to Phase II and Phase III, the EPA notes the Phase III proposal option is no longer relevant. The Phase III rule co-proposed a 50 mgd threshold assuming full implementation of the Phase II rule. The Phase III rule was based on those I&E requirements consisting of percent reductions over a baseline. Therefore the Phase III rule would have imposed E requirements on facilities of all flow thresholds, whereas this final rule does not. A comparison between the Phase III rule and this rule is therefore not meaningful. Further, a Phase III rule with similar requirements to Phase II would have cost $216 million annually ($2012 using ENR index) for 603 facilities, including 91 small businesses. Today's revised section 316(b) rule provides a flexible approach for IM compliance, and does not establish uniform national E technology requirements.

Financial stress has been further mitigated by a $180 million reduction in costs over the Phase III rule cost for lower flow facilities. However, because the technical basis for this rule is different than the technology basis for Phase II and Phase III, the costs are not directly comparable to this final rule. The costs for the proposed rule revisions (including the reduced biological monitoring requirements for existing facilities between 2 and 50 mgd) are $22 million for 476 facilities below 50 mgd; about $295 million for the 589 facilities above 50 mgd (i.e., about 7 percent of total rule costs are cost for lower flow facilities). The flexibilities of the final rule will further reduce the compliance costs; see Essay 21 regarding EPA's overestimation of rule costs. This results in EPA's finding that there are no manufacturing facilities with a cost-to-revenue ratio of

3 percent, and one facility with a cost-to-revenue ratio exceeding 1 percent, all under a conservative assumption of zero cost pass-through to the consumer. See EPA's composite findings regarding no SISNOSE in the preamble. Electricity sector revenues exceed $126 billion, and the final rule cost is less than 0.1 percent of revenues. These costs for lower flow facilities are too small to affect costs of power or household utility bills. In summary, because there are affordable, available, and feasible technologies for impingement, EPA does not have an economic rationale for excluding low flow facilities from the national uniform requirements. With respect to small businesses specifically, the final rule adopts two recommendations of the SBAR panel: (i) clarification, consolidation, or simplification of compliance and reporting requirements under the rule, and (ii) the use of performance rather than design standards.

With regard to states, delegated states are currently responsible for issuing permits including 316(b) requirements to existing facilities that use CWISs. Under this rule states remain responsible for implementing 316(b) conditions in permits (both categorical requirements and those based on BPJ). With or without a rule, permits must address cooling water intake structures. The final rule establishes a procedure for collecting information, conducting studies, and evaluating alternative technologies. The final reports for the suite of entrainment studies required by facilities with an AIF greater than 125 mgd must be peer-reviewed, alleviating concerns that the public and permit authorities won't have accurate and reliable information to inform decision-making. Therefore this rule does not dramatically increase the burden on states beyond their current responsibility. In many cases, the rule is expected to reduce the burden on states as the states will no longer have to determine BTA on a case-by-case basis. The rule provides a clear framework for issuing NPDES permits that include 316(b) permit conditions.

For the same reasons, if EPA were to adopt commenter suggestions about higher thresholds, Directors would have an increased burden in determining site-specific IM requirements. Based on the Phase II ICR costs for permit application and studies ($395k to $679k per facility initial permit application, plus $7k annual reporting and monitoring), the submission of basic characterization studies and permit application materials upon which site-specific impingement requirements would cost the 603 facilities below 50 mgd an aggregate $69 million per year ($2012). This is approximately twice the cost of the studies plus technologies for meeting the IM requirements of this final rule. Thus, EPA finds it is more cost-effective to set uniform standards for impingement than to utilize BPJ. In other words, the revised rule is more cost-effective than BPJ decision-making for IM at existing facilities below 50 mgd. EPA notes the same conclusion does not hold true for entrainment.

With regard to the relationship of estimated costs to benefits, EPA did consider the cost and benefit data available in the development of this rule. EPA has developed a final rule based on all relevant factors, but its BTA determinations hinged on factors other than costs and benefits. EPA's analysis does indicate that the benefits of the final rule justify its costs. Moreover, the significant flexibility built into the rule allows it to be implemented in a cost-effective manner.

Use of AIF for Entrainment Characterization Study

Several commenters supported the use of AIF for the 125 mgd threshold for the permit application requirement to provide entrainment characterization information because AIF better reflects potential CWIS impacts. Some support 125 AIF but assert that the rule should not require entrainment mortality controls for facilities with flows less than 125 AIF and observe that the use of 125 AIF will address 90 percent of flows. Some expressed concern that, as proposed, facilities under 125 AIF will have to submit expensive engineering and cost studies and EPA has not considered these costs for non-primary manufacturing facilities.

Some commenters suggested that EPA clarify that the 125 mgd AIF threshold for the Entrainment Characterization Study allows for averaging flow over the whole year, including periods of zero flow. This is important for peaking and load-following facilities, which have low average flow and very limited impact. Some suggested that EPA should specify how AIF would be calculated for facilities with multiple intakes.

Other commenters opposed the use of AIF for the Entrainment Characterization Study and indicated that decision-makers need to know the potential for adverse environmental impact (which is better reflected in DIF), and could also consider AIF alongside the DIF. Some commenters wanted EPA to reduce 125 mgd AIF to 20 mgd DIF for industrial facilities required to meet entrainment mortality requirements and maintained that the time of year and life history determines impacts. Some commenters indicated that there is no statistical basis for entrainment requirements based on AIF and DIF. One commenter asked EPA to use 200 AIF under Option 4. Finally, some commenters asked that EPA clarify that only facilities greater than 125 mgd are subject to entrainment mortality requirements.

The final rule provides that for existing facilities the entrainment requirements are to be determined on a case-by-case basis. Such requirements are applicable to all in-scope facilities (including those with intake flows at or below 125 AIF). Under the final rule, facilities with an AIF at or below 125 AIF will only submit those entrainment characterization studies and data as requested by the Director. The full entrainment characterization studies are required of all facilities above 125 AIF. EPA has clarified in the rule that AIF reflects an average annual flow that considers days of zero flow. DIF and AIF for a facility with multiple in-scope intakes is based on the total flows of the intakes as defined in the rule, although DIF does not include flows associated with emergency and fire suppression capacity. EPA has specified AIF in the final rule for the Entrainment Characterization Study for the reasons specified in the preamble. The Entrainment Characterization Study is designed to reflect factors relevant to entrainment including time of year and life history. The permit application includes DIF, thus the Director will already have the DIF and AIF information together. As discussed above, the record shows that there are identified studies impingement mortality and entrainment impacts associated with facilities, including those under 100 mgd, thus EPA disagrees that only facilities greater than 125 mgd should be subject to entrainment mortality requirements.

AIF is more appropriate than DIF in this role since case-by-case requirements can be developed to address known actual impacts, whereas it would be more difficult to develop appropriate controls based on projected impacts and such controls may overregulate actual impacts. In addition, AIF reflects flow over multiple years so it should be representative of typical operating conditions. Under the final rule permit conditions, including entrainment requirements should be reassessed each permit term based on current permit application information.

Applicability of Rule to Offshore Oil and Gas Facilities, Seafood Processing Vessels or LNG Import Terminals

Some commenters supported the determination of section 316(b) requirements at existing offshore oil and gas facilities on a BPJ basis. Other commenters maintained that offshore facilities should be subject to categorical standards that minimize AEI, and suggested that EPA should clarify whether it considered variable speed pumps and operational changes for such facilities. Commenters also suggested that EPA should clarify that § 125.91(d) provides that only ocean-going vessels are exempt from the categorical provisions of the rule. Still others argued that only offshore (ocean going) seafood processing vessels are exempt from categorical standards.

Some commenters argued that the proposed definition of new CWIS (i.e., the date used to distinguish existing facilities from new facilities) conflicts with the definition of existing offshore oil and gas facility adopted in Phase III. The requirements applicable to facilities between January 17, 2002 (the date adopted in Phase I and proposed to delineate new versus existing facilities) and July 17, 2006 (the date established to define existing offshore oil and gas facilities in 40 CFR 125.33) conflict (or are ambiguous) and it is unclear whether Subpart J or N applies to offshore oil and gas facilities constructed between these two dates. The existing facility definition should include "(or July 17, 2006 for an offshore oil and gas extraction facility)." These commenters stated that EPA should retain the existing date (July, 17, 2006) for offshore facilities. Some commenters also asserted that visual or remote monitoring is problematic for offshore submerged CWISs, has no basis, and should be limited to once per year, an approach that has proven effective with effluent diffusers.

EPA considered a variety of technologies available to existing offshore seafood processing facilities as part of the Phase III rulemaking. As discussed in the preamble, EPA did not identify technologies that were effective, broadly available, and did not interfere with the seaworthiness and safe operation of the facility. See in addition to this rule record the Phase III rule record, including the Phase III TDD. Such facilities were less likely to have space for redundant pumps or excess capacity. A variable speed pump it would be unlikely to achieve more than a five percent reduction in flow, and was rejected both as available, feasible, and as a most effective technology. Commenters did not suggest any operational changes available to an offshore facility. EPA has not identified any new information since the Phase III rulemaking to identify any available, feasible, and most effective technologies for existing offshore faculties. Therefore, any requirements for existing offshore faculties are best determined on a site-specific basis using BPJ.

EPA also notes that existing facilities do not have the same opportunities as new facilities to install better performing equipment. This rule provides for requirements for existing offshore facilities based on BPJ and, thus, the Director can consider technologies that meet BPJ criteria (in contrast, on-shore existing facilities are subject to the uniform national rule requirements).

The definitions that address existing offshore seafood processing facilities are sufficient to identify in-scope facilities. EPA has clarified the existing facility definition to be consistent with the provisions addressing existing offshore oil and gas facilities. With regard to visual or remote monitoring, these are established practices, yet because implementation can be challenging in some situations, EPA has included some flexibility for the Director to modify these requirements where warranted.

Definition and Applicability of New Unit

Commenters expressed views regarding the new unit definition and provisions in the rule. Some supported EPA's definition of new unit and the new unit provisions. Some commenters want the new unit provision deleted. Some commenters suggested that EPA should clarify what constitutes a new unit at manufacturing facilities. They asserted that the definition of new unit is confusing and that it appears tailored to power plants, and asked if EPA could provide examples. Some noted that the rule does not define operating unit. Others pointed out that the term generation capacity is unclear, and could refer to intake structure flow or the capacity to produce a certain product.

EPA has added some language in the definition of new unit that clarifies how this term could apply to manufacturers. EPA has not defined operating unit but has made additional efforts to make the definition of new unit clear. The final definition of new unit does not use the term generation capacity.

Some commenters stated that EPA has failed to explain how the definition of new unit relates to applicability thresholds in rule.

EPA disagrees with the comment. The rule makes it clear which facilities are in scope. A facility must be in-scope of this rule for the new unit definition to be potentially relevant. A new unit does not have a separate applicability threshold. The applicability of the requirements of the final rule to a new unit at an existing facility are determined by whether the existing facility uses a cooling water intake structure with a design intake flow greater than 2 mgd and not by the design intake flow of the new unit.

Numerous commenters support not regulating rebuilt, replaced, upgraded or repowered facilities or elements of facilities as new units for the reasons stated by EPA. Some supported power plant upgrades and installation of replacement units as existing units. Some commenters argued that repowered and replacement units are not new and do not have lower capital costs. Some asserted that EPA should define repowering to include fuel conversions. Some commenters suggested that repowering and replacement involve limited reconfiguration and do not create opportunities for wholesale replacement of cooling systems and related equipment. Others noted that the existing definition of new units promotes upgrades that increase efficiency and a broader definition would hinder cleaner, more efficient technology. Some commenters observed that no baseline date has been set to define which retired units can be repowered or replaced. Some commenters argued that the rule should promote retiring older units and repowering with cleaner technologies, as well as allow for the use of existing capital intensive assets.

EPA has included the new unit requirements in the final rule for the reasons discussed in the final rule preamble. The impingement and entrainment requirements specified apply to the intake flow serving the new unit only. EPA has not determined that fuel conversions provide the same opportunity to install CCRS as the addition of a new unit, and agrees with those commenters accordingly. The final rule definition of new unit does not specify a date to identify which units can be repowered because identifying such a date is not necessary in the final definition. EPA supports the use of cleaner technologies but notes that this rule does not address power generating technologies, rather the rule addresses CWIS technologies.

In contrast, some commenters asserted that EPA defines new unit too narrowly and that rebuilt, retrofitted, repowered or replaced units should be subject to the more stringent controls regardless of whether the unit or facility increases intake or generation capacity. Some suggested that any modifications (rebuild, repower, replacement) should require cooling towers. They asserted that many of the reasons that justify the use of closed-cycle cooling at new units apply to repowered or replaced units. Commenters from New York State indicated that New York State regulates repowered or replaced units as new, since to do otherwise would cause unnecessary harm to aquatic resources. The New York Department of Environmental Conservation recommended that EPA require all repowered and replaced industrial facilities with a DIF of 2 mgd or more to meet the standards of the Phase I rule since the rationale for that rule applies directly to such facilities. Similarly, The Connecticut Department of Energy and Environmental Protection suggested that the new unit definition should be broader, encompassing repowering, rebuilding or replacement, even if capacity is not increased, since these major modifications present an opportunity for a facility to evaluate and invest in effective technology in a cost-effective moment. Commenters also asserted that repowered, replaced and rebuilt facilities must be subject to the same closed-cycle cooling requirements as new units at existing facilities. One commenter stated that EPA should adopt the definition of new unit in the version of the proposed rule that was submitted to OMB shortly before proposal as the proposed definition of new unit and existing facility are problematic in that facilities expanding or upgrading are not required to use modern CWIS technology. These commenters stated that EPA does not provide justification for not treating replaced, repowered, or rebuilt facilities as new units. Some commenters suggested that new units should include physical changes to an intake structure that materially increases the design flow rate and EPA should not include the replacement of components that do not do so. Some commenters asserted that EPA's definition of new unit would create a huge loophole.

The final rule does not require CCRS for existing units at existing facilities for the reasons discussed in the final rule preamble. It does provide for CCRS for new units based, as discussed in greater detail in the preamble, on the unique situation the addition of new units at a facility provides. This approach is consistent with the efficacy, feasibility, cost and other data available to EPA, as well as with the Phase I rule. EPA's definition of new unit in the final rule is consistent with this approach. In addition, this rule does not restrict states from imposing more stringent requirements pursuant to state law. EPA does not agree that the definition of new unit creates a loophole because, under the final rule and the new facility rule, a facility will be subject to regulation either as a new facility, existing facility, or a new unit at existing facility. Any existing facility not subject to this rule, as noted, will continue to be subject to section 316(b) requirement established on a BPJ basis pursuant to 40 CFR 125.91.

Some commenters asserted that EPA's approach to new units is not authorized (the CWA addresses intakes, not units), is arbitrary (in the Phase II rule EPA rejected addressing new units at existing facilities and no new justification is provided for reversing that decision, only unsupported assertions), is unclear (it is unclear with regard to when manufacturing units are replacement versus increased capacity, and whether the new unit must meet a DIF threshold) and, as a result, is unworkable. Commenters stated that the new unit provisions are so unclear that EPA needs to re-propose them. Commenters asserted that the definition of "replacement unit" needs to be clarified. Some commenters stated that the assertion that the capitol costs for closed-cycle at new units are lower than the capitol costs for once through cooling is not credible, and that new units require the same equipment, plus cooling towers. Other commenters argued that limited land availability is an issue for new units required to install closed-cycle cooling. Some maintained that EPA has not justified the conclusion that closed-cycle cooling is BTA for new units. These commenters asserted that existing facilities installing new units have less space than other facilities, issues such as drift still are problematic, and it is EPA speculation that existing facilities have the option to reduce water usage elsewhere (modern manufacturing facilities have reduced water use significantly). Commenters also argued that EPA's decision to define only units added to increase capacity is OMB driven, contrary to EPA technical experts, irrational, arbitrary and capricious.

EPA has explained its basis for the new unit provisions and definition in the preamble to the final rule. As indicated in the preamble, EPA has compiled and assessed additional data since publishing the Phase II rule and these data, including engineering and costs analyses, support EPA's approach in the final rule. Based on the final rule record, EPA maintains that exiting facilities have greater flexibility in configuring new units and associated cooling than in altering aspects of existing units, and that repowering which constitutes installation of a new unit creates engineering opportunities to install closed-cycle cooling. As EPA has stated above, the final rule definition has been clarified and includes language that addresses manufacturers. It does not use the term replacement unit.

Some commenters asserted that, for new units, the rule should focus on the design of the condenser cooling system being consistent with closed-cycle cooling. EPA agrees with the comment, and has revised the final rule requirements and definition to achieve a similar result.

Some commenters indicated that a new unit cannot determine the cost of compliance until after the facility is constructed. EPA disagrees with the comment. EPA's record includes costs for a retrofit. Retrofits are more difficult to assess than new construction. Therefore EPA maintains that reasonable cost estimates can be developed prior to construction.

Some commenters noted that when submitting a permit application for a new unit, baseline entrainment densities at the existing facility could be exceeded due to natural population fluctuations. EPA agrees that source water characterization can change with season, diel, weather, and further can change over time. Accordingly, EPA requires that the characterization be updated with the application for permit renewals, and requires biological studies be conducted over sufficiently long periods to characterize such fluctuations.

Some commenters suggested eliminating the new unit provision and addressing new additional units consistent with Phase I requirements. EPA disagrees with the comment. This rule does not alter the Phase I rule provisions. This rule has been developed to be consistent with the Phase I rule while addressing exiting facilities. The Phase I rule was not developed to address new units at existing facilities and, thus, this rule is the appropriate mechanism for doing so.

Some commenters asserted that the new unit provision should not disallow use of recirculating cooling reservoirs. The commenter appears to misunderstand the new unit provisions. The new unit provisions do not disallow use of a CCRS.

Other Comments

Some commenters stated that smaller units and smaller communities will be most impacted by the cost of compliance. Other commenters stated that waste-to-energy facilities should be given greater flexibility regarding compliance. As discussed previously, the final rule imposes reasonable costs consistent with 316(b) requirements and includes significant flexibility that should enable existing facilities to identify cost-effective options. Further, the rule streamlines permit applications, compliance, monitoring, and other reduced requirements in certain situations. Section 316(b) does not provide for specific requirements for waste-to-energy facilities. EPA conducted a site visit to a waste-to-energy facility, and has not identified a basis for different standards. EPA also notes the commenter did not provide any data or examples of why waste-to-energy facilities should be given greater flexibility regarding compliance.

Some commenters suggested applying the rule to new facilities only and grandfathering existing facilities until 2040. EPA disagrees with the comment. Not addressing existing facilities until 2040 would not implement CWA section 316(b) or ensure that each CWIS reflects BTA. See preamble XI Implementation for more information on how the final rule schedule for implementation accounts for studies, IM, E determinations, and compliance.

Some commenters indicated that it is not clear what it means for compliance costs to be wholly out of proportion. The entrainment provisions of this rule include a provision that allow the Director to determine that no additional entrainment controls are required at a particular facility if the Director finds that all the entrainment control technologies considered for the facility have social costs not justified by the social benefits of the controls.

One commenter suggested some regulatory revisions to achieve consistency. Generally, in response to some comments and to ensure consistency and clarity in the rule, EPA has made certain edits to the final rule language. See the final rule and preamble. There is § 122.21r(ii)(A) and thus it is not clear which provision is being referenced. It should also be noted that some permit application requirements (e.g., § 122.21(r)(1)(ii)(B)) are in addition to basic permit application requirements for a specific category of facilities, and these should be read together. With regard to requiring AIF information as part of the permit application, § 122.21(r)(3) requires flow information at (iii) A narrative description of the operation of each of your cooling water intake structures, including design intake flows, daily hours of operation, number of days of the year in operation and seasonal changes, if applicable; and (iv) A flow distribution and water balance diagram that includes all sources of water to the facility, recirculating flows, and discharges. Because this information must be provided for each intake, there is generally no need to identify the facility-wide AIF as additional information. The Director can require additional information, including monitoring of the AIF, when needed. Further, those compliance alternatives that are based on actual flow already require flow monitoring; such as § 125.94(c)(1), (3), (4), and (6). Finally, the final rule includes Entrainment Characterization Study provisions in the permit application portion of the rule. These provisions focus on development and submission of entrainment information and are appropriate in this part of the rule.

Essay 15: EPA's Approach to Establishing Best Technology Available 316(b) Standards for New Units and Existing Units

Introduction

As described in the preamble to the final rule, in evaluating standards to minimize adverse effects associated with cooling water intake structures at existing facilities, the EPA reviewed the data from its previous section 316(b) rulemaking efforts as well as collecting and analyzing new data to evaluate the best technology available for existing facilities. In response to its proposed standards for existing facilities, EPA received a large number of comments on its proposed approach for determining what standards would reflect the best technology available for minimizing adverse environmental effects. These comments addresses area that included what regulatory framework that EPA should follow to determine these standards and the role of costs and benefits in evaluating "best technology available" as well as information about what specific technologies for reducing adverse effects should be adopted for the final rule.

As discussed in section VI of the preamble, on the basis of the high levels (about 96 percent on average) of flow reduction obtained by properly operated cooling towers and the availability, feasibility and affordability of closed-cycle cooling at *new* units, EPA has identified wet cooling systems as the BTA technology for both impingement mortality and entrainment for new units at existing facilities. The EPA did not compare costs to benefits for new units (as defined in the final rule) because EPA does not know where a new unit will be built, what cooling water withdraws would occur at the new unit, what levels of impingement or entrainment would occur at the new unit, or when the new unit would be constructed. For more info on new units, also see Essay 20.

The final rule establishes BTA standards for reducing impingement mortality and entrainment requirements for existing power generating facilities and existing manufacturing and industrial facilities that withdraw more than 2 million gallons per day (mgd) of water from a waters of the U.S. and use at least twenty-five (25) percent of the water they withdraw exclusively for cooling purposes. EPA's determination of BTA standards followed a rigorous analysis of technology performance, the feasibility and applicability of different technologies in multiple settings and a reasoned assessment of the costs and benefits of the different approaches. Moreover, as described in section VA.A of the preamble the EPA considered a number of factors in its final determination of what should be the BTA standards, including many of same factors EPA looks at in establishing its BPT, BCT and BAT effluent limitations guidelines.

For additional information, refer to the preamble to today's final rule.

Overall Approach to BTA for Existing Units

As noted above, EPA received a large number of comments on how the rule should be structured. As described in the preamble, EPA has promulgated a final rule that establishes requirements under section 316(b) of the Clean Water Act for existing power generating facilities and existing manufacturing and industrial facilities. For impingement, the final rule establishes BTA standards for minimizing impingement mortality that include seven compliance alternatives, providing ample flexibility for all in-scope facilities. The alternatives include several options for "pre-approved" technologies and "streamlined" options, all of which are based on technologies for which EPA's record demonstrates achieve reductions in impingement mortality that are comparable to the IM BTA – modified traveling screens with fish returns. The final rule also establishes the national BTA standard for entrainment. In the case of existing units, the rule does not prescribe a single nationally applicable entrainment reduction technology but instead establishes a framework that requires the Director to establish the BTA entrainment requirement for a facility based on site-specific data contained in the permit application. The entrainment requirements must reflect the Director's determination of the maximum reduction in entrainment warranted after consideration of all factors relevant to the BTA determination at the site and must include consideration of the specific factors spelled out in the final rule. The permit application requirements in the final rule will ensure that the Director has adequate information for determining the BTA for entrainment. Refer to the preamble for details on each of these items.

One large umbrella environmental organization, Riverkeeper, stated that EPA's approach to establishment of BTA (i.e., rejecting a single uniform national standard for entrainment in favor of a national standard for data gathering and the process for a site-specific determination for entrainment) is illegal and that EPA must develop a nationally applicable standard that reflects BTA. As discussed in section V1.A of the preamble and in more detail below, the CWA is silent about what factors EPA should consider in its determinations under section 316(b) and in the face of this silence, EPA may consider a number of relevant factors. As EPA's analyses and record show, facilities exhibit significant variability in their configuration and operations, arguing that uniform entrainment requirements are generally infeasible at the national scale. As such, the final rule appropriately establishes a national BTA standard for entrainment that is a process for a site-specific determination of entrainment requirements at existing CWIS. This provision further reflects EPA's assessment that there is no technology that is BTA for entrainment at all facilities, based on a set of factors that are best accounted for on a site-specific basis. EPA also disagrees with the commenter's interpretation of section 316(b) as a technology-based standard; see discussion of litigation history including the U.S. Supreme Court decision in the preamble at section II and the Essay 10.

Approach to BTA for Entrainment at Existing Units/Facilities

Closed-Cycle Recirculating Systems

Many commenters provided variable positions as to how to consider closed-cycle cooling such as wet cooling towers (or an equivalent level of performance based on the significant reduction in flow by a properly operated cooling tower) as the BTA standards basis for entrainment. Riverkeeper and other environmental groups argued that EPA should find closed-cycle cooling and cooling towers as the basis for section 316(b) BTA standards and that EPA incorrectly rejected this technology as the basis for entrainment standards. These commenters favored Option 3 (an option requiring closed-cycle at all facilities with a DIF greater than 2 mgd) as presented in the proposed rule. Riverkeeper noted that the flow reductions of closed-cycle cooling pose the most certain way to reduce entrainment. In support of this position, these commenters state that there are significant losses of aquatic life due to the operation of once-through cooling water intake structures, that closed-cycle cooling is both available and affordable, and that EPA has established the final rule under the mistaken principle that best technology available implies that the technology must be universally available to all facilities. They suggest that the lack of a national entrainment standard will largely result in the status quo at facilities, resulting in no installation of technologies and therefore very little improvement. Riverkeeper further argued that the Second Circuit (in Riverkeeper I) determined that many of the factors cited by EPA in rejecting closed-cycle cooling were not valid. Some commenters provided detailed studies and analyses supporting these positions; EPA appreciates these submittals and the supporting studies and data, and has considered them in preparing the final rule. Some commenters also claimed that projected impacts to energy reliability as a result of the impacts of closed-cycle cooling are overstated; one commenter referred to a study that was not provided, so EPA was unable to verify the specific information.

Industry commenters supported the proposed rule's position that closed-cycle cooling is not available at the national level, which in the commenters view is a position supported by the *Entergy* decision. These commenters also agreed with the approach of the proposal to determine entrainment on a site-specific basis.

Some industry and some environmental group commenters provided detailed studies (including analyses of reliability, costs, benefits, feasibility, the universe of affected facilities, and other non-water quality environmental impacts) supporting these positions; EPA appreciates these submittals and considered them in preparing the final rule.

Some commenters (including states) supported the proposed rule regulatory framework of flexible approach to IM requirement and a framework for site-specific entrainment requirements. They noted that a site-specific approach is preferable for entrainment, allowing consideration of multiple factors most relevant to the particular location. Others suggested that EPA adopt a "rebuttable presumption" for closed-cycle cooling as BTA. Another state commenter argued that closed-cycle cooling was the clear choice as the best technology available for similar reasons stated by environmental groups. A state commenter agreed with EPA's proposal that closed-cycle cooling was not feasible at all facilities, but that EPA should require BTA entrainment standards that reflect equivalent (or nearly so) performance at those sites where closed-cycle cooling is infeasible. These state commenters did not provide data or suggest what technology these alternatives to closed-cycle might be based on.

Another commenter stated that the approach taken in the proposed rule was contrary to EPA's historic approach as well as the Agency's position in Riverkeeper I. Some commenters state that EPA failed to describe how a BPJ-based approach is comparable to closed-cycle cooling, which in their view is required by Riverkeeper II.

As explained in the preamble, closed-cycle cooling based on wet cooling towers is a highly effective technology for reducing both impingement and entrainment. However, with respect to entrainment, the EPA has concluded that it should not adopt a BTA entrainment standard prescribing a uniform national technology with a requirement for a (CCRS) closed-cycle recirculating system based on wet cooling towers. EPA concluded that closed-cycle cooling is not an available entrainment reduction technology on a national scale and therefore should not form the basis for the "best technology available" entrainment standard. The record shows that closed-cycle cooling is not technically available in a number of circumstances either because (1) land availability and geographical constraints could be a factor on a local basis (such as limited space available to install cooling towers, noise mitigation, and setback distances for plume abatement); (2) increased air emissions (such as due to the need for increased fuel burned to operate the cooling towers); and (3) remaining useful plant life (for example a plant scheduled to be shutdown in 3 years will result in very little entrainment reductions as compared to a facility that will continue to operate for a significantly longer period). In addition, EPA analyzed other factors in addition to availability in reaching its conclusion not to base the BTA entrainment standard on closed-cycle cooling.

To be clear, EPA did not conclude that closed-cycle cooling is not available at *every* facility. Nor has EPA rejected CCRS on grounds that the technology is not economically achievability. While EPA did consider costs, costs were not a dispositive factor in the decision to reject CCRS based on cooling towers. Rather, EPA considered its applicability to the industry as a whole. That is, the record demonstrates that while EPA cannot identify with precision the extent of these limitations on installing closed-cycle cooling systems nationwide, the record indicates that the circumstances are neither isolated nor insignificant. EPA tried to identify characteristics for which it has information that would allow it to subcategorize those facilities where closed-cycle is not available (e.g., land size threshold), but was unable to do so and concluded that such determinations can only be made on a site-specific basis consideration; see TDD for further discussion. Furthermore, contrary to the statement made by some commenters, EPA reasonably concludes that the availability of a technology to the industry is an appropriate factor for evaluating BTA technology bases for national standards. EPA has historically evaluated the availability of a technology to the industry in making technology base determinations for other national technology based performance standards. For more information on the reasons EPA rejected closed-cycle cooling as the basis for national BTA entrainment requirements, see the preamble.

Some commenters stated that there are other technologies, where cooling towers are infeasible, that would allow such facilities to comply with performance standards based on cooling towers as BTA. One commenter argued that wedgewire screens can offer comparable performance to closed-cycle cooling.

EPA disagrees with the commenters supporting performance equivalent to CCRS is BTA. EPA has concluded that performance equivalent to CCRS is not BTA because there are no available, demonstrated, and feasible technologies on which to base such requirements. Most commenters did not suggest what technologies demonstrated a performance comparable to CCRS. While several commenters submitted studies, none of the commenters provided performance data that demonstrated performance comparable to CCRS. More specifically, with respect to traveling screens, modified traveling screens offer no reduction in entrainment unless the screens consist of fine mesh. With respect to fine mesh screens (both passive and traveling screens) the record shows that CCRS reduces the entrainment mortality of eggs and larvae 8-fold more than fine mesh screens (based on the mean value of performance data for both eggs and larvae); see TDD Chapter 6 for more details. While some sites obtained reductions in entrainment with one or more technologies including fine mesh screens, EPA found the studies did not distinguish between intake location (such as offshore submerged intakes) and the fine mesh screens themselves. Most studies submitted by industry showed a bias towards older/larger larvae, which are generally more developed life stages of fish and shellfish. These older life stages are starting to exhibit survival traits and avoidance responses. These studies are poor indicators of performance for eggs and early life stages, which have no avoidance response (eggs can't swim) and no protective features (no skeletal structure or incomplete formed structure, and no scales). The submitted studies also did not fully characterize survival of entrainable organisms; in other words, these studies often characterize entrainable exclusion, and did not measure entrainable survival. These studies are therefore rejected as supporting fine mesh performance is comparable to CCRS.

In addition to EPA concluding fine mesh performance is not comparable to CCRS, EPA's analysis shows fine mesh is not widely available. Overall, EPA's technical analysis shows 68 percent of facilities would need to expand the size of their intake[10] by more than five times to accommodate a retrofit to fine mesh, and the vast majority of these sites do not have sufficient water front space or water depth to accommodate such an expansion. In addition to limited source water depth and well depth, EPA notes that even if fine mesh performance was comparable to CCRS, fine mesh is not available at an estimated 17 percent of facilities based on existing intakes that need to be enlarged to accommodate 2.0-mm fine mesh. Similarly, enlarging the existing intakes to accommodate a reduced open surface area when retrofitting to 0.5-mm mesh is unavailable for at least 55 percent of facilities. These analyses and supporting data lead EPA to conclude that fine mesh screens would not be an available technology at a significant number of sites. EPA did not receive any new data to the contrary. In addition, EPA recognizes that high sediment waterbodies pose a challenge for fine mesh screens, and high sediment water can cause "blinding" of the intake. For all of these reasons, fine mesh screens do not offer survival of entrainable organisms to the extent CCRS does, and EPA rejects all comments stating that fine mesh performs comparable to CCRS. See preamble VI.C for further discussion of fine mesh screens.

EPA agrees that other technologies (such as variable speed pumps or variable frequency drives, seasonal shutdowns) may be effective at some sites, and facilities are encouraged to implement such technologies to reduce entrainment, EPA's analysis showed that these technologies also do not achieve the same level of reduction in entrainment as closed-cycle cooling. Variable speed drives can achieve a maximum of 10 to 15 percent reduction in flow; the average flow reduction is about 8 percent for those sites where the technology is available. Therefore CCRS is approximately an order of magnitude better in performance than VFDs. Seasonal shutdowns are not available at baseload power generating facilities, nor are they available at most manufacturing sites, because these facilities operate year round. Shutdown during peak entrainment seasons is not viable for these facilities. See preamble VI.C for more discussion. Upon full consideration of all comments and data, EPA has concluded that performance equivalent to CCRS is not BTA (because there are no available, demonstrated, and feasible technologies on which to base such requirements).

To reiterate, EPA concluded that closed-cycle cooling is the most effective technology and there is a gap in performance (when viewed at the national scale) between closed-cycle cooling and all

[10] Fine mesh screens reduce the open screen area available for water to flow through the screen. To maintain approximately the same volumetric flow and the same intake velocity so as not to cause adverse plant operations, the intake therefore must be expanded with additional screen bays to provide the requisite open screen area.

other technologies with regards to entrainment As discussed above, closed-cycle cooling provides an average of 96 percent reduction in entrainment. According to EPA's record, one of the next most effective technology with regards to entrainment is fine mesh screens. Also as discussed above, the record shows that fine mesh provides less than 12 percent survival of entrainable organisms at 0.5-mm mesh size (mean value for eggs and larvae combined), and no protection of eggs at a 2.0-mm mesh size. In addition to this performance gap, there is a lack of nationally available technologies. For all of these reasons, EPA did not identify an available candidate technology on which to base entrainment performance standards. As discussed above, since technologies other than closed-cycle cooling may offer some level of entrainment reduction at some sites, EPA's final rule includes requirements at § 122.21(r)(10) to develop a Comprehensive Technical Feasibility and Cost Evaluation Study.

EPA also disagrees that under section 316(b), the EPA may only consider one factor - the performance of different entrainment reduction technologies - in determining BTA requirements under section 316(b). Riverkeeper I and II and the U.S. Supreme Court's decision in *Entergy* establish that, while EPA <u>may</u> consider the factors specified in sections 304 and 306 as relevant factors in its decision-making, it is not limited to those factors. Section 316(b) is a separate and distinct statutory provision from section 301, 304 and 306. (See, for example, page 1506 of 129 S. Ct., which concluded that EPA is not bound to apply only those factors. The court noted that the BTA standards of section 316(b) must "minimize" adverse environmental impacts and contrasted that with the Congressional goal to "eliminate" the discharge of pollutants. Also, the Supreme Court noted that 316(b) contains broader language with additional discretion, describing the statute's silence on certain issues as an indication to "convey nothing more than a refusal to tie the agency's hands.") As a consequence, while EPA may consider factors like those considered in developing its effluent limitations guidelines, EPA has discretion to consider other factors in its decision-making under 316(b). See preamble section II and Essay 10 for more details.

EPA disagrees that the final rule will perpetuate the "status quo" of inaction on 316(b) requirements. Section 125.90 makes it clear that all CWIS must meet the requirements of section 316(b), including those CWIS at facilities not in scope of the final rule. Today's final rule establishes a schedule for submitting permit applications and studies, provides the Director and the public with new and significant information, and ultimately establishes a rigorous process for determining BTA for each facility. Notably, while site-specific permit requirements are not new, what is different about EPA's approach from the current requirement for permits to include 316(b) conditions is that for the first time, EPA is establishing a detailed specific framework for determining BTA entrainment control requirements. Thus, the rule identifies what information must be submitted, prescribes procedures that the Director must follow in decision-making and factors that must be considered in determining entrainment requirements. See preamble for further discussion.

EPA disagrees with the comment that facilities with closed-cycle should have *no* further study or reporting obligations. EPA's record shows that there are existing facilities with closed-cycle cooling that do not optimize their operations to minimize water withdrawals. In some cases, facilities with cooling towers have been found to operate their cooling towers as once through cooling. Other cooling towers are operated at far lower than optimized cycles of concentration and with makeup water withdraws that are not minimized. Today's final rule definition of CCRS requires the facility to demonstrate to the Director that makeup water withdrawals have been minimized. Furthermore, periodic evaluation of the source waterbody is necessary to ensure no significant changes have occurred in the operation of the facility or in the source waterbody. For example, a species of local importance may warrant additional study, monitoring, or technology controls. For these reasons, EPA disagrees that there are any facilities that should have no study requirements as part of the permit application or reporting obligations under the permit.

EPA also disagrees that the *Riverkeeper I* decision establishes the factors EPA consider in determining BTA. EPA has considered non-water quality environmental impacts to the extent such information was available. EPA further notes that more information on these impacts is available now than was available in the development of the Phase I and II rules. However, CCRS is rejected as BTA for the reasons stated above. See the preamble for more details on the factors EPA considered in determining BTA for entrainment. Examples of non-water quality and other impacts considered in this rule at § 122.21(r)(12) include changes to energy consumption, estimates of air pollutant emissions, changes in noise, impacts to safety, facility reliability, and consumption of water. Also see Essay 17A.

Some commenters suggested low intake velocity was BTA. Riverkeeper noted that reducing the intake velocity will do little to reduce entrainment.

EPA disagrees low intake velocity is BTA for entrainment. As discussed above, early life stages have no avoidance response, and therefore low intake velocity offers no protection to such organisms. With respect to theories regarding hydrodynamic influences of low intake velocity, EPA notes that egg and larvae exclusion do not equate to survival. Impact of eggs and especially early life-stages of larvae on a CWIS still cause damage and/or mortality of the organisms. Also see Essays 10 and 18. Therefore EPA agrees that reducing the intake velocity does not reduce entrainment and has assigned no reductions in entrainment to intake velocity-related compliance options.

Approach to BTA for Entrainment at New Units Constructed at Existing Facilities

New units are required achieve performance commensurate with that which can be attained by the use of CCRS because the technology is available, demonstrated, and achievable; see preamble for further discussion. The final rule at § 125.94(e)(2) provides the flexibility for facilities to demonstrate, on a site-specific basis, a system of technologies approach that provides performance comparable to CCRS. Because new units are required to achieve performance commensurate with that which can be attained by the use of CCRS (at § 125.94(c)(12)), the above discussion of lesser performing technologies for entrainment at existing facilities is obviated.

Other Technologies for BTA for Entrainment at Existing Facilities

One commenter argued that wedgewire screens can offer comparable performance to closed-cycle cooling. The commenter did not provide comparability performance data. EPA disagrees that wedgewire screens perform comparably to closed-cycle cooling, especially with respect to entrainment. To date, EPA has not identified any performance studies for wedgewire screens alone that support the position that these screens achieve a performance equivalent to that of closed-cycle cooling systems. First, the screens must consist of fine mesh to have any bearing on entrainable eggs or larvae; see the TDD. Second, fine mesh wedgewire screens merely exclude entrainable organisms from being sucked into the facility because eggs have no avoidance response and thus do not necessarily result in reduced destruction of the eggs and larvae. This is in contrast to closed-cycle cooling which significantly reduces withdraw of cooling water in the first place. EPA acknowledges that wedgewire screens may result in reductions of entrainable organisms at some facilities (based on local species and life-stages found in the vicinity of the CWIS), and may prove to be effective at some sites as part of a systems approach to reducing adverse environmental impacts (such as in combination with a far offshore and deep submerged intake). EPA's record suggests that a far offshore location with a deep intake, with variable speed drives, in combination with fine mesh has the potential for entrainment performance approaching that of closed-cycle. However, such an approach is not available at inland waterbodies such as rivers and streams.

While the record shows fine mesh wedgewire screen performance is not comparable to CCRS, and is not BTA for the reasons discussed above, EPA is not prejudging the site-specific determination of entrainment. While EPA can address the overall performance of each technology considered in this rule (see TDD), EPA does not have sufficient data to opine on the facility-specific details raised by the commenter as to what technology is the best choice at a given site. The final rule establishes a process through which the facility will submit data and the Director will make a site-specific determination of BTA for entrainment. EPA's BTA standard for entrainment requires the determination of BTA entrainment reduction controls in a structured process with consideration of specified factors as indicated above. This process allows the Director to consider a given technology or system of technologies performance at a given site, particularly installation and operation of a numbers of technologies that in combination may result in achieving reductions in entrainment necessary to achieve BTA at that site. For the same reasons, EPA is unable to pre-judge the timing of benefits when establishing a schedule for entrainment requirements at each site.

Some commenters requested that EPA include cooling ponds in the definition of a closed-cycle system and that makeup water should be excluded from 316(b) requirements; refer to Essay 14 for responses to this comment. Some commenters stated that the bulk of the burden of proof of having an adverse environmental impact falls to the Director instead of the facility, when the inverse would be more appropriate. Other commenters (including a state commenter) urged EPA to not promulgate a rule based on a site-specific determination of entrainment, as it reinforces industry's positions of status quo, and would not further the goal of enhanced protection.

EPA disagrees with each of these comments. As discussed above, the final rule is a significant improvement over the status quo. The studies required for certain facilities' permit applications, including but not limited to peer reviewed information related to entrainment characterization, must be collected by the facility. The rule lays out a structured process by which entrainment will be addressed by each facility. Together, these requirements minimize adverse environmental impact through significant reductions in entrainment. Facilities will collect new data and Directors and the public will have access to this information. EPA disagrees with the adverse comments concerning cooling ponds and waters of the U.S. The definition of closed-cycle cooling does not preclude the use of cooling ponds, nor does this rule alter or define waters of the U.S which is outside the scope of this proceeding. Hundreds of studies in EPA's record document impingement and entrainment occurring at all CWIS, including all waterbodies, types of intakes, and locations. Commenters did not provide any data to the contrary; even industry commenters providing data that their facility poses a de minimis AEI show impingement and entrainment. Therefore, there is no need for further proof that a CWIS subject to this rule has the potential for having an adverse environmental impact. The site-specific level of adverse environmental impact will vary, further supporting EPA's conclusion that BTA for entrainment includes a framework and the factors for determining BTA requirements.

Some commenters argued that EPA should clarify that there is no BTA for entrainment and allow the Director to establish entrainment controls. EPA disagrees with the notion that there is no BTA. EPA has determined that there is no available technology on which EPA can establish performance standards for entrainment. However, the final rule establishes as the BTA standard the requirement to determine for each facility in a structured process the site-specific entrainment reductions measures that comprise BTA for that site.

Some state commenters advocated for national entrainment requirements, noting that a site-specific approach would be too resource intensive; alternatively, they called on EPA to provide guidance, funding or staffing. EPA disagrees. As noted in the preamble and above, EPA concluded that national entrainment numerical performance standards were not appropriate. With respect to intensive resources, EPA also disagrees. All facilities must submit source water baseline characterization, cooling water system data, existing entrainment characterization studies, and other information as part of the permit application at § 122.21(r)(1) through (8). Facilities that withdraw greater than 125 mgd must submit detailed entrainment characterization studies, technical feasibility and cost evaluations, and other relevant data. The complete Entrainment Characterization Study must be peer reviewed. EPA has considered all costs associated with studies and peer review, and the final rule establishes these requirements on the facility. This permit application process thus places the relevant information in front of the state Director. The final rule at § 125.98(g) provides Directors the discretion to waive certain requirements for an ongoing permit proceeding. The final rule also provides Directors the discretion to waive certain permit application requirements; see § 125.95(a)(3). Further, EPA has defined a process by which site-specific determinations are made based upon these studies and data. See § 125.98 for details regarding the factors to be considered and the process for determining BTA for entrainment. Additional costs have been included for the Director's review of the submitted information and final determination of BTA. EPA finds these costs are not burdensome. For further information see the discussion of UMRA in section XI.D of the preamble. EPA will evaluate the need for further guidance after publication of the final rule as the final rule will be implemented through the Directors' existing NPDES state programs.

Some commenters stated that because the proposed rule fails to address entrainment, the rule leaves a majority of the impacts unregulated. Other commenters added that the apparent lack of adequate entrainment control technologies should encourage additional research. Some commenters stated that the rule should, at a minimum, achieve the lower end of the performance range from the Phase II rule.

EPA disagrees with all of these comments; the final rule does address entrainment by establishing a process for collecting information and providing it to the Director to make a site-specific determination of BTA. "Site-specific" does not equate to "unaddressed." EPA also disagrees that it can establish requirements on the premise of technologies that have yet to be developed. EPA can realistically only base performance standards upon technologies that are available and demonstrated at the present time. As noted in the preamble and in the proposed rule, EPA has changed its approach to addressing entrainment since the Phase II rule primarily based on new data, as well as a more complete understanding of the difference between entrainment exclusion and entrainment mortality. Further, some of the Phase II rule entrainment requirements are no longer authorized (restoration). The performance range is now known to represent exclusion, and does not represent reductions in entrainment mortality. Accordingly, the Phase II performance range for entrainment no longer reflects BTA. As discussed above, there are no intermediate performing technologies for entrainment. For all of these reasons, a percentage-based approach to reducing entrainment is no longer relevant. EPA agrees that CCRS must be considered in the rulemaking, but disagrees with the interpretation that *Riverkeeper II* mandates that EPA mandate closed-cycle cooling in future rulemaking (i.e., this rule). The Supreme Court decision in *Entergy* reversing the Second Circuit in *Riverkeeper II* made it clear that EPA has wide discretion in the factors it considers in its section 316(b) decision.

Approach to Impingement BTA at Existing Units/Facilities

As indicated above, industry commenters argued that facilities with existing closed-cycle cooling systems should be considered compliant for both impingement mortality and entrainment, and that such facilities should not have any additional impingement requirements. Some industry commenters noted that EPA's assumption that all facilities employing closed-cycle cooling (as a retrofit) would meet the design intake velocity threshold of 0.5 fps, and thus would meet the proposed rule requirements for IM, was erroneous. Some industry and some environmental group commenters provided detailed studies (including analyses of reliability, costs, benefits, feasibility, the universe of affected facilities, and other non-water quality environmental impacts) supporting these positions; EPA appreciates these submittals and considered them in preparing the final rule.

Another state commenter added that modified traveling screens should be considered pre-approved compliance technology for the impingement BTA standards. The commenter further suggested that for intakes supporting a closed-cycle cooling system, such intakes should have no further study requirements.

Based on the record for the final rule, EPA agrees with commenters that facilities with an existing closed-cycle system that is properly operated and maintained will meet or exceed the impingement mortality performance standard regardless of their intake velocity. This is because CCRS, on average, will reduce flows by 96 percent. This reduction in flow results corresponds to a 96 percent reduction in the rate of impingement. Accordingly, EPA agrees with the concept that facilities with closed-cycle cooling should have *reduced* study requirements. This is reflected in the final rule definition at § 125.94(c), and the permit application requirements at § 122.21(r). See preamble for further discussion of reduced study requirements.

With respect to IM, EPA disagrees with the comment that facilities with closed-cycle should have *no* further study or reporting obligations for the reasons stated above for entrainment. EPA also disagrees with the comments suggesting no studies, monitoring, or evaluation of further technologies need be conducted. First, a properly operated CCRS could withdraw more than 100 mgd each day, and could still be imposing an AEI. Second, installing the technology does not mean it is being properly operated; EPA found several instances where a cooling tower has been installed but not operated to minimize the volume of withdrawn. See 77 FR 34319. Therefore, in the final rule facilities with CCRS must demonstrate the makeup water has been minimized; see § 125.94(c). Third, even where the facility already has CCRS, the characterization studies and source water baseline data may indicate additional measures are necessary for shellfish, fragile species, or other aquatic organisms. The Director may make such a determination under § 125.94(c)(8) and (9). Finally, the record shows that for at least 10 percent of all facilities, the cooling water intake system may be comprised of more than one technology, and that 24 percent of manufacturers and 33 percent of electric generators have more than one CWIS; see TDD section 4.1.4. The rule provides the flexibility for the facility to demonstrate compliance for each intake, or at the facility level, but in either case further evaluation is necessary to determine whether the IM standard has been met.

The final rule establishes a standard for impingement mortality (with seven compliance alternatives) that must be achieved by all in-scope facilities. EPA has found that each alternative meets or exceeds the level of performance achieved by the selected BTA technology. See the preamble for discussion of each of these alternatives and the basis for each.

Riverkeeper opposes a site-specific approach to determining BTA for impingement. Riverkeeper stated that closed-cycle cooling is the best approach to reducing impingement and barring that, reducing the intake velocity is next most effective; they also argue that facilities should employ both technologies. Riverkeeper stated that EPA's own data show that a large number of facilities already meet the velocity standard and that the percent reduction in impingement is higher than that of the performance standard for traveling screens. Riverkeeper also stated that the rule should not allow degraded waters to influence the process for determining BTA.

EPA has established a national impingement mortality standard in today's final rule and, as such, agrees that a site-specific requirement for impingement mortality is not BTA; see the preamble for more information. While the BTA impingement mortality standard for the final rule is based on the performance of modified traveling screens, the rule does not require the installation and operation of this technology. Instead, EPA provided seven alternatives means of achieving the performance associated with well-operated modified traveling screens. EPA agrees that both closed-cycle cooling and reduced intake velocity are very effective in reducing impingement, and therefore impingement mortality. Therefore the final rule includes both of these technologies as compliance alternatives. EPA did not base the impingement mortality performance standard on these technologies for existing units as suggested by the commenter, because the record demonstrates that these technologies are not available on a national scale. See the discussion above and in the preamble on the availability of closed-cycle cooling. See Essay 17 and the TDD for a similar discussion on the national availability of reduced intake velocity technologies, and the preamble for further discussion of why low intake velocity is not BTA.

Riverkeeper supports their assertion that intake velocity should be the technology basis for the BTA impingement standard for by citing data from the Phase I rule on the extent to which new facilities have low intake velocities. EPA notes that the data cited referred to facilities constructed in the prior 15-year period. EPA agrees that newer facilities tend to have lower intake velocities, but today's final rule addresses all existing facilities, including those that are much older, and the percentages of existing compliant facilities cited is much lower. In fact, EPA's cost analysis (which used industry survey data for the entire universe of existing power generating facilities) estimated that approximately one-third of the in-scope universe would comply using the design intake velocity option; some existing intakes already have a compliant velocity and others would install a technology to reduce their intake velocity to 0.5 fps. EPA agrees that reducing the intake velocity is a highly effective approach, but as noted above, it is not an available technology for many facilities and therefore is not appropriate to consider as the basis for a national BTA for impingement. EPA has identified a most effective technology for IM that is available at most facilities, established a performance based on that technology, and then identified a number of ways in which this level of performance can be achieved. Intake velocity and closed-cycle cooling both achieve the required level of performance, therefore such technologies (where feasible at a facility) would allow existing units to comply with the final rule IM requirements. EPA notes that the final rule is not based on the condition of the receiving waters (or intake waters), as all waters are treated equally in terms of establishing appropriate requirements.

EPA disagrees with commenters that facilities that employ closed-cycle system that are properly operated and maintained should additionally have to meet an impingement requirement based on reduced intake velocity. As explained above, EPA concluded reduced intake velocity is not available nationally. Comments and data received on the proposed rule show that not all facilities with CCRS would meet the 0.5 fps intake velocity. Furthermore, EPA's record demonstrates that facilities that utilize such closed-cycle cooling systems have correspondingly reduced impingement (and entrainment) mortality by approximately 96 percent. Therefore, any additional requirements on facilities with properly operated CCRS would further reduce IM by at most 1 to 4 percent. EPA has determined the BTA for IM as discussed above; properly operated CCRS achieves the BTA IM standard. Therefore EPA disagrees that all existing facilities with CCRS should be additionally required to demonstrate reduced intake velocity.

Industry commenters stated that the proposed rule's impingement requirements are too inflexible. Commenters further suggested that site-specific approach for impingement mortality (including consideration of costs and benefits) would be preferable, appropriate given EPA's history of site-specific evaluation of BTA, and less costly to facilities and consumers.

As discussed in Essay 24 and as noted in the preamble, EPA disagrees that the IM requirements are inflexible. EPA did not propose and is not today establishing requirements to install modified traveling screens. As noted in the preamble, EPA has promulgated a final rule with seven IM compliance alternatives, including compliance alternatives for both pre-approved and streamlined technologies as suggested by commenters. The last alternative provides an opportunity to demonstrate new and innovative technologies and approaches that achieve the IM performance standard. EPA concludes the rule provides ample flexibility. EPA also disagrees site-specific IM is less costly that EPA's flexible final rule; in some cases the burden of data collection studies, biological assessments, pilot studies, site-specific engineering assessments, and other factors makes the site-specific IM determination process alone more costly than a facility implementing one of the seven compliance alternatives. As discussed in the preamble, EPA has found the suite of technologies for IM to be affordable, available, feasible, demonstrated and effective. Therefore, EPA disagrees that a site-specific approach is appropriate for impingement mortality. See below for a discussion of the role of costs and benefits.

Role of Costs and Benefits in Determining BTA

Many commenters stated positions on how (and whether) EPA should consider costs and benefits in the final rule. These comments generally fit into several categories, as discussed below.

Cost-Benefit/Benefits Must Justify the Costs/Maximize Net Benefits for the Final Rule

Environmental commenters state that EPA should not rely on cost-benefit analyses and should prohibit Directors from considering cost-benefit analyses. They also stated that cost-benefit analysis is intended to be a screening tool to rule out absurd results and not to make significant regulatory decisions; as a result, EPA's reliance on cost-benefit is illegal. Riverkeeper also stated that there was no cost-benefit analysis for Phase I or for offshore industries in Phase III and therefore none should be conducted in the existing facility rule. Riverkeeper argued that EPA has overestimated compliance costs and underestimated the benefits of the rule, resulting in a skewed cost-benefit ratio. They state that, with partial corrections to these analyses, Option 3 becomes the clear choice for the final rule, as the benefits exceed the costs. Riverkeeper argued that EPA stated that Proposal Option 1's benefits were justified by the costs, but did not state a conclusion for the same test for Options 2, 3 and 4. Environmental commenters also noted that there is a significant burden on the Director, who will be required to make decisions with little to no guidance, adding that states lack the expertise and resources to conduct the same extensive analyses of costs and benefits as those conducted for the final rule. They argued that EPA has spent years developing its analyses (even exceeding the level of effort typically afforded to a BPT threshold) and cannot reasonably expect that states can reproduce this level of effort and will therefore likely fail to fully account for benefits to be gained by closed-cycle cooling. Environmental commenters also stated that, if cost-benefit analyses are allowed, EPA should set limits on how they will be implemented. They further stated that OMB altered language related to considering costs and benefits. Some environmental commenters stated that EPA should conduct a break-even analysis when costs exceed the benefits.

Many industry commenters stated that the final rule should have benefits that are commensurate to or greater than the costs of the rule. Some commenters argued that EPA has not explained its rationale for taking action, asserting that the costs are not justified. Similarly, several commenters stated that EPA had failed to comply with Executive Order (EO) 13563, titled "Improving Regulation and Regulatory Review." Some comments stated that EPA had not maximized the net benefits, as directed by the EO. Other commenters argued that EPA had not demonstrated that the rule's costs were justified by its benefits, as directed by the EO. Many commenters also pointed out that the Entergy decision permits EPA to consider costs and benefits and that EPA should do so, in keeping with past practice for 316(b). These commenters noted that the cost-benefit ratio for the proposed rule was approximately 21 to 1 and that that ratio did not include any consideration of costs to address entrainment, which one commenter noted was inconsistent with EO 12291. Some commenters stated that Option 3 had the worst cost-benefit ratio among the options considered, suggesting that the application of closed-cycle cooling is not an appropriate national requirement and that a conversion to closed-cycle cooling would be applied only in limited circumstances. Some commenters stated that the disparity in the costs and benefits for the rule failed the Administrative Procedure Act's test of "reasonableness." Another commenter stated that EPA had pre-judged the outcome of the incomplete stated preference survey and used those results to conclude that the rule's benefits justify the costs.

Some commenters provided a summary of EPA's guidance document for conducting cost-benefit analyses or a detailed discussion on how to conduct a cost-benefit analysis.

A state commenter noted that state policy was to conduct a cost-benefit analysis and discourage negative impacts to the state economy and employment. The commenter argued that "benefits justify the costs" would constitute backsliding, as well as place an undue burden on the Director to justify any action. Another state commenter added that EPA should eliminate any requirements to evaluate costs and benefits at the facility level, given that EPA was unable to develop a complete analysis for the final rule.

Other commenters argued that EPA should define the threshold for "benefits justify the cost" as being comparable to one another or to have a net positive benefit. Another state commenter preferred to continue using the "wholly disproportionate" threshold, as it had already withstood several legal reviews Several commenters stated that the threshold of "benefits justify the costs" is superior to the current threshold of "wholly disproportionate" and Phase II's "significantly greater." Some commenters advocated instead using the threshold of "benefits exceed the costs." One commenter stated that the Clean Water Act did not support the use of the "wholly disproportionate" test. Another commenter noted that in the Phase II rule, EPA determined that a cost-benefit ratio of 5 to 1 was considered "wholly disproportionate" and had no basis to change this threshold in the final rule. Other commenters noted that, in the Phase III rule, EPA concluded that the costs for regulating land-based facilities (small power plants and manufacturers) was not justified, yet the Phase III rule had a cost-benefit ratio that is very similar to that of the final rule. They added that EPA has not explained why the underlying logic of these decisions has changed.

EPA agrees the appropriate standard is wholly disproportionate. EPA notes commenters have confused this with the EO 13563, as discussed below. In *Riverkeeper II,* the court decision states "because cost is not supposed to be a paramount consideration in determining BTA, *see Riverkeeper I*, 358 F.3d at 185, the "significantly greater than" standard poses substantial concerns." The court also noted discomfort with the "significantly greater than" standard of 40 CFR 125.94(a)(5)(i), given the historical applicability of a "wholly disproportionate to" standard and the use of the latter standard in the Phase I Rule. EO 13563 directs EPA and other Federal agencies to identify and use the best, most innovative and least burdensome tools for achieving regulatory ends. In its regulatory actions, agencies "must take into account benefits and cost, both quantitative and qualitative," and to the extent permitted by law, only promulgate regulations that are based on "a reasoned determination that its benefits justify its costs (recognizing that some benefits and costs are difficult to quantify)" (see section 1(b)(1)). EPA has improved its analysis since Phase II, and has used the best available science regarding widely accepted tools and data to monetize the benefits of the various options in four major categories: recreational fishing, commercial fishing, nonuse benefits, and benefits to threatened and endangered species. EPA has concluded that the benefits estimated for the first two categories are generally complete, while the benefits estimated for the latter two categories are far from being complete for a number of reasons. For example, the nonuse benefits consider only one species and only for the northeast and middle Atlantic states. See preamble section VI.F for further discussion. The Phase II rule, like today's final rule, had many benefits that were not quantified and were therefore not monetized. As a result, the Phase II cost-benefit ratio cited by commenters provides an incomplete comparison of the costs and benefits. With respect to Phase

III, EPA based the decision on its judgment that the monetized costs associated with the primary option under consideration are wholly disproportionate to the monetized environmental benefits to be derived from that option. EPA was unable to assign a monetary value that fully captured the value of avoiding the environmental impacts that EPA had identified because the necessary information was not available. EPA did attempt in the Phase III rule to monetize the loss of forage fish indirectly through its impact on reducing commercial and recreational harvests, and found these impacts to be generally small. However, this approach does not capture the value that society may place on these fish for their own sake. Therefore, EPA only considered nonuse benefits qualitatively. EPA has since collected additional data, conducted supplemental analysis and explored additional regulatory options. EPA explained the basis for its proposed rule and solicited comment. Therefore EPA disagrees that the rationale for any changes to the Phase II or Phase III rules has not been provided.

Other commenters stated that EPA should present a full cost-benefit analysis in the final rule. Some commenters noted that EPA conducted a summary-level cost-benefit analysis in the proposed rule, yet still selected an option that had a worse cost-benefit ratio that other options.

For the final rule, EPA estimated both the compliance costs and its projected benefits and has fully considered both analyses in its decision-making. EPA recognizes that commenters expressed a wide range of opinions on how to consider costs and benefits in the final rule, noting that there are many considerations, resources, and precedents to bear in mind. In fact, Justice Breyer's opinion in *Entergy* recognizes the difficulty associated with monetizing benefits. After evaluating these comments, past practice of implementing 316(b), and case law, as explained in the preamble, EPA concludes it has permissibly and appropriately considered costs and benefits in this final 316(b) rule. EPA notes that cost-benefit analyses in other regulations are not relevant. EPA disagrees that previous Agency decisions from the Phase I or Phase III rule are binding for this final rule because EPA has collected new data, developed new options, solicited further public comment, has new case law, and is considering the more complete body of information and analysis now before it. As recognized in *Entergy*, under section 316(b), EPA may consider, but is not required to consider, costs and benefits even if benefits are non-monetized. In this case, EPA exercised its discretion to consider monetized cost and benefits as one of many other factors it evaluated in selecting the final regulatory option.

EPA also disagrees that it has not complied with EO 13563 or the APA. The Agency considered a number of regulatory options, including a consideration of the costs and benefits for each option, and solicited comment on all aspects of the rule. As described in the preamble and in other responses to comments, EPA has considered both the monetized and non-monetized costs and benefits in developing the final rule and has therefore fully complied with EO 13563. EPA disagrees that comparing only monetized costs to monetized benefits is an appropriate test that trumps all other Clean Water Act factors for evaluating regulatory options; this casts a shadow of doubt onto any "benefits that justify the costs," "maximize net benefits," or "benefits that are commensurate with the costs" comparisons that are strictly numeric. EPA notes that the monetized benefits in the final rule do not capture all of the benefits that are projected to result from today's rule. For this reason alone, a comparison of only the monetized costs and benefits poses an incomplete evaluation of the full range of costs and benefits that would result from each option considered.

Additionally, many commenters cited only part of the text of the EO; the EO subsequently continues: “In applying these principles, each agency is directed to use the best available techniques to quantify anticipated present and future benefits and costs as accurately as possible. Where appropriate and permitted by law, each agency may consider (and discuss qualitatively) values that are difficult or impossible to quantify[.]” As described in the preamble, EPA has applied the principles spelled out in EO 12866 and EO 13563. The EPA assessed total costs and benefits of the regulatory option for the final rule and has reasonably determined that the benefits of the rule justify the costs. In this way, EPA considered both costs, benefits, and the relationship of the two in selecting today’s impingement and entrainment mortality requirements. While the rule costs exceed the monetized benefits as presented, EPA has concluded that the costs do not outweigh total benefits when both monetized and nonmonetized benefits are considered. EPA notes that the monetized benefits are only a subset of all benefits. In the absence of complete estimates of nonuse benefits, EPA estimated partial nonuse benefits for the final rule using the benefits transfer approach from proposal. This approach is still a partial estimate, because it concerns only one species in two coastal regions; see the preamble for additional discussion.

EPA disagrees that it has miscalculated the total national monetized costs and benefits (including those for closed-cycle cooling), thus leading to faulty decision-making for selecting a regulatory option. EPA has updated its costs and benefit analyses since the proposed rule, solicited data and comments, and fully documented its costing (see the TDD and Essay 21). Therefore the EPA has the best and most recent data available. While costs (and benefits) were estimated and were a consideration while reviewing all regulatory options for the final rule, they are not the sole or primary factor in selecting BTA. Thus, even if EPA’s estimates of costs and/or benefits are incomplete (which they are to the extent that certain benefits cannot be quantified or monetized) or were found to be incorrect, EPA would not have selected a different regulatory approach. For example, as discussed above with respect to CCRS, EPA concluded cooling towers are not nationally available as a technology basis for controlling impingement and entrainment mortality. Therefore CCRS is not BTA irrespective of the national costs, benefits, and/or the relationship of the two.

EPA agrees that a break-even analysis can be a useful tool for decision-making. See Essay 76 for a discussion of the break-even analysis EPA conducted for nonuse benefits in the final rule.

EPA disagrees that a market-based approach suggested by some commenters is a viable solution for evaluating cost-benefit for this rule. EPA explored approaches involving trading in prior rulemakings; see, for examples 67 FR 17170 (April 9, 2002) for information. As noted in the Phase II response to comment document (see comment 316bEFR.034.027), trading of ecological resources is a far more complicated endeavor than pollutant trading and EPA declined to establish such a program. In EPA’s view, trading is a difficult concept in the context of 316(b). As appropriate, the Director could develop such a program on a state or watershed level.

Consideration of Costs and Benefits on a Site-Specific Basis in Establishing Entrainment Controls - General

EPA notes that it considered costs, benefits, and the relationship of the two in its consideration of options for the final rule. Because EPA has not identified a technology basis that is available, demonstrated, and achievable for a national standard, EPA determined there is no basis upon which to conduct a cost benefit analysis on a site-specific basis. EPA notes this is in contrast to IM, where a technology has been identified as available, demonstrated, and achievable, therefore a cost-cost test is not necessary. The impingement mortality performance standard provides 7 compliance alternatives, and additionally provides each facility the flexibility to comply at a facility level or at an intake level. The IM performance standard is economically achievable. And the costs of IM at the facility level have low variability. See TDD Chapter 12, the proposal at 76 FR 22186, and the EA for more details. As such, the following discussion is specific to site-specific entrainment standards only.

As explained previously, the final rule requires that the Director must establish the BTA entrainment requirement for a facility on a site-specific basis. The requirements must reflect the Director's determination of the maximum reduction in entrainment warranted after consideration of all factors relevant to the BTA determination at the site and must include consideration of the specific factors spelled out in the final rule. These considerations and factors are spelled out in the preamble and final rule. Some of the comments above relate to site-specific considerations for entrainment.

Some noted that states are ill-equipped to conduct these types of site-specific entrainment analyses and that it would create an undue burden on the states. EPA disagrees. See above discussion regarding burden on states and the Director. Furthermore, EPA notes that permits containing 316(b) conditions have been issued for over 30 years under a BPJ-based approach that inherently considered costs and benefits in addition to various other factors. With respect to cost benefit, the final rule establishes a process by which relevant sampling, studies, and information is submitted to the Director. This process is expected to result in the appropriate information needed by the Director, and will likely reduce historic levels of burden on states. EPA notes that there is a long history of Director discretion and public participation in 316(b) permitting, and that the rule establishes a process (including a transparent, reliable peer review process) to provide consistent review, determinations, and permit issuance. EPA notes that while the process requires a cost-benefit analysis, in the event that the facility does not submit complete and relevant data to evaluate cost benefit, the Director may reject the incomplete data. Further, the Director may choose how to consider cost-benefit and what weight to afford it in determining entrainment standards.

In response to state commenters, as noted above, the Director has discretion in how to consider cost-benefit analyses in determining appropriate permit requirements. As such, the final rule does not interfere with existing state policies on the treatment of costs and benefits. EPA disagrees that the final rule constitutes backsliding, as the Director may choose how to consider cost-benefit and what weight to afford it in determining entrainment standards. EPA disagrees that additional cost-related variances are necessary, as the final rule already requires the Director to consider costs and benefits.

One commenter considered it important that permit writers should obtain cost estimates that reflect the specific characteristics of each site and technology application and was concerned that the cost tool that EPA used in developing national costs would be used in lieu of cost estimates that reflect the specific characteristics of each site. They also recommend that potential electricity rates and reliability concerns be included in site-specific assessments. Another commenter was concerned that nonuse benefits could be considered on a site-specific level. A commenter also stated that EPA did not conduct formal sensitivity analyses on most cost or benefit parameters.

As noted above, the final rule establishes a framework for the Director to determine entrainment requirements on a site-specific basis, using information submitted by the facility on a variety of factors. EPA disagrees that the cost tool used for national level costing is a concern because the final rule at § 122.21(r)(10) requires an engineering study, an engineering cost estimate, and furthermore specifies criteria for conducting the cost evaluation. In addition, the final rule at § 122.21(r)(13) requires the study must be externally peer reviewed. Finally, at § 125.98(f), the final rule states that the proposed permit must include the Director's proposed entrainment determination. As such, the site-specific cost estimates, potential effects to electricity rates and reliability, and other information that may be considered by the Director when determining BTA will be subject to public scrutiny. As noted by the commenter, site-specific assessments of costs and benefits can vary, EPA is not required to do so, and therefore did not evaluate information on that scale in establishing the final rule. EPA is aware that the use of site-specific cost estimates may be overstated, as historically facility developed cost estimates do not appropriately represent the *incremental* costs of compliance. EPA expects the peer-review and other requirements in the rule discussed above will ensure facility level cost estimates are properly determined.

With respect to sensitivity analyses, EPA disagrees that formal, quantitative analyses are required, according to guidance from OMB for regulations with a total cost under $1 billion. (See OMB Circular A-4, DCN 10-3266.) Instead, EPA has discussed the uncertainties and limitations in its analyses; for example, see the TDD. EPA identified the major cost drivers of the rule, and these uncertainties would not have changed the outcome of the final rule decisions. EPA has not identified any other parameters upon which to conduct a sensitivity analysis, and the commenter did not provide any suggestions. Therefore, even if EPA had conducted additional sensitivity analyses, the EPA does not expect results of such analyses would have changed the outcome of the final rule decisions.

Comments Specific to Cost

Industry commenters generally stated that the proposed rule was overly expensive (some asserted costs were prohibitive), that costs were underestimated, compliance costs could lead to higher costs for consumers, or could lead to facility closures, and all without a commensurate increase in benefits. Some commenters provided facility-specific cost estimates for technology installations. These commenters also stated that these cost would be incurred at facilities where the facilities believe no adverse environmental impacts are occurring. Commenters also stated that EPA neglected to include costs for entrainment controls in its analysis. Similarly, these commenters claimed that facilities with certain technologies or intakes in certain locations would not require any action and that the national-scale analysis used by EPA masks these site-specific details. Other commenters added that effects outside of 316(b) affect water quality and aquatic organisms and would not be reflected in EPA's analysis. Some commenters asked EPA to clarify that "social costs" include capital costs, monitoring and O&M.

Some commenters noted that there are significant costs associated with compliance for other rules. Other commenters noted that EPA's analysis does not include sufficient data on the category of "other industries" and this category should therefore be excluded from the regulation.

Some environmental commenters stated that even the highest cost options examined resulted in nominal increases on a per-household basis. Environmental commenters also noted that EPA has not considered certain categories of costs, such as the costs associated with once-through cooling and the economic impacts of fish kills. Another environmental commenter stated that once-through cooling amounted to a subsidy for industrial facilities.

As described in the preamble, EA and Essay 21, EPA has conducted a thorough analysis of the incremental costs to comply with today's final rule. That is, the costs are those that EPA estimates facilities would incur in addition to existing costs to comply with today's rule. EPA notes that many commenters did not provide a detailed description of their cost estimates, making it impossible for EPA to evaluate some commenter's submittals. To the extent facilities and vendors provided detailed costs, EPA considered such data in combination with the rest of its record for estimating costs for the finale rule. As discussed above, facility-level cost estimates are often higher than EPA's cost estimates because they do not properly reflect the incremental costs of compliance. For example, a facility that already employs modified traveling screens with smooth mesh and fish friendly buckets would not be costed for installation of new modified traveling screens. In some instances the data provided by commenters was not comparable due to inconsistent analytical methods provided in comments such as interest rates, annualization terms, useful life of equipment, and commenter assumptions regarding labor hours and compliance monitoring EPA's final rule cost estimates are based on all available data, including appropriately documented cost data provided by commenters. Therefore EPA disagrees that the costs are significantly understated, and in light of the cost driver sensitivity analysis discussed above, any small changes in costs would not result in a different decision. EPA also disagrees that the costs are unreasonable, as described in the preamble, the EA, and above. Specifically, 86 percent of regulated facilities will incur compliance costs of less than 1 percent of revenue. On average, for a typical U.S. household, the final rule will result in an annual cost of $1.03 per household. See preamble Section IX for additional analyses demonstrating the costs of the final rule are reasonable and affordable.

EPA estimated incremental costs for the regulatory options evaluated for today's final rule. For regulatory options that included a specific technology basis for both impingement and/or entrainment, EPA estimated incremental costs for those facilities to come into compliance. The regulatory option ultimately selected for today's final rule includes performance standards for impingement mortality and a site-specific determination of entrainment requirements. Because determinations of BTA for entrainment are to be made by the Director on a site-specific basis, EPA has no way to predict the outcome (and therefore incremental costs) of these site-specific permit proceedings. As is common with EPA national technology based regulation development, costs associated with site-specific requirements are not estimated as rule costs because, in absence of nationally applicable technology based regulations, permitting authorities are already required to determine technology based requirements on a best professional judgment basis, and facilities are already required to meet such requirements. Therefore this rule would not impose any incremental compliance costs. The rule does require certain studies and information to be submitted, and the rule does include the costs for these activities. The costs for the final rule therefore include incremental costs associated with the impingement mortality performance standard and incremental costs associated with the site-specific entrainment process including characterization study requirements. Because the Director will consider various factors including costs and impacts in determining site-specific BTA for entrainment, the commenters concerns will be most appropriately addressed on a site-specific basis. Nevertheless, EPA did estimate costs for various entrainment technologies. For illustrative purposes, EPA analyzed two hypothetical outcomes for the proposal (76 FR 22211).

EPA disagrees with the comments regarding “other” industries. EPA established a model facility costs analysis, and has assigned each model manufacturing facility a weight of greater than one; this modeling approach ensures all in-scope facilities are counted in EPA’s analysis. EPA notes that the Phase III rulemaking, the 2011 proposed rule, and the 2012 NODA all provided opportunities for comment and data. EPA specifically solicited comment on the “other industries.” EPA did not receive new data upon which it could consider additional model facilities. EPA has therefore established a reasonable approach to conducting the analysis and has made a reasonable effort to represent all in-scope facilities.

Benefits

Some industry commenters stated that benefits were overstated in the proposed rule. Others stated that EPA’s assessment of benefits in the proposed rule was incomplete, as the stated preference survey had not yet been conducted in all regions nor had the analyses been completed, thereby depriving the public the opportunity to comment on the analysis. Some commenters provided site-specific estimates of benefits projected to be realized through compliance with the rule.

A state commenter argued that the complexity of EPA’s benefits analysis would be unlikely to be repeated at the state level, making it difficult for a Director to pursue closed-cycle cooling as an entrainment control technology at a site-specific level.

Some environmental commenters (including Riverkeeper) stated that EPA has underestimated the benefits of closed-cycle cooling. Similarly, these environmental commenters noted that EPA’s benefits analysis is incomplete, as it does not include the value of entrainment reductions for many facilities under some options. Environmental commenters added that EPA cannot ignore the results of the stated preference survey, however preliminary they may be. Environmental commenters also stated that EPA should weigh impacts to threatened and endangered species as significant, given that the loss of even a single individual can be a significant effect on the remaining population.

As described in the preamble, BA and Essays 70, 71 and 73 through 78, EPA has conducted a thorough analysis of the benefits as a result of today’s final rule. EPA disagrees that the benefits are overestimated, as described elsewhere, and EPA notes that commenters did not explain how EPA had overstated benefits. Because EPA did not calculate benefits for the final rule on a site-specific basis, it is not possible to directly compare EPA’s analysis with facility-specific values submitted by some commenters. Finally, as discussed above, EPA disagrees that only monetized benefits should be considered.

One commenter argued that EPA should use a market-based approach (such as cap and trade), as this would likely maximize the net benefits. The commenter added that, in the absence of such an approach, EPA must weigh the advantages and disadvantages of a site-specific approach.

EPA disagrees that a trading program would maximize net benefits. EPA notes that section 316(b) of the Clean Water Act intends to minimize the adverse environmental impact associated with cooling water intake structures. EPA considered a trading program in response to comments in the now remanded Phase II rule (see Phase II RTC at 316bEFR.034.027). The premise is that such a program must result in environmental performance within a watershed that is comparable to the reductions of impingement mortality and entrainment that would otherwise be achieved under the requirements established at § 125.94. To this end, EPA expected approval would only occur for those trading programs which allow trades within individual watersheds and trade for numbers of the same species. However, such an approach would not minimize AEI, because under such a program there is no incentive or requirement for a group of facilities (involved in the trade) to do any more than the bare minimum. Such an approach does not maximize net benefits because it neither maximizes benefits nor reduces compliance costs more than EPA's final rule approach. Under EPA's approach to the final rule, the facility has seven compliance alternatives for IM. The first four alternatives are based on pre-approved technologies or superior performing technologies, such as CCRS or intake velocity. Facilities utilizing these technologies are already achieving some of the highest reductions in IM possible, and their benefits are likely close to maximum. Under these alternatives compliance is already streamlined, such as no requirement for biological compliance monitoring. The costs to these facilities are already minimal. Under another two of the compliance alternatives (modified traveling screens and systems of technologies), the technologies selected by the facility must undergo an optimization study. Because the facility will be optimally operating these technologies, the highest reductions in IM possible are already obtained. Again, the costs are already reduced as there is no requirement for biological compliance monitoring or other monitoring in perpetuity. As a result, EPA's final rule has minimal costs for the roughly 99 percent of facilities expected to choose one of these six compliance alternatives, and the highest possible performance is obtained. Trading would require biological monitoring by each facility, an endeavor cited as expensive by commenters, and this burden alone makes it unlikely such an approach could come close to the net benefits of EPA's selected approach. EPA further notes a trading program that includes other stressors such as habitat alteration, dredging, coastal development, overfishing, industrial pollution, nutrient pollution, wastewater runoff, and climate change might not satisfy all requirements because these types of trades introduce comparability and implementation challenges that would be difficult to overcome. EPA also questions whether such a program would be consistent with EPA's Water Quality Trading Policy. Thus, it is questionable whether such a program could even meet the requirements for approval. EPA agrees that there are advantages and disadvantages to each approach considered in the rulemaking, and has done so. See Section VI of the preamble for EPA's rationale for decision-making.

Other Elements of BTA

Variances

Other commenters stated that EPA should create a variance for economic considerations on a site-specific basis, asserting that such variances were permitted by the U.S. Supreme Court in

Entergy, and should then provide detailed guidance to Directors on the decision criteria to use in considering costs and benefits. Other commenters suggested variances such as a cost-cost test or fundamentally different factors to avoid unreasonable results. Some commenters argued that EPA should allow a site-specific cost-benefit test to determine compliance with the final rule, including specific guidance to the Director to reject any entrainment technology whose costs exceeded its benefits or that did not maximize the net benefits. These commenters noted that such a site-specific determination would provide the greatest flexibility and maximize the ability to consider costs and benefits. Some commenters stated that the impingement mortality requirements should also be subject to a cost-benefit test. Other commenters argued that if certain cost (or feasibility) criteria were not met, a facility should not be obligated to examine certain compliance options in detail.

EPA disagrees with these comments. See § 125.31(d) for factors that may be considered if a facility is fundamentally different, as well as those factors that may not provide a basis for a variance. Under § 125.31(b)(3), a request for less stringent requirements may be approved only if compliance would result in a cost wholly out of proportion to the costs considered during development of the standards; or non-water quality environmental impacts more adverse than the impact considered during development of the standards. EPA finds that, for the IM requirements, neither of these conditions would occur. While none of the IM compliance alternatives will result in incremental non-water quality environmental impact that are adverse, EPA notes the rule at § 125.94(c)(12) already addresses low CUR units that may be important for grid reliability. EPA has identified technologies for IM that are demonstrated, achievable, and affordable. EPA's flexible approach includes 7 compliance alternatives, including credits for existing technologies and intake location. EPA's final rule also includes a de minimis provision where rates of impingement or so low as to make additional controls unwarranted. As a result, the compliance costs for the final rule are less than those at proposal, and commenters did not provided any data demonstrating compliance costs for IM at any facility are wholly disproportionate to EPA's proposal costs. (EPA notes that a permitee's ability to pay is not an allowable basis for a variance.) With respect to comments pointing out that the Phase II rule had such provisions such as cost-cost, EPA notes the Phase II rule also had technology requirements for entrainment, that the costs of these technologies is considerably higher than the costs of today's final rule. This is not the case here. In consideration of all of these features of the final rule, EPA concludes that an additional variance provision is unnecessary.

Availability and Flexibility of Rule Requirements

Many commenters stated that the proposed rule only provided for two compliance alternatives for minimizing impingement mortality -- an impingement performance standard and a maximum intake velocity standard -- and that achievement of these standards were not available at all facilities. Commenters requested that EPA identify pre-approved technologies for impingement and that these technologies have minimal permit or monitoring requirements associated with them. Other commenters requested that the rule provide flexibility for facilities with multiple intake structure configurations. Other commenters noted that EPA should consider previous reductions in impingement in evaluating impingement mortality performance at a particular facility.

EPA disagrees that the performance standard is not available at all facilities. EPA notes many commenters mistakenly assumed modified traveling screens with a fish return were required by the rule. Other commenters asserted that retrofit CCRS was the only way to meet the performance standards. As discussed in the NODA (77 FR 34319) and addressed in Essay 24, neither is not the case. EPA also made it clear in the proposal and NODA that consideration of other technologies, including intake location and alternative technologies, were intended as an integral part of the IM performance standard; see 77 FR 34321 – 5. EPA's record shows there are many IM technologies (as well as combinations of technologies) that are demonstrated. Based on EPA's technical survey, site visits, and other information in the record, EPA concludes that one or more technologies are available for every facility. While commenters provided data and examples where one or more technologies may be more costly or difficult to install at a particular site, none of the commenters provided data or identified a facility in which the IM performance standards could not be achieved. For the final rule, as discussed above the BTA standard for impingement mortality includes seven compliance options that, in addition to the impingement mortality performance standard, include pre-approved technologies as well as options for streamlined compliance. The alternative at § 125.94(c)(6) allows for consideration of other technologies resulting in previous reductions in impingement. In the permit application requirements at § 122.21(r)(6), the owner or operator must identify the chosen compliance method for the entire facility; alternatively, the applicant must identify the chose compliance methods for each CWIS.

As noted, the final rule provides a number of compliance alternatives for meeting the impingement mortality standard. For example, the final rule at § 125.94(c) identifies three pre-approved IM technologies (closed-cycle, design intake velocity of 0.5 fps which includes most wedgewire screens, and offshore velocity caps) for which there may be reduced permit application requirements and for which no biological compliance monitoring is required. The final rule further streamlines compliance for those facilities using the specific technology that forms the basis for the impingement mortality performance standard (modified traveling screens, see § 125.94(c)(5)). Another alternative at § 125.94(c)(6) includes conducting an optimization study for a "system of technologies" that achieves the required level of performance. A facility may demonstrate that its existing technology reduces the rate of impingement and therefore qualifies for a "credit" towards meeting impingement requirements as part of this alternative.

Another commenter stated that national requirements would reduce the permitting authority's burden, while providing a higher level of protection. EPA notes that the final rule establishes national standards for minimizing impingement mortality and entrainment. In the case of the standard for minimizing impingement mortality, there are seven different options, each has a clearly described information requirements for permit submittal and how to comply is either apparent or spelled out. As discussed above, in the case of the BTA standard for entrainment, the final rule establishes a framework for facilities to gather data, conduct studies, and obtain external peer review, along with a process by which the Director considers certain factors and establishes appropriate entrainment controls. EPA has reduced or streamlined the burden on facilities as compared to the proposed rule. For example, as noted above, the pre-approved compliance alternatives will greatly reduce monitoring costs, as well as simplify compliance and oversight by the Director. EPA agrees that each of these national standards reduce permit authority burden.

Many commenters stated that EPA should determine if an adverse environmental impact is occurring before taking action. EPA has determined impingement and entrainment are the "adverse environment impact" of cooling water intake structures that its section 316(b) standards should address. Studies in EPA's record show impingement and entrainment occur at CWIS of all types, sizes, and locations. Therefore all facilities with a CWIS have the potential for causing AEI. EPA disagrees that the presence of community- or population-level impacts is required before an AEI has occurred. This has been the EPA's consistent position in prior rules and the Second Circuit in both *Riverkeeper I* and *Riverkeeper II* has sustained this position. See Essay 16 for more detailed discussion.

Some commenters state that the proposed rule (by not addressing entrainment) will engender a "race to the bottom" among states, contrary to the goals of the Clean Water Act. Another commenter stated that the proposed rule does not guarantee that impacts will be minimized. EPA disagrees and notes that the final rule has been structured in a way that provides facilities and the Director with the best possible tools to minimize impacts at each site, including addressing entrainment on a site-specific basis. In the case of the BTA impingement mortality standard, EPA based the standard on the performance of modified traveling screens. In the case of the BTA entrainment standard, EPA concluded there was no single, nationally available technology. Instead, the BTA standard establishes a framework for studies and information, along with peer review, and requires a site-specific proceeding in which the Director must evaluate certain factors. The EPA concluded that the site-specific proceeding mandated by the E standard will reflect, among other things, the variability between sites including species, geographical location, CWIS operation, technologies and practices already in place, and intake location.

Many commenters stated that EPA appears to have identified 125 mgd as the flow threshold for the occurrence of adverse impacts and that any facility below that threshold should be presumed to employ BTA for both impingement and entrainment. Other commenters suggested that EPA conclude that all facilities withdrawing less than 125 mgd to be compliant with the rule, as the benefits of including these facilities in the universe of affected facilities would likely not justify the costs. Commenters noted that this would allow the Director to focus on higher impact sites, while still allowing some degree of site-specific requirements on an as needed basis. Other commenters stated that EPA has provided no evidence of adverse impacts at sites withdrawing between 2 mgd and 125 mgd.

EPA disagrees with each of these comments and approaches. EPA's analysis indicates that greater than 82 percent of impinged fish mortality across all facilities would be prevented by this rule at this threshold. EPA disagrees that it has not examined impingement and entrainment effects at facilities with flows under 125 mgd; EPA specifically collected studies during the Phase III rule and considered these studies in its development of the impingement mortality limit in the final rule.[11] The record includes more than 40 studies from facilities with flows lower than 50 mgd documenting IM at such facilities. EPA has defined adverse environmental impact as any impingement or entrainment (i.e., adverse impacts are not predicated upon flow), as noted in the preamble. Further, the industry questionnaire demonstrates that such facilities are twice as likely to have no controls in place for impingement or entrainment than are facilities with higher

[11] See 69 FR 68451 (November 24, 2004) and for a specific example, DCN 10-5554 for a study from a facility with a DIF of approximately 18 mgd and an AIF or approximately 7.5 mgd.

intake flows, especially those greater than 50 mgd. In addition, lower intake flow facilities both by themselves and in aggregate can have similar impacts to those of larger flow facilities as sizable numbers of fish are impinged by lower flow facilities. Moreover, site-specific impacts of lower flow facilities may be significant, particularly where threatened or endangered species are present. One state commenter argued that a focus on flow does not necessarily correlate to adverse impacts; for example, a facility withdrawing less than 125 mgd might be withdrawing a large percentage of the source waterbody. EPA agrees with the comment and notes that the Director may require a facility to submit additional permit information to address these scenarios, including, where not otherwise applicable, the information required, for example, at § 122.21(r)(8)-(13). EPA's selection of 125 mgd as a threshold is not the result of an assessment of biological impacts, but is (in part) an administrative cutoff to balance the Director's need for data against the burden placed upon regulated facilities.

EPA disagrees that costs do not justify the benefits of including lower flow facilities. Although smaller flow facilities constitute a larger proportion of the total number of the facilities regulated, the total compliance cost for these smaller facilities are only a small portion of the total compliance cost of the rule (for example, $23 million at a threshold of 50 mgd). See the TDD and Essay 14 for more information regarding thresholds, including cumulative impacts, low flow facilities that withdraw significant portions of a waterbody, and other impacts. These lower flow facilities, if not subject to the national standard, would still be subject to section 316(b) and thus would require BPJ permit requirements. Thus any perceived aggregate cost savings from setting the threshold higher is minimal. And because the costs are a small portion of the total compliance costs, and for all of the reasons stated above, the costs justify the benefits.

EPA agrees that the Director must consider costs and benefits in establishing the entrainment requirements, irrespective of the 125 mgd flow threshold; this is required at § 125.98(f)(2)(v). As noted above, the 125 mgd threshold is not intended to be an indicator of impacts and the Director is authorized to require the additional studies to facilitate the BTA determination.

A commenter also stated that EPA should determine that facilities meeting the 0.5 fps intake velocity threshold as meeting the entrainment requirements. EPA disagrees, noting eggs and other early life stages of larvae are nonmotile and have not developed an avoidance response, therefore a lower intake velocity is essentially irrelevant. See Essays 17 and 18 for more detailed discussion.

Commenters stated that EPA should not promulgate entrainment standards at all, as they are burdensome, costly, subjective, and have a poor cost-benefit ratio. Some commenters also stated that a best professional judgment-based approach will lead to inconsistent application of 316(b) across the nation. As discussed above, EPA disagrees with these points. EPA's record indicates that entrainment is a significant aspect of addressing adverse environmental impacts at cooling water intakes. EPA has not identified a single technology that is nationally available to address these impacts. EPA has, however, repeatedly stated that the lack of widely available technology for reducing entrainment mortality in no way suggests that entrainment effects are not important. On the contrary, the final rule establishes requirements to submit data and the framework for the process for the Director to determine the BTA for entrainment at each site.

Commenters also requested that EPA reconsider the implementation schedule for the rule such that a facility could address both impingement and entrainment at the same time, thereby preventing wasted expenditures. EPA agrees, see rule requirements for implementation schedule at § 125.94(b) and Essay 22. Some commenters argued for separate requirements for nuclear facilities; see Essay 18. EPA disagrees, noting that commenters have not submitted data supporting why nuclear facilities need separate requirements; see TDD Chapter 6 and Essays 14 and 19 for EPA's consideration of subcategories. Some commenters argued in favor of certain flow thresholds for triggering compliance. EPA disagrees, as discussed above for the 125 mgd threshold; also sees TDD, preamble, and Essays 14 and 19 for more information. A commenter stated that EPA should "grandfather" existing facilities and instead focus on new facilities. EPA disagrees, see Essay 10 for legal authority and preamble section VI Basis for rule; also see Essay 14. Another commenter stated that EPA should not require major changes at the facility and drew a comparison to BACT for air emissions regulations; EPA disagrees, noting that 316(b) of the Clean Water Act has statutory requirements different than the Clean Air Act. See preamble section III for legal authority and Essay 10.

Some commenters noted that several states have an existing 316(b) program, obviating the need for national requirements. For example, one commenter noted that California has already begun a state policy to eliminate once-through cooling at coastal facilities. As described in the preamble, EPA is aware of this and recognizes that some states have invested significant time in developing NPDES permits and has provided some flexibility in the final rule to incorporate that past effort into the new national requirements. Specifically, § 125.90(c) explicitly states that states can adopt more stringent controls than required by Federal Law, and § 125.98(g) in today's rule acknowledges the work already done by States in ongoing permit proceedings. In response to the comment that a State should not have achieve environmental performance comparable to those that would be achieved under § 125.94, EPA disagrees. While EPA is giving significant flexibility to permitting agencies at the State level to determine how and what each facility must protect and monitor, it is appropriate for EPA to set uniform national performance standards. Other concerns raised by the commenter are addressed by EPA's revised implementation schedule, which marries the timeline for impingement controls and entrainment controls.

Other industry commenters suggested other revisions to the proposed rule, including (for example, requirements that vary by waterbody type, requirements that vary for manufacturers and other facilities with a low intake flow, consideration of the benefits of once-through cooling, and accounting for variability. The EPA disagrees with commenters' suggestion that a site-specific approach for impingement is warranted, most notably because there are controls for IM that are available, demonstrated, and achievable; this is not the case with entrainment. See preamble for further discussion. EPA considered many different subcategories including fuel type, source waterbody type, industrial type, cooling water flows, intake location, age of generating unit, and others; see TDD for further discussion. EPA concluded that no subcategorization was necessary or appropriate for the final rule, because there are controls for IM that are available, demonstrated, and achievable. EPA considered the same approaches to subcategorization for E requirements, but there are no demonstrated and available high performing technologies for entrainment, and EPA concludes that the different factors considered for subcategorization does not change this finding. Also see Essay 19.

One commenter stated that EPA has inherently acknowledged in its support documents that regional differences in biology preclude the possibility of national-level requirements. EPA disagrees. EPA's record shows that BTA for IM is achievable on a national scale at all facilities. See Essay 16A for full discussion of the variability and applicability of the IM performance standards. The technologies forming the basis for the final rule's performance standards are available, feasible, and demonstrated (see preamble). Another commenter stated that national requirements should not be developed for waters that do not cross state lines; EPA disagrees, noting that the Clean Water Act (and consequently, section 316(b)) extends to waters of the United States irrespective of State lines. One commenter stated that the proposed rule would interfere with the operation of vessel traffic and dock operations. EPA agrees in part, for example, some types of screens in some waterways may interfere with boating. EPA disagrees that the IM standard is not achievable, first noting that the facility in question already has an intake structure and is able to operate the facility despite dock and vessel traffic. EPA notes that other facilities also have navigational traffic to contend with, and EPA has accounted for additional costs incurred as a result of navigational traffic as one of several types of site-specific factors that make technology upgrades a more "difficult" level of retrofit; see Chapter 6 in the TDD, identifying additional costs for "difficult" level installations. Further, the final rule offers seven compliance alternatives for IM, allowing the facility to take into account such consideration in order to accommodate facility-specific circumstances.

Another commenter stated that EPA should integrate consideration of thermal effects into the rule framework. Other commenters noted the secondary effects associated with implementation of section 316(b) controls in reducing thermal discharges from industrial sites. EPA agrees that thermal impacts can be an important consideration but has not included any specific considerations in the final rule, aside from a requirement to consider thermal effects in a facility's permit application materials. Thermal impacts are typically addressed under section 316(a), a different part of the Clean Water Act. EPA notes that any associated reductions in thermal discharges may well be a factor in permitting determinations under section 316(a). Reduced thermal discharges was not a consideration in the EPA's determination of national BTA standards for E, because EPA did not identify any technology for E that was demonstrated, available, and achievable. Therefore, EPA did not need to consider reduced thermal discharges when comparing different technologies.

Some commenters stated that EPA has not properly accounted for aquatic species in the Pacific Ocean or other locations. EPA disagrees; as noted in the preamble and Essay 16A, EPA reviewed many studies with impingement mortality data in developing the final rule and found no reason to subcategorize facilities by these assemblages for the purposes of a national rule. In fact, many of the species in either the Atlantic or Pacific locations exhibit similar physiological, ecological and behavioral traits and are therefore a reasonable surrogate for examining impingement and entrainment effects. Some commenters provided data from facilities withdrawing cooling water from the Pacific Ocean, and EPA they employ the same technologies (including traveling screens, offshore velocity caps, and low intake velocity) that EPA used in setting the final rule's performance standards. Indeed, the record from the Phase II rulemaking shows that approximately 95 percent of the species of fish are capable of swimming away from an intake velocity of 0.5 feet per second; see DCN 2-028A. As discussed above, the technologies forming the basis for the final rule's performance standards are available, feasible, and demonstrated (see preamble).

Essay 16: Requirements for Impingement and Entrainment

Introduction

As described in the preamble to the final rule, EPA has developed a final rule that establishes "best technology available" standards for cooling water intake structures that minimize adverse environmental impacts. Specifically, the final rule establishes BTA standards for reducing impingement mortality and entrainment, the adverse environmental impacts that EPA identified as associated with cooling water intake structures. First, the rule establishes a BTA impingement mortality standard that provides seven different alternatives for complying with the standard. Second, the rule establishes a BTA standard for entrainment that requires the determination of required entrainment reduction measures in a structured site-specific permitting proceeding. The BTA standard for entrainment requires that certain prescribed factors must be considered in the decision and must reflect the maximum reduction in entrainment warranted after consideration of relevant. EPA introduced the framework for entrainment decision-making in the proposed rule and, based on public comments and additional analysis by EPA, revised this framework as explained in a subsequent Notice of Data Availability (NODA). This essay addresses specific comments on adverse environmental impact, and the requirements associated with today's BTA standards. Please refer to Essay 15 for information on EPA's approach for determining BTA for existing units and Essay 20 for EPA's approach to the requirements for new units.

Adverse Environmental Impact (AEI)

Section 316(b) of the Clean Water Act requires that "the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact." A number of industry commenters stated that EPA has not demonstrated that adverse impacts are occurring, suggesting that there is no need for a regulation. These commenters also stated that EPA has not demonstrated that the current level of impacts from impingement and entrainment are affecting aquatic organisms at the population level. Other commenters added that some species exhibit high rates of natural mortality, which may lead to a lack of impacts due to impingement of individuals of these species. Other commenters argued that EPA has historically used a population-based approach and should continue to do so. Some commenters called on EPA to define AEI, including acknowledging that some impingement is not an adverse impact (e.g., impingement of nuisance species or stocked fish). Some commenters stated that EPA has cited examples of impacts from large facilities and extrapolated these impacts to all facilities. Some commenters argued that the proposed rule goes beyond minimizing AEI and is inconsistent with the Supreme Court's interpretation of BTA. Some commenters argued that the rule should exclude stocked fish from the definition of impingement.

A commenter argued that EPA should expand the universe of affected organisms to include all biota. Riverkeeper also stated that impacts should not be based solely on the numbers of individuals impinged or entrained, as this may not accurately reflect the biological implications.

State commenters argued in favor of both industry's and Riverkeeper's interpretation of AEI. One commenter stated that EPA should allow the Director to assess whether AEI is occurring, while another called upon EPA to clearly define AEI and provide guidance to determine when a waterbody is being adversely affected.

With respect to comments on defining AEI, EPA has not changed its views about what constitutes AEI from those explained in the Phase I rule, the remanded Phase II rule, the Phase III rule and the proposal to today's final rule. See 66 FR 65289-97 (December 18, 2001) and 316bNFR.029.013 from the Phase I Response to Comment document (DCN 3-0091); 69 FR 41612 (July 9, 2004); 71 FR 35019 (June 16, 2006); and 76 FR 22196 (April 20, 2011). In those preambles, EPA discussed what are the adverse environmental effects that the 316(b) standards are designed to minimize.

In the Phase I rule, EPA established a framework that defined AEI as the impingement or entrainment of individual organisms, regardless of considerations of population effects, natural mortality, or compensatory reserve. (See, e.g., 66 FR 65289 [December 18, 2001], which states "EPA does not agree that adverse environmental impact associated with cooling water intake structures is solely a population-based phenomenon" and 66 FR 65285 "EPA does not believe that a population approach makes sense for new facilities.") Upon challenge by industry, the Second Circuit agreed in *Riverkeeper I*, stating:

> "We think that the EPA's focus on the number of organisms killed or injured by cooling water intake structures is eminently reasonable. *See* Final Rule, 66 Fed. Reg. at 65,262-63, 65,292. As discussed above with respect to restoration measures, Congress rejected a regulatory approach that relies on water quality standards, which is essentially what UWAG urges here in focusing on fish populations and consequential environmental harm."

EPA continued to use this approach for existing facilities in the Phase II rule ("Similarly, based on the analyses and for the same reasons set forth in the preamble to the new facility rule [66 FR 65256, 65291–65297], EPA has selected reductions in impingement and entrainment as a quick, certain, and consistent metric for determining performance at Phase II existing facilities." 69 FR 41586 [July 9, 2004]). Upon challenge by industry in *Riverkeeper II*, the Second Circuit again supported EPA's approach to defining AEI:

> "As did the industry petitioners in *Riverkeeper I*, PSEG argues that the EPA arbitrarily defined AEI to include any loss of or harm to aquatic organisms due to impingement mortality and entrainment rather than only more severe "population-level effects." […] We are not persuaded by PSEG's arguments.
>
> We agree with the EPA that the Phase II Rule is based on substantially the same record evidence of impingement mortality and entrainment relied upon in promulgating the Phase I Rule and that we rejected substantially the same arguments advanced here by the industry petitioners in *Riverkeeper I*, 358 F.3d at 197 ("The EPA considered all of the factors that UWAG now raises, and we are inclined to defer to the EPA's judgment of how best to define and minimize 'adverse environmental impact.'" (internal footnote omitted)). *Riverkeeper I* thus controls this issue."

EPA again followed this approach in the Phase III rule (see 69 FR 68461, November 24, 2004).

Commenters failed to provide new information or basis for changing EPA's position regarding AEI and the direct link between impingement and entrainment. EPA has concluded that it is inconsistent with "minimizing adverse environmental impacts" to adopt standards based on ensuring only against the most drastic consequences – decline and destruction of fish populations – rather than preventing these in the first instance through the reduction of impingement and entrainment. As stated, EPA has no basis for changing its long-held approach in today's final rule based on a sound scientific basis sustained in multiple legal reviews. As discussed in the preamble, EPA has identified a clear need for addressing impingement and entrainment at cooling water intakes and the definition of AEI in today's final rule is consistent with the rule framework and EPA's historical treatment. EPA has not included any further definition or guidance for AEI in the final rule, as it is not necessary; the rule recognizes that AEI may be occurring at all intakes and establishes an appropriate framework for facilities to address these impacts.

With respect to comments stating that AEI should be defined as all organisms, including all biota, EPA disagrees. The Agency focus of section 316(b) requirements is on all life stages of fish and shellfish, and as discussed above commenters did not provide new data or information why the Agency should change this approach. Impingement and entrainment are the primary (but not only) indicators of AEI under today's rule, as they are the most easily measured impacts. Because EPA acknowledges that other organisms may be a concern on a local basis, the final rule provides the Director with significant discretion to identify and address site-specific problems for other categories of biota. At § 122.21(r)(11), the permit application must provide a discussion (with quantification and monetization, where possible) of any other benefits expected to accrue to the environment and local communities, including but not limited to improvements for mammals, birds, and other organisms and aquatic habitats. The definition of all life stages of fish and shellfish at § 125.92 gives the Director discretion to exclude nuisance species from being considered for impingement and entrainment requirements. The BTA provision at § 125.94(c)(9) specifically addresses fragile species and other aquatic organisms in addition to fish and shellfish, and a provision at § 125.94(c)(8) specifically addresses additional protections for shellfish. EPA also disagrees that, in describing the impingement and entrainment effects at some facilities, it has extrapolated the impacts of large facilities across the affected universe. The examples provided in the preamble showcase facilities that impinge and entrain large numbers of organisms as a way to demonstrate the need for the regulation. EPA also disagrees that it has no data for facilities with a DIF less than 50 mgd. Some commenters have insisted this is this case despite studies available in the public record since Phase I, where EPA's record includes counts of impingement at 5 facilities, one of which was under 20 mgd DIF (DCN W-00-03). The record for today's final rule includes more than 40 biological studies from Phase III facilities (manufacturers) alone. In calculating the benefits associated with the rule (i.e., the reduction in the number of age-one equivalents impinged and entrained), EPA used a large number of studies from a variety of facilities (including small power plants and manufacturers) to derive an average value for various ecoregions; see the preamble and EEBA for more information. EPA disagrees that its definition of AEI is inconsistent with the Supreme Court's view of BTA; refer to Essay 15 and the preamble for additional discussion on EPA's approach to BTA.

With respect to comments suggesting that stocked fish be excluded from the definition of impingement, while the rule permits the Director to waive permit applications requirements for certain facilities located on waterbodies where the fisheries are stocked, the rule does not exempt such facilities from impingement and entrainment requirements. EPA adopted this provision not as a means of excluding certain organisms, but rather recognizing the practical matter of conducting biological assessments that will soon be unrepresentative or their value negated by stocking and significantly adjusting the population in that waterbody. With respect to simple enumeration of impinged or entrained organisms, EPA also agrees that this approach is not always reflective of adverse impacts. For example, mortality of a single threatened or endangered organism may be significant.

With respect to comments stating that EPA should account for past organism losses, EPA disagrees that assessments of impingement should account for past losses; it is inappropriate to consider additional permit requirements based on events that occurred in the past in an attempt to "make up ground." Additionally, even if EPA agreed with this concept, EPA has little confidence that it would be able to accurately calculate the effects of past impingement losses on current abundances of organisms (especially when the abundance is also affected by other factors, such as fishing pressure, natural disasters, several decades of industrial operations, etc.), making it nearly impossible to determine an appropriate level of response.

Impingement Requirements

Commenters provided information on a wide variety of topics related to impingement mortality requirements.

Riverkeeper advocated basing the rule on closed-cycle cooling or reduction of intake velocity, which they state are more protective measures than the numeric limit. Riverkeeper also opposed providing additional means of complying with the impingement mortality standard that EPA described in the June 11, 2012 NODA. Many industry commenters argued in favor of a site-specific approach to addressing impingement, noting that this would be consistent with the logic for addressing entrainment on a site-specific basis. This would also allow for the greatest degree of flexibility and options for the affected facilities, adding that this has been EPA's historic approach for addressing impingement. Some state commenters also favored a site-specific approach. These commenters also stated that a site-specific approach would allow consideration of waterbody-specific concerns. One commenter provided a framework for determining BTA. Riverkeeper argued that a site-specific approach for impingement mortality would be less protective, as they expect many facilities will claim that they can't meet the standards, delay permit proceedings, or otherwise overwhelm permit writers. Riverkeeper also stated that assessments of impingement should account for past organisms losses, which would artificially lower the present-day abundance of organisms. Some state commenters favored the limited use of a site-specific approach for impingement (e.g., in cases where closed-cycle cooling is a likely solution), but otherwise considered the approach to be too burdensome.

Commenters were also concerned that many facilities would be unable to meet either of the two compliance options in the proposed rule, leaving no options for compliance and forcing facilities to install closed-cycle cooling to comply with impingement requirements. Commenters stated that a site-specific approach should be used if a facility can demonstrate that the national impingement mortality limit is not feasible. Commenters also stated that the rule assumes that no facility currently exhibits BTA. Commenters also noted that Ristroph screens have not been demonstrated as effective at all sites. Some commenters argued that EPA should eliminate the numeric standard (and utilize a site-specific approach) or make the numeric standard a performance goal. These commenters advocated that a facility that installs a proven technology and demonstrates that it is operating the technology properly should be deemed to meet impingement requirements. Riverkeeper argued that facilities should be required to install multiple technologies to ensure that BTA is achieved. Some state commenters favored the numeric impingement limit, as well as some degree of monitoring to ensure that the technology is properly operating. Some state commenters favored the concept of combining compliance approaches.

Other commenters argued in favor of identifying pre-approved technologies, including closed-cycle cooling, velocity caps, cooling impoundments, and offshore wedgewire screens, as well as other developing technologies (Geiger screens, WIP screens, Hydrolox screens, etc.). Industry commenters opposed requiring that facilities employ a closed-cycle cooling system or achieve a 0.5 fps intake velocity from being required to install modified traveling screens. Commenters also advocated that an intake should not be limited to exclusively supplying a unit with makeup water, which would exclude fire water or other uses. Several commenters also favored creating a process by which future technologies could become pre-approved.

Similarly, industry commenters stated that EPA should include streamlined options in the final rule and favored the concept of identifying specific operating parameters and reducing the monitoring requirements. One commenter requested that EPA develop a database of technology performance for specific sites. Some commenters also noted that, for some facilities, there may be relatively few operational parameters that can be tested or fine-tuned, limiting the feasibility of a streamlined compliance alternative. Riverkeeper opposed the use of streamlined compliance alternatives, stating that it may allow facilities to be deemed to meet impingement requirements, while not achieving any actual improvement. Riverkeeper also opposed reduced monitoring under a streamlined compliance alternative, noting that it eliminates the only source of data that can confirm the continued performance of a technology. Some state commenters favored a streamlined compliance alternative. Commenters provided a wide variety of comments on the study requirements for a streamlined compliance alternative, ranging from eliminating the study entirely to arguing that the study would be challenging to conduct to agreeing with the general content of the study described in the NODA. Commenters also provided information on the various components of an intake technology, including features that can be optimized to maximize impingement survival. Commenters stated that facilities employing pre-approved technologies should not be subject to any monitoring requirements.

Some industry commenters stated that the rule should also include a provision for facilities that exhibit very low levels of impingement (i.e., de minimis), in part because the numeric standard could penalize facilities with historically low levels of impingement. Some commenters also argued that the standard for de minimis should not be determined at a national scale, but left to the Director. Commenters also noted that the costs to install impingement controls may greatly outweigh the benefits of saving a few fish. Riverkeeper opposed the de minimis provision, noting that an annual threshold could mask significant short-term impacts. Some state commenters favored a de minimis provision, but called on EPA to provide a threshold in the final rule.

Commenters argued that the final rule should permit "credit" towards meeting impingement mortality requirements for several categories of technologies. First, credit could be given for flow reduction, such as closed-cycle cooling, operational measures, unit closures or retirements, variable speed pumps, or reduced capacity utilization. Second, credit could be given for technologies that reduce the rate of impingement (as opposed to the impingement mortality rate), such as barrier nets, behavioral technologies (e.g., lights, air bubble curtains, etc.), or intakes located in a less biologically-active area. One commenter suggested that EPA's example of calculating credits was flawed. Some commenters (including Riverkeeper) stated that only the actual intake flow should be used as the baseline for flow credits, as this reflects "real" reductions in flow. One commenter said that EPA has essentially recreated the calculation baseline approach from the 2004 Phase II rule, but has not defined the term. Some commenters argued that EPA should not use an arithmetic average in calculating the appropriate credits, suggesting a proportional credit. One commenter also stated that the example equations provided in the proposed rule preamble were incorrect. Riverkeeper also stated that EPA should require long-term monitoring to verify any credits. Other commenters stated that EPA should clearly define a calculation baseline, as was used in the Phase II rule.

Some commenters stated that EPA should include provisions for a fundamentally different factors (FDF) variance.

Industry commenters also argued that the framework for impingement in the final rule should include considerations of cost-benefit or cost-cost tests, should eliminate the entrapment and barrier net provisions of the proposed rule, should consider closed-cycle cooling as compliant for impingement, should give credit to facilities that have already installed technologies (especially those that acted upon the Phase II rule by installing technologies), should allow previous determinations of BTA to remain valid and in effect, and should allow the facility to use existing studies as permit application materials.

One commenter stated that EPA incorrectly concluded that nearly all eggs are entrained at a mesh size of 2 millimeters.

One commenter stated that some facilities are faced with historically low water levels and may require booster or emergency pumps to be placed in the source water; these pumps typically have no screens.

Option Selection

Refer to Essay 19 for the primary discussion of comments related to option selection. As described in the preamble, EPA has concluded that it should base the impingement mortality standard for existing units on the performance of modified traveling screens (e.g., modified Ristroph screens and equivalent modified traveling screens) with fish-friendly fish returns – the "best technology available" for minimizing impingement mortality). EPA refers to this BTA simply as modified traveling screens throughout this essay. While there are a number of technologies that may perform as well or better than traveling screens (including closed-cycle cooling), as detailed in the preamble, these technologies were not feasible or available on a nationwide basis and thus were not the "best technology available" for standard setting purposes. Moreover, the impingement mortality standard for existing units provides a number of alternatives, including some of these other technologies, for compliance with the standard. EPA based the BTA impingement mortality standard for existing units on the performance of traveling screens because EPA concluded that this technology is effective, widely available, feasible,[12] and does not lead to unacceptable non-water quality impacts.

With respect to comments that EPA should adopt a site-specific approach for impingement, as described in the preamble, EPA disagrees that it should adopt a national impingement mortality standard requiring the establishment of impingement mortality controls on a site-specific basis. EPA has established a national BTA performance standard for impingement mortality based on modified traveling screens. EPA concluded that, on a national basis, the performance associated with modified traveling screens is achievable, feasible and demonstrated. As such, EPA appropriately established a national BTA IM performance standard rather than a site-specific performance standard. This is in contrast to entrainment, where EPA did not identify a technology basis that is achievable, feasible and demonstrated. See preamble section VI for additional discussion.

As to the commenter that provided a framework for determining BTA for IM on a site-specific basis, for the reasons specified above, EPA did not adopt a site-specific approach for determining BTA for IM. EPA did not adopt the framework wholesale but EPA notes that many of the elements in the framework are included in the final rule (e.g., pre-approved technologies, study of multiple alternate technologies, inclusion of a de minimis provision, etc.)

Compliance Alternatives

As described in the preamble, there are seven compliance alternatives for meeting the impingement mortality requirements. One alternative is to comply with the impingement mortality performance standard. Three alternatives utilize pre-approved technologies for compliance. Three alternatives utilize a streamlined approach for permitting. Each of these are described in detail below.

The alternative for complying with the impingement mortality performance standard (§ 125.94(c)(7)) requires the owner or operator to demonstrate compliance with the numeric impingement mortality performance standard through biological monitoring. Under this alternative, the owner or operator has the flexibility to choose any technology, including a new or innovative technology, provided the compliance monitoring demonstrates the standard is achieved.

The following pre-approved technologies will comply with today's rule and are associated with minimal monitoring and reporting of operational and/or design parameters to demonstrate compliance. These technologies are (the numbering reflects the numbering in § 125.94(c)): operating (1) a closed-cycle recirculating system; (2) a cooling water intake structure that EPA or the State NPDES permitting authority determines has a design maximum through-screen intake velocity of 0.5 feet per second; or (4) an existing offshore velocity cap. The general intent behind a compliance path based on a pre-approved technology is to provide a level of certainty to the regulated entity that they would be deemed compliant with the relevant rule requirements by designing, installing, and operating the technology as specified in the regulation. The three pre-approved compliance alternatives are each based on a particular technology approach. A

[12] As part of the feasibility determination, EPA found that the IM standards are also economically achievable.

compliance alternative based on a pre-approved technology entails criteria, design standards, and operational measures in the regulatory language specific to the pre-approved technology. The compliance paths based on pre-approved technologies in today's final rule include simplified permit application requirements (such as reduced or minimal study requirements), reduced documentation, or reduced monitoring, and therefore pose greatly simplified implementation. In today's final rule, there are no biological compliance monitoring requirements for any of the three compliance paths based on "pre-approved" technologies.

Under the three streamlined compliance alternatives, a facility must demonstrate to the permit Director that traveling screens, actual intake velocity, or some combination of technology controls or operational measures represent BTA performance under the conditions at the site. The three "streamlined" compliance alternatives are (the numbering reflects the numbering in § 125.94(c)): (3) a cooling water intake structure that EPA or the State NPDES permitting authority determines has an actual maximum through-screen intake velocity of 0.5 feet per second; (5) operating modified traveling screens whose demonstrated performance represents the best technology available for impingement reduction at the site (and were the basis for the numeric IM performance standard); or (6) operating a system or combination of technologies or operational measures whose demonstrated performance is the best technology available for impingement reduction at the site. Compliance with (3) is similar in concept to alternative (2) but relies instead on operational measures to ensure that the facility's intake velocity does not exceed 0.5 feet per second; it is because of this degree of uncertainty (i.e., that there is not a technology or design feature limiting the velocity) that led EPA to designate (3) as streamlined as opposed to pre-approved. In order to demonstrate BTA performance under compliance alternatives (5) and (6), a facility will need to conduct a two-year site-specific study at the same time it conducts its source water characterization and Entrainment Characterization Study. This study must demonstrate that its modified traveling screens, or combination of technology controls and operational measures, have been adjusted and optimized so as to minimize impingement mortality. If the Director concludes that the facility has demonstrated optimized performance for its controls the facility will have no subsequent biological monitoring and reporting requirements in the current permit cycle. These "streamlined" compliance alternatives are based on a technology or suite of technologies and practices with more variable performance, and as such necessitate some degree of study, in order to optimize technology performance for the site-specific conditions encountered by a facility. A streamlined compliance alternative may require some level of monitoring, but once the optimal performance of the technology has been identified, conditions included in the permit specifying optimal operation ensure that the streamlined alternative is similar to or better than the impingement mortality performance standard.

The compliance alternatives for "pre-approved" technologies and the streamlined compliance alternatives address industries concerns about the expense and burden of perpetual biological compliance monitoring associated with the impingement mortality performance standard when many technologies can be readily shown to consistently achieve EPA's desired performance.

IM Performance Standard

Refer to Essay 16A for the primary discussion of comments related to the calculation of the IM performance standard. With respect to comments on the performance standard or concerns that some facilities would be unable to meet the performance standard, EPA disagrees that the numeric performance standard is inappropriate or that the values were inaccurately calculated (see Essay 16A for more discussion on how the performance standard was derived). EPA also disagrees that biological monitoring to demonstrate compliance with the numeric IM performance standard should be eliminated. Biological monitoring provided the data upon which the standard is based and, thus, including a compliance alternative based on it is appropriate. EPA also notes that inclusion of that compliance alternative is one way the final rule is structured to allow for future technology innovation.

But EPA is not requiring compliance with the BTA impingement mortality standards only through biological monitoring data that demonstrates achievement of the numeric reduction in mortality levels that EPA has determined well-operated modified traveling screen will achieve. Rather, as described above, the final rule allows facilities to comply by employing any of seven alternatives, including monitored compliance with a numeric impingement mortality performance standard.

Based on its review of available data and information submitted by commenters, EPA identified a number of other technologies and operational measures that could achieve equivalent, or better, performance to the impingement mortality reductions achieved with modified traveling screens that may be available for some sites. Thus, the final rule provides seven alternatives for complying with the BTA impingement mortality standards. EPA included the seven compliance alternatives in the final rule to provide facilities with ample flexibility to select the compliance alternative most consistent with their facility. In addition to biological monitoring for compliance with the numeric IM performance standard, the rule includes three compliance paths based on “pre-approved” technologies, and three compliance paths that offer a “streamlined” approach to compliance. EPA expects the majority of facilities will use one of these six options to comply with the BTA impingement mortality standards.

Pre-Approved Technologies

Many commenters requested that EPA “pre-approve” technologies that, once installed, would obviate the need for further regulatory conditions such as periodic monitoring. This is similar to the approach taken for cylindrical wedgewire screens in the remanded 2004 Phase II rule (see § 125.99(a)). With respect to a compliance alternative for pre-approved technologies (i.e., technologies with reduced permit application or monitoring requirements), under the final rule, facilities are afforded greater flexibility in choosing a compliance alternative than in the proposed rule. As explained above, EPA makes a distinction between pre-approved technologies and streamlined compliance alternatives. Alternatives (1) , (2), and (4) at § 125.94(c) are pre-approved technologies requiring no demonstration or only a minimal demonstration that the flow reduction and control measures are functioning as EPA envisioned. These are discussed further in the preamble. The streamlined alternatives discussed above require more detailed information be submitted to the Director before the Director may specify it as the requirement to control impingement mortality.

As explained above, EPA has adopted, in significant measure, commenters’ suggestion in the impingement mortality standard to incorporate pre-approved technologies in its compliance alternatives. In these cases, EPA concludes its record demonstrates that use of these technologies as defined in the rule will consistently and reliably enable a facility to meet or exceed the IM performance standard. Given the consistent and widely applicable performance data of these pre-approved technologies, there is no need for ongoing biological monitoring or an optimization study. In each case, however, a facility is required to monitor intake flow or other parameters to ensure continued operations. EPA concluded the following technologies are appropriately deemed as pre-approved:

- Closed-cycle recirculating systems, defined at § 125.92
- Existing offshore velocity caps, defined at § 125.92
- Technologies that result in a design intake velocity less than or equal to 0.5 fps, including most modern cylindrical wedgewire screens

EPA did not develop a process to designate additional pre-approved technologies because in EPA's view a facility has ample flexibility to demonstrate a candidate technology's effectiveness under § 125.94(c)(6) and, upon successful demonstration, may qualify for reduced permit application and monitoring requirements. This demonstration could also be used to illustrate the effectiveness of other combination of technologies in use at a facility. For example, the facility could combine two or more technologies or operational measures and demonstrate that the performance of its installed controls reduce impingement mortality consistent with the required BTA standard.

As explained above, in the final rule CCRS is a pre-approved technology, accordingly an impoundment that meets the definition of CCRS at § 125.92(c)(2) is pre-approved. See preamble section VI.G.

Some commenters suggested that EPA should include wedgewire screens as a pre-approved compliance alternative. In support of such an alternative, they cite EPA observations that most wedgewire screens are already designed to meet the 0.5 fps intake velocity requirement in EPA's low velocity compliance alternative. EPA disagrees that a separate compliance alternative is appropriate for wedgewire screens. To the extent that a facility employs a wedgewire screen that is designed to meet the 0.5 fps intake velocity in the low velocity compliance alternative, the facility can avail itself of the low velocity compliance alternative. EPA does not have data that demonstrates that facilities with wedgewire screens that are designed to operate with an intake velocity above 0.5 fps would achieve the IM performance standard. However, such a facility may be able to demonstrate compliance by documenting impingement mortality reductions equivalent to the performance standard through the compliance path outlined in § 125.94(c)(6) or (7). In response to comments about the Phase II provision regarding wedgewire screens, today's low velocity compliance alternative is more flexible than the Phase II provision for wedgewire screens because today's final rule, in addition to low velocity, does not require the other conditions that were in Phase II (including cylindrical screen shape, waterbody type, sufficient counter currents/cross-flow, requirements for slot size, or total DIF).

EPA also notes that it does not have sufficient data in its record to demonstrate that the more recent traveling screen designs (Geiger screens, WIP screens, Hydrolox screens, etc.), will reliably and consistently achieve the IM performance standard without the optimization study. Therefore EPA disagrees that these should be included as pre-approved compliance alternatives and as such EPA did not designate these technologies as pre-approved. These technologies, like other modified traveling screens, require optimization in order perform equal or better than the Ristroph-type modified traveling screens. These technologies are listed in the examples of modified traveling screens in the rule definition at § 125.92. EPA notes that, where data for such screens was available and met the criteria for inclusion in calculation of today's IM performance standard, EPA included it. See Essay 16A. EPA expects that many facilities employing these technologies would seek compliance through performance optimization of these technologies under § 125.94(c)(5), Modified Traveling Screens.

With respect to comments on requiring additional technologies (e.g., the requirement at proposal for facilities employing closed-cycle cooling to also install modified traveling screens), EPA disagrees that facilities should be required to install multiple technologies to achieve the greatest reduction possible irrespective of other factors. As stated in the preamble and Essay 10, the Clean Water Act requires that facilities "minimize" impacts, not "eliminate" them. Further, the Clean Water Act provides EPA with the flexibility to consider factors other than the degree of reduction in determining what is best in terms of minimizing the impacts. As such, EPA is not mandated to base BTA solely on a technology or a group of technologies that achieves the greatest reduction. If a single technology is sufficient to minimize impacts, there is no reason to require additional technologies or to determine BTA should be based on multiple technologies, even if some marginal improvement in impingement could be achieved. Consequently, after reviewing the data in the record that demonstrated closed-cycle cooling systems achieve IM reduction that is equivalent to or greater than the IM performance standard, EPA eliminated the proposed requirement to install modified traveling screens at facilities that employ closed-cycle cooling and adjusted its compliance costs accordingly. EPA's data also indicates that the substantial reduction in flow achieved by closed-cycle cooling is highly protective of aquatic resources. EPA also revised the regulatory language regarding exclusive use of an intake for closed-cycle cooling units to permit more flexibility. Similarly, because EPA's data on intake velocity indicates that maintaining a low velocity will consistently and reliably provide adequate protection from impingement, additional technologies (such as screens) are not necessary if an intake is achieving the necessary velocity.

With respect to comments on existing technologies that are already installed and operating at a facility, EPA notes and acknowledges that facilities that have already installed a technology may in fact have already achieved the IM BTA standard. (See Exhibit VIII-1 of the preamble for a summary of EPA's projections on how facilities will choose to comply with the IM requirements.) Section 316(b) of the CWA requires that EPA must establish BTA standards for cooling water intake structures that minimize adverse environmental impacts. It does not require that all facilities raise their existing level of performance. That is, in absence of today's rule, some facilities already meet BTA under their existing permit. Under EPA's NPDES permitting regulations, all NPDES permits after the effective date of today's rule must include conditions meeting today's BTA standards. 40 CFR 122.44(b)(3). Thus, permits for all facilities must include conditions consistent with today's BTA standard, which may or may not require that a particular facility take action to achieve additional reduction over their current performance. In an effort to reduce implementation burden and recognizing that some facilities already employ approaches that will achieve today's BTA IM performance standard, EPA included several compliance alternatives in today's final rule that would allow a facility to demonstrate that it has installed a pre-approved technology, or, in the case of those facilities complying via compliance alternative (c)(6), the rule would allow facilities to demonstrate reductions in the rate of impingement to be used toward reducing impingement mortality and reflected in the calculations of IM in the performance optimization study.

Streamlined Approach

EPA disagrees with commenters that indicated such streamlined compliance alternatives will allow facilities to claim compliance with little or no improvements. In fact, EPA anticipates that performance for facilities that have done optimization studies will likely exceed those used as the basis for the IM performance standard. This is so because the facilities used as basis for the IM performance standard may not have optimized their system whereas facilities electing the streamlined compliance alternatives must conduct a study specifically for the purpose of optimization. While the streamlined alternatives are intended to significantly reduce the long-term monitoring requirements for a facility (versus complying via the numeric standards), EPA disagrees that facilities choosing a streamlined alternative would be exempt from all data collection requirements pertaining to technology performance. As explained above, in the final rule, the streamlined alternatives require a 2-year optimization study as part of the permit application, in which biological data is collected and used to optimize technology performance in order to minimize impingement mortality. Once the site-specific operational and management parameters for optimized performance have been identified, the Director would establish enforceable permit conditions in the permit to ensure continued optimized operation of the technology (e.g., continuous screen rotation, use of low pressure spray wash). Enforceable permit conditions will help ensure that facilities achieve and maintain high levels of performance. Under this approach, the technology would not be operated merely to meet the IM performance standard, rather the approach results in a level of performance higher than the minimum standard.

EPA also disagrees that perpetual monitoring is necessary to ensure long-term performance of IM technologies. As explained above, once a facility has demonstrated that the particular technology chosen for a given site can achieve the necessary impingement mortality reductions, no additional compliance monitoring would be required for the duration of that permit, provided that the conditions at the facility remain the same. EPA determined this is appropriate given the consistent, well-known performance of modified traveling screens when operated under set parameters and a reasonable certainty that such performance would continue in future operations. The optimization study would identify the critical elements to optimize operation and serve as the basis for identifying permit conditions that ensure the technology is operated to achieve optimal performance. While the facility would then not conduct biological compliance monitoring in the current permit cycle, in subsequent permit cycles, the facility would conduct an updated 2-year performance optimization study. Under § 125.95 the rule requires the optimization study be redone with every permit application unless the Director has approved the facilities request to waive some or all of the permit application requirements. EPA notes that all of these data and the draft permit would be available to the public. EPA expects that, in subsequent permit terms, those circumstances where there are changes in source waterbody, changes in operation of the facility, or changes in local species, etc., may warrant a reevaluation of the optimization study and the associated permit conditions reflecting optimized operation. Under such circumstances, EPA expects the Director would reevaluate the permit conditions to ensure the technology continues to be operated in an optimized fashion. EPA also notes that where necessary, the Director also retains the discretion to establish additional monitoring at § 125.96(a), including additional provisions to re-evaluate changes in operating conditions or the source waterbody at § 125.96(c). In this case, EPA finds the overall approach to be less expensive and more effective than perpetual biological monitoring. This approach also addresses commenters' concerns about changing operating conditions or changes to the source waterbody that they believe would warrant a re-evaluation of BTA for IM.

EPA appreciates commenter' submittals with information on the various elements of the modified screens that could be modified or optimized. In response to comments that facilities may have limited opportunities to utilize the streamlined alternative for modified traveling screens, EPA agrees that, at some sites, some operational parameters may have reduced flexibility (e.g., many traveling screens are now rotated continuously, and no longer revolve based on pressure drops or a fixed timer). In EPA's view, this should actually make demonstrating optimized operation easier for a facility (by reducing the number of operational variables to be tested during the optimization study), and therefore may have led it to include an overstatement of costs associated with such a study. EPA also notes that the Director may determine additional technologies are necessary to meet BTA, including protections for T&E species, shellfish, or fragile species.

In addition, as discussed above, for a facility choosing to comply with compliance alternatives at § 125.94(c)(5) and (6), technology optimization studies in subsequent permit applications provide for flexibility for the future, such as where changes in the facility's operations or in the biota in the waterbody necessitate a different set of operating parameters in order to optimize operation of the technology.

For all the reasons explained above, EPA disagrees that the optimization study should be eliminated for these streamlined compliance alternatives. EPA also disagrees that such studies would be challenging to conduct. EPA notes that facilities have been conducting impingement monitoring for decades and the state of the science is sufficient to conduct the sampling and provide the Director with an accurate assessment of the expected performance of the proposed technology.

Finally, EPA notes that the impingement mortality performance standard in the final rule does not require specific technological or operational controls nor does it require an optimization study. Rather, specific technological or operational controls and/or the optimization study is required if a facility chooses to comply with the standard through one of the streamlined compliance alternatives. For example, a facility that currently has traveling screens with fish returns will most likely elect to comply via § 125.94c(5). In that case, the rule requires that the screen exhibit certain categories of design features that are demonstrated and documented to improve the survival rates of impinged fish. The two-year duration of the optimization study required for the permit application allows for the facility to capture data over a wide range of operational conditions with the expectation that the study will enable the facility to determine optimal operational procedures for its specific location; nothing precludes a facility from collecting more than 2 years' worth of data. Further, the two year period will allow facilities to test these operational procedures over time so as to demonstrate they are the most effective for more than just a narrow window of time. The final rule also does not require the facility to meet the numeric performance standard at § 125.94(c)(7) during the optimization study, alleviating commenter concerns about being issued a notice of violation while still evaluating its intake impingement mortality control technology.

Other

With regard to development of an impingement technology performance database for specific sites, EPA disagrees that this is necessary or appropriate. EPA has already collected a significant amount of information on the performance and feasibility of the various impingement technologies. This information is compiled in the TDD and included in the record supporting this rule. The commenter requests that the database use a robust statistical approach for calculating performance of each technology. As discussed above, EPA based the IM performance standard on modified traveling screens and calculated the associated performance standard using a robust statistical approach (see Essay 16A). The performance standard serves as the basis of comparison for other technologies, including new and innovative technologies and approaches. EPA assumes that this makes unnecessary development of such a national database.

With respect to comments requesting a provision for very low impingement rates, the final rule includes a de minimis provision. See § 125.94(c)(11). In seeking to avail themselves of the de minimis provision, facilities are required to submit data to the Director indicating that they experience exceptionally low impingement rates; the Director will then determine what measures are appropriate. EPA did not establish any metrics for what qualifies as "exceptionally low" impingement rates, as the Agency intends for the de minimis provision to be infrequently used. The NODA used the example of several fish per month; see 77 FR 34324 (June 11, 2012).As such, EPA disagrees with Riverkeeper's contention that impacts will be masked under a de minimis provision; the absolute number of fish impinged is likely to be sufficiently low that no masking of significant biological impacts will be numerically possible. Said differently, a facility with sufficient impingement to enable the development of temporal effects likely would not qualify for the de minimis provision. The de minimis provision also addresses comments about EPA's calculation of a limit when the numbers of organisms are statistically indeterminate. EPA concluded that a definition of de minimis was inappropriate, as the definition can vary on a site-specific basis given the species impinged, the presence of threatened or endangered species near the intake structure, the relative abundance of fish, and other factors. EPA notes that several comments provided data in support of the de minimis provision, but did not provide sufficient data to allow EPA to define de minimis. Due to the lack of comparable data, EPA did not determine whether these data sets were appropriate examples of de minimis. Because EPA's economic analysis did not include the cost savings of facilities determined to pose de minimis impacts, the cost of the rule is likely overestimated for such facilities that are able to comply via the de minimis provision.

With respect to comments requesting "credit" towards compliance, the final rule also includes a provision to allow a facility to demonstrate credit towards meeting impingement mortality requirements; see § 125.94(c)(6). Under this provision, a facility can demonstrate partial (or complete) progress towards meeting comparable performance to the impingement mortality performance standard. For the system of technologies compliance alternative under § 125.94(c)(6), the final rule, at § 122.21 (r)(6)(ii), specifies how a facility would obtain credit for actual flow reduction, reduced rates of impingement, reduced impingement mortality, and the overall performance of the system of technologies. Similarly, the compliance option described at

§ 125.94(c)(6) could provide credit for technologies such as barrier nets and behavioral technologies. EPA included a separate provision for existing offshore velocity caps at § 125.94(c)(4).

With respect to comments regarding the calculation baseline used in the 2004 Phase II rule, EPA notes that facilities could demonstrate other locational credits by documenting the difference in impingement rates or organism abundance at the existing intake location and, for example, a comparable location along the shoreline at the facility. While EPA is not retaining this provision from the Phase II rule for reasons articulated at 76 FR 22185, EPA acknowledges that some facilities and their permit authorities have already developed documentation for such an approach. To the extent a handful of Phase II facilities have already developed information supporting their calculation baseline, EPA envisions § 125.94(c)(6) will allow use of this information to demonstrate or show progress towards demonstrating equivalent performance for the compliance alternative. With respect to comments regarding EPA's methodology for calculating credits (including the sample equations provided in the Federal Register notices), EPA disagrees that the arithmetic average is inappropriate for calculating credit towards meeting impingement mortality or entrainment requirements; EPA has already evaluated other mathematical approaches and has rejected them (see TDD Chapter 11 and Essay 16A). EPA also disagrees that the equations in the final preamble will lead to an incorrect implementation of the rule. These equations were provided as an example of how the Director may calculate credit towards meeting impingement mortality requirements and they represent one way in which credit may be calculated for a facility. With respect to long-term monitoring, as above, EPA disagrees that perpetual monitoring is necessary to ensure long-term performance; for example, many of the opportunities for credit are easily verified through flow reduction calculations or through documented performance of the technology.

As to the commenter requesting a provision for an FDF variance, EPA disagrees that such a provision is either necessary or appropriate. Primarily, EPA notes that there are no FDF variances authorized for 316(b). However, even if such variances were authorized, today's final rule offers a wide variety of compliance alternatives for impingement mortality controls, as well as a site-specific determination for entrainment; as a result, there is no need to develop a variance provision.

In support of a comment disagreeing with EPA's assertion that fine mesh larger than 2 mm does not provide significant exclusion of eggs from an intake (and thus provides reliable entrainment reduction), a commenter provided citations with egg sizes that exceed 2 millimeters. First, EPA notes a 2-mm diameter round egg can be squeezed through a -2-mm square mesh. While EPA appreciates the comment and data, the fact remains that the vast majority of eggs and early life stages of larvae are smaller than 2 mm, as documented by the numerous biological studies in the record. See, for example, Bagenal (1971, DCN 12-6975) showing 4 of the 46 marine species evaluated have fish eggs that could potentially be larger than 2 mm. For freshwater species see, for example, Bonisławska et al (2001, DCN 12-6976) showing both eggs and yolk spheres of species (other than trout and pike) have a mean diameter size smaller than 2 mm. Further, fish eggs are not solid spheres, as such they can be compressed or forced through openings slightly smaller than their natural diameter. Second, the commenter did not provide any details on whether the studies were conducted in the context of entrainment at an intake structure. For example, slot velocity has been identified as a major factor in the ability of fine mesh screens to exclude both eggs and larvae. EPA agrees that some larger eggs may be retained by larger slot sizes, noting that such situations are essentially impinging the eggs. The overwhelming body of studies in EPA's record clearly shows that most eggs are not retained on 2 mm or larger mesh sizes (and therefore would become entrained in absence of other controls), and that in most instances 0.5-mm mesh sizes are necessary to collect the majority of entrainable organisms to prevent them from being entrained. See for example "Field Evaluation of Wedgewire Screens for Protecting Early Life Stages at Cooling Water Intake Structures: Chesapeake Bay Studies" (EPRI, DCN 10-5558). Further, EPA notes the organisms cited by commenters are too small (i.e., smaller than the 3/8-inch mesh size that defines an impingeable organism, see § 125.92) to affect the calculation of the performance standards for impingement mortality. See preamble Section VI for more information about why fine mesh is not BTA for entrainment.

With respect to the comment that some facilities are faced with historically low water levels and may require booster or emergency pumps which do not have screens, EPA is aware that some facilities face critical shortages of cooling water, such as lowered source water levels that may require the installation of booster/emergency pumps or other equipment. EPA notes that it visited several facilities that retrofitted to closed-cycle cooling as a remedy to this problem or a similar one (see, e.g., DCN 10-6524 and 10-6534). By converting to closed-cycle cooling, these facilities' cooling water needs were greatly reduced and the ability of the source water to provide sufficient flow was restored. Facility actions in response to decreased water availability and similar circumstances are beyond the scope of this rule, nevertheless EPA supports actions that reduce the withdrawal of water for cooling, such as reuse of process water or gray water. The final rule has incorporated additional compliance alternatives that provide greater flexibility for facilities to meet the rule requirements while reducing source water withdrawals such as reuse of recycled water and gray water (see § 125.94(c)(10)).

For information on how the final rule addresses subcategorization, including a framework based on waterbody type, refer to TDD Chapter 4 and Essay 19. For information about makeup withdrawals and how the final rule addresses fire suppression and other emergency withdrawals, refer to Essay 14. For information on how the final rule addresses cost-benefit or cost-cost tests, refer to Essay 15. For information on how the final rule addresses the entrapment and barrier net provisions in the proposed rule and closed-cycle cooling, refer to Essay 18. For information on how the final rule addresses credits for unit closures or retirements, refer to Essay 18. For information on prior installations of technologies, prior determinations of BTA, and the use of existing documents, refer to Essay 22; EPA notes that many studies or technologies that have previously been conducted or installed will likely be acceptable under the final rule.

Entrainment Requirements

Riverkeeper argued against a site-specific approach to entrainment, stating that the proposed rule provided the Director with unlimited discretion in what factors to consider in determining BTA. Additionally, they argued that unlimited discretion is not equivalent to setting a standard. They added that states are ill-equipped to oversee the study process and to review the results.

Industry commenters overwhelmingly supported using a site-specific approach to address entrainment. Some commenters noted that the proposed rule did not specify how the Director would establish entrainment requirements and what factors would be considered (including those listed in the regulatory language). Other commenters added that a site-specific approach will lead to highly variable results, given how open-ended the Director's criteria are. Some commenters stated that a wide variety of considerations could affect decision-making on entrainment controls, including nuclear-fueled facilities, previous efforts to address impingement and entrainment, lack of water depth, conflicts with navigation, and equipment changes that would trigger requirements under other regulatory programs. Other commenters stated that EPA should provide guidance and research on entrainment controls to the Director. Another commenter stated that EPA should not use the phrase "maximum reduction in entrainment warranted" to describe the development of entrainment BTA, as it may lead to inappropriate BTA determinations.

Commenters also advocated certain subcategories for entrainment requirements, such as no entrainment requirements for facilities located on lakes, for facilities withdrawing less than 5 percent of a river's mean annual flow, or those facilities with a capacity utilization rate less than 15 percent. Each of these metrics was included in the Phase II rule. Some commenters advocated implementing entrainment controls in such a way that threatened and endangered species would not be adversely affected.

As discussed in the preamble and Essay 15, EPA determined that there are no technologies available, demonstrated, and feasible for which to establish national entrainment requirements, and instead has established a process in the rule to make site-specific entrainment BTA determinations. EPA disagrees with comments stating that the Director has been given "unfettered discretion" and also disagrees that it has not set a standard. The Director has been afforded significant flexibility in setting entrainment requirements, but the final rule requires determination of site-specific entrainment control measures through a structured process that all facilities and Directors must follow. Also see Essay 10. EPA also disagrees with comments that the states are unprepared to undertake a site-specific determination for entrainment; as noted in the preamble and Essay 15, Directors have been using a site-specific approach for decades. Today's final rule establishes a framework for submitting materials with the facility's NPDES permit application, a process with which Directors are highly experienced. Today's framework creates a more standardized set of expectations for both permittees and permit writers. A significant amount of information will be collected and submitted for the Director's (and public's) review. In many cases, this will include studies assessing closed-cycle cooling (as part of § 122.21(r)(10)) as one possible solution to address entrainment.

EPA also notes that, aside from advocating for closed-cycle cooling as the sole technology basis for the BTA entrainment standard (which EPA has concluded is not BTA for the reasons specified in the option selection section of the preamble), Riverkeeper has not provided another viable, effective alternative that is widely available for addressing entrainment in a national rulemaking. In the final rule, EPA has included direct guidance on factors that must be considered by the Director. EPA will evaluate the need for further implementation guidance after promulgation of the rule. EPA notes that it has already provided a large quantity of information on entrainment controls in the TDD and record. EPA disagrees that the language used in § 125.94(d) is inappropriate, as it conveys a need to be protective while considering a number of other factors.

As described in the preamble, TDD, and Essay 19, EPA also examined a number of possible subcategorization strategies, including waterbody type, and determined no subcategorization schemes were supported by the data or EPA's analyses.

As discussed in the preamble and above, EPA has established site-specific requirements for entrainment; as a result, the Director may consider a variety of factors in developing those requirements, including those suggested by the commenters. For information on how EPA considered impacts to threatened and endangered species, refer to Essays 10, 69, and 72. Also refer to Essay 15 for a discussion on the role of costs and benefits in determining BTA in the final rule.

Technologies to Address Impingement and Entrainment

For a more detailed discussion of the technologies and operational measures available to reduce impingement mortality and entrainment and a summary description of their effectiveness, refer to preamble section VI, Essay 18 and the TDD. This essay subsection is more narrowly focused on the process used to select technologies as the basis for BTA for the final rule.

Commenters generally agreed that modified traveling screens are a reasonable choice as the technology basis for establishment of the impingement mortality standard, as they are in wide use and have well-established performance. These commenters argue, however, that modified traveling screens are not feasible at all facilities and that EPA should consider including additional technologies as candidates for BTA. Commenters also stated that some modified screens may not require all of the features listed in the proposed rule to be effective. Other commenters argued that EPA should limit the level of modification that a Director may require as upgrades to a modified traveling screen. Some commenters also stated that modified traveling screens can still damage fish. Other commenters stated that fish returns should not be required.

Riverkeeper supported the requirements to maintain a maximum of 15 percent screen blockage and to eliminate carryover. Industry commenters opposed the requirements, stating that these requirements were difficult to implement and measure. Those commenters added that the requirements are unnecessary, as facilities have an incentive to keep their screens clear to promote proper operation of the cooling system and prevent debris carryover and damage to the cooling system.

Some commenters stated that EPA should not reject fine mesh screens as a technology, as the technology is evolving and may be the only technology available to reduce entrainment at some facilities.

Some commenters stated that the final rule should require the installation of a screen of some variety.

Other commenters state that EPA should include an analysis of cost and other impacts that may result from facilities that have installed (or begun installing) a given technology that ultimately conflicts with or otherwise does not satisfy the final rule.

EPA concludes that modified traveling screens with fish return are the proper technology basis for establishment of the best technology available impingement mortality standard for the reasons previously explained. With respect to the availability of modified traveling screens, EPA disagrees that the technology is not available. See section VI.D of the preamble and Chapter 6 of the TDD. However, as previously discussed, traveling screens may not be the most cost effective technology for all facilities. Consequently, also as discussed previously, the final rule includes seven compliance alternatives for the IM performance standards. Additionally, for the final rule, EPA changed its definition of modified traveling screens from that of the proposed rule to include other screens that have the same critical protective features, such as WIP screens, Geiger screens, and Hydrolox screens. This is consistent with the data used to determine the impingement mortality performance standard, which includes data from studies for a Geiger screen and the WIP screen. Refer to the TDD and Essay 16A for more information. With respect to the fish protection features on modified traveling screens, EPA agrees that a modified traveling screen can be effective even if it does not employ all of the features described in the final rule; however, in order to utilize the streamlined option for screens (§ 125.94(c)(5)), the rule requires that the screens meet certain technical specifications. The rule does not require that facilities comply with the IM standard via the streamlined compliance alternative for screens so facilities that wish to use other technologies or screens that do not meet the required technical specifications have the option of doing so as long as they can comply with one of the other six IM standard compliance alternatives. With respect to damage to fish by modified traveling screens, EPA recognizes that these screens will not achieve 100 percent reduction in impingement mortality, but notes that the Clean Water Act simply requires that adverse impacts be "minimized" and not "eliminated." EPA notes that no technology completely eliminates IM and that other technologies evaluated that likely exceed the performance of traveling screens are not widely available and are thus, not BTA. EPA's analysis confirms that modified traveling screens can be highly effective when properly designed and operated. For information on fish returns, refer to Essay 18.

With respect to the screen blockage and carryover requirements, EPA determined that these requirements are not necessary because facilities already have an incentive to maintain clean screens (to ensure continued operation of the facility). In addition, these requirements could be extremely difficult for a facility to measure. Therefore EPA has eliminated them from the final rule. EPA notes, however, that the principles behind those requirements (e.g., maintaining a clean screen) remain important and should be considered by the Director in determining whether an intake technology is being properly operated and maintained. In addition, the Director could determine that circumstances dictated inclusion of such requirements as appropriate conditions of a facility's permit. EPA expects such factors will be identified in the technology optimization study and may be incorporated as permit conditions where appropriate.

With respect to the comment that EPA should not determine fine mesh screens are not BTA as the technology is evolving, EPA agrees that fine mesh screens can be effective in reducing entrainment for certain species and in some locations. For this reason, fine mesh screens are one technology that can be considered by the Director as BTA for a given site. However, as described in the preamble, TDD, and other essays, EPA does not consider fine mesh screens to be a nationally available technology to address entrainment. EPA considered the costs and availability of fine mesh screens, and found that the conversion of course mesh to fine mesh would cause an increase in the number and size of screen banks to accommodate the reduced through screen area. While a doubling of required screens is not unusual, in a substantial number of instances the required increase in screen banks could exceed a 5-fold increase, which is a level of expansion of the existing CWIS that many facilities would not be able to accomplish with existing available waterfront acres. EPA also rejected fine mesh because of the low survival of most larvae and many eggs; see TDD and preamble for further discussion. Under the final rule, facilities will provide the Director with information for each facility including costs and performance of fine mesh screens, thus enabling the Director to fully consider fine mesh screens as a potential site-specific BTA technology. The site-specific BTA entrainment framework in today's rule, by its very nature, would enable evolution in fine mesh screens to be considered, as appropriate, in determining the site-specific BTA requirements.

EPA disagrees with comments claiming that screens should be required in all cases, as other technologies may perform equal or better than screens, when available for a specific site. EPA further disagrees that the final rule should require some type of screen, as some intake configurations do not need a screen to be effective. For example, a velocity cap may not have a screen, but due to its operation and location, it can be deemed BTA. Similarly, closed-cycle is a high performing technology that performs better than screens. Thus a facility with properly operated cooling towers should not have to install modified traveling screens in addition. EPA notes that most intakes do have screens of some type to prevent the entry of debris into the cooling system, but does not see a need to require screens at all facilities.

With respect to consideration of costs incurred for technologies already installed, EPA conducted a cost and impacts analysis for this rule, and found that the BTA requirements of the rule are economically achievable. EPA disagrees that EPA's analysis must include other expenses already undertaken by the facility, noting that the rule analysis of cost reflects the incremental costs of a facility. To the extent a facility has debt, this is reflected in the EA and this analysis may be considered to include technologies and operating practices already in place. EPA found that the rule is economically achievable; see preamble section VII. The flexibilities in the rule provide alternatives that may be less costly for some facilities. To the extent a facility is developing a new technology, the "systems of technologies" and the IM performance standard compliance alternatives are both available.

Essay 16A: Impingement Mortality Performance Standards

EPA received numerous comments concerning the proposed monthly and annual average impingement mortality performance standards. Comments assert that the proposed standards would be too stringent and facilities using the model technology would not achieve them on a consistent basis. The comments also claim that EPA based the proposed standards upon data that did not fully capture site-specific factors contributing to variability in both impingement rates and resulting impingement mortality. Comments also expressed concern regarding the methodology used to derive the performance standards.

Introduction

This essay describes the comments on the proposed impingement mortality (IM) performance standards and EPA's subsequent reevaluation of criteria for the data acceptance and the methodology ultimately used for the determination of the IM performance. The proposal included both a monthly average and an annual average numeric IM performance standard; both were based upon data from three facilities selected using a well-defined set of criteria. Comments generally suggest that EPA either delete any numerical standards altogether, reevaluate the criteria for data acceptance, establish less stringent requirements, and provide for pre-approved compliance approaches.

Because EPA has developed different compliance strategies than typically used for annual average limitations promulgated under the Clean Water Act, EPA changed the name of its proposed annual average impingement mortality limitation to "IM performance standard" for the final rule.[13] EPA is doing this to help make it clear that CWA section 316(b) requirements are not effluent limitations guidelines and standards (ELGs). In the record, EPA may also refer to the final IM performance standard as the 12-month percent survival performance standards, the percent survival standard, or percent SPS. See Legal Authority in the preamble for a discussion of the *invitation* to look at the CWA factors for ELG in establishing CWA section 316(b) requirements.

EPA notes that the final rule deletes the requirement for a monthly standard, as discussed below. Further, compliance strategies including calculations for demonstrating compliance when meeting a 12-month IM performance standard are different than those used for annual average limitations, therefore the final rule specifically refers to 12-month performance standard to avoid possible confusion. Specifically, the final rule includes a 12-month IM performance standard, which is not the same as an annual limitation. To further avoid confusion over the meaning of "annual" or "annual average" the rule precisely refers to the requirement as a "12-month" impingement mortality performance standard. This is a more transparent description of what the performance standard requires, as well as what the performance standard is based on.

Upon reevaluation of the available studies and the analysis, EPA revised the data exclusion criteria, thereby increasing the size (number of studies) and variability of the database. The final

[13] Throughout this document, EPA refers to the proposed limitations as standards. EPA is taking this approach in this essay so that the reader can easily compare the proposed "standard" to the final standard.

database consists of data from 17 facilities located in a large geographic area stretching from Massachusetts to Florida and as far west as Minnesota and Nebraska. This increased dataset addresses both variability in the rate of impingement and the subsequent rate of impingement mortality. For the 12-month IM performance standard in the final rule, EPA used the same statistical methodology as it had proposed, because it is still an appropriate method for the available data. EPA did not receive any information or data to the contrary. By applying this methodology to the revised database, EPA calculated that the 12-month IM performance standard was 24 percent. This means that no more than 24 percent of the impinged fish and shellfish may die or alternatively at least 76 percent of the impinged fish and shellfish must live. While the resulting IM performance standard is approximately double that of the proposed rule standard, the final rule dataset addresses concerns about (1) the stringency of the proposed annual standard, (2) a standard based on three best-performing facilities, and (3) facilities used in calculating the standard are all located in a single geographic region. See more detailed discussion below. In addition, by adopting the 12-month IM performance standard, EPA increased the regulation's flexibility to address industry concerns about compliance with annual averages. With respect to comments about rate of impingement and the specific comment about a facility obtaining credit for measures that reduce the rate of impingement in the first place, a facility may choose to demonstrate the rate of impingement as part of the "systems of technologies" compliance alternative; see preamble and the rule at § 125.94(c) for more discussion. This essay consists of six main sections that address detailed comments about EPA's justification for the proposed standards, alternative forms of the standards, data selection, statistical methodology, achievability and compliance issues, and additional public review.

Justification for the Proposed Standards

Comments express concerns about EPA's justification for the proposed annual average and monthly average standards. This section summarizes the comments about both types of standards and provides EPA's response. In particular, this section addresses why a 12-month performance standard is appropriate, and why the monthly standard is unnecessary.

The proposal cited the regulation for the pulp and paper category (40 CFR 430) as an example of a Clean Water Act (CWA) rule with an annual average limitation. Comments assert that EPA's adoption of the annual average concept was based upon an inappropriate and faulty comparison. They assert that natural resource management required by 316(b) differs from the pollution control required by effluent guidelines. They assert that controlling pollution in wastewater discharges is not the same as controlling biological organisms that come in contact with cooling water intake structures. Within any industrial effluent guidelines category or subcategory, waste streams are likely to be similar between facilities and treatable with the same or similar technologies, regardless of where the facilities are. Because of what commenters consider an imperfect analogy between control of industrial waste streams and intake structures, comments conclude that EPA cannot justify an annual average limitation for 316(b) based upon the construct established in the pulp and paper annual effluent limitations or other annual CWA limitations. Instead, for facilities subject to 316(b) requirements, comments assert that the biological conditions are widely variable at intake structures throughout the country, thus requiring different technologies for successful IM control.

EPA disagrees that facilities cannot effectively apply BTA technology or its equivalent in a consistent manner within the biological conditions specified in the final regulation. EPA's record shows dozens of studies specific to traveling water screens, indicating the status of the technology as a widely available, demonstrated, and feasible technology. Further studies show similar levels of performance with screens other than traveling screens, but with the same types of fish protection features. Thus EPA's record shows a minimum level of performance can in fact be obtained with certain technology. More specifically, EPA's record shows 17 studies evaluating technologies with the fish protection features found in modified traveling screens with fish returns, and these studies show the technology does in fact provide a consistent level of IM control. This consistent level of performance is further enhanced because the definition of impingement in the rule excludes organisms smaller than a 3/8-inch mesh size; at this mesh size, impingement does not include the most fragile life stages (eggs and larvae). EPA's analysis shows when fragile species are excluded from the 12-month performance standard calculation, there is very little variation in performance exist across geographic locations. As discussed in the preamble, EPA is: keeping the definition of impingement in the final rule, deleting the species of concern provision, and is adding a definition of fragile species to the rule. These three components clearly articulate applicability of the performance standards. A thorough review of these studies demonstrates for non-fragile species, the performance for properly operated technology is in fact highly predictable. See TDD Chapter 11.

EPA recognizes that facilities may prefer to apply different treatment strategies at different intake locations, particularly where intake location or other management measures have resulted in reduced rates of impingement. EPA agrees that a facility that has considerably reduced the rate of impingement should be able to get credit for such reductions. For this reason, the final rule allows a systems of technology approach by where a facility can demonstrate reduced rates of impingement as part achieving a level of performance comparable to the 12-month IM performance standard. See the Basis for the Final Regulation section of the preamble for further information.

While EPA could have included a monthly performance standard and commensurate biological compliance monitoring, EPA found that achieving the 12-month performance standard would achieve the same overall environmental improvement as a monthly performance standard. As discussed further below, the performance of the BTA technology is consistently achievable over the course of a year, and the performance is consistent across the wide range of intake structures, waterbody types, and geographical locations. Further, the 12-month performance standard will require a facility to actively evaluate performance during the 12-month period enabling the facility to optimize the technology to improve performance to counter balance a result above the standard by one below the standard. If EPA had included a monthly standard, it would have similarly needed to incorporate allowances for exceedances. Allowing for exceedances would have provided no incentive for improving operations for such exceedances. Therefore, EPA concludes the additional burden and expense of a monthly performance standard would not increase the environmental benefit over that already achieved by facilities employing various technologies to meet the 12-month performance standard. Thus the 12-month performance standard on its own is appropriate, and there is no need for monthly performance standards. EPA notes that, contrary to commenters' assertions, EPA is not relying on the use of annual average limitation in other regulations as the justification for its use here. EPA's cite to a past example of where EPA used an annual average limitation approach within its CWA program demonstrates that this approach has been validly used in other cases.

For the proposed monthly average standard, comments assert that its purpose and benefits are unclear, and thus, EPA should delete it from the final regulation. Comments claim that a monthly standard has numerous drawbacks due to factors including the seasonal nature of impingement, water temperature, salinity, fish abundance, and community composition. Other comments assert that monthly data would rely on frequent occurrence of low impingement catches which result in small sample sizes and render monthly estimates imprecise. Other comments are concerned about the high risk of false violations associated with monthly standards and incompatibility of monthly IM standards with credits for alternative technologies. Other comments assert that EPA should only use an annual standard, and not a monthly average, to avoid penalizing facilities during any months when seasonal measures are not in place. Some commenters favor the monthly standard, and support frequent biological monitoring to demonstrate the monthly standard is being met.

EPA disagrees with the implication that facilities cannot control BTA performance on a regular and ongoing basis. However, EPA agrees that a monthly IM performance standard is not necessary in order to achieve the desired long term IM performance for the reasons explained above. Therefore, the final rule does not include a monthly average.

The final rule also uses the IM performance standard as a measure of performance for determining which technologies should be deemed pre-approved, which technologies should be eligible for streamlined compliance such as reduced monitoring, and provides the permit authority a clear and transparent metric for comparison purposes when determining whether technologies other than modified traveling screens are appropriately deemed BTA for a given location.

Alternative Forms of the Standards

The EPA expressed the proposed monthly average and annual average standards as maximum percentages of impingement mortality that facilities were not to exceed, on average, in each month or 12-month period identified by the permit authority. Comments suggest several alternatives to the percentage basis for the IM standards. The suggested alternatives include reduced impingement measures, biomass, impingement mortality loss, percent survival, species-specific mortality rates, or arbitrary values.

Riverkeeper's comments assert that EPA should not establish the proposed standards for IM because it allows the technology to impinge an unlimited number of fish and requires that the facility determine how many of each species survive. Riverkeeper recommends a standard based on reduced impingement rather than impingement mortality (such as an intake velocity standard), because it would be more practical, certain, and effective by preventing impingement and thereby avoiding sub-lethal harm. The EPA agrees that it is desirable to prevent both impingement and impingement mortality. As explained in the preamble, EPA considered other technology bases such as reduced intake velocity (i.e., 0.5 ft/sec), far offshore locations, and closed-cycle cooling that are capable of reducing both I and IM. The EPA found that reduced intake velocity and closed-cycle cooling are both more effective at reducing I and IM than the annual standard based on the performance of well-operated modified traveling screens. Because the performance of these two technologies exceeds the performance of well-operated modified traveling screens, the final rule includes compliance alternatives based on these two technologies. However, the EPA finds that reduced intake velocity and closed-cycle cooling are not available for many facilities, and neither of these technologies are therefore the basis for BTA. Far offshore location alone did not consistently reduce impingement to the level of well-operated traveling screens. See Section VI of the preamble and Essay 17 for further discussion.

Because they consider a requirement for purely meeting a percent survival rate (IM standard) to be a poor measure of environmental impact, other comments suggest that the EPA base the limitation upon biomass instead of an organism count or percentage. In support of their comment, they also assert that for the purposes of counting impinged mortality, a fish egg should not count the same as a grown fish. First, EPA received limited data from three facilities upon which it could base a standard on biomass, and found that standards based on biomass required a large amount of waterbody specific data that the EPA did not have and that commenters did not provide. Therefore a biomass standard could not be determined. Second, EPA disagrees that a standard based upon biomass would be appropriate because it would not protect species with low biomasses. In other words, under a biomass approach the facility could impinge and kill numerous small sized fish as long as the prescribed mass standard had not been exceeded. Third, EPA disagrees with the need for an approach to IM that counts eggs differently from grown fish. EPA considers an adjustment for fish eggs to be unnecessary, because the IM performance standard applies only to impingeable organisms. Impingement is defined in the rule at § 125.92. The EPA found that the majority of eggs are smaller than a 1.0-mm mesh, and industry-supplied data showing that only in the rarest of circumstances are eggs larger than 2.0-mm mesh. These data supports EPA's final rule definition for impingement. To be consistent with these findings, EPA notes that the screens forming the basis for the final rule performance standards must have a maximum spacing of 0.57 inches (roughly 1.4 cm).

Another comment suggests that the final rule distinguish between "impingement mortality rate" (the fraction of impinged fish which die from impingement) and "impingement mortality loss" (mortality losses expressed as a percentage of baseline conditions as described in the NODA). EPA agrees with the comment in principle. The proposed regulatory definitions distinguish between impingement and impingement mortality. In the NODA, EPA further clarified the distinction, and made it clear that reductions in impingement were intended to count as reductions in mortality. EPA provided examples in the FR notice. For example, under certain compliance alternatives, the final rule provides for an allowance for the reduction in fish potentially impinged when considering the number that are actually impinged by the CWIS. For example, a facility may use acoustic deterrents to prevent a species from impinging the first place. That facility could demonstrate the rate of impingement at the CWIS both with and without the acoustic deterrent. EPA considers this reduction in impingement to be an equivalent reduction in IM, and thus, the resulting calculated IM rate is an estimate of the efficacy of the overall combination of technology and operational measures at that intake. This estimated IM rate is the equivalent of "impingement mortality loss" as defined by the comment. In the final rule, EPA is maintaining the definitions of me and IM in the regulatory language; thus the EPA continues to clearly distinguish between the two concepts and considers any additional terminology to be unnecessary.

EPA disagrees with comments that survival percentages instead of mortality percentages should be used as the basis for standards development. Because percent IM and percent survival together should sum to 100 percent, one can be used to calculate the other (e.g., percent survival=100- percent IM). Performance studies were not found to consistently report one metric over the other. The final rule's IM performance standard places an upper bound on mortality, that is, the percentage of fish that die from impingement. In contrast, placing a lower bound on survival could be viewed as setting less stringent and therefore less protective standards. EPA's selected final rule approach, as discussed above, requires an optimization study. This approach precludes facilities from doing the bare minimum to achieve the performance standard. EPA notes that some comments appear to confuse mortality and survival. For example, Riverkeeper incorrectly states that the proposed annual standard of 12 percent (final IM performance standard is 24 percent) would have allowed 88 percent (i.e., 100 percent -12 percent =88 percent) to die, when the correct value is 12 percent. Contrary to another comment's assertion that the regulation does not consider stressed fish (e.g., the comment cites the Huntley study), the regulation requires fish to be held for a period of time after impingement to determine if any injuries were severe enough to cause mortality. In the final rule *Latent mortality* is defined at § 125.92 and means the delayed mortality of organisms that were initially alive upon being impinged or entrained but that do not survive the delayed effects of impingement and entrainment during an extended holding period. Delayed effects of impingement and entrainment include but are not limited to temperature change, physical stresses, and chemical stresses. The EPA has clearly identified latent mortality to ensure it can be determined whether any mortality is a result of impingement. See discussion about holding times in the Data Selection section below.

The proposed rule would allow the Director to determine site-specific species of concern for which the performance standards would be applied. Comments suggest that EPA should further consider species-specific mortality rates in revising the proposed standards for the final rule. For example, some commenters assert that EPA should incorporate species-specific information into the revised standards and cite an UWAG analysis as supporting the approach. Based upon a more inclusive BTA data set than the EPA's proposed database, UWAG's Table 2 presents average percent IM values of 5 percent, 17 percent, and 39 percent for high, medium, and low survival potential species. (UWAG 2974 Attachment 2 Table 2). Comments assert that the analysis demonstrates the need for separate standards for fish of different survival potentials. EPA agrees in part. First, the technology basis for the IM performance standard in the final rule will not control IM for fragile fish species. EPA did not identify a nationally applicable technology that could serve as a BTA basis for standards specific to fragile species. For example, EPA found that a low intake velocity such as 0.1 ft/s could be protective of salmonids, and behavioral deterrent systems could be tuned for some fragile species, however neither of these technologies is widely available to the industry. Fragile fish species are specifically excluded from the IM performance standard in the final rule and the final rule includes a definition of fragile fish corresponding to the exact data and methodology used by EPA to calculate the performance standards. The final rule does not establish national requirements for facilities to control IM of fragile fish. Second, after evaluating differences in fish mortality rates, EPA based the final rule's IM performance standard upon data for non-fragile fish, as explained in Essay 22. The EPA made this change to ensure the regulatory definitions and the IM performance standard are clear, reproducible, transparent, and correlate to EPA's methodology for calculating the IM performance standard. Based on the costs of monitoring and biological evaluations provided in comments, EPA determined that additional regulatory requirements to document further distinction between species would be an unnecessary burden, as it would result in unnecessary complications and expense for facilities in monitoring and evaluating impinged fish species. Further, the commenter's approach is not necessary because the final rule is readily implementable and applicable nationally, ensures environmental protection, and is achievable. Finally, such an approach could result in a different technology basis for each classification of fish survival (fragile vs. hearty), and the different technologies may be incompatible. Again, the resulting level of complexity at some locations would be unworkable.

Other comments suggest arbitrary values for the standards. One suggests that the final rule specify a value of 50 percent for the annual average standard. No data was provided supporting the approach. Another comment suggests values of 20 percent and 39 percent to help account for variability, derived using EPA's proposed standards but adjusted downwards by 10 percent. Commenters based this approach on EPA's Phase I requirements that considered 90 percent of BTA to be comparable performance. The 10 percent margin of error was appropriate in Phase I because the new facility rule required EPA to predict the effect of the regulatory approach at a new facility based on limited empirical data. The variety of methods, sources, underlying studies themselves, sampling errors, and natural fluctuations also skew the results on a day to day basis. See Phase I TDD, Chapter 5, EPA-821-R-01-036. The Courts found in favor of EPA using the 90 percent comparable to indicate in the regulation the amount of uncertainty that was considered "tolerable." In contrast, today's existing facility final rule includes a more comprehensive set of data; the data used to determine the IM performance standard already include variability across species, location, waterbody type, and other factors; and the final rule performance standard reflects 12 months performance rather than daily. Therefore, additional adjustments for variability are not necessary. EPA thus disagrees with the commenter's recommendation of using 90 percent comparable, an approach that would lower what has been identified as an achievable standard by an additional 10 percent. EPA disagrees with these comments and has based the final rule's IM performance standard upon facility performance studies with the data selected using well-defined criteria as specified in the proposed rule and NODA, and modeled using well-known statistical concepts, as further explained in the next two sections.

Data Selection

EPA based the proposed standards upon eight data sets from three facilities, all located in the State of New York. Comments expressed concerns about the sample size, limited geographic region represented in the data sets, variability reflected in the data, data exclusions, data errors, and documentation. This section summarizes the comments and provides EPA's reevaluation of the data for each issue raised in the comments.

Comment Summary

The comments raise many issues related to the EPA's selection of the data used as the basis of the proposed IM standards. This section provides a summary of the comments, followed by sections that describe EPA's evaluation of the comments.

Comments describe several issues related to the EPA's data selection. Comments assert the proposal data were insufficient (i.e., too small a sample size) for the modeling of a statistical distribution. Comments also assert that the proposal data did not reflect variations due to waterbody type, geographic location, species present, environmental conditions, operating parameters, seasonal variability (e.g., in fish species, abundance, and impingement), and year to year variability. Some comments assert that the eight data points used in the analyses were not independent observations but were artificially created; they note that the assumption that there is independence and adequate replication for testing monthly variability in IM is not statistically nor scientifically supported. Some comments claim that the EPA made errors in selecting or labeling certain data sets. Other comments recommend that the EPA should change its criteria to include data from specific studies. Some comments note that the EPA relied on second-party reviews of studies, not the more complete, original study reports. Other comments argue that the EPA should not eliminate laboratory-based studies. Other comments claim that the requirement that acceptable studies contain reported values that are "actual measurements" of IM is needlessly restrictive, as it would preclude consideration of studies based on modeling or estimates. Other comments note that the EPA's proposal documentation did not identify the specific criterion used to eliminate specified datasets, making it impossible to determine if the EPA had applied the exclusion criteria correctly.

Comments on the EPA's holding time restrictions claim that they establish an arbitrary range of holding time conditions for a test method that is highly sensitive to such conditions; however, there is considerable disagreement in recommendations and concerns. Some comments recommend that the IM standard database should exclude data for holding times greater than 48 hours because the data may reflect mortality associated with holding rather than from the impingement and collection process. Other comments argue that the standard database should include data with holding times greater than 48 hours because there are several studies (e.g., Beak 1987; Tetra Tech memo DCN 10-6709) in which longer holding periods did not result in high mortality. Comments also note that data for holding times less than 24 hours and interim evaluations during a longer holding time can provide useful information. Still others assert that EPA has no technical or scientific basis for assuming that the standards based upon data calculated using a 24-hour holding period are achievable at a 48-hour holding period.

EPA's Reevaluation of Data and Response to Data Selection Comments

In response to comments with data selection concerns, EPA performed a comprehensive review of the available data sets. As explained in the proposal's Technical Development Document (TDD) Chapter 11.B, EPA examined 170 documents for potential data sets to use as the basis of the proposed IM standards. In its reevaluation of the data, EPA compiled the data received in comments, and solicited data from commenters that claimed to have additional data supporting their position. After receiving all data, EPA reviewed the 207 newly received documents for potential data sets. As explained in the preamble to the final regulation and in Chapter 11 of the TDD, EPA revised its data selection criteria so that the final rule's IM performance standard is based upon a larger set of data, number of facilities, and broader geographic region than used for the proposed standards. EPA considers facility level performance to be a critical factor in determining the annual average standard. By revising the data selection criteria, EPA is able to include more facility level data in its calculations; thereby addressing commenters concerns that it is too limited (e.g., geographic area, environmental conditions, species, etc.) while ensuring the limits represent the BTA technology basis. The resulting data set contains data from 17 facilities with traveling screens with post-Fletcher modifications. The 17 facilities collectively provided data for facilities in 11 states and more than 1500 sampling events beginning as early as 1977.

Other commenters continue to take the position that EPA did not collect sufficient data. EPA disagrees. For more than 10 years, EPA repeatedly requested the industry to provide data for the model technologies and explained its rationale for requesting the data, including but not limited to requests in the Phase II rule, the Phase III rule, this proposed rulemaking and the subsequent NODA. In the EPA's view, numerous opportunities to collect data and provide information over the last 10 years provides additional support that the actual data in front of the EPA at this time is both representative and appropriate and is the best available. In developing the final regulation, EPA used all available relevant data to maximize the number of facilities, geographic regions, waterbodies, seasons, species, holding times, and years present in the data. EPA has all available data, even if the data is limited, with which to set the standards, thus EPA's approach is reasonable. See e.g., BASF Wyandotte Corp. v. Costle, 598 F.2d 637, 652-653, (1st Circuit, 1979).

Some commenters advocated inclusion of specific data in the calculations, such as data from particular facilities along the West Coast or Hawaii, or specific facilities. Commenters suggest inclusion of their chosen data would address concerns over variability between locations.

Contrary to assertions in comments, EPA has not seen any patterns in the data underlying the IM performance standard that suggest performance varies by waterbody types that would possibly affect operations of the model technologies on the West Coast (or other geographic areas). Nor do comments identify any factors that might influence performance of the model technologies by geographic region or submit any data to support this assertion. In selecting data as the basis of the IM performance standard in the final rule, EPA applied its criteria to data from all locations. Because none of the data from West Coast or Hawaiian facilities met EPA's final data criteria, none was included in calculating the IM performance standard. Upon further review of the specific species identified in the data obtained from the West Coast or Hawaiian facilities, EPA finds that similar species (same Genus or family, for example) are indeed represented in the data from the 17 facilities. As another example, the EPA eliminated the proposal requirement that species must be typical of the location. This provision excluded certain data from the Salem facility. However, the documentation for the Salem data identify them as estimates (Ronafalvy (2000, page S381 refers to the IM as "estimate average proportion") and EPRI (2007, e.g., Table 2-12 labels all survival rates as "estimates" on page 2-29)). As explained in TDD Chapter 11, the selection criteria required that the data were actual measurements, and not estimated data. Therefore EPA did not include these data in its calculations. See TDD for more information.

Some commenters suggested EPA created data for calculating the performance standard. EPA disagrees that it has in any way artificially created the data used as the basis of the IM performance standard. It has based the IM performance standard upon sampling events conducted and reported by others. These data sets are in the record. EPA has applied widely accepted statistical procedures in aggregating the data and developing the 12-month performance standard. Comments express concerns that percent IM from different sampling events at a facility may be statistically related to one another (i.e., not independent); however, EPA modeled the IM performance standard, not the individual sampling events. EPA need only consider independence between the mutually exclusive, approximately 12-month periods in the data from each facility. When data are said to be positively autocorrelated, it means that measurements taken at specific time intervals (such as 1 day or 2 weeks apart) are related, and thus, not independent. To determine if autocorrelation exists in the data, a statistical evaluation is required using many measurements for equally spaced intervals. With the data provided by industry, all of which cover relatively short time periods, it is not possible to conduct a rigorous evaluation of independence of facility performance from year to year. However, EPA considers its influence on the value of the final IM performance standard to be minimal based on its autocorrelation analyses using all available data that meets the requirements of such analysis. Although many facilities provided data collected for more than 12 months, it was possible to separate the data into separate (approximately) 12-month periods for only one facility (such as data for Somerset). After separating the Somerset data into two 12-month periods, EPA averaged the two values to obtain a single value for Somerset to use in the statistical modeling. Any effect of dependence between Somerset's two IM rates would have been minimal because EPA used their average, not the two separate values, in the statistical modeling. In addition, Somerset's data would not have had an undue influence on the value of the final IM performance standard because it provided only one of the 17 annual average values used in the statistical modeling to determine the final IM performance standard, and not 2 of the 17 as suggested by commenters.

For the proposal and final rule, EPA cites certain studies as described in second-party reviews conducted by EPRI; however, EPA did not rely solely on the second-party reviews. EPA appreciates the reviews conducted by organization such as EPRI, and used such reviews to obtain additional original studies. These studies are in the record, and were used to glean additional information about the studies conditions and the technologies reviewed. Although the second-party reviews generally presented fewer details, they consolidated the results in a format that facilitated EPA's data extraction. To avoid the appearance of having double-counted data sets, EPA cited only the second-party reviews and provided references to their consolidated tables.

Specifically, EPA reviewed three studies for the Huntley, Roseton, and Arthur Kill facilities because comments asserted that EPA had incorrectly incorporated their data into the proposal's standards database. For the Huntley study from 1999, a comment expressed concerns about EPA's use of the data, and suggests that Huntley could not meet the performance standard that based on Huntley's own data. EPA disagrees. Contrary to the comment's assertion, Huntley's data with an average percent IM of 1.6 percent demonstrates better control than would have been required by either the proposed annual performance standard and certainly the final IM performance standard. Commenters do not describe how any perceived shortcomings in Huntley's study would have affected the performance data. For example, although Huntley shortened its planned sampling time and did not sample for the entire 12 months, EPA has determined that the study still provides IM data that reflects the performance of the model technologies over the course of an entire year. See the TDD for further discussion of the criteria for long term data collection. Because the Huntley data meet the revised criteria and commenters have provided no data to the contrary, EPA has appropriately continued to include the data from 1999. For the Roseton study, comments identified data as coming from a document that does not, in fact, contain data for Roseton. The comments refer to Micheletti, W. and J. Burns, Estimating Energy Penalties for Wet and Dry Cooling Systems at New Power Plants (2003) (EPA Docket OW-2002-0049 DCN 6-5046H). After reviewing its record index (the DCN and report title refer to different documents), EPA concluded that the comment refers to the DCN, and not the cited report. The cited report was not provided to EPA. DCN 6-5046H is a document by Johnson and Moser entitled “Fish Return System Efficacy and Impingement Monitoring Studies for JEA’s Northside Generating System.” In conclusion, EPA agrees that the data from this report are for JEA Northside, and not Roseton, and has corrected its database. For the Arthur Kill study, another comment questioned the values shown in Exhibit 11-4 of the TDD. The comment appears to only have considered data from Table 4 of the Arthur Kill study. However, the Arthur Kill study also provides data in Table 7 which were collected from the same screens and sampling event as the data from Table 4. Thus, EPA has appropriately combined the data from the two tables in the Arthur Kill study Exhibit 11-4.

Comments identify three studies, Fletcher (1986 and 1990) and McLaren and Tuttle (2000), as additionally relevant to the proposed performance standards development. The comments also recommended that EPA change its data selection criteria so that IM data from these studies could be included in developing the final IM performance standard. However, despite a follow-up request, the commenter did not provide EPA with a copy of Fletcher (1986), and therefore, EPA could not evaluate that set of data. EPA disagrees with the other comments. EPA finds the final criteria are appropriate; see TDD Chapter 11. Specifically, inclusion of data from lab studies are not appropriate because these data do not reflect the same operating conditions in which the technologies are actually employed, such as trash and debris loading and weather events. While it is an important study of traveling screens, Fletcher’s 1990 study does not contain any IM data because its focus is on engineering and efficiency aspects. EPA’s evaluated the McLaren and Tuttle report from 2000 (for the complete citation, see Document ID 64 in TDD Chapter 11, Appendix A). Because the data in this report for Somerset meets the final rule data selection criteria, EPA incorporated the Somerset data from Table 3 into the standard database. It excluded the data from Table 5 because the data represent a period longer than specified in the criterion (i.e., approximately 12 months). EPA also notes that its record includes a second report by McLaren and Tuttle. This report is undated, but assumed to be 1999, and presumably an unpublished report, identified as Document ID Study 244 in TDD Chapter 11, Appendix A. Both the 1999 and 2000 reports contain the same tables of IM data collected from the Somerset station.

EPA disagrees with comments that assert that laboratory and modeled data can be used to determine the relative strength of species, informing decisions about the likely survival achievable in the field, especially when data for certain species are limited or unavailable. EPA continues to be concerned that laboratory and modeled data may not represent the real world results of BTA. For example, EPA has identified that low rates of fish catch may inadvertently increase fish mortality, poor fish condition prior to their use in collection results in poor survival, and some studies used techniques such as a “crowder” or other means employed for purposes of forcing fish to impinge or be collected; these data are not representative of actual technology performance. Regardless of the availability of data for particular species, the comments have not provided convincing evidence that laboratory and model data would appropriately mimic the performance of the model technologies under normal conditions.

EPA agrees that data from a wider range of holding times are appropriate for inclusion in the IM database used for the IM performance standard in the final rule. EPA reevaluated both the old and new data using an expanded holding time criteria range of 18 hours to 96 hours which increased the number of facilities present in the final database. Several studies demonstrated impingement duration and holding times were not critical factors affecting survival for many species. The majority of the data used was from studies with holding times of 48 to 96 hours, with only four studies having holding times of 18 to 24 hours. In studies that assessed survival at multiple intervals, EPA used only the data from the longest period within the 18 to 96 hour time-frame. EPA excluded data for periods shorter than 18 hours since some lethal injuries due to impingement will not be immediately apparent. None of the data and comments provided indicates this is no longer the case. However, in light of the other comments and data, EPA agrees that holding times are no longer a critical factor, at least not for the species identified in the data. For these reasons, for the final regulation EPA has revised the criteria by expanding the range of mortality monitoring holding times from 24 to 48 hours to 18 to 96 hours, and has further specified that the Director may establish alternative holding periods. In the absence of data upon which the Director may determine the appropriate holding time, EPA's analysis suggests a minimum of 48 hours is most appropriate to ensure that the facility observes the majority of initial and latent mortality associated with impingement. See DCN 10-6709 for additional discussion. See also TDD Chapter 11 and Section V of the preamble for additional information.

EPA disagrees that comments asserting that the proposal documentation was deficient or that EPA fabricated data for calculating the performance standard. All studies and data are in the public docket. Proposed Chapter 11 describes EPA's thorough, consistent, and unbiased review of the data and all supporting documentation accompanying the data. The final TDD Chapter 11 documents EPA's additional and thorough review of its data for the final rule. EPA performed the reviews to ensure that the selected data represent IM and that the data reflect the performance of the model technologies. The EPA used as much data as possible, only rejecting data that do not meet the acceptance criteria. By identifying these criteria, the study documents, and the data, EPA considers its data selections to be easily reproduced by using information in the public docket. While the EPA did not identify all criterion by number for each and every study, both the proposed and final TDD Appendix 11-A provide one or more reasons for data exclusions for each study. As discussed above, those studies that did not meet EPA's acceptance criteria can still be used to demonstrate the 12-month performance standard is achievable.

Statistical Methodology

Appendix D to Chapter 11 of the proposal TDD provides details on the EPA's choice of the beta family of distributions, and section 11D.2 discussed alternatives to the beta distribution (including the normal distribution model, nonparametric approaches, and survival analysis approaches) for modeling percent IM. The documentation demonstrate that the EPA considered alternatives and, upon doing a statistical assessment of each, determined that the beta family of distributions was the best approach to take given the objectives addressed in the proposal. Despite earlier evaluation of the statistical methods, the EPA re-evaluated possible alternatives. This section of the essay describes the comments and the EPA's response regarding reevaluation of its statistical methodology.

Comment Summary

EPA based the value of the proposed annual average standard and final 12-month IM performance standard upon the expected value of the beta distribution determined from the IM percentage data from facilities with BTA technology. The median of the facility averages provides the same value as the expected value from the beta distribution. Many comments argue that the application of a beta distribution was not appropriate for the data set used by EPA. They claim that EPA provides no basis for selecting and fitting the beta distribution and the distribution over-aggregates the data so that the actual variation is neglected. Comments also argue that the "fit" of the data to the beta distribution provides very little assurance that the distribution is predictive of conditions outside of the data set. Comments also question EPA's use of method of moments ("MOM") estimation, because of what commenters consider a small sample size. Comments assert that EPA still should have incorporated a standard deviation, confidence interval, or variability factor not only in monthly averages, but in the annual average standard.

EPA did not consider comments related to the statistical basis of the monthly average standard because they are not relevant for the final rule. For example, EPA did not consider comments about the perceived lack of EPA analysis to back up the assumption that the monthly IM observations would be distributed about the expected average as suggested by the beta distribution.

EPA's Reevaluation of the Statistical Methodology and Response to Statistical Comments

In developing the final IM performance standard, in light of the comments that it had received, EPA again considered several parametric methods and the nonparametric approach to model the data used as a basis of the proposed annual average standard. Because of their concerns about the capability of facilities to meet the proposed standard, comments suggest that EPA reject the beta distribution and use methods that would incorporate additional variability in the standard development. For the reasons explained below, EPA disagrees that the recommended alternatives are appropriate and has confirmed its choice of the beta family of distributions as a reasonable choice to use as the basis for the IM performance standard in the final rule.

For the first alternative method, comments suggest that EPA develop a performance standard that would allow for exceedances. EPA disagrees that such an approach is appropriate for several reasons. First, the IM performance standard applies to the *average* observed during a 12-month period, and not to individual monitoring events during that period. By actively evaluating ongoing performance during the 12-month period, a facility can optimize the equipment to improve performance to counterbalance a result above the standard by one below the standard. Second, allowing periodic exceedances would be a disincentive for ongoing maintenance and operations of the BTA. Third, the approach could have a seasonal effect on percent IM. For example, if a facility claimed its allowable exceedance during spawning season, a poor IM percent could result in large numbers of young organisms dying than during non-spawning seasons. Courts have agreed with EPA's rationale in similar situations. For example, the 2nd Circuit Court ruled that denying excursion provisions justifiably compels the industry to develop the technological capability necessary to avoid excessive discharges. Accord, United Steel Corp. v. Train, supra, 556 F.2d at 842.

For the second alternative method, comments recommend that EPA consider a statistical tolerance limit. In referring to a 95 percent analysis around a mean or average value of the data, comments are referring to a tolerance limit, or confidence limit, which is not a point estimator but rather an interval estimator having the property of being larger than the desired quantity with a stated degree of statistical confidence. Comments incorrectly assert that EPA had developed the proposed monthly average standard using such an approach. As explained in the proposal TDD, the EPA calculated the 95th percentile of the distribution of monthly averages. Interval tolerance limits also are based on accepted statistical methods; however, they are designed for special applications in which it is critically important to obtain an upper bound on a quantity and in which the cost of substantially overestimating that quantity is small. EPA has determined that basing the final IM performance standard on a tolerance limit would be inappropriate and would allow mortality rates that would greatly exceed the consistently observed performance of the model technologies. While EPA considers facilities that properly operate and control the model technologies capable of complying with the IM performance standard, as discussed above EPA's final rule approach requires optimized operation, and a tolerance limit is not necessary.

For the third alternative method, comments assert that EPA is required to apply a variability factor in developing the standard. In developing limitations for effluent guidelines, EPA approximates the percentile basis of daily and monthly limitations using long-term averages and variability factors based upon pollutant concentration data. For the final rule here, EPA is establishing an IM performance standard using a different methodology to better model percent IM data. In addition, the variability factor would provide an upward adjustment to the IM performance standard that EPA does not consider necessary for a value that facilities need only comply with on an annual basis.

After considering and rejecting the three alternatives, EPA reevaluated and reaffirmed use of the beta distribution as still appropriate in developing the final IM performance standard. An advantage of the beta family of distributions is that it provides parametric methods for statistically evaluating the distribution of data. Parametric methods require that a probability distribution be specified and this allows estimation of unknown parameter(s) from the available data using maximum likelihood or an alternative estimation methodology. Parametric methods apply a series of mathematical equations to the data to obtain estimated parameters. In this manner, the estimated parameters are a function of the defined distribution and the data. In contrast, nonparametric statistical procedures rely on no or few assumptions about the shape or parameters of the underlying distribution. EPA prefers the parametric approach because it uses all of the available data to estimate the distributional parameters, which in turn, are used to estimate the value of the IM performance standard.

A second advantage is that the beta family provides EPA with reasonable flexibility in modeling the data. The beta family of distributions provides considerable flexibility in modeling the IM percentages because it is not a single distribution (as commenters were implying), but instead, represents many distributions that can take on a variety of shapes. Appendix D.1 in Chapter 11 of the proposal TDD shows several of the possible shapes within the beta family of distributions. Unlike the distributions such as the normal distribution, the beta family is not limited to symmetric, bell-shaped, and unimodal forms. Because it uses all available data to model the distribution, each beta distribution allows for the maximum use of the available data from a facility. When applying the beta distribution to a set of data, there is no need to verify that the data are distributed about the average of the distribution because each fitted beta distribution is not constrained to one particular shape (unlike the normal distribution) as it originates from a broad family of distributions. Therefore, the fitted distribution will closely match the shape observed in the data. Thus, for this reason and because it used all available data that met its criteria for performance data associated with BTA, EPA disagrees with comments that assert that the "fit" of the data to the beta distribution provides little assurance that the distribution is predictive of conditions outside of the data set.

A third advantage is that the beta family constrains the data in the same manner as the observed data. The beta distributions are continuous in nature, which also holds for the percentages of IM. IM percentages can be expressed as proportions that can take on any value between 0 and 1, which is the range covered by the beta family of distributions. In contrast, the lognormal distribution, suggested by comments as a more appropriate distribution, does not have a finite upper bound that is inherent with IM percentages (i.e., 100 percent is the upper bound).

A fourth advantage is that the specific form of the beta distribution, contrary to assertions in comments, accounts for the variability in each modeled facility data set. The specific form of the beta distribution was determined by the observed data (when expressed as proportions of IM). The method of moments (MOM) fitting of the beta distribution to the data utilizes both the observed average and the observed standard deviation (which is calculated as the square root of the variance) of the facility's data points in determining the parameters of the beta distribution. Thus, the actual variation in the data is accounted for in determining the specific form of the beta distribution for each facility data set.

EPA also considered the issue of sample size in applying the beta distribution. Comments assert that economic literature frequently discusses the inapplicability of the MOM estimation approach for small sample sizes and emphasizes that small samples result in biased estimators and inaccurate confidence intervals. EPA is familiar with the economic literature and disagrees with the conclusions that the comments attribute to the literature. Bias and lack of accuracy are not introduced to estimators exclusively by small sample sizes; rather, small sample size is associated with higher uncertainty (i.e., theoretically lower precision) in estimation. Thus, while small sample size is associated with larger standard errors in most traditional estimation techniques, the sample size and the MOM estimation approach do not inherently lead to biased or inaccurate estimates. In any case, EPA has increased the number of data points in the standard database and has used all of the relevant data available to it in developing the final standard. For additional explanation about EPA's efforts to maximize the sample size, see the section "EPA's reevaluation of data and response to data selection comments." EPA also notes that the comments expressed concern about the size of the database, but did not explicitly identify the number of data points that they would find to be acceptable for EPA's calculations.

The MOM estimation approach is one of several ways to estimate the two parameters of the beta distribution from observed data. The advantage of MOM is that it is straightforward to calculate from closed-form equations. A disadvantage is that the MOM can yield estimates that are outside the range of possible parameter values, though this did not occur in developing the final IM performance standard (i.e., the estimates of both parameters of the beta distribution were greater than zero). After considering these advantages and disadvantages of the MOM, Maximum Likelihood Estimation (MLE), and Bayesian estimation procedures, EPA concluded, contrary to assertions in comments, that the MOM was the best approach because it provided consistent estimates from closed-form equations that can be used by others to readily and transparently reproduce the value of the standard. EPA rejected the MLE and Bayesian approaches as explained in the following paragraphs.

For the MLE approach, EPA considered its use instead of the MOM because its parameter estimates are always within the range of possible parameter values. A disadvantage of MLE is that no closed-form equations for the beta distribution exist, and therefore, iterative algorithms would need to be used. As a result, these algorithms may not always converge to a global maximum, and persons using different implementations of the MLE algorithms might arrive at different estimates. For this reason, EPA rejected the MLE approach because different applications might not result in the same, consistent, value for the standard.

For the Bayesian estimation approach, EPA was concerned about its requirement for either a subjective choice of a prior distribution or the use of a non-informative uniform prior; in the latter case, the result would be the same as the MLE that EPA previously rejected (as explained in the previous paragraph). EPA rejected a subjective choice of a prior distribution because it requires a judgment call in selecting a distribution. Therefore, while EPA agrees this approach is a possible alternative, this approach did not represent the best approach available here.

In addition to evaluating the statistical methodology, EPA evaluated whether the statistical methodology over-aggregates the data, as comments asserted. To ensure that it was basing the final IM performance standard upon appropriate data, EPA aggregated the data within each facility into mutually exclusive periods of approximately 12 months or less, as explained in the TDD. To ensure that any one facility did not have undue influence on the IM performance standard, EPA then aggregated across multiple periods. In this manner, EPA based the IM performance standard upon the facility annual averages by using appropriate aggregation of data collected during individual monitoring events. EPA concluded that its aggregation approach used for the proposal was appropriate and has used the same approach in developing the final IM performance standard.

After confirming its earlier choice of the beta distribution for the IM data, EPA applied the proposed methodology to develop the IM performance standard using all of the available and relevant data from the facilities using the model technologies. The next section addresses concerns with achievability and compliance with the IM performance standard.

Achievability and Compliance Issues

As explained in the previous section, EPA considers the beta distribution to be appropriate for modeling the percent IM data, in part because it incorporates the variability in the data, and has used the method of moments ("MOM") to estimate the parameters of the beta distribution. The regulation establishes the IM performance standard as a maximum value that facilities are not to exceed, on average, in any 12-month period. This section of the essay addresses concerns about achievability and compliance of the IM performance standard. In this section, EPA responds to comments recommending further flexibility in complying with the rule; achievability by facilities used as the basis of the IM performance standard, all facilities, and facilities with low numbers of impinged fish; and optimization of the technology selected for BTA.

Comments suggest that EPA develop alternative compliance strategies for the situation when achieving the IM performance standard would not be feasible. For example, one comment suggests that the state permitting authority should have the flexibility to set mortality rates that may be variable from month-to-month, or to include only an annual average. As another example, another comment points to EPA's consideration of WET limits during its rulemaking. EPA notes the commenter incorrectly interprets EPA's regulation as being a trigger for further sampling and evaluation, not as a pass/fail standard, because of inherent variability in attempting to sample and measure natural systems. Although the comment is incorrect about WET limits being triggers because they are enforceable standards, EPA considered the comment's concept of using triggers to require additional monitoring of ongoing performance. First, for the reasons explained above, EPA disagrees that the IM performance standard is not feasible. Second, the final rule includes seven compliance alternatives for the IM standard, only one of which requires biological compliance monitoring to demonstrate the IM performance standard is met. See Essay 16. For those facilities that elect to comply with one of the pre-approved or streamlined IM compliance alternatives, EPA agrees that it is not necessary to require biological compliance monitoring. See Essay 16. Further, because EPA's final rule does not require biological compliance monitoring in perpetuity for 6 of the 7 compliance alternatives, EPA's approach offers the benefit of "streamlined" compliance; see final rule at 40 CFR 125.94(c).

Comments claim that EPA's approach produced a proposed annual average performance standard that could not be met even by those facilities on which the standard was based. Many comments argue that 50 percent of the BTA facilities cannot meet the proposed annual average standard because EPA based its value on the average performance of all BTA facilities. EPA disagrees that it has promulgated an IM performance standard that BTA technology cannot achieve on a regular and ongoing basis. The IM performance standard is not designed to validate current practices but rather to control intake structures within prescribed limits. EPA applied statistical methods to develop the IM performance standard using all of the available and relevant data from the facilities using the model technologies. EPA notes that not all studies included in the database were using technology optimized for the purposes of meeting the IM performance standard; such facilities, upon optimizing their technology performance, are expected to exceed the level of performance identified in the studies. As discussed above, because the IM performance standard is based upon data collected from facilities applying the model technologies, it already incorporates all sources of variability within the data. For facilities choosing to comply by alternatives § 125.94(c)(1) through (4), the technology performance exceeds that of the IM performance standard and the comments are irrelevant. For facilities choosing to comply by alternative § 125.94(c)(5) using EPA's model BTA technology (modified traveling water screens with fish handling and return), the final rule requires a 2-year optimization study to be used to establish permit conditions that are indicative of the site-specific optimized operation of the technology. Such facilities will not use biological monitoring to demonstrate ongoing compliance. Similarly, under § 125.94(c)(6), the 2-year study demonstrating a system of flow reductions, reduced rates of impingement, and other practices will be used to establish permit conditions that are indicative of the site-specific optimized operation of the technology. Again, such facilities will not use biological monitoring to demonstrate ongoing compliance. See preamble for more details.

EPA expects that few facilities, estimated at less than 1 percent of all facilities, primarily those with new and innovative control technologies not already addressed by the IM compliance alternatives in § 125.94(c)(1)-(6) will comply with the standard via § 125.94(c)(7) and conduct biological compliance monitoring. Because EPA expects this compliance alternative may be chosen by facilities are not using the IM BTA, these facilities must achieve an average performance level that facilities with well-designed and operated model technologies (i.e., the top 50 percent) have demonstrated can be done.

There are numerous studies in the record that were not included in the database because they did not meet all acceptance criteria. These studies, while not meeting all of EPA's criteria, show the technologies are widely available, demonstrated, and capable of achieving the IM performance standard. For example, a study may have included some instead of all the fish protection features, or may not have included 12 months of data – and yet the performance in these cases is consistent with that required in the final rule. EPA notes these additional studies do not suggest that a more stringent performance standard is warranted and that EPA should therefore revise its acceptance criteria, rather these studies show EPA's model technology is demonstrated, available, and performs in a consistently high manner.

Comments question how facilities would demonstrate compliance with the monthly and annual average performance standards. As described above, the monthly standard is not included in the final rule so no response is required. The facility would calculate the 12 month average by using the arithmetic average of its percent IM observed in monitoring events each month in the proceeding 12-month period. See the preamble for additional information.

Comments express two concerns regarding compliance with the annual average standards when the facility has low rates of impingement. One concern is that the proposed standard did not account for technologies and operational measures that may have contributed to low impingement. Another concern is that those facilities with low impingement would have difficulty complying with the IM performance standard if the number of impinged fish are so low that the mortality percentage could vary widely just with the fate of relatively few fish. Comments add that the expression of the IM performance standard as a percentage of impinged organisms is highly problematic, as it would require mitigation even when absolute counts of killed fish are very low. Other comments state that EPA did not propose a methodology that could accommodate widely varying sample sizes (e.g., 10 versus 1000) when calculating annual and monthly survival performance. EPA agrees that the proposed standard did not accommodate facilities that observe few fish impingements because the only situation where that occurs is when the facility has adopted other measures to actively avoid or reduce fish impingements. EPA solicited comments on this aspect of the proposal, and issued a NODA that included possible approaches to this concern (77 *FR* 34322). In the case of the commenter data with just a few fish impinged, EPA notes the facility has low rates of impingement due to the off-shore velocity cap. Thus the facility could demonstrate compliance under section § 125.94(c)(6) without other controls. In the NODA (77 *FR* 34322) and the final TDD Chapter 11, EPA describes the calculations to incorporate credit for existing or newly installed technologies. In addition, the final rule allows the Director, based on review of site-specific data and where no threatened or endangered species may be present, to conclude that, where few fish are likely to be impinged, a *de minimis* rate of impingement exists and therefore no additional controls are warranted to meet the BTA IM standard.

Some comments argue that EPA based the proposed standards on a flawed assumption that a single technology (i.e., traveling screens with fish return capability or the equivalent) is capable of reliably achieving the same level of protection regardless of the location, relative abundance of individual fish species within and between years, or differences in the aquatic environment. Comments state that a facility could expend a considerable amount of money installing technology without any assurances that the prescribed technology could meet the IM performance standard. Comments also claim that operators would not be able to innovate and optimize the operation and configuration of their traveling water screens to achieve reduced rates of IM because facilities can modify and optimize very little on a modified traveling water screen. They note that nowhere in the record does EPA point to evidence to support its assertions about optimization. EPA disagrees with these comments. As discussed above, the BTA model technology is demonstrated, available, and achieves a consistent level of performance. Site visits in EPA's record show facilities can and do strive to optimize their modified traveling screen performance. Other comments from actual facilities provide data showing that the model BTA technology can in fact be optimized. These commenters suggest possible operating parameters subject to modification would include: 1) rotation speed; 2) rotation frequency (e.g., intermittent vs. continuous); 3) spray wash pressure; and 4) spray wash angle. Other comments question EPA's assumptions in the proposal that these parameters could be adjusted to maximize fish survival. Studies in the record support EPA's claim that optimized values exist for the operating parameters, including a number of lab studies that successfully focus on one operating parameter at a time. EPA disagrees that it is impossible to optimize performance to meet the IM performance standard in the final rule. The final preamble, and the final record, cites several examples including site visits and examples provided by industry in comments (e.g., Energy Information Administration). Optimization requires study and modifications which are inherently part of proper operations and maintenance, which EPA has included in its costs of the rule. The final rule establishes seven alternative methods for complying with the IM BTA standard. One of these methods involves employment of a modified traveling screen that meets certain design characteristics and has been demonstrated to be operated in an optimized manner through biological monitoring during a 2 year optimization study. As discussed above, EPA expects that once the technology operation is optimized, its performance would exceed the IM performance standard, and the EPA has therefore streamlined compliance by eliminating biological monitoring after the optimization study. See the preamble for additional details and the record for the literature studies that describe technology optimization.

Public Review

EPA disagrees with comments that assert that further public review and comment was necessary for the revised performance standards. The proposal documentation clearly describes the methodology EPA used to derive the proposed annual average performance standard. EPA clearly provided notification of EPA's consideration of revising the standards based on new data in the NODA at 77 FR 34317 Col. 3. The data and methodology used is available in the record allowing the public to independently calculate and verify the final IM performance standard. Nothing prohibits the Agency from adding supporting documentation for a final rule in response to public comments. In fact, adherence to the commenter's view might result in the EPA's never being able to issue a final rule capable of standing up to review: every time the Agency responded to public comments, such as those in this rulemaking, it would trigger a new comment period. Thus, either the comment period would continue in a never-ending circle, or, if the EPA chose not to respond to the last set of public comments, any final rule could be struck down for lack of support in the record. Cf. BASF Wyandotte Corp. v. Costle, 598 F.2d 637, 644-45 (1st Cir. 1979) (noting that it is "perfectly predictable" that an administrative agency will collect new data during the comment period "in a continuing effort to give the regulations a more accurate foundation" and stating that "the agency should be encouraged to use such information in its final calculations without thereby risking the requirement of a new comment period"), cert. denied, 444 U.S. 1096, 62 L. Ed. 2d 784, 100 S. Ct. 1063 (1980), later proceeding, 614 F.2d 21 (1st Cir. 1980) (dismissing petitions for review). Also see Cf. Chemical Mfrs. Ass'n v. EPA, 870 F.2d 177, 200-02 (rejecting argument that agency was required to reopen notice-and-comment period before relying on economic data updated and expanded after the close of a comment period), clarified, 885 F.2d 253, later proceeding, 885 F.2d 1276 (5th Cir. 1989) (concerning attorneys' fees).

Essay 17: Intake Velocity

Introduction

Many commenters expressed concern that operation of a cooling water intake structure that does not exceed the prescribed through screen design velocity may be difficult to achieve at many facilities or that the costs to comply would be high. Commenters also considered the 0.5 ft/s design velocity to be over conservative, especially when applied as a through-screen velocity and also questioned the underlying rationale for selection of this value. Many had concerns regarding implementation.

EPA agrees that 0.5 ft/s design velocity is not available for some facilities and that the compliance costs may be higher where the design velocity is difficult to achieve. EPA disagrees that a requirement for a 0.5 feet per second design velocity is inappropriate or improperly calculated as an alternative to comply with the impingement mortality performance standard. The record for today's rule, as well as previous proposals and 316(b) rules, supports such an alternative requirement. Additionally, for the reasons explained in the preamble, EPA did not establish an impingement mortality requirement based on low velocity. It is one of seven alternatives available for complying with the BTA impingement mortality standard in the final rule. Consequently, compliance with a design velocity restriction is not required at all facilities.

With the exception of issues and clarifications discussed below, EPA has addressed previously most of the issues raised with regards to intake velocity by comments on the proposal and NODA. EPA first prescribed a design velocity requirement as a compliance alternative in the Phase I Rule and it continued this approach in the Phase II, Phase III, and today's existing facility rule. Under the Track I approach of the Phase I rule, a new facility had the choice of complying with velocity and capacity requirements. Many of the issues raised in the proposal and NODA public comments for the existing facility rule concerning the standard and its validity have been raised in previous comments. Many commenters have expressed concerns regarding technology availability and implementation particularly with respect to the method of determination and intake location where it is applied.

Background

EPA first adopted a 0.5 ft/s design velocity as a maximum through-screen velocity requirement in the Phase I Rule. The design velocity was also adopted under Phase II as an option to comply with impingement mortality requirements. Under Phase III, a design velocity similar to that in Phase I was adopted for new offshore oil and gas extraction facilities.

<u>Previous Comments on Intake Velocity</u>

Phase I

A summary of significant comments and EPA's response regarding the velocity standard in Phase I final rule may be found at section VI.E of the Phase I preamble. See 66 FR 65301/2 to

65304/1. Many of the issues currently being raised by commenters on the existing facility rule were also submitted under Phase I.

Commenters have provided no basis for EPA to change its earlier conclusions that the 0.5 ft/s requirement is scientifically based, technically sound, protective of aquatic resources, and technically available and economically practicable as demonstrated by the fact that it is frequently employed at recently built facilities.

Phase II and Phase III

The absence of a discussion of intake velocity in the major comments section of the preamble for the final Phase II and Phase III rules indicates that commenters did not raise any new or significant issues with respect to this approach for those rules. See 69 FR 41610 (July 9, 2004) and 71 FR 35018 (June 16, 2006) for a summary of the major comments on each of these rules.

Previous Litigation on Intake Velocity

Phase I

In the Riverkeeper I Decision (decided February 3, 2004), the court summarizes the Utility Water Act Group (UWAG) arguments that there is insufficient support in the record for Track I's through-screen velocity limit of 0.5 ft/s and that the relevant velocity should be the approach velocity and not the through-screen velocity. The court notes EPA's position that through-screen velocity is easier to measure, that many recently constructed facilities are designed to meet through-screen velocity limits, and that it provides a margin of safety. The Second Circuit concluded that EPA's choice of velocity limit was reasonable. *Riverkeeper, Inc. v. EPA,* 358 F.3d 174, 198-99 (2^{nd} Cir. 2004).

EPA's Response

Nothing in the comments on today's rule provided any basis for EPA to revise its earlier conclusions about the appropriateness of a specified design velocity in achieving reductions in impingement mortality and its suitability for inclusion as one alternative for meeting the BTA impingement mortality standard.

Comments on the existing facility rule pertaining to intake velocity tended to be focused on three main aspects: the availability or feasibility of the 0.5 fps velocity, the derivation of the 0.5 fps, and how the 0.5 fps would be implemented. The sections below address these comments.

Availability/Feasibility

Riverkeeper supported the inclusion of a velocity standard with a carefully crafted variance for those who cannot meet it and argues that EPA's rejection of the 0.5 ft/s velocity as the primary national standard is illegal. They state that "EPA lacks a legitimate legal or evidentiary basis for rejecting the 0.5 ft/s velocity limit" questioning EPA's assertion that it is not "available" stating that "analysis or evidence in the record to support a conclusion that reduced intake velocity is not capable of being implemented at all locations appears to be lacking." EPA agrees that, where available, an intake velocity less than 0.5 ft/s is an effective IM reduction technology. EPA, however, disagrees that achievement of this low intake velocity is broadly available. In fact, as noted by Riverkeeper, only 18 percent of existing intakes could meet the 0.5 fps velocity with existing technology. In order for an existing intake with a higher velocity to comply, they would need to either reduce flow or increase the screen surface area. Because many intakes have high screen velocities to begin with, the degree to which either the flow would be reduced or screen area increased could be considerable.[14] These conditions may severely constrain or prevent particular locations from achieving the necessary velocity reductions required to meet a 0.5 ft/s velocity performance standard. Thus, EPA concluded that there would be a large number of intakes that may encounter difficulty complying with a low velocity performance standard. For these and other reasons, EPA rejected a 0.5 feet per second through-screen design velocity as the national BTA performance standard for impingement mortality. (See the discussion in Essay 15 and Essay 16.) Rather, EPA included it as one of seven compliance alternatives for the BTA IM performance standard reflecting the performance of traveling screens with fish returns.

More specifically, while EPA has identified a number of compliance technologies capable of achieving 0.5 fps, each has potential drawbacks. Ways to reconfigure or adapt existing intake structures to achieve a low velocity requirement where intake screen velocity is high include increasing the size of intakes, relocating and submerging the intake to an offshore location with wedgewire screens, variable speed pumps,[15] and partial closed-cycle cooling. Larger intakes, wedgewire screens, and closed-cycle cooling are some of the most costly technologies considered by EPA and each may have restricted application in certain circumstances. The availability of wedgewire screens is limited by waterbody considerations such as water depth, sweeping velocity, and navigation interferences and, as such, applications tend to be limited to smaller intakes and the largest waterbodies. The availability of larger intakes is often limited by existing shoreline interferences (for example, where the shoreline is not owned by the intake facility; see Potomac Generating site visit report (DCN 10-6512) showing the shoreline property is part of a national park). Furthermore, increasing the intake size (three times for an average intake and five times or more for an older intake) may not be feasible due to a lack of available space at the intake structure. According to EPA's record of acres owned, a facility with a shoreline intake that had to increase the existing intake structure by a factor of five or more will rarely have enough shoreline to be able to do so. For examples, see site visit reports for: East River (DCN 10-6506); Scattergood (DCN 10-6545); Haynes (DCN 10-6547); Crawford (DCN 10-6544); Eddystone (DCN 10-6507); Sunoco (Philadelphia) (DCN 10-6542); and Potomac. In waterbodies that regularly contain high quantities of silt and sand, such as the Ohio and Missouri rivers, reducing the intake velocity creates problems regarding the deposition of sediment in the vicinity of the screens and in the channels/canals leading up to the screens. For example, see the site visit report for Nebraska City Station (DCN 10-6520). Silt and sand often require a certain sweeping velocity to prevent deposition as sediment. For example, a minimum of 2.5 to 3 ft/s is recommended to prevent deposition of sediment and sand in intake pipes for submerged offshore intakes (see Phase II TDD section 1.1.1). Such sedimentation may make it extremely difficult to maintain a low velocity in the vicinity and upstream of the screens effectively defeating the

[14] The average screen velocity for Phase II facilities was 1.5 ft/s and older screens were typically designed with a velocity of 2.5 ft/s. An intake with a velocity of 1.5 ft/s and 2.5 ft/s screen would need to reduce flow by 67 percent and 80 percent or increase the screen area by a factor of three to five times.

[15] Variable speed pumps are only considered as viable for meeting a 0.5 fps velocity requirement for those intakes with a velocity already close to that value.

purpose of any low velocity requirement. Technology limitations are discussed further in TDD Chapter 6. EPA estimated that a total of only 34 percent of intake structures could comply with a velocity standard, including those that are already compliant. Thus, as noted, EPA has concluded that it should not establish low velocity as the national BTA for IM nor should it prescribe a nationally applicable low velocity IM performance standard. The identified constraints that restrict its application in numerous settings mean that low screen design velocity is not a nationally available technology.

Riverkeeper also cites EPA's rationale for including the velocity standard in Phase I as a rationale for including it as a primary national standard and points out that EPA's supporting documentation for current rulemaking has stated that the velocity standard will reduce IM by 96 percent, which is better than the selected technology (traveling screens). New facilities subject to Phase I are required to have intakes commensurate with closed-cycle cooling. According to EPA's record, such intakes withdraw an average of 96 percent less volume of cooling water. Facilities with closed-cycle cooling (or retrofitting to closed-cycle) can design a new intake structure with a significantly smaller size than for once-through and still be able to meet the additional intake velocity requirement. The EPA agrees that a design velocity standard of 0.5ft/s is generally more effective at reducing impingement (and impingement mortality) than the selected basis for today's IM standard. For this reason, the intake velocity is available as an alternative for meeting the BTA performance standard. However, as discussed above, the ability to retrofit an existing facility to meet such a velocity standard is not available at 66 percent of existing facilities. Also see the preamble and Essay 16A.

Riverkeeper recommended that when applying a velocity standard, EPA should retain the additional fish return, fish entrapment, and shellfish barrier net requirements identified in the proposed rule. EPA agrees that 0.5 fps velocity is an effective IM reduction technology and has included it as one of several compliance options for meeting the BTA IM standard. For the reasons discussed in the preamble, EPA disagrees that the inclusion of other measures in addition to the 0.5 fps should also be a requirement of the low velocity IM compliance alternative. The record demonstrates that the 0.5 fps velocity alone, as well as the other IM compliance alternatives, will provide impingement reductions that achieve the required IM BTA performance standard.

Other commenters expressed concern that 0.5 ft/s velocity standard was unachievable by many facilities, was not available at all facilities, and that there was no effective way to reduce velocity without expanding the size of the intake. Site-specific limitations such as gravity fed intakes will have limited options to comply. Commenters also argued that requiring that the maximum design through-screen intake velocity must be achieved under all conditions, including during minimum ambient source water surface elevations to include low flow conditions was too restrictive and cite multiple examples of existing intakes with velocities less than 0.5 ft/s that have been previously determined to employ BTA. As explained above, the EPA agrees that many existing intakes may not be able to comply with the 0.5 fps velocity without expanding the screen surface area by either expanding the intake or replacing the screen technology (e.g., using wedgewire screens) and that such options may be difficult and/or costly. In the final rule, EPA has established several alternative impingement mortality compliance options that facilities may choose as a means of compliance for each intake. EPA did not identify low flow as the basis for the IM performance standard and facilities are not required to comply with a design 0.5 fps velocity.

One commenter (EEI) also argued that requiring an "instantaneous maximum" design through-screen intake velocity must be achieved under all conditions was inconsistent with how it was applied in Phase I and Phase II where velocity was averaged over the screen surface and noted that EPA revised the Phase I rule such that the velocity is derived using "[d]esign calculations showing that the velocity requirement will be met at minimum ambient source water surface elevations (based on best professional judgment using available hydrological data)…." 40 CFR 125.86(b)(2). EPA disagrees that, when a facility chooses to comply with the IM performance standard with the 0.5 ft/s screen design velocity, it must achieve an instantaneous maximum. In the final rule, EPA has adopted the same language for defining minimum ambient source water as specified for monitoring velocity via head loss under Phase I at 40 CFR 125.86(b)(2). Also, EPA has provided the option of measuring through-screen velocity based on engineering calculations which allows for averaging the velocity over the entire screen surface. Also, short-term exceedances of the 0.5 fps velocity may be permissible for brief periods (with approval from the Director) for purposes of maintaining the cooling water intake system, such as backwashing the screen face. EPA expects that facilities will employ appropriate design and operational measures to ensure that the maximum velocity is not exceeded during minimum ambient source water surface elevations, as can be anticipated through best professional judgment using hydrological data.

Commenters argued that EPA should eliminate screen blockage requirements. EPA agrees that screen blockage requirements are unnecessary because the compliance alternative that is based on 0.5 fps velocity already includes a safety factor and therefore has removed them from the final rule; see next section for more information. Commenters argued that process water should be excluded. See Essay 14 for discussion of the applicability of IM requirements to process water.

Derivation/Technical Framework

Commenters argued that EPA should remove any additional requirements (e.g., Ristroph features, counting fish carryover) if the 0.5 fps velocity is met and that those with closed-cycle cooling should not be required to meet it. EPA agrees that either the 0.5 fps velocity or closed-cycle cooling alone will provide impingement mortality reductions that meet the performance of the BTA impingement mortality standard. EPA has revised the final rule so no additional technology measures are required for IM BTA compliance if the 0.5 ft/s velocity is met or for intakes that meet the definition of "closed-cycle recirculating system" at § 125.92.

Commenters argued that the application of the 0.5 fps as the through-screen velocity was overly protective since it resulted in a much smaller corresponding approach velocity and that the approach velocity is more consistent with the underlying basis of swim speed. They note that an approach velocity has greater flexibility, less uncertainty, does not vary with screen porosity or penalize intakes with screens. EPA disagrees that the low velocity IM compliance alternative should be applied as an approach velocity. The original data used to support the 0.5 fps velocity was for fish swim speed, not approach or through-screen velocity; establishing the velocity threshold has nothing to do with whether EPA selects approach or through-screen, as it has to do with setting a protective standard (greater or equal to the BTA IM standard) for a water velocity from which fish can escape. EPA's position since Phase I has been that the difference between basing a velocity standard on through-screen velocity rather than approach velocity imparts a safety factor. This safety factor helps account for spatial differences that occur due to varying hydrodynamic conditions in and around the screens including varying degrees of debris blockage. This issue was also raised during litigation over the Phase I rule and the U.S. Court of Appeals for the Second Circuit sustained EPA's position.

Commenters noted that application of the 0.5 fps velocity as a through-screen velocity penalizes screens with fine mesh and may limit the availability of fine mesh as an entrainment technology for intakes that would meet the velocity intake with coarse mesh but not after replacement with fine mesh. EPA acknowledges that the application as a through-screen velocity has the perceived impact of penalizing intakes with screens and those with finer mesh, possibly limiting facilities compliance options. EPA has concluded that the most reasonable approach is to apply the standard uniformly and notes that facilities are free to select from multiple compliance alternatives including choosing a combination of technology "fixes" that will meet the BTA impingement mortality standards (see BTA impingement mortality standards alternative at 40 CFR 125.94(c)(6)). This alternative allows facilities to aggregate partial credit for multiple existing technologies and provides a facility with the option to take credit for employing additional technologies or operational measures which can be particularly helpful if only an incremental reduction is needed to meet the IM BTA requirement.

Commenters argued that there is no scientific basis for a low velocity screen requirement, that EPA misinterpreted the data in Phase I, and that the standard has no direct relationship to IM. EPA disagrees. As noted, these issues were also raised during development of the Phase I rule. EPA has seen no convincing evidence that contradicts its determination that reduced screen velocity has a significant effect in reducing and preventing impingement mortality. As previously noted, on a challenge to the Phase I rule, the Second Circuit determined that the record for that rule supported a through-screen velocity limit of 0.5 feet per second.

Commenters argued that a screen velocity requirement should allow for consideration of site-specific data such as susceptibility of species of concern or ocean environments where fewer poor swimmers may exist or demonstration that higher velocity is still protective. EPA disagrees that site-specific data should be used to modify the low velocity compliance alternative or its application. First, EPA has dropped the species of concern component from the final rule, and related comments are no longer applicable. Second, the low intake velocity IM compliance alternative is protective of all live stages of fish and shellfish that meet the definition of impingement (i.e., retained by a 3/8-inch sieve). While EPA agrees that some locations may exhibit fewer poor adult swimmers, EPA disagrees a higher intake velocity is appropriate. The record shows larval stages and early life-stage fish are not as strong swimmers as adults. (See, e.g., Boucher and Petrell, 1999, DCN 12-6971.) Some species have not yet fully developed their burst speed potential. In many species, swim speed correlates to body length (EPRI 2001). EPA concludes the 0.5 fps intake velocity is protective of multiple life stages.

Commenters question whether complying using the 0.5 fps velocity is only appropriate for new facilities, which would have a chance to address the issue in design. As explained above, EPA agrees that it is not nationally available as a technology basis for IM requirements for existing facilities. EPA disagrees that the 0.5 fps velocity is only appropriate for new facilities, and sees no reason why this velocity developed under Phase I should not apply to some existing intakes as well if a facility elects to do so. As explained earlier, this approach is only one of several IM compliance alternatives available and no existing facility is required to achieve compliance with the BTA impingement mortality standard by meeting a design velocity requirement unless it so chooses.

Commenters noted that intake velocity is not defined in the same way as in Phase I. EPA agrees that it has modified the definition. These changes allow for greater flexibility for existing facilities in complying with the BTA impingement mortality standard through the design velocity approach. For the final rule, EPA has defined the maximum design through-screen velocity using the same concept as under Phase I and has provided additional flexibility in that the velocity can be measured, it can be calculated based on the design intake flow, or it can be calculated based on the actual monitored intake flow. In both cases, the velocity is measured at minimum ambient source water surface elevations. Under Phase I, however, the application of minimum ambient source water elevation is described differently where it is used to derive the “head loss across the intake screens to obtain a correlation of those values with the design intake velocity.” In this final rule, EPA has allowed facilities to choose a more easily employed calculation method for measuring the intake velocity.

One commenter noted that lower velocities will provide insufficient warning to fish. EPA agrees that this may be true for velocity caps which are designed fundamentally differently than shoreline intakes for which the velocity compliance alternative is intended. EPA does not require that velocity caps that comply by meeting definition of exiting velocity caps or via the system of technologies compliance alternative meet the velocity compliance alternative. EPA disagrees that this assertion would apply to screen technology since the screen itself provides sufficient warning.

Implementation

Many commenters explained that it would be difficult to measure through-screen velocity directly for screen technology and agreed with the suggestion in the NODA that EPA should allow for calculation of through-screen velocity and that the calculations should be based on actual flow rather than design flow since many facilities operate well below the design flow. EPA agrees and has included provisions in the final rule for using engineering calculations to determine the maximum through-screen velocity and for using either the maximum design intake velocity or the actual intake flow rate which requires ongoing monitoring.

Commenters wanted EPA to let the Director set the monitoring frequency or be allowed to calculate the maximum expected velocity once using a reasonable worst case. EPA requires daily monitoring for intakes complying via the actual intake flow but notes that this monitoring in instances where the values are calculated should involve monitoring the flow rate, corresponding water depth, screens in-service, etc. Facilities complying via the maximum velocity based on the design intake flow will need to calculate only once based on the minimum ambient source water surface elevations based on BPJ. EPA concluded that it is reasonable to require those choosing to comply via the actual intake flow to monitor daily because (1) operating and ambient conditions will vary, and (2) automated means of measuring intake flows are readily available. Most facilities that completed the detailed technical survey were able to report daily minimum, maximum, and average intake flow volumes.

Commenters wanted EPA to exclude intermittent or rare excursions of the 0.5 fps velocity. Some also suggested EPA should make exceptions for rare weather events such as drought that may occur for extended periods. EPA has addressed issue of intermittent or rare excursions by allowing the Director to authorize the owner or operator of the facility to exceed the 0.5 fps velocity at an intake for brief periods for the purpose of maintaining the cooling water intake system, such as backwashing the screen face. Also, the minimum ambient source water elevation for the 0.5 fps design velocity in the low velocity IM compliance alternative is to be based on BPJ and it is reasonable to assume that such determinations will take this into consideration. Regarding exceptions for longer term conditions like droughts, EPA disagrees that specific exceptions need to be included in the regulation. As with other situations that are truly exceptional, the Director can use discretion regarding the appropriate response and an upset provision is a common approach.[16] Additionally, periodic drought conditions may be normal at some facilities. The velocity standard has always been intended to be "highly protective requirement" (see 66 FR 65302) including under conditions such as drought, where the biological organisms in the waterbody may be under additional stress from the low water conditions. Facilities where such conditions occur may need to make technology or operational changes in order to comply or select an alternative method of compliance.

Commenters wanted EPA to calculate the maximum velocity based on annual average. EPA has decided to apply the 0.5 fps velocity as a maximum value. EPA has concluded that in order for the 0.5 fps velocity to be effective it must be just that, a maximum velocity. An average over any extended length of time would not represent a maximum value.

Commenters wanted EPA to clarify that if the 0.5 fps velocity is met that no other IM reduction requirements are necessary. EPA addressed this issue in the final rule by making it clear that the low velocity compliance alternative is one of several IM BTA compliance options and that a facility only needs to select one option for each intake or the whole facility.

Commenters were concerned that through-screen velocity cannot be physically measured and that through-screen velocity is subject to spatial variability. Commenters also wanted EPA to provide specific guidance on how to calculate through-screen velocity. Recognizing that both direct and indirect measurement (e.g., through head loss) can be difficult to implement, EPA has allowed for the maximum through-screen velocity to be measured through engineering calculations which are derived using physical data. EPA is aware that spatial variations of intake velocity can occur and has concluded that the safety factor inherent in applying the 0.5 ft/s as a through-screen velocity accounts for this. EPA concluded that it is not necessary to provide specific guidance in calculating through-screen velocity since these are standard engineering calculations. EPA allows the calculated velocity to be an average across the surface of the screen area but does not allow averaging across multiple intakes. For more discussion, see Basis for the Final Rule section of the preamble.

[16] See 40 FR 122.41(n).

Commenters wanted EPA to allow the Director flexibility in determining how facilities may calculate actual intake velocity based on actual flow where flow cannot be easily measured or where it varies with conditions such as water level. EPA agrees that there will be instances where the flow volume cannot be directly measured and that flow volume may, in some instances, need to be estimated using a reasonably reliable indirect method. The rule does not specify how flow is to be measured and therefore, it will be left up to the Director to determine the method to be used for flow volume calculation, which may include the installation of flow meters.

Commenters are concerned that it is not always clear where to apply the 0.5 fps velocity or had specific suggestions regarding where it should be applied. For example, it should be applied at the outward-most point or first point of contact like the bar racks or barrier net. If so, then the entire system including all downstream technology should be deemed compliant. EPA agrees that it may not always be clear where the point(s) of compliance for the 0.5 fps velocity should be, especially if there are structures or constrictions upstream of the screens. The issue regarding point of compliance for the 0.5 fps in the low velocity IM compliance alternative is discussed in detail in Essay 14.

Commenters argued that facilities that comply using the 0.5 ft/s velocity for a portion of time should get IM reduction credit. EPA intended for the 0.5 fps velocity to be protective and therefore it must be met under all conditions. In the final rule, facilities may obtain partial credit for certain technologies under the system of technologies alternative provided the facility can demonstrate a quantifiable reduction. For further discussion, see the preamble.

Commenters stated that flow requirements for emergency service water systems at nuclear facilities should be excluded from the calculation of actual intake velocity. EPA agrees, as long as the emergency service water is only in operation during emergencies and periodic testing. The final rule specifically excludes emergency and fire suppression capacity and back-up pumps. This exclusion should apply to the actual intake velocity as well. See Essays 14 and 18 for more information.

Commenters argued that EPA should include velocity caps and wedgewire screens as IM BTA compliant technologies. EPA agrees that these technologies can be very effective at reducing IM. EPA notes that wedgewire screens are typically designed with a through-slot velocity of 0.5 ft/s and that water depth above the screen does not affect the design velocity. As such, the evidence EPA has reviewed is convincing that most wedgewire screens will comply via the low velocity IM compliance alternative and do not need to be singled out as an IM compliant BTA technology. EPA is aware that low intake velocity is sometimes confused with velocity cap technologies. These concepts are not the same. For further discussion of velocity caps, see 77 FR 34320.

Commenters noted that low intake velocities may make some intakes more susceptible to colonization by zebra mussels or may result in increased siltation of the intake. EPA agrees that at some intakes, the site-specific conditions may result in a conflict between low intake velocities and certain intake design and operational considerations. Also see Essay 18. Facilities where such considerations may take precedence over low intake velocity are free to choose to comply via one of the several other IM BTA compliance alternatives that do not require low velocities.

Essay 17A: Closed-Cycle Recirculating Cooling

Introduction

In the proposed rule and NODAs, as well as the Technical Development Document (TDD) for the proposed rule, EPA discussed a wide variety of intake technologies and operational measures that can be employed to reduce impingement and entrainment. This essay addresses comments from the public related to closed-cycle recirculating systems (CCRS), including both cooling towers and cooling ponds.

To avoid confusion about the regulatory status of cooling ponds that are waters of the United States, the EPA uses the term *impoundment* when referring to cooling ponds or cooling lakes.

In many cases, commenters advocated impoundments such as cooling ponds should be considered as BTA, while other comments gave reasons for rejecting CCRS including impoundments as the basis for BTA. Many commenters also expressed concern over a number of requirements, definitions, or operational measures laid out in the proposed rule, principally noting that these requirements were either not feasible or not necessary at most facilities. Other commenters suggested other technologies have performance comparable to CCRS. For comments concerning costs of CCRS, see Essays 21 and 55. For comments concerning cooling ponds and waters of the U.S., including comments on the definition of CCRS in the rule, see Essay 14.

Impoundments

Comments included numerous suggestions regarding requirements for closed-cycle systems. Numerous comments addressed man-made cooling ponds and impoundments, including suggestions for exemptions and less stringent requirements for such CWIS. EPA notes that these suggestions assume that all cooling ponds comprise a closed-cycle system. Comments also addressed whether a closed-cycle system can be a water of the United States. Others argued that cooling ponds that were not themselves waters of the United States when they were built should be defined as CCRS. See Essay 14 for more details.

Some commenters indicated that EPA should create reasonable presumptions that provide certainty for facilities that use cooling ponds. Some asserted that a cooling pond that functions as a closed-cycle recirculating system (water use reduced by 96.6 percent) should not be required to do more to reduce I and M since presumably any benefits do not justify the costs. Similarly commenters maintained that no additional controls should be required for facilities with constructed cooling reservoirs that use/are closed-cycle recirculating system since these are BTA. Commenters also asserted that EPA should exclude regulation of intakes in dedicated cooling ponds or allow for site-specific determination by permitting authority. Some commenters asserted that EPA should eliminate the entrainment requirements if a cooling pond has a retention time of 7 days or more. Others suggested that the regulation of intakes for makeup water should be left to the states that are familiar with local water issues. Finally, some asked whether blowdown was intended to address overfilling a pond to reduce TDS and, if not, suggested that EPA modify the definition to include such an operational control.

A cooling pond is a man-made impoundment used either in lieu of a cooling tower or as a supplement to a cooling tower to remove waste heat from the plant. Once the water has cooled in the pond, it is reused by the plant. Some plants use cooling ponds to reduce the temperature of the cooling water exiting the facility before it is discharged back into a receiving waterbody. The pond dissipates waste heat through the surface of the pond, resulting in evaporative losses. Therefore, a cooling pond requires additional makeup water from another source to replace the water lost through evaporation. EPA's record shows the makeup water is frequently obtained from a water of the U.S. (EPA's technical survey data shows 46 power plants and 34 manufacturers withdraw from a water of the U.S. as makeup water for a pond.) Cooling ponds may require a significant amount of land in order to provide a sufficient surface area for heat dissipation, and thus may not be feasible for other reasons. However, a cooling pond has the advantage of transferring a larger percentage of waste heat to the atmosphere via convection or slower evaporation due to lower differential temperatures, potentially reducing the rate of evaporation and thus the rate of consumptive water loss relative to cooling towers.

Traditionally, a cooling lake is very similar to a cooling pond, except that the cooling lake is formed by impounding a water of the U.S. such as damning of a river. The EPA finds that many comments interchange the terms cooling pond and cooling lake, and for purposes of this essay EPA is not distinguishing between the two.

The EPA is not determining which ponds are waters of the U.S. in this rule. See Essay 14 for more details. The definition of CCRS in the final rule includes impoundments that are not waters of the United States at 40 CFR 125.92(c)(1). The c*losed-cycle recirculating system* definition at 40 CFR 125.92(c)(2) includes a system with impoundments of waters of the U.S. where the impoundment was constructed prior to the effective date of the final rule and created for the purpose of serving as part of the cooling water system. To the extent such impoundments are determined not to meet the definition of a closed-cycle system, EPA notes these costs are a small portion of the total national rule costs because even if all ponds were determined not to meet the definition of CCRS, those facilities using ponds comprise approximately 2 percent of all facilities (less than 7 percent of the 31 percent of existing facilities that currently use CCRSs, noting cooling towers comprise the other remaining 24 percent). EPA conducted a more formal cost analysis of this at DCN 12-2502.

Some facilities use an existing lake or reservoir as a heat sink for cooling by withdrawing the cooler water from the bottom of the lake, and returning the warmer water back to the source water. These are sometimes referred to as deep lake water cooling. EPA is clarifying that these systems are once-through cooling systems, and are not addressed by this essay where EPA is referring to cooling ponds or cooling lakes.

The rule does not exempt man-made impoundments even if such impoundments meet the definition of waters of the United States. Nor does this rule alter the definition of waters of the United States. See the rule at 40 CFR 125.92(c) and the preamble for discussion of how impoundments may be demonstrated to comprise a CCRS. To the extent EPA agrees that artificially managed reservoirs may be different than natural lakes, EPA has discussed in the preamble and provided in the final rule that the Director may waive some or all of the information requirements of 40 CFR 122.21(r) if the intake of concern is located in a manmade lake or reservoir, and the fisheries are stocked and managed by a State or Federal natural resources agency or the equivalent. Although this provision does not relieve any facility of the requirement to comply with the BTA standards of the rule, it does provide the Director with the ability in certain cases (e.g., where the biological characterization of the source water is significantly influenced by the actions of the natural resources agency) to reduce information required for the facility's permit application.

EPA disagrees that a cooling pond with a specified retention time should be exempt from entrainment requirements. The commenter did not provide any data supporting the suggestion of 7 days retention time. EPA notes that the retention time is the volume of the aeration tank divided by the influent flow rate. Thus, even a 100 million gallon pond would still withdraw 14 mgd, a volume well in excess of the rule's applicability to those intakes designed to withdraw 2 mgd. The rule does not categorically exclude from entrainment requirements a facility with an impoundment that has a retention time of 7 days or more, because the final rule requires that the Director address entrainment after a site-specific assessment. In this assessment, the Director may potentially consider retention time to the extent retention time affects adverse environmental impacts including entrainment.

Commenters also expressed concern about cooling ponds or impoundments being included as part of the definition of a closed-cycle cooling system. EPA data show more than 50 facilities have cooling systems that include impoundments. In some cases, the cooling systems that include impoundments were created in the waters of the U.S., in whole or in part, or were created in uplands but withdraw makeup water from waters of the U.S. These cooling systems may perform like a closed-cycle recirculating system. EPA has clarified at 40 CFR 125.92(c)(2) that a cooling system that includes an impoundment lawfully created in the waters of the U.S for the purpose of cooling may be considered a closed-cycle recirculating system. As with other closed-cycle recirculating systems, the Director will determine whether the impoundment minimizes the withdrawal of water for cooling purposes and therefore meets the definition of a closed-cycle recirculating system. See the preamble for discussion of this issue.

Cooling Towers

Wet Cooling

A power plant or manufacturing facility may discharge surplus heat to the air using recirculating water systems which mostly use the physics of evaporation. In other words, a recirculating system reuses cooling water in a second cycle rather than immediately discharging it back to the original water source. Most commonly, wet-recirculating systems use cooling towers to expose water to ambient air and dissipate heat. The facility may employ either natural draft (large parabolic shaped towers using a chimney effect) or mechanical draft (modular towers using large fans). Mechanical draft towers enable a much lower profile but require more operational power due to the fans.[17] The cooling in the tower is achieved by transferring the water's heat to the air, both directly and through evaporation of some of the water. Some of the water evaporates, some of the water is purged to manage the accumulation of dissolved solids (called blowdown), and the rest of the water is sent back to the condenser in the power plant. In the United Kingdom, the

[17] EPA is aware of new designs in mechanical draft towers that use the pressurized water to operate a hydroturbine, thereby operating with no additional supplied electricity. As of this rule's final issuance, the technology is patented and already under demonstration status at a refinery.

water requirement for a 1600 MWe nuclear unit is about 2 cubic meters per second (173 ML/d), this being about half for evaporation and half for blow-down (see below). Chinon B in France (4x905 MWe) and the proposed Calvert Cliffs power plant in the U.S. (1650 MWe) use low-profile forced-draft cooling towers. At Chinon B one cooling tower per unit is 30 m high (instead of 155 m required for a natural draft type there), 155 m diameter, and uses 8 MWe for its 18 fans (0.9 percent of power). At Calvert Cliffs the cooling tower fans will use about 20 MWe (1.2 percent) of power. Because wet-recirculating systems based on cooling towers only withdraw water to replace the water that is lost through evaporation in the cooling tower, these systems have significantly lower water withdrawals than once-through systems, but tend to exhibit a higher level of water consumption. Cooling towers with recirculating water are a common visual feature of power plants, often seen with condensed water vapor plumes.

The most common configuration for natural draft towers is called counterflow. These towers have a large concrete shell with a heat exchange "fill" in a layer above the cold air inlet at the base of the shell. The air warmed by the hot water rises up through the shell by convection (the chimney effect), creating a natural draft to provide airflow to cool the hot water which is sprayed in at the top. Other configurations include crossflow, where the air moves laterally through the water, and co-current, where the air moves in the same direction as the water droplets. These towers do not require fans and have low operating but significant maintenance costs. For a large facility they may need to be over 200 meters high. They are used most frequently in large nuclear and coal-fired plants in Europe, eastern U.S., Australia, and South Africa.

Mechanical draft cooling towers have large axial flow fans in a timber and plastic structure. The fans provide the airflow and are able to provide lower water temperatures than natural draft towers, particularly on hot dry days. However, they have the disadvantage of requiring auxiliary power, typically about 1 to 1.2 percent of the plant's output. Mechanical draft towers are used predominantly in central and western U.S. since they can provide a more controlled performance over a wide range of climates, ranging from freezing to hot and dry. Also they are less visually obtrusive designs, being less than 50 m high. For more information, see the TDD.

Dry Cooling

Where access to water is even more restricted, or environmental and aesthetic considerations are prioritized, dry cooling techniques may be chosen. As the name suggests, this relies on air as the primary medium of heat transfer, rather than evaporation from the cooling circuit. Thus, dry cooling means that minimal water loss is achieved. There are two basic types of dry cooling techniques available.

One design works like an automobile radiator and employs high-flow forced drafts of air past a system of finned tubes through which the steam passes, simply transferring heat to the ambient air directly. The whole power plant then uses less than 10 percent of the water required for a wet-cooled plant, but 1 to 1.5 percent of power output is consumed by the large fans required. This is direct dry cooling, using air-cooled condenser (ACC) and it is not currently known in use for any nuclear power plant.

Alternatively, there may still be a condenser cooling circuit as with wet recirculating cooling, but the water in it is enclosed and cooled by a flow of air past finned tubes in a cooling tower. Heat is transferred to the air, but less efficiently. This technology is not favored if wet cooling depending on evaporation is possible, as the energy use is only 0.5 percent of output. This system appears to be the back-up system planned for Loviisa in Finland in 2014. In the U.S., EPA is aware of several manufacturing facilities that use either or both types of dry cooling for specific process units.

Hybrids

Some mechanical draft towers are a hybrid design incorporating a dry section above the wet section. The mode of cooling used depends on the season, with dry cooling being preferred during the colder months. In both dry and hybrid cases there is no dependence on vaporization and hence no evaporative loss of cooling water. The use of fans allows for greater control over cooling than relying simply on natural draft. However the heat transfer is much less efficient and hence requires a larger cooling plant which is mechanically more complex.

Definition of Closed-Cycle Recirculating Cooling

EPA found in site visits that facilities with wet cooling towers did not operate the towers to minimize the withdrawal of makeup water. Therefore the proposed definition of closed-cycle recirculating cited examples of proper operation, including flow reduction observed at power plants with well-operated cooling towers, as well as levels of the cycle of concentration found at manufacturing facilities with well-operated towers. These parameters generally represent minimized makeup and blowdown, with slightly different values for fresh and salt water sources of makeup water. In the final rule the Director will determine whether any specific impoundment, cooling tower, or other closed-cycle recirculating system, is properly operated and thus meets the requirements of the final rule. Makeup water and blowdown is specifically included in the definition of a closed-cycle recirculating system to reflect the efficient use of cooling towers as part of the recirculating cooling system. In addition, EPA notes that states retain the ability to address local water issues.

Flow Reduction

Commenters provided a number of specific elements to include in the definition of a closed-cycle system (e.g., considering makeup water, adjusting the flow reduction threshold, adopting the definition of closed-cycle cooling from the Phase I rule, establishing a "commensurate with closed-cycle cooling" threshold). Commenters also noted that by including the 94.9 percent and 97.5 percent flow reduction as standards in the definition of closed-cycle, that the new unit requirements were more stringent than Phase I. Another commenter suggested flow reduction targets, such as a 90 percent reduction in water demand, as indicative of a well-operated system. In Phase I, EPA stated that closed-cycle cooling reduced flow by a minimum of 70 percent for saltwater systems. This value was adjusted in Phase II to a minimum of 72 percent flow reduction. Commenters then note that applying the Track II requirement for comparable performance of 90 percent results in a minimum flow reduction of 85 percent (because 90 percent of the 94.9 percent flow reduction required in the proposed rule is 85 percent). The comments further assert that this is a change to the Phase I rule that EPA cannot lawfully make without giving fair notice or opportunity to comment.

EPA has considered each of these suggestions, and upon review of the Phase I rule and today's final rule, disagrees with these suggestions. The final rule defines the major elements of what constitutes a closed-cycle cooling system, and does not elaborate on narrower aspects because it results in a more cumbersome definition that would not improve implementation. To the extent that additional flexibility is necessary, the final rule provides that the Director will make the final determination on a site-specific basis. EPA disagrees that the proposed rule has any effect on the Phase I rule, and further disagrees that the definition is more stringent. First, this definition would not in any way change the Phase I rule, as the proposed definition of closed-cycle would have only applied to existing facilities. EPA also notes that the low end of the range of 70 percent reduction cited in Phase I was given as an example of a worst-case situation where site-specific water quality based discharge standards limit the chloride content in the blowdown to a maximum increase of 10 percent over background. This worst-case scenario would limit the cycles of concentration of the cooling tower to 1.1, a concept discussed further below. Both the Phase I and Phase II rulemaking records identify saltwater closed-cycle systems as clearly being capable of operating cooling towers at a cycle of concentration of 1.5 (or greater). This 1.5 cycles of concentration is the level of performance equivalent to a 94.9 percent flow reduction. However, this specific comment is no longer relevant since in the final rule EPA has changed the definition of closed-cycle so that a facility does not need to demonstrate that it achieved the cited values for cycles of concentration and the corresponding percent reduction in flow to establish that it is operating a closed-cycle recirculating system. Rather, as EPA has explained in the preamble to the final rule, achievement of the cited values for cycles of concentration and flow reductions are indications of a well-operated closed-cycle cooling system. Similarly, commenters suggesting the standard for new units are more stringent than Phase I new facility requirements are incorrect.

EPA notes that some commenters questioned EPA's logic in stating that makeup flows at large closed-cycle cooling systems could approach or exceed 100 mgd. Commenters appear to have misunderstood EPA's statement. EPA's statement regarding makeup flows merely indicates the fact that the largest facilities with wet cooling towers still have the potential to withdraw significant volumes of water for cooling (77 FR 34319). With respect to the IM requirements, because a properly operated CCRS achieves an average flow reduction of 96 percent, such technologies already perform equal or better than the BTA performance standards for IM in the final rule. However, upon examining the data from the industry technical survey, the largest withdrawals for a once-through facility are approximately 3 billion gallons per day. If a facility of that size were to retrofit to closed-cycle cooling with a flow reduction of 94.9 percent, the makeup flows would be approximately 150 mgd. Thus while EPA agrees that significant reductions in flow over a once through cooling system is one of the best ways to minimize AEI, and that properly operated CCRS achieves BTA, EPA also notes that an intake flow of 150 mgd is not an insignificant amount of cooling water. With respect to entrainment, depending on the configuration (such as withdraw for makeup water is not minimized) and location of the intake (such as on a small river), it is possible that such an intake could still be contributing to an unacceptable level of adverse environmental impact, despite the magnitude of flow reduction already realized.

As discussed above, if a facility's configuration is such that it has significantly reduced its intake flow, but cannot demonstrate to the Director that it has a properly operated and maintained closed-cycle system, the facility may instead choose to comply under the "system of technologies" approach at 40 CFR 125.94(c)(7) and would use the intake flow reductions towards complying with the impingement mortality standards. Such a facility would also provide data on the reduction in flow to the Director as part of the site-specific entrainment determination.

Cycles of Concentration

Some commenters appeared to misunderstand what a cycle of concentration (COC) means. Cycles of concentration can be measured as the ratio of chloride levels in the recirculated water or blowdown relative to the chloride levels in the source water, or makeup water. Cycles of concentration represents the accumulation of dissolved minerals in the recirculated cooling water. Discharge of a portion of the water (called "blowdown") is used to control the buildup of these minerals. COC is a measure of how concentrated are chlorides in recirculated water relative to makeup water, and thus how well a system recycles intake water before replacing it with new withdrawals. This is not to be confused with cycles of flow, as some commenters appeared to do.

Commenters questioned EPA's definition of a closed-cycle system, including the proposed rule definition of proper operations based on a minimum COC for closed-cycle systems. Another commenter favored more stringent COC requirements. Some commenters stated that, while they have been operating as closed-cycle units for many years, they were concerned that their facilities would not be "closed-cycle recirculating systems" under the proposed definition because they would not achieve the required COC. EPA has found the concentration cycles in the majority of cooling towers usually range from 3 to 6 at power plants, and can often exceed 9 at manufacturing facilities. However, EPA recognizes that many manufacturers have complex water balances, and calculating a specific flow reduction attributable to cooling water use could be difficult and time consuming. In such cases, many manufacturers could far more readily calculate the cycles of concentration of particular unit operations, and could therefore show those unit operations that use cooling water meet the conditions for closed-cycle cooling. EPA found in site visits many complex manufacturing plants already have this capability, and have achieved very high COC. Likewise, power plants may find it much easier to measure flow than cycles of concentration. Accordingly, EPA's proposed rule attempted to recognize performance using either metric. EPA expects most power generators would use percentage flow reduction to demonstrate they are closed-cycle, and expects most manufacturing facilities would use COC for those units that utilize water for cooling purposes. Increasing the amount of minerals present in the water by cycling can make water less aggressive to piping; however, EPA is also aware that excessive levels of minerals (such as found in certain source waters, most notably those with higher salinity) can cause scaling problems, leading to different levels of both metrics for freshwater and saltwater facilities. After EPA carefully considered these issues, EPA concluded that the most important aspect of the definition of a properly operated closed-cycle cooling system is that the makeup flow be minimized. Thus EPA has removed the numeric levels of the metrics as threshold, while retaining the minimized makeup flow aspect of the definition.

While EPA has determined that a COC of 3.0 for freshwater facilities and 1.5 for marine facilities (approximately equivalent to a percent reduction in flow of 97.5 percent and 94.9 percent, respectively) is indicative of a well-operated cooling system (i.e., one that truly minimizes makeup withdrawals), as discussed above the EPA has decided not to include a minimum COC requirement as part of the definition for closed-cycle systems. Instead, the definition at 40 CFR 125.92 requires makeup flows be minimized. These flow reductions and COC serve as indicators of minimized makeup flows, and thus may be used by Directors when assessing performance of a particular CCRS. Regardless of whether facilities achieve either these levels of COC or reductions in flow, the Director would determine whether such facilities in fact are operating as a close-cycle recirculating cooling system. The Director would review the information provided by the facility and determine if the facility's configuration and operation are otherwise consistent with the definition of a closed-cycle cooling system in the final rule. A facility may, during the permitting process, demonstrate how particular site-specific circumstances may affect the performance of its closed-cycle system relative to the benchmarks EPA has suggested for evaluating whether a system is a closed-cycle recirculating system. Therefore EPA notes that these metrics, while not an explicit requirement in the final rule, are applicable in many instances, and therefore as stated in the preamble these metrics are provided as examples. A facility with CCRS systems but that do not meet the definition of closed-cycle cooling will need to demonstrate to the Director the additional technologies or operational measures employed are adequate to achieve BTA under one of the other compliance alternatives.

As an example, in the case of a facility that uses makeup water from a freshwater source, a Director may determine that a closed-cycle recirculating system can generally be deemed to minimize makeup and blowdown flows if it reduces actual intake flows (AIF) by 97.5 percent as compared to a once-through cooling system or if its cooling tower is operated at a minimum cycles of concentration of 3.0. And likewise, in the case of a facility that uses makeup water from a saltwater, brackish, or other source with a salinity of greater than 0.5 parts per thousand, a Director may determine that a closed-cycle recirculating system can generally be deemed to minimize makeup and blowdown flows if it reduces AIF by 94.9 percent as compared to a once-through cooling system or if its cooling tower is operated at a minimum cycles of concentration of 1.5. These reductions and cycles of concentration are illustrative. A Director may determine that other levels near these numbers could also constitute a closed-cycle system. The final rule further recognizes that in certain unavoidable circumstances, these levels for COC or percent flow reduction might not be achievable at all facilities. Such circumstances could include situations where water quality-based discharge limits might limit the concentration of a pollutant that is not readily treatable in the cooling tower blowdown or situations where varying source water quality could lead to unavoidable problems concerning scale formation, solids buildup, corrosion, or media fouling. Such facilities should demonstrate these circumstances to their Director and indicate the measures they have taken to minimize makeup flows. The Director will retain the discretion to conclude that the particular facility employs a closed-cycle recirculating system when the benchmarks are not met.

EPA disagrees with the commenter in favor of increasing the COC requirement, as such a requirement could increase chemical costs and water treatment costs, not reduce them (as stated by the commenter). The reference cited in the comment was developed for small cooling systems that discharge to a wastewater treatment plant with a stated goal of reducing its discharge flow, which ultimately affects the strategies that the treatment plant may promote to its clients. While EPA recognizes that a reduction in total flow (achieved by increasing the COC) may reduce certain chemical costs on a simple mass basis, the increased COC can introduce or exacerbate other issues (such as scale and chemical deposits) that would then need to be addressed by other chemicals. As the cited reference noted, "[d]etermining the optimum number of cycles of concentration is a balancing act between the reduced chemical, water, and sewage costs at higher cycles of concentration versus the increased risk of scale formation." In the final rule, EPA has not included a requirement for COC in the definition of closed-cycle.

Intermittent Flow

Comments addressed the intermittent flow provision in the definition of closed-cycle recirculating system. Some commenters asserted that a prohibition against any level of continuous flow is unreasonable. Commenters argued that there is no reason why a closed-cycle recirculating system has to have an intermittent flow of makeup water, but there are reasons why a consistent flow may be desirable. Commenters argued that some ponds withdraw a continuous flow because this protects the source waterbody. Commenters noted that limiting makeup water to replenishment of certain losses will interfere with common power plant practices.

The commenter appears to misunderstand the rule definition. The definition of closed-cycle recirculating system does not require an intermittent flow in the final rule. In addition, the final definition provides flexibility so that replenishment can extend to losses beyond blowdown, drift or evaporation in specified circumstances. Such replenishment is not prohibited by the final rule. Under the final rule, in evaluating whether a particular cooling water intake structure represents a CCRS, the Director will determine whether such withdraws are for cooling purposes and thus are attributable to a determination that the withdrawals constitute minimized makeup.

Emergency Flows

Some commenters sought clarity on the 316(b) rule applicability to emergency flows. In cases where the Director will make a determination as to whether the facility's cooling system meets the definition of a closed-cycle system, EPA's intent is that the withdrawal of small amounts of service water (for uses such as fire suppression, potable water, screenwash water, vehicle wash water, and such) do not preclude consideration of the system as closed-cycle. EPA has clarified in the definitions of the final rule that design intake flow does not include emergency and fire suppression capacity.

Performance of CCRS

EPA has made it clear that a facility that uses a closed-cycle recirculating system, as defined in the rule, would meet the rule requirements for impingement mortality at 40 CFR 125.94(c)(1). As discussed above, EPA has made this decision based upon the record that shows that CCRS on average reduces flow by 96 percent, and therefore properly operated CCRS meets or exceeds the BTA performance standard for IM. The final rule language specifically identifies closed-cycle as a compliance alternative for the IM standards.

Demonstration Status

Several commenters suggest that CCRS is not demonstrated. EPA disagrees. Cooling towers are used by power generators of all fuel types, using both fresh water and salt water as the source makeup water. See EIA Form EIA-860 (2012). Similarly, manufacturers use both wet and dry cooling where cooling water is used for power generation. Further, EPA has identified numerous manufacturers that use CCRS for cooling of process units at iron and steel plants, petroleum refineries, chemicals manufacturers, and food and agricultural products; see the site visit reports in the record. According to U.S. Energy Information Administration, Form EIA-860, Annual Electric Generator Report of the 1,655 operable cooling systems in the United States, 875 (53 percent) reuse water either through a cooling tower or a cooling pond, 719 (43 percent) do not reuse water, and 61 are either dry or hybrid (switching between dry and wet cooling depending on the temperature and availability of water). See the TDD for more information.

Comparison to Other Technologies

Commenters requested EPA consider technologies that perform comparably to CCRS. Most commenters did not suggest what technologies demonstrated a performance comparable to CCRS. None of the commenters provided performance data that demonstrated performance comparable to CCRS. One commenter specifically argued that wedgewire screens can offer comparable performance to closed-cycle cooling. The commenter did not provide comparability performance data.

EPA disagrees with all of these comments. With respect to traveling screens, the record clearly shows that the performance of traveling screens does not equal or exceed the performance of CCRS for impingement mortality, and moreover traveling screens offer no reduction in entrainment unless the screens consist of fine mesh. While some sites obtained reductions in entrainment with one or more technologies including fine mesh screens, EPA found that some studies did not distinguish between intake location (such as offshore submerged intakes) and the fine mesh screens themselves. Other studies showed a bias towards older/larger larvae, which are generally more developed and starting to exhibit survival traits and avoidance responses. Studies also did not fully characterize survival of entrainable organisms. For all of these reasons, fine mesh screens do not offer survival of entrainable organisms to the extent CCRS can. The record shows that CCRS reduces the entrainment mortality of eggs and larvae 8-fold more than fine mesh screens (based on the mean value of performance data for both eggs and larvae); see TDD Chapter 6 for more details. EPA further notes that even if fine mesh performance was comparable to CCRS, fine mesh is not available at an estimated 17 to 55 percent of facilities based on the need to expand the existing intake to accommodate fine mesh (specifically reflecting analysis of existing intakes to be enlarged to accommodate fine mesh with 2.0-mm and 0.5-mm mesh, respectively). EPA's technical analysis shows as many as 68 percent of facilities would need to expand the size of their intake by more than five times, leading EPA to conclude that fine mesh screens would not be an available technology at those sites. As noted above, EPA did not receive any comments or data to the contrary. See Section VI.C of the preamble for further discussion of fine mesh screens. EPA notes that high sediment waterbodies pose a challenge for fine mesh screens, and high sediment water can cause "blinding" of the intake.

Evaporative Losses

Commenters expressed concern about consumptive losses of water due to a conversion to a closed-cycle cooling system. Riverkeeper noted that consumption of water should be a factor considered in evaluating cooling system options. EPA disagrees that this is a significant concern. EPA has considered this issue in several ways. First, EPA found that comparisons of once-through to cooling towers provided in comments ignored the additional evaporation of water from the downstream discharge of heated water from a once-through cooling system. The discharged water from once-through cooling may exceed 100 degrees. The elevated source waterbody temperature has increased evaporation than would occur in the absence of the thermal discharge. Second, in most cases, there are multiple facilities that withdraw from the same source water, resulting in cumulative impacts such as progressively higher source water temperatures. See Essay 14 for more discussion of the frequency of cumulative impacts. Third, evaporation modeling shows in certain cases, such as where the source of cooling tower makeup water is a small river or lake, the additional evaporative loss in the source water due to the discharge of heated water from a once through system is comparable to the evaporative losses from a cooling tower. In contrast, the heated water from a cooling tower may not significantly contribute to evaporation from an ocean, nor does an ocean intake likely contribute to significant evaporative losses due to cooling towers. Fourth, a source water that is supposedly too small to support a cooling tower (due to evaporative losses) is also too small a source of water to provide adequate flow for a once-through cooling system. This has prompted some facilities to retrofit once-through cooling to cooling towers; see, e.g., DCN 10-6524, 10-6536 and 10-6538. For all of these reasons, EPA's record does not support the position of commenters that increased evaporative losses from a closed-cycle system should be a factor in EPA's consideration of closed-cycle for national BTA requirements. Evaporative loss of water, however, is one of a number of factors that the Director may consider in determining BTA requirements for entrainment on a site-specific basis. EPA agrees that in certain watersheds where available source water is a significant concern (e.g., arid areas), evaporative consumption may play a larger role in decision-making regarding cooling water intake system choices. Therefore the final rule requires a facility to evaluate evaporative losses on a site-specific basis when submitting the Non-Water Quality Environmental and Other Impacts Assessment information required in 40 CFR 122.21(r)(12).

EPA agrees that cooling towers give rise to some level of water consumption, with data in EPA's record showing up to 3.0 liters being evaporated for each kilowatt-hour produced, depending on conditions. See the TDD for more details. This evaporative water loss by phase change of a few percent of it from liquid to vapor is responsible for removing most of the heat from the coolant water. Water evaporating from the cooling tower leads to an increasing concentration of impurities in the remaining coolant. Some bleed – known as "blowdown" – is needed to maintain water quality. Despite many coal and nuclear plants using wet cooling towers, in the U.S. electric power generation accounts for only about 3 percent of all freshwater consumption, according to the U.S. Geological Survey - some 15.2 gigaliters per day (5550 GL/yr). However, as mentioned above comparisons made by commenters neglect evaporation of once-through cooling systems.

Commenters provided an August 2010 report from DOE's National Energy Technology Laboratory (NETL) which analyzed the implications of new environmental regulations for coal-fired plants in the U.S. The NETL report noted that the projected increase in coal-plant water use over the next two decades if direct cooling is no longer allowed on new plants does not factor in the likelihood that many coal plants will add carbon capture and storage (CCS) technology to constrain U.S. carbon emissions, thereby increasing water consumption by a further 30-40 percent. EPA disagrees that such water consumption is a result of this rule.

Alternative Sources of MakeUp Water

Commenters observed that the definition of CCRS should allow for other uses of makeup water beyond "blowdown, drift and evaporation", such as water stored in cooling ponds. In addition, it should clearly allow other uses, including service water, emergency back-up and fire protection, and facility maintenance and sanitary uses (also screen washing, air preheater washing, boiler makeup, and wetlands rehydration).

EPA acknowledges water may be used for purposes other than for cooling, and distinguishes between makeup water for cooling and water used for other purposes. The final rule definition requires makeup be minimized and provides for the replacement of water lost due to evaporation. The final rule also allows for such systems to replace other water losses. See the final definition of CCRS at 40 CFR 125.92. See Essay 14 for more details.

Rejection of CCRS as BTA

As explained in the preamble, closed-cycle cooling based on wet cooling towers is a highly effective technology for reducing both impingement and entrainment. However, with respect to entrainment, the EPA has concluded that it should not adopt a BTA entrainment standard prescribing a uniform national technology with a requirement for a (CCRS) closed-cycle recirculating system based on wet cooling towers. EPA concluded that closed-cycle cooling is not an available entrainment reduction technology on a national scale and therefore should not form the basis for the "best technology available" entrainment standard.

Three Factors

EPA concluded that closed-cycle cooling is not an available entrainment reduction technology on a national scale and therefore should not form the basis for the "best technology available" entrainment standard. The record shows that closed-cycle cooling is not technically available in a number of circumstances either because (1) land availability and geographical constraints could be a factor on a local basis (such as limited space available to install cooling towers, noise mitigation, and setback distances for plume abatement); (2) increased air emissions (such as due to the need for increased fuel burned to operate the cooling towers); and (3) remaining useful plant life (for example a plant scheduled to be shutdown in 3 years will result in very little entrainment reductions as compared to a facility that will continue to operate for a significantly longer period). That is, the record demonstrates that while EPA cannot identify with precision the extent of these limitations on installing closed-cycle cooling systems nationwide, the record indicates that the circumstances are neither isolated nor insignificant. EPA tried to identify characteristics for which it has information that would allow it to subcategorize those facilities where closed-cycle is not available (e.g., land size threshold), but was unable to do so and concluded that such determinations can only be made on a site-specific basis consideration; see the TDD for further discussion. Furthermore, contrary to the statement made by some commenters, EPA reasonably concludes that the availability of a technology to the industry is an appropriate factor for evaluating BTA technology bases for national standards. EPA has historically evaluated the availability of a technology to the industry in making technology base determinations for other national technology based performance standards. Examples of non-water quality and other impacts considered in this rule at 40 CFR 122.21(r)(12) include changes to energy consumption, estimates of air pollutant emissions, changes in noise, impacts to safety, facility reliability, and consumption of water. For more information on the reasons EPA rejected closed-cycle cooling as the basis for national BTA entrainment requirements, see the preamble.

Cost and Affordability

Commenters suggested that CCRS was too expensive. Some commenters provided facility estimates and EPA considered these data; see DCNs 12-6655 and 12-6656. Other commenters cited energy costs and lowered plant efficiency. For example, cooling towers with recirculating water reduce the overall efficiency of a power plant by 2-5 percent compared with once-through use of water from sea, lake or large stream, the amount depending on local conditions. Commenters cite a 2009 U.S. DOE study which says they are about 40 percent more expensive than a direct, once-through cooling system. Elsewhere the study says dry towers are three to four times more expensive than a recirculating wet cooling system.

As discussed above, EPA did not conclude that closed-cycle cooling is not available at *every* facility. Nor has EPA rejected CCRS on grounds that the technology is not economically achievable. While EPA did consider costs, costs were not a dispositive factor in the decision to reject CCRS based on cooling towers. Rather, EPA considered its applicability to the industry as a whole. See the EA for the impacts analysis of regulatory options based on CCRS as BTA.

Other Options Considered Based on CCRS

EPA also examined other closed-cycle cooling scenarios in developing the final rule. Some commenters (including Riverkeeper) advocated that EPA consider dry cooling in determining national BTA. For dry cooling, consistent with EPA's previous findings (see, e.g., 69 FR 41608), EPA found that it does offer a slightly greater flow reduction (essentially 100 percent reduction in intake withdrawals) but at a significantly higher cost. Thus, dry cooling would reduce IM&E by roughly 5 percent over wet cooling. In Phase II and Phase III, EPA found that dry cooling costs as much as 10 times as wet cooling. While dry cooling may not be as costly today, it still costs at least twice as much as wet cooling. Furthermore, dry cooling has a higher energy penalty than wet cooling. While EPA recognizes that dry cooling is becoming a more common technology and that its costs have decreased over the past decade, EPA ultimately rejected this option for the same reasons that it rejected all other closed-cycle options: (1) land availability and geographical constraints could be a factor on a local basis (such as limited space available to install cooling towers, noise mitigation, and setback distances; (2) increased air emissions (such as due to the need for increased fuel burned to operate the cooling towers); and (3) remaining useful plant life (for example a plant scheduled to be shutdown in 3 years will result in very little entrainment reductions as compared to a facility that will continue to operate for a significantly longer period). Refer to the proposed rule preamble (76 FR 22208) and the TDD for more information on this option and today's preamble for information on why closed-cycle cooling was not selected as BTA for entrainment at existing facilities. For all of these reasons, EPA has concluded that dry cooling is not available. Further dry cooling is not a cost-effective option (5 percent improved performance over wet cooling at anywhere from 2 to 4 times the cost) for the reduction of impingement under a national regulation for existing facilities. See 67 Fed Reg.

17122, 17168 (2002).[18] Dry cooling may still be considered by the Director as part of the entrainment determination, and may for example, be justified over wet cooling in those geographic areas with insufficient water resources to support any water withdraws for cooling, or where cooling tower drift has been confirmed as a concern in an area where entrainment poses an AEI.

EPA solicited comment in the proposed rule on the use of seasonal operation of closed-cycle cooling during peak entrainment season. Commenters noted that, at some sites, this may yield equivalent reductions in impingement and entrainment to a fully closed-cycle system, while reducing the overall energy penalty and O&M costs. Other commenters noted that closed-cycle cooling should be utilized year-round, and that additional fish-protective measures (such as seasonal outages) should be utilized during peak entrainment season. EPA appreciates the submittal of technical studies on seasonal closed-cycle systems that are included in the record for today's final rulemaking. EPA generally agrees that the long-term costs of a seasonal closed-cycle cooling option would likely be lower than a fully closed-cycle option, due to reductions in O&M over the life of the technology. But EPA ultimately rejects this option due to the same factors EPA did not select other options based on closed-cycle as BTA; refer to the proposed rule preamble (76 FR 22208) for more information on this option and today's preamble for information on why closed-cycle cooling was not selected as BTA for entrainment.

Some commenters suggested different applicability thresholds for the final rule requirements. Such thresholds do not change EPA's three primary reasons for rejecting CCRS as BTA. Also see Essay 14 regarding scope and applicability.

See Essay 19 regarding EPA's consideration of a requirement for CCRS with an off-ramp, or consideration of a final rule option that would require CCRS with a rebuttable presumption of CCRS as BTA.

[18] EPA encourages permitting authorities to consider utilizing the technology on a site-specific basis where appropriate, as it would meet the definition of a closed-cycle cooling system at 40 CFR 125.92. However, dry cooling is not required under the rule and existing facilities are not required to retrofit to dry cooling under the rule. EPA also encourages the use of dry cooling technologies, especially for cooling smaller process units at manufacturing facilities. Facilities may demonstrate reductions in cooling water intake flows due to the use of dry cooling through 126.94(c)(6) system of technologies.

Essay 18: Impingement and Entrainment Technologies and Operational Measures

Introduction

In the proposed rule and NODAs, as well as the Technical Development Document (TDD) for the proposed rule, EPA discussed a wide variety of intake technologies and operational measures that can be employed to reduce impingement and entrainment. This essay addresses comments from the public related to these technologies and operational measures. In many cases, commenters advocated that a given technology or operational measure should be considered as BTA (or as credit towards meeting BTA) in the final rule. Many commenters also expressed concern over a number of requirements laid out in the proposed rule, principally noting that these requirements were not feasible or necessary at most facilities.

EPA's record demonstrates that a wide variety of technologies can be used by themselves or in combination as part of a "system" of technologies to minimize impingement and impingement mortality. The record shows the same is not true about entrainment controls. Commenters provided information on the performance of some technologies, as well as opinions on how EPA should incorporate the performance of some technologies or operational measures in the final rule framework. The final rule addresses impingement by establishing a national impingement mortality standard with seven different compliance alternatives whose performance is comparable to or better than that of the technology – modified traveling screens with fish-friendly returns – that EPA determined is the best technology available for minimizing impingement. The final rule establishes a national BTA standard for entrainment that requires determination of entrainment controls on a site-specific basis in a structured proceeding requiring consideration of prescribed factors. See the preamble sections V and VI for a description of the final rule.

Background

Over the course of the 316(b) rulemaking process, beginning with the development of an industry- wide technical survey conducted in 2000, EPA has collected a wealth of knowledge about intake technologies, their feasibility, costs, and performance. Part of this improved understanding is a result of EPA's clear articulation of impingement versus impingement mortality, and entrainment versus entrainment survival. Further, entrainment exclusion does not necessary equate to entrainment survival (76 FR 22185). EPA has found that entrainable organisms that are collected show poor survival in the case of most eggs, and essentially no survival of larvae. Consequently, on the basis of the record information it has reviewed, EPA concluded for purposes of this rule that all entrained organisms die, i.e., no entrained organisms survive. (See, for example, 76 FR 22188 (April 20, 2011) and 69 FR 41620 (July 9, 2004).) See the proposal preamble at 76 FR 22197 as well as additional discussion in the preamble for the final rule for a complete discussion of this issue. Additional perspective was obtained through 22 site visits during the Phase II rule development and over 50 site visits to both electric generators and manufacturers since 2007; see TDD Chapter 2 for more details. EPA also collected information from facilities the staff did not physically visit, and several stakeholders provided information to EPA in addition to that submitted during the public comment period. In some cases technologies have improved (such as composite materials that are lighter, sturdier, and less expensive), new technologies have been developed (such as new rotary screens), or the data identifying the performance of a given technology has been refined (such as lab studies to measure conditions before and after an intake technology where *in-situ* monitoring is not practical). Accordingly, during each phase of the 316(b) rules development, EPA has provided extensive discussions reflecting the most current understanding of the variety of intake technologies and operational measures:

Phase I: The proposed rule TDD (Economic and Engineering Analyses of the Proposed §316(b) New Facility Rule, August 2000) analyzed several compliance alternatives, including relocating an intake, reducing intake flow (including conversion to closed-cycle cooling), reducing intake velocity, and installing a variety of intake technologies (traveling screens with fish baskets, wedgewire screens, and velocity caps). The final rule TDD (Phase I—New Facilities, Technical Development Document for the Final Regulations Addressing Cooling Water Intake Structures for New Facilities, November 2001) dedicated an entire chapter to discussing the efficacy of intake technologies, including many that were not addressed in the proposed rule analysis. This discussion also included EPA's first attempt to quantitatively describe the percent reduction in impingement (not impingement mortality) and entrainment (see Table 5-1), as well as providing a fact sheet for each technology that provided technology performance data, site-specific details from individual facilities, design criteria, and advantages and disadvantages of each technology.

Phase II: EPA expanded its data collection efforts for information on intake technologies, especially with regards to performance data. As described in the NODA (68 FR 13538, March 2003) and TDD for the final rule (Phase II—Large existing electric generating plants, Technical Development Document for the Final Section 316(b) Phase II Existing Facilities Rule, February 2004), EPA developed a technology efficacy database to support the development of a performance range that facilities would be required to meet. EPA also hosted the *Symposium on Cooling Water Intake Technologies to Protect Aquatic Organisms* in May 2003 to gather experts in the field of intake technologies.

Phase III: In the proposed TDD (Technical Development Document for the Proposed section 316(b) Phase III Rule, November 2004), EPA added information regarding technologies for intakes at offshore facilities.

Existing Facility Rule: As described in the proposed rule (76 FR 22184, April 20, 2011), NODA (77 FR 34317, June 11, 2012), and proposed TDD (Technical Development Document for the Proposed Section 316(b) Phase II Existing Facilities Rule, March 2011), EPA expanded its data collection efforts for intake technology data. Specifically, EPA collected and reviewed a large number of documents in the development of the impingement mortality performance standard. In doing so, EPA conducted a detailed evaluation of the intake technologies used at facilities documented in impingement studies and retained only those that met certain criteria for acceptability for developing the performance standard. (See Essay 16A and Chapter 11 of the TDD for more information on the development of the standard.) EPA also developed more detailed analyses about individual technologies or operational measures as needed and included these materials in the record; for example, see DCN 10-6601 for a memo on variable speed pumps.

Overall Response: Introduction

As discussed above, EPA has collected and evaluated data on the performance of intake technologies and operational measures over considerable time and with numerous opportunities for public input. In the Phase II final rule, EPA stated that "[while] many documents do show a level of success in reducing impingement mortality or entrainment, other studies have shown the deployed technology to be unsuccessful or at best inconclusive. EPA does not view the varying degrees of success with regards to a specific technology as indicative that the performance standards cannot be met, but rather as evidence that some technologies work in some applications but not in others." (See 69 FR 41612, describing the data used to develop the now-withdrawn performance range.) Since the Phase II rule, EPA has identified additional studies and data showing the performance of the technologies considered for the final rule. This information has resulted in an improved understanding of the relationship between impingement and impingement mortality, entrainment and entrainment mortality, entrainment survival, and impinged entrainables (or "converts"). See VI.B of the preamble and Essay 15 for detailed discussion of these concepts.

Impingement Mortality BTA Standard

As discussed in the preamble, closed-cycle cooling is the most effective technology for reducing both impingement mortality and entrainment. EPA, however, decided that it should not base the BTA standards for IM and entrainment on the performance of closed-cycle cooling systems based on a number of factors (including that CCRS is not available nationally). See preamble section VI and Essay 15 for further explanation of the reasons for EPA's decision.

In addition to closed-cycle cooling, EPA has identified several other technologies that are also effective in reducing impingement and impingement mortality. The costs, availability, feasibility, and performance of these technologies are discussed in TDD Chapter 8. However, other than modified traveling screens with fish returns, none of these technologies are available nationally. As stated in the preamble, as a result of this thorough evaluation, EPA decided to base the BTA standard for impingement mortality on the performance of well-operated modified traveling screens with a fish handling and return system. EPA has defined "modified traveling screens" at § 125.92 to include, among others, modified Ristroph screens with a fish handling and return system, dual flow screens with smooth mesh, and rotary screens with fish returns such as vacuum pumps. The definition derives from, and reflects, the technologies EPA used to calculate the impingement mortality reduction performance standard. The definition reflects the common features of the most effective screens it used in its assessment of the IM performance standard. EPA often refers to this IM BTA technology simply as traveling screens or modified traveling screens throughout this essay.

As discussed in the proposed existing facility rule (76 FR 22202), EPA developed a monthly and annual performance standard for impingement mortality based on the performance of modified Ristroph traveling screens. EPA revised this standard since proposal, as noted in the impingement mortality discussion in a 2011 NODA (77 FR 34317) and described in the preamble for today's final rule, in part due to data received from commenters and in part due to additional analyses performed by EPA. Nonetheless, it is apparent that modified traveling screens are a widely available, feasible, cost-effective, and high performing technology for reducing impingement mortality. See TDD Chapter 4 for more information on the large number of facilities utilizing traveling screens.

This does not mean that facilities must install traveling screens with fish handling and return systems. Rather, as mentioned above, EPA recognizes other technologies (that may not be available nationally), are at least as effective as the BTA IM technology basis. As such, the rule identifies four other technologies that will also comply with the BTA impingement mortality standard (closed-cycle recirculating systems[19], reduced design intake velocity, reduced actual intake velocity, and existing offshore velocity caps). The data in the record demonstrate that these technologies will achieve impingement mortality reduction as good as or better than well-operated traveling screens and therefore comply with the BTA impingement mortality standard of today's final rule. In addition, EPA has included a flexible approach that allows facilities to comply by employing any of seven alternatives for achieving the BTA impingement mortality standard, including monitored compliance with a numeric impingement mortality performance standard. See Essay 16 for more detailed discussion.

Many commenters provided information on additional technologies and operational measures. EPA appreciates the additional data, and upon thorough review has concluded that none of these may be selected as the basis for BTA for impingement mortality or included as a compliance alternative in the final rule.[20] However, as discussed in the preamble, facilities may choose the technologies provided they demonstrate the impingement mortality performance standard has been met. Also see § 125.94(c)(7).

Entrainment BTA Standard

EPA has identified several technologies that reduce entrainment, but the performance of these technologies does not approach that of closed-cycle. EPA has found generally low performance for entrainment by these technologies, and finds greater uncertainty in their performance compared to IM technologies. Furthermore, some of these entrainment technologies have specific limitations (e.g., site location) that restrict their availability and feasibility, thus precluding their use as BTA technology at many locations. For all of these reasons, EPA did not select any one of these technologies as the basis for the BTA standard for entrainment. Instead, the national BTA entrainment standard for existing facilities requires the establishment of BTA entrainment control measures on a site-specific basis in a prescribed permitting setting. See preamble Section VI and Essay 15 for more information.

Specific Technologies Discussions

Below, EPA addresses each of the specific technologies discussed in the comments; these technologies can generally be divided into three categories: flow reduction, exclusion and

---

[19] EPA does not intend for facilities to install closed-cycle cooling solely for the purpose of meeting the IM requirements. In fact, EPA expects all facilities could comply with IM requirements without relying on closed-cycle cooling (see Exhibit VIII-1).

[20] This essay generally focuses on the application of technologies to reduce impingement mortality. Each technology discussed below may be appropriate, however, for consideration in addressing site-specific entrainment requirements.

collection technologies, and avoidance/behavioral technologies.[21] For purposes of this discussion, low intake velocity which allows fish and shellfish to escape impingement is considered an avoidance/behavioral technology; see Essay 17 for more information specific to this technology. Similarly, see detailed discussion of CCRS and cooling towers are found in Essay 17A.

Flow Reduction Technologies

Several technologies are available that employ flow reduction, including wet-cooling towers, that are effective for reducing impingement mortality, entrainment or both. Some commenters (including Riverkeeper) requested that EPA use closed-cycle cooling based on wet cooling towers as the technology basis for performance requirements for impingement mortality and entrainment in the final rule. EPA disagrees; as described in the preamble, Essay 15, and other essays, EPA is not requiring closed-cycle cooling or equivalent performance for either impingement mortality or entrainment for existing facilities in this rule. However, flow reduction such as that obtained via cooling towers and similar closed-cycle recirculating systems remain the most effective technology in reducing flow and associated impingement mortality and entrainment, providing an average 96 percent reduction in mortality. See Essay 17A. If a facility reduces intake flows, it similarly reduces the number of organisms subject to impingement and entrainment.

Riverkeeper advocated requiring additional technologies to be installed on intakes that supply makeup water to a closed-cycle cooling system. EPA disagrees that additional technologies are necessary for IM, as properly operated cooling towers already achieve an average 96 percent reduction in IM. Therefore EPA has clarified in the final rule that properly operated CCRS including wet cooling towers are "pre-approved" technologies for IM at § 125.94(c)(1). Also, see Essays 10 and 16.

EPA also received comments on other methods of flow reductions. In general, EPA agrees that these technologies may be viable for reducing flow on a site-specific basis, but ultimately concluded that these technologies are not feasible at all locations, the performance of these technologies is too low to represent BTA, and therefore these technologies are not appropriate for setting the national BTA for impingement mortality and/or entrainment.

- Variable speed pumps (VSP) or variable frequency drives (VFD): VSPs can typically reduce intake flows by approximately 8-15 percent, but are not widely used, based on data and information in the record. The reduction in flow is dependent on how often the facility can utilize the variable speed drives on the pumps, which is generally a function of generating needs and the temperature of the source waterbody. As noted by Riverkeeper, these reductions in flow may be somewhat uncertain, as they may be realized only during certain periods of time depending on operational considerations, but over the course of long-term use significant reductions in flow may be obtained. In particular, baseload power generating facilities have a more consistent waste heat load, and are the least likely to reduce overall cooling water flows except when the source

[21] For a detailed technical discussion of each of these technologies, please refer to the TDD; the information below provides EPA's response to commenter's suggestions regarding the use of these technologies.

cooling waterbody is significantly colder. Given the relatively low volume of annual intake flow reduction (at the most 15 percent for load following plants, and closer to zero for base load facilities), EPA did not consider VSPs as a nationally available technology for reducing impingement mortality. VSP are unlikely to reduce intake flows significantly at manufacturing facilities, because most manufacturers are operating almost continuously. Nonetheless, a facility that uses VSP may obtain credit for such flow reductions. A facility would do this by demonstrating the flow reductions obtained by the use of a VSP and then applying this credit towards part or all of its total required IM reduction under the “system of technologies” approach at § 125.94(c)(6). One commenter noted that such reductions must be reflective of actual operating conditions. EPA agrees and the final rule requires two years of flow data to assist the Director in making this determination. With respect to entrainment, the same range of reductions may be expected, and the same reasons the technology is not available still apply. Note that flow reductions in general would still be considered for entrainment reduction where appropriate at some facilities; see § 122.21(r)(10)(ii).

- Seasonal flow reductions: Seasonal flow reductions can significantly reduce impingement and entrainment impacts if the peak season(s) for impingement and entrainment is avoided. Note the peak season for impingement is not necessarily the same as for entrainment. However, seasonal reductions may not be as effective in waterbodies where the peak season is of a long duration (e.g., many estuaries have spawning periods throughout the year; see DCN 10-6702) or the facility’s period of peak electricity demand coincides with critical biological periods (such as mid to late summer). Seasonal reductions are not widely used, but a facility may demonstrate the flow reductions obtained and apply this reduction as credit towards meeting the IM performance standard under the “system of technologies” approach at § 125.94(c)(6). Riverkeeper stated that facilities should consider additional technologies during peak spawning periods, including outages. EPA disagrees that additional technologies during peak spawning seasons should be required of all facilities. The impingement mortality requirements in the final rule were developed with data from all seasons, represent an entire year of operations, and are therefore reflective of highs and lows in the rate of impingement. The Director can establish additional measures for shellfish and other species, where necessary, under § 125.94(c)(8) and (9).

  For entrainment, seasonal outages are one possible approach in developing site-specific requirements. With respect to entrainment, the same range of reductions may be expected as with IM, and the same reasons the technology is not available still apply. While not BTA at the national level, flow reductions (in general) could still be considered for entrainment reduction where appropriate at some facilities; see § 122.21(r)(10)(ii). One commenter noted that seasonal flow reductions may not be available to manufacturing facilities. EPA agrees this may be the case for many manufacturing facilities, but notes that there are seven compliance alternatives to comply with the IM standard of the final rule. Manufacturing facilities are not required to implement seasonal outages, but such measures may be established for individual facilities as part of the BTA entrainment determination.

- Alternate sources of cooling water: Some commenters (including Riverkeeper) note the value of using reclaimed water and other alternate sources and commented that EPA should include incentives for utilizing reclaimed water. Commenters also indicated that EPA has underestimated the availability of reclaimed water. EPA agrees in principle that water reuse is a desirable goal, but notes that the availability of alternate sources of cooling water is the most critical factor in determining the feasibility. Even if such sources existed in adequate quantity, and such sources provided an appropriate quality of water to be used as makeup water for cooling, in many cases, a facility may not be located in close proximity to the source. It is not cost-effective to haul or pump water over long distances. Additionally (and as noted by some commenters), for facilities that utilize once-through cooling, an alternative source cannot consistently provide the entire volume of cooling water required. The Vidic study cited by Riverkeeper states (first sentence of the abstract) that the analysis is based on the premise of using reclaimed water as "makeup water in recirculating water systems at thermoelectric power plants." While the Vidic analysis does suggest that some degree of reclaimed water is available at many facilities, it is not a logical conclusion to then assume that all existing power plants can use a recirculating cooling system in assessing the viability of reclaimed water. Further, Vidic lists the availability of reclaimed water (Table 2.5) as being, on average, less than 1 percent of the total volume of cooling water used at existing facilities. Given the costs and challenges to construct piping between a POTW, for example, and a facility (as well as other hurdles), this is neither demonstrated nor feasible for all facilities. EPA does not expect many facilities would incur these costs to avail themselves of reclaimed water that only comprises 1 percent of their water needs. Therefore, even if all facilities were to retrofit to CCRS (as discussed below), and even if all facilities had access to reclaimed water sources, all available reclaimed water in aggregate would at best provide about 20 percent of total makeup water needs. This is clearly not a feasible and available approach for national requirements.

  In practice, this operational measure is usually limited to facilities that employ closed-cycle cooling, who then use the gray water as makeup water for the cooling system. The State of California extensively examined the use of reclaimed water in its 2008 *California's Coastal Power Plants: Alternative Cooling System Analysis* (see DCN 10-6964) and noted the limitations to its use on a site-specific level. Overall, the use of alternative sources of cooling water is likely to have limited applicability for existing facilities. EPA does, however, encourage facilities or permitting authorities to consider utilizing reclaimed water on a site-specific basis where appropriate and notes that the practice of water reuse does offer two incentives. First, it may provide a facility an opportunity to drop below the criteria for inclusion in the regulated universe of the existing facility rule (i.e., if the use of alternative sources allows the facility to drop below 2 mgd withdrawn or 25 percent use of cooling water) and be regulated purely on a BPJ basis. Second, the facility may demonstrate the flow reductions realized and apply this reduction towards meeting the IM standard under the "system of technologies" approach at § 125.94(c)(6). Lastly, while EPA did not promulgate any national requirements related to alternative sources of cooling water, facilities are required to consider alternate sources in their permit application submittals under § 122.21(r)(10).

- EPA is also aware of technologies that utilize subsurface water withdrawals for cooling water, such as Ranney wells and substratum intakes. (For the latter, see DCN 10-6609.) These technologies can be effective, but EPA has found that substratum intakes are demonstrated for small water withdrawals such as drinking water plants, and are not used at industrial facilities such as large power plants or large manufacturing facilities. A commenter also noted that requirements to use alternate water sources may unintentionally lead to increased groundwater withdrawals. The final rule only requires that a facility evaluate alternate sources of cooling water; it does not require a facility to utilize groundwater. Also, see Essay 14. As with alternate sources of cooling water, both of these subsurface technologies are unlikely to be able to supply the necessary volume of water for once-through facilities, limiting their applicability nationally. However, EPA encourages facilities to consider utilizing these technologies on a site-specific basis to meet applicable requirements.

- Facilities may also realize reductions in intake flow by retiring older units. Some industry commenters supported an approach where a facility could claim a flow reduction credit for a closed unit, while other comments were opposed to any such credit. Some commenters suggested that credit for such closures should be provided indefinitely. EPA proposed that facilities could obtain credit towards site-specific entrainment requirements for unit closures for a period not to exceed 10 years. EPA proposed this time frame because it reasonably allows facilities to get credit for flow reductions attributable to unit closures, but also requires such facilities to make future progress to ensure its operations reflect best available technology. EPA did not receive any data supporting an alternate time frame and therefore has retained this requirement for entrainment for the final rule. As described in the preamble to the final rule, a facility may consider the flow reduction associated with the retirement of a unit for a limited time. EPA notes that, by setting the date for which unit requirements may be considered at 10 years prior to the promulgation of the final rule, facilities do not have an unlimited ability to claim flow reduction credits. This date also effectively sets a “sunset clause” on the unit retirement credit, as facilities would not be able to utilize this credit in perpetuity. EPA considers this approach to be reasonable because unit retirements, while perhaps not explicitly completed for 316(b) reasons, do offer a notable reduction in impacts. EPA also did not want facilities to “close” existing units and then operate other units simply to obtain credit for unit closures; these reductions would not comprise true reductions of impingent (and entrainment). In future years, unit retirement flow credits become less available to facilities, new units must comply with different requirements than other existing facilities, and facilities will have ample time to plan for future reductions in impingement and entrainment using other approaches, as well as planning repowering or other aspects of the facility’s operations.

Some commenters (including Riverkeeper) questioned EPA’s rationale for correlating a reduction in flow with a proportional reduction in impingement mortality. As discussed in the proposal (see 76 FR 22198), EPA has long held that flow is directly related to impingement and entrainment. For example, all other things being equal, reducing intake flow volume by 50 percent would completely eliminate the impingement and entrainment for those fish and shellfish found in that volume of water no longer being withdrawn. Thus the reduced flow intake has reduced the rate of impingement and entrainment by 50 percent for that intake. Thus, impingement mortality and entrainment mortality would be similarly be reduced by at least 50 percent. EPA agrees that impingement is subject to other factors (and stated such in the preamble cited above) but maintains that the correlation is still appropriate for a national scale regulation. EPA notes the commenters did not provide any data to the contrary. However, if a facility can (in the future) demonstrate a correlation that is different than what EPA has assumed, the facility can opt to comply under the "system of technologies" approach at § 125.94(c)(6).

With respect to entrainment, some commenters suggest low intake velocity would reduce impacts. While reduced intake volume and reduced intake velocity is not the same thing, EPA agrees that reducing intake volume should also reduce the intake velocity. However, EPA disagrees that low intake velocity significantly affects entrainment (see Essay 15, 16, and 17).

Exclusion and Collection Technologies

EPA also received comments on a variety of exclusion and collection technologies, as discussed below.

Traveling and Passive Screens

Vertical traveling screens are the most common technology at cooling water intake structures, and comprise the base technology at about 83 percent of all CWIS (see TDD 4-19). EPA has developed impingement mortality standards in the final rule based on the performance of modified traveling screens with fish returns such as Ristroph screens, which include a number of enhancements and fish protection features over standard traveling screens such as fish buckets, improved rails, low pressure spray wash and other removal improvements, and smooth mesh screens. EPA agrees with commenters and acknowledges that many types of screens may achieve similar performance and could also be determined to meet the impingement mortality requirements; this is why EPA did not specify a particular type of modified traveling screen, provided certain minimum fish protection feature are present; see rule definitions at § 125.92. At proposal, EPA acknowledged that some studies in the record demonstrated a traveling screen without all of the fish protection features could achieve performance equivalent to the modified traveling screens with fish returns as defined in the proposal. In other cases, the data demonstrated traveling screens performed close to, but generally lower than, the performance of modified traveling screens with a fish handling and return system. EPA views these studies in the record as additional support for BTA in the final rule based on modified traveling screens. In other words, if facilities can occasionally achieve the BTA level of performance without all of the fish protection enhancements, a facility with all of the fish protection features will be able to perform at the BTA level of performance at all times. See Essay 16A for full discussion.

Riverkeeper provided information on Ristroph screen performance in Appendix B to its comments; EPA appreciates the information and notes that for three of the cited performance values, Riverkeeper provided citations to actual studies/data. As such, EPA evaluated them as part of its development of the impingement mortality performance standard for the final rule. For the other three, Riverkeeper provided no references to the studies or the underlying data so the information did not meet the data acceptance criteria for the development of the impingement mortality performance standard. See TDD Chapter 11 for data acceptance criteria. Commenters also discussed several alternative screen designs (e.g., WIP screen, Geiger screen, angled screen, MultiDisc) that could be used to meet the IM standards. EPA agrees that these screen technologies can also be effective at reducing impingement mortality, and performance data from such designs were included, where appropriate, in developing the final IM performance standard; see TDD Chapter 11. As discussed above, the definition of "modified traveling screen" in the final rule at § 125.92 specifically describes the screen elements that are needed to achieve superior performance, but has not limited "modified traveling screen" to only Ristroph type screens. Further, EPA has included a provision in the final rule for a facility to demonstrate that its intake technology can perform at or better than the IM BTA – modified traveling screens with a fish return. See § 125.94(c)(5) and (7). To the extent new and innovative screen technologies come along, these provisions allow a facility to demonstrate BTA level of performance without having to comply with the seventh IM compliance alternative that involves continuous biological monitoring.

Several commenters stated that EPA was, in effect, requiring Ristroph screens at all facilities. EPA disagrees. The proposed rule at § 125.94(b) would have required compliance with a monthly and annual performance standard based on the performance of modified traveling screens, but did not require installation of the technology. Similarly, the final rule does not require facilities to install modified traveling screens or any other specific technology; the BTA impingement mortality standards are simply based on the performance of that technology. (Refer to Essay 16.) That said, EPA recognizes that on a site-specific basis, these screens may not be the most effective or least costly technology; therefore, in developing compliance costs for the final rule, EPA used a cost tool to assign a variety of technologies to model facilities, where the technology performance represents one of the final rule IM compliance alternatives and thus where the performance is equal or better than that of modified traveling screens. (Refer to Essay 21.)

Other commenters noted site-specific issues that would make implementation of modified traveling screens difficult or infeasible. EPA disagrees that difficult installation eliminates the technology as a BTA candidate. Difficult or challenging installations may pose additional costs, and the final rule cost analysis reflects this.[22] See Essay 21. Despite these additional costs, EPA concluded the technology is available, demonstrated, and achievable. As noted above, EPA is not requiring a specific compliance technology; each facility can select one of seven compliance alternatives that will best suit the facility's conditions to achieve compliance.

Some commenters noted potential problems with biofouling, such as zebra mussels. As stated in the Phase II response to comment document (DCN 6-5049A) in response 316bEFR.027.005, EPA acknowledges that biofouling can be a problem at some intakes. However, EPA notes that some facilities have historically had issues with biofouling, even in absence of today's rules and have already developed strategies to address it. The record shows that a variety of design and operational techniques (e.g., nickel alloy screens, air burst systems, chemical or heat treatments, etc.) can reduce the negative effects of biofouling organisms. EPA has not included broadly applicable incremental costs to address biofouling that would result from today's final rule, as many facilities are already addressing the issue and incurring these costs. In other words, for many facilities this is not an incremental cost of this rule. However, because EPA could not

[22] For example, the final rule does not require barrier nets. The costs of barrier nets were kept in the final rule analysis for marine facilities, and may be viewed as an example of additional costs a facility may incur.

determine with certainty whether other facilities would experience reduced performance of their IM technologies without such controls, EPA included some additional costs for model facilities located in zebra mussel-prone areas to address costs related to additional O&M or for installing alloy screens. EPA finds that the additional costs of these controls is a small part of the total rule costs, and the costs did not affect the option selection decision or the rationale for the final rule decision. Further, EPA did not receive any data showing that with biofouling controls in place, the performance of the model technology is affected. Therefore the potential for biofouling does not change EPA's conclusion that the BTA technologies are available, demonstrated, and achievable.

Riverkeeper supports mandatory fish returns for all intake structures. EPA agrees in principle, as contrary to other commenters' assertions, EPA's record shows that fish returns are an important part of the overall performance of the intake technology. In other words, it is not sufficient to remove any impinged fish gently from the screen. The removed fish must also be transported back to the source waterbody. For facilities choosing the compliance alternative at § 125.94(c)(5) based on optimized operation of a modified traveling screen, the definition of modified traveling screen at § 125.92 includes a fish handling and return system with sufficient water flow to return the fish directly to the source water in a manner that does not promote predation or re-impingement of the fish. These features are the same features included in EPA's criteria for performance data acceptance in calculating the IM performance standard. In contrast, low intake velocity or behavioral deterrent technologies help avoid impingement in the first place, and a fish handling return is neither warranted nor applicable. For example, Seabrook is 1.5 miles from the source water making a fish return a difficult and more costly proposition, however, the facility already has an existing offshore velocity cap and will likely comply per § 125.94(c)(4). EPA has found the offshore velocity cap performance meets the IM standard, and therefore a fish return is not part of the velocity cap performance, and is therefore not necessary to meet this IM compliance alternative. EPA notes that some states prohibit the discharge of debris (most notably Florida), which in some cases includes fish that are impinged and collected. This may limit some facilities' compliance alternatives, but EPA does not find that this poses a constraint on the final rule because there are another six compliance alternatives that do not rely on the return of impinged fish to their source water. EPA disagrees that the aquatic organisms need to be returned to the same source waterbody in all cases. For example, return to a tributary rather than return to the original source water may be preferable to prevent re-impingement, predation, and other concerns. Therefore, EPA expects the Director would approve the location of a fish return.

Commenters' examples of where a fish return is unfeasible are already addressed by either innovations in traveling screen technology or by the other IM compliance alternatives. Examples include but are not limited to: coastal facilities have already developed fish returns that accommodate large tidal variations and address the potential for a fish return with a large vertical drop; inland facilities on large rivers have already learned to deal with high debris loads and heavy sediment; facilities on the Great Lakes and in the north operate despite freezing temperatures and frazzle ice; screen houses are used to enclose traveling screen bays for protection from extreme weather conditions; Texas facilities adjust operations to handle large seagrass loadings; facilities with intakes on a shipping canal already handle large trash loads and navigational traffic constraints; facilities subject to debris loads following a major rainfall event have management practices in place to ensure continued operations of their plant; et. al. The comments rejecting technology feasibility based on local challenges posed to a given facility did not indicate in their comments that any consideration was given to these solutions already developed by their peers. In short, every viable manufacturing facility has adapted to ensure an available supply of cooling water, and further every power plant has taken the measure necessary to ensure condenser pipes remain open and free so that the plant can function. Facilities that fail to make these adjustments are not able to offer reliable power, steam, or manufactured products. EPA encourages technology transfer and sharing of information between facilities, so that all facilities can establish the most cost-effective compliance path available.

EPA, through its site visits and other data collection, has observed a number of intakes with fish returns that are poorly designed or discharge impinged organisms into a trash bin; an inadequate fish return can negate any benefits that a well-designed and well-operated screen may offer. EPA appreciates the submittal of technical studies on the effectiveness of fish return systems. EPA acknowledges that some facilities will face greater challenges when installing a fish return (as discussed in several comments; e.g., very long return distances, debris loading, infrastructure constraints). EPA has accounted for this comment through revised compliance cost estimates for fish returns and O&M for traveling screens. (See the TDD and Essay 21.) EPA also notes that a proper fish return system is not required under the other IM six compliance alternatives; for example, under § 125.94(c)(1), a facility employing a closed-cycle recirculating system will comply with the impingement mortality requirements without adding a fish return system, as will the 0.5 fps intake velocity because, as discussed above, it prevents impingement in the first place. Lastly, while EPA has eliminated any specific requirements regarding entrapment (see below), any organism that is entrapped (e.g., unable to return to the source waterbody due to a poor fish return system) must be counted as a mortality in determining compliance with the rule under the seventh compliance alternative (i.e., biological monitoring for compliance with the IM performance standard).

Barrier Nets

In the proposed rule, EPA required performance equivalent to barrier nets as a technology to minimize the impingement of shellfish at estuarine and marine intakes. Commenters stated that this requirement was not technically feasible for a variety of reasons (e.g., tidal action, vessel traffic, biofouling, etc.), as well as noting that EPA did not define the term shellfish. Other commenters (including Riverkeeper) stated that shellfish merit protection. EPA proposed this requirement because it did not have adequate data on the performance of the BTA technology (modified traveling screens) with respect to shellfish. EPA has removed this requirement from the final rule because EPA's revised performance data used to develop today's final rule IM performance standard includes data that incorporate shellfish survival as part of the impingement standard. To the extent entrapment of shellfish poses additional concern, the Director may establish additional measures, such as seasonal deployment of barrier nets, under § 125.94(c)(8).

Aquatic Filter Barriers or AFB

An AFB (sometimes sold under the trade name Gunderboom) operates similarly to a barrier net, but typically has a much smaller mesh. More recent versions of the technology are no longer a mesh, but rather are comprised of a smooth woven fabric. EPA has studied this technology and acknowledges that it can be highly effective for impingement at some facilities, and further may be used to reduce entrainment. EPA agrees with commenters that it can be very costly to maintain and faces a number of logistical challenges in installation and implementation at some locations. Data provided by other commenters shows that recent improvements help mitigate previous issues with the technology (such as wave action and tidal influences on the AFB tiedowns and posts), and this may result in more frequent application of the technology. The technology is not feasible where navigational traffic is a concern, as the AFB is installed as an offshore barrier to the intake structure. Furthermore, where EPA has data on AFBs, it is limited and primarily for small flow intakes only. As a result of the data and application limitations, EPA finds this technology is not demonstrated nor is it available nationally. For these reasons, EPA concludes the technology is not BTA. As a result, EPA did not include this technology in its compliance cost estimates (i.e., it was not assigned to any model facilities) nor did it include an IM compliance alternative specific to AFBs. EPA notes, however, that a facility may consider utilizing this technologies on a site-specific basis for entrainment and where appropriate to meet IM requirements under § 125.94(c)(6) or (7).

Cylindrical Wedgewire Screens

EPA has long recognized the performance of wedgewire screens on impingement. (See, e.g., 69 FR 41591, where EPA designated wedgewire screens meeting certain criteria including a low intake velocity as pre-approved for the now-withdrawn Phase II rule.) Consistent with commenters' assertions and supporting performance data, EPA agrees that wedgewire screens are an effective technology for reducing impingement (and therefore impingement mortality) at some facilities. However, EPA disagrees that wedgewire screens should be separately considered as a pre-approved technology. As noted in the preamble, a properly designed wedgewire screen will typically have a design intake velocity of 0.5 fps and would therefore already meet the impingement compliance alternative at § 125.94(c)(2). EPA does not have data supporting BTA level of performance for a cylindrical wedgewire screen operating at a significantly higher velocity. Therefore EPA has no evidentiary basis that would support the inclusion of wedgewire screens as a pre-approved compliance technology. Wedgewire screens may also be used to reduce entrainment, provided the screen uses fine mesh as discussed further below.

Fine Mesh Screens

EPA has evaluated the use of fine mesh screens (both fine mesh traveling screens and fine mesh wedgewire screens) and is aware of their effectiveness at reducing entrainment of some fish and shellfish, but did not develop national BTA requirements based on this technology. In response to the commenter stating that EPA had equated the performance of fine mesh traveling screens with fine mesh wedgewire screens, EPA's intent in discussing the two technologies jointly was to raise the issue of screen mesh size and the possibility that previously entrained organisms could then instead be impinged. As alluded to in EPA's title of the referenced section in the proposed rule preamble ("Entrainment Exclusion Versus Entrainment Survival," 76 FR 22185), EPA specifically recognized that the two technologies operate differently and some studies have shown modest performance levels of fine mesh wedgewire screens on <u>exclusion</u> of some organisms. However, more commonly EPA found that smaller organisms were simply impinged on the fine mesh rather than being entrained by the intake structure (also called "converts"). Upon review of the survival of these smaller organisms post-impingement, EPA concludes the overall survival was low; see TDD for more discussion. To avoid confusion, EPA proposed a framework whereby fine mesh screens could be used for the impingement mortality standard by allowing facilities with fine mesh to use a theoretical "3/8-inch sieve." This regulatory provision has been adopted in the final rule, and avoids penalizing a facility using fine mesh for their increased impingement of the smaller organisms that would otherwise have been entrained. In other words, since course mesh and fine mesh screens would have the same protective effect on impinged organisms larger than the 3/8-inch sieve, a facility could use the technology to meet the IM performance standard. The facility can then study the site-specific performance for smaller organisms as part of the Entrainment Characterization Study. Refer to the preamble and TDD for more information, including a discussion of how fine mesh screens impinge organisms that would otherwise be entrained.

The record shows that fine mesh screens generally must be smaller than 1.0-mm mesh to be effective at reducing entrainment of larvae, and that the screens must be 0.5-mm mesh to reduce entrainment of eggs. More importantly, EPA found that the survival of impinged organisms smaller than the 3/8-inch mesh size to be poor; unlike larger and more mature life stages of fish, larvae and similar early life stages have little avoidance response, undeveloped skeletal structure, and a general lack of mobility. Eggs have no mobility and no avoidance response. Thus while fine mesh screens may reduce entrainment, the mean value of entrainment <u>survival</u> is 12 percent; see TDD. In addition to the generally poor performance of fine mesh on entrainment, the smaller mesh reduces open area for water flow, thus retrofit to fine mesh requires an expanded number of screens to maintain the same amount of cooling water flow. This results in at least a doubling in size of the intake structure. This is not feasible for intakes with limited shoreline space, or intakes with navigational issues; see TDD for further discussion. Thus for national BTA for entrainment, EPA rejects fine mesh screens as either available or demonstrated. The Director may establish requirements for entrainment based on fine mesh on a site-specific basis, upon consideration of the site-specific factors affecting performance of the technology such as intake volume, intake velocity, affected species and the relevant life stages, and the intake location relative to shoreline. Facilities with AIF greater than 125 mgd would submit this information as part of their technology evaluation submitted with the permit application at § 122.21(r)(10) *Comprehensive Technical Feasibility and Cost Evaluation Study.*

Avoidance/Behavioral Technologies

As explained earlier, avoidance/behavioral technologies may be helpful in reducing impingement (and impingement mortality). However, they have not been demonstrated to reduce entrainment (e.g., eggs can't swim and these technologies largely work because the fish are able to swim away). Therefore, the following discussions apply to impingement and impingement mortality only.

Reduced Intake Velocity

See Essay 17 for responses to comments on reduced intake velocity.

Velocity Cap

Many commenters requested that EPA consider velocity caps as a pre-approved technology. EPA disagrees. Based on performance data, EPA did not find that velocity caps by themselves performed at the IM BTA level. However, EPA did find that existing velocity caps, in combination with a far offshore location, meet the IM BTA level of performance. In the final rule, existing offshore velocity caps that meet the definition at § 125.92 would meet the impingement mortality compliance alternative in § 125.94(c)(4). See the preamble for additional information, including a more detailed discussion of why EPA is not categorically approving all velocity caps as an allowed impingement mortality compliance alternative. For velocity caps installed after the final rule, a facility could choose § 125.94(c)(6) or (7) to comply with the IM standard.

Acoustic/Behavioral

There are a variety of technologies that will alter the behavior of fish and thus reduce the potential for their impingement. See TDD Chapter 6, for examples. The most common behavioral technologies include sound and light diversion technologies, however other possibilities include louvers and other intakes designed to elicit behavioral responses from fish and shellfish. Data in the record indicates that performance of these technologies is highly variable and often must be tuned for specific species. For example, EPA is aware of a deterrent device tuned for alewife and the performance has been reported to exceed 90 percent reduction in impingement. The same device at the same location has little effect on most other species. Due to this inconsistent performance, EPA did not consider this class of technologies for national BTA for impingement for the final rule, but encourages facilities to consider utilizing these technologies on a site-specific basis to meet IM requirements. A facility may demonstrate the effectiveness of behavioral technologies if it chooses the systems of technologies impingement mortality compliance alternative under § 125.94(c)(6).

Porous Dike

As noted by several commenters, another technology that operates on the principle of exclusion is the porous dike. EPA agrees that this technology can be effective at some facilities but notes that it is not widely demonstrated or available for most facilities due to the need to construct the dike into the source water. As a result, EPA did not consider this technology for national BTA for impingement but encourages facilities to consider utilizing this technology on a site-specific basis to meet IM requirements where appropriate. A facility may demonstrate the effectiveness of this technology if it chooses to comply with the “systems of technologies” impingement mortality compliance alternative under § 125.94(c)(6).

Entrapment

In the proposed rule, EPA included requirements to minimize the impacts to fish and shellfish that are entrapped in an intake. (See 76 FR 22204.) Many industry commenters questioned the feasibility and cost, as well as whether the issue was sufficiently common to necessitate a national requirement. Riverkeeper noted that it is important to protect entrapped fish. Further, EPA received various comments that question the costs of both monitoring and compliance for such a requirement.

After consideration of all the comments and data, EPA has not adopted any specific technology requirements for entrapment in the final rule. In the final rule, facilities that elect to comply with the IM standard under § 125.94(c)(7) must include entrapped organisms as mortality and facilities that comply with an IM alternative that requires an optimization study must account for all impinged fish and shellfish when conducting their 2-year performance study. To the extent entrapment of shellfish poses a concern, the Director may establish additional measures, such as seasonal deployment of barrier nets; see the preamble for additional details. EPA noted that it has limited data as to the prevalence of entrapment as a national problem and did not receive any new comments or information that suggests otherwise. However, to avoid a potential loophole in which fish are not impinged but are not able to escape the cooling water system, the standards for IM require that any organisms that are entrapped must be counted as mortalities when determining the IM survival rates for compliance. EPA disagrees with the comments that this provision is under costed as discussed below. Therefore, the rule does provide for an accounting of entrapped organisms. More specific responses are discussed below.

Based on site visits and other information in the record, the scenarios in which entrapment was identified as most likely to occur involve screens at a forebay where there is no fish handling and return system. If the cooling system provides no means for escape, entrapment may occur; the comments are not relevant to those intakes with access to the forebay or some other means for escape. In site visits, EPA observed this scenario occurred with intake canals and offshore velocity caps. In the case of offshore velocity caps, a fish handling and return could involve a return flume that is sufficiently lengthy as to cause mortality and/or predation during the return. Therefore EPA agrees with comments noting the lengthy fish return may cause feasibility issues or significant additional costs, such as at Seabrook Station or Cook Nuclear, and may not, in fact, be effective. On the other hand, EPA visited the St. Lucie nuclear power plant in Florida, which employs an offshore velocity cap to withdraw water into an enclosed onshore canal system. Conceptually, this scenario could lead to entrapment. Due to concerns over impacts to endangered sea turtles that are occasionally drawn into the canal, St. Lucie has set up a series of barrier nets in the canal and employs several full-time biologists to capture the turtles and return then to the ocean, thereby addressing the entrapment issue. This example shows how entrapment was addressed on a case-by-case basis to protect specific species as needed.

Despite the potential for some degree of entrapment with an offshore velocity cap, based on performance data EPA concludes existing offshore velocity caps meet or exceed the performance of the IM BTA – modified traveling screens with fish return. Therefore no additional requirements or biological monitoring would be required under the IM compliance alternative in § 125.94(c)(4), and EPA disagrees that additional costs would be incurred. In response to the comment that a single organism may slip through and become entrapped, it is both unreasonable and unrealistic to assume that a single organism would result in a facility being out of compliance with the IM standards. In any event, no data was provided supporting this assertion. In the case of an intake canal, EPA disagrees that the costs of monitoring are considerable, as the final rule does not impose biological monitoring requirements in perpetuity for any of the IM compliance alternatives at § 125.94(c)(1) through (6); § 125.94(c)(7) is the only alternative that requires biological compliance monitoring, and that alternative's costs already include monitoring. In addition, any monitoring required for modified traveling screens under § 125.94(c)(5) is already costed as part of the two year performance optimization study required at § 122.21(r)(6). Therefore, any entrapment would already be counted during the performance optimization study, submitted as part of the permit application, and the results reviewed by the Director. As EPA expects the majority of facilities will comply with § 125.94(c)(1) through (5), EPA anticipates that only in limited cases would additional requirements be necessary. Thus the rule specifies the Director can develop additional requirements including monitoring at §

125.96(a), or additional technology requirements for protection of shellfish at § 125.94(c)(8) or fragile species at § 125.94(c)(9).

Nuclear Facilities

Commenters stated that nuclear facilities merit special consideration under the final rule. EPA studied this issue in the Phase II rule and coordinated with Nuclear Regulatory Commission (NRC) staff on safety concerns. The Phase II proposal states:

> "Finally, EPA has coordinated with the staff from the NRC in the development of this proposed rule to ensure that the proposal does not conflict with NRC safety requirements. NRC staff have reviewed the proposed 316(b) rule and did not identify any apparent conflict with nuclear plant safety. NRC licensees would continue to be obligated to meet NRC requirements for design and reliable operation of cooling systems. NRC staff recommended that EPA consider adding language which states that in cases of conflict between an EPA requirement under this proposed rule and an NRC safety requirement, the NRC safety requirement take precedence. EPA has added language to address this concern to the proposed rule." (67 FR 17127, April 9, 2002)

Based on this information, EPA agrees to the extent that there may be safety concerns, the Director may consider alternative provisions. EPA also placed a document in the Phase II record that describes this coordination with NRC; see DCN 4-00016Q. EPA received similar comments about nuclear facilities in the Phase II rule and addressed them in the same way; refer to the Phase II response to comment document at DCN 6-5049A. To this end, EPA has included § 125.94(f) in the final rule to account for safety-related concerns. EPA also notes that § 125.94(f) in today's final rule is essentially the same as the language from the 2004 final Phase II rule; see § 125.94(f) at 69 FR 41687 (July 9, 2004).

With respect to general operations (especially the day-to-day operations of a cooling water intake structure), EPA disagrees that nuclear facilities are substantially different than other facilities. EPA recognizes that nuclear facilities may still require cooling water withdrawals even when they are not generating electricity to dissipate heat from the fuel rods. EPA also recognizes that not all nuclear facilities are primarily electric generators; a handful of such facilities are research units or used for other purposes. But in general, nuclear generating units operate in a manner very similar to fossil-fueled plants with respect to cooling water use. Additionally, the rule provides several compliance options the facility could select. For example, commenters question the additional risk and cost of having biological staff onsite to conduct impingement mortality sampling. A facility could select one of the seven IM compliance options that does not require biological compliance monitoring and avoid these issues entirely. EPA also notes that many of the problems cited by commenters, such as the need for increased security measures, are not issues of feasibility, but rather of cost.[23] While EPA agrees this is an important consideration, cost alone is not a factor in assessing the technical feasibility of impingement requirements for

[23] One commenter mentioned the need to potentially install grates across fish returns to ensure a secure perimeter, which may affect the survival of fish in the return trough. EPA disagrees, as most fish returns are relatively small (a foot or two in diameter at most) and any grating could be sized to permit the passage of fish unimpeded while still excluding human entry.

nuclear facilities. Other commenters noted that many nuclear facilities have already studied impingement and entrainment as part of developing other documents, suggesting the need for increased security measures is an issue that the industry has already resolved.

Commenters also questioned the timeframe for compliance for nuclear facilities. Because nuclear facilities are generally baseload facilities, and have longer times between scheduled outages (such as refueling), EPA agrees that nuclear facilities may require more time to comply with any requirements. This has been addressed at § 125.94(a) and (b), allowing the Director to establish the schedule for implementing the final rule requirements. As a result, the final rule allows ample time for the facility and the Director to comply with any impingement or entrainment requirements. Commenters stated that nuclear facilities should be allowed to consider the remaining useful life of a generating unit. EPA agrees this is an appropriate consideration for entrainment requirements, and has included considerations for units that are approaching retirement in § 122.21(r)(1)(ii)(F-G) and as one of the factors for the Director to review in establishing site-specific entrainment requirements (see § 125.98(f)(2)(iv)). EPA notes that nuclear generating units often are relicensed for 10 or 20 years, and that such extension of useful life should also be considered. Commenters also noted that nuclear facilities may have already studied impingement and entrainment as part of developing other documents (e.g., NEPA); EPA appreciates that some effort may have been dedicated to this analysis, but cannot rely on these documents as the sole source of information to make a BTA determination. In some cases, for example, impingement and entrainment may be a minor area of focus. EPA notes that the facility can utilize any data collected or analyses completed in submitting materials under 316(b) and may, as a result, already meet some of its permit application requirements.

Riverkeeper argued that the provision for nuclear facilities is unwarranted, or, at a minimum, should be revised to a previous version. EPA disagrees that the provision is unwarranted; EPA is not the nuclear expert and is not in a position to fully assess nuclear safety issues on a site-specific basis. As noted below, EPA agrees that there may be cases where nuclear safety is not a concern, but EPA is unable to make that determination on a national scale. The commenter also argued that a previous version of this provision was superior because the revised language weakened other requirements. EPA disagrees that these changes from the proposed rule weakened the requirements for nuclear facilities. The language is generally very similar and can be relevant for either impingement mortality or entrainment; this is appropriate, given that conflicts with nuclear safety could result from requirements for either one. Additionally, the deletion of consideration of technical feasibility from this provision did not eliminate the Director's authority to consider technical and cost considerations in determining BTA. As discussed in the preamble, cost is one factor to consider in establishing BTA and the Director will weigh cost considerations along with technical considerations.

Commenters also noted that the NRC must be consulted as part of establishing any new requirements for 316(b); EPA agrees in principle and has retained the provision at § 125.94(f) to facilitate this review. One commenter notes that EPA has no authority over nuclear issues, particularly with respect to safety. EPA agrees and notes that the final rule does not supersede authority residing with the NRC. However, EPA maintains that the final rule's requirements are sufficiently protective of safety concerns at nuclear facilities (and NRC agrees, as documented in the Phase II rule), as provided for in § 125.94(f).

Several commenters noted EPA's discussion in the proposed rule TDD regarding the cooling system at Palisades Plant. Primarily, this discussion was intended to establish that there has, in fact, been a nuclear facility that has retrofitted to closed-cycle cooling, in contrast to numerous statements made previously by industry that such a retrofit has never been demonstrated. EPA refers to DCN 10-6888B in the record, titled "Application for Reactor Construction Permit and Operating License Amendment No 21." This correspondence from the facility to the Atomic Energy Commission (now the NRC) states "[a]mendment No. 21 adds new material to sections 10 and 11 of the FSAR to describe modifications to the condenser cooling and the liquid radwaste systems that the Company plans to install in the future, after initial operation. The condenser cooling system modification involves the addition of a cooling tower or towers to change the existing once-through system to a system which is closed-cycle except for makeup from, and blowdown to, Lake Michigan." A plain reading of this document, as well as information provided in comments from the facility's current owner,[24] indicates that the cooling towers were installed <u>after</u> the facility began operating with a once-through cooling system. EPA also placed a number of documents related to Palisades' cooling system in the record for the Phase II rule. These documents further support Palisades did, in fact, retrofit its cooling system.[25] EPA agrees that considerations for 316(b) do not appear to have been a direct factor.[26] EPA also agrees that there were unusual circumstances surrounding this facility and it appears that changes were made to the design of the cooling system in the midst of construction or in early stages of operation; there is no doubt that the retrofit at Palisades has a complicated history. However, the documentation continues to indicate that the cooling towers were installed <u>after</u> the facility had operated for approximately two years using a once through cooling system, which does constitute a retrofit. EPA also provided this documentation in the record to demonstrate that, at some nuclear facilities, it may be possible to separate the cooling system related to waste heat from electricity generation from the cooling system related to maintaining system safety within the reactor. If this is the case (as it appears to have been at Palisades), nuclear safety concerns may not be a significant issue in evaluating the feasibility of retrofitting to closed-cycle cooling. EPA, however, does not interpret this instance of a retrofit to indicate that all nuclear facilities may be able to retrofit to closed-cycle cooling. As noted in the preamble, there are many factors that affect that decision.

---

[24] See EPA-HQ-OW-2008-0667-2347-A2, summarizing the Phase II proposed rule TDD; "The facility began operating in early 1972 utilizing on a temporary basis a once-through cooling system. The main portions of the tower system were constructed in 1972 and 1973, while the plant operated in a once-through mode. After a ten-month outage, the conversion to a closed-cycle recirculating system occurred in May 1974, when the cooling towers became operational."

[25] See DCN 4-2502, which states "Mr. Gulvas [an employee of Consumer Energy] also stated that he knew of no other facility that had gone through a retrofit like the Palisades facility." This document also referred to "the historic conversion of the plant's cooling system from once-through to recirculating with cooling towers." DCN 4-2529, written by Mr. Gulvas, also refer to "the conversion of the once-through cooling system to cooling towers." See also DCN 4-2530 for similar discussion.

[26] DCN 4-2529 from the Phase II rule indicates that radwaste and thermal discharges were the primary concern of the citizen organizations that petitioned for the retrofit.

Essay 19: Regulatory Options

Introduction

EPA identified 4 options considered at proposal:

Option 1: Impingement mortality (IM) controls based on modified traveling screens for all facilities with flow greater than 2 million gallons per day (mgd), closed-cycle cooling or its equivalent for new units, and a site-specific determination of entrainment BTA for all other facilities.

Option 2: Intake flow commensurate with closed-cycle cooling for facilities that have a design intake flow of greater than 125 mgd and IM controls based on modified traveling screens for all facilities with flow greater than 2 mgd.

Option 3: Intake flow commensurate with closed-cycle cooling for all facilities and IM controls based on modified traveling screens, for all facilities with flow greater than 2 mgd.

Option 4: Impingement mortality (IM) controls based on modified traveling screens for all facilities with flow greater than 50 mgd, closed-cycle cooling or its equivalent for new units, and a site-specific determination of entrainment BTA for all other facilities and of impingements mortality controls for facilities with flow less than or equal to 50 mgd.

General Response

As described in the preamble to the final rule, EPA adopted a modified version of Option 1 for the final rule. EPA has developed a final rule that establishes "best technology available" standards for cooling water intake structures that minimize adverse environmental impacts. Specifically, the final rule establishes BTA standards for reducing impingement mortality and entrainment, the adverse environment impacts that EPA identified as associated with cooling water intake structures. First, for existing power generating facilities and existing manufacturing and industrial facilities that withdraw more than 2 mgd per day from waters of the U.S., at least 25 percent of which is used exclusively for cooling water, the rule establishes a BTA impingement mortality performance standard based on the performance of modified traveling screens with fish returns (often referred to in this essay simply as modified traveling screens) and that provides seven different alternatives for complying with the standards. Second, for existing facilities, the rule establishes a BTA standard for entrainment that requires the determination of required entrainment reduction measures in a structured site-specific permitting proceeding. The BTA standard for entrainment requires that certain prescribed factors must be considered in the decision and must reflect the maximum reduction in entrainment warranted after consideration of relevant factors. In addition to the above provisions, which apply to existing CWIS units at existing facilities, the rule establishes a BTA standard, for both impingement and entrainment, for new units at existing facilities. Under this standard, new units at existing facilities will be subject to requirements similar to the section 316(b) requirements for new facilities subject to the previously promulgated Phase I rule. This essay discusses the requirements for existing facilities only. See Essay 20 for a discussion of the new unit provisions.

As described in Section VI of the preamble, EPA examined the full range of technologies that reduce impingement mortality or entrainment or both.[27] After considering a full range of factors (see Essay 10 and Section VI of the final rule preamble), EPA has concluded that it should base the impingement mortality standard for existing units on the performance of modified traveling screens because modified traveling water screens[28] are the "best technology available" for minimizing impingement mortality. While EPA identified a number of technologies that perform as well or even better than traveling screens, these technologies are either not feasible or available on a nationwide basis and thus are not the "best technology available" for standard setting purposes. See Section VI of the final rule preamble. Moreover, the impingement mortality standards for existing units provides a number of compliance alternatives that include these other equally effective or better performing technologies that while not available nationally, may be available for some sites. See Section VI of the final rule preamble. EPA based the BTA impingement mortality standard for existing units on the performance of traveling screens because EPA concluded that this technology is effective, widely available, feasible, and does not lead to unacceptable non-water quality impacts.

As explained in Section VI of the preamble, EPA has not identified a technology or combinations of technologies that EPA concluded is "best technology available" for minimizing entrainment at existing units. EPA did not identify a technology for reducing entrainment that is effective, widely available, feasible, and does not lead to unacceptable non-water quality impacts. As such, EPA is unable to identify a nationally applicable BTA technology on which to base the BTA entrainment standard.

While EPA concluded that flow reduction commensurate with a closed-cycle recirculating system such as a cooling tower reduces entrainment (and impingement mortality) to the greatest extent and is a most effective performing technology, after careful consideration of multiple factors, EPA concluded that closed-cycle is not the "best technology available" for existing units within the meaning of the statute. It is not the best technology available on a national basis for minimizing adverse environmental impact and should not form the sole basis for the BTA standard for entrainment. For the final rule, EPA has identified three factors as significant in its decision to reject closed-cycle cooling as the technology basis for a national BTA entrainment standard. The three factors that collectively support rejecting closed-cycle cooling systems as a widely applicable BTA for existing facilities (except new units) are land availability, increased air emissions, and remaining useful life. The record shows that though closed-cycle cooling is effective and a high performing technology, it is neither widely available nor feasible, and has unacceptable non-water quality impacts in some instances. While EPA cannot identify with precision the extent of these limitations on installing closed-cycle cooling systems nationwide, the record indicates that the circumstances are neither isolated nor insignificant. EPA also considered other forms of flow reduction including variable speed drives and seasonal outages. EPA found that these were not available and not BTA; see Essay 18.

EPA also determined that there were no other "available" technologies for entrainment whose performance came close to that of closed-cycle recirculating systems. For example, fine mesh

---

[27] Some technologies only reduce impingement (or IM), and have no effect on entrainment. Therefore EPA considered each technology's performance for IM and entrainment separately.
[28] Defined at 40 CFR 125.92 to include any traveling screens with the same fish-friendly and protective features as modified traveling screens with fish-friendly fish returns.

screens reduce entrainment mortality by only 12 percent on average. See Essay 18 for further discussion. See the TDD for EPA's analysis showing that there are no intermediate performing technologies for entrainment.

Further, while reduced intake velocity was a very effective control for impingement mortality and may also reduce entrainment of some life stages of fish and shellfish, it does not significantly reduce entrainment of eggs and non-motile stages of larvae. As discussed in the preamble, in almost all cases entrainment results in 100 percent mortality. However, even if reduced intake velocity was effective for entrainment, EPA has already rejected the technology for consideration as BTA because it is not physically available in many locations. See Section VI of the preamble and Essay 17.

Because EPA did not identify any single technology or group of technology controls as the basis for establishing the national performance standard for entrainment for existing units, EPA's national BTA entrainment standard for existing units puts in place a framework for establishing entrainment requirements on a site-specific basis. The framework specifies factors that must be considered in the Director's determination of the BTA controls.

Factors for Supporting Site-Specific Entrainment and Rejecting a Uniform Standard Based On Closed-Cycle Cooling

Riverkeeper commented that EPA illegally uses the four factors to justify site-specific entrainment standards. The statutory directive requiring facilities to adopt the best technology cannot be construed to permit a facility to take measures that produce second-best results. In the view of Riverkeeper, EPA itself proposes easy solutions to the problems and none of these reasons provides enough grounds for instituting site-specific BTAs industry-wide. EPA disagrees. For the reasons explained above and in preamble Section VI, EPA has determined that the most effective technology, closed-cycle cooling, is not sufficiently available to provide the technology basis for the national BTA entrainment standard. More specifically, for the final rule, after a full consideration of all factors, EPA determined three factors that collectively support rejecting closed-cycle cooling systems as a uniformly applicable BTA for existing facilities (except new units) are land availability, increased air emissions and remaining useful life. The commenter discusses and dismisses each factor individually, but does not consider them in aggregate. While EPA cannot identify with precision the extent of these limitations on installing closed-cycle cooling systems nationwide, the record indicates that the circumstances are neither isolated nor insignificant. Each of these and the comments received are discussed in more detail below. In establishing a national standard that requires determination by the Director on a site-specific basis of required entrainment controls in a structured proceeding requiring consideration of identified elements, EPA also has not ruled out closed-cycle cooling as an appropriate BTA control measure for individual sites. Rather, EPA would expect that, where appropriate, the Director will determine that closed-cycle cooling is the required control for entrainment under the BTA standard. See preamble Section VI and Essay 10 for a discussion as to why an informed decision resulting in a site-specific determination by the Director is an appropriate approach in absence of an identified national BTA.

Commenters indicated that it would be arbitrary and capricious for the EPA to force an existing facility to completely redesign its facility by installing closed-cycle cooling. EPA first notes that retrofit to closed-cycle does not require a facility to completely redesign; see Phase I and Phase II discussions of facilities that have already completed a retrofit to closed-cycle. The retrofit to closed-cycle has been incorporated at both power plants and manufacturing facilities. Some manufacturers have even retrofitted dry cooling on certain unit processes within the facility; see site visits in the record for more examples. The rule requires as part of the 40 CFR 122.21(r)(10) *Comprehensive Technical Feasibility and Cost Evaluation Study* a description and discussion of closed-cycle cooling, fine mesh screens, water reuse, and alternate sources of cooling water. Each of the three factors that support EPA's determination that closed-cycle is not BTA nationally must also be evaluated. Therefore, EPA disagrees that the site-specific requirements for entrainment reduction, which may include closed-cycle cooling if determined to be appropriate by the Director, will be arbitrary or capricious since the Director will carefully consider all issues raised by the facility in the permit application documents.

Land Availability

EPA received a number of comments concerning the use of land availability as a factor for rejecting a uniform standard based on closed-cycle cooling. Some disagreed with EPA's proposal analyses saying that EPA cited 25 percent as not having sufficient land but then stating that some of those 25 percent would likely find a way around the land availability issue. According to them, that leaves a small percentage of facilities that would be unable to retrofit to cooling towers because of limited space. They also note that EPA based this decision on an in-line tower design and that EPA did not consider a back-to-back configuration that would require only 17 percent of the space required for two side-by-side in-line towers. Riverkeeper commented that allowing potential space-constraint considerations at some sites to justify a case-by-case approach for all facilities, as EPA has done in the Proposed Rule, is arbitrary and capricious and that even if there are arguable site constraints, the use of eminent domain for matters relating to power transmission and generation (as well as a variety of other public goods and services) is well-established and should not be ruled out in this context.

EPA reviewed the record for the final rule and notes that there is little detailed data available regarding availability of land on a national basis. First, EPA has reviewed all of its site visit reports including an evaluation of the size of each site. EPA agrees that in some circumstances, some facilities with a small parcel of land could still install closed-cycle cooling by using creative engineering solutions. On the other hand, EPA found that some facilities even large sites could not feasibly install cooling towers because of local zoning requirements or other local concerns. Second, EPRI submitted results of a survey that asked "Does your facility have contiguous open space on your property or adjacent 'offsite' open space that can be used to support cooling tower construction?" Twenty-three percent of facilities responded definitely that they did not. (DCN 10-6927). Similar to the facilities where EPA conducted site visits, EPA expects that some of these facilities may be able to install cooling towers using creative engineering solutions. However, EPA does not have the information or the capability to assess these situations. Third, further review has shown that setback distances to mitigate noise and plume abatement (based on GPS mapping of residential areas) act as an additional constraint on land available for retrofitting to closed-cycle. Finally, EPA also recognizes that some facilities may be able to purchase new land, but is aware that in space constrained areas such as urban areas, such land may not be readily available, and/or costs may be prohibitive. Consequently, EPA estimates that as many 25 percent or more of facilities might have one or more constraints on land availability that would limit retrofit of cooling towers for the entire facility. EPA lacks adequate support to indicate that land constraints can be accommodated at existing facilities, and commenters did not provide supplemental data to support the alternative.

Regarding back-to-back cooling towers, EPA agrees that back-to-back cooling towers use less space, but disagrees this tower configuration is demonstrated as available for locations that require plume abatement. EPA estimates abatement would be required at approximately 25 percent of closed-cycle systems, and commenters have not provided any data to the contrary. EPA notes that requirements for plume abatement tend to occur at facilities with small buffer areas that are also located in close proximity to roadways and housing/urban development. Facilities in these locations also tend to be much more likely to be subject to space constraints. Thus, a back-to-back tower design may not be widely available to many facilities with space constraints.

With respect to the comment about eminent domain, to the extent that eminent domain is a legally available option to acquire land to retrofit to cooling towers, it may not, in fact, be an option because of public opinion or other constraints. For example, the power station may be located in a populous area. Environmental Justice (EJ) or other public opinion issues may constrain further expansion. In any event, EPA cannot assume the broad availability of eminent domain as a cure-all for geographical or land limitations.

Finally, EPA disagrees that allowing potential space-constraint considerations at some sites to justify a case-by-case approach for all facilities is arbitrary and capricious. First, EPA notes that it rejected cooling towers on the basis of three factors combined. For a response to the comment about EPA’s selection of a site-specific BTA standard, see Section VII of the preamble and Essay 10.

One commenter stated that refusal to set cooling towers as BTA because of a desire to save room for new units is unacceptable noting that land needed for the retrofit would later be required for a new unit when new units are already required to seek viable alternate sites. While EPA did use land availability as a consideration in its decision to establish entrainment requirements on a site-specific basis, EPA’s discussion of the potential competing land requirements for exiting unit cooling towers and new units was only described to highlight the potential tradeoffs involved. Saving land for possible future new units was not a consideration in this decision.

Other commenters agreed with EPA that land availability was a limiting factor at many facilities stating numerous concerns such as the need to locate towers a sufficient distance from equipment that would be damaged by drift or ice formation; local zoning requirements; the potential for tower foundations to interfere with groundwater movement away from infiltration ponds that treat wastewater from the facility; and location of available land in relation to the location of process units that require cooling water. While EPA did not specifically cite such concerns, EPA agrees that such considerations may affect the availability and costs of a closed-cycle cooling systems and expects that, depending on site-specific conditions, these concerns may be some of the many issues that will be taken into consideration by the Director in determining site-specific entrainment requirements.

Commenters argued that requirements to purchase land to accommodate entrainment control technologies is unlawful and inappropriate and cited a legal precedent They state that the Clean Water Act does not authorize EPA, or the States, to require enlarging a site and that EPA should eliminate any suggestion that facilities examine the availability and feasibility of purchasing additional land. EPA notes that the final rule does not establish a requirement based on cooling towers. Furthermore, the final rule does not require a facility to purchase adjacent land nor is there an implied requirement to demonstrate infeasibility. The final rule preamble language has been revised to state that the Director must provide a discussion explaining how issues concerning land availability, insofar as they relate to the feasibility of adoption of an entrainment technology, were addressed in the site-specific determination. For example, a discussion of land availability might include an evaluation of adjacent land, and acres potentially available because of generating unit retirements, production unit retirements, other buildings and equipment retirements, ponds, coal piles, rail yards, transmission yards, and parking lots; decommissioning of existing units; repurposing of existing land uses; documentation that insufficient acres are available on-site; and evidence of the feasibility of the purchase or other acquisition of property adjacent to the facility. In particular, EPA is aware of corporate level ownership of multiple adjacent parcels of land, and it is appropriate for these parcels to be considered. Issues regarding the feasibility and legality of requiring the purchase of adjacent land can be determined on a site-specific basis.

Increased Air Emissions Could Be a Factor on a Local Basis

Many commenters agreed with EPA's assessment regarding the potential for increased air emissions associated with closed-cycle cooling. In particular, there was concern that $PM_{2.5}$ which is generated by drift from the cooling towers themselves may cause permitting problems. They note that air permits may need to be reopened and that the ability to obtain new permits is uncertain. EPA agrees that this may be a problem in a number of locations and has considered increased air emissions as a significant factor supporting the decision to require site-specific determination of entrainment requirements.

Riverkeeper commented that air emissions would not increase as a result of closed-cycle requirements because the recent air emission regulations and the trend in the power industry of switching away from coal to natural gas have resulted in a downward trend in air emissions nationwide. They also note that replacement power may come from cleaner sources and that some facilities may choose to repower using less polluting fuels and technologies. They suggest that the result of these factors will be that closed-cycle cooling may simply result in a slightly less dramatic decrease in emissions. EPA disagrees. Retrofitting closed-cycle cooling (without also repowering) would result in increased air emissions of various pollutants, including particulates, sulfur dioxide, nitrogen oxides, mercury, and greenhouse gases, among others.[29] As a result of installing closed-cycle cooling structures, fossil-fueled facilities would need to burn additional fuel, thereby emitting additional PM, CO_2, SO_2, NO_X, and Hg. Two factors are responsible: (1) the need to compensate for energy required for operating cooling towers, and

[29] EPA recognizes that retrofitting closed-cycle cooling could be combined with other energy efficiency or pollution control technologies with the net effect of reducing air emissions; however, facilities could (and may be required to under other rules) install such technologies anyway, without converting to closed-cycle cooling. Comparing closed-cycle cooling to once-through cooling with all other technologies held constant, there is an energy penalty for the auxiliary power consumption that would lead to greater air emissions.

(2) slightly lower generating efficiency attributed to higher turbine backpressure when the condenser is not replaced with one optimized for closed-cycle operation when retrofitting existing units (also referred to as the energy penalty). While both of these contribute to increased air emissions, the larger contributor by far to projected increased air emissions results from the energy penalty.

The impact of the increased emissions varies according to the local circumstances. The increased emissions could consist of stack emissions from increased fuel usage, cooling tower emissions, and plumes of water vapor. EPA's analysis suggested that the most significant impacts would be increased $PM_{2.5}$ emissions, which are associated with an increase in human health effects. EPA notes that cooling plume abatement and drift elimination technologies exist to address cooling tower emissions. EPA has included costs for such technologies in its analysis of Proposal Options 2 and 3. Since EPA did not reject closed-cycle on the basis of cost, the added expense of these additional control measures was not a basis for rejecting closed-cycle. Further, EPA expects most effects of the particulates from cooling tower emissions would be limited to the immediate vicinity, confined wholly to the facility property. (See DCN 10-6954.) Therefore, EPA's primary concern here is increased air emissions associated with additional fuel usage due to the so-called energy penalty when retrofitting to cooling towers. EPA's review of emissions data from E-GRID (year 2005) suggests that impacts from these pollutant discharges could be significant. These potentially include the human health and welfare and global climate change effects – all associated with a variety of pollutants that are emitted from fossil fuel combustion. EPA is not able to quantify the frequency with which facilities could experience these local impacts, and therefore has concluded that the proper forum to address such local impacts fully is in a site-specific setting.

One commenter (2181.016) stated that EPA failed to fully evaluate the air emission impacts of requiring closed-cycle cooling for new units. Since new units have not been designed or constructed yet, EPA has no way of reasonably estimating the net difference in air emissions that would occur as a result of new unit requirements. However, in the Phase I rule for new facilities, EPA found such impacts for newly constructed facilities were acceptable. The new facility will produce additional emissions, and the additional emissions for closed-cycle are a very small portion of total emissions. EPA further concludes that since there are far fewer emissions from new units compared to emissions from new facilities, primarily because there is no energy penalty associated with new units because the condenser can be selected to compensate for higher turbine backpressure, that any such incremental air emissions impacts would be acceptable. As described in the Basis for the Final Regulation section of the preamble, EPA has concluded that the new unit requirements will not pose an unacceptable air emissions impact. See Essay 20 for further discussion of new units.

Remaining Useful Plant Life Could Be a Factor on a Facility Basis

EPA received several comments regarding consideration of useful plant life as a factor in the availability of certain technologies for controlling entrainment at a particular facility. Some agreed with EPA that significant investment in closed-cycle cooling for short-lived units is not economical. Most expressed a desire that EPA establish some sort of defined exemption from BTA requirements for units that are planned for retirement or a requirement for a clear trigger for automatic reopening of permits if an exempt unit planned for retirement should pursue an extension of unit life. Those requesting exemptions for future retirements gave examples of where an existing facility has formally committed, or will formally commit, via a legally binding instrument to retire within a specified time (e.g., 5 or 10 years) of the effective date of the final rule or would occur prior to the proposed eight-year compliance deadline. Commenters also stated that EPA should remove study and compliance requirements for planned early retirements or closures.

Remaining useful life is perhaps the most difficult parameter to evaluate on a national basis for several reasons. EIA and EEI analyses show that uncertainty in fuel prices and profitability of certain fuel types could result in different sets of facilities likely to close. Further, while the facility age may be used as an indicator of remaining useful life (see TDD Chapter 4), other factors make the facility age irrelevant, such as: license extensions at nuclear facilities; repowering at fossil-fuel power plants; replacing existing units sequentially at a facility; addition of newer more efficient units; replacement of existing product lines; addition of new product lines; and other construction and upgrade projects. For example, several nuclear facilities that are several decades old have completed Type III uprates and obtained relicensing for another 20 years; oil-fired power plants have repowered to NGCC; a coal facility that is more than 50 years old recently replaced the boiler and condenser to improve efficiency, and will likely operate for many years.

EPA agrees that it does not make sense to spend considerable time and resources on technologies that may only be used for a few years or less. However, EPA concluded that the 316(b) BTA standards should not build in an unintended incentive for facilities to delay closure because they may obtain an exemption based on planned retirement. Considering the long lead time to plan, design, and construct the most effective entrainment technology, closed-cycle cooling systems such as wet cooling towers, EPA determined that the Director should have the latitude to consider the remaining useful plant life in establishing entrainment requirements for a facility. The remaining useful plant life, along with other site-specific information, will affect the entrainment reduction of closed-cycle cooling at a facility. For example, retrofitting to a closed-cycle system at a facility that is scheduled to close in three years will not result in much entrainment reduction as compared to retrofitting to closed-cycle at a facility that will continue to operate for 20 years.

Riverkeeper stated that industry has historically argued that facilities with little remaining useful life should be exempt from regulation because the costs of a retrofit to such a facility may not justify the benefits. They commented that remaining useful life is not quantifiable, certain, binding or relevant unless a facility owner has committed to a specific closure date and suggest a 5-year timeframe. EPA agrees that facilities requesting exemptions related to planned retirements should commit to a specific date. EPA has included a provision in the final rule waiving certain permit application requirements for existing facilities that plan to retire the facility before the current permit expires. In addition, if the owner or operator of an existing facility plans to retire the facility after the current permit expires but within one permit cycle, then the Director may waive many of the permit study requirements pending a signed certification statement from the owner or operator of the facility specifying the last operating date of the facility. EPA notes that the entrainment requirements are established on a site-specific basis by the discretion of the Director who would take the issue of planned retirements into consideration and should be capable of assessing the veracity of such claims.

Part of EPA's rationale for reduced requirements where a facility has little remaining useful life is the timeline in which full compliance will be achieved by facilities subject to this rule. Full studies and analysis as part of the initial permit application, including IM requirements and Entrainment Characterization Study, are expected to take approximately 3 years to complete, and will generally take 2 years to complete in subsequent permit applications. Since permits are generally issued on 5-year cycles, in any given year some 20 percent of facilities are expected to apply for a permit. In the example when a permit application is made immediately after the final rule effective date, where required data is collected as soon as practical, where there are minimal additional technology requirements, and where the permit is issued as soon as practical, EPA estimates it would take a minimum of 3 years to achieve full compliance. On the other extreme, where a permit application is submitted closer to 5 years after the effective date of the rule, data is collected prior to the permit application due date,[30] and significant technology upgrades are anticipated (such as closed-cycle or a relocated intake at a baseload power generating facility or a complex manufacturing facility), EPA expects full compliance could take longer than 14 years. See Section VIII of preamble for further discussion of implementation. In view of the range in time that may be required for full compliance, EPA expects that full compliance with the impingement mortality and entrainment BTA requirements will, in most cases, take at least 6 years. As noted above a permit is typically issued for 5 years. In other words, after consideration of the permit application study requirements, the permit cycle, the entrainment determination by the Director, and the facility's choice of compliance alternative for IM that harmonizes with this entrainment determination, EPA does not expect that a permit with entrainment determinations can be fully implemented by the facility during the first permit cycle (i.e., the first 5 years) after this rule's effective date. As discussed in the preamble, for impingement requirements the compliance date is determined by the permit schedule and selected compliance alternative – a schedule which again is subject to some discretion by the Director in order to harmonize the IM requirements with any required entrainment controls. Regarding the concern that units may avoid compliance through delay of planned retirements, EPA notes that the Director has the discretion to require interim entrainment controls at 40 CFR 125.94(h).

Riverkeeper also noted that some facilities may claim that the remaining useful life (of their cooling system or compliance technology) may be too long in that they have not yet been able to recoup original construction costs and therefore should be exempt from technology upgrades. They were concerned that EPA's focus on remaining useful life would allow permitting authorities to consider too long as well as too short remaining useful life in determining compliance requirements. EPA would like to make it clear that with respect to this issue, EPA is only concerned with situations where the remaining useful life of the entire unit may be too brief to warrant a substantial expenditure for compliance technology that would be useful for only a brief period. EPA notes the model facilities used for conducting the cost analysis are based on the technical questionnaire, and since the data therein is at least 10 years old, the technology in place reported in the technical questionnaire has also been installed for at least 10 years. Therefore, EPA disagrees that many facilities (if any at all) can reasonably claim compliance technology costs have not yet been recouped. To the extent a facility's existing compliance technology has been installed since the technical questionnaire, and the technology can be used

---

[30] In this case EPA does not anticipate 3 additional years to collect data because the data gathering activities will have already been completed prior to the permit application; see 40 CFR 125.95 for the time frame for permit application requirements.

to meet the final rule requirements, EPA's costs are overstated. To the extent the existing compliance technology is not useable to meet the final rule requirements, because EPA's cost methodology incorporates the full compliance costs as discussed above, EPA disagrees that the costs of the rule are incomplete. Further, EPA's economic analysis is based on the above assumptions of compliance costs, and EPA did not find these costs to be unaffordable; see the preamble and the EA. Other concerns regarding remaining useful life apply to the production unit, not the compliance technology, and would not be a consideration in situations where the life of the required compliance technology itself would not be brief. In situations where units are planned to be replaced/repowered and the compliance technology can be incorporated into the design of the replaced/repowered unit, the remaining useful life of the units to be replaced/repowered should not be a consideration in determining compliance requirements.

Energy Reliability is Not a Dispositive Factor in EPA's Rejection of Closed-Cycle Cooling as BTA

In the proposed rule EPA considered energy reliability as an important factor in its decision not to prescribe a single technology as the basis for a national BTA entrainment standard and received a number of comments concerning this issue. Most commenters agreed that energy reliability should be an important consideration. But some commented that variances could be granted on a site-specific basis and that EPA acknowledges that extending compliance time for power plants with potential energy reliability issues would likely resolve such problems.

EPA performed a revised reliability analysis for the final rule and, consistent with the proposal, results indicated that there would be no significant reliability impacts associated with requiring closed-cycle cooling. EPA also observed findings from the market model analysis conducted using IPM that demonstrated that the options analyzed for the proposed rule will not have a significant adverse effect at a national or regional level. Because of these findings, EPA did not prepare a Statement of Energy Effects. For further details see the Economic Analysis for the Final Section 316(b) Existing Facilities Rule (EPA-821-R 13-004). Based upon this evaluation EPA concluded that even for the most stringent option there would not be any significant reduction in reliability of the national or regional electricity supply. Accordingly, while EPA considered this in evaluating options for the final rule, it was not a dispositive factor in its determination to reject closed-cycle cooling as BTA. EPA notes that to the extent that facilities believe this is a relevant consideration in the site-specific determination of BTA, they can provide such data to the Director and the Director may consider it.

Other Factors

In addition to land availability, air emission, remaining useful life, and reliability discussed above, commenters cited a number of other factors that may affect the availability of closed-cycle, the costs of controls or the environment. According to commenters, these factors affecting the availability of closed-cycle cooling in any specific setting may include:

- A highly adverse cost to monetized benefit ratio;
- At a number of facilities insurmountable piping difficulties may be encountered;

- Requirements for the redesigning and reconstruction of large portions of the facility, not just the intake structure;
- Loss of beneficial aspects of the thermal effluent for manatees;
- Increased water consumption;
- In tidal areas use of non-saline alternative makeup sources could negatively impact future ground water availability;
- Environmental impacts through the discharge of cooling tower blowdown (treatment chemicals, concentrated pollutants);
- Increased safety hazard associated with bulk storage of treatment chemicals used for closed-cycle cooling;
- Impacts of fogging and icing;
- Human health effects from pathogens, endocrine disruptors and particulates;
- Increase in noise impacts should be considered;
- Aesthetics;
- Challenges to obtaining appropriate Federal, State, and local permits (endangered species, CWA section 404, local building height and noise);
- Saltwater drift;
- Impacts associated with building the required transmission to accommodate new generation far from load centers;
- Lost jobs at manufacturing facilities since costs cannot be passed along to customers;
- Process upgrades at manufacturing facilities such as heat exchangers to account for warmer water would be required;
- Loss of manufacturing production capacity due to warmer water;
- Added cost and energy requirements for upgraded process refrigeration machines;
- Blasting mandates at nuclear facilities;
- Existing nuclear power generation, and to a lesser but still important extent, gas-fired generation, offer specific environmental benefits-to electric-system function, air quality and climate change goals-not provided by other sources of baseload power production;
- Premature or immediate facility closures;
- Extended construction-related outages and permanently reduced output and their effects on reliability and affordability.

These are important, but they are secondary considerations that do not change (nor are they dispositive with respect to) EPA's determination of the BTA impingement mortality and entrainment standards and rejection of closed-cycle cooling as the sole technological basis for BTA. Because closed-cycle has already been rejected as BTA, EPA is not responding specifically to these items with regards to consideration of BTA and has not specifically analyzed all of these considerations in terms of costs, benefits or impacts. EPA acknowledges that some of these may require consideration on a site-specific basis and may affect costs. Many of these considerations were considered in developing the compliance costs for the options evaluated (see Chapter 6 of the TDD). Given that any requirements for closed-cycle cooling will result, if appropriate, from a site-specific determination by the Director, many of the above listed considerations are identified in the various components of the required permit application studies. Facilities will have the opportunity to raise these issues in their permit application documents, subject to review by the interested public, and considered by the Director in making the determination for entrainment.

Regulatory Options

Technology Basis

Riverkeeper commented that a BTA determination does not require that a technology be available everywhere and that EPA opted for a lowest common denominator strategy - setting no uniform entrainment standard, and basing the impingement standard on traveling screens because they are capable of being installed everywhere. Riverkeeper commented that "technology-forcing" standards like BTA must compel industry to meet ever more stringent limitations and therefore must be established with reference to the best performer in any industrial category. One commenter stated that to be BTA for the industries covered, a technology must be shown to be technologically "available" to all of the facilities in the industry category or subcategory. EPA does not agree that a technology must be available to *all* facilities, but agrees that is should be widely available for the industries covered. As explained above, EPA rejected some technologies as BTA because they are not widely available (e.g., only 15 percent of facilities would be able to comply with a low intake velocity compliance alternative).

EPA disagrees that CWA section 316(b) compels ever more stringent standards. More broadly, EPA does not agree that the language of section 316(b) identifying four elements to which the standard may apply (i.e., CWIS location, design, construction and capacity), necessarily limits what factors EPA may consider in section 316(b) decision-making. Congress did not express a clear and unambiguous intent that 316(b) requirements must be expressed only as uniform national technology-based standards. For example, in considering below threshold structures under the new facility rule (Phase I) the Second Circuit upheld a case-by-case approach and stated that 316(b) "…does not compel the EPA to regulate either by one overarching regulation, or based on categories of sources … or on a case-by-case basis…" *Riverkeeper, Inc. v. USEPA*, 358 F. 3d 174, 203 (2nd Cir. 2004). The U.S. Supreme Court decision further supports EPA's discretion to consider a variety of factors, but section 316(b) imposes no obligation on the agency to do so. Also see Essay 10 for more information.

Riverkeeper commented that EPA did not establish a presumptive hierarchy of technologies that must be applied if available. They stated that for the impingement mortality standard, EPA selected widely available modified traveling screens as the basis for BTA even though there were more effective technologies available at many facilities. EPA agrees that there are more effective technologies than modified traveling screens (such as the 0.5 fps intake velocity), but disagrees that these technologies are widely available (for example, only approximately 15 percent of facilities can meet 0.5 fps intake velocity); therefore the technologies cannot form the basis for

BTA. Also, see Essays 16, 17, and 18. EPA disagrees that a presumptive hierarchy should be applied to the IM standards. EPA selected modified traveling screens as BTA for impingement because it is widely available, demonstrated, feasible, and affordable; the record shows that more than 70 percent of facilities already have some form of traveling screens. EPA concluded that other technologies were also capable of performing equal to or better than modified traveling screens (such as offshore velocity caps), and while these technologies are not widely available and thus should not be considered as the technology basis for BTA (for example, offshore velocity caps are available for about 1 percent of affected facilities), the final rule recognizes such technologies as compliance alternatives.

Riverkeeper commented that EPA is compelled to establish entrainment controls based on closed-cycle and that EPA has no authority to establish impingement only controls. EPA disagrees. The 316(b) statute only requires minimization of adverse environmental impacts (AEI), not its elimination. As the Supreme Court has clearly recognized, Congress knows how to require elimination of a problem when it expects that result. Thus, the Clean Water Act provides, with respect to discharges, that the ultimate goal of the statute is the elimination of the discharge of pollutants and the prohibition of the discharge of toxic pollutants in toxic amounts. See section 101(a) of the Clean Water Act. Minimization necessarily implies choice of the degree of minimization required. Congress has entrusted the Agency with discretion in this area as its decision-maker. EPA has decided that the BTA standard for entrainment should be a structured process that, on a site-specific basis, results in entrainment controls tailored to the conditions at the site and the individual facility. The final rule appropriately addresses both impingement and entrainment AEI. The Second Circuit observed that "[t] he Clean Water Act does not forbid the EPA from addressing certain environmental problems on a case-by-case basis where categorical regulation is not technologically feasible, or when it does not violate the statute's language and is otherwise consistent with Congress's overriding goal of improving the quality of the nation's waters (internal citation omitted here)." Riverkeeper, Inc. v. USEPA, 358 F. 3d at 203. For additional discussion, see Section II and Section VI in the final preamble and Essay 10.

Riverkeeper also commented that for entrainment there should be a rebuttable presumption that closed-cycle cooling is BTA for all facilities with provisions that allow the permittee to attempt to make a showing that demonstrates closed-cycle cooling is not a viable option. As explained above, based on a combination of three factors: land availability, air emissions, and remaining useful life, EPA concluded that closed-cycle cooling was not BTA for existing facilities, and therefore did not based standards on closed-cycle cooling. EPA considered the approach suggested by Riverkeeper to establish standards for entrainment based on closed-cycle cooling as BTA and to provide "off-ramps" for facilities that could demonstrate that closed-cycle cooling was not a viable option. For example, EPA attempted to determine criteria based on the data in its record that would enable it to define a threshold for determining land availability on a nationwide basis, but was unsuccessful. One analysis explored a threshold of approximately 160 acres per GW (gigawatt) below which a facility could not feasibly install cooling towers. Based on acres and the footprint of the facility and its surroundings (primarily those sites for which EPA conducted site visits), EPA found such an approach did not accurately identify which facilities could feasibly install closed-cycle cooling. Commenters stated that EPA's assessment of 160 acres per GW for cooling towers is too simplistic and that having a specific threshold is reasonable only if it is used as a trigger for further evaluation and that land availability should be determined on a case-by-case basis. EPA notes that the 160 acres per GW was simply an attempt at identifying a threshold. Recognizing the limitations of such a threshold, EPA decided not to incorporate this threshold in the final rule.

EPA's decision not to establish closed-cycle cooling as BTA with "off ramps" is broader than its consideration of a land threshold. As explained above, after fully considering all comments and data, EPA finds closed-cycle cooling is not the "best technology available for minimizing adverse environmental impact" on a national basis. Because of a combination of concerns over land availability, air emissions, and remaining useful life of the facility, EPA has rejected closed-cycle recirculating systems as the basis for national impingement and/or entrainment requirements. Nor is EPA able to identify a subcategory for which these concerns no longer apply, nor did commenters suggest one. Moreover, the complex interaction of all of these factors at individual sites does not lend itself to other regulatory options that would require closed-cycle recirculating systems with an "off ramp" if any of the factors were shown to result in unacceptable impacts because this would create a presumption for closed-cycle cooling rather than an equal balancing of all relevant factors. EPA decided not to put its thumb on the site-specific scale by establishing any presumptive BTA entrainment outcome. EPA finds the entrainment standards framework in today's final rule will provide a consistent, more efficient, and more effective approach than standards with an "off ramp."

With respect to one of the IM compliance alternatives, one commenter stated that an Entrainment Characterization Study should not be required for intakes that meet the less than 0.5 fps intake velocity impingement compliance alternative. EPA disagrees since compliance with the impingement standard only ensures reduction of impingement mortality. Juvenile fish have lower swim speeds and smaller energy reserves and therefore cannot escape from an intake with a velocity of 0.5 fps. Many entrainable organisms may be non-motile or slow swimmers; eggs, for example, have zero mobility and zero avoidance response capability, and most early life-stages of fish such as larvae have no skeletal structure and no avoidance response.

One commenter stated that EPA should have considered a "no regulatory action" option. EPA did consider a BPJ rule. EPA disagrees that no action is appropriate in this case because there are technologies that are available, demonstrated, feasible, and affordable for all facilities, and EPA has found the costs of such controls are justified by the benefits. EPA found this rule to be necessary to minimize AEI based on the record, noting the mortality of hundreds of billions of aquatic organisms that are impinged and entrained at cooling water intakes that withdraw water from waters of the United States each year. See the preamble for further discussion of the need for this rule and for EPA's rationale for selecting the regulatory option and rejecting others.

One commenter was concerned that the proposed rigid IM performance standard and low velocity compliance alternative are based on a small number of intakes and does not consider the wide variety of existing technology in-place. EPA disagrees that the IM performance standard and the low velocity compliance alternative in the final rule are based on a small number of intakes. As noted above, traveling screens are already installed at 70 percent of all facilities. The 12-month IM performance standard is calculated from data for 17 facilities located in a large geographic area stretching from Massachusetts to Florida and as far west as Minnesota and Nebraska. See Essay 16A. The 0.5fps velocity is based on the analysis of fish burst swim speeds, and is therefore based on the thousands of intake structures where such fish and shellfish may be located. EPA disagrees that the final IM standard is rigid and notes that the final rule IM requirements take into consideration the wide variety of site-specific conditions and technologies in-place. Further, the final rule allows facilities to choose to comply on an intake basis or facility wide basis, and further allows facilities to select from seven impingement mortality compliance alternatives.

Proposal Option 1

As explained above, after a careful review of the proposed options, additional data, and public comments on both the proposed rule and the two NODAs, EPA has opted to promulgate BTA standards for the final rule that are similar to that of Proposal Option 1. How the BTA standards vary from Proposal Option 1 and EPA's rationale for selecting this option for the final rule are described in detail in Section VI of the final preamble.

EPA received many comments concerning the proposed selection of Option 1. Many supported EPA's selection because Option 1 would not require the specific flow reduction requirements based on closed-cycle cooling contained in Options 2 and 3. Others opposed Option 1 because it included specific impingement mortality requirements including a monthly and an annual standard. Others commented that EPA has failed to demonstrate that current impingement levels are causing AEI. One commenter noted that EPA justified Option 1 largely on the qualitative benefit of protecting threatened and endangered (T&E) species, and yet EPA admits that it is "unable to quantify effects on T&E populations from the Rule."

EPA disagrees with the assertion that existing impingement levels are not causing AEI. First, this assertion reflects the commenters' opinion that AEI requires a population level impact; nothing in CWA section 316(b) states this requirement. EPA further notes this issue was addressed in Riverkeeper I, where the 2nd Circuit stated:

> "We think that the EPA's focus on the number of organisms killed or injured by cooling water intake structures is eminently reasonable. *See* Final Rule, 66 Fed. Reg. at 65,262-65,292. As discussed above with respect to restoration measures, Congress rejected a regulatory approach that relies on water quality standards, which is essentially what UWAG urges here in focusing on fish populations and consequential environmental harm."

EPA used this same approach in Phase I, and this approach was continued without change in the Phase II and Phase III rulemakings. Commenters have not here provided any new data supporting their alternative approach to AEI. Also see Essay 16.

Second, the record shows nearly a billion losses in fish and shellfish due to impingement alone. Even when baseline losses are normalized to an age-1 equivalent, the losses due to IM&E are in the billions. EPA concluded that national BTA requirements for impingement mortality reduction are warranted. EPA disagrees that Option 1 was largely justified on the qualitative benefits of protecting T&E species. Consideration of impacts on T&E was one of several factors considered in selecting Option 1. For detailed discussion see Section VI of the final preamble.

EPA re-considered whether a monthly IM standard was necessary to achieve the full range of environmental improvements under this rule. The 12-month IM performance standard will require a facility to actively evaluate performance during the 12-month period enabling the facility to optimize the technology to improve performance and counterbalance a result that does not meet the standard with a result that exceeds the minimum standard. If EPA had included a monthly average, it would have similarly needed to incorporate some form of allowance for exceedances. An allowance for exceedances provides no incentive for improved operations to avoid such exceedances. As part of this evaluation, EPA determined that the 12-month IM performance standard is sufficient to ensure performance consistent with best technology available. Further, the additional biological compliance monitoring for a monthly standard would not improve the overall technology performance, but would cause additional expense. For these reasons EPA is not promulgating the monthly average that was included in the proposal. EPA's decision is consistent with effluent guidelines where compliance with the monthly average limitation is not required for facilities subject to a longer term limitation such as an average limitation (e.g., pulp and paper 40 CFR 430 Subpart B AOX limitations). For further response to comments on monthly and annual IM performance standards, see Essay 16A.

Environmental organizations opposed the selection of Option 1 because, in their view, it did not include specific entrainment reduction control requirements but allowed entrainment reduction requirements to be established on a site-specific basis. Commenters indicated that EPA abdicated its responsibility to adopt effective standards for minimizing environmental impact from cooling water intake structures. Some commenters stated that it was illegal for EPA to select Option 1 over Options 2 or 3 and indicated that closed-cycle cooling was technologically and economically feasible and that EPA should honor the science and should also presumptively identify closed-cycle cooling as BTA for existing facilities. A State agency suggested EPA should establish an impingement standard of 88 percent reduction in mortality and an entrainment standard of at least 70 percent reduction in mortality.

As discussed above, in the final rule, EPA established an impingement mortality performance standard based on modified traveling screens (with a fish return) because the technology is widely available, demonstrated, and affordable. There are several other technologies that perform comparably or better than the BTA technology, that while not available widely and thus not BTA, are available for some facilities and these technologies are included in the final rule as compliance alternatives. Also as explained above, EPA did not establish a BTA entrainment standard based on the performance of closed-cycle technology. EPA concluded that there is no "best" performing technology that is widely available, demonstrated, and affordable. Further, EPA could not identify another technology with performance that is anywhere near the performance of closed-cycle cooling. See TDD Chapter 5. EPA notes the comment suggesting an entrainment standard of 70 percent did not provide the basis for such a standard. As discussed above, the final rule adopts a BTA entrainment standard that requires determination of specific entrainment reduction measures on a site-specific basis. The standard prescribes a structured process for determining such controls after required consideration of identified factors at 40 CFR 125.98(f), as well as other factors to the extent that the applicant has submitted such information. Also as discussed above, EPA is not precluded from considering standards that requirement a site-specific determination.

EPA notes Riverkeeper I has already upheld EPA's authority to establish site-specific requirements:

> "Section 316(b) merely directs the EPA to require every cooling water intake structure subject to regulation under section 306 (which below-threshold structures indisputably are) to reflect the "best technology available." It does not compel the EPA to regulate either by one overarching regulation, or based on categories of sources (as does section 306), or on a case-by-case basis (which, incidentally, was the tack the EPA took in its first crack at regulations pursuant to section 316(b)."

and

> "The Clean Water Act does not forbid the EPA from addressing certain environmental problems on a case-by case basis where categorical regulation is not technologically feasible, *see Nat'l Wildlife Fed'n*, 286 F.3d at 566-67 (upholding the EPA's decision to regulate color discharges on a case-by-case basis), or when it does not violate the statute's language and is otherwise consistent with Congress's overriding goal of improving the quality of the Nation's waters, *see Natural Res. Def. Counsel v. EPA*, 859 F.2d 156, 201-02 (D.C. Cir. 1988) (upholding the continued enforcement of best professional judgment permit limits established prior to the promulgation of categorical limitations). It is, of course, true that once the EPA promulgates applicable standards, regulation of those facilities subject to those standards on a best professional judgment basis must cease, *Natural Res. Def. Counsel v. EPA*, 859 F.2d at 200, but where the EPA is justified in not regulating uniformly, we see no reason why the EPA should have to avoid all regulation. <u>Given a choice between not regulating below threshold structures because of technical impracticalities and regulating them on a case-by-case basis, we think the EPA reasonably chose the latter course</u>." [underlined for emphasis]

Some commenters, including state agencies, opposed Option 1 because of concern that the site-specific determination of entrainment requirements would place additional burden on state agencies already experiencing backlogs in permitting efforts. One noted that EPA should provide comprehensive and clearly detailed guidance on the implementation of BPJ. EPA is aware of the burden that site-specific determinations for entrainment will place on state agencies. Where the final rule includes a site-specific determination, it reduces this state burden by requiring the facilities to conduct studies, analysis, and evaluations. In addition, the required peer review will significantly review state agency review burden.

<u>Other Options Considered for Today's Final Regulation</u>

EPA considered several other options in developing today's rule, but ultimately rejected them.

Proposal Option 4

(Flexible Impingement Mortality Controls Similar to Final Rule at Existing Facilities with DIF of 50 mgd or more; BPJ Permits for Impingement Mortality and Entrainment at Existing Facilities with Design Intake Flow between 2 mgd and 50 mgd; Site-specific Entrainment Standard for Existing Facilities with DIF of 50 mgd or more; and Uniform Impingement Mortality and Entrainment Controls for All New Units at Existing Facilities Similar to Final Rule)

At proposal, EPA's preferred option was Option 1, which was the option closest to today's final rule. At proposal, EPA also considered a variant of Option 1, called Option 4, which changed the impingement mortality requirements for facilities under 50 mgd from the performance standard in Option 1 to BTA as determined by best professional judgment. In the case of an existing facility below 50 mgd that added a new unit, the flow associated with the new unit would have been subject to the uniform entrainment requirements based on closed-cycle cooling. Finally, all existing facilities withdrawing more than 2 mgd of DIF would have been subject to entrainment requirements established on a site-specific basis, with the exception noted above for new units.

EPA received many comments concerning the rejection of Option 4. Many commenters opposed EPA's rejection of Option 4 indicating that Option 4 was consistent with EPA's rationale used in developing the Phase II and Phase III rules stating that smaller intakes have lower impact and withdraw a smaller proportion of the source water. Some suggested that EPA failed to follow the directive provided to EPA by the Supreme Court Entergy decision and questioned whether EPA violated EO 13563 by selecting Option 1 over Option 4 failing to "tailor its regulations to impose the least burden on society...." Commenters indicated that the proposed Option 4 benefits are nearly the same as Option 1 but with a $56 Million lower cost. Some indicated that the cost burden will be disproportionate for smaller facilities with minimal incremental benefit and that the larger facilities are the most likely to be able to comply with the data collection, operational and monitoring requirements of the proposed rule. Other commenters supported EPA's rejection of Option 4 stating that it provides little guidance to States for making BTA determinations and does not provide industry with a well-defined compliance standard for planning purposes. In particular, Riverkeeper stated that it is the least protective and most legally inadequate of all the options that EPA considered and should be given no further consideration.

EPA ultimately rejected Proposal Option 4 because it found that the technologies on which the requirements of today's final rule are based are available, feasible, demonstrated, and affordable for all regulated facilities on a national basis. Moreover, EPA's analysis showed that the difference in the total costs for the two options was nominal. Additionally, EPA notes that many facilities with a DIF under 50 mgd already use closed-cycle cooling and would have minimal burden under the final rule. EPA's cost analysis shows that 321 of 595 (54 percent) of facilities under 50 mgd have technologies would meet the final rule requirements, and 22 (4 percent) have no compliant technologies in place (weighted, based on detailed questionnaire responses, see the TDD for more details). The remaining facilities have one or more technologies in place and need minor upgrades or need to complete demonstration studies. Thus most facilities would have no difficulty complying with either the requirements EPA is establishing in today's final rule or with those under Proposal Option 4. Proposal Option 4, by not distinguishing between those facilities under 50 mgd that have already minimized adverse environmental impacts from those that have not, masks the actions that would have to be taken by the latter group to comply with today's final rule. In addition, the flexibilities introduced in the June 11, 2012, NODA and included in today's final rule apply to all facilities, rather than taking the Option 4 approach at proposal of providing for more Director discretion for only the smaller withdrawing facilities. EPA also concluded that the data collection activities required under the final rule will be more protective of threatened and endangered species because it provides information on a larger number of facilities than Proposal Option 4 for consideration by the Director in permitting decisions. Lastly, EPA acknowledges that Proposal Option 4 is more burdensome to permitting authorities than is the final rule, as it requires more site-specific decision-making.

EPA disagrees with assertions that lower flow facilities are small facilities, that the rule would result in a disproportionate burden on small facilities, or that the costs are too high. For a discussion of why EPA appropriately subjected facilities between 2 and 50 mgd to the BTA standards promulgated today, see Essay 14 and Section VI of the final preamble.

For the reasons explained above, EPA agrees with the commenters that supported rejection of Option 4 and notes that, in comparison, the selected Option 1 will reduce the burden on State agencies, provides a more clearly defined path to compliance for impingement reduction and will provide more protection for T&E species at smaller facility intakes. The proposed rule and final rule are not comparable to Phase II or Phase III, thus any arguments comparing them are not applicable. For example, Phase II (and III) would have established performance standards for entrainment for in-scope facilities, whereas today's rule requires IM standards and site-specific determinations for E; see Essay 14 for more discussion.

With respect to comments on reducing burden to society, the final rule is more cost effective than BPJ at any threshold suggested by commenters. The final rule requires studies as part of the permit application, and includes many pre-approved technologies and streamlined compliance alternatives for the IM standard that significant reducing biological monitoring for compliance. EPA expects that the vast majority of facilities subject to this rule will elect to comply with the IM standard via one of the seven compliance alternatives that does not require biological monitoring to demonstrate compliance with the numerical IM performance standard. EPA's record shows that the compliance technology costs for the IM optimization study are less than standards determining via BPJ due to the expense of biological studies and monitoring associated with a BPJ determination. Based on the Phase II ICR (costs of $395k to $679k per facility for initial permit application, $7k annual reporting and monitoring), submission of basic characterization studies and permit application materials upon which site-specific impingement requirements would cost the facilities from $59.8 million to $99.3 million per year in aggregate ($2012, for the 531 facilities with a DIF less than 50 mgd (i.e., Option 4)). Therefore the record shows that it is more cost-effective to set uniform standards for impingement than to utilize BPJ. (This statement does not hold true for entrainment.)

With respect to comments on AEI, the record contains studies for more than 40 facilities with less than 50 mgd flows, showing low flow facilities do impinge and entrain fish and shellfish. The record also shows that low flow facilities can withdraw large portions of water from small waterbodies. Approximately 20 percent of facilities (41 facilities) below 50 mgd withdraw more than 5 percent of the mean annual flow of the fresh water river sources on which they are located. At least 14 percent of manufacturers below 50 mgd withdraw more than 5 percent of the mean MAF. Further, there are 17 facilities with a DIF less than 20 mgd and withdraw more than

5 percent MAF, and another 11 which withdraw from small unnamed or unknown source waters. Thus one fourth of the 116 facilities under 20 mgd exceed 5 percent MAF. Based on a review of the existing facility detailed questionnaire, EPA also found that facilities that withdraw less than 50 mgd from a river or estuary and that are also small businesses are co-located with one or more facilities. At a minimum these small businesses in aggregate pose the cumulative impact of a higher percent of the source water being withdrawn; see TDD Chapter 5 for more information. After a careful review of the public comments on both the proposed rule and the two NODAs, EPA concluded that none of the issues raised by the commenters warrant a change in EPA's decision to not select Option 4. See the Basis for the Final Regulation section of the preamble for further discussion and Essay 14.

Regarding the comment that EPA violated EO 13563, EPA has assessed costs and benefits (C-B) for the final rule and has reasonably determined that the benefits of the rule justify the costs. EPA agrees that exclusion of nonuse benefits from C-B considerations is arbitrary. It is disingenuous for commenters to argue C-B rationales to support a threshold and simultaneously discount EPA's efforts to fully monetize the benefits of this rule. For example, the exclusion of nonuse benefits from C-B consideration suggests that the nonuse benefits of large flow facilities may be different than small flow facilities. Further, cumulative impacts of facilities with DIF below 50 mgd are significant in most of the U.S. At least 54 percent of withdrawals by just those facilities with DIF below 50 mgd are cumulative withdrawals, i.e., there are withdrawals by more than one facility on the same river segment. EPA does not have the data to monetize benefits based on reduced cumulative impacts. For all of these reasons, while EPA has considered costs and benefits, a threshold selected exclusively on C-B grounds is unsupported by the record. See Sections VI and XI of the preamble for further discussion.

One commenter, Georgia Pacific, stated that EPA has failed to account for certain state level trends – that future state-driven water conservation efforts could cause several of their smaller facilities (with design intake flows greater than 2 mgd but less than 50 mgd) that are currently exempt based on the 25 percent cooling water threshold to be subject to this existing facilities rule as a result of reducing overall water use and thereby increasing the percentage of cooling water used. The selection of Option 4, rather than Option 1, would minimize these unintended consequences. EPA notes that the commenter supports this assertion with an unsupported statement that "cooling water use as a percentage typically becomes greater as water is recycled at most manufacturing facilities." EPA disagrees with this statement as it relates to the final rule definition of cooling water. The definition of cooling water in the final rule excludes cooling water that is used in a manufacturing process either before or after it is used for cooling. Thus, this water is considered as process water for the purposes of calculating the percentage of a facility's intake flow. EPA included this reuse clause in the cooling water definition as an incentive for flow reduction through reuse of cooling water. Thus, the cited facilities need only include cooling water reuse in a similar proportion as the overall flow reduction in order to maintain their current status. EPA notes that the opposite (i.e., facilities may fall out of scope) may be just as likely, or even more likely to occur, since this clause allows facilities that currently fall within the scope of the final rule to no longer fall within the scope if they are able to reduce cooling water use to less than 25 percent through reuse.

Proposal Options 2 and 3

Proposal Option 2—Flexible Impingement Mortality Controls Similar to Final Rule at All Existing Facilities that Withdraw over 2 mgd DIF; Require Flow Reduction Commensurate with Closed-cycle Cooling by Facilities greater than 125 mgd DIF and Uniform Impingement Mortality and Entrainment Controls for All New Units at Existing Facilities.

Proposal Option 3—Flexible Impingement Mortality Controls at All Existing Facilities that Withdraw over 2 mgd DIF; Require Flow Reduction Commensurate with Closed-Cycle Cooling at All Existing Facilities over 2 mgd DIF.

Proposal Option 3 was, in many ways, the same as requiring closed-cycle cooling at all existing facilities. As described above, each of the three factors for rejecting closed-cycle cooling as BTA for entrainment would apply with equal force for Proposal Options 2 and 3. As a result, EPA has concluded Proposal Options 2 and 3, similarly, are not appropriate as BTA for entrainment.

EPA received many comments concerning the Rejection of Options 2 and 3. Many commenters opposed EPA's rejection of Options 2 and 3, indicating that the closed-cycle cooling requirement in Options 2 and 3:

- Were consistent with the goals of the Clean Water Act;
- Would increase air pollution by only a small amount;
- Provide less of a burden on State agencies;
- Are technologically and economically feasible;
- Would provide far more robust protection for America's waterways;
- Would create jobs;
- Have higher monetized benefits that EPA estimated.

In particular, environmental organizations commented that closed-cycle cooling should be the presumptive standard and that the four factors identified in the proposal in support for rejecting closed-cycle cooling as BTA could be addressed by allowing the permittee to demonstrate closed-cycle cooling is not a viable option and that particular sites with difficulties can be addressed individually. They indicated that Option 3 is well-supported by the law and by scientific facts and that the EPA estimated costs of complying would be only $1.47 per household for electric generators even under Option 3, and that only 3.4 percent of facilities would experience even "moderate" cash flow impacts. They indicated that Option 3 would not cause electric reliability problems, would not increase electricity prices, and would not cause any significant adverse environmental effects. Riverkeeper commented that EPA overestimated closed-cycle costs and that the costs of retrofitting to closed-cycle cooling are minimal from both a microeconomic and a macroeconomic perspective. They note that at the company level, EPA estimated that, at the very most, 1.5 percent of existing power units would retire as a result of the compliance costs and consider this an overestimate since EPA assumed companies would assume costs rather than pass them on. They also note that the annualized total cost of Option 3 at a 7 percent discount rate, the highest cost estimate in the analysis, is $4.86 billion, or 0.033 percent (1/30 of one percent) of the $14 trillion U.S. GDP.

Many other commenters supported EPA's decision not to select Options 2 and 3 because they did not believe closed-cycle cooling should be a BTA requirement. Many agreed with EPA citing one or more of the four factors identified in the proposal to support rejecting closed-cycle cooling as BTA (increased air emissions, land availability, remaining useful life, and energy reliability) as reasons for not selecting Options 2 and 3 along with:

- The costs far exceed benefits. Net benefits versus costs for Options 2 and 3 are far worse than Option 1 and costs are at least 10 times those of alternative technologies;
- Closed-cycle cooling is not feasible at many existing facilities;
- Closed-cycle cooling increases evaporative losses and chlorine use;
- These options do not allow for due consideration of site-specific technical feasibility;
- These options would result in an increase in early unit retirement;
- These options would result in a reduction in debris removal;
- EPA has failed to demonstrate that current impingement levels are causing AEI.

As previously explained, EPA assessed a number of different technologies that reduce impingement mortality and entrainment as the possible basis for section 316(b) requirements. EPA concluded that closed-cycle recirculating systems (based on wet cooling towers) are the most effective technology for reducing impingement mortality and entrainment. EPA disagrees that costs for retrofitting closed-cycle at existing facilities are minimal. Total costs for power plants of $5 billion are almost 4 percent of total electricity sector revenues of $126 billion – by any measure a not insignificant amount. Therefore, EPA did look at costs and the other considerations cited above by Riverkeeper in EPA's deciding whether to reject options requiring closed-cycle cooling. EPA determined they were not dispositive.

As explained above, EPA has decided not to establish a performance standard for impingement and/or entrainment based on closed-cycle recirculating systems for existing facilities. As described previously, each of the three factors for rejecting closed-cycle cooling as BTA for entrainment would also apply in the case of Proposal Option 2 or 3, despite the smaller number of facilities that would be subject to a requirement to retrofit. The technology basis for entrainment controls for facilities above the threshold under this option would have been wet cooling systems. The constraints discussed above that are associated with retrofitting a large portion of the universe of affected facilities led EPA to conclude that requiring closed-cycle cooling on a uniform basis scale was not appropriate for a national regulation.

EPA notes that it proposed multiple options that included closed-cycle, and solicited comment on all aspects of closed-cycle cooling. After fully considering all comments and data, EPA still finds closed-cycle cooling is not the "best technology available for minimizing adverse environmental impact" required on a national basis. Because of a combination of concerns over land availability, air emissions, and remaining useful life of the facility, EPA has rejected closed-cycle recirculating systems as the basis for national impingement and/or entrainment controls. Nor is EPA able to identify a subcategory for which these concerns no longer apply.

After a careful review of the public comments submitted in response to both the proposed rule and the two NODAs, EPA concluded that the issues supporting the selection of Option 2 or 3 raised by the commenters did not warrant a change in EPA's decision to not select Options 2 or 3. See the Section VI of the preamble for further discussion regarding this decision. Additional discussion is provided above regarding comments concerning the specific factors for supporting site-specific entrainment and rejecting a uniform standard based on closed-cycle.

Regarding the 125 mgd threshold for Option 2, Riverkeeper commented that EPA should keep DIF as the measurement because DIF puts fewer burdens on States and because the actual intake flow (AIF) may change over time. They were concerned that once the NPDES permit determination is set, an increase of the AIF in the future may not be reassessed for years due to permit backlogs. See proposed rule at 76 FR 22192 and 22195, as well as the final preamble for further discussion of AIF and DIF. EPA has not selected Option 2 for the final rule, so specific comments regarding use of a threshold regarding AIF or DIF with respect to Proposed Option 2 are not relevant to the final rule. The final rule applies to existing facilities with a DIF greater than 2 mgd. In addition, existing facilities with AIF greater than 125 mgd have additional information submittal requirements.

For the final rule, EPA also considered some variations to the proposed Options in response to comments.

Proposal Option 4 Variant

EPA also considered and rejected a variant of Proposal Option 4 for the same reasons Proposal Option 4 was rejected. As compared to Proposal Option 4, the variant does not include the impingement mortality flexibilities, but instead adopts the 50 mgd threshold to determine those facilities for which the Director has discretion in determining BTA. EPA analyzed this option to directly compare the effects of introducing flexibilities associated with the IM compliance alternatives at all facilities (as the final rule does) to the effects of introducing greater Director discretion for a subset of facilities, via BPJ permitting (as the Proposal Option 4 variant does). The preferred option at proposal, Option 1, was estimated to be more costly than Option 4 (Option 1 was estimated to cost $384 annually as compared with $327 million annually for Option 4). The final rule is estimated to cost $275 million annually in comparison with an estimated cost of $290 million annually for the Proposal Option 4 variant. Thus, EPA found that the approach of introducing IM flexibilities at all facilities was both more effective at reducing costs to society and more readily justified as best technology available, compared to the approach of introducing greater Director discretion for only a subset of facilities (below 50 mgd). Hence, EPA rejected the Proposal Option 4 variant, and the approach of introducing greater Director discretion for only a subset of facilities (below 50 mgd).

Proposal Option 2 Variant

EPA also considered a variation of Proposal Option 2 that would have used 125 mgd AIF rather than 125 mgd DIF as the threshold. However, as described above, EPA rejected Proposal Option 2 and, for the same reasons, rejected this variant of Option 2.

Site-Specific Approach to Addressing Impingement

Many commenters (primarily from manufacturing facilities) commented that EPA should adopt a site-specific approach to addressing impingement mortality, similar to that employed for entrainment. As a result, EPA also considered an approach that would have established both impingement mortality and entrainment requirements fully on a site-specific basis taking into account for the particular facility, among other factors, those previously described as pertinent to EPA's 316(b) BTA determination. EPA rejected a fully site-specific approach for impingement controls principally because technologies for impingement mortality are available, feasible, demonstrated, and affordable for facilities nationally. Because technologies are available, a fully site-specific approach would place unnecessary burden on State permitting resources. Moreover, the final impingement mortality standard includes several alternatives that allow site-specific demonstration that a particular technology performs at a level representing the best technology available for the site. EPA is instead promulgating a modified version of the proposed rule, adding several elements of flexibility, and thus directly addressing many of the concerns raised by these commenters. Also see Essays 10 and 16.

Consideration of Costs and Benefits on a Site-specific Basis in Establishing Entrainment Mortality Controls, Including a Cost-Cost Test

Commenters indicated that the rule should have a robust economic variance provision. In general, they argued that the inclusion of a cost-cost variance is necessary to avoid the irrational result of requiring a facility to install a technology where that facility has unique, site-specific characteristics that cause individual compliance costs to be many times greater than those compliance costs considered by EPA. They note that EPA's conclusion that a specific cost-cost variance is not necessary because under the proposed rule the Director already would have the discretion to consider such factors does not apply to impingement requirements since there is no allowance for the Director to provide a variance from any of the impingement mortality requirements based on cost and benefits. They state that if EPA intends to include this flexibility, the regulatory language must be clarified.

As discussed in the proposal, EPA found that the cost-cost test it had adopted in the Phase II rule would have proved difficult to implement in part because the Appendix to the Phase II rule discussing how to apply the test was prone to uncertainty and error. EPA notes that the Phase II rule included requirements for entrainment reductions, and the final Phase II rule was more costly than today's rule even though it only addressed existing large flow electric generating facilities. While not required to do so, the final rule includes sufficient flexibility to allow facilities to avoid exceptional costs. EPA accomplished this by structuring the final rule to allow facilities to choose from multiple impingement mortality compliance alternatives presenting facilities with a range of different costs associated with each alternative. Thus, facilities are free to choose the lowest cost alternative. These include streamlined alternatives based on modified traveling screens or a system of technologies that are intended to result in reduced long-term costs by reducing future monitoring requirements. Also the final rule allows the Director to conclude based on site-specific data that impingement mortality at the site is de minimis and therefore no additional controls are warranted to meet the BTA impingement mortality standard. EPA has determined that the available compliance alternatives provide sufficient flexibility, and that the costs of such controls is sufficiently low such that no facility will experience an exceptional level of cost and need a cost variance. Commenters have not provided data to the contrary. Indeed, EPA notes that detailed comments and data on EPA's costs of the proposed IM requirements support the agency's finding on this matter; see TDD Chapter 8 concerning costs and Chapter 12 for uncertainty analysis in costs. Therefore EPA has not included a cost test for IM in the final rule because of the flexible nature of the final impingement mortality standard (i.e., includes seven compliance alternatives), the significantly less cost of this rule (compared to Phase II), as well as the finding that IM is available, feasible, and achievable.

Riverkeeper suggested the compliance costs to be considered in any cost-cost variance should include only capital expenditures, operation and maintenance, and energy penalty, not speculative, indirect add-on costs. EPA notes that the final rule does not include a specific cost-cost variance and that the Director's evaluation of site-specific entrainment requirements may include consideration of many factors including costs. EPA recognizes that the Director is in the best position to evaluate what entrainment controls are appropriate at a particular site taking into account the costs cited by the facility and other factors identified at 40 CFR 125.98(f)(2).

Subcategorization

Capacity Utilization Rating As a Basis for Different Standards, Peaking Units, Seasonal Operation and Other Related Comments

EPA received a number of comments concerning capacity utilization rates (CUR) and the applicability of requirements to peaking units and intermittently operating facilities. Some argued that facilities with low capacity utilization rates should be subject to the same limitations on entrainment, entrapment, and impingement as other facilities. Most argued that low CUR facilities should be exempt from impingement and/or entrainment requirements with possible exceptions for those that use disproportional amounts of water or operate during periods of peak biological activity. They note that as EPA explained in the preamble to the Phase II rule, imposing entrainment controls on facilities with capacity utilization rates at or below 15 percent is not economically practicable and that the impacts of such facilities is small. Various definitions for low CUR were suggested (e.g., 10 percent, 20 percent, 1,500 hrs per year, percentage set equal to the BTA mortality rates). Another stated it is unclear as to what flexibility NPDES states have in addressing old power plants that are rarely, if ever run. They questioned whether EPA considered alternative permitting and/or implementation procedures to address the older facilities that are mothballed, placed on cold standby, or maintained in various other states of operational readiness but are rarely, if ever, placed into operation. An industrial stakeholder stated that the factors EPA used to justify eliminating consideration of low CUR in determining requirements don't necessarily apply to manufacturing intakes with a low frequency of use such as for aircraft engine testing and research and development activities. In order to account for such operations, they suggested EPA should exempt CWISs used for these activities or use intake flow capacity utilization to determine which CWIS at manufacturing facilities are used often enough to justify the costs of any further regulation.

The final rule, in contrast to Phase II, does not establish a single uniform technology-based requirement for entrainment reductions, but rather entrainment determinations will be made on a site-specific basis. Further, the final rule includes seven alternatives for achieving the impingement mortality standard. To this extent, therefore, the CUR provision in the Phase II rule is not particularly pertinent to this final rule. EPA disagrees that, as a categorical matter, low

CUR facilities have minimal impact. EPA found that low CUR facilities are generally peaking plants that operate at full capacity for portions of days during a few months or less. Further, EPA found that some sites continue to withdraw water through their cooling water intake structure even when no power is being generated. With respect to entrainment, if that period of cooling water intake operation corresponds with times when spawning is occurring, those facilities could have significant entrainment. In contrast to Phase II which included minimum entrainment reductions, today's BTA standards for entrainment and impingement mortality are less costly and do not result in disproportionate economic impacts, even for low CUR units. Therefore, EPA has no record basis for and is not including an outright exemption for all low CUR facilities in the final rule. For the same reasons, EPA is not including an exemption for "infrequently" operated intakes at manufacturing facilities.

EPA notes that with respect to today's IM standard, all facilities have seven compliance alternatives. In particular, EPA notes that the lowest CUR units may indeed be operated at times where I and or E are minimal. Such facilities may be able to comply with the impingement mortality standard under 40 CFR 125.94(c)(6) with a system of technologies, such as flow reduction, location, and seasonal operation, demonstrated to achieve comparable impingement mortality reduction performance to that achieved by modified screens. Alternatively, under 40 CFR 125.94(c)(11) a facility can demonstrate to the Director that impingement mortality at its site de minimis and consequently, no additional controls are warranted.

However, EPA agrees there are valid reasons that the IM requirements should be considered on a site-specific basis for some infrequently used units, especially some very low CUR units and that the existing IM flexibilities may not account for such situations. Therefore, while the final rule applies to low CUR units, it includes a provision that enables the owner or operator of low CUR units to request the Director to establish BTA standards for IM for that unit's cooling water intake structure which are less stringent that today's final IM standards. After consideration of various approaches to regulating low CUR facilities, EPA concluded that only those intakes serving power generating units with a CUR of less than 8 percent may request less stringent impingement mortality controls as determined by the Director. In particular, CUR units serve critical energy reliability functions, such as during peak energy demands or during emergency events (such as a baseload unit going offline due to flooding). Therefore, EPA has determined that even with the numerous IM flexibilities, an additional provision specific to low CUR units was necessary to ensure energy reliability. See 40 CFR 125.94(c)(12). Also see the Implementation section of the preamble for further discussion.

One commenter requests that State Directors be granted specific discretion to consider capacity utilization in establishing impingement and entrainment standards and monitoring requirements and if a capacity factor-based standard is unacceptable to EPA, an "off-ramp" based on AEI should be considered. EPA disagrees that AEI should be considered for impingement mortality standards except where for the most rare cases where the de minimis impingement can be demonstrated under 40 CFR 125.94(c)(11). As discussed above, EPA has determined that low CUR facilities will have little difficulty in complying with the BTA impingement mortality standard, given the broad range of compliance alternatives and the provision at 40 CFR 125.94(c)(12). EPA notes that under the final rule entrainment requirements will be established in a site-specific proceeding that will take into account environmental impacts of the site. The permit application requires, among other data, information specific to operational status at 40

CFR 122.21(r)(8), as well as the baseline biological characterization at 40 CFR 122.21(r)(4). EPA expects that this will inform the Director, in establishing entrainment controls specific to low CUR facilities.

One commenter suggested that an alternative approach would be to allow consideration of capacity utilization factor in the context of flow reduction and the calculation baseline to calculate reductions in impingement and entrainment. EPA disagrees with this suggested approach. EPA does not consider the relationship between the historical actual intake flow and the design intake flow as an indicator of flow reduction. For example, many baseload facilities operate at an AIF of approximately 50 percent of their DIF. These facilities should not get credit for the unused capacity of their intake structures. However, if a facility chooses to reduce operation as a flow reduction strategy, credit for the corresponding reduction in AIF may be incorporated in the system of technology compliance alternative.

One commenter stated that low capacity facilities should not be required to complete the proposed Entrainment Characterization Study (ECS) because they do not operate frequently enough to meet the proposed permit application requirements. EPA disagrees. Any facility that withdraws more than 125 mgd must submit the ECS. Since the calculation of the AIF includes days of zero flow, facilities with low CUR should also have a low AIF and consequently, few such facilities, if any, would need to complete an ECS as part of their permit application. This 125 mgd provision is also intended to address those situations where the facility is a low CUR facility, but continues to withdraw cooling water even though it is not producing electric power.

A State agency commented that DIF should be used instead of AIF for determining entrainment requirements because using AIF gives an unfair advantage to peaking generators when assessing need for entrainment requirements. These peaking generators come on line and intake large quantities of water during their hottest and driest summer months, which only exacerbates the potential for environmental harm. EPA disagrees that DIF would be the better measure but understands that at certain sites, even facilities with lower AIF may have a substantial entrainment impact where high flow volume coincides with high biological densities or stress. As discussed above, this is why EPA has not categorically exempted peaking plants from the rule, and has not exempted such facilities from IM standards or entrainment requirements.

Some commenters disagreed with EPA's assertion that peaking unit operation may coincide with spawning periods. Other commenters noted that this may be true for the northeast but may not be true for other regions like Florida where peak spawning occurs in the spring and fall. EPA agrees that the timing between peaking unit operation and high biological activity will vary from region to region and site to site. However, as discussed above EPA does not have a record basis for exempting such units from requirements, and commenters here did not provide any such basis. As discussed above, EPA expects that the Director will take into consideration the operating schedule and seasonal biological data when developing actual site-specific entrainment requirements.

One commenter expressed concern that low CUR plants will have difficulty collecting required characterization and monitoring data without forced operation. Facilities should not be required to operate to collect such data. Operating solely for the purpose of satisfying the permit application requirements would result in more entrainment/impingement, and unnecessary costs, fuel use, and air emissions. EPA should consider amending the permit application and post-installation verification monitoring requirements so that facilities can collect and submit impingement mortality and entrainment data collected when they otherwise would be operating and, if operations are sufficiently unpredictable, allow for waiver of requirements. EPA agrees that facilities should not be required to operate their cooling system in order to collect data. As noted above, the final rule does not require a facility to conduct biological compliance monitoring to demonstrate compliance with today's IM standard. Rather, that approach is one of seven compliance alternatives. Facilities that choose to comply with the alternative that involves biological monitoring to demonstrate compliance with the numeric performance standards will not be required to operate the intake in order to collect data. Monitoring periods in which there was no operation will simply have no impingement data to submit. In other words, if the facility did not operate the intake structure in March, that facility did not impinge or entrain any organisms in March, and the facility data would appropriately reflect zero counts. Finally, 40 CFR 125.96(f) provides that a facility may request less frequent monitoring under certain conditions. With respect to the permit application requirements, EPA notes that the required source water baseline biological characterization data is an evaluation of the biological community in the vicinity of the cooling water intake structure and does require the operation of the intake to be completed. EPA also notes that the ECS at 40 CFR 122.21(r)(9) specifies data gathering must be representative of entrainment at the intakes, thus nothing in the rule requires facilities to be operated to collect data. Similarly, the entrainment monitoring to support the facility's calculations for the Entrainment Characterization Study must be collected during periods of representative operational flows for the cooling water intake structure.

Commenters expressed concern that the installation of controls at low capacity units which can operate as independent profit centers is not cost effective as the capital cost cannot be recouped given the limited operation of the unit. They argue that requiring even the performance of advanced studies at these facilities, let alone the installation of technology, could potentially force the early retirement of these facilities and that the continued availability of low utilization units during times of peak demand significantly improves the reliability of the grid. If they are deemed to be "reliability, must run" facilities by the independent system operator charged with ensuring the stability of the electric system, then the costs of technologies or additional studies may be borne by the ratepayers. One suggested that, at the least, EPA should include a provision that allows the Director to avoid requiring studies for low CUR facilities in the event the facility operator is willing to enter into an agreement to retire the facility at the close of the eight-year compliance window.

As explained above, EPA has found IM controls are available, feasible, and achievable. EPA disagrees that additional relief is warranted for low CUR units, as discussed above, based on the economic analysis of the less costly (compared to Phase II) rule. EPA has already included flexibilities for requirements to submit studies, and for facilities with low CUR units, as described above. EPA's analyses demonstrate that the final rule is affordable, including for low CUR facilities. Regarding the comment requesting reduced requirements for low CUR units planning retirement see response under "Remaining Useful Plant Life Should be Considered in Establishing Compliance Requirements" section above. Regarding the costs of entrainment controls, EPA notes that entrainment requirements are based on site-specific considerations including costs.

Waterbody Type as A Basis For Different Standards

In general, industry disagreed with EPA's decision to not consider proportional flow, waterbody type, or associated fish reproductive strategies as a basis for different requirements. They stated that EPA's rationale for exempting facilities with intake flow less than 5 percent of waterbody flow under Phase II remains valid, that the impact of small intakes on large rivers are negligible and such adoption would also serve to reduce the administrative and implementation burden on State permitting agencies. Others suggested EPA should exempt entrainment requirements for greater than 125 mgd intakes where intake flow is less than 5 percent of waterbody flow such as on the Mississippi River. EPA disagrees that proportional flow should be a consideration in applying the BTA standards for the final rule.

EPA notes that the Phase II rule exemption where withdrawals are less than 5 percent of the mean annual flow was only for freshwater rivers and streams, and further only applied to entrainment requirements. Here commenters are suggesting that such withdrawals should be outright exempted, including exempted from IM requirements. EPA disagrees; see Essay 14 for full discussion. Next, commenters assert that all such withdraws pose negligible impacts, but did not provide data supporting this position. As discussed above, AEI is defined as impingement and entrainment, and the studies in the record show that facilities of all sizes and on all waterbodies do impinge and entrain numerous organisms. EPA was upheld on this issue, and has neither proposed to change nor identified a record basis to change this definition. Further, as discussed above and in the preamble, EPA has identified significant potential for cumulative withdraws and cumulative impacts, such that exempting individual facilities would be inappropriate. In this final rule entrainment requirement are established on a site-specific basis, and as such, the need for entrainment requirements will be determined by the Director on a site-specific basis, which may take impacts on the waterbody into consideration. Therefore, an exemption is neither appropriate nor necessary.

Many industry stakeholder commenters wanted EPA to consider waterbody and or fish characteristics when establishing entrainment requirements noting that waterbody type is an important factor regarding AEI. The primary focus was on entrainment but a few mentioned both entrainment and impingement requirements. Suggested approaches include: exclusion based on predominant fish reproductive strategies; retaining the Phase II exclusion for lakes, reservoirs, and river/stream intakes with DIF less than 5 percent of waterbody flow; and exclusion of Great Lakes. In particular commenters focused on the differences between entrainment rates of eggs and fish larvae particularly between coastal versus inland freshwater bodies. Regarding reproductive strategies of the species present in the waterbody, commenters stated that it makes no sense for EPA to apply entrainment standards to fresh water systems where broadcast spawning species do not exist. Many commenters also questioned EPA's argument and supporting documentation against subcategorizing intakes based on waterbody type. They particularly took issue with EPA's assertion that data in the six graphs presented in DCN 10-6701 and 6701A support EPA's conclusion that entrainment concentration is similar in all waterbodies. Commenters were concerned as well with the lack of any explanation of the source for the underlying data, the methodology used to analyze the data, the unusual use of milligrams per liter units, the variation in sample sizes, or the use of different scales on the y-axis. They also argued that the six graphs in EPA's documentation that show density of organisms in various waterbody types appear to clearly show that entrainment concentrations in marine and estuarine environments are much higher than entrainment concentrations in fresh waterbodies.

Riverkeeper supported EPA stating that there is a legal requirement for uniform national standards across all waters of the United States; that Congress intended that the best technologies available be used, and that technology-based standards not be relaxed based on assessments of local water quality, which in this context means considerations of the density or reproductive strategies of the aquatic populations in a particular waterbody; and that establishing different standards for different waterbodies based on their existing ability to support certain densities and populations would allow facilities to impact the remaining and badly stressed aquatic populations in waterbodies that have already been severely harmed by prior use as industrial dumping grounds.

With respect to waterbody-based national standards for IM, as discussed above EPA disagrees. The IM performance standards are available, demonstrated, and feasible; further the final rule provides seven compliance alternatives. EPA disagrees with the industry stakeholder suggestions regarding the six graphs, again noting the above discussion that AEI is defined as impingement and entrainment. The graphs clearly show significant I and E densities in all waterbodies. EPA agrees that freshwater reproductive species are generally different than other waterbodies, but notes that this distinction has no bearing on which technologies can be used for IM, and further that waterbody type does not result in disparate performance levels of the technologies. EPA also notes that comments regarding the spawning habits of various species do not mean that larval stages and early life-stages of fish and shellfish will not be found in those waterbodies. Indeed, the graphs show that the range of densities of all life stages is similar in all waterbodies, and therefore establishing a waterbody-based standard may not provide adequate protection. Further, EPA found that there is no fundamental difference in technological performance or availability based on waterbody, and rejected these reasons as a basis for subcategorization. EPA notes that because the final rule requires entrainment to be determined on a site-specific basis, many of these comments will be addressed during such determinations. This may include consideration of physical and biological characteristics of the waterbody. This flexibility in the application of entrainment requirements addresses the commenter's assertion by providing the opportunity to demonstrate to the Director that entrainment densities in the vicinity of the intake structure and the distribution of species in the waterbody do not warrant additional controls for entrainment. With respect to further comments about the Phase II rule exemption, EPA notes that further review of the available data in the proposed rule did not support EPA's earlier conclusion; see preamble discussion regarding I and E, E survival, and E mortality.

One commenter notes that the proposed rule may conflict with activities to restore the Great Lakes, adding that once-through cooling has a significant impact on the Great Lakes. EPA recognizes that there are many concurrent programs across the nation that are working to restore or improve water quality and commends these efforts. However, these efforts are independent of section 316(b) from a statutory perspective and EPA has developed a final rule that considers the appropriate factors established under the Clean Water Act and is supported by its analyses and record. EPA concluded that establishing subcategories for different waterbody types was not necessary or appropriate. To the extent the commenter does not support closed-cycle due to withdraw from the Great Lakes and subsequent evaporative losses, see discussion in Essay 17A.

EPA received several comments suggesting other subcategorization approaches. Riverkeeper commented that EPA should subcategorize facilities according to the feasibility of control technologies and further suggested that if impact to small facilities was the concern, then setting a higher threshold (e.g., 500 mgd) would be a better approach. EPA did not find that facility size nor impact to low flow facilities posed a rationale for subcategorization because the IM technologies are available, demonstrated, and feasible for facilities of all sizes and waterbodies; see EA. Further, low flow facilities do cause AEI; see preamble and Essay 14. Therefore, EPA disagrees with the comments and has decided to maintain the scope and applicability of the final rule at 2 mgd DIF. EPA explored the possibility of subcategorizing facilities based on feasibility of CCRS, and has rejected such an approach as discussed above.

For a more detailed discussion of these and other factors considered for subcategorization by EPA see TDD Chapter 5. EPA considered subcategorization based on other control technologies as well as other attributes such as waterbody type, CUR, and flow but found that subcategorization based on these (or any other factors) was not necessary. EPA rejected subcategorization based on waterbody type and CUR and was unable to identify a suitable basis for subcategorization with respect to technology feasibility. EPA did consider subcategorization based on various flow thresholds and availability of space. For example, EPA considered a threshold of 50 mgd for Option 4 and requested comments on that approach; EPA rejected the Option 4 because technologies for IM are available, demonstrated, feasible, and affordable for all facilities. EPA also investigated other flow threshold values with the intent of reducing the total costs of the rule by reducing the number of facilities regulated while still capturing the majority of cooling water flow (for example, the 125 mgd threshold in Option 2). However, none of the thresholds considered resulted in subgroups with discernibly different attributes that would support subcategorization; see TDD Chapter 5. As described above, EPA also considered subcategorization based on available space but as discussed below was unable to identify a basis or metric that could provide a reasonably reliable assessment of feasibility of closed-cycle cooling. EPA notes that the 1976 rulemaking also attempted to consider available space. In light of the identified limitations on installation of closed-cycle recirculating systems in described circumstances, EPA concluded that providing the Director the discretion to consider multiple factors provides a much more reasonable approach to determining entrainment requirements. For the first time, EPA is including in the regulatory language specific requirements for studies, analysis, evaluation, and peer review of entrainment controls. This information will be submitted in the permit application, and will be considered by the Director when making a determination of BTA technology for entrainment. EPA notes that the commenter did not provide any suggestions regarding what specific basis EPA should have considered for subcategorizing based on technology feasibility beyond those EPA did investigate.

Essay 20: New Units

Introduction

The Phase I 316(b) Rule requires closed-cycle cooling or an equivalent level of performance for newly constructed greenfield and stand-alone power generation and manufacturing facilities, which under certain circumstances may include new construction at existing facilities. In developing the existing facility final rule EPA observed that certain newly constructed units at existing facilities may share many of the same characteristics of Phase I new facilities and the same opportunity to incorporate updated design features, but are not new facilities as defined in the Phase I rule. Because of these similarities EPA decided that its BTA requirements for new units at existing facilities should be modeled after certain requirements applicable to a new facility under the Phase I Rule.

Overall Response

In the proposal, EPA clearly defined those units that would be a "new unit" and requested comments on its definitions. New units were defined as additional units and did not include replacement or repowered units. After considering the public comments, for the final rule, EPA has changed the definition of new units to indicate that they are stand-alone units at existing facilities whose construction begins after the effective date of the rule, that are added to a facility for either the same general industrial purpose or for another purpose and that do not meet the definition of new facility (see, § 125.92). This provision distinguishes new units from new facilities, and further makes it clear that any new stand-alone unit at an existing facility would be subject to the new unit requirements.

EPA's rationale for adopting the same requirements for new units at existing facilities as the requirements for Phase I facilities is that, like Phase I facilities, these new unit construction projects present the ideal opportunity to design and construct the new unit's cooling system in a manner that avoids many of the difficulties, additional expenses and operational disadvantages associated with retrofitting an existing unit to closed-cycle cooling. For example, the three factors that led EPA to reject closed-cycle cooling as BTA for existing units at existing facilities (land availability, increased air emissions, and remaining useful life) are far less relevant for new units at existing facilities than for retrofitting existing facilities. First, an existing facility may need additional land in order to accommodate new construction. EPA found in site visits that where land availability may pose a constraint, the construction of new units is often accomplished in phases that allow for the demolition of the old structures to make room for the new construction and that newly designed and constructed units can take advantage of innovative designs that use less space.[31] Second, EPA rejected increased air emissions as a factor for rejecting closed-cycle as BTA for new units because the condensers will be optimized for closed-cycle, reducing energy requirements, and high-efficiency cooling towers can be incorporated into the design of the new unit, potentially allowing for smaller cooling towers to be installed. Thus,

[31] Innovative locations can include locating towers over top of waterbodies such as discharge canal or the source water as well as locating dry cooling systems on rooftops. The innovative technologies are not limited to cooling tower technology.

the turbine backpressure is eliminated and any associated energy penalty can be substantially reduced in a new unit. For more information, see the preamble and Chapters 6, 8, and 10 of the TDD. Further, the new unit is likely to be more efficient and emit less pollution than existing units, therefore net emissions are expected to decrease as new units replace older, less efficient units. Third, EPA rejected useful life as a factor for rejecting closed-cycle cooling because a new unit has the maximum opportunity to produce power or be used for production of manufactured goods for the longest time possible. Modifications and upgrades to maintain or replace an existing unit or to enable the unit to operate for a few years more are not part of the new unit definition. Therefore such upgrades would not result in the facility being considered a new unit, and there is no disincentive under the rule for needed upgrades to occur. EPA expects that most new unit projects that meet this definition will have a long useful life.

New power producing units are almost always much more fuel efficient than existing units. This efficiency minimizes emissions and increases power output. For example, the average coal-fired plant had a heat rate of 10,498 BTU per kW-hr (EIA, 2012) corresponding to a fuel efficiency of 32 percent. Modern coal-fired plants operate at 35-38 percent fuel efficiency, with some super critical[32] plants approaching 42 percent. Combined cycle gas can achieve around 60 percent fuel efficiency. The more fuel efficient systems are also typically more energy efficient, resulting in lower cooling requirements. For all of these reasons, the three factors for rejecting closed-cycle as BTA for existing facilities would not generally apply in the case of new units. In consideration of each of these factors, EPA finds the record shows that closed-cycle is feasible, demonstrated, and available for new units at existing facilities.

In setting BTA for new units, EPA also considered the costs of closed-cycle requirements for new units. EPA found that a significant number of new unit construction projects already employ closed-cycle. Therefore, the baseline analysis accounts for this trend. For example, many new units in the south and southwest are installing closed-cycle due to limitations in local water availability. See DCN 12-6673. Some recently built new units have not installed closed-cycle, and EPA has estimated costs for similarly constructed new units to install closed-cycle. When constructing a new unit, the costs of a CWIS large enough to accommodate once-through cooling are comparable to the capital costs of a facility with closed-cycle cooling. While differences in capital cost may or may not offset the energy requirements for operating closed-cycle cooling (i.e., cooling tower pumping costs) at a particular site, the total annual incremental costs are low. EPA found that these incremental costs do not pose a barrier to entry for new units; see the Economic Analysis (EA).

The new unit requirements also apply to new units at manufacturing facilities. As discussed elsewhere, a majority of manufacturers use cooling water primarily or exclusively for power and steam generation; see Essay 14. In these instances, the new unit definition is appropriately applied to the manufacturing facility. EPA recognizes that, for other manufacturing facilities, it may be less clear, compared with power generation, what constitutes a “unit” and, further, it may require judgment to determine when construction of a new unit occurs at the existing manufacturing facility. EPA has addressed this issue, in part, by revising the definition of new unit. See Section I of the preamble for more discussion.

---

[32] Operating at 220 bar and 600 degree C superheat and reheat.

Finally, the EPA realizes that in a few instances, it is possible that installation of a new unit could result in an existing facility with a DIF of 2 mgd or less and thus not previously subject to this rule becoming subject to this rule's existing facility requirements. The owner or operator of a new unit, as defined at § 125.92, at an existing facility not previously subject to existing facility cooling water intake structure requirements under 40 CFR Part 125 that increases the total capacity of the existing facility to more than 2 mgd DIF must submit the permit application information specified at § 122.21(r) at the time of the permit application for the new unit. In addition, the owner or operator of new units at existing facilities must submit to the Director the information required under paragraphs (r)(9), (10), (11), (12), and (13) at the time of the permit application for the new unit if the additional capacity will result in the existing facility withdrawing greater than 125 mgd AIF. The final rule definitions as well as the distinct section of permit application requirements for new units make it clear that, in such circumstances, a new unit is not the same as a new facility.

Definition of New Unit

Many commenters expressed concern that the definition of new units provided in the proposed rule was unclear. Some were concerned that any modification to an existing unit might trigger new unit requirements. Commenters were particularly concerned that it is unclear how the concept of "new unit" would apply to a manufacturing facility. EPA solicited comments regarding the definition of new units in the proposal and considered issues raised in the public comments received in crafting the revised definition of new units for the final rule. For generating units, EPA has made it clear that only newly built, separate, stand-alone units that are added to a facility for either the same general industrial operation or another purpose meet the definition of a new unit. For power generators, the term "generating unit" is quite clear since there is only one product (electricity), the non-contact cooling water predominantly comes from one source, and the application of the term is well-understood in the industry. As discussed above, where manufacturers use cooling water primarily or exclusively for power generation, the same definition of new unit is equally applicable. EPA recognizes that the definition of what comprises a new unit at an existing manufacturing facility may be less clear than it would be for power generating facilities since manufacturing may include various subdivisions of process and product equipment groupings that could conceivably be deemed as a unit. For these reasons EPA has defined new unit to simply mean a new stand-alone unit. A new unit may include one or more distinct production lines that are added to increase product output and operate parallel to and independently of existing production equipment. A new unit does not include the replacement or rebuilding of one or more distinct production lines or distinct processes involving the replacement of the majority of the waste heat producing equipment that serves as sources of non-contact cooling water and the majority of the heat exchanging equipment that contributes heat to the non-contact cooling water. In many cases, the application of the term "new unit" will be quite clear while for a small handful of situations a site-specific determination may be necessary. The final rule clearly states it does not apply to "contact cooling water."

Many industrial stakeholders support the proposed new unit definition that excluded rebuilt, repowered, and replacement units at existing facilities, agreeing that they should be treated as existing facilities rather than as new units. Other commenters argued that replacements, repowerings, and rebuilt power plants should be required to meet standards based on closed-cycle and that excluding repowered/rebuilt plants is a big loophole. One commenter also suggested that EPA should set a deadline by which all existing facilities must comply with the new source (new unit) standards in this rule to prevent environmentally destructive plants from remaining open longer than they otherwise would have absent the regulation. EPA agrees with the industrial stakeholders that all rebuilt, repowered, and replaced units at existing facilities should be exempt from the new unit requirements, for the reasons discussed below. EPA disagrees that all rebuilt, repowered, and replaced units should be defined as new units, for the reasons discussed below. After evaluating the public comments and considering the technical issues involved, EPA has made minor changes to the definition of new units. In the final rule new unit definition, EPA sought to distinguish those facility upgrades that constitute a modification or replacement of an existing unit from stand-alone projects where major construction will occur based on the extent to which these actions provide the opportunity for, and advantages of, employing closed-cycle cooling in a manner similar to those at Phase I facilities. Thus, EPA has specified that a new unit is a stand-alone unit, which is defined as a separate unit that is added to a facility for either the same general industrial operation or another purpose. EPA disagrees that a deadline is necessary to impose new unit requirements for all existing facilities. New unit requirements are not applicable to existing units at existing facilities for the reasons discussed in the preamble. In addition, new units could be added to existing facilities at different points in time, so a fixed deadline is impractical. Further, new unit requirements can vary and therefore any schedule is more effectively addressed in a permit.

EPA agrees with commenter statements that the new unit requirements should not discourage or jeopardize the replacement of existing generating units with more efficient units that offer multiple benefits such as reducing air emissions per megawatt of electricity generated. EPA notes that an existing facility's equipment will eventually need to be replaced and, over time, most facilities will be modernized using high efficiency units. EPA considered, and requested comment on, different ways to distinguish upgrades to an existing unit. After consideration of all comments, EPA concludes that avoiding disincentives to modernizing existing units is paramount. EPA further finds that the wide array of activities that could be considered as triggering new unit requirements do not always present the opportunity to design and construct the new unit's cooling system in a manner that avoids many of the difficulties, additional expenses and operational disadvantages associated with retrofitting an existing unit to closed-cycle cooling as discussed above. For example, a Type I uprate[33] at a nuclear facility, and most Type II uprates[34] do not involve extensive reconstruction, and therefore would involve a retrofit rather than a redesigned cooling water intake system. The final rule definition of new units does not discourage upgrade activities given its focus on new stand-alone units. EPA also agrees that high energy efficiency systems have multiple benefits such as reduced fuel consumption,

[33] Type I nuclear uprates, referred to as "measurement uncertainty recapture power uprates" are are achieved by implementing enhanced techniques for calculating reactor power. This involves the use of state-of-the-art feedwater flow measurement devices to more precisely measure feedwater flow, which is used to calculate reactor power. More precise measurements reduce the degree of uncertainty in the power level, which is used by analysts to predict the ability of the reactor to be safely shutdown under postulated accident conditions. See U.S. NRC, Types of Power Uprates, available at http://www.nrc.gov/reactors/operating/licensing/power-uprates/type-power.html.

[34] Type II nuclear uprates, referred to as "stretch power uprates" are uprates within the design capacity of the plant. The actual value for percentage increase in power a plant can achieve and stay within the stretch power uprate category is plant-specific and depends on the operating margins included in the design of a particular plant. Stretch power uprates usually involve changes to instrumentation setpoints but do not involve major plant modifications. See U.S. NRC, Types of Power Uprates, available at http://www.nrc.gov/reactors/operating/licensing/power-uprates/type-power.html.

reduced cooling water use and fewer air emissions and has sought to encourage rather than discourage such systems. EPA notes that rebuilt, repowered and replacement units will almost always be more efficient resulting in less cooling water use per unit of production. By requiring closed-cycle cooling in new stand-alone units, EPA is ensuring (along with the Phase I rule) that no new once-through cooling units or facilities will be built. For more information, see Section VI of the preamble.

One commenter noted that at § 125.94(d)(1) it is not clear that the closed-cycle requirement only applies to the new unit. Further, the rule did not clarify how the rule applies to the existing intake if water for the new unit is to be withdrawn through it. A similar concern was expressed regarding the 90 percent comparable performance requirement in § 125.94(d)(2). One commenter noted that it is not clear if the standard at § 125.94(d)(1) applies to independent suppliers. EPA agrees the language was unclear since § 125.94(d)(1) referred to the "actual intake flow (AIF) ***at*** a new unit…" and has revised the requirement to read "design intake flow (DIF) ***for*** the new unit…." Note this final rule provision is now § 125.94(e), not § 125.94(d). These requirements apply only to the intake flow component associated with the new unit and not necessarily the source intake; see § 125.94(e)(1). The flow reduction requirement applies to the DIF requirement of the new unit and applies to independent suppliers in that they will be required to supply less water. The alternative comparable performance requirement may apply to an independent supplier in that such reductions may be achieved through changes in intake technologies employed.

One commenter states that the definition of "replacement unit" should be clarified to mean replacement units of a specific size. Thus EPA would make it clear that a repowered or replacement unit of larger capacity than the unit it replaces would be a "replacement unit" and not a "new unit." EPA's definition of new unit applies to stand-alone units only and as discussed in the preamble does not include rebuilt, repowered or replaced units. Therefore, size designation is not necessary.

Commenters are concerned that the rule is not clear about the applicability flow threshold for new units and suggested a de minimis flow exemption should be provided for new units. An example given was a 225,000 gpd new unit that should not be subject to the proposed rule requirements since it would not be covered under Phase I if built as a separate greenfield plant. Commenters suggested that EPA should at least exempt small facilities from an automatic closed-cycle cooling requirement, and instead allow them to engage in case-by-case analysis. EPA disagrees that any facility should be exempt from 316(b) requirements of this rule; see Essay 14 regarding scope and applicability. EPA further disagrees that low flow facilities should be exempt, see Essay 14 regarding cumulative impacts. In the final rule, the scope of the rule includes those facilities in which the total design intake flow is greater than 2 mgd, including both the existing and new unit cooling water withdraws (facilities with a design intake flow of 2 mgd or less are subject to 316(b) requirements determined on a case-by-case, best professional judgment basis). EPA disagrees that there should be some sort of minimum incremental flow volume threshold for the new unit component. New units are a component of an existing facility and the relative size of a new unit does not change the factors that EPA evaluated in determining the new unit requirements. The addition of any new unit of any size and its cooling water requirements poses a new and additional withdraw from the source water, exasperating any cumulative impacts; see Essay 14. Also, setting a threshold at some level below 2 mgd could allow facilities to break up new unit upgrades into components and stagger their implementation such that each remained under the threshold but in aggregate would clearly meet the scope of today's rule. To the extent that a new unit results in the existing facility being subject to Subpart 125 for the first time, see the above discussion regarding permit application requirements.

One commenter stated that the "exclusively for cooling towers" and "only for replacing losses of cooling water" restrictions and the definition of "cooling pond" in § 125.92 are needlessly restrictive and could cause resources to be wasted on constructing new intakes with little or no benefit to fish. EPA no longer refers to cooling ponds or includes the cited restrictions in the final rule. The final rule provides clear guidance to the Director concerning the applicability and determination of closed-cycle cooling where water is withdrawn from impoundments that are also waters of the U.S. See the preamble for more discussion**.**

BTA Requirements for New Units

Commenters argued that closed-cycle cooling should not be the presumptive BTA for new units at existing facilities and that the same standard should apply to both existing and new units. In other words, a case-by-case approach to entrainment should be applied to new units to take into account the same site-specific factors evaluated for existing units. Several commenters also noted that the rationale EPA used to conclude that new units should be treated as existing facilities under Phase II still apply today (i.e., factors such as energy requirements as well as site space limitations and site location characteristics that could affect visibility, highway and airport safety, noise, and salt drift make it inappropriate to subject new units at existing facilities to new facility requirements).

EPA disagrees with the comments. As discussed in Essay 14, the Phase II and Phase III rules were remanded and subsequently revised in this rule based on EPA's updated analysis. As discussed above and in the preamble, in contrast to existing units, new units, as more narrowly defined in today's rule, have much greater flexibility in terms of cooling system design, construction scheduling, and other factors. These factors help minimize many of the negative aspects associated with closed-cycle cooling that prompted EPA for the final rule to conclude that it should adopt a site-specific approach for establishing BTA entrainment controls for existing facilities. EPA has discussed above how the factors of land availability, air emissions, and remaining useful life pose less of a barrier when considered in the context of new units. Other factors also support the final new unit provisions. For example, incremental downtime and issues of energy reliability, which can be associated with retrofitting to closed-cycle cooling, are avoided altogether at a new unit. In addition, when new units are added condensers can be configured for closed-cycle cooling, reducing energy requirements (by substantially reducing the turbine backpressure energy penalty and associated air emissions). High-efficiency cooling towers also can be designed as part of a new unit, allowing for smaller cooling towers. As a result of all of these factors, the capital costs for installing closed-cycle cooling at new units are lower than the capital costs for installing once-through cooling. (See DCN 10-6651.) EPA notes that one of the reasons that new units were treated as existing facilities in the Phase II preamble was that at the time EPA concluded that more stringent regulation might discourage or preclude projects that would improve energy efficiency. In the final rule, new units are defined as added, stand-alone units which are almost always much more fuel efficient than existing units so this consideration did not militate against adoption of the requirement for performance comparable to closed-cycle systems for the new unit flows. With regard to several of the factors associated with closed-cycle cooling that EPA considered under Phase II in its rationale to define new units as existing facilities for purposes of that, now suspended, rule, EPA's current analysis indicates that, where relevant, these factors can be sufficiently managed. The factors of visibility impairment, highway and airport safety issues, noise abatement issues, salt drift and corrosion problems are not universal for all facilities or all closed-cycle cooling technologies but rather will be of concern only at the portion of the facilities where the available tower locations are within proximity of certain receptors and where the technology under consideration involves use of a basic conventional mechanical draft cooling tower. Visibility and highway and airport safety issues are related to the visible plume of evaporative cooling tower which can generally be resolved through the use of readily available plume abatement technology (certain facilities might be able to use an alternative cooling technology such as dry cooling). Noise may need to be controlled in order to comply with noise ordinances of adjacent communities and can be minimized through the use of readily available noise abatement technologies. Similarly salt drift and corrosion problems associated with deposition of salt on nearby equipment can be minimized through the use of readily available high efficiency drift eliminators. Recent developments in salt drift elimination technology has resulted in drift rates as low as 0.0005 percent (of circulating flow) compared to drift rates as high as 0.2 percent for a tower without drift eliminators. See TDD Chapter 10 for additional discussion. Each of these technology solutions is available and may add a certain amount of additional costs but EPA has concluded that these costs are not inordinate when part of a new construction. For a more detailed discussion see Section VI of the preamble. Regarding the rationale EPA used in Phase II, EPA sought to provide clarity between a new facility and an existing facility (69 FR 41579); EPA is continuing to do so, and today's final rule does not affect the definition of new facility in the Phase I rule. EPA notes the Phase I rule treated the addition of a new unit for purposes of a different industrial operation as an existing facility only if it used an existing cooling water intake structure whose design intake flow was not increased. EPA further notes that there are a wide variety of repowering and uprate activities that an existing facility could undertake while still being regulated as an ''existing facility'' rather than a ''new facility'' (67 FR 17128). EPA has also maintained this distinction in today's final rule; see Section I.J of the preamble on new units.

Commenters noted that the 90 percent entrainment mortality option is more stringent than the Phase I rule. In particular, EPA requires a 90 percent reduction in "entrainment" in Phase I versus 90 percent reduction in "entrainment mortality" in the proposal noting that entrainment mortality is a subset of entrainment. EPA disagrees that the new unit requirements are more stringent than Phase I. In evaluating entrainment mortality, EPA assumes that entrainment mortality is equal to entrainment, unless entrainment survival is specifically demonstrated by the facility. See final rule at § 125.96(d)(3), which states that "Mortality after passing the cooling water intake structure must be counted as 100 percent mortality unless you have demonstrated to the approval of the Director that the mortality for each species is less than 100 percent." The one-to-one relationship between flow reduction and entrainment reduction also applies to entrainment mortality reduction. EPA notes that even when they are not equal, limited data provided by commenters show they are still close. EPA's analysis conservatively continues to presume the relationship is one-to-one.

One commenter also noted that by including the 94.9 percent and 97.5 percent flow reduction as standards in the definition of closed-cycle, that the new unit requirements were more stringent than Phase I. In Phase I, EPA stated that closed-cycle cooling reduced flow by a minimum of 70 percent for saltwater systems. This value was adjusted in Phase II to a minimum of 72 percent flow reduction. Commenters then note that applying the Track II requirement for comparable performance of 90 percent results in a minimum flow reduction of 85 percent (90 percent of the 94.9 percent flow reduction is 85 percent). The comments further assert that this is a change to the Phase I rule that EPA cannot lawfully make without giving fair notice or opportunity to comment. EPA disagrees. First, this definition would not in any way change the Phase I rule, as the proposed definition of closed-cycle would have only applied to existing facilities. EPA also notes that the low end of the range of 70 percent reduction cited in Phase I was given as an example of a worst case situation where site-specific water quality based discharge standards limit the chloride content in the blowdown to a maximum increase of 10 percent over background. This worst case scenario would limit the cycles of concentration of the cooling tower to 1.1. Both the Phase I and Phase II rulemaking records identify saltwater closed-cycle systems as clearly being capable of operating cooling towers at a cycle of concentration of 1.5 (or greater). This 1.5 cycles of concentration is the level of performance equivalent to a 94.9 percent flow reduction. However, this specific comment is no longer relevant since in the final rule EPA has changed the definition of closed-cycle so that a facility does not need to demonstrate that it achieved the cited values for cycles of concentration and the corresponding percent reduction in flow to establish that it is operating a closed-cycle recirculating system. Rather, as EPA has explained in the preamble to the final rule, achievement of the cited values for cycles of concentration and flow reductions are indications of a well-operated closed-cycle cooling system. CCRS is defined at § 125.92(c) to mean a system that reuses the water for cooling multiple times, and § 125.92(c)(1) makes it clear that a properly operated CCRS withdraws makeup water only to replenish losses due to blowdown, drift, and evaporation. See Essay 17A for further discussion.

One commenter disagreed with EPA's claim that "condensers can be configured for closed-cycle" when designing a new unit, thus improving energy efficiency. The commenter indicated that, while this might be true for new condensing-steam turbine generators, it is irrelevant to the cooling water needs for many types of new units at manufacturing facilities, such as slag quenching, bearing cooling, or chillers. Thus, in the commenter's view, EPA's assumption that any energy penalty is negligible for such manufacturers is wrong. EPA disagrees, first by noting that the majority of cooling water intakes used at manufacturing facilities are for power production and, thus, function exactly like an electric generating facility. Second, one of the examples provided by the commenter (slag quenching) is contact cooling and, thus, would not be in scope of the rule. Third, bearing cooling does not involve an efficiency loss. The third example, chillers, can be designed to operate at a higher efficiency and thus exceed EPA's performance for closed-cycle. In contrast to existing units, the energy penalty is negligible for new units for the reasons discussed above. Despite the failure of the commenter to supply evidence that, in fact, supported its position, EPA agrees that cooling water uses may be different at some manufacturing facilities and that the net effect on system efficiency of using a closed-cycle system will vary. EPA maintains that it is reasonable to allow for the consideration of cycles of concentration in determining whether a cooling system is commensurate with closed-cycle cooling, noting that in site visits EPA found the more complex manufacturing facilities would be challenged to calculate facility wide flow reductions.

One commenter noted that there is no equivalent alternative to closed-cycle, so an alternative compliance track does not exist. EPA disagrees. In the final rule, Under § 125.94 (e)(2) EPA has included a provision similar to Phase I, Track II where a facility can demonstrate compliance if they demonstrate entrainment reductions equivalent to 90 percent or greater of the reduction that could be achieved through closed-cycle. There are facilities where this level of performance is achievable without using closed-cycle cooling. Some facilities may be capable of achieving this BTA requirement through a combination of technologies which may include, but are not limited to, flow reduction, cooling water reuse, fine mesh screens, far offshore locations, and alternative intake location. EPA is aware of facilities that through a "systems of technologies" approach can combine one or more technologies to achieve an overall level of performance as required under § 125.94 (e)(2). Specifically for manufacturers, EPA is aware that many facilities have conducted water audits and already implemented significant flow reduction and or water reuse practices; EPA expects manufacturers could demonstrate these reductions in flow as part of alternative § 125.94(e)(2). Also, the new unit provision allows the Director to establish less stringent alternative requirements for a facility if compliance with the new unit standards would result in compliance costs wholly out of proportion or would result in significant adverse impacts on local air quality, water resources, or local energy markets. Thus, alternative compliance tracks do exist for new units.

Commenters stated that proposed § 125.94(d)(5) (which states: "For cooling water flows specified in paragraph (d) of this section that are not subject to this standard, the Director may establish additional BTA standards for entrainment mortality on a case by case basis") is unnecessary and unjustified. EPA disagrees. The final rule establishes national BTA standards for impingement and entrainment. To the extent uniform standards cannot be established for a subcategory, BTA standards must be established on a case-by-case basis. For example, contact cooling water at a pulp and paper facility is different than quench water at a steel mill, and EPA determined such cooling water was best addressed on a case-by-case basis. The withdrawal of any water for cooling may pose an adverse environmental impact, see Essay 14. As such, the rule allows the Director to establish BTA standards for entrainment mortality for this flow component on a case-by-case basis. EPA has retained this provision in the final rule for consideration of entrainment mortality requirements, similar to the provision for additional controls for IM as determined by the Director at § 125.94(c).

One commenter stated that "If EPA nevertheless retains special requirements for new units, at a minimum, § 125.94(d)(4) should be revised so that it does not appear optional for the Director to establish alternative requirements even where the compliance costs are wholly out of proportion to the costs EPA considered or there would be significant adverse impacts on local air quality, significant adverse impacts on local water resources other than impingement or entrainment, or significant adverse impacts on local energy markets." Within the new unit requirements, the final rule provides that the owner or operator of a facility must comply with any alternative requirements established by the Director pursuant to § 125.98(b)(7). The provisions in § 125.98(b)(7) provide the Director with discretionary authority to establish alternative requirements when specified conditions are met, including a facility demonstrating that its compliance costs under § 125.94(e)(1) or (2) for each new unit would result in compliance costs wholly out of proportion to the costs EPA considered in establishing the requirements at issue.

Where alternative requirements are not established a facility must meet § 125.94(e) for its new units.

Projected Baseline Compliance

As part of estimating the costs associated with the new unit provisions, EPA projected what would have happened in the future in the absence of any rule or closed-cycle requirements for existing facility new units where only the current BPJ (or state program) approach to establishing entrainment mortality requirements are applied during the NPDES permitting process. This projection is referred to as baseline compliance and is defined as the degree[35] to which new units would have been designed and constructed to utilize closed-cycle cooling or its equivalent. At proposal, EPA assumed a future baseline compliance rate of 50 percent based primarily on current overall compliance of existing units. Since proposal, EPA investigated baseline compliance further to determine the trend of closed-cycle cooling implementation over time. Based on new information concerning trends in the industry EPA concluded that baseline compliance would range between 75 percent and 90 percent. For a more detailed discussion, see DCN 12-6672 and Chapter 8 of the TDD.

Many commenters have expressed concern regarding the imposition of closed-cycle requirements for new units at generating facilities. EPA's analysis shows very few new power generating units are constructed in a given year, and further shows that many would have installed closed-cycle cooling in the baseline. Thus, while many commenters have expressed concern regarding the imposition of closed-cycle requirements for new units at generating facilities, the current trends and data indicate that in the future most facilities (between 75 percent and 90 percent) will install closed-cycle cooling for their new units regardless of any final rule requirements.

Implementation

Commenters were concerned with how compliance with the closed-cycle standard would be measured. One commenter indicated that if EPA intends that new units show that their makeup and blowdown flows are consistent with a closed-cycle cooling system, then it would be clearer to say so. Many were concerned that there is no baseline for comparison in a new unit and that using the actual intake flow (AIF) would be problematic since there may never be an actual baseline flow to measure. EPA agrees that using AIF would be problematic and has revised the new unit standard such that it is based on the design intake flow (DIF). EPA notes that the facility must reduce the design intake flow for the new unit, at a minimum, to a level commensurate with that which can be attained by the use of a closed-cycle recirculating system for the same level of cooling. The determination of closed-cycle cooling may be informed through calculation of the cycles of concentration or monitoring of flow. EPA notes that there is prior implementation experience determining compliance with the same standards (i.e., elements of Track II) at Phase I facilities since 2004, and EPA has modeled the BTA standards for new units after the Phase I rule language.

---

[35] In order to estimate compliance costs and impacts, EPA derived an estimate of the percent of new units that would be designed and constructed using closed-cycle cooling in the absence of any rule.

Commenters stated that the new unit requirements should at least be flexible enough to address sites where meeting the requirements is not technically feasible (e.g., land availability). Commenters also argued that the purchase of adjacent land should not be a consideration. Other comments suggested EPA should provide guidance, including a clearer definition of what it means for compliance costs to be "wholly out of proportion" stating that the proposed rule is currently quite vague concerning such waivers. EPA notes that the rule does not require facilities to consider purchase of adjacent land. As discussed previously, EPA finds closed-cycle is available, demonstrated, and feasible for new units at existing facilities in the nation as a whole. As discussed above, in Phase I, the final rule allows for the Director to establish less stringent alternative requirements for a facility if compliance with the standards would result in compliance costs wholly out of proportion to those EPA considered in establishing the Phase I requirements or would result in significant adverse impacts on local air quality, water resources, or local energy markets. In today's final rule, EPA has included a similar provision providing the Director with the discretion to establish alternate requirements for each new unit if the requirements would result in compliance costs wholly out of proportion to the costs EPA considered in establishing the requirements at issue, or would result in significant adverse impacts on local air quality, significant adverse impacts on local water resources other than impingement or entrainment, or significant adverse impacts on local energy markets. Such determinations are necessarily made at the discretion of the Director and, therefore, EPA disagrees that further guidance on "wholly out of proportion" is necessary at this time.

One commenter expressed concern that the new unit requirements do not appear to consider the circumstance where a new unit is constructed at an existing manufacturing facility where construction of the new unit does not require any modifications to the existing intake structure. EPA disagrees that the new unit requirements do not consider such circumstances. In evaluating new unit scenarios, EPA recognized that there are many circumstances where a new unit may have no impact on flow requirements or require no modifications to the intake structure. This is particularly true in the scenario where a new unit is installed and used in lieu of an existing unit with similar flow requirements. In the commenter's example of using an existing intake structure to provide cooling water for a new unit, the existing intake clearly has the capacity to provide water for the new unit. Therefore, the final rule would simply require that the flow provided by the existing intake be a level of flow commensurate with CCRS. The closed-cycle requirement for new units is intended to require the use of BTA flow reduction technology which will have an impact on flow requirements reducing the intake flow with corresponding reductions in impingement mortality and entrainment.

Commenters argued that the effective date of the new unit provisions should be delayed for a reasonable period of time after the final rule is issued since the proposed rule does not adequately provide for existing projects already well advanced in the planning, design and permitting process. EPA acknowledges that at promulgation, new units whose construction begins after the effective date of the rule must comply with closed-cycle requirements. EPA concluded that there will be few, if any units in the advance planning stages that would likely be adversely affected by this provision for the following reasons. As explained above in the discussion of "baseline," EPA has determined that most new units will already include closed-cycle cooling. EPA, however, does acknowledge those in which construction begins soon after this date will have already undergone some level of expense and effort in planning, design, and permitting. The potential added expense of project delay and redesign could apply to those units with construction start dates soon after the effective date of the rule and will diminish as time passes post-promulgation of the rule. Compared to the cost of the new unit, EPA does not find that the incremental cost of project redesign poses such a significant hardship as to discourage addition of units. Further, as discussed above, the Director may establish alternative requirements where the compliance costs are wholly out of proportion to the costs EPA considered or there would be significant adverse impacts on local air quality, significant adverse impacts on local water resources other than impingement or entrainment, or significant adverse impacts on local energy markets.

Notice and Comment

Some commenters stated that "The Proposed Rule introduces a new concept for EPA regulation of cooling water intake structures: mandatory requirements for "new units at existing facilities," which are modeled on requirements for entirely new facilities. EPA has not justified this departure from prior determinations, and the provisions of the Proposed Rule intended to implement the "new unit" concept are confused and should be deleted. EPA would need to re-propose "new unit" requirements if it wants to continue with this initiative." The commenter argued that it is impossible to determine what the proposed rules would require of facilities that install new units, therefore the commenter has not been provided with a meaningful opportunity to comment on this aspect of the proposed rule.

EPA disagrees that, in adopting the new unit provisions, EPA has changed anything in the Phase I rule; nor did it propose any changes to the Phase I rule. The new unit provision only applies to existing facilities under Subpart J. Only a new facility, as defined in the Phase I rule found under Subpart I at 40 CFR 125 is subject to Phase I requirements. The definition of "existing facility" under Subpart I at § 125.83 makes it clear that a facility cannot be both a Phase I new facility and an existing facility at the same time, and EPA did not propose to change the Phase I rule.

EPA disagrees that the public has not had a meaningful opportunity to comment on this aspect of the proposed rule. Not only did EPA take notice and comment on the definition of new unit, EPA specifically proposed that new units would be subject to a requirement based on closed-cycle cooling. EPA solicited comment on the general concept of new unit, and also specifically requested comments on the new unit provision in section XI.22. This includes specifically requesting public comments regarding the clarity of the definition of new unit and whether or not this definition should be expanded to include other units such as those that are repowered or rebuilt, or whether new unit provision should be deleted (see 76 FR 22275). EPA received 27 comments regarding the new unit provision, suggesting that other commenters responded to EPA's request for comment. EPA also requested comment on the number of new units and the amount of new capacity construction projected but received no specific comments related to this issue. Therefore, based on the numerous references to the new unit provisions in the preamble, the proposed regulation text, and the many comments received on the issue, the question of how to define new units and what the requirements for new units should be was clearly "on the table" and the final rule reflects a logical outgrowth from the proposal and the comments it generated. See American Coke and Coal Chemical Inst. v. EPA, 452 F.3d 390, 398-99 (D.C. Cir. 2006). "'An agency satisfies the notice requirement, and need not conduct a further round of public comment, as long as its final rule is a 'logical outgrowth' of the rule it originally proposed.' *Northeast Md. Waste Disposal Auth. v.EPA,* 358 F.3d 936, 951–52 (D.C.Cir.2004). If interested parties 'should have anticipated' that the change was possible, and thus reasonably should have filed their comments on the subject during the notice-and-comment period, then the rule is deemed to constitute a logical outgrowth of the proposed rule. *See* *City of Waukesha v.EPA,* 320 F.3d 228, 245 (D.C.Cir.2003); *see also* *Envtl. Integrity Project v.EPA,* 425 F.3d 992, 996 (D.C.Cir.2005); *First Am. Discount Corp.,* 222 F.3d 1008, 1015 (D.C.Cir.2000); *Nat'l Mining Ass'n v. Mine Safety & Health Admin.,* 116 F.3d 520, 531 (D.C.Cir.1997). A petitioner must demonstrate that the agency's violation of the APA's notice and comment procedures has resulted in 'prejudice,' 5 U.S.C. § 706(2). *See generally* *Chamber of Commerce of the United States v. SEC,* 443 F.3d 890, 904 (D.C.Cir.2006).

Essay 21: Development of Compliance Costs

Introduction

Section IX of the preamble provides an overall description of the basis and methodology used to derive the compliance costs. A more detailed description of the methodology used to derive the model facility site-specific components of the capital and O&M compliance costs is also provided in Chapter 8 of the Technical Development Document (TDD). EPA used a model facility approach to develop the final rule compliance technology cost estimates. The technology modules used to model costs for the impingement mortality reduction technologies are based upon technology modules originally developed for the Phase II Rule which were then modified for the existing facility rule proposal. Since proposal of this rule, EPA adjusted all of the Phase II module costs for inflation and modified some modules in response to public comments received as described below. This, for the most part, has resulted in an increase in the total cost estimate for some model facilities and the industry as a whole compared to the estimates at proposal.

For the cost of closed-cycle cooling technology in the final rule, EPA did not use the Phase II module costs but rather used a closed-cycle cost module presented at proposal that was based upon a cost estimation model provided by the Electric Power Research Institute (EPRI). EPA adopted this model because the costs are based on numerous facility-specific cost estimates to retrofit an existing facility with once-through cooling to closed-cycle cooling. Prior to proposal, EPA reviewed the underlying data and development of the estimation model and concluded that this model provides a good estimate of the compliance costs of an option based on closed-cycle cooling; see DCN 12-6656 and Chapter 8 of the TDD. EPA largely adopted the EPRI model for estimating compliance costs in the final rule.

In response to public comments, EPA re-evaluated the engineering methodology for determining model facility site-specific costs subsequently used in the economic analysis, and used new information to revise these capital and O&M compliance cost estimates (including the methodology used for assigning technology compliance modules to model facilities in the costing analysis) for the final rule.

Summary of Changes to Cost Estimation Methodology

In response to the public comments and new information, EPA has revised the proposal compliance cost estimation methodology in the following ways for the final rule:

- Capital costs for modified traveling screens with a fish return have been increased by 20 percent, reflecting additional cost data from facilities and vendors.
- The capital cost for the fish handling and return component of the modified traveling screens has been increased by a factor of 2, reflecting additional cost data from facilities and vendors.
- For intakes where fish handling and return systems may be difficult or costly to install, the capital costs of the fish handling and return component of the modified traveling screens has been increased by a factor of 4.

- The design through-screen velocity applied in estimating the costs to install a new larger intake module in the costing analysis has been decreased from 1.0 fps to 0.5 fps, which effectively increases the capital and O&M costs by a factor of 2. As a result, this cost reflects a technology compliant with the IM compliance alternative based on low velocity. Since a facility meeting that compliance alternative would not have to meet additional IM technology requirements, the costs associated with installing and improving the fish handling and return, which were applied in costing this module at proposal, are not necessary and therefore are not included.
- Technology assignment was changed such that modified traveling screens were assigned only to intakes with existing traveling screens because the modified traveling screen technology module only included costs for replacement of existing traveling screens and did not include costs for modifications to civil structures that may be needed if no existing traveling screens are present.
- Velocity caps alone (i.e., with no specification for an offshore intake location) were not considered as an IM compliance technology. Therefore facilities with this technology were assigned additional compliance costs. Existing velocity caps meeting EPA's definition (including the requisite minimum distance offshore) are assumed to meet the IM standard, and incurred no further technology costs.
- A capital and O&M compliance module was developed for variable speed pumps (Module 15) in order to provide another method of compliance for facilities whose actual intake velocity is near (but still above) 0.5 feet per second.
- Costs are adjusted for inflation based on economic model timeframe

Each of these changes is explained further in TDD Chapter 8.

All other impingement mortality assumptions and methodologies remain unchanged from proposal. EPA notes that while a small number of facilities may be able to comply with the IM standard through the de minimis or low capacity utilization provisions, it did not assume any facilities would comply in either manner. To the extent that facilities may be able to comply with these provisions, EPA has overestimated costs for such facilities.

The cost estimation methodology for closed-cycle cooling systems and other technology modules remain unchanged from proposal.

IM Technology Cost Development

Baseline Compliance

Several commenters made general arguments that EPA had, for the proposal, overestimated the number of facilities considered already in compliance with the impingement mortality BTA standard. EPA disagrees. First, EPA based the determinations for the model facilities on survey data from actual facilities. This data was collected in the year 2000 and does not include more recent improvements made at facilities in anticipation of more stringent standards. In that respect, EPA may have underestimated the number of compliant facilities since EPA's estimates do not include recent technology upgrades that have been made at a facility or required by permitting authorities. Second, in evaluating existing technologies for compliance for the final rule, EPA was careful only to designate specific technologies as IM compliant such as existing wedgewire screens (since most have design velocity of 0.5 fps), intakes with a design through-screen velocity ≤0.5 fps, existing velocity caps if they were far offshore, and closed-cycle cooling (if all units served by the intake were closed-cycle). Modified traveling screens (as defined in the final regulation) were also assumed to have no additional technology capital costs; EPA used a relatively conservative approach and only considered those employing the key elements of a modified traveling screen reported in the 2000 survey, including a low pressure spray, fish buckets and a separate fish return as meeting the definition of modified traveling screens for purposes of costing.[36]

The third reason EPA disagrees that it overestimated baseline compliance is that, for the final rule, EPA has included a greater degree of flexibility in the IM compliance standards allowing facilities, even individual intakes, to comply via a number of different alternatives, including one that allows for consideration of the combined impact of multiple technologies and operational measures (see preamble Section IV). EPA lacks the complete site-specific data to consider compliance based on combined systems of technologies. For example, the survey data shows that 7 percent of facilities employ behavioral deterrence or fish avoidance systems. EPA does not have adequate performance data for each of these systems, nor does EPA have the site-specific biological data on which to determine whether the facility's existing technologies meet the IM standard. EPA also expects some facilities will be able to take credit for their intake location (e.g., offshore submerged), flow reductions (e.g., seasonal operations or variable speed drives), new technologies (e.g., WIP screens, rotary screens), or credits for reused or recycled process water used as cooling water. Thus, while facilities with these control technologies may already meet the IM standard, EPA has assumed for costing purposes that none of these technologies contribute to compliance with the final IM standard. Further, in the costing EPA did not assume any facilities would have zero compliance technology costs as a result of a site-specific "de minimis" or low capacity utilization determination.

In particular, some commenters cited concern that EPA assumed facilities that reported a design through-screen velocity ≤0.5 fps may not be able to meet the low velocity compliance alternative at minimum water depth and that facilities simply reporting traveling screens with a fish return may not in fact have the full array of features required by the proposed rule to meet the IM requirement. For the final rule analyses, EPA disagrees that the number of facilities considered as already compliant via the low velocity compliance alternative are overestimated. In response to comments concerning existing intake compliance with the low velocity compliance alternative, EPA examined the methodology used and design through-screen velocity and water depth data reported (see DCN 12-6602). EPA found that it assigned a total of only 11 percent of model facilities compliant with the IM standard via the low velocity compliance alternative. This 11 percent breaks down as follows: 2 percent are estimated to have the reported the velocity based on critical low flow and should therefore be equivalent to the maximum velocity possible; 5 percent reported a velocity enough below 0.5 fps that even if the mean water depth were

[36] In the final rule, modified traveling screens are not deemed IM compliant but are included here because the technologies listed are those that were assigned no compliance costs for technology upgrades. While no capital costs were assigned, these model facility intakes were assigned costs for the optimization study as were those facilities with intakes assigned traveling screens upgrade costs.

reduced by 30 percent, the velocity would still be compliant; and 1 percent used submerged wedgewire screens where water depth is irrelevant. EPA concluded that many of the remaining 3 percent could meet the IM standard by measuring their actual intake velocity (40 CFR 125.94(c)(3)) in lieu of the design velocity compliance alternative (40 CFR 125.94(c)(2)). EPA agrees that some of these facilities may not be able to achieve an intake velocity of 0.5 fps without additional costs, and has included the cost of variable speed pump retrofits for these facilities. EPA concludes this is reasonable because these facilities have actual intake velocities that are close to 0.5 fps, and therefore installing variable speed pumps will allow these facilities to ensure the actual velocity stays below 0.5 fps during periods of low flow. EPA notes that 39 percent of facilities did not report velocity data; therefore EPA conservatively assumed all of them were greater than 0.5 fps. Thus, while there may be some instances where model facilities deemed IM compliant by EPA may actually require some compliance upgrades, there are also many other instances where EPA's conservative approach results in costs for technology upgrades that may not be necessary. Further, there are likely instances where facilities that did not report velocity data can in fact comply with one of the intake velocity compliance alternatives with no additional costs (40 CFR 125.94(c)(3) or 40 CFR 125.94(c)(2)).

Regarding the concern that facilities with fish returns may not have the full array of modified traveling screen features, see the baseline compliance section below.

In the case of velocity caps, one commenter noted that EPA appears to assume that velocity caps will comply because they met the low velocity compliance alternative but that many do not and may incur costs associated with entrapment. There are three scenarios where velocity caps are addressed by the final rule. In the first scenario, the design or actual intake velocity is below 0.5 fps, and the facility can choose one of the two intake velocity alternatives discussed above. In the second scenario, where the velocity cap is far offshore as defined in the regulation as 800 ft or more, EPA's data shows that the combination of an offshore location and the behavioral deterrent effect of the velocity cap design result in performance equal or greater than IM BTA. See preamble Section VI for further discussion. EPA has revised the final rule to provide that offshore existing velocity caps (meeting the final rule's definition) will comply based on intake location and intake structure design (but NOT velocity as indicated by commenters). EPA's assumptions about existing velocity caps as meeting the IM requirements for costing purposes are consistent with the rule's definitions. Only those existing velocity caps that meet the definition of offshore included as pre-approved in the final rule are assumed to be compliant. Further, EPA has removed specific entrapment requirements for reasons stated in the final rule preamble Section VI. In the third scenario, EPA allows the possibility that a velocity cap is built after issuance of the final rule. A facility could choose to demonstrate that the velocity cap meets the IM standard via the compliance alternatives 40 CFR 125.94(c)(6) or 40 CFR 125.94(c)(7). EPA did not assume any facilities will choose to do this, and has not costed any facilities to install a new velocity cap. Upon review of all three scenarios, EPA is confident that its costing methodology for existing offshore velocity caps is consistent with and reflects the final rule.

Costing Technology Selection

Commenters expressed concern that EPA estimated costs only for a relatively small range of selected technologies and that upgraded modified traveling screens may not be able to meet the standards. EPA recognizes that it has relied on a simplified approach to model the costs to comply with the IM standard and that to develop costs that accurately represent the compliance approach for some facilities would have required a more detailed site-specific analysis. Reliance on the simplified model was, in part, due to the lack of the necessary detailed site-specific information. Lacking this information, EPA could not tailor the technology selection for its costing analysis to meet site-specific conditions to ensure compliance. Rather, EPA selected from a suite of technologies that are anticipated to be compliant in many circumstances and would apply in a variety of situations. These technologies are representative of a wide range of costs. EPA estimated costs for modified traveling screens with fish returns where this technology was clearly available (i.e., intakes with existing traveling screens that did not have very high through-screen velocities[37]). Where modified traveling screens were not the most cost-effective compliance path or where such screens may not be the selected alternative, costs are estimated for technologies that could easily meet the velocity compliance alternatives such as wedgewire screens and new larger intakes because they have relatively high compliance costs and could serve as conservative surrogates for the possible range of technologies that ultimately may be employed. EPA applied these technologies, particularly wedgewire screens, based on certain site-specific conditions such as waterbody type, design intake flow, and water depth.[38] EPA recognizes that, in many cases where these technology modules are assigned, a lower cost technology or mix of technologies may be a more cost effective approach for facilities to meet the IM standards. EPA has included a high degree of flexibility in meeting the IM standard by providing multiple pathways for compliance including one that gives credit for combinations of technologies and operational measures (see Section IV of the preamble). EPA fully expects facilities will evaluate each IM compliance alternative and select the most cost-effective approach to compliance. Using information in the record, EPA was able to determine a technology that was likely feasible for a model facility, but EPA recognizes that a facility could select another compliance approach because it is less costly. Therefore, while facilities may not elect to comply using wedgewire screens or larger intakes, if the facilities can bear the costs of these expensive technologies, then EPA reasonably concludes the facilities can afford less expensive technologies.

One commenter stated that EPA overestimated the number of facilities that could comply via modified traveling screens because they would have difficulty meeting the 12 percent proposed annual impingement standard. As a result, commenters assert EPA underestimated the number of facilities that would need to comply via the more costly low velocity compliance alternative.

---

[37] EPA was concerned that some intakes with traveling screens may include design parameters that are outside the range typically employed. For example, intakes in high sediment load waters may use unusually high intake velocities to avoid sediment drop out in front of the intake. Performance data from facilities with traveling screens and high sediment waters do not show that the high velocity, in most cases, results in any diminished performance. However, in response to comments, EPA has not been able to rule out the possibility. Accordingly, the final rule at 40 CFR 125.94(c)(5) provides that the Director will review the *impingement technology performance optimization study* at 40 CFR 122.21(r)(6)(i), and then the Director will determine whether the modified traveling screens is the best technology available for impingement reduction at the site. For purposes of costing this provision, EPA conservatively assumed that having a through-screen velocity of greater than 3.0 fps provides a criterion for identifying intakes with traveling screens where an alternative technology may be necessary. As indicated above, such traveling screens (when upgraded) likely would meet the BTA requirements, but EPA has included this higher cost option for a select subset of model facilities to account for instances where other more costly technologies may be more required.

[38] Wedgewire screens were only assigned to those intakes where design considerations such as screen size, water depth, and waterbody type indicated sweeping velocities are compatible with basic technology limitations.

EPA disagrees that it has underestimated costs in this way for the final rule. First, EPA notes the numeric IM performance standard has been revised; there is no longer a monthly standard, and the numeric IM performance standard has been revised to represent a 12-month level of performance. See Section VI and Essay 16A for more information. Second, in the final rule EPA has established seven alternative impingement standard compliance pathways and only one of these alternatives relies upon monitoring to meet the numeric impingement mortality performance standard. Compliance alternative 40 CFR 125.94(c)(5) specifically addresses modified traveling screens. As discussed in Section VIII of the preamble, EPA estimates that a very small portion of facilities will select monthly biological monitoring to demonstrate compliance with the numeric IM performance standard. EPA has provided the IM performance standard as a performance benchmark for all BTA technologies, including new and innovative technologies yet to be demonstrated. As a result, facilities have much more flexibility in achieving compliance, eliminating the concerns raised by the commenter related to the limited choices available for compliance. See Section VI of the preamble for more information.

In the proposed rule, EPA required performance equivalent to barrier nets as a technology to minimize the impingement of shellfish at estuarine and marine intakes. Several commenters noted that at proposal, barrier net costs were not included for certain facilities on tidal rivers and others stated that the requirement is not necessary. At proposal, due to the limitations of the survey data, EPA used additional data to distinguish intakes on brackish tidal rivers from those on freshwater rivers or streams and assigned waterbody type and technologies accordingly. Some waterbody type designations may vary from those of the commenters. In the final rule, EPA is no longer including a separate requirement to reduce IM of shellfish at estuarine and marine intakes because the revised average percent survival performance standard accounts for shellfish as it includes data on shellfish survival. See Essay 18 and Section VI of the preamble for more information. Accordingly, in the final rule compliance cost analysis, EPA included barrier net costs for intakes in marine environments.[39] EPA notes that the final rule allows the Director to establish additional requirements, such as barrier nets, for protection of shellfish at 40 CFR 125.94(c)(8). The Director may also establish additional measures for other species at 40 CFR 125.94(c)(9). EPA's cost estimates appropriately do not include costs that may result from these additional site-specific determinations because EPA cannot predetermine the outcome of such determinations and the final rule does not prescribe a particular requirement. See TDD Chapter 8 for more details on EPA's costing approach specific to marine environments.

Many commenters stated that the low velocity compliance alternative is inflexible and cannot be met without high costs, or perhaps not at all. EPA agrees that at certain facilities, compliance via the low velocity compliance alternative may not be feasible or the most cost-effective way to meet the IM standard. The final rule does not require facilities to meet a low velocity requirement. Rather, low velocity alternatives (on a DIF or AIF basis) are two out of seven compliance alternatives for the IM standard. Further, the low velocity compliance alternative itself is flexible in that it allows for either compliance via the design intake flow (thus indicating the maximum intake velocity based on the intake design) in which case no further monitoring is required; or via the actual intake flow where facilities that consistently operate below the design intake flow volume may demonstrate via monitoring the facility's actual intake flow. As

[39] EPA did not include costs for barrier nets for intakes in freshwater streams because data indicate shellfish are not present in these waters.

discussed above, in the compliance cost analysis, for many of the intakes that did not employ existing traveling screens and where the low velocity alternative could not be met without modifying the intake, EPA assigned costs for a new larger intake or submerged wedgewire screens with a design through-screen velocity of 0.5 fps. EPA agrees that for intakes where the existing screen area is too small to comply with the low velocity alternative that construction of a larger or submerged intake represent a fairly high cost option compared to upgraded traveling screens. In this regard, EPA views the cost analysis as conservative, as discussed above.

Technology Costs – Overarching Comments

Some commenters argued that EPA's cost estimates for IM and EM technologies are flawed because they are based on large facilities and then scaled down for smaller facilities such as manufacturers that use as little as 2 mgd. EPA disagrees. In theory, extrapolating a cost curve towards zero or infinity results in unreasonable results. However, EPA's cost models have two boundaries to avoid such conditions. First, the cost curves are not applied to intake flows below 2 mgd. Second, for several technologies, the cost tool imposes a minimum cost below a specified point (or in this case, below a certain threshold).[40] If EPA does not have costing data for a specific technology below a certain intake flow, it used the costing data for the lowest flow available. For example, for variable speed pumps, all intakes less than 10,000 gpm received the same cost as that was the lowest intake volume for which EPA had costing data. This likely overstates costs for lower flow facilities, but EPA does not have the data to refine this cost assumption any further. See TDD Chapter 8 for information on thresholds for various technologies. Furthermore, EPA's technology module cost estimates generally use equations based on costs curves that were derived using technology scenarios of varying sizes; as a result, EPA is already considering the possibility of higher unit costs at lower flows. The exceptions are those cost modules that used linear equations (closed-cycle and variable speed pumps), which were derived for larger systems and would have underestimated technology costs for low flow intakes if EPA had not established minimum costs below certain intake volumes as described above. More specifically, to account for the possible underestimation of variable speed pump costs, a minimum capital cost was established such that the lowest flow facility costs would not be understated. For module 15, for design flows below 10,000 gpm (or about 14 mgd), the minimum costs are set equal to the capital cost value for a 10,000 gpm system (rather than using the equation).

Commenters on the proposal noted that EPA had assumed no incremental costs to meet the "no entrapment" requirement. This is appropriate for the final rule because the final rule did not establish any additional requirements for entrapment. See Essay 18 for more discussion regarding entrapment.

Some commenters on the proposal stated that for its earlier analysis, EPA has underestimated the costs of traveling screens. Several compared the costs derived using the EPA cost tool to vendor-quoted costs and noted that for their intakes, their estimated capital costs ranged from about 44 percent to several times greater than EPAs model costs. Some of these are discussed in greater detail below. EPA considered these comments, as well as new information including a review of

[40] For traveling screens a minimum screen width was imposed and for variable speed pumps a minimum cost was imposed for intakes less than 10,000 gpm. See TDD Chapter 8.

actual traveling screen replacement costs obtained during site visits (see DCN 12-6654) and agrees with commenters that some cost adjustments are warranted. As a result of the revised cost data, for the final rule, the capital cost of traveling screens has increased by a factor of 20 percent. See preamble Section V for further discussion of changes in costs since proposal. EPA also re-evaluated the costs of the fish handling and return component in light of public comments arguing that some facilities may encounter site-specific difficulties in the design of a fish return. Upon review of the newly provided facility and vendor data, EPA concluded that the proposal cost estimates represented an "easy" retrofit situation. However, EPA has little data that singles out the capital and installation cost of just the fish return. One cost set indicative of a "somewhat difficult" level installation for a fish return was about 3 times EPA's cost, whereas another data set for a "low difficulty" level installation was found to be similar to EPA's cost. To account for a small subset of more difficult situations, EPA increased the fish return and spraywater pumps capital cost resulting in a total final capital cost that is four times the costs at proposal for these components (i.e., fish return and spraywater pumps). This allows for "difficult" level installation costs consistent with the new data, and results in a cost for the "non-difficult" fish return and spraywater pump that is twice that of proposal. For details, see TDD Chapter 8. In order to confirm the validity of the revised traveling screen cost estimates, EPA compared actual costs for traveling screen replacement obtained during site visits with the revised cost model results and concluded that the EPA costs are comparable (see DCN 12-6654).

One commenter (UWAG comment 2210, which represents the power industry) argued that EPA underestimated the O&M costs for traveling screens. They note that the costs should include: labor hours needed to maintain the fish collection and return systems; installation costs including (for example) crane costs associated with screen removal or intake bay dewatering during major overhauls; spray water system replacement and overhaul; and fish return system replacement due to cracking and erosion. EPA disagrees that it has underestimated O&M costs for traveling screens and concluded that the traveling screen O&M cost modules represent a reasonable estimate of average O&M costs. The O&M costs are based on labor hours cited by a vendor which includes system overhauls of the traveling screens and the spray systems, both of which are integral components of the system. The O&M costs also include material costs for equipment replacement components that are based on a percentage of equipment costs. This percentage is also based on a vendor recommendation. EPA however, did not include costs of dewatering since facilities with most intakes are already equipped with stop logs or gates that facilitate dewatering, and EPA found in site visits that most facilities have the ability to continue facility operations while a specific forebay is removed from service. EPA also notes that this technology cost was only assigned to intakes with existing traveling screens and that the O&M costs are incremental costs. Some of the components cited such as screen overhaul and installation, dewatering, and spray system (high pressure) were already being performed prior to the upgrade and thus should not be included in the cost estimate. While the existing screens may not be designed for continuous operation and would require more frequent overhaul if operated continuously, EPA included costs for complete replacement using screens with a more robust design that minimizes maintenance due to wear. Other costs associated with new components are included in the vendor estimates which were described as the net increase over current conditions. Therefore, EPA has concluded any incremental costs were included in the O&M estimates. EPA notes the commenter did not provide any specific data on this issue. EPA also did not include costs of a crane since the actual need for a crane and the frequency of use can be highly variable. Further, EPA expects such construction work would be done during outage periods, during other construction activities, and on a schedule determined by the Director that would reflect any additional controls for entrainment (see preamble Section IX for more discussion on compliance schedules). In most cases, any work is expected to occur when heavy equipment is already available. Therefore, mobilization and transportation costs for heavy equipment would not be an incremental cost resulting from the requirements of this final rule. Further, EPA has included a contingency factor in the cost analysis to reflect those site-specific instances where costs may be inadvertently understated; see TDD Chapter 8.

Another commenter on the proposal (commenter 2171) stated that O&M costs assumed by the EPA for modified traveling water screens were underestimated, and EPA did not include cost and maintenance of replacement fixed screens when screens are sent offsite for overhaul and replacement. As discussed above, maintenance overhaul of traveling screens is an activity that is already performed for the existing screens and thus should not be included, regardless of methodology employed. EPA based screen replacement costs on vendor quotes for a typical replacement, which should not require an extended period of fixed screen use under normal circumstances. EPA notes the commenters provided no supporting data for their assertions. Based on further review, EPA has concluded that the O&M costs estimates it used for the final rule are reasonable estimates because they are based on vendor quotes and available data rather than unsupported assertions. Since no detailed information or cost data has been received by EPA to suggest that traveling screen O&M costs are underestimated, EPA disagrees with these comments.

UWAG stated that EPA's barrier net costs are low, arguing that costs for components such as pilings and O&M cost are underestimated. They note that in TDD Chapter 12-2, EPA claims that if all 139 tidal facilities installed barrier nets the costs would be only $4,010,000 ($28,849 per facility) and UWAG stated that it was unclear whether the cost basis was total or annualized and whether it included O&M costs. A Southern Company (comment 2190) estimate suggested that the capital costs for barrier nets on oceans and tidal waters to minimize impingement of shellfish from existing water flow would be $4,000 per cfs (equal to approximately $9 per gpm). Based on the discussion below, EPA disagrees that the cost estimates for barrier nets are underestimated. EPA notes that the barrier net costs shown in TDD Chapter 12-2 for the final rule are annualized costs, which include (and are largely driven by) O&M. The O&M is primarily associated with removal/deployment, repair, and replacement of the barrier nets. EPA based the cost estimates for barrier nets in estuarine environments on cost information provided by Chalk Point that reflect the actual design and operation at their facility. EPA concluded that the barrier nets at Chalk Point (which includes a robust design with two concentric nets and fixed pilings) that have demonstrated an 80 percent reduction in IM are well-suited for use as an example of a well-functioning barrier net in an estuarine environment. Chalk Point did not provide information on installation costs for the pilings. Instead, EPA based its estimate for initial barrier net installation on more general unit cost data for marine pilings installation. The final rule barrier net costs were adapted from the Phase II cost module and a description of the derivation of costs can found in Chapter 4.1 of Phase II TDD. The design flow for the Chalk Point Plant was greater than 800,000 gpm and the Phase II TDD Table 4-7 shows that for a 20 ft deep net, an intake with a design flow of 807,840 gpm would need 152 pilings at a cost of $162,792 plus 20 percent ($32,558) or $195,350 in 2002 dollars. A comparable cost estimate for Chalk Point derived using the EPA final rule cost tool results in a total capital cost of approximately $220,000 and an annual O&M of approximately $92,000 in 2009 dollars. UWAG cited a cost of $200,000 (2006 dollars) for the actual piling design at Chalk Point which demonstrates that EPA's estimate for barrier net support structure installation tends to conform with the commenter's estimate. EPA's final estimated costs for barrier nets include a substantial component for O&M that includes labor costs for routine maintenance, seasonal deployment, and annual replacement of 1/3 of the net each year (see Chapter 4.2 of the Phase II TDD). These costs are based on costs cited by Chalk Point for use of a contractor to periodically remove and replace the nets with clean nets, plus replacement costs for damaged nets and therefore EPA's barrier net costs include O&M costs that are reflective of actual cost of a well-functioning barrier net. The O&M costs of $75,000 to $88,000 (2006 dollars) per year to control biofouling at Chalk Point cited by UWAG is very similar to the comparable EPA O&M cost of $83,250 (2002 dollars). The 20 ft depth scenario was used as a default costing assumption for all ocean and estuarine intakes. Southern Company cited capital cost rate is nearly an order of magnitude higher than comparable EPA cost estimates. They provide no description of the basis for their cost estimate and therefore cannot be directly compared. As described above, the EPA cost estimates are based on a detailed breakdown of cost components, a portion of which is confirmed by cost data cited by UWAG.

Comments Concerning Capital Costs for Specific Facilities

EPA recognizes that for individual facilities, actual costs may be higher or lower than the average based on site-specific conditions. However, for purposes of national rule cost estimates, the cost model based on average costs provides a reasonable approach since these differences will tend to balance out. The final rule includes many compliance alternatives in addition to those included in the proposal and that these alternatives may provide less costly approaches to meeting the IM standard than anticipated at proposal. Recognizing that each of these companies may reconsider their compliance approach in light of the additional compliance alternatives, EPA is responding to the specific comments.

Many commenters provided total compliance cost estimates for one or more facilities in support of their argument that EPA underestimated the costs. In many cases, EPA is unable to directly respond to these comments since the commenters provided only total costs and did not include any supporting data or detailed information describing system design or how the cost estimates were developed. In other cases, facilities included total costs that also included costs to comply with other rules (such as the Utility Air Toxics rule) and EPA was unable to determine whether the costs were related to complying with today's rule or the other rule. It is not appropriate to include compliance costs for other rules in developing the incremental compliance costs for today's rule. Such costs were already considered in EPA's compliance cost estimates for those final rules.

The Wisconsin Public Service Corporation provided estimated aggregate O&M cost for continuously operated traveling screens at their Pulliam Plant of $240,000 and $330,000 at their Weston Plant. They compare these costs to "agency's site specific estimated O&M costs for the J.P. Pulliam and Weston Generating facilities are $271,000 and $88,000, respectively." EPA is unable to respond to these estimates in a detailed manner since the commenter provides no details regarding the source of the EPA estimates they cited and/or how they were derived. Further, no details regarding the derivation of their own estimates were provided except that they include costs for increased power and maintenance/repairs assuming the traveling screens operate continuously when pumps are in service. EPA notes that these two facilities completed short technical surveys only and are therefore not included in the model facility estimates for the final rule. However, the commenters O&M estimate for the Pulliam appear to be in agreement with the EPA estimate they cited. EPA notes that flow is a major input value driving costs and based on technical survey data, the design intake and average intake flow for the Weston is about 3 times that for the Pulliam. The commenter failed to provide information (nor does EPA have any other site-specific information) that would explain why their own O&M estimate for a facility with 1/3 the flow volume would have O&M cost that is only decreased by 38 percent from that of the larger facility. As a result, EPA disagrees with the comment and did not make changes to its cost methodology or to any facility-specific costs.

A comment from ConocoPhillips Company, Bayway Refinery stated that total replacement of traveling screens at Bayway refinery would cost $5-10 million (including screen replacement, engineering reviews, and configuration of a fish return but not including screens for the reservoir intake or barrier nets). The commenter provided an overall estimate but did not similarly provide estimates of the individual components included in that total. For the final rule, EPA estimates that the capital cost to comply with the IM standard via replacement of existing traveling screens with modified traveling screens including the addition of a fish return would be $3.6 million. EPA acknowledges the difference in the two capital cost estimates. However, EPA is unable to determine why the EPA and Conoco cost estimates differ because the commenter did not provide any supporting data or detailed information describing system design or how the cost estimates were developed. It is also unclear whether the commenter's data reflects incremental costs or a full replacement of the entire intake structure. In absence of more specific information (which the facility did not provide), EPA concludes its cost estimate is a reasonable reflection of probable costs for the facility.

A comment from the Astoria Generating Company (comment 2193) stated that the projected capital cost for retrofit of the screens for Units 30, 40, and 50 at Astoria Generating Station for the facility is $9.75 million. The facility did not provide any detailed information on the components included in that cost or information on how it developed its costs and EPA does not have specific data concerning the size and number of screens employed. EPA notes that if units 30, 40, and 50 each utilize two 10-ft wide screens (which is a typical configuration for facilities this size), the corresponding EPA projected capital costs for modified screens with fish returns would be approximately $5.7 million for 50-ft tall screens in 2009 dollars. EPA acknowledges the difference in the two capital cost estimates. However, EPA is unable to determine why the EPA and Astoria cost estimates differ because the commenter did not provide any supporting data or detailed information describing system design or how its cost estimates were developed. In absence of more specific information which the facility did not provide, EPA concludes its cost estimate is a reasonable reflection of probable costs for the facility.

The Astoria Generating Station has estimated that an additional 4 bays of similar configuration to the existing bays would be required at AGS if they were required to attain a through-screen velocity of less than 0.5 fps. They estimated the costs would be $32.9 million based on a complete reconstruction of the intake structure and inclusion of modified traveling screens and a fish return. EPA notes that the compliance technology design proposed by Astoria in this instance consist of modified traveling screens, a fish return, and a reconfiguration to 0.5 fps. This facility would likely install modified traveling screens or reconfigure its system to comply via the low velocity compliance alternative, but not both. This compliance response goes beyond the final rule IM requirements. As such, the cost estimate provided by this facility is, by its very nature, higher than EPA's estimate. Having said that, EPA applied its costing modules to the scenario described by the commenter. Based on the available design through-screen velocity of 1.0 to 1.1 fps reported for the intakes at this facility, EPA estimates that a total screen width of around 100 ft or more would be needed to meet the 0.5 fps compliance alternative. Assuming a total screen width of 100 ft, EPA has calculated capital costs for a larger intake with traveling screens (Module 10.2) would be approximately $22 million. These costs do not include modified traveling screens or fish returns because the larger intake is built to meet the 0.5 fps velocity compliance alternative. Consequently, the corresponding cost to meet only the low velocity alternative for the Astoria Generating Station should be significantly less than the $32.9 million cited.

A comment for Cook Nuclear Plant provided a capital cost estimate for a fish return and handling system of over $3 million dollars. Further, the comment urges EPA to acknowledge that fish collection and return systems are not easy, potentially not feasible, and inexpensive to retrofit at some facilities. They explain that the Cook Nuclear Plant operates seasonally a fish deterrent system that uses high frequency sound to repel fish, particularly species of the Clupeidae family. They state that the combination of its velocity cap, its offshore intake location, and its fish deterrent system would likely eliminate the need for a fish collection and return system, and the Cook Nuclear Plant expects that it could demonstrate an equivalent level of mortality reduction, consistent with EPA's goals for the 316(b) rule. EPA agrees that fish returns may be more challenging to install at some sites, but maintains that the technology is available and demonstrated. Further, EPA has adjusted the cost of fish returns as described above to reflect more difficult installations. However, EPA agrees with the commenter that they may not need to install a fish return and handling system. As explained in the preamble, the final rule provides seven compliance alternatives for demonstrating compliance with the IM standard, several of which are potentially relevant at the example facility described in the comments: existing velocity cap, intake velocity, and the "system of technologies." See the preamble for further discussion of the alternatives. Because, similar to the facility, EPA expects the facility would not need to install a fish return and handling system and would not incur such costs, EPA appropriately did not estimate costs for this facility to add a fish return or handling system and the facility's estimate is not relevant.

The Eastman Company presented a $20 million cost estimate for traveling screens for their Tennessee facility and argues that these costs are much higher than costs derived by EPA. They perform comparisons to two different EPA cost estimates. The first EPA estimate used for comparison to their $20 million estimate was derived using the impingement compliance technology cost factors in Exhibits 8-19 of the proposal TDD that EPA used in the IPM model analysis which derives costs by multiplying design flow (in gpm) by a factor.[41] This cost factor is based on total costs and total design flow and represents an average for all facilities on a national basis. While EPA did revise the corresponding impingement technology costs for traveling screens in response to comments in the final rule such that the IPM capital cost factor representing the average technology costs increased from $13.1/gpm to $20/gpm, the equivalent

[41] As part of the economic analysis, EPA used the Integrated Planning Model (IPM) to estimate economic impacts. To facilitate the modeling runs, EPA developed specific cost equations; see Chapter 8 of the TDD for more information.

cost of roughly $10 million for the Eastman facility was still only about half the Eastman estimate. As the commenter is comparing a site-specific cost to one EPA developed to represent a national average, EPA would expect that some site-specific costs would be higher (and some would be lower) than those predicted by a national average.

The second EPA estimate used for comparison by Eastman Company to their $20 million estimated capital costs for freshwater modified traveling screens was presented in Exhibit 3-27 of the Phase III TDD. EPA agrees that the costs and methodology presented in Exhibit 3-27 were the basis for the cost equations used to develop costs estimates for the proposed and final existing facilities rule but notes that the costs in Exhibit 3-27 are in 2002 dollars and that, based on the ENR CCI, the costs should be increased using a corresponding inflation factor for adjusting 2002 to 2011 dollars of 1.4 (9070/6538) before the commenter can reasonably compare the costs. For the final rule EPA has adjusted the capital costs for traveling screens based on data such as vendor data and facility data such as that provided by the commenter. Eastman notes that they intend to use dual flow screens which, as described in the Phase II TDD, EPA had concluded would add an additional 20 percent to the capital costs but would result in lower facility operating and maintenance costs due to reduced debris carryover which would not be reflected in the traveling screen O&M costs. When these adjustments are incorporated, their original EPA estimate increase from $4.5 million to around $10 million.

Insufficient data is available for EPA to verify the cost components including the screen costs cited in comments. However, one assumption that drives Eastman's estimate up is their inclusion of a contingency factor of 30 percent. EPA disagrees with Eastman's use of a contingency factor of 30 percent. Contingency factors are added to reflect unexpected costs that may occur. Typically, contingency factors reflect the complexity and the degree of uncertainty regarding the scope of the work being performed. That is, a more complex application and especially one where the scope of various components and tasks have a high degree of uncertainty would include higher contingency factors that less complex and uncertain applications.[42] In the modified traveling screen cost module, EPA used a contingency factor of 10 percent reflecting a more reasonable contingency rate for an average facility because traveling screen upgrades involve replacement of existing technology with no major modification of existing civil structures. The technology is well-demonstrated, well-understood, retrofit of such technology is already done by the industry, and therefore the uncertainty of costs is relatively low. A higher contingency factor such as that described by the commenter would be appropriate where the technology is poorly understood, undemonstrated, or uncertainty about the retrofit process was extremely high. The commenter goes on to point out that the overall EPA methodology may be accurate for some average facilities, and EPA agrees with the comment. The commenter goes on to assert that the cost to retrofit large pieces of new equipment into very old buildings will often far exceed the median estimated cost for an average facility. Eastman notes that many of their intakes were built in the 1920s, 1930s, and 1960s. EPA notes that the estimated costs of this rule are incremental costs, and are not intended to represent the costs of other upgrades a facility may need to undertake or, in the absence of any rule, choose to undertake. EPA notes that this may explain Eastman's use of an additional 30 percent cost increase applied to equipment costs for

[42] For example, projects where civil structures must be modified or constructed and where strategies for dealing with interference with existing utilities and structures have not been fully developed will involve a higher degree of complexity and uncertainty.

"Civil / Structural, Concrete, Steel and Misc." EPA considers this cost high as compared to the average facility which is the basis for EPA's estimates. EPA also notes that Eastman included 2 percent escalation factor over a seven year period (2011-2018) which increased costs by 14 percent or another $2 million. Escalation is used to account for increases in the price of goods and services over time and typically is included to account for increases during the duration of the project. EPA does consider such costs in the economic analysis but not in the overnight cost estimates which were used for comparison here. EPA does not consider the inclusion of a 14 percent escalation factor for a project that should have relatively short duration to be appropriate in this case. In any event, costs escalated to 2018 are not comparable to an EPA 2011 estimate. EPA concluded that the Eastman $20 million estimate includes a contingency cost that is inflated by $3 million (30 percent versus 10 percent), a "Civil / Structural, Concrete, Steel and Misc" cost component of $2.4 million that appears excessive, and an escalation cost of $2 million that is inappropriate for this comparison. When factored into this comparison, the difference of roughly $10 million (about 50 percent lower) between the revised EPA estimates and the Eastman becomes much smaller (equal to roughly 25 percent lower). Based on this discussion, EPA has concluded that the Eastman capital cost estimate does not conflict with the EPA estimates for modified traveling screens by a significant amount but rather the differences in total costs reflect Eastman's use of certain cost components that EPA does not consider as appropriate in the application of this technology. Further, as explained previously, EPA's model facility approach estimates costs on a national basis. As such, some facilities will experience cost above the national average and some will experience costs below the national average.

Service Life

Several commenters argued that EPA has overestimated the service life of technologies. One commenter (UWAG) noted that EPA estimated the service life of traveling screens as 20 years but notes that they commonly are replaced or overhauled every three to five years due to continuous operation and extensive O&M requirements. As described below, based on information it its record, for most facilities, EPA concludes 20 years is a reasonable estimate of the service life of traveling screens. However, EPA agrees with the commenter that many screens will require ongoing maintenance, replacement, or overhaul during this time period and that, for some, the lifetime may not extend to 20 years. EPA's costing approach reflects that and as such do not result in underestimates of cost. Observations from EPA's site visits confirms that under certain circumstances, such as rivers with persistently levels of suspended silt and sand levels, traveling screens may require overhauls at higher frequencies but notes that this is only a small subset of intakes. These overhauls typically involve replacement of certain moving parts such as specific screen panels, the bay, motor, cover, and mounts. An overhaul does not entail replacement of the entire traveling screen. EPA notes that newer traveling screen units are designed with sturdy but lightweight composite materials, which greatly decrease wear and tear on moving parts and decreases operational costs. Under high sediment loads, EPA found that facilities replace chain and sprockets, and individual screen panels. This is consistent with EPA's O&M costs based on vendor quotes of typical labor and equipment costs associated with ongoing maintenance including equipment overhauls. EPA has concluded that these costs are representative of full range of O&M costs associated with a service life of 20 years.

The commenter also stated that EPA assumed a service life of 30 years for barrier nets but that many such nets are replaced more frequently (e.g., every 2-3 years). EPA notes the commenter misunderstood the methodology. EPA agrees that many barrier nets may require frequent replacement. EPA's technology costs for barrier nets include O&M costs for the replacement of one third of the nets each year. This is consistent with the commenters suggested frequency. The 30 year service life assumed by EPA applies only to the more permanent components such as pilings and anchor points. Other commenters were less specific about their concern for EPA's assumed length of service life for technologies and EPA is unable to respond to these comments since they are general in nature and no information is provided regarding specific technologies or service life duration.

Entrainment Costs Development for Existing Units/Intakes

Industrial stakeholder commenters argued that the cost analysis fails to include any costs for entrainment requirements. The rule establishes a BTA standard for entrainment that requires the determination of required entrainment reduction measures in a structured site-specific permitting proceeding. The BTA standard for entrainment requires that certain prescribed factors must be considered in the decision and must reflect the maximum reduction in entrainment warranted after consideration of relevant factors. EPA's cost estimates include the costs of studies and analyses that are required to be submitted to the Director for a site-specific determination of BTA for entrainment. However, EPA has not included compliance cost estimates for any entrainment reduction technologies because, under EPA's selected option, compliance for entrainment reduction requirements is established on a site-specific basis. EPA cannot predetermine the outcome of such determinations and this final rule does not prescribe a particular requirement. EPA did, however, develop cost estimates for the cost of several compliance options at proposal that included entrainment compliance costs, including an assessment of the cost of an option that would have required flow reduction equivalent to that achieved by closed-cycle recirculating systems at all facilities with 125 mgd or greater (Proposal Option 2), which account for 90 percent of actual flows. Also see Essays 37 and 55 for additional discussion concerning entrainment cost and impact evaluation.

Several commenters provided total facility technology costs for one or more facilities to comply with a closed-cycle cooling requirement. EPA is unable to evaluate these estimates since the commenters provided only total costs without a breakdown among component costs (e.g., O&M, capital), and did not include any supporting data or detailed information describing system design or how the cost estimates were developed.

Regarding closed-cycle, low flow cooling systems are, in many cases, associated with manufacturing facilities and EPA's approach was to account for higher compliance costs at manufacturing facilities reflecting more complex cooling systems by applying capital costs based on EPRI's difficult retrofit cost category. Upon further analysis, EPA has confirmed the validity of the manufacturing facility costs as reasonable for medium and large systems, but acknowledges that the cost model may have underestimated closed-cycle retrofit costs for smaller manufacturing systems due to extrapolating the cost curve to small flows. This cost underestimate is likely offset by EPA's use of the higher cost of the difficult retrofit cost category. EPA does not have additional data upon which to base different costs, nor did commenters provide any. Further, EPA has concluded that this would not have changed the outcome of EPA's evaluation of closed-cycle cooling as BTA since costs were not dispositive. EPA notes that the impact on the national costs is limited since smaller systems only comprise 20 percent of total manufacturing closed-cycle system design flow. In other words, even a modest increase in capital costs for low flow manufacturing facilities would not have resulted in national total rule costs that were appreciably higher. This topic is discussed in greater detail in DCN12-6655.

Riverkeeper (comment 2391) argued that EPA's Option 2 and Option 3 costs are overestimated by 60 percent to 70 percent. As discussed below, EPA disagrees that it has overestimated closed-cycle cooling costs. Also, EPA notes that while EPA considered costs for today's final rule, costs were not a dispositive factor in rejecting closed-cycle as BTA on a national basis. See Section VI of the preamble. Riverkeeper developed their estimates using EPA's closed-cycle Phase II cost model retrofit factor applied to SPX Clear Skies cooling tower costs, adjusted for inflation, and adjusted for the energy penalty cited in the EPA Phase II Proposal TDD. The commenter assumed zero downtime costs. EPA's position regarding each of these components is discussed in detail in the record (see DCN 12-6656) and summarized below.

Closed-Cycle Cooling for Existing Units at Generators

Riverkeeper (comment 2391) expressed concern that EPA abandoned its own closed-cycle estimation methodology developed under Phase II and adopted costs developed by the power industry and as a result overestimated costs. Riverkeeper discussed several aspects in which EPA overestimated costs and presented an evaluation of EPA's closed-cycle cost estimates in an attachment prepared by their contactor, Powers Engineering. EPA disagrees that the revised closed-cycle costs are overestimated. EPA's original Phase II cooling tower cost estimation methodology relied upon vendor quotes and BPJ engineering assumptions from new construction. The approach did not include any data from actual project estimates. EPA now has better cost data, including the EPRI cost models based on actual facility-specific retrofit costs. EPA included this data in its methodology for developing the final rule costs. EPA continues to receive critical comments from industry (including EPRI) that the closed-cycle costs are underestimated despite the fact that EPA relied upon basic elements of the cost estimation methodology provide by industry and EPRI. A comparison of hypothetical capital costs cited by Riverkeeper and actual cost data for more recent closed-cycle retrofit projects supports EPA's position that its estimate is a reasonable approximation of the range of costs that may be incurred nationwide. A more detailed analysis and discussion of this issue and the Powers Engineering comments can be found at DCN 12-6656.

Riverkeeper (comment 2391) also stated that EPA's reasoning on closed-cycle retrofit downtime is contradicted by the record. They state that EPA overestimated construction downtime for closed-cycle retrofits for fossil-fuel facilities by a factor of two in the 2002 Phase II TDD. The comment asserts EPA repeats the overestimate in the March 2011 existing facilities rule proposal TDD when EPA continued to assume a two month (8 week) total downtime and a net downtime of one month (4 week). EPA agrees with this commenter that, at some facilities, a retrofit can be implemented with little difficulty, the tie-in can be performed during a typical facility annual or 18 month scheduled maintenance period (which based on site visits, EPA estimates are 4 weeks on average), and that for these cases there would be no net downtime. However, for facilities where retrofit difficulties may be encountered the downtime duration may be much longer. For example, new data obtained by EPA indicate that 6-8 weeks total downtime was required for the Yates and McDonough retrofits which represent average to difficult retrofits. Also, EPA's analysis of the EPRI downtime estimates for generators resulted in a weighted average of 1.5 months net downtime which is equivalent to a net downtime of 6 weeks which is longer than the 4 weeks assumed by EPA.[43] EPA notes that there is limited information available upon which to base this estimate but concluded that the eight week total downtime estimate is reasonable and still supported by the record. See DCN 12-6656 for additional discussion. See Essay 35 for detailed discussion of installation downtime.

Riverkeeper (comment 2391) also takes issue with EPA's increase in the estimated construction downtime from 2 months to 7 months between 2002 and 2011 for nuclear facilities. Based on data regarding recent nuclear generating system upgrades, Riverkeeper states that the additional outage should be no longer than 2 months. In response to comments received since proposal and upon evaluation of additional data, EPA has revised the downtime estimates for closed-cycle retrofits at nuclear facilities in a way that substantially reduces the overall downtime estimate to an aggregate value similar to that suggested by Riverkeeper. In the revised approach, facilities are divided into two groups: those that have conducted or are currently planning to conduct an extended capacity uprate (ECU) and those that have not. An important characteristic of an ECU is that it involves considerably more construction activities compared to simple refueling outages (including replacement of portions of the generating system) and therefore involves outages much longer than those for refueling. These projects provide an ideal opportunity to further reduce downtime if the closed-cycle retrofit is performed concurrently. Data regarding ECU scheduling was readily available and revisions to the final rule have given the Director greater flexibility in establishing compliance schedules for entrainment requirements would allow for scheduling of the closed-cycle retrofit to occur concurrently with an ECU. For those facilities where ECUs are unlikely to occur in the future (i.e., facilities where an ECU has been performed or is currently planned), EPA took a more conservative approach similar to the approach used at proposal but with the duration adjusted downward to a level consistent with new information. At proposal, EPA used the 7-month (28-week) closed-cycle retrofit outage for all nuclear facilities on the Phase II NODA estimate which was based on the only nuclear closed-cycle retrofit actually performed at an existing nuclear facility (Palisades) in the 1970s. For the revised final rule estimate, EPA evaluated the EPRI net downtime estimate of 6 months used in their cost estimate (EPRI Report Number 1022491, provided as an attachment to EPRI's comments on the proposed rule; see EPA-HQ-OW-2008-0667-2200). In support of the 6-month estimate, EPRI cited engineering estimates for four nuclear power plants that ranged from 5 to 22 months and noted that the expected downtime was difficult to predict since there was a great degree of uncertainty given the lack of actual data. A closed-cycle retrofit for these facilities that will not conduct an ECU would likely occur concurrently with a refueling outage which now typically takes about 4 to 6 weeks (see DCN 12-6876). Thus, the EPRI net downtime estimate of 6 months or 24 weeks would be consistent with a total retrofit downtime of about 28 weeks. EPA notes that this 28-week value is consistent with the duration of the first steam generator replacement project for SONGs Unit 2[44] and while this outage length is the higher of the two similar projects at SONGS, the difference demonstrates that complex projects for which contractors and engineers have little previous experience will tend to take longer. The actual duration of the

[43] The EPRI estimates which ranged from 0 to 6 months were used to derive energy replacement costs and given that easy retrofits were assigned 0 months these values clearly reflect net downtime.
[44] The first attempt at replacement of the steam generator for SONGS unit 2 took 28 weeks but a similar subsequent project for unit 3 was expected to be shorter (see DCN 10-6548).

outage required for a nuclear closed-cycle retrofit is still unknown and will be influenced by site-specific factors. Given this uncertainty, EPA concluded that a 24-week estimate was reasonable and applied this value in the economic analysis.

For the remainder of facilities that are likely to conduct an ECU in the future, EPA estimates that under favorable conditions, ECUs typically have a duration of two to four months (see DCN 12-6875) but can also take much longer.[45] For this analysis, EPA assumed that facilities performing an ECU would be capable of completing the retrofit concurrently with the ECU and that the scope of the ECU would be extensive enough to push the duration toward the longer end of the 2 to 4 month or longer range. For these projects, EPA assumed zero downtime which is actually a shorter duration than the 2 months suggested by Riverkeeper. See the Economic Analysis for Final 316(b) Existing Facilities Rule for more details regarding the application. See also DCN 12-6656. Based on data from the NRC, EPA estimates that roughly one-third of existing nuclear generating units have already performed or have applied for an ECU and therefore are assumed the a 24-week downtime. As a result, the equivalent average net downtime across all nuclear units should be about 8 weeks (2 months). Thus, while the 24-week estimate is still longer than Riverkeeper's suggested length, EPA has adjusted the overall nuclear closed-cycle retrofit downtime to a value that is consistent with Riverkeeper's position.

Moreover, to the extent that Riverkeeper comments stating that EPA may have overestimated closed-cycle cooling retrofit costs, EPA also would stress that its decision about what national standards for impingement and entrainment to promulgate took a variety of factors into consideration in addition to the costs. In deciding on its final regulatory option (and in rejecting closed-cycle as BTA), cost was not a dispositive factor. See Section VI.E of the final preamble for additional discussion.

Several commenters stated that EPA did not include costs of blowdown treatment particularly if high cycles of concentration (COC) are required. The final rule does not include a requirement to meet a specified COC in order to meet the definition of closed-cycle cooling and thus the high COC requirement cited are not relevant. See Essay 17A. However, regarding cost of blowdown treatment, EPA agrees that there is no separate cost element for blowdown treatment in the cost methodology used but disagrees that such costs are not included. EPA notes that its costs include actual costs for the entire closed-cycle retrofit project as estimated by EPRI. Since the costs are total project costs, the data includes blowdown treatment component costs anytime the specific facility found such costs to be necessary. This presumption is supported in documentation of the most recent EPRI cost estimate which uses the same model approach (see EPRI Report 1022491) and provides similar costs as EPA's (see DCN 12-6656). The EPRI report specifically discusses the need for considerations for "water treatment and other maintenance facilities for the treatment of cooling tower makeup and blowdown, if required." The EPRI report also states that "water treatment may be required for discharge of cooling tower blowdown" when discussing the basis for O&M costs used in the model. Thus, EPA concluded that it is reasonable to assume that blowdown treatment costs are already included in the EPA model. Also, as explained above, high COCs or flow reductions of 97.5 percent or 94.9 percent depending on the water salinity are

[45] Riverkeeper provided examples of ECU-type activities suggesting that a 75 day (10 week) duration which is in agreement with a 2 to 4 week duration cited by engineers (see DCN 12-6875) but there are instances where the duration was much longer. For example, Turkey Point took 5 months and SONGS unit 2 took 28 weeks.

not requirements to meet the definition of closed-cycle, but rather serve as examples as to what comprises a properly operated cooling tower with minimized makeup flows.

One commenter stated that EPA did not consider that some existing closed-cycle systems may incur increased tower maintenance chemical and blowdown treatment costs due to unspecified permit application requirements and certain impingement mortality requirements (e.g., lower velocity, flow for fish returns, blockage reduction). EPA has revised the final rule to provide an IM compliance alternative for facilities with closed-cycle recirculating systems. Therefore, no additional costs will result. Commenters provided no explanation or examples of how such requirements would result in increased chemical and blowdown treatment costs.

Commenters noted that the EPRI costs for the electric generating facilities covered in proposal Options 2 and 3 are about 50 percent higher than the EPA estimates at proposal for electric generators. EPA notes that these EPRI estimates are based on the methodology described in EPRI Technical Report 1022491. EPA conducted a comparison of the EPA and EPRI cost methodologies and concluded that the national level capital costs were within 11 percent, which corresponds to less than 1 percent change in annualized costs of the rule at a 7 percent interest rate. EPA notes a major component contributing to the higher EPRI total costs is the increased downtime associated with EPRI's inclusion of cooling system re-optimization. As discussed in DCN 12-6656, EPA concludes that by factoring in only the higher downtime costs and reduced auxiliary power costs, EPRI failed to also incorporate other cost benefits of re-optimization that would have resulting reductions in long term costs that favor selection of re-optimization. EPA notes that re-optimization (which involves improvements to the condenser performance as well as use of an overall smaller cooling system) will have additional benefits of reduced heat rate penalty and reduced O&M costs beyond just the auxiliary power requirements; these were not addressed in the EPRI methodology.

EPRI presented a detailed closed-cycle retrofit cost analysis for Phase II facilities in EPRI Technical Report 1022491. This document was one of many submitted by EPRI that were described as either directly supporting their comments or which they believed EPA would find of use as part of developing the final Existing Facilities Rule. EPA welcomes this data and notes that EPA's final closed-cycle cost methodology is based on an earlier cost estimation approach originally provided by EPRI. EPRI's previous cost methodology data submissions did not come with any actual facility or industry-wide estimates. The cited report included additional refinements to their methodology including some actual industry-wide (Phase II facility) cost estimates. EPA conducted a detailed analysis that compared the EPRI methodology and results of the model presented in the EPRI Technical Report 1022491 to the EPA model used in the final rule (see DCN 12-6656). This comparison evaluated how well the results of the application of the EPRI closed-cycle cost estimation methodology (with recent refinements) compared to the results of EPA's final rule methodology and whether any changes to the EPA methodology were warranted based on this new information. The EPRI report did not address O&M outside of energy requirements. The analysis concludes that the EPA and EPRI capital costs are similar in magnitude with the EPA costs being about 13 percent lower than the EPRI costs. Though the new EPRI capital costs are somewhat higher, they are based on detailed site-specific information that was not made available to EPA. As discussed above, EPA finds that the capital costs are close enough that when the costs are annualized there are no changes necessary. EPA notes such changes would not even be possible without EPRI's more detailed site-specific information. See DCN 12-6656 for the detailed analysis.

The Utility Water Act Group (UWAG) (comment 2210) noted that EPA's approach to estimated closed-cycle cooling costs includes a variety of assumptions, and that EPA seems to have made little effort to ground-truth its hypothetical cost equations against real costs experienced by real facilities or detailed estimates prepared by operators or their consultants. UWAG gives several examples of facilities where costs would be higher than EPA estimates. EPA agrees that for some facilities the actual costs will be higher than the EPA estimate, but notes the cost curves generated by EPRI suggests that UWAG has deliberately selected only the higher costs estimates as their examples. UWAG did not provide cost data for all of the facilities, include any low cost facilities, and the provided examples were never examples of "easy" retrofits. In calculating the national estimates, since EPA did not have the information to determine whether any specific installation would be easy, average, or difficult, EPA chose to apply cost estimates for average difficulty cooling tower retrofits in recognition that some actual costs would be higher and some would be lower and that these costs would balance out in the overall national estimate. EPRI Technical Report 1022491 includes a ground-truth comparison of their recent estimated capital costs to actual and detailed engineering estimates for nine facilities. One nuclear plant designated as an extremely difficult retrofit reported costs over 50 percent higher than the EPRI estimate. The aggregate of the remaining eight was within 4 percent. Since the EPA estimates resulted in similar total costs to those of EPRI, EPA has concluded that its costs are representative of actual costs when viewed on a national basis.

Midwest Generation, Edison Mission Energy, LLC (comment 2245) states that both the EPA and EPRI closed-cycle estimates are underestimated because they did not include: 1) the cost of increased maintenance, including increased labor and chemical costs, necessary to operate closed-cycle cooling systems; 2) the cost to finance the capital project of installing closed-cycle cooling systems; 3) permitting costs required to permit closed-cycle cooling system installation and operation; 4) the cost of electrical system upgrades necessary due to unit retirement, energy replacement, and efficiency loss; and 5) the cost of environmental impacts that result from closed-cycle cooling systems. EPA notes that the EPA cost estimates include O&M costs, auxiliary energy costs, heat rate energy penalty costs, and construction downtime costs. The EPRI capital cost model upon which EPA based its estimates uses both actual and industry estimated closed-cycle cooling retrofit projects which are often expressed as total project costs. EPRI Technical Report 1022491 specifically notes that it does not include permitting, financing, or electrical system upgrade costs. Regarding permitting costs, EPRI states that "Permitting costs, while potentially significant, are highly site-specific, and there is no obvious method for generalizing them." EPA concurs with this assessment. EPA did include a permitting costs component in the economic analysis, noting these costs were not necessarily specific to cooling towers. Further the EPA economic analysis does account for financing costs via present value and annualization. The 7 percent discount rate (used in the private analysis, and as one of the alternative discount rates for the social cost analysis) reflects long-term, real cost of capital, based on OMB guidance and various studies. EPA assumes the electrical upgrade comment is referring to the costs of possible electric distribution system modifications. In assessing whether the rule constitutes a "significant energy action" under Executive Order 13211, EPA concluded that the rule would not result in increases in the cost of energy distribution in excess of one percent. With regard to environmental impacts, the only environmental impacts that would result in costs rather than benefits are for an increase in air emissions due to increased fuel use to compensate for the heat rate penalty and auxiliary energy requirements. In some locations, the net air emissions would decrease as the older, less efficient units are closed under a closed-cycle requirement. Newer, more efficient facilities would be constructed to make up the lost power production. Thus, the long term impacts may be minimal. While EPA did not specifically quantify the costs of such air emissions, EPA did consider air emissions and the potential impact of increased air emissions is one of the three factors EPA considered in deciding to require entrainment requirements on a site-specific basis. Also, to the extent that these costs can assessed on a site-specific basis, these costs can be included in the evaluation required as part of the site-specific permit application requirements. See preamble for a more detailed discussion.

One commenter, Duke Energy (comment 2215), in support of requiring site-specific determination of entrainment requirements stated that EPA's closed-cycle costs are flawed and that EPA's cost estimates may understate the costs by 5 to 18 times. EPA notes that the final rule requires establishment of entrainment requirements on a site-specific basis as requested by the commenter. EPA disagrees with the commenter's assertion regarding costs, noting the basis of comparison provided by the commenter consists of cooling tower costs based on the Phase 1 new facility cooling tower model. The Phase I new facility costs were then compared to the costs of the closed-cycle cooling system for one of their new generating facilities. EPA notes that this argument is flawed in several obvious respects. First, a comparison of Phase I model costs is irrelevant because there is a significant difference in the cost components considered and construction requirements between existing system retrofits and new systems, and that EPA need only consider incremental costs. The result is higher net costs for retrofit systems. Second, as discussed above the costing methodology for this final rule is different from that used in the Phase I rule. In this rule EPA was able to use real world data obtained from EPRI. And third, the Phase I model costs are net costs that include discounts for offsetting once-through system costs which would otherwise need to be built at a Phase I facility. Existing facilities already have intake structures, pumps, condensers, and other elements of a cooling water system.

Closed-Cycle Cooling for Existing Intakes at Manufacturers

The American Chemistry Council (ACC) (comment 2207) provided a detailed closed-cycle cost estimate for retrofitting small (5,000 gpm), medium (20,000 gpm), and large (100,000 gpm) cooling towers. These estimates were developed to support their argument against Proposal Options 2 and 3 as being too costly. However, elsewhere in the comment they state that "The potential cost per gallon of complying with the CWIS proposed rule is much greater for smaller intake structures because many of the compliance costs do not vary substantially with intake flow." This comment shares a common element with many other commenters who argued that manufacturers are different and it is not appropriate to simply transfer costs from the larger generating facilities to smaller manufacturing facilities. With respect to general comments that power plants and manufacturers are completely different, EPA disagrees. See TDD for detailed discussion of intake structures and technologies in use by both power plants and manufacturers. See Essay 14 discussion regarding many manufacturers only withdraw cooling water for purposes of power production. Also see Essay 14 regarding contact versus non-contact cooling water.

Assuming ACC closed-cycle costs at the smaller 5,000 gpm facilities are representative, the resulting effect on national level cost estimates is insignificant. EPA evaluated the ACC cooling tower costs estimates and compared them to similar costs derived using the EPA cost model. See DCN 12-6655 for a detailed analysis and discussion. This analysis confirms that for medium and larger cooling systems, EPA's capital and O&M costs are mostly in agreement with the ACC estimates. In fact, EPA's capital costs are slightly higher for larger systems. The same is not true for smaller 5,000 gpm systems and the differences suggest that the EPRI (and EPA) approach using linear cost equations may have limitations when estimating costs for smaller systems where the effects of economies of scale are more pronounced. On an individual facility basis, the potential underestimation of smaller system costs can be significant but on a national industry-wide level, the impact is small since the larger systems comprise the majority of the total non-contact cooling water flow. For manufacturing intakes currently operating as once-through, an estimated 80 percent of total industry-wide manufacturing facility closed-cycle cooling costs under Proposed Option 2 were based on estimated non-contact cooling water flow associated with larger systems.[46] Moreover, the final rule does not require any facility (small, medium, or large manufacturer, or generator) to comply with IM and E requirements based on closed-cycle cooling. Rather, as explained above, the final rule requires a site-specific determination of entrainment requirements under a specified framework. As such, in the site-specific entrainment consideration, facilities that are less than 5,000 gpm will be able to provide site-specific costs that may be different than those EPA calculated for this final rule.

It is also important to note that EPA may have overestimated closed-cycle retrofit cooling technology costs for Proposal Options 2 and 3 for manufacturing facilities on an industry-wide basis. The reason is that EPA used estimated non-contact cooling water flow rates based on industry-specific estimates of the proportion of DIF that is non-contact cooling water. This may represent an overestimation of the flow that would have ultimately been retrofitted as closed-cycle since some manufacturing facilities have opportunities to reduce all or a portion of the volume of cooling water flow by reusing the non-contact cooling water as process water at significantly lower overall costs. EPA lacks the data to conduct a more refined analysis addressing this cost overestimate. Further, this option is generally not available to power plants which use a significantly smaller quantity of process water compared to cooling water. However, since total costs were not a reason for rejecting closed-cycle cooling as BTA, the potential overestimate is no longer relevant with respect to the national BTA entrainment determination.

New Unit Costs

EPA received one comment concerning new unit costs from the United States Steel Corporation stating that for closed-cycle cooling costs for new units the economic "analysis should include secondary costs associated with treatment, emissions, and energy use." EPA disagrees with the detailed comment; EPA's costs and economic analysis need only reflect the incremental costs for complying with rule requirements. Other costs associated with other upgrades, construction, or projects are not a cost of this rule. EPA agrees that certain secondary costs should be considered. For new units, EPA has already included net O&M costs for treatment chemicals, energy requirements, and labor/materials. With regard to emissions, the commenter made reference to

[46] In this case, larger systems are defined as those with a non-contact cooling flow over 20,000 gpm which was chosen for illustrative purposes because it was the middle (medium size) flow value used in the ACC estimates. See DCN 12-6655.

permit modifications for air emissions and cooling tower blowdown, but did not provide any details regarding what these costs should include or their magnitude. Also, as noted above EPA has concluded that blowdown treatment is included in the cost estimates for retrofitting existing units which also serves as the basis for the new unit costs. See Essay 20 for more information regarding new units.

Other Cost Comments

Southern Company (comment 2190) stated that EPA did not include capital costs for upgrades at their Daniel Plant which receives water from a cooling pond owned by an independent supplier. EPA agrees that no costs are included for this facility because the facility reported it withdrew water for cooling from an independent supplier. Southern Company presumes that they would be responsible for ensuring compliance of the independent supplier's intakes that fed the cooling pond and states that leaving compliance up to a third party is unacceptable. They conclude that the alternative scenario is that the facilities will need to build a new intake if EPA does not "grandfather" such independent supplier arrangements. Due to the fact that facilities that receive cooling water from the independent supplier were not required to complete a technical survey, EPA did not have the data necessary at proposal to determine whether they would be in compliance nor estimate the cost of compliance. However, EPA notes that information supplied in the comment further indicates that Daniel uses a cooling pond (owned by an independent supplier) and that EPA's final rule position regarding cooling ponds has changed such that many cooling impoundments (ponds) may meet the definition of closed-cycle cooling provided the makeup water withdrawal supplying water to the impoundment is minimized. While no further information is provided by the commenter concerning the intake technology or cooling system, the information provided indicates that this facility may already meet the final rule compliance requirements. In the final rule, EPA has not revised its position regarding applicability to independent suppliers and concluded this provision will have only limited applicability and therefore only a minimal impact on a national basis. EPA expects that the independent supplier scenario described by the commenter is addressed at 40 CFR 125.91(b). See Section I of the preamble for more discussion of this issue, as well as Essay 14.

One commenter states that a lab technician and an environmental scientist would cost a minimum of $100,000 per employee in costs per year including benefits and salary. EPA generally agrees with the annual salary rate noting that EPA's economic impact estimate regarding monitoring costs use similar costs including a loaded dollar/hr cost of $46/hr for a biologist and $31/hr for a biological technician; these are equivalent to annual salaries of $96,000 and $64,000, respectively.

Other commenters provided total cost estimates using general descriptions of what the costs represented. EPA is unable to respond to the generalized total cost estimates cited in the comments since these commenters failed to provide supporting documentation describing the source or basis of the cost estimate. Without such supporting documentation, EPA is unable to determine the scope and comparability of the cost estimates.

Essay 22: Implementation

Introduction

In the proposed rule, EPA considered a variety of options to implement the requirements it proposed to establish under section 316(b) of the Clean Water Act (CWA) for existing power generating and manufacturing and industrial facilities that withdraw water from waters of the U.S. exclusively for cooling purposes. EPA's preferred option would have allowed facilities to select any technology that achieved the IM numeric performance standard, or alternatively to demonstrate that intake velocity was less than 0.5 fps. EPA subsequently published a NODA that discussed additional approaches to implement 316(b) CWA requirements on a national basis. This essay addresses comments relaying support for, suggesting modifications to, and disagreeing with EPA's options for complying with the BTA standards and the associated requirements for implementing them. Commenters also responded to EPA's request for comment on a variety of topics. The majority of commenters (generally, these were industry and State resource agency stakeholders) expressed concerns about the administrative burden and technical and logistical constraints in complying with the proposed NPDES permit applications requirements, timelines for submittals, and monitoring and reporting requirements. Many commenters urged EPA to streamline permit application and monitoring requirements, particularly for facilities that plan to operate or are already operating CCRSs and/or any other technology deemed to be BTA. Many of these commenters expressed particular support of the possible rule revisions discussed in the NODAs, noting the flexibility and site-specific approaches provided in the possible revisions. Some commenters (State resource agencies) generally favored site-specific discretion being granted to the permitting authority for impingement mortality limitations and monitoring requirements, while also expressing concern about the resources needed to establish site-specific entrainment mortality requirements for applicable facilities in the absence of prescribed technical requirement. Many commenters asked for clarification on specific approaches and issues. Some commenters (generally, these were environmental organizations) supported more extensive data gathering and submissions for NPDES permit application and minimum monitoring and reporting requirements.

In today's final rule, EPA establishes a standard for minimizing impingement mortality, and provides seven different compliance alternatives to achieve the BTA standard. EPA has reevaluated and revised the criteria it adopted for demonstrating compliance with this standard and the compliance alternatives; see Essays 16 and 16A. EPA has streamlined and simplified the permit application and monitoring requirements, including harmonizing the permit application and compliance deadlines for impingement mortality and entrainment mortality to allow for comprehensive, site-specific requirements to be established at each facility; see preamble Section VIII. The national BTA standard for entrainment requires that entrainment reductions measure will be determined on a site-specific basis, using information provided to the Director in the facility's NPDES permit application.

General Implementation

The final rule impingement mortality standard and provides seven compliance alternatives allowing each entity affected by this rule to determine the compliance option and technology or systems of technologies that are most appropriate for that particular facility, or alternatively for each cooling water intake structure at the facility. The rule does not require implementation of any particular technology, though it does provide specific alternatives that streamline compliance when using any technology that EPA's record shows will consistently and reliably meet the impingement mortality BTA requirements, including closed-cycle recirculating systems, low intake velocity, offshore velocity caps, and modified traveling screens. See Essay 16.

Many commenters were concerned that the proposed permit application and supporting information requirements were unworkable, overly burdensome, and unclear, particularly those relating to permit application deadlines, peer review, and entrainment studies. As outlined in the preamble to today's rule, EPA has clarified the timeframe for compliance deadlines and simplified the permit application and supporting information requirements. EPA has concluded that these schedules and the flexibility allowed to the Director in requiring permit application materials are reasonable and will not force facilities into noncompliance. See preamble Section VIII for more information.

Short-Term Exceedances

A few commenters requested that EPA add an exception to the proposed velocity standard for "short-term" exceedance periods of no longer than 24 hours, due to unusual weather conditions, facility malfunctions, or required maintenance (e.g., backwash conditions). Several commenters called for the inclusion of a provision that certain conditions (e.g., extreme weather events) constitute an affirmative defense to claims of noncompliance with rule requirements. EPA agrees that the Director should have the authority over short-term velocity exceedances if a facility elects to comply via a low velocity compliance alternative. The rule explicitly states that the Director may authorize the facility to exceed 0.5 fps at an intake for brief periods for the purpose of maintaining the cooling water intake system, such as backwashing the screen face. EPA expects the Director already has enforcement discretion for short-term velocity exceedances related to exceptional events, such as operational upsets, malfunctions, or emergencies. Short-term or emergency conditions should not affect a facility's ability to comply with the impingement mortality standard, and such conditions should not interfere with overall optimized performance of impingement minimization technology or performance of a suite of technologies. Ultimately, the Director has discretion to determine the appropriate enforcement response for each situation in the face of exceptional or extreme events. See Essay 17 for further discussion in handling short-term exceedances.

Similarly, several commenters requested inclusion of a provision providing exemption for emergency CWISs from the applicable impingement mortality standards at 40 CFR 125.94, applicable to facilities that have installed passive intake technologies. First, EPA notes that today's final rule does not apply to any quantity of emergency back-up water flows. See 40 CFR 125.94(c)(3)(iv). With respect to passive intake technologies such as wedgewire screens, barrier nets, or porous dikes, EPA understands they may be subject to clogging due to icing, aquatic plants, or damage from other uncontrollable environmental conditions. EPA does not expect this provision would be necessary to address such situations. As described in more detail in Essay 18, every viable manufacturing facility has adapted to ensure an available supply of cooling water, and further every power plant has taken the measure necessary to ensure condenser pipes remain open and free so that the facilities can function. Facilities that fail to make these adjustments are not able to offer reliable power, steam, or manufactured products. While EPA is aware these can be a concern, EPA's record demonstrates that facilities have developed approaches that overcome clogging. EPA encourages technology transfer and sharing of information between facilities, so that all facilities can establish the most cost-effective compliance path available. Also, EPA expects that the vast majority of facilities that employ wedgewire screens will comply with the IM standard because the screens will achieve the pre-approved low velocity requirements under the IM standard compliance alternatives at 40 CFR 125.94(c)(2) and (3). In cases where facilities comply with the IM standard via the low design velocity, this would not be an issue as facilities are not required to monitor their velocity. In cases where facilities comply with the IM standard via actual velocity, the rule allows the Director to authorize temporary exceedances to maintain the CWIS.

Application to Each Intake

Many commenters requested that regulatory agencies have the flexibility to address impingement and entrainment mortality requirements on a facility-wide basis rather than addressing requirements in the same manner at each intake structure. EPA agrees that the proposed rule was unclear regarding the whether specific provisions apply to the entire facility or to individual intakes. To clarify this issue, EPA modified the final rule language so as to state clearly that a facility with multiple intakes must decide whether it will adopt a single compliance strategy for impingement mortality for the entire facility or adopt an intake-specific compliance strategy at each cooling water intake. Thus, EPA has created flexibility for facilities with multiple intakes to select different compliance strategies for each intake. Regardless of which impingement compliance approach a facility chooses (single strategy for entire facility or different strategies for different intakes), if the facility chooses to comply with the impingement standard by operating at a maximum through-screen velocity of 0.5 feet per second, the facility must measure and comply with the velocity alternative on an individual intake basis.

One commenter also requested that the AIF (25 percent cooling water criterion) threshold and applicable requirements be determined on an intake-by-intake basis. EPA already considered this issue in Phase I and Phase II, and did not receive any new information that would result in a different approach here. See Essay 14 for a more detailed response to this issue.

Compliance Deadlines and Implementation Schedules

<u>NPDES Permit Application Cycle</u>

EPA received many comments concerning the permitting schedule and deadlines for permit application submittals. Many commenters thought that the proposed timelines for submittals were unreasonably short, while some felt the timeline was too long. Commenters suggested that EPA allow appropriate degree of flexibility and longer timeframes for permit application submittal, such as tying permit application requirements to the NPDES permit renewal cycle to stagger implementation of the regulation. They stated that this approach would help address resource concerns for implementing the regulation at all facilities on the same timeframe. Several commenters were also concerned about the burden of coordinated compliance efforts for multiple rules. Commenters, including Riverkeeper, expressed concerns about time and resource constraints for both permitting authorities and entities subject to the final rule, particularly with respect to the detailed technical and cost-benefit studies required to evaluate entrainment. They noted that permitting authorities have limited time to review and provide comment on permit applications that are expected to be submitted in the same timeframe and limited resources to consult technical experts to support this effort. One commenter was concerned that State permitting authorities lack the resources and expertise for case-by-case permitting determinations. In addition, there was concern about limited availability of technical experts qualified to review permit application materials. Similarly, facilities subject to the same rule timeframes would overwhelm the limited stock of qualified technical experts available to support the development of required permit application materials and the manufacturers of BTA technologies. Other commenters, including Riverkeeper, were concerned that the proposed implementation schedule was already unreasonably long and that facilities should be required to come into compliance in half the time proposed; they stated that three years should be sufficient for impingement mortality compliance and eight years for entrainment compliance. Riverkeeper also stated that a retrofit to closed-cycle cooling should generally take only three years. Other commenters, including Riverkeeper, stated that facilities had already completed much of the documentation that comprises the permit application materials and should therefore be subject to an accelerated compliance schedule.

Because IM and EM compliance requirements were proposed to be developed on different tracks, commenters were concerned that facilities subject to both IM and EM requirements might begin installation of redundant or ineffective technology for meeting both sets of requirements. Commenters requested that EPA harmonize permit application and compliance deadlines for IM and EM to allow for comprehensive, site-specific requirements to be established at each facility so that impingement controls are not needlessly or prematurely installed.

As outlined in the preamble to today’s rule, EPA has clarified and revised the timeframe for compliance deadlines. EPA agrees with the concerns of many commenters regarding compliance deadlines and has tied the permit application materials submittal deadlines for existing facilities to the NPDES permit renewal cycle. EPA realizes that, in some cases, a facility may already be in the middle of a permit proceeding at the time of promulgation of this rule, or the Director may have already required much of the same information be submitted by the facility prior promulgation of today’s final rule. Therefore, the rule includes several provisions that provide flexibility for the permit application requirements. In the case of permit proceedings begun prior to the effective date of today’s rule, and issued prior to December 31, 2016, the Director may proceed with any determination of BTA standards for impingement mortality and entrainment without requiring all of the permit application requirements of 40 CFR 122.21(r). See 40 CFR 125.94(a)(2). In such circumstances where permit proceedings have already begun prior to the effective date of the rule, these facilities will still need to submit the appropriate permit application materials found at 40 CFR 122.21(r) permit applications during their next application. Additionally, while EPA expects that many facilities will already comply with 40 CFR 125.94(c), in some cases the facility will need to choose one of the compliance alternatives for IM in their subsequent permit cycle. See Section VIII.A of the preamble for further discussion.

Permit renewals for existing facilities and permit modifications for new units at existing facilities generally conform to the typical NPDES permit cycle. Existing facilities subject to the final 316(b) regulations applying for reissuance of a permit expiring after December 31, 2016, must submit the information required in 40 CFR 122.21(r), in addition to all other applicable permit application information, no later than 180 days before the current permit expires. The rule provides flexibility for the Director to waive or allow later submission of the materials required in 40 CFR 122.21(r) based on a showing that the facility could not develop the information by the time required for submission of the permit application. The Director also has the discretion to waive some or all of the information requirements of 40 CFR 122.21(r) if the intake is located in a manmade lake or reservoir, and the fisheries are stocked and managed by a State or Federal natural resources agency or the equivalent. Similar to a new NPDES facility, applicable 40 CFR 122.21(r) materials for new units at existing facilities must be submitted no later than 180 days before the planned commencement of cooling water withdrawals for the operation of the new unit. EPA has determined that these schedules and the flexibility allowed to the Director in requiring permit application materials is reasonable and will not force facilities into noncompliance.

Commenters were concerned about how other regulations affecting the energy sector will compound the difficulty in implementing strategies to achieve compliance with today's final rule. In determining the cost of compliance with today's rule, EPA considered the cost of compliance with multiple rules. The flexible approach in today's rule allows the Director to consider other regulatory constraints when establishing the facility's site-specific compliance schedule. EPA notes that, in some cases, efforts made to achieve compliance with multiple rules could be coordinated during regularly scheduled plant outages or downtime. See Essay 29 for further discussion of the cumulative impact of EPA regulations.

Harmonizing IM and EM Requirements and the Compliance Timeline

EPA further modified the proposed compliance deadlines for impingement mortality and entrainment requirements by aligning them. A facility subject to both impingement mortality and entrainment standards must comply with BTA standards for impingement mortality and its entrainment requirements as soon as practicable after issuance of its final permit establishing applicable entrainment requirements. New units at an existing facility must comply with applicable BTA standards with respect to the new unit upon commencement of the new unit's operation. Though the regulation does not address the concept of "additional time," EPA acknowledges that there may be overlap in the technologies used to comply with impingement mortality and entrainment standards, which could result in the facility needing more time to comply with the impingement mortality requirements. For example, if a facility plans to retrofit to wet cooling towers to reduce entrainment, the wet cooling towers technology also meets the requirements for impingement mortality via 40 CFR 125.94(c)(1). EPA therefore concluded that most facilities would not have an entrainment determination completed early enough to impose a 3-year compliance deadline on all impingement technology responses. As such, the Director would schedule compliance with the impingement mortality requirements to match the schedule for entrainment requirements. EPA does expect, however, that facilities where modified traveling screens are determined to be BTA should not take more than three years for installation and implementation of the technology, though technology optimization and completion and approval of the 2-year performance optimization study would necessarily take a longer period. For facilities that choose to comply with the IM standards via the low velocity compliance alternative, have existing offshore velocity caps, or existing closed-cycle recirculating systems, EPA expects compliance to occur much sooner. EPA projects just over half of facilities (18 percent of facilities choosing closed-cycle recirculating systems; 34 percent choosing velocity reduction; and 1 percent choosing velocity caps) will comply with one of these alternatives where compliance can occur quite rapidly.

EPA notes that some facilities (i.e., those already required to conduct certain studies under the 2004 Phase II rule) will have already developed some of the permit application materials. However, not all facilities submitted these data in pervious permit applications. EPA notes that its estimates of administrative costs reflect this previous data collection requirement. However, EPA disagrees that an accelerated compliance schedule is appropriate, as the existing facility rule addresses facilities not covered by the 2004 Phase II rule (i.e., small power plants and all manufacturers) that have not been previously required to conduct any of these studies. In addition, under the final existing facility rule, facilities are required to submit studies that, in some cases, while similar to studies required under Phase II, would not have been completed prior to the suspension of the 2004 Phase II rule. These studies (such as the Entrainment Characterization Study) need to be given ample time for adequately representative sampling and analysis. Other studies, such as the Benefits Valuation Study, are largely comprised of material that was not collected or analyzed under Phase II; in these cases, there is clearly no way to accelerate the schedule for submission of these materials. EPA also disagrees that most facilities have completed detailed studies for converting to closed-cycle cooling. While it is possible (or even likely) that many facilities have contemplated conceptual analyses of cost and feasibility for closed-cycle cooling, in EPA's view, most facilities have not likely completed an analysis of sufficient detail to complete the Comprehensive Technical Feasibility and Cost Evaluation Study. For an entrainment determination (especially one requiring a facility to retrofit to a closed-cycle recirculating system), EPA disagrees that compliance could occur in all cases as rapidly as some commenters suggest. Nuclear facilities and some manufacturing facilities faced with more complex retrofits could require a lengthy period of time to design, construct, and implement control technologies. Further, EPA intends that energy reliability be considered when establishing a schedule for compliance. Nuclear power plants and other baseload facilities serving the same region may need to have compliance staggered so as to avoid inadequate energy supplies and reserves. See Essay 19 regarding EPA's expected timeline for full compliance. Thus, while EPA expects all facilities would comply as soon as practicable, EPA agrees that some of the above scenarios could, in some cases, result in a lengthy period of time where unacceptable levels of AEI would continue to occur. Therefore, the rule authorizes the Director, at 40 CFR 125.94(h), to establish interim BTA requirements in a facility's schedule of requirements, for impingement mortality, entrainment, or both, where necessary on a site-specific basis.

One commenter expressed concern about the 10-year time-frame assumed for retrofit to closed-cycle cooling used for Option 2 in the proposed rule. EPA notes that there is no fixed timeline specified in the final rule for making a BTA entrainment determination or installing a compliance technology. EPA agrees that actual implementation times will vary and notes that Option 2 (which was rejected) used 10 years as a preliminary estimate for the start-to-finish permitting and compliance process, including study submittals, review by the Director, permit issuance (as needed), and construction of required technologies (such as a cooling tower). See Essay 19 regarding EPA's expected timeline for full compliance.

While EPA has dropped the proposed requirement for compliance with the impingement mortality standards within eight years, instead requiring facilities to comply with the impingement mortality and entrainment requirements as soon as practicable according to the schedule of requirements set by the Director, the Agency has concluded that the final rule will generally result in compliance along a similar seven to eight-year timeframe. The final rule provides the Director with the flexibility, when establishing an electric power generating facility's compliance schedule, to consider issues (e.g., logistical, regulatory) concerning maintenance of adequate energy reliability and necessary grid reserve capacity. Similarly, the Director may consider extenuating circumstances in establishing a compliance schedule for a manufacturing facility. The example in the preamble includes establishment of a staggered implementation schedule for multiple facilities serving the same localities. These flexibilities allow the Director to consider constraints from multiple regulations when establishing the facility's site-specific compliance schedule. Ultimately, all facilities will be required to follow their schedule as determined by the Director.

Nuclear Facilities

Several commenters were concerned about implementation schedule of the final rule at nuclear facilities. They requested assurance that the compliance schedules for nuclear facilities would provide opportunities for consultation with the Nuclear Regulatory Commission and allow for alignment with Nuclear Regulatory Commission relicensing processes. EPA's considerations of nuclear facilities are discussed in Essay 18.

Consideration of Remaining Useful Plant Life

One commenter was concerned about BTA requirements for facilities utilizing once-through cooling that have recently been replaced and repowered. The commenter noted that premature replacement of some of this equipment would impact debt capitalization, power rates, and represent an improper use of ratepayer funds. EPA acknowledges the trade-offs inherent in balancing protection of fish, air quality, and remaining plant life, among other factors. As such, EPA structured the final rule with sufficient flexibilities as to allow the Director to determine compliance schedule for entrainment BTA requirements based on consideration of local factors, including remaining useful plant life. EPA notes that, for facilities that have or will be required to install closed-cycle recirculating systems, the final rule allows for harmonizing compliance schedules for impingement and entrainment such that facilities would not need to install technologies that become obsolete upon installation of the CCRS. Considering the long lead time to plan, design, and construct the most effective entrainment technology, closed-cycle cooling systems such as wet cooling towers, EPA determined that the Director should have the latitude to consider the remaining useful plant life in establishing entrainment requirements for a facility. See full discussion in Essay 19.

Facility Retirement

Some commenters requested that facilities scheduled to retire in the near future be provided with additional flexibility, including waivers for permit application materials. Generally, EPA agrees this would not be an efficient use of a facility's resources and has included a provision in the rule to allow the Director to waive some or all permit application requirements. EPA notes, however, that units that are repowered instead of retired may be subject to additional requirements.

Considering Use of New Technologies

Another commenter was concerned that alternative entrainment technologies tailored to certain local fish species are not yet available for implementation; therefore, utilization of these unproven technologies would have an uncertain outcome and might prove an unwise investment. EPA notes that the final rule does not require any specific technology and allows for sufficient flexibility in subsequent permitting proceedings to incorporate new technologies in a facility's approach towards meeting BTA requirements. As new entrainment reduction technologies are developed and become commercially available, EPA expects that permitting authorities will consider these new technologies when evaluating site-specific factors in determining entrainment BTA.

Permit Development and Review Resource Constraints

EPA acknowledges that significant efforts will be required by facilities and State permitting authorities to develop and submit and review and approve permit applications. With the staggered rule implementation allowed by these implementation schedules, EPA has concluded that the implementation schedule will not pose an unreasonable burden on contractors or manufacturers of BTA technologies. EPA furthermore disagrees that State permit authorities lack the resources and expertise to review and approve permit applications. State permit authorities already issue and oversee the NPDES permits in place at existing facilities, which may already contain BPJ 316(b) requirements. While some commenters were concerned that a site-specific approach would result in State permitting authorities needing to conduct case-by-case individual performance standard determinations, the process established in the final rule does not allow for unfettered case-by-case determinations. The rule instead establishes a rigorous process for determining BTA for entrainment for each facility based on site-specific conditions. The seven IM BTA compliance alternatives offer structured flexibility in determining which option is best for each facility. Because EPA concluded that national entrainment requirements based on a particular technology were not appropriate as BTA, in-scope facilities must submit extensive entrainment characterization studies and data. The rule outlines the process by which site-specific determinations are made based upon these studies and data, so State permitting authorities will not need "reinvent the wheel" for each permit.

EPA made an effort to ensure that information provided to the State will be checked by an appropriate third-party reviewer. It is EPA's experience that a sufficient number of qualified contractors are available to assist facilities and State as needed. In addition, oversight authorities will have already reviewed studies and data previously submitted by many facilities that are substantially similar to the permit application requirements at 40 CFR 122.21(r). Because the Director has the discretion to waive some or all of the 40 CFR 122.21(r) requirements based on applicability of previously submitted material, the burden for both the facility and oversight authority in developing and reviewing those materials has the potential to be significantly decreased. Finally, EPA staff are available to assist in the process as needed with review and approval of permit applications.

Clarifying "As Soon As Possible" and "Additional Time"

Commenters also requested clarification on the definitions of the terms used in the rule, "as soon as possible" and "additional time" for compliance purposes. EPA notes that the concept of "as soon as possible" is one that already exists for compliance schedules in the generally applicable NPDES regulations at 40 CFR 122.47. The concept allows for consideration of the steps needed to modify or install treatment facilities, operations or other measures and the time those steps would take but does not presume that the permitting authority should establish a compliance schedule based on the maximum time period allowed.

In contrast to the proposed rule, today's final rule does not include a requirement for compliance with the impingement mortality standards within eight years. Therefore, the final regulation does not address the concept of "additional time." EPA recognizes that it will take facilities time to upgrade existing technologies and install new technologies, and that there are limits on the number of facilities that can be simultaneously offline to install control technology and still supply goods and service to orderly, functioning markets. EPA expects the Director will take this into account when establishing a deadline for compliance and any such schedule would take into account factors provided in 40 CFR 125.98(c). EPA acknowledges that some facilities which are not now in a permitting proceeding may need as much as three years to fully complete their studies and data collection, and depending on the types of control selected, may need additional time to design, construct, and implement their technologies. EPA discusses the expected compliance timeframe in Section VIII.A of the preamble and Essay 19.

Requiring Interim Measures

One commenter requested that the rule define interim measures to protect aquatic ecosystems to be implemented as NPDES permit conditions until long-term compliance solutions are in place. The commenter suggested that such measures could include installation of variable speed pumps or drives at peaking facilities or scheduling regular maintenance outages during peak spawning periods whenever feasible. As discussed above, the final rule clarifies that the Director has the authority to establish interim BTA permit requirements. Therefore EPA agrees with the comments that tailored measures could be required as interim measures. While today's final rule does not specify interim measures to address site-specific concerns, the rule does provide the Director discretion to determine which interim requirements might be necessary according to BPJ and include those requirements in the facility's permit.

Cooling Water Intake Thresholds

Several commenters requested that facilities below the applicable cooling water intake thresholds should be considered presumptively to employ BTA for I and E and/or should not be subject to today's rule unless the Director determines that the CWIS is causing adverse environmental impact. EPA disagrees that facilities not subject to today's national standards are automatically achieving BTA I and E performance. See Essay 14 for discussion about the potential for impingement and entrainment at any cooling water intake threshold, and see preamble for discussion about cumulative impacts. Any CWIS may therefore cause unacceptable levels of AEI. EPA agrees that today's rule does not apply to existing facilities with a cumulative design intake flow below 2 mgd or operators of new units at existing facilities with a cumulative design intake flow below 2 mgd. For these facilities, the Director must set appropriate requirements on a case-by-case basis, using best professional judgment, as required by 40 CFR 125.90(b). The scope of the facilities affected by today's final rule is further discussed in Essay 14. EPA's consideration of adverse environmental impacts can be found in Essay 15.

NPDES Permit Application Requirements

In general, commenters were concerned about the resources needed to complete the permit application requirements, both in the initial and subsequent permit terms. In particular, commenters were concerned about burdensome peer review and permit renewal requirements. In the case of permit renewal requirements, commenters argued that the permit renewal process should be streamlined as long as there were no significant changes to the facility; in such a case, they stated that the requirement for the 40 CFR 122.21(r) permit application studies should be waived and there is no need to reevaluate the BTA decision for the facility.

EPA agrees that the proposed permit renewal process could be streamlined. As outlined in the preamble to today's rule, EPA has simplified the permit re-application and supporting information requirements. Today's rule allows, after the initial submission of the 40 CFR 122.21(r) studies in accordance with the rule, that the owner or operator of a facility may, in subsequent permit applications, request to reduce the information required, if conditions at the facility and in the waterbody remain substantially unchanged since the previous application so long as the relevant previously submitted information remains representative of conditions at the facility. Substantial changes warrant a full permit application in the subsequent permitting cycle. For example, a species listed as threatened or endangered after issuance of the current permit whose range of habitat or designated critical habit includes waters where a facility intake is located constitutes a substantial change. Other substantial changes might include a significant change in the facility's operating schedule, shifts in the local fish population, or changes in the quantity of water available from the source water. The owner or operator's request must identify each permit application element that has not substantially changed and the basis for that determination. The submittal schedule for this request is specified at 40 CFR 125.95(c). Today's rule grants the Director the discretion to accept or reject any part of the request.

Peer review requirements are addressed in the preamble to the rule and later in this essay.

Application Requirements Submittal Dates

In general, commenters (both industry and State resource agency) thought the proposed timeline for submittal of permit application materials was insufficient and the permit application requirements were onerous. Many commenters thought that EPA underestimated the time and effort required to gather and organize all the permit application data. Commenters were concerned about requirements to begin collecting permit application information before the publication of the final rule. Many commenters (both industry and State resource agency) thought that all the permit applications nation-wide being due at the same time could create an overwhelming administrative burden for permitting authority reviewers. Commenters were also concerned that that the proposed deadlines did not build in any time for permitting authority reviews and that the timeline would create overwhelming demand for contractor assistance.

As discussed previously in this essay in response to comments on compliance deadlines and implementation schedules concerns, EPA has removed the hard deadlines from the proposed rule for permit application materials submittal, instead tying the submittal timeline to the NPDES permit renewal cycle, and creating discretion for the Director to waive or push back the deadlines for some or all parts of the permit application under certain circumstances. The final rule provides that facilities intending to comply with the BTA standards for impingement and entrainment using a CCRS can choose not to provide the applicable entrainment studies.

BTA Standard for Impingement Mortality

In general, commenters were concerned about the lack of compliance alternatives for meeting the IM standard, issues in conducting impingement mortality reduction studies, and the lack of data supporting the intake velocity requirement. Commenters also responded to EPA's request for comment on monthly and annual limits on impingement mortality. Most were concerned about logistical issues about monitoring and the derivation and application of the limits. Many were concerned about the lack of approved methods or guidance for impingement survival monitoring. Several suggested that an impingement mortality numeric performance standard should not apply to facilities implementing technology considered to be BTA. Others noted that the proposed numeric performance standard was based on a small data set not broadly representative of waters of the U.S. Another commenter stated that EPA's provision to require long-term monitoring to capture variation in the source waterbody is unnecessary, as an adequate sampling regime, in combination with an appropriately calculated IM numeric performance standard, will provide enough data to validate the long-term effects.

The Agency has built a tremendous amount of flexibility into today's rule, including a wide range of choices for achieving compliance with the rule's BTA standards for impingement mortality. This flexibility allows facilities to select a site-specific (or unit-specific) approach to achieving compliance with applicable requirements and, as necessary, to coordinate compliance efforts with other regulatory constraints. While compliance with a numeric annual impingement mortality performance standard is one compliance alternative, the rule provides that other technologies and operational measures, including conformance with through-screen design velocity and through-screen actual velocity, may be used to achieve compliance with impingement mortality standards. The facility may choose the compliance alternative or alternatives that best alleviate any concerns about conducting performance studies, installation and/or operational costs, or monitoring. As such, today's rule promotes research and development of available technologies and site-specific optimization of the technologies and methods used to reduce impingement mortality. In addition, EPA has simplified and reduced the monitoring requirements for impingement mortality compliance alternatives other than compliance with the numeric impingement mortality performance standard. See Essay 16.

As outlined in the preamble to today's rule, EPA has simplified the numeric impingement mortality performance standard from a monthly to a 12-month numeric impingement mortality performance standard. The derivation of the 12-month numeric impingement mortality performance standard is further discussed in Essay 16A. EPA has specified certain parameters for evaluating compliance with this standard, including aquatic species to be considered, sampling equipment characteristics, and minimum and maximum holding times for evaluating mortality. Today's rule also includes a provision for rates of impingement that might be so exceptionally low at an intake as to be insignificant. In such circumstances, depending on documented information available, the Director has the discretion to conclude that the documented rate of impingement at the cooling water intake is so low that no additional controls are warranted. EPA also disagrees that long-term effects will be readily apparent. In site visits, EPA found that the species and counts at a site could change as rapidly as within a few years, and it was only by virtue of frequent monitoring that the facility could identify the return of species to the waterbody. The biological characterization at 40 CFR 122.21(r)(4) would be conducted every permit term, which could be supplemented with additional monitoring established by the Director under 40 CFR 125.96(c), to illuminate changes in the source waterbody.

Barrier Nets

EPA also received many comments stating that barrier nets were both unnecessary and might be unavailable in many locations. EPA's consideration of barrier nets can be found in Essay 18.

Annual impingement mortality performance standard monitoring methods are addressed later in this essay.

Entrapment

The proposed rule included a prohibition on trapping organisms in an intake structure with no viable escape route. Many commenters expressed concern that the proposed requirements were not well-defined and would require costly technologies not considered in EPA's cost estimates. Moreover, in the commenters' view, the requirements could be difficult to comply with, particularly where cooling systems employ impoundments or basins downstream of the initial intake structure. The final rule deleted the requirement that facilities demonstrate that their cooling water intake structures do not lead to entrapment. However, EPA does not agree that entrapped organisms should be ignored or go uncounted. A facility that entraps fish must count the entrapped organisms as impingement mortality, and would include such counts as part of 40 CFR 122.21(r)(6). Then under either 40 CFR 125.94(c)(5) (or (c)(6)), if applicable, the Director will determine the modified traveling screens (or system of technologies) is BTA for that site. The Director makes this determination upon review of the optimization studies required under 40 CFR 122.21(r)(6), and thus the entrapment will have been considered. The Director may determine the number and type of entrapped organisms warrant additional technology. As a means of complying with the IM BTA standard, this could include technologies to reduce or eliminate entrapment as part of the traveling screens or the system of technologies. Alternately, the Director can require additional measures under 40 CFR 125.94(c)(8) or (9).[47] Also, see Essay 18.

Entrainment Mortality Reduction Requirements

In this section, commenters discussed EPA's request for comment on different aspects of the proposed entrainment mortality requirements. Commenters discussed site-specific determinations for entrainment survival, reviewed criteria to guide evaluation of closed-cycle or identified other criteria to be used as BTA for entrainment mortality, reducing flow to be commensurate with the operation of a CCRS, and land constraints in implementing entrainment mortality BTA.

[47] See the TDD for further information regarding EPA's cost analysis including barrier nets at certain facilities that already have traveling screens or a low intake velocity.

100 Percent Mortality of Entrainment Organisms

Some commenters supported allowing facilities to make site-specific demonstrations that entrainment mortality of one or more species of concern is less than 100 percent, but others supported the assumption of 100 percent mortality. Entrainable organisms generally consist of eggs and early life stage larvae. Early larvae generally do not have well-developed skeletal structures, have not yet developed scales, and in many cases are incapable of swimming for several days after hatching. The record shows that entrainable organisms that are collected frequently show poor survival in the case of eggs, and essentially no survival of larvae. Consequently, on the basis of the record information EPA has reviewed, for purposes of this rule EPA maintained the assumption that all entrained organisms die, i.e., no entrained organisms survive. Also see Essay 18. Commenters provided data showing that certain species have entrainment survival rates, and therefore EPA has retained a provision in today's rule that allows, for monitoring purposes, a facility to demonstrate to the Director that the entrainment mortality for each species is less than 100 percent. Otherwise, if the facility chooses not to demonstrate actual survival, entrainment mortality after passing the cooling water intake structure is counted as 100 percent mortality. EPA disagrees that a facility should be able to use entrainment survival data from another site; given that entrainment impacts are highly site-specific (a point argued by industry), it is not reasonable to assume that a small number of entrainment survival studies could be broadly applied to facilities nationwide. Not only would the species be different between sites, but so could the physical, chemical, and thermal stresses that an entrained organisms is subjected to while passing through each facility. EPA also notes that this demonstration is not required; if a facility deems it to be too expensive or infeasible to complete in a reasonable time, it does not have to conduct the study. As noted above, EPA also disagrees that Directors will be unable to review these or any other permit application materials due to a lack of expertise. See preamble for further discussion of the peer-review requirements of the final rule.

Land Availability

Commenters thought that it was inappropriate to have a standardized threshold for land availability with regards to determining BTA at that site. Refer to Essay 19 for a detailed discussion and response.

Description of Entrainment Survival Study

Commenters also requested a description of studies demonstrating entrainment survival. The Phase II Regional Analysis Document (DCN 6-0003; EPA-HQ-OW-2002-0049-1490) discusses extensively in Chapter A7 the criteria used to evaluate entrainment survival studies that were analyzed as part of that rulemaking effort. Part of the intent of EPA's review was to determine the soundness of the findings behind the entrainment survival studies. EPA reviewed the studies to determine if they were conducted in a manner that provided adequate representation of the probability of entrainment survival at the facility. The criteria EPA used to evaluate the studies focused on three main themes: the sampling effort of the study, the operating conditions of the facility during the study, and the survival estimates determined as the result of the study. Chapter A7 provides a list of questions EPA used to determine whether the entrainment survival studies provided adequate indication of the soundness of the science behind the facility's estimate of potential entrainment survival. Studies submitted to demonstrate entrainment survival should address those questions to adequately document the design and implementation of a sampling program intended to accurately establish the magnitude of entrainment survival.

Further discussion of the review criteria selected to guide evaluation of closed-cycle or identify other criteria as to be used as BTA for entrainment mortality is in Essay 16.

Further discussion of flow constraints commensurate with closed-cycle cooling is in Essay 17A.

Application Requirements

Commenters provided many suggestions and critiques of each portion of the permit application process. Many comments were related to concerns about an excessive permit application burden on affected entities, the strictness of the proposed submittal timeline, and excessive resources needed to prepare and review materials. Several commenters stated that new studies should not be required if State environmental agencies find that entrainment issues have been sufficiently addressed at existing facilities. Similarly, some commenters suggested that facilities already utilizing closed-cycle recirculating systems should not have to submit all permit application materials.

In response to comments on the proposed rule, EPA has simplified the permit application and supporting information requirements. The concerns commenters mentioned in this section were addressed earlier in this essay in response to permit applications and compliance deadlines. EPA also notes that each permit application requirement is intended to fulfill a specific purpose, while providing the Director with sufficient information to develop BTA requirements for both impingement mortality and entrainment; as a result, EPA disagrees that some studies should be eliminated. EPA recognizes that facilities may have already submitted materials to their Director that are equivalent in content to the permit application requirements; if this is the case, the Director may waive the requirement for certain studies. Many commenters were concerned about the definition and application of the concepts of "species of concern" and "fragile species." These concerns are addressed later in this essay.

Exemptions for Peaking Units

Several commenters were concerned that the extensive biological studies required to support permit applications under the proposed rule are unreasonably burdensome for peaking units. To the extent the peaking plant operates infrequently and the CWIS is not used, there is no need for sampling or monitoring during these zero flow days. In other cases, peaking plants continue to withdraw cooling water even while not producing power, and these operations result in impingement and entrainment. In other circumstances peaking plants operate at full capacity for a few months, most often during the summertime during local peaking energy demand. Where this period of operation corresponds to spawning periods, those facilities could also have significant impacts on impingement and entrainment. Additionally, there is no guarantee that a peaking unit will remain a peaking unit; it may operate more frequently and without notice to the Director. Therefore, it is both reasonable and necessary to obtain full permit application requirements from these facilities. Also see Essays 14 and 19. With regards to subsequent permit applications, see previous discussion of the streamlined application requirements earlier in this essay.

Peer Review

Many commenters suggested modification or elimination of the peer review requirements, citing undue burden on facilities and likely reviewer resource constraints. EPA notes some of these commenters insist that EPA peer review the critical data and analysis it conducts; EPA not only obtains peer review, EPA also obtains public review and comment. Those commenters not urging elimination of the peer review requirement requested that EPA provide implementation criteria and/or guidance on the peer review process. Commenters also noted that that the limited pool of qualified peer reviewers could result in delays in the permit application process. One commenter was concerned that industry would control peer review process, inhibiting the Directors' ability to meaningfully review permit application materials. One commenter expressed partiality concerns in using peer reviewers and suggested that the technical adequacy of permit applications should be judged solely by oversight authorities.

With regards to peer review, EPA disagrees with commenters that it is overly burdensome or inappropriate for inclusion in the permit application process. In Section VII.H.3 of the preamble, EPA recounts the typical use of the peer review process in Agency activities and confirms its value. EPA disagrees that industry will control the peer review process. Properly implemented, peer review is designed to allow a neutral third party to conduct an objective evaluation. Objective evaluation by independent subject-matter experts at that stage of the permit development process allows EPA staff to augment their capabilities, adds a degree of credibility that cannot be achieved in any other way, and can, in some cases conserve resources by steering the permit development along the most efficient course. While peer review can help expedite and support the permit development process, the Director (e.g., State or EPA staff) remains the ultimate arbitrator of the adequacy of the permit application materials, including any peer reviews that were conducted. EPA notes that peer review requirements are not expected to add undue burden to the permitting process in light of the reduced and simplified permitting procedures promulgated in today's rule. EPA also notes the expanded and consolidated submittal timelines and points to peer review guidance materials available on the EPA web site.

Several commenters requested that peer review requirements be waived for existing studies or updates to existing studies. Today's final rule does not specify any exemptions from peer review requirements. EPA notes, however, that the Director has the discretion to waive some or all a facility's 40 CFR 122.21(r) permit application requirements, based on previously submitted information. Therefore, the materials that the Director deems acceptable in lieu of submission of 40 CFR 122.21(r) permit application requirements, including existing studies, may not have to go through the peer review process.

Benefits Valuation Study

One commenter protested the requirement in the proposed rule for permit applications to provide an accounting in the Benefits Valuation Study of mitigation activities that have offset impingement and entrainment. The commenter suggested that there is no legal justification for consideration of habitat restoration during either national rulemaking under CWA 316(b) or during site-specific BTA determinations. EPA disagrees that the discussion of recent mitigation efforts already completed (up to the effective date of today's rule) mitigation is unwarranted or irrelevant for making site-specific BTA determinations. The purpose for gathering this data is to determine how mitigation efforts that had been authorized as components of one of the compliance alternative in the 2004 Phase II rule (up through the 2007 suspension of the rule) have affected fish abundance and ecosystem viability in the intake structure's area of influence. This information is necessary for developing an appropriate social benefits valuation for use in making a site-specific BTA determination. Today's final rule specifically removes the restoration provisions from the Phase I rule and restoration activities are not included in the compliance options available to existing facilities established today. Requesting information about mitigation activities that have taken place in the past does not constitute allowance of restoration measures for achieving the I&E standards set forth in today's final rule.

Default Values for Permit Applications

One commenter suggested that EPA define default values for certain expected costs to be used in permit applications, noting this it could streamline the permit development process. While EPA has conducted extensive evaluation and verification of these costs and parameters at the national level, the Agency disagrees that it should set or suggest standardized costs for cooling tower retrofit or other BTA approaches on a site-specific basis. Over the 10-plus years of this rulemaking, EPA has published the data used in its cost modules and other calculations and those values are available to the public for reference or other use. To set default or suggested expected values would infringe on the site-specific BTA approach EPA has selected. In today's final rule, EPA requires facilities to present site-specific data such that a tailored approach may be used to determine the optimal EM BTA at that facility.

Use of Existing Studies or Data

Several commenters asked whether they could submit historical data or other existing studies, or data that had already been collected to satisfy components of the 40 CFR 122.21(r) permit application requirements. Today's rule specifies that facilities may use historical data that are representative of current operations of the facility and biological conditions at the site to meet the permit application requirements, so long as they provide documentation regarding the continued relevance of the data. The requirements for the impingement technology performance optimization and entrainment performance studies state that studies more than 10 years old must include an explanation of why the data is still relevant and representative of conditions at the facility. In addition, the explanation should clarify how the data should be interpreted using relevant terms (e.g., in terms of the updated definitions of impingement and entrapment). In general, historical data and existing studies more than 10 years old should include this accompanying information. EPA notes that, if the facility has previously submitted historical data or other existing studies that are substantially similar to the 40 CFR 122.21(r) permit application requirements, the Director has the discretion to waive the requirements for those portions of the permit application requirements.

Similarly, commenters asked whether they would be able to submit previously gathered data on already-installed technologies to receive compliance credit or to demonstrate compliance with the IM standard or a compliance alternative. Today's rule provides a compliance alternative at 40 CFR 125.94(c)(6) for a facility to operate a system of technologies that will achieve the impingement mortality standard. This is the only compliance alternative that relies in part on a credit for reductions in the rate of impingement achieved by the facility's system. The rule requires that the facility submit an estimate of those reductions to be used as credit towards reducing impingement mortality, as well as any relevant supporting documentation, *including previously conducted performance studies* not already submitted to the Director as part of the facility's entrainment performance studies. As such, the rule explicitly specifies that previously gathered data on system performance must be submitted to the Director under this compliance alternative.

Chosen Method of Compliance with Impingement Mortality Standard

Several commenters requested that the rule allow facilities to meet the IM BTA standard by complying with one compliance alternative for part of the year and another alternative for the rest of the year (e.g., meeting the low velocity compliance alternative for part of the year and meeting the IM numeric IM performance standard for the remainder of the year). One commenter noted that their facilities implement variable operational standards to meet 316(b) permit requirements throughout the year. EPA considered operational measures such as seasonal operation or seasonal flow reductions which the Agency concluded were not appropriate as elements of the national BTA IM or E standards. Nonetheless, EPA intends for facilities to have the flexibility to employ such measures in a system of technologies to meet IM BTA on a site-specific level as specified at 40 CFR 125.94(c)(6). Compliance with this alternative is based on a combination of a) reduction in rate of impingement; b) reduction in impingement mortality; and c) reduction in flow. Facilities choosing to comply with this alternative must demonstrate how the performance of the selected impingement reduction measures represents the best technology available for the site. Facilities may choose to implement different operational measures and/or technologies throughout the year based on site-specific conditions, so long as the complete system is then approved by the Director as BTA at that site. Facilities choosing to demonstrate reduction in impingement mortality must include two years of biological monitoring demonstrating the level of impingement mortality the system is capable of achieving.

Entrainment Characterization Study

One commenter suggested that the biological baseline in the Entrainment Characterizations Study (ECS) should account for ecosystem damage already done by the facility, noting that organism counts and density will be much lower after years of damage. EPA disagrees with this approach, because it is impossible to completely characterize the magnitude of the facility's effect on the waterbody without sufficient historical data, and that data is generally unavailable. The biological entrainment characterization component of the ECS requires a detailed characterization of the organisms in the vicinity of the CWIS, including data of sufficient duration to express variations in the ecosystem related to climate and weather differences, spawning, feeding, and water column migration. While this characterization may include historical data, that data is not required and entrainment BTA decisions will be made by the Director on the basis or conditions that are representative of the *current* operation of the facility and of biological conditions at the site.

Several commenters suggested that they be allowed to submit a truncated analysis if a technical factor precludes the use of closed-cycle cooling (e.g., lack of land availability would preclude closed-cycle cooling), fine-mesh screens, or any other entrainment reduction technologies identified by the applicant or requested by the Director. EPA disagrees that facilities should be allowed to truncate their analyses in the case of a potentially infeasible candidate entrainment reduction technology. In the commenter's example of limited land availability, EPA found in site visits that this factor did not always prevent a facility from developing engineering solutions to accommodate the limit in space. Further, EPA expects some facilities with limited space may still be able to install closed-cycle for some, but not all, of the power generating or production units. Therefore, in the Comprehensive Technical Feasibility and Cost Evaluation Study (40 CFR 122.21(r)(10)), today's rule requires the facility to submit an engineering study of the technical feasibility and incremental costs of candidate entrainment control technologies, including closed-cycle cooling, fine-mesh screens with a mesh size of 2mm or smaller, reuse of water or alternate sources of cooling water, and any other entrainment reduction technologies identified by the applicant or requested by the Director. Today's rule specifically states that this study must include a description of all technologies and operational measures considered and *documentation of factors that make a candidate technology impractical or infeasible for further evaluation*. The preamble provides an example how land availability or unavailability may be discussed to demonstrate technical feasibility or infeasibility.

Monitoring Requirements

In general, commenters thought that the proposed monitoring requirements were overly burdensome and costly, in some cases exceeding the calculated value of the benefit to the environment. Commenters requested the flexibility to have monitoring requirements reflect site-specific considerations and reduced monitoring for consistent compliance or demonstration of proper operation and maintenance of a "pre-approved" BTA technology. Commenters also requested removal of monitoring requirements for the "life of facility." Some commenters provided specific comments on EPA's assumptions for sampling costs, including the staff time required, equipment costs, the effects of debris, moribund organisms, and monitoring/sampling frequencies (including diel and tidal cycles). Other commenters stated that the proposed rule contained too few compliance alternatives, and many facilities would not be able to meet the impingement mortality performance standard. These commenters were also concerned that a failure to meet the performance standard would constitute a violation of the facility's NPDES permit and could result in significant fines or other penalties. In contrast, Riverkeeper stated that EPA should set minimum monitoring requirements to ensure adequate protection for organisms and to alleviate burden on the States.

EPA addressed concerns regarding monitoring in the final rule by revising and simplifying monitoring requirements. Most significantly, biological compliance monitoring is no longer required for pre-approved and other approvable technologies in 40 CFR 125.94 (c)(1) through (5) of today's rule beyond that required for the permit application, and monitoring may be greatly reduced for facilities choosing other compliance alternatives. EPA recognizes that biological monitoring can be expensive, which factored into EPA reducing those requirements. Furthermore, EPA has harmonized the monitoring requirements and timing between the impingement and entrainment mortality standards to reduce overall monitoring burden. At the same time, periodic biological data collection is necessary to update the biological activity in the vicinity of the CWIS. The final rule balances the costs of biological monitoring with the need for this information. Also see Essay 16.

Additionally, EPA has expanded the compliance options available to regulated entities; many of the options added have streamlined requirements for monitoring and compliance. As a result, facilities that anticipate that they may have difficulty meeting the impingement mortality performance standard can instead choose a different compliance alternative. Each compliance alternative contains demonstration requirements and only the option of demonstration of compliance with numeric impingement mortality performance standard (40 CFR 125.94 (c)(7)) contains monitoring requirements similar to those in the proposal.

EPA agrees that monitoring requirements for the life of the facility can be unduly burdensome. Accordingly, today's rule includes a compliance alternative (40 CFR 125.94(c)(5)) that allows facilities that demonstrate compliance with the impingement mortality numeric performance standard to request that the Director reduce monitoring requirements after the first full permit term in which these monitoring requirements are implemented, on the condition that the results of the monitoring to date demonstrate that the owner or operator of the facility has consistently operated the intake as designed and is meeting the requirements of 40 CFR 125.94(c). Similarly, for entrainment monitoring requirements, facilities must follow the monitoring frequencies identified by the Director for at least two years after the initial permit issuance. After that time, the Director may approve a request for less frequent monitoring in the remaining years of the permit term and when a subsequent permit is issued.

Exhibit VIII-4 in the preamble to today's final rule summarizes the minimum monitoring requirements for each compliance approach. Even implementation of a closed-cycle recirculating system, the most protective technology, requires daily monitoring of cooling water withdrawals, makeup water, and blow down flows to allow the Director to determine that makeup and blowdown flows have been minimized. EPA recognizes that monitoring comes with a certain cost and has carefully crafted appropriate minimum monitoring requirement for each technology considered. EPA has set minimum biological monitoring requirements for compliance with the numeric impingement mortality performance standard 40 CFR 125.94(c)(7). In establishing the biological monitoring requirements, EPA expects any approved monitoring protocols will consider the entire daily and (where appropriate) tidal cycles over which data collection should occur. Typically, facilities have collected impingement samples continuously for 6 or 8 hours and repeated this cycle to cover an entire 24-hour period. Stratifying collection in this manner allows an analysis of the diel variation exhibited by many aquatic organisms, which may be important. For example, in some species, larval life stages are more active at night and impingement rates may be higher; as a result, sampling during only daytime hours would not be reflective of the biological conditions at the facility. EPA also expects the approved monitoring protocols will ensure that sampling occurs during periods of representative intake flow and not during periods of non-peak flow or scheduled outages.

EPA has also revised its cost estimates for impingement sampling in the ICR, as discussed in Essay 23. EPA has assumed 48 hours of staff time per sampling event for 2 staff (i.e., round the clock staffing), plus additional time for pre-event preparation and travel to the site. EPA also included costs for durable sampling equipment (e.g., a shed). These estimates are reasonable approximations for an average facility for national cost purposes. EPA further found the sampling costs reflect the range of costs for sampling actually conducted by facilities; naturally, the exact costs at an individual facility may be higher or lower.

Clarifying "Direct Measure"

Commenters requested clarification of the term, "direct measure" with regards to monitoring. The term "direct measure" has been removed from the rule language in reference to monitoring to evaluate compliance with impingement mortality performance standard. EPA agrees that direct measurement of intake velocity on a traveling screen may be problematic in some circumstances, and the final rule allows intakes to comply with the low velocity compliance alternatives by either calculation or direct measurement. Compliance will be demonstrated through monitoring and reporting of actual or calculated intake velocities. EPA expects that facilities will employ appropriate design and operational measures to ensure that 0.5 fps is not exceeded during minimum ambient source water surface elevations, as can be anticipated through best professional judgment using hydrological data.

Annual Average

Commenters expressed concern that EPA expects facilities to track their compliance with the annual average standard on an ongoing basis, and to proactively modify their technology or operations when any individual monthly average suggests that they may be in danger of exceeding the annual average IM performance standard in the future. They note that this language suggesting that compliance with these standards can be "adjusted" does not recognize the delay in receipt of data from the laboratory and also ignores the seasonal variability of many species and the inherent variability in hardiness of species. One commenter expressed concern that there is the question of whether the annual average is or is not a "rolling average." The proposed rule at 40 CFR 125.97(a)(2) required permittees to "update and submit your calculated annual average for each month covered by the report." The final rule addresses these concerns by (1) making it clear that it promulgated a 12 month performance standard, and by providing six IM compliance alternatives that do not require biological monitoring to demonstrate compliance with the IM performance standard. Also see Essay 16A.

Species of Concern and Fragile Species

Commenters were concerned that EPA assurances of Director discretion does not resolve how the rule would treat sensitive species that would be deemed "species of concern," and thus be included in the impingement mortality counts. They suggested that EPA should also allow permit authorities to specify what "species of concern" will be used to measure compliance and that the difficulty of achieving the impingement mitigation standards would be mitigated by careful definition of species of concern to exclude particularly sensitive organisms with lower ecological value consistent with EPA's statements in the preamble and the TDD.

Commenters stated that EPA offers no evidence that the survival rates of the fourteen predominant species on which the impingement mortality performance standard is based are, in fact, representative of all species. They suggested that there should be no reliance by EPA on speculation that State permitting authorities will be inclined to exclude "highly prevalent" forage fish species or any other species for that matter, from being considered "species of concern" and that EPA should include all fish or specify excluded fish. One commenter stated that based on discussions with EPA staff, that they understood that the species of concern, and thus the fish whose mortality is to be measured, are to be finfish, not shellfish. They suggested that the rule should make this clear and that EPA offers no explanation for excluding shellfish from these standards. They should apply, in aggregate, to all “species of concern.”

Commenters were concerned that the Proposed Rule did not clearly define “species of concern” nor did it differentiate between “species of concern” and representative important species (“RIS”). They suggested EPA should adopt standards for hardy, intermediate, and fragile species and grant discretion to State Directors to identify species of concern. To adequately protect each species of fish, EPA should apply the impingement mortality standard to each species impacted by the cooling water intake system. EPA could develop IM standards based on categories of species, e.g., one for hardy species and one for fragile species. One commenter thought that EPA should not allow State permitting agencies to exclude any species from monitoring, sampling, or study requirements, including reptiles and marine mammals.

First, the final rule provides six compliance alternatives that would not require a facility to conduct biological compliance monitoring for the IM performance standard. For those that elect to comply with the numerical IM performance standard, EPA addressed these concerns by eliminating from the final rule the species designations “species of concern” and “representative important species” and instead identifying fragile and non-fragile species. As detailed further below, this approach mimics the actual data forming the basis of the IM performance standard. EPA then developed the numeric impingement mortality standard for the final rule using data from only the identified non-fragile species. Facilities monitoring to demonstrate compliance with the numeric impingement mortality performance standard must measure mortality, including latent mortality, for each non-fragile, non-threatened, and non-endangered species collected during sampling events. Accordingly EPA disagrees that monitoring requirements should be limited only to selected species of concern. EPA notes the Director may require additional monitoring and may require additional controls for fragile-fish at 40 CFR 125.94(c)(9)(i). EPA agrees that shellfish should be considered under the impingement mortality performance standard; see Essay 16A. While not traditionally viewed as “impingeable,” EPA also notes that many non-fish or shellfish species (such as sea turtles and marine mammals) have additional protections under other laws, such as the Endangered Species Act or Marine Mammal Protection Act. The Director may establish additional controls for these aquatic organisms at 40 CFR 125.94(c)(9)(ii). For further discussion see Chapter 11 of the TDD and the Section VIII of the preamble.

EPA notes that, in contrast to the proposed rule, the permit application no longer requires submission of the proposed “species of concern.” EPA found that the term “species of concern” was similar to terms used in the context of T&E (threatened and endangered) species, and was concerned about further confusion over existing Services or State requirements for such species. Furthermore, despite EPA’s efforts to distinguish between species of concern and RIS (representative indicator species) in the NODA (77 FR 34325, June 11, 2012), EPA found that many commenters were still confused by the language. EPA is therefore adopting the term “fragile species” and exempting fragile species from being counted to determine compliance with the numeric impingement morality performance standard. The term “fragile species” is meant exactly as it is used with the impingement mortality data and criteria used in calculating the impingement mortality performance standard of the rule. EPA defines “fragile species” at 40 CFR 125.92, as a species of fish or shellfish that has an impingement survival rate of less than 30 percent even when the BTA technology of modified traveling screens are in operation. EPA has long recognized these species as having low survival rates under the best of conditions and fragile species have been shown to suffer from high rates of mortality even in control studies (see DCN 10-6810). The EPA does not intend for such naturally occurring mortality to be counted against a facility's performance in reducing impingement mortality. EPA therefore took an approach to ensure that a facility's performance in reducing impingement mortality as demonstrated by biological monitoring would reflect only the effects of its improvements to the CWIS technology, and not be confounded by effects of monitoring that are not caused by impingement. EPA notes the change in terminology to "fragile species" eliminates the proposed rule burden on States to review and approve each facility's site-specific species of concern, and eliminates confusion over any T&E or RIS that may be subject to more stringent requirements under other Federal, State, and Tribal law. EPA also notes that the use of "fragile species" instead of "species of concern" greatly increases the transparency of the Agency's impingement mortality performance standard.

One commenter expressed concern that the proposed 12 percent limit would allow 100 percent mortality of vulnerable species as long as they represented a small portion of fish impinged and suggested that, in order to adequately protect each species of fish, EPA should apply the 12 percent impingement mortality standard to each species impacted by the cooling water intake system. EPA disagrees; the IM performance standard was developed based on aggregating impingement mortality data across numerous species and EPA has concluded that it would be inappropriate to then apply a standard based on aggregated specie data to each individual species. Such an approach would require the development of a performance standard for each species of fish and is not a viable one, given the lack of available date to do so. Also see Essay 16A.

EPA disagrees that the exclusion of fragile species from the numeric impingement performance standard weakens the implementation of the numeric standard in the final rule. Fragile species are accounted in the baseline biological monitoring and are only excluded for measurement of compliance against the numeric standard (which is appropriate as the technology basis for the standard, modified traveling screens with fish returns is largely not effective against fragile species). On a site-specific basis, BTA technologies and practices will afford some measure of protection for all fish and shellfish, including fragile species. Today's BTA for impingement mortality allows the Director to establish site-specific controls under 40 CFR 125.94(c)(9) to address fragile species. The Director may require additional measures such as behavioral technologies to protect fragile species, or additional monitoring for species not subject to the BTA requirements for impingement mortality at 40 CFR 125.95(c). Such monitoring requirements will be determined by the Director on a site-specific basis.

EPA agrees that exclusion of "invasive" species is problematic and removed the language from the proposed rule that excluded measurement of invasive species for determining compliance with the numeric standard. The final rule does specify, however, that "all life stages of fish and shellfish" does not include other specified nuisance species. Therefore, many non-indigenous invasive species (e.g., zebra mussels) that are nuisance species are excluded in determining compliance with the numeric standard. EPA's use of the term "invasive species" in the proposed rule may have been confusing because some might consider non-native stocked fish as invasive species. It was not EPA's intention to exclude those types of fish from being counted towards compliance with the numeric IM performance standard.

Effects of Debris

Commenters expressed concern that some facilities experience very high debris loads on their traveling screens. They stated that this has the potential to substantially increase impingement mortality noting that impinged organisms are likely to be subjected to impact and abrasion from the debris resulting in increased mortality. They argued that there is no evidence in the record for the proposed rule that the modified traveling screens identified as BTA are able to separate debris and organisms effectively enough to achieve the impingement mortality standards and that heavy debris loads greatly complicated sorting and enumeration of impinged organisms during studies. They requested that provisions should be included in the rule that accommodate these natural events. They also noted that some NPDES permits have conditions that prohibit the return of debris to the source waterbody and that returning organisms impinged at these facilities while maintaining compliance with the permit condition that prohibits discharge of debris would require complete separation of debris from organisms, which they state is infeasible. EPA agrees that high debris loading and debris return prohibitions can affect mortality rates of fish returned from a traveling screen and may occasionally present difficulties when monitoring for impingement mortality. EPA also agrees that debris return prohibitions in NPDES permits may conflict with requirements to return impinged fish. EPA notes, however, the problems described will only have an impact on ability to comply for those intakes where the numeric performance standard alternative is selected. The impingement mortality performance standard is one of seven compliance alternatives and EPA expects that the numeric performance standard will be the selected compliance alternative for only a small portion of intakes. The problems described would not affect compliance via the compliant technology alternatives (i.e., closed-cycle, 0.5 ft/sec velocity, and existing offshore intake). Therefore, EPA would expect a facility that has debris concerns will elect to choose one of the other six IM compliance alternatives. To the extent that a facility elects to comply with the IM standard via the optimized traveling screen or system of technology compliance alternatives, the Director will have the discretion to consider the impacts of the problems described. For these reasons, EPA has concluded that specific provisions regarding debris are not needed.

IM Monitoring Methods

Many commenters expressed concern that there is no single, standardized approach to measuring impingement survival, because the collection and holding systems must be designed for each individual facility. They argue that the tests are time-consuming and expensive to perform, unduly burdensome, difficult to replicate, and subject to high levels of experimental error. One stated that EPA has not adequately recognized the difficulty of maintaining fish for a period of time and that using this kind of problematic procedure to determine compliance is unreasonable. One argued that such monitoring is unwarranted once either of the prescribed BTA standards has been met. One noted that EPA admits that it cannot point to standard methods for the collection and analysis of the type of biological samples called for in the Proposed Rule, much less for the determination of latent mortality and distinguishing it from natural morbidity. In general, they conclude that it is not feasible to regulate impingement mortality by requiring achievement of an IM numeric performance standards applied to pollutant discharges and suggest that EPA should delete or modify monitoring requirements for facilities that can demonstrate that their technology design meets EPA requirements and they are complying with an approved operation and maintenance plan. Riverkeeper states that EPA should require the Director's approval for all sampling plans. EPA recognizes that at present, there are no standard methods for conducting impingement and entrainment studies and that there can be variability in designing a sampling plan between sites. EPA disagrees, however, that it is not feasible to regulate impingement mortality using a numeric performance standard and notes that the general methodology has been well-established over the 25-plus year timeframe facilities have been conducting impingement survival studies. EPA also disagrees that an impingement sampling plan must be approved by the Director prior to sampling. See DCN 10-6706 for a discussion of some fundamental study elements and parameters that are universally essential for the completion of impingement and entrainment surveys and DCN 10-6708 for a discussion of elements that should be incorporated into any sampling plan. EPA however, understands that many facilities would prefer to comply via alternatives that require less ongoing biological monitoring that involves less associated uncertainty and lower costs. EPA has addressed this by establishing in the final rule numerous other compliance alternatives that do not require ongoing biological impingement mortality monitoring. These alternatives incorporate many of the suggested approaches including defined compliant technologies that only require certification of continued optimized operation and maintenance. In many cases, impingement data collection will be required only for an initial two-year study period.

IM Monitoring at Each Intake

Several commenters asked about consolidating or eliminating monitoring requirements. They asked if IM monitoring could be conducted on a unit basis, rather than at each intake; if IM monitoring at a single intake could be used as a surrogate for similar intakes; and if facilities could, for compliance with IM performance standard, combine or average the counts of organism IM across intakes. Today's rule establishes IM standards that may be applied at either the intake level (such as intake velocity) or the facility level (such as volume of intake flow). The rule clarifies that facilities may adopt an intake-specific compliance strategy at each cooling water intake; accordingly, individual monitoring and compliance requirements are applied at each intake. Given that source water and operational conditions at individual intakes may vary, as further demonstrated by some data sets provided by commenters,[48] the final rule does not allow the owner or operator to consolidate or eliminate monitoring to demonstrate compliance at each intake complying with the IM performance standard.

EPA notes that today's final rule has removed biological compliance monitoring requirements for the compliance paths based on "pre-approved" technologies. In addition, there are three "streamlined" compliance alternatives available at 40 CFR 125.94(c)) (3), (5) and (6) that, after a facility has made a demonstration of system optimization as to minimize impingement mortality, have no subsequent biological monitoring and reporting requirements as compared to a facility that complies using the numeric impingement mortality performance standard. Therefore, there are several compliance alternatives available for facilities wishing to reduce or eliminate ongoing biological monitoring requirements. Note that these facilities still have biological characterization data gathering requirements as part of any subsequent permit applications.

One commenter questioned whether facilities could have relief from IM monitoring during downtime or extreme circumstances. As shown in Exhibit VIII-1 of the preamble, EPA has

[48] For example, where intakes are located parallel to the shoreline and on a river bend, the upriver intake generally shows much higher rates of impingement.

projected that the overwhelming majority of the facilities within the scope of today's rule will select IM compliance alternatives that do not have biological monitoring requirements. For the very small number (less than 1 percent) of intakes that are projected to demonstrate compliance with the IM performance standard, biological monitoring is only required on a monthly basis and not required during downtime or when the facility is not otherwise operational. Waiver of monitoring requirements during extreme events is not necessary because monitoring can be scheduled around short-term or emergency conditions. Such conditions should not affect a facility's ability to comply with the 12 month impingement mortality performance standard, and such conditions should not interfere with overall optimized performance of impingement minimization technology or a suite of technologies. EPA expects that once a sufficient body of performance data has been collected, the facility would request less frequent biological monitoring under 40 CFR 125.96(f). Further, once the technology has been demonstrated to the satisfaction of the Director, EPA expects the facility would utilize compliance alternative 40 CFR 125.94(c)(6) in subsequent permit cycles. Therefore even new and innovative technologies have a venue for demonstration of performance equivalent to that required by the IM standard, and EPA does not expect any facility would need to conduct frequent biological monitoring in perpetuity to comply with the BTA for IM.

Remote and Visual Inspection

Commenters were concerned about the implementation of the required remote and visual inspections. The final rule requires all facilities with new units to either conduct visual inspections or employ remote monitoring devices when the cooling water intake structure is in operation. The facility must conduct such inspections at least weekly to ensure that any technologies installed to comply with 40 CFR 125.94 are maintained and operated to ensure that they will continue to function as designed. Some commenters supported this particular provision. EPA agrees that periodic inspections are one way to ensure that a technology continues to perform as intended and has retained these inspections. EPA is aware that, for some facilities, this requirement could pose a feasibility challenge (for example due to ice cover in the winter season, inability of divers to see through more than a few inches of water, or certain intakes in deep water). The rule, therefore, authorizes the Director to establish alternative procedures. See 40 CFR 125.96(e).

Monitoring Feasibility

Some commenters were concerned about challenging physical or other logistical conditions that would render the methodology and frequency of monitoring specified in the proposed rule impossible or impracticable. Commenters gave the example of CWISs that are located under or adjacent to active wharves or marine terminals where collecting the samples specified in the proposed rule would require putting divers in active shipping lanes or shutting down commerce for the duration of the sampling. Other examples of the challenges associated with impingement sampling provided in comments included impingement events caused by storms, the effects of mortality caused by sample holding, physical challenges to access proper sampling locations or to house biologists or analytical equipment, how to account for "carry over" of organisms not removed by the spray wash system, and selecting an appropriate sampling location that balances scientific integrity and worker safety. Commenters noted that the proposed rule allowed for compliance monitoring to take place at a location other than at the intake itself "where appropriate," and "as approved by the Director" in situations involving (but not limited to) forebays, barrier nets, or fish handling and return systems. They were concerned, however, that EPA did not specify the circumstances that would qualify for an alternative monitoring location.

EPA recognizes that some facilities may be faced with certain challenges in developing and implementing a sampling program for impingement mortality. First and foremost, more than 90 percent of facilities are expected to choose a compliance alternative that does not require biological compliance monitoring to demonstrate compliance with the numerical IM performance standard. Second, as noted above, this type of sampling is not new and has been in use at many facilities for several decades; to wit, the studies used to develop the impingement mortality performance standard demonstrate the availability and common use of these sampling techniques. In fact there are hundreds of studies in the record, spanning a full range of waterbodies, intake types, and CWIS including successful monitoring by those "difficult" situations described by commenters. EPA further considered these feasibility concerns by incorporating flexibility in the compliance alternatives established in today's final rule; not all compliance options require impingement mortality monitoring, only one alternative requires biological compliance monitoring which EPA projects would be used by at most 1 percent of facilities as described above. All compliance alternatives include reduced monitoring over that which was described in the proposed rule. For intakes without traveling screens or those that have inaccessible sampling locations, the rule provides IM compliance alternatives that do not involve routine monitoring of impingement rate or impingement mortality (e.g., velocity reduction and system of technologies).

In addition, facilities with intake structures that do not use traveling screens or other technologies that return fish unharmed to the waterbody may choose to comply with IM requirements via the "system of technologies" alternative. Compliance with this alternative is based on a combination of A) reduction in rate of impingement; B) reduction in impingement mortality; and C) reduction in flow. Only component B (reduction in mortality) involves frequent (monthly) biological data collection for at least two years. Component B can be zero as long as the other two are sufficient to meet the BTA standard. If there is no fish return then component B will be zero by design and there will be no need to perform monthly impingement data collection. Component A (reduction in the rate of impingement) may involve some initial biological data collection (near-field versus far-field, inspection for impinged organisms, etc.), but will likely be short-term and acceptable requirements will be subject to the discretion of the Director who can take site-specific limitations into consideration. Component C (flow reduction) can easily be monitored without interfering with terminal operations. Only component B (reduction in mortality) would require frequent monitoring or inspection activities that might interfere with terminal operations beyond the initial assessment. EPA has concluded that ample flexibility has been provided in the final rule, allowing facilities to choose a compliance alternative that obviates monitoring feasibility concerns.

Taxonomic Identification

One commenter expressed concern that very few facilities would have employees with the education and experience necessary to make taxonomic determinations that would be required to monitor compliance with more-complex IM performance standard with different requirements for different groups of fish. Specialists needed to monitor IM do not exist at most facilities that will be subject to the rule, and especially not at the manufacturing facilities and smaller electric utilities formerly covered by the Phase III rule. EPA agrees that such skills may not be present within the existing workforce and included in the ICR costs estimates the costs for skilled contract employees necessary to conduct biological monitoring. EPA also notes that in most cases such monitoring will only need to be conducted for an initial two-year study period. Those facilities that choose to comply with the impingement standard via the intake velocity or flow reduction commensurate with CCRS standards will not be required to conduct any biological compliance monitoring at all.

Converts

One commenter expressed concern that EPA offers no remedy for non-compliance resulting from converts. EPA disagrees. EPA has defined impingement at 40 CFR 125.92(n) and entrainment at 40 CFR 125.92(h). These definitions are mutually exclusive in that the definition includes a mesh size of 0.56 inches. This approach completely eliminates any miscounting of converts. This approach was also adopted in the final rule to avoid penalizing facilities that utilize fine mesh screens and thus inflating the count of I and IM, as discussed in the preamble.

Moribund Organisms

One commenter stated that scientific information exists indicating that impingement "selects" fish and shellfish of impaired health condition and, therefore, violations of the standards are likely to be frequent. Another commenter suggested that specific language should be drafted to account for naturally occurring mortality-inducing situations, such as due to red tide, so that the facilities are not adversely penalized for the natural mortality. EPA agrees that some organisms may become impinged as a result of their health being impaired due to naturally occurring factors. The final rule specifically allows for fish and organisms that are moribund (i.e., close to death) to be taken into account; see 40 CFR 125.94(c)(7) reference to "latent mortality." The impingement mortality performance standard specifically excludes fragile fish from the calculation of impingement mortality. EPA has concluded that specific language is not required since the Director has discretion to take into consideration site-specific characteristics and condition of local fish species when establishing monitoring and reporting protocols. Also for compliance options involving traveling screens and system of technologies, the Director has discretion in determining what level of impingement meet BTA requirements.

Biofouling

One commenter expressed concern that annual or bi-annual biofouling control measures to combat invasive bi-valve species (e.g., zebra mussels - mortality of both bivalve and fish species can occur prior to screened intakes as determined by the design of the once through cooling system) and requested that monitoring should exclude periods during which facilities undertake biofouling control measures. EPA notes that continuous biological compliance monitoring is not required. Monitoring requirements for entrainment will be determined by the Director on a site-specific basis. In both cases, the Director has wide discretion in determining whether monitoring periods should include episodes of employment biofouling control measures. EPA expects that the Director would take into consideration the frequency of such measures in any determination of protocols and frequency of monitoring requirements.

Zero Catch

One commenter observed that zero catches provide a statistical analysis problem in determining monthly and annual averages and questioned whether zero catches would be counted as zero mortality or as no data. EPA has concluded that, since the standard is expressed as a percent of total, the proper handling of the circumstance where no impingement occurred would be to count this as "no data." See Essay 16. Another commenter noted that EPA should adopt a provision for facilities with very low impingement rates. EPA disagrees that zero catches would result in compliance issues, because compliance alternatives 40 CFR 125.94(c)(1) through (c)(4) do not require counting of fish, and compliance under 40 CFR 125.94(c)(5) and (c)(6) are based on those permit conditions that result in optimized performance of the BTA technologies. These permit conditions reflect the optimization study required at 40 CFR 122.21(r)(6) and reviewed by the Director, and the study would already reflect low rates of I or IM, including zero catches. Further, EPA has a de minimis rate of impingement alternative[49] at 40 CFR 125.94(c)(11); see preamble for more details.

New Units

Some commenters stated that the monitoring requirements for new units were excessive. EPA disagrees. Without any monitoring data regarding the facility's intake flow and other parameters, the Director may not be able to determine if the new unit's closed-cycle system is operating in a manner that minimized makeup and blowdown. Further, in most cases, new units would meet the BTA requirements with CCRS under 40 CFR 125.95(e)(1). This alternative requires a demonstration of flow for the new unit commensurate with CCRS requires flow monitoring, a parameter that is highly automated and very inexpensive. This monitoring requirement imposes virtually no burden. Flow monitoring for facilities that choose 40 CFR 125.95(e)(2) must demonstrate entrainment reduction equivalent to 90 percent or greater of the reduction that could be achieved through compliance with 40 CFR 125.95(e)(1). The type of monitoring in these circumstances is variable, and may include biological data collection in some cases. However, EPA concludes the requirements are necessary, reasonable, and affordable, and the requirements are similar to those required of new facilities in Phase I. Further, as noted in the comments (and in the rule), the Director may eventually reduce these monitoring requirements after the cooling system has been confirmed to reduce flows to the necessary levels. Additionally, EPA expects that the monitoring required will be very simple and relatively inexpensive—monitoring of flows into and out of the system is easily accomplished, especially with modern instrumentation and design that would accompany a newly constructed unit.

Counting Impinged Organisms with the "Hypothetical Net"

Commenters had varying concerns about the procedures for counting impinged organisms using the "hypothetical net," such as concerns over interactions with debris and how biologists would utilize a hypothetical net on segregating organisms during a sampling event. Several commenters agreed that impingement mortality should only be calculated using the organisms that would not have passed through a 3/8-inch mesh screen, while others thought the hypothetical net calculation would add significant difficulty to monitoring for impingement and entrainment.

[49] EPA did not predict which facilities would obtain Director approval to comply with IM via 40 CFR 125.94(c)(11); EPA assumed costs for technologies for all facilities; see the TDD for more information.

EPA maintains that this concept is still appropriate, as a facility needs a method to distinguish "impingeable" organisms from "entrainable" organisms, particularly at facilities with fine mesh screens or other technologies that differ from the basic screens with a mesh size of 0.56 inch. By impinging smaller life stages (which typically have lower impingement survival rates than larger organisms), affecting the facility's overall impingement mortality rate and its ability to meet the performance standard; the hypothetical net helps these facilities by eliminating smaller organisms from the group of organisms that will determine compliance with the performance standard. Though today's rule no longer mentions the proposed procedures for counting impinged organisms using the "hypothetical net," the impingement mortality restrictions in the final rule are based on the operation of a modified traveling screen with a fish return. To ensure that a facility's monitoring plan is consistent with the technical basis for today's requirements, for those facilities that elect to comply with the IM standard via biological compliance monitoring, EPA is requiring facilities to monitor impingement mortality using a sample that has been passed through a sieve or net with no more than 0.56 inches maximum opening, so that only organisms that do not pass through this mesh size are counted. In doing so, facilities would retain (and therefore count) only organisms that would have been impinged on a 3/8-inch mesh screen, which was the technological basis used for developing the impingement mortality performance standard. As such, facilities can similarly apply a "hypothetical net" in that they could elect to count only organisms that would not have passed through a net with mesh openings less than 0.56 inches. The example given in the preamble is that a facility using a fine-mesh screen of 0.5 mm or diverting the flow directly to a sampling bay will need to count only organisms that remain if the flow passed through a net, screen, or debris basket fitted with 3/8-inch mesh spacing.

One commenter suggested that EPA must define what organisms are impingeable (versus entrainable) and evaluate the feasibility and performance of technologies for reducing mortality to organisms of that size and type. The commenter stated that, for facilities that cannot comply via the low velocity compliance alternative, requiring direct monitoring of all life stages of fish that are collected or retained in a 3/8-inch sieve unacceptably increases hazards to these organisms. EPA notes that the use of a sieve with a maximum opening dimension of 0.56 inches (3/8-inch) during sample collection is intended to distinguish between impingeable and entrainable organisms for regulatory purposes and must be used only in conjunction with intake screens that use finer or coarser mesh screens. EPA has concluded that this method is much more preferable since it is based on the design and performance of the BTA impingement technology upon which the performance standard is based and is relatively simple to implement. An attempt to define impingement and entrainment using lists of species and sizes would be a very difficult and imprecise method both to develop and implement especially considering the available data limitations.

Methods for Evaluating Latent Mortality Effects Resulting from Impingement

Commenters responded to EPA's request for comment regarding methods for evaluating latent mortality effects resulting from impingement. They were primarily interested in EPA establishing procedures for evaluating latent mortality, or eliminating the requirement entirely. Some commenters noted that there are significant challenges in conducting latent mortality studies and offered suggestions for how to conduct these studies or to interpret the results.

Today's rule establishes the holding time for evaluating latent mortality (under the performance standard) as a period of 18 to 96 hours; the Director will ultimately select an appropriate holding time based on site-specific considerations, such as the species present. The Director has the discretion to prescribe an alternative holding period. After evaluating the data, EPA concluded that a range of holding times of 18 hours to 96 hours was acceptable for inclusion in the development of a performance standard because commenters had provided documentation showing that the actual time period typically had little effect on IM rates; see Chapter 11 of the TDD, Essay 16A, and the preamble for more discussion. Selecting an appropriate holding time will be a balance of monitoring for latent mortality (which would necessitate longer holding times) against the challenges of holding organisms for an extended period of time that may introduce mortality unrelated to being impinged (e.g., predation in the holding tank, needing to feed the held organisms). In contrast to the proposal, EPA counted all fish that died at any time during the holding period, instead of excluding those that were dead at time zero. By considering a wider range of holding times and other requirements, EPA was also able to utilize a larger set of data for calculating the performance standard, with broader geographic representation. (For more information, see DCN 12-6703.) The rationale for these revisions to the data acceptance criteria are described in further detail in the TDD, Chapter 11. EPA's evaluation of holding times is further discussed in Essay 16A.

EPA disagrees that monitoring requirements should not include evaluation of latent mortality. Facilities monitoring to demonstrate compliance with the numeric impingement mortality performance standard must measure mortality, including latent mortality, for each non-fragile, non-threatened, and non-endangered species. As discussed above, the rule explicitly references "latent mortality" to provide clarity. One commenter expressed concern that without a control test of similar species that was not exposed to impingement, it is not possible to determine whether any latent mortality was the result of impingement, entrainment into the sampling equipment, confinement within the handling/collection system, exposure to other organisms within the collection system or organism handling related to monitoring. Generally, up to 10 percent mortality in a control test is considered acceptable in a whole effluent toxicity WET test and 10 percent mortality related to test conditions alone is too similar to the proposed annual average impingement mortality standard. EPA has revised the impingement mortality performance standard in the final to a value which is significantly greater than the 10 percent test related mortality suggested by the commenter. EPA's standard does not include a control adjustment since the standard itself was developed with the effects of the sampling procedure built-in. EPA expects that facilities will design and conduct the tests in a manner that minimizes the effects cited and has concluded that facilities should be able to replicate the procedures used in the studies that comprise the standard development database. Also, EPA expects that many of the species most susceptible to increased mortality as a result of the sampling methodology are also fragile species which are excluded from the calculation of impingement mortality. Also see Essay 16A.

Reporting Requirements and Record Keeping

In general, commenters were concerned about the burden associated with reporting requirements and the logistical difficulties in submitting reporting through monthly discharge monitoring reports (DMRs), such as the lag time for biological analysis of impingement sampling. Commenters also thought that the separate annual certification statement was not necessary, as the information required in the certification could be addressed through monthly or quarterly reporting as required in the facility's permit. Some commenters suggested that the annual certification statement and report only be required when significant modifications are made to the approved technology or the facility's implementation practices.

EPA disagrees that DMRs are an inappropriate submittal vehicle for all required reports. Today's rule requires that the results of all monitoring, demonstrations, and other information to determine compliance with the permit conditions and requirements established under 40 CFR 125.94 be included with the facility's DMR or equivalent report. The required reports for monitoring activities are similar to requirements that are already in NPDES permits for effluent discharges. DMRs are a routine and existing mechanism for reporting monitoring data that is required by an NPDES permit. In addition, the Director has discretion in choosing the format of the DMR or the portion of the DMR used to submit required monitoring data. Similarly, the Director may allow some degree of lag time in submitting analyses that require lengthy analysis, as appropriate. EPA expects that, during the near term, EPA and State NPDES Authorities will be making a number of revisions to the NPDES program to address today's requirements. These will include revisions to the DMR reporting form in some cases to provide for submission of any monitoring data required by today's final rule.

EPA has simplified the requirements for the annual certification and report requirement. Facilities that have not substantially modified approved technologies or implementation practices may submit a letter asserting that the information contained in the previous year's annual certification is still pertinent.

Facilities that have substantially modified operation of any unit that impacts cooling water withdrawals or operation of cooling water intake structures must provide a summary of those changes in the annual certification report and submit revisions to the information required at 40 CFR 122.21(r) in its next permit application.

Many of the peripheral concerns mentioned by commenters were addressed earlier in the essay in the response monitoring and reporting burden issues.

Compliance with Other Laws

For a discussion of EPA's consideration of relevant acts of Congress, Executive Orders, and Agency Initiatives in developing this final rule, see the final preamble. Also see Essay 59.

Commenters were concerned that today's rule not be applied in a manner that results in conflicts with other regulations, including the Information Quality Act (IQA). The commenter concerned about the rule's conformation with the IQA particularly noted that EPA has not met the obligations of the IQA is disclosing all the statistical and scientific information used to calculate costs, quantify benefits, and to justify the Agency's option selection. EPA disagrees that it has not met the transparency obligations set forth in the IQA. Throughout the 10-plus years and multiple proposals and NODAs associated with this rule, EPA has published a public docket including all the relevant materials not protected by confidential business information requirements used in the development of the rule. In addition, EPA published the Environmental and Economic Benefits Analysis for Proposed Section 316(b) Existing Facilities Rule, Economic and Benefits Analysis for Proposed Section 316(b) Existing Facilities Rule, and the Technical

Development Document with the 2011 proposed rule that described the statistical and scientific information used to calculate the costs and quantify the benefits of the rule. Stakeholders have had multiple opportunities to comment on these materials and request additional clarification about EPA's procedures to calculating the costs and benefits that ultimately led to the regulatory options selected in today's rule. In some cases, industry commenters requested EPA provide Excel spreadsheets with the models, data inputs, and outputs; EPA did so. EPA is not required to publish a formal analysis of its compliance with the IQA. However, EPA is confident that it has provided adequate access to all relevant materials and data used in the development of the final rule. Also see response to Essay 59.

Another commenter was concerned about the rule's impact on manatees, an endangered species. The commenter requested that EPA include a provision in the final rule stating that the regulations will not be construed or applied in a manner that results in adverse impacts to manatees or critical manatee habitat. The final rule has not made any specific mention of impacts to manatees but does consider threatened and endangered species, including 40 CFR 125.94(c)(9)(ii) for other aquatic organisms. The final rule provides the Director the discretion to establish alternative entrainment requirements for new units if the data specific to the facility indicate that compliance for each new unit would cause adverse impacts on threatened and endangered species. Similarly, for existing units, the Director may consider in the site-specific BTA determination quantified and qualitative social benefits and social costs of available entrainment controls, including ecological benefits and benefits to any threatened or endangered species. Finally, the rule provides seven alternatives through which facilities may comply with the today's IM requirements. This flexibility allows facilities to select a site-specific approach to achieving compliance with applicable requirements while addressing individual constraints such as the presence of threatened and endangered species. See Section VIII.K of the preamble for how permits for existing facilities subject to requirements under the Endangered Species Act will be handled. The 316(b) rule and preamble establish a number of requirements and commitments to ensure coordination and information sharing between EPA and the Services concerning permit applications and permit requirements for facilities with cooling water intakes under the rule. The rule ensures that the Services will have an early review of permit applications, will have the opportunity to recommend measures to include in the permit to protect listed species and critical habitat, and will have an opportunity to review draft permits for the same purpose at the time they are public noticed. The rule also specifies the Director's authority to include measures in the permit to protect listed species and critical habitat. The preamble reaffirms EPA's commitment to coordinate with the Services on State-issued permits and so that they include measures necessary to ensure that the permit will not jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. Also see Essay 10.

State 316(b) Programs

EPA notes that in a number of areas of the country (California, Delaware, New York, and New England), permitting authorities have already required or are considering requiring existing facilities to install or retrofit to closed-cycle cooling systems. Today's final rule does not alter the basic State-Federal scheme established in the CWA under which EPA authorizes States to implement the NPDES permitting program, including, according to their own rules and regulations, implementation of more stringent requirements. Existing facilities are in these states are still subject to the Federal rule but some State requirements were considered in costing. In addition, the today's final rule addresses the permit application requirements and ongoing permit proceedings for these facilities at 40 CFR 122.21(r)(1) and 40 CFR 125.98(g).

Director's Role

Overall, many commenters urged EPA to allow the Director wide discretion in making site-specific BTA determinations (including expanding the list of factors that the Director may consider in setting entrainment requirements and allowing the Director to tailor entrainment requirements to minimize the burden of compliance), requiring permit application materials, and setting monitoring and reporting requirements. Several commenters requested that EPA delete the provision asserting that the permitting authority can include more stringent state-law-based requirements in permit conditions implementing the regulation. Commenters also requested exemption from impingement and entrainment mortality BTA analysis requirements for all facilities where final BTA determinations have been reached since EPA suspended the prior Phase II rule.

EPA agrees that the Director needs wide discretion in making many determinations relevant to each facility. In today's final rule, EPA requires the Director to make site-specific BTA determinations for entrainment. In addition, the Director has the discretion to waive or delay some permit application materials, and implement reduced monitoring and reporting requirements. These concerns are further addressed earlier in this essay. More specifically to CCRS, EPA agrees that fogging, icing, salt drift, and visibility or aesthetic impacts may also be considered in making a BTA determination, although these factors are likely to be less important because such impacts are easily overcome by modern cooling tower design.

Setting More Stringent Standards

EPA disagrees that it should prevent States from mandating more stringent performance standards than those set by today's rule, and it also disagrees that allowing States to set more stringent requirements will cause excessive energy costs. With the promulgation of the final rule, EPA has set national standards for the reduction of entrainment and impingement mortality. EPA understands, however, that the original intent of the Clean Water Act includes broad authority for States to implement CWA requirements. Thus, EPA has left a great deal of discretion to the individual State permit administrators (Directors) in setting the appropriate requirements for their facilities, as long as the requirements are not less stringent than minimal Federal requirements established by today's rule. While States are obligated to ensure that the facilities in their jurisdiction comply with minimum Federal requirements, they are also authorized to set more stringent standards if they desire. EPA has determined that allowing States to set more stringent requirements will not increase energy costs or decrease energy reliability.

Permit Proceedings Begun Prior to the Effective Date of the Final Rule

EPA recognizes that some States have invested considerable effort in developing and implementing section 316(b) permits and facilities have invested significant resources in meeting those requirements. While today's final rule does not grant automatic exemption from impingement and entrainment mortality BTA analysis requirements for all facilities where final BTA determinations have been reached since EPA suspended the prior Phase II rule, the regulation at 40 CFR 125.98(b) and (g) allows the Director flexibility where there are ongoing permit proceedings or where a BTA determination has already been made based on substantially the same information required at 40 CFR 122.21(r). In the case of permit proceedings begun prior to the effective date of the final rule, the Director may determine whether the information already submitted is sufficient. As such, the Director has the discretion to confirm or proceed with a determination of BTA standards for impingement mortality and entrainment without the information required in 40 CFR 122.21(r). The bases for the Director determination of sufficient information and BTA are specified at 40 CFR 125.98(g).

Establishing a Policy to Disallow EPA Comments

One commenter requested that EPA establish a policy to accept the State permitting authority's BTA determination based on BPJ without allowing EPA regional staff to object to draft permits. EPA disagrees such a policy could be established and reminds the commenter that NPDES permits, including 316(b) permit conditions, are subject to EPA oversight and also to the public notice and comments requirements at 40 CFR 124.10 and 40 CFR 124.11. The regulations mandate a public comment period during which any interested person may submit written comments on the draft permit or the permit application during the required public comment period provided. These comments could include objections to a State permitting authority's BTA determination. In addition, the regulations at 40 CFR 124.13 specifically require that all who have concerns that any condition of a draft permit is inappropriate must raise all reasonably ascertainable issues and submit all reasonably available arguments supporting their position by the close of the public comment period. As such, EPA will not establish a policy that would circumvent the legal requirements required of the NPDES program including public notice and comment procedures.

Requiring Additional Information

One commenter requested that the final rule be revised to specify that the permitting agency will use the data submitted in the permit application to address the factors at the proposed 40 CFR 125.98(e)(1)-(9) and the facility will not be required to perform any additional studies. EPA disagrees that the Director should be limited to the information submitted with the permit application. In the final rule, EPA specifies at 40 CFR 125.98(i) that Director is authorized to inspect the facility and to request additional information needed for determining permit conditions and requirements. As such, the Director is explicitly granted the discretion to request additional information or require the facility to conduct additional independent studies deemed necessary to aid the Director in the BTA determination.

Communications and Outreach

Several commenters requested specific and general guidance regarding procedures for implementing the requirements established in the final rule. Commenters urged EPA to maintain open communications with stakeholders throughout the rulemaking and option selection process and to work closely with States regarding regulatory requirements after publication of the final rule. EPA agrees on the importance of open communications and notes that the Agency has actively engaged the stakeholders in significant consultation and outreach activities during the development of the final rule. Stakeholders have actively participated throughout the several phases over a decade of rulemaking. In particular, given that the final rule addresses facilities that had been previously regulated by the Phase II and Phase III rules, stakeholders have been provided with ample opportunity to participate in the process. EPA has staged symposia, held conference calls, conducted facility site visits, and performed other activities where EPA sought the input from various stakeholders. In addition, there have been many opportunities for stakeholders to comment throughout the different phases of 316(b) regulatory development. EPA considered all comments and concerns raised throughout the rulemaking process and addressed them, where relevant, in today's final rule. EPA will evaluate the need for implementation support and guidance after publication of the final rule as the final rule will be implemented through the existing NPDES programs. EPA notes that the final rule does provide some guidance to Directors; for example, the preamble states that the Director may determine that no additional entrainment controls may be required if all analyzed options have social costs that are not justified by the social benefits (see discussion below). EPA staff also will be available to assist State permitting authorities in the review and approval of permit applications.

Dry/Hybrid Cooling Towers

Several commenters requested that the rule preclude dry and/or hybrid cooling towers as BTA for impingement and entrainment mortality controls. EPA disagrees that dry or hybrid cooling towers should be precluded as BTA options. Today's rule states that a *closed-cycle recirculating system* may include a facility with wet or dry cooling towers. In addition, flow reduction has been defined as any modification to a cooling water intake structure or its operation that serves to reduce the volume of cooling water withdrawn, including variable speed pumps, seasonal flow reductions, wet cooling towers, dry cooling towers, hybrid cooling towers, unit closures, or substitution for withdrawals by reuse of effluent from a nearby facility. As today's rule allows operation of a CCRS or various flow reduction measures to comply with the impingement mortality BTA standard, EPA has chosen not to preclude dry or hybrid cooling towers as BTA technologies. In some locations, availability of water may result in the need to consider hybrid or dry cooling. Manufacturing facilities already incorporate dry cooling in many unit processes; this indicates that dry cooling is available and demonstrated in at least some situations. Further, EPA intends for manufacturers to obtain credit for flow reductions already obtained; see preamble for more discussion. Note, however, that EPA recognizes that dry cooling is significantly more expensive that wet cooling. The use of dry cooling towers is further discussed in Essay 17A.

Social Cost-Benefit Analysis in Establishing Entrainment Standards

Commenters on this topic requested clarification of the social cost-benefit test. Several commenters also requested that EPA clarify that the State Director must apply cost-benefit in establishing entrainment standards and must reject an available technology if its costs are not justified by the benefits. Some commenters also stated that site-specific cost and benefit estimates be used in determining BTA, as opposed to national scale or model costs. The role of cost and benefits (including a specific cost-benefit test) is discussed in Essay 15.

The rule states that the Director, in establishing a facility's site-specific BTA entrainment reduction requirement, must consider the factors spelled out in 40 CFR 125.98(f). Today's final rule does not specify the weight the Director must afford each factor when determining entrainment requirements. These factors include a requirement that the Director must consider the quantified and qualitative social benefits and costs of available entrainment technologies. The

Director must determine whether the entrainment technologies considered have social costs that are justified by the social benefits, or whether the technologies would cause unacceptable adverse impacts that cannot be mitigated. In such cases in which the information on benefits is adequate to make this determination, the Director has the discretion to reject an otherwise available technology as BTA standards for entrainment if the social costs are not justified by the social benefits and determine that no additional control requirements are necessary beyond what the facility is already doing. Generally, EPA agrees that site-specific estimates of costs and benefits are preferable for determining BTA; however, estimates that are calculated using a model cost approach (for example) should not be discarded, as they still likely provide some value, particularly if site-specific data is absent or incomplete. See Essay 15 for additional discussion on the role of costs and benefits in determining BTA.

Today's rule also allows the Director to establish alternative entrainment requirements for new units if the data specific to the facility indicate that compliance for each new unit would result in compliance costs wholly out of proportion to the costs EPA considered in establishing the requirements at issue or would result in significant adverse impacts on local air quality, significant adverse impacts on local water resources other than impingement or entrainment, adverse impacts on threatened and endangered species, or significant adverse impacts on local energy markets. This provision is identical to such a provision in the Phase I rule for new facilities. See the preamble for further discussion.

Essay 23: EPA's Information Collection Request (ICR) and Administrative Costs of the Rule

In addition to technology costs and O&M costs incurred as a result of complying with the rule, facilities will also incur administrative costs to comply. Examples of these costs are the cost of obtaining a 316(b) NPDES permit (including the costs of preparing an NPDES permit application), ongoing monitoring costs, and the costs of materials purchased to support a facility's demonstration of compliance. These costs can be expressed in terms of labor hours to complete a given task or in dollars required to purchase the necessary materials (also known as "other direct costs" [ODCs]).

The Paperwork Reduction Act requires that every Federal agency obtain approval from the Office of Management and Budget (OMB) before collecting the same or similar information from 10 or more members of the public. If EPA decides to gather such information, the EPA must prepare and submit for approval to OMB an Information Collection Request (ICR). The ICR describes the information to be collected, gives the reason the information is needed and estimates the time and cost for the public to answer the request. After reviewing the ICR and comments received from the public, OMB may approve or disapprove the ICR. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. The OMB control numbers for EPA's regulations in 40 CFR are listed in 40 CFR Part 9.

In the proposed Existing Facilities Rule, EPA described the proposed information collection requirements (e.g., new submissions that would be required as part of the permit application) and included costs associated with information collection requirements in the costs of the proposed rule. EPA also reported estimated burden associated with the information collection requirements for the total industry, for individual facilities, and for the Directors. See 76 FR 22262-22263. For the proposed rule, EPA based its information collection cost estimates on its previously approved ICR for the Phase II rule.

Today's final rule streamlines some aspects of the permit application and implementation process and would impose reduced information collection requirements in comparison to the Phase II rule. For example, six of the seven IM compliance alternatives eliminate the need for costly biological compliance monitoring as compared to the Phase II rule. However, EPA recognizes that some facilities subject to today's final rule were not subject to the Phase II rule.

EPA received comments on its information collection estimates in the proposed existing facilities rule. Where appropriate, EPA revised the information collection requirements in the final rule to incorporate these comments. EPA has also developed a new ICR rule to accompany this final rule that more accurately reflects the requirements and applicability of this final Existing Facility Rule. EPA notes that its total burden estimate associated with the information collection requirements in today's final rule is much less than that estimated at the time of the proposal. Further, this new ICR also provides more meaningful information because, as explained above, it reflects both the applicability and requirements of today's final rule after consideration of public comments on the proposal (and subsequent Notices). EPA is publishing in the Federal Register this new ICR to provide the public an additional opportunity to comment on the associated burden. Following receipt and consideration of the comments, EPA will again publish it in the Federal Register and submit the ICR to OMB for approval. While the public has already been provided the opportunity to comment on the information collection requirements and burden throughout this rulemaking process, this approach provides yet another opportunity to comment on EPA's estimates before OMB makes its final determination. As such, EPA is not in violation of the Paperwork Reduction Act. The Paperwork Reduction Act requires EPA to make the ICR available for public review and comment, but it has no requirement to do so at the same time that a proposed action is made available for comment. EPA also notes that no facilities will be required to submit any information for this Final Existing Facilities Rule until this new ICR has been approved.

Essay 24: Technical Development Document

Introduction

EPA received a number of comments that suggested corrections to or disagreed with information in the Technical Development Document (TDD). Responses to those comments are below.

Basis for Developing Costs

Several commenters stated that EPA was inconsistent with how it described the development of estimated costs in the rule, preamble, and TDD. EPA disagrees. The preamble summarizes the cost methodology, whereas the TDD provides the detailed methodologies, algorithms, cost equations, and the basis for each component. Some commenters appear to confuse the technology basis for the impingement mortality performance standard and the technology costed for compliance with that standard. The rule requires facilities to meet an IM performance standard based on modified traveling screens with a fish-friendly fish return system. The rule does not require facilities to install a modified traveling screen; that technology was chosen as the basis for developing the numeric impingement mortality performance standards; see Section IX.B in the final preamble, which states that "this does not preclude the use of other technologies." Each facility may choose the technology that they will use or install to meet the impingement mortality requirement, as well as choosing one of seven compliance alternatives for demonstrating it has met the requirement. EPA's costing approach reflects that reality. For purposes of estimating national level costs of compliance with the rule, EPA developed a cost model that assigns one or more technologies to a model facility and estimated the costs for that facility. These model facility costs were then summed such that all likely in-scope facilities were included in the national costs estimate. See TDD Chapter 8 for a detailed description of how EPA applied this methodology to develop facility-level costs for the final rule. Also see Essay 21. EPA agrees with commenters that each facility may require different modifications to its technology to meet the impingement mortality standard and, as noted above, the rule allows for various ways to demonstrate compliance. See Section IV of the preamble for additional discussion of the seven compliance alternatives for the IM standard.

In the final rule, EPA notes that none of the BTA standards for IM at 40 CFR 125.94 require modified traveling screens. One of the compliance alternatives at 40 CFR 125.94(c)(5) allows a facility to select optimized operation of modified traveling screens as a way to meet the IM standard. The final rule at 40 CFR 125.92(s) defines *modified traveling screens* to mean a traveling screen that incorporates measures protective of fish and shellfish. The definition at 40 CFR 125.92 lists a number of protective features that can be found on a modified traveling screen. In explaining what EPA meant in the proposal when discussing modified traveling screens, EPA cited a Fletcher (1990) article to illustrate that several features of Ristroph screens can be modified or optimized in ways that significantly reduces impingement mortality. This does not mean that modified Ristroph screens are the only type of screens that form the basis of the IM performance standard, nor does it mean modified Ristroph screens are required. For facilities choosing this compliance alternative, the permit application at 40 CFR 122.21(r)(6) requires a complete description of the modified traveling screens and associated equipment including, for example, type of mesh, mesh slot size, pressure sprays and fish return mechanisms. Finally, the definition at 40 CFR 125.92(s) states “examples of *modified traveling screens* include, but are not limited to: modified Ristroph screens with a fish handling and return system, dual flow screens with smooth mesh, and rotary screens with fish returns or vacuum returns.”

Several comments expressed concern that a modified Ristroph traveling screen was required by the rule. As explained above, this is not correct. And contrary to some comments, EPA’s cost methodology appropriately reflects that facilities may employ various approaches; EPA did not assign costs for all facilities to comply with the IM performance standard by installing modified traveling screens. The summary of technical survey data in the TDD shows that 73 percent of manufacturers and 93 percent of all power generators (or 83 percent of the total in-scope universe of facilities) have traveling screens prior to this rule. But the costs developed for the final rule do not presume all facilities will replace or upgrade their existing screens with modified Ristroph screens or similarly performing screens in order to comply with the rule.[50] EPA has made this clear in the preamble at Exhibit VIII-1 and the TDD, providing EPA’s projections of how facilities will choose to comply with the IM requirements. EPA projects that 29 percent of intakes will use modified traveling screens to comply with the BTA requirements for IM. Other facilities will use intake velocity, closed-cycle cooling, offshore velocity caps, or a system of technologies to meet the BTA requirements for IM.

Commenters note that the TDD describes the methodology for assigning technology modules, including technologies that are not modified traveling screens, in estimating the costs of today’s rule (EPA notes that this is referred to by the agency as the *cost basis*). As discussed above, the rule does not require a facility to install a specific technology; it simply requires that the facility meet a certain level of performance. It is the facility’s choice as to what technology they will use. Site-specific factors will play a significant role in a facility’s choice of technology; it is unlikely that every facility will actually install modified traveling screens to comply and this is reflected in the flow charts describing how a compliance technology is assigned to estimate the costs. For example, a facility with an existing offshore intake would be highly unlikely to completely abandon their existing intake just to build a new shoreline intake with modified traveling screens. They would be more likely to install a less costly technology such as a velocity cap or wedgewire screen to reduce the intake velocity. As evidenced by the seven IM compliance alternatives in the final rule, EPA acknowledges that there are other demonstrated technologies that achieve performance equal to or greater than modified traveling screens. As described in Chapters 6 and 7 of the TDD and the preamble, a number of other technologies can also be highly effective and EPA assigned these technologies to a substantial number of model facilities. Additionally, the inclusion of other technologies in EPA’s cost estimates actually increased the overall compliance costs, as these other technologies are typically more expensive than installing a modified traveling screen. For example, an expanded intake for wedgewire screens with a design velocity of 0.5 fps is more expensive than modified screens with a fish return. However, facilities may have other reasons for selecting a particular compliance alternative, and minimum cost may not be the only reason a facility choose a particular compliance approach. As the

[50] The commenters noting that text in the preamble at 76 FR 22214/1 that EPA estimated costs by assigning Ristroph screens to all facilities could be interpreted to mean facilities were required to install such screens. As described elsewhere in the preamble, the TDD, and in the response to comments, this was not the case. A variety of technologies were used to develop compliance costs.

compliance alternatives based on these other technologies meet or exceed the IM BTA performance standards, EPA is providing the flexibility for a facility to choose that technology and its cost estimates reflect this flexibility. For more information regarding EPA's cost estimates for screens, please refer to Essay 21.

Similar to the above misunderstanding regarding traveling screens, some comments expected all facilities to reduce intake velocity to 0.5 fps. As explained at proposal at 76 FR 22202 and repeated in the final rule, EPA did not find that low intake velocity was widely available and achievable for all existing facilities. See preamble Section VI. Therefore, the final rule does not establish low intake velocity as the national BTA nor does it establish performance standards based on low intake velocity. EPA notes, however, that the final rule includes 0.5 fps as a compliance alternative for the IM performance standard because the impingement mortality performance achieved with reduced intake velocity performs better than the technology basis for the performance standard in the final rule. EPA notes that because reduced intake velocity is not widely available and therefore not a viable BTA basis for the final rule, EPA generally did not attempt to estimate costs for most facilities which employ traveling screens that might choose to reduce their intake velocity to comply with the rule. These facilities were generally assigned costs for upgraded traveling screens. The exception to this was in costing facilities with known intake velocities that were very close to 0.5 fps, EPA did assign the cost module for variable speed pumps which EPA estimated may be used by approximately 100 intakes to meet the 0.5 fps velocity compliance alternative. See TDD Chapter 8.

Some commenters indicated EPA did not properly account for costs of IM requirements at facilities that already have closed-cycle cooling. EPA disagrees. At proposal, EPA assigned costs for screen upgrades to facilities already employing closed-cycle cooling to be consistent with the overall approach for addressing impingement mortality described in the proposed rule. However, in the final rule, this would represent an overestimate of costs because the final rule provides a compliance alternative for a properly operated closed-cycle system to meet the impingement mortality standards. EPA expects no further technologies will be required to achieve the BTA standard for IM if a properly operated closed-cycle cooling system is used. Therefore, for the final rule analysis, EPA appropriately did not include costs related to traveling screens (or other IM technologies) for those facilities with CCRS already in-place (reflecting 18 percent of intakes, see Exhibit VIII-1 in the preamble) to comply with the IM standard.

Lastly, one commenter discussed the usage of alternative technologies and how these could be used to demonstrate compliance with the IM performance standard. EPA agrees that alternative technologies may be effective in meeting the IM performance standards, and has included a system of technologies compliance approach at 40 CFR 125.94(c)(6) for this purposes. EPA provided examples of credit for existing technologies and alternative technologies in the NODA, and has included them again in the final preamble Section VIII. Also see Essay 16 and preamble Section VIII for discussion of how alternative technologies may be used to meet the final rule.

Technology Performance

One commenter states that the TDD does not sufficiently describe the performance of entrainment technologies. The commenter specifically states that there is a lack of performance data for flow reduction technologies other than cooling towers. EPA disagrees. The TDD describes multiple types of entrainment technologies, including flow reduction and fine mesh screens.[51] The final TDD's Chapter 6 provides an overview of the suite of available E technologies and their performance. EPA notes that the principle of flow reduction is the same for any flow reduction technology; a gallon of water not withdrawn equates to 100 percent of the organisms in that gallon as no longer being entrained. Cooling towers generally offer the greatest reduction in flow and therefore the greatest reduction in entrainment.[52] Variable speed pumps are not intended to match the flow reductions realized by a facility-wide cooling tower retrofit; they simply offer a measurable reduction in flow as part (or all) of a facility's response to reducing entrainment. The amount of flow reduction is entirely dependent on the facility's configuration and operational needs, thus the reduction will vary somewhat between facilities. As stated in the TDD, variable speed pumps (where feasible) result in a maximum flow reduction of 10-15 percent, and more typically will result in a flow reduction of about 8 percent. The availability and effectiveness of seasonal flow reductions and scenarios for water reuse are very site-specific, and at a minimum are typically not available for baseload power generating facilities and many manufacturers, as these facilities need to operate all year (see Essay 15). These are flow reduction options that some facilities could undertake as all or part of a system of technologies compliance approach (as well as fulfill any regulatory or permit-related requirements).[53]

Some commenters suggested intake location was not properly considered, particularly for entrainment. As explained in the final rule, intake location (in combination with other technologies) is an approach that, while not widely available and thus not BTA, may allow a facility to comply with today's IM standard. For IM, the final rule includes a compliance alternative for a facility to take credit for an advantageous intake location by demonstrating that the intake is in a location that is less susceptible to impingement. EPA did not use a relocated intake as the technology basis for BTA for impingement mortality because it is not an available technology at most existing facilities, nor is a relocated intake alone demonstrated to meet the IM performance standard in all cases. For example, small rivers may have limited locations suitable

---

[51] Note that the commenter uses the term "entrainment mortality" when describing technology performance. Typically, entrainment mortality refers to the survival of entrainable organisms that pass through the entire cooling system of the facility, where they are subjected to thermal, mechanical, and other stresses. (See footnote 38 in Chapter 6 of the proposed TDD for more information.) EPA assumed that entrained organisms experienced 100 percent mortality. Data provided in comments showed that in some circumstances, some eggs survive entrainment. However, in general the data does not support comments purporting significant entrainment survival, and EPA continues to assume for purposes of national rulemaking that entrainment results in 100 percent mortality. For this reason, EPA's focus in the final rule is entrainment, not entrainment mortality.

[52] EPA also discusses "combination" cooling systems in Chapter 6 of the final TDD. In these systems, only part of a facility uses a closed-cycle cooling system. For example, if one unit uses a cooling tower, it would achieve a reduction in flow of greater than 94 percent, but its other unit could be operating as a once-through system, which offers no reduction in flow. However, taken as a whole, the facility has realized a nearly 50 percent reduction in its flow relative to a full-flow baseline.

[53] In particular, seasonal reductions are highly dependent on season and the organisms present. Conceptually, if a facility is located in a waterbody where entrainable organisms are only present for a short time, it could schedule outages or periods of reduced flow to coincide with the entrainment season and operate the remainder of the year as a once-through facility with minimal risk with regard to entrainment. On the other hand, a facility located in an estuary with virtually year-round spawning of multiple species is unlikely to be able to utilize seasonal reductions. Manufacturers are unlikely to be able to shut down during peak entrainment periods every year. EPA further examined a case study of seasonal flow reductions for the Saugus River, and found that biological monitoring would be needed to identify the upcoming peak entrainment season, which is likely to shift each year based on weather, temperature, and other climatic factors.

for a relocated intake, and even larger waterbodies may have navigational issues that constrain the location of an intake structure. Furthermore, a relocated intake alone would be unlikely to achieve a level of performance comparable to the BTA performance standards for IM. For example, the offshore data for velocity caps in the record shows the density of organisms does not drop sufficiently to equate to the BTA performance standards for IM in all cases. EPA found the far offshore location (defined as greater than 800 feet off shore) must be combined with a velocity cap in order to perform better than the BTA performance standards for IM. Because of the far offshore distance, this alternative is, therefore, more likely to be available to facility intakes located on an ocean, an estuary, or the Great Lakes. For those not located on an ocean, estuary or Great Lake, EPA expects facilities will choose to comply with the IM performance standard via one of the other compliance alternatives. EPA found that relocation of an existing intake structure is costly (including civil work, permits, capital costs, and installation costs) and unlikely to be the most cost-effective choice for an existing facility. See TDD Chapter 6 for more information about the performance of intake location. Nevertheless, the final rule allows a facility to take credit for reductions in impingement resulting from the intake location. Nor does the final rule prejudge whether a facility may achieve some or all of its IM obligations through intake location. For example, EPA is aware that some intakes are located on the bend of the river, adjacent to a cold water source, or otherwise deliberately situated where fish are less likely to reside. The rule at 40 CFR 125.94(c)(6) provides a compliance alternative that allows a facility to demonstrate the performance of intake location for IM.

The final rule does not mandate any technology to meet entrainment requirements. The rule establishes a framework and requires studies to inform the site-specific BTA determination to reduce entrainment at existing facilities. Since the rule requires BTA for entrainment to be determined on a site-specific basis, the rule already provides the flexibility to consider intake location as well as intake relocation.

One commenter stated that several pieces of information on the California coast and the performance of velocity caps were incorrect. EPA appreciates these comments on the TDD and has addressed these items as described below:

- The discussion regarding kelp forests on page 6-46 was not intended to imply that facilities located near a kelp forest are more or less likely to cause an adverse environmental impact. As the introduction to the bullet in question states, the existence of kelp forests is a unique feature of the California coast and may be important in determining the effectiveness of a velocity cap. EPA appreciates the additional information on kelp forests and has made revisions to the final TDD as appropriate.
- EPA agrees that the statement on page 22202 of the proposed rule preamble about intake velocity being slightly lower due to a pressure differential when using a velocity cap is not entirely accurate. EPA agrees this is generally not the case, and has corrected the TDD accordingly.
- EPA appreciates the additional information on the sampling conducted at Huntington Beach, El Segundo, and Scattergood and has included these data in the revised TDD as appropriate.

EPA notes that this information is not related to the technology basis for the IM performance standard in the final rule nor to the site-specific BTA entrainment determination at the vast majority of intakes/facilities in the U.S. This information is specific to certain facilities located in California. To the extent that this information is relevant to the compliance alternative selected by facilities in this area or to their site-specific BTA entrainment requirements, this information can be submitted and considered by the Director.

One commenter questions EPA's exclusion of technology performance data derived in a laboratory setting, specifically with regard to cylindrical wedgewire screens. EPA notes that the commenter only mentions studies that relate to cylindrical wedgewire screens. In the specific case of wedgewire screens, EPA agrees laboratory data may be useful because fish diversion is difficult to measure, and impingement of fish on a wedgewire screen is difficult to sample in native settings. However, because this technology was not selected as the technology basis for the impingement mortality performance standards, the source of data for wedgewire screen studies (whether from a field study or a laboratory) were not used in developing the performance standards, and the remainder of the comment is irrelevant. For further discussion of criteria for data acceptance, see TDD Chapter 11 and Essay 16A.

EPA has previously noted that wedgewire screens are typically designed with a maximum through-screen velocity of 0.5 fps. Wedgewire screens work because of a combination of factors including low velocity, sweeping velocity, flow dynamics, etc. Regardless, the final rule provides compliance alternatives at 40 CFR 125.94(c) for a maximum through-screen velocity of 0.5 fps. EPA recognizes the performance of low intake velocity by providing the compliance alternative for either design or actual intake velocity. This compliance alternative is not limited to wedgewire screens. As indicated above, the final rule allows any intake (including a wedgewire screen) with a maximum through-screen velocity of 0.5 fps as meeting the impingement mortality standard.

Site-Specific Data for Capacity Utilization Rate

One commenter stated that the capacity utilization rate for one of its facilities was an error and reported as too low. In general, EPA notes that the utilization rates used in the analysis regarding the feasibility of a spawning season-oriented regulatory option for entrainment (flow reduction by virtue of seasonal operation, as discussed above) used information about capacity utilization provided in the industry questionnaires and representing the years 1998-2000. While the commenter provided more recent operational data, in the context of analyzing the technical feasibility of the seasonal operation as a regulatory option, the data used by EPA is sufficient to demonstrate that this option is not feasible on a national scale. EPA made this conclusion because the snapshot of the industry over this time period illustrated that many facilities would not be able to provide power as needed locally and still be consistent with strict controls of reduced operations during the spawning season. More specifically, EPA found that in most locations, reduced operations during spawning seasons and peak entrainment seasons frequently coincided with peak power demands in the summer. See TDD Chapters 5 and 6. As discussed above, most manufacturers operate all year, and seasonal reductions in operations every year would not be viable at such sites. Also see Essay 35 and the TDD, discussing how most manufacturers do not have annual maintenance outages on the shoulder months. Therefore reduced operations would result in lost revenues. Accordingly, EPA did not revise the analysis with the most current facility-specific CUR data. On the other hand, EPA recognizes that utilization changes on an annual basis and has used the most recent available utilization rates for its economic analyses. See the EA for more information.

EPA notes that the final rule provides authority to consider alternative requirements for certain facilities with low capacity utilization rating (CUR) at 40 CFR 125.94(c)(12). EPA found that low CUR facilities are generally peaking plants that operate at full capacity for a short duration during a few months or less. EPA further found that some sites continue to withdraw water through their cooling water intake structure even when no power is being generated. If that period of cooling water intake operation corresponds with times when spawning is occurring, those facilities could have significant impacts from impingement and entrainment. Therefore, EPA did not exempt all low CUR facilities from requirements, or develop a subcategory for such units. However, as discussed in the preamble, the Director may consider less stringent controls for intakes dedicated to low CUR power generating units. See 40 CFR 125.94(c)(12) and Essay 19 for details. With respect to entrainment, energy reliability is one factor the Director may consider when establishing entrainment controls (see 40 CFR 125.98(f)(3)). Also see Essay 19.

Analysis of Uncertainty

One commenter states that EPA inadequately addressed uncertainty in its development of estimated compliance costs. EPA disagrees. As the commenter notes, the TDD describes the multiple ways in which EPA's estimated costs are conservative. The TDD for the final rule expands on this uncertainty analysis. Additionally, as described in Chapter 8 of the final TDD, EPA used a model facility approach for estimating the national compliance costs. Given that EPA does not have data for every potentially regulated facility, it is not possible for EPA to develop site-specific costs, probability assessments, and other analyses as suggested by the commenter. However, EPA's cost analysis does take into account a wide variety of site-specific data in determining the most appropriate compliance technology, the size of said technology, and other site-specific factors that will affect the facility's response to comply and, ultimately, its cost to comply. As such, EPA's cost estimates have a significant degree of site-specificity to the model facilities; no two model facilities receive exactly the same technology and cost. Additionally, the commenter referenced uncertainty analyses conducted in the development of benefits. See the EBA for more discussion of uncertainty analysis specific to benefits. Also see Essay 22.

Essay 29: Cumulative Impact of Multiple EPA Regulations on the Electric Power Sector

Overview of Comments

Several commenters expressed concern that EPA did not consider the cumulative burden of all recently-promulgated and currently pending regulations on the electric power industry in developing the section 316(b) Existing Facilities Rule and assessing its impact. Commenters' concerns include the following:

- Compliance with multiple regulations during the same timeframe would be too costly and will result in higher electricity rates, reliability issues, and job losses due to premature retirement of generating units.
- Ohio Public Utilities Commission (PUC) urged EPA to assess the impact of these multiple regulations on individual States.
- The relatively short period to comply with multiple regulations may not give facilities enough time to install all compliance technologies required under these regulations, in which case facilities will be prohibited from operating until compliance activities can be completed (Western Business Roundtable). The likelihood of adverse reliability effects is high in such instances. Western Business Roundtable cited a recent policy resolution by the National Association of Regulatory Utility Commissioners (NARUC) that it may take five years and more for facilities to complete all retrofit projects required under multiple regulations.
- To ensure that compliance with the section 316(b) Existing Facilities Rule along with other recently proposed and pending regulations does not result in adverse reliability effects, EPA must consult with the governmental and non-governmental agencies responsible for grid reliability and electric resource adequacy and do so in a way that this consultation is known to the public (National Mining Association).
- Taken together, multiple regulations affecting coal generating units will adversely affect not only the coal industry, but the entire U.S. economy. These rules will directly affect employment in the coal industry and indirectly affect employment in the overall economy as a result of higher energy prices and consequently, will impair U.S. competitiveness, GDP, and economic activity generally (National Mining Association).
- Anthracite Region Independent Power Producers Association (ARIPPA) urged EPA to consider the impact of the section 316(b) Existing Facilities Rule on ARIPPA electric power facilities that use coal refuse for electricity generation to make sure the rule does not force these facilities to retire prematurely. ARIPPA points out that, from an environmental perspective, the reclamation of coal refuse piles eliminates one of the most significant sources of water pollution in the historical coal mining regions of this country. Further, by utilizing coal refuse as a fuel source, ARIPPA facilities remove coal refuse piles and allow communities to reclaim land that would otherwise remain idle and unproductive for decades.

- Electric power facilities may face difficulty meeting the compliance requirements of multiple regulations during a short timeframe due to shortages of available capital, materials, and labor.
- Some commenters urged EPA to account for potential losses associated with "stranding" air pollution control devices previously installed to comply with air regulations in instances when facilities shut down or repower before this installed equipment is fully depreciated.
- The need to comply with multiple regulations will affect companies' decisions regarding whether to build new generating units.
- Multiple regulations with lengthy generating unit downtime for installing compliance technical will impact grid stability and transmission system reliability.

Impact of the 316(b) Final Rule in the Context of Multiple Environmental Regulations Affecting the Electric Power Industry

EPA has taken account of the potential cumulative impact that multiple environmental regulations may have on the electric power industry. The EPA's economic impact analysis of both the Proposed and Final Section 316(b) Existing Facilities Rules (proposed and final rules) on the electric power industry specifically took account of recently promulgated air regulations. Based on their breadth of effect and potential cost, EPA views these air regulations as the most important *other* final regulations affecting the electric power industry, and therefore, EPA concluded these should be assessed in its evaluation of the cost and impact of the final 316(b) existing facilities rule. Other regulations (e.g., Coal Combustion Residuals and other Clean Air Act rules) are under consideration that may affect this industry, but as any requirements (and associated costs) are not yet determined, it is appropriate and reasonable to take into account only those recent requirements that are known and final.

The results of this analysis are discussed in Chapter 6 of the Economic and Benefits Analysis for the Proposed Section 316(b) Existing Facilities Rule (EBA) report and Chapter 6 of the Economic Analysis for the Final Section 316(b) Existing Facilities Rule (EA) report, respectively. For this analysis, EPA used the Integrated Planning Model (IPM®), a comprehensive electricity market optimization model that assesses such impacts within the context of regional and national electricity markets. EPA has used IPM to analyze the impacts of various regulatory actions affecting the electric power sector over the last decade, including the Phase II and Phase III 316(b) regulations, Final Mercury and Air Toxics Standards (MATS), and Cross-State Air Pollution Rule (CSAPR). The IPM platform EPA used in the market model analysis for the final rule incorporates costs and market-level effects of final MATS and final CSAPR and then applies the 316(b) requirements on top of that. As described in Chapter 6 of the EA report, based on this analysis, EPA found that the final 316(b) rule will lead to a very modest increase in capacity retirements – less than 0.1 percent of total baseline capacity at the national level and the highest percent, 0.8 percent, of baseline retired capacity of any North American Electric Reliability Corporation (NERC) region, is projected to occur in TRE. EPA assesses that these very small retirements are inconsequential relative to total national and regional generating capacity. As a result, the final rule will not significantly affect electric supply reliability – either nationally or by NERC region.

EPA notes that any comments received above other promulgated rules or rules under consideration such as comments about statements in the preamble to the MACT rule are outside the scope of this rulemaking.

Impact of 316(b) Final Rule on Electricity Rates, Total Economy, and Employment

The EPA found the final rule will result in only small effects on electricity rates nationally, and at the level of individual NERC regions. For the final rule, under an assumption that all compliance costs would be passed through to consumers in electricity rate increases, the EPA estimated that rates would increase by approximately 0.009 cents per kWh across the United States. On a percentage basis, the estimated rate increases are comparably small, both nationally and by region: the estimated percentage increase in electricity rates averages 0.09 percent nationally, with the largest increase by region being only 0.15 percent. The EPA found that these increases to be very low, particularly when viewed in light of the environmental benefits the EPA expects will be achieved by this regulation. See Essay 39.

In terms of broader economic effects, the EPA expects minimal impact from the final rule. Given the low cost of the rule in relation to the total economy (estimated total annual cost of $275 to $297 million,[54] depending on discount rate, which is less than 0.01 percent of GDP in 2012), EPA concludes that the final rule will not adversely affect U.S. competitiveness, GDP, and economic activity, generally. Also see response to Essay 55.

In the analysis for the final rule, the EPA did not specifically assess the employment effects from early retirement of generating units; however, because (1) only 23 units (out of 14,920 generating units analyzed in IPM), accounting for 0.1 percent of total market capacity, are projected to retire early due to the final rule, (2) these retired units do not contribute significantly to electricity supply in the baseline case, with 15 and seven units having a capacity utilization rate of zero and less than 11 percent, respectively, and only one unit with substantial capacity utilization, approximately 66 percent, and (3) some jobs will be gained as the result of new generating units constructed to replace the retired units, EPA does not expect significant, if any, job losses from capacity effects associated with the final rule. See Essay 36 for more discussion of employment effects of the final rule. For more discussion on the impact of the final rule on the U.S. economy, see Essay 37.

Need for Consultation and Coordination

Concerning commenters' arguments that the EPA should consult and coordinate with agencies and organizations that are responsible for grid reliability and electric resource adequacy, the EPA notes that it developed the final rule with substantial interagency review, and opportunity for consultation and input from the Department of Energy, the Federal Energy Regulatory Commission, and other federal agencies.

[54] All costs and economic impacts reported in this document reflect the assumption that all facilities with cooling water system impoundments will qualify as baseline CCRS, and will not need to install additional technology to meet the impingement mortality performance standard under the final rule (for more information on this assumption, see Chapter 1 of the EA).

Impact on Coal Usage and the Coal Industry

In regard to NMA's concerns about the rule's potential impact on coal usage and the coal industry, as discussed in Chapter 12 of the EA report relative to the Executive Order 13211: Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use, based on the IPM analysis, the EPA found that the final rule will not have a significant adverse effect on coal usage by the electric power industry. From the IPM analysis described above, the final rule causes only a 0.1 percent reduction in total coal usage. Again, while EPA did not assess the change in jobs in the coal industry as the result of the final rule, given the small change in coal usage by the electric power sector, the EPA does not expect significant job losses in the coal industry.

Impact on Coal-Refuse Based Generation

In regard to ARIPPA's concern about the rule's potential impact on facilities using coal refuse as fuel source to generate electricity, EPA concluded that the final rule would not significantly affect such facilities. As discussed in Chapter 12 of the EA report, the EPA's IPM analysis showed that the final rule will not force generating units using coal refuse, captured in the "waste coal" category, to retire prematurely.

Adverse Impact on Decisions to Build New Units

As discussed in Chapters 4 and 6 of the EA, EPA found that the new unit provision of the final rule will not deter existing facilities from constructing new**,** standalone units at existing facilities that would be subject to the new unit provision. EPA conducted this barrier-to-development analysis in two parts. EPA compared the compliance costs for new units to the overall cost of building and operating generating units, on a per MW basis, to assess whether the required addition of a closed-cycle recirculating system (CCRS) as part of a new unit, would substantially increase the cost for the new standalone unit. Additionally, EPA assessed these costs as part of its electricity market analyses using IPM; this analysis tests the impact of the new unit provision on electricity markets accounting for the expected number and timing of new unit installations, and provides additional insight on whether the costs of complying with the new unit provision of the final rule would affect future capacity additions. Neither analysis showed that the final rule would substantially increase costs or affect future capacity.

Adverse Impact Due to Compressed and Overlapping Compliance Periods from Multiple Regulations

The final rule provides substantial flexibility to Permit Directors in establishing the specific schedule and compliance requirements for individual permitees as they comply with the rule. Specifically, the final rule gives Permit Directors the authority to establish specific compliance requirements and compliance schedules, and does not include a requirement for compliance with the IM performance standards within a specific universal timeframe. EPA expects, however, that the existing unit provision of the final rule will generally result in compliance within a relatively lengthy period of eight years after promulgation. EPA did not specify universal compliance dates for IM standards because the specific method of compliance with these standards is tied to the determination of BTA entrainment control requirements. Under the existing unit provision of the final rule, facilities must meet IM requirements as soon as practicable after issuance of a final permit establishing the BTA entrainment control requirements, as determined by the Permit

Director. The final rule aligns compliance deadlines for IM and entrainment control requirements. If technologies required for compliance with IM and entrainment control standards overlap, which could result in facilities needing more time to comply with IM standards, the Permit Director will schedule compliance with the IM requirements to match the schedule for the entrainment control requirements.

All facilities will be required to follow their schedule as determined by the Permit Director. The schedule of requirements established by the permitting authorities will ensure compliance with those requirements as soon as practicable. In developing technology-installation schedules for Electric Generators, EPA expects permitting authorities to take into account compliance requirements of other regulations and take measures to ensure adequate energy reliability and necessary grid reserve capacity during any expected facility outage associated with installation of compliance technology. In addition, as discussed in the EA, the resource requirements of the final rule – in terms of estimated capital outlay, near-term capacity effects, and ongoing operating costs and effects – are relatively small in themselves. As a result, facilities should not face unreasonable challenges in obtaining financial capital, materials, or labor for 316(b) rule compliance – even as they may also be meeting requirements from other environmental regulations at approximately the same time.

Financial Losses from Capacity Retirements

The EPA understands the argument and concern raised by the commenters regarding the potential financial losses some companies may face if they retire generating units before the equipment they installed to comply with other regulations is fully depreciated. However, all regulations involve costs and potential impacts of the sort described. Moreover, as described above, the EPA foresees only a small impact in terms of early retirements of capacity as a result of the 316(b) final rule.

Potential Impact on Grid Stability and Transmission System Reliability

Some commenters argued that the multiple environmental regulations, including the 316(b) existing facilities rule, will adversely impact grid stability and transmission system reliability. Commenters made this argument specifically in the context of the expected occurrence of lengthy downtime for generating capacity to install compliance technology, and difficulty in bringing sufficient electricity from other operating units to meet local electricity needs, when nearby capacity is out of service for technology installation. In terms of the impact of the 316(b) rule itself, in this context, the EPA first notes that downtime for installation of impingement mortality technology for the vast majority of units beyond ordinary scheduled maintenance outages, is zero. Second, the EPA conducted an analysis of reliability for this rulemaking and found the impacts would be incrementally very small. One commenter notes that the EPA cited information collected during site visits that several urban areas were identified where the existing transmission system would not be able to transfer sufficient electricity during periods of extended downtime or that, in some areas, even though excess capacity could be generated by other plants within the area, it may not be enough to replace the capacity lost during the extended downtime. The EPA notes that the commenter is referencing site visits to Los Angeles, CA and that the information was specific to the installation of closed-cycle cooling. After reviewing its site visit information, the EPA did not find that this information was more broadly applicable geographically. As discussed in the preamble, the EPA did not find reliability to be dispositive in its consideration of closed-cycle cooling as the entrainment BTA. Third, the final rule provides flexibility in the compliance schedule. For those facilities that elect to comply with the IM performance requirements via a compliance alternative that may necessitate more lengthy downtime beyond the normally schedule maintenance outages, the Director has the flexibility to consider local reliability concerns in scheduling the compliance timeframes. EPA cannot predict the outcome of the site-specific entrainment determinations, but notes that Directors similarly have flexibility to consider local reliability in the determination of BTA for entrainment on a site-specific basis as well as the implementation schedule. In the EPA's judgment, the short or nonexistent net downtime period for most units, combined with Permit Directors' flexibility to set and adjust compliance schedules, will mitigate any potential concerns regarding grid stability and transmission system reliability.

Essay 31: Cost and Economic Impact Analysis: Methods and Approaches

Overview of Comments

Some commenters raised concerns with EPA's approaches for analyzing the cost and economic impact of the 316(b) existing facilities rule. Particular concerns include the method for annualizing costs and benefits, and various aspects of the economic impact analysis. The comments include:

- American Chemistry Council (ACC) claimed that, according to the Technical Development Document for the Proposed Section 316(b) Existing Facilities Rule (TDD), EPA annualized social costs over 10 or 30 years, depending on the cost component, while in the Economic and Benefits Analysis for the Proposed Section 316(b) Existing Facilities Rule (EBA) report it says that EPA used the 50-year annualization period. ACC suggested EPA explain this discrepancy.
- Some commenters expressed concern over the 50-year period EPA used to annualize social costs for the analysis of the Proposed Section 316(b) Existing Facilities Rule (proposed rule). These commenters argued that this methodology underestimates true upfront investment requirement and suggested EPA use the 10-year annualization period in accordance with the approach suggested by the Congressional Budget Office (CBO). Using the 10-year annualization period will, in turn, lead to a higher cost-to- benefits ratio.
- Some commenters pointed out that EPA used a different annualization period in the cost and economic impact analyses conducted in support of the remanded Phase II Rule and the Phase III Rule; specifically, commenters claimed, EPA annualized costs over 10 or 30 years, depending on the cost category. Some commenters pointed out that for the remanded Phase II Rule specifically, EPA annualized social costs using the 7-percent discount rate over 10 years. These commenters stated that EPA provided insufficient explanation for this methodology change and urged EPA to provide a better one.
- Midwest Generation, Edison Mission Energy, LLC (EME) expressed concern over the 30-year period EPA used to model benefits, contending that if closed-cycle cooling were required many facilities would shut down leading to benefits actually occurring over a shorter time frame.

Some commenters expressed concern with the methodology EPA used to assess the impacts of the proposed rule on regulated facilities. These comments include:

- Kansas City Board of Public Utilities (KCBPU) argued that in its cost-to-revenue analysis at the level of parent entity, EPA incorrectly use the sum of facility-level revenue owned by a given entity instead of this entity's revenue.
- KCBPU also stated that EPA has underestimated the cost of compliance of the section 316(b) regulation in general, but also the compliance cost per unit in sales to customers.

- American Municipal Power, Inc. (AMP) expressed concern that EPA underestimated the full cost of the section 316(b) regulation because the Agency did not properly account for retirement of generating units. Specifically, AMP claimed, while EPA provided estimates of the number of regulated manufacturing facilities estimated to retire as the result of the CWIS rule (73 separate manufacturing facilities representing 13 percent of the total), the Agency failed to account for any retirements of the regulated electric power facilities.
- The United States Steel Corporation (USS) argued that cost-to-revenue analyses EPA used to assess the impact of the section 316(b) regulation on entities owning regulated manufacturing facilities may not be an appropriate measure of this impact and the results generated using the cost-to-revenue test may be misleading. These commenters pointed out that revenue does not capture the large overhead costs that some industries may require or the cyclical nature of operations in those industries. These commenters suggested EPA use other financial metrics that would take these factors into account such as earnings before interest, tax, depreciation, and amortization (EBITDA).
- Some commenters advised EPA conduct cost and economic analysis taking accounting the specifics of each individual manufacturing industry, implying that the current analytic approach does not do that.
- Riverkeeper stated that the cost-pass-through assumptions EPA made in the cost and economic impact analysis conducted for electric generators and manufacturing facilities are overly conservative. Specifically, for electric generators, EPA made the assumption of no cost pass through in the cost-to-revenue analysis conducted at the facility and entity level and the assumption of 100 percent cost pass through in the electricity rate and household impact analyses, are overly conservative. For manufacturing facilities, EPA assumed no cost pass through when modeling after-tax cash flow. Riverkeeper argued that in reality, some costs will be borne by consumers and some by complying facilities/entities.

Annualization of Costs and Benefits

EPA notes that, to a large degree, the comments concerning EPA's approaches for annualization of costs and benefits reflect misunderstanding of the differences between *private cost*, which EPA calculates from the perspective of the individual regulated facility, and *social costs* and *benefits*, which are calculated from the perspective of society, and reflect the total group of regulated facilities as a whole. In developing its analyses for the final rule, EPA followed well-established practice in annualizing different costs. The following responses to these comments clarify the reasons for the different cost analysis approaches and the resulting differences in the calculations.

Claim of Inconsistencies in Annualization Periods

ACC claims there are differences in the annualization periods in the cost methodologies described in the TDD and in the EBA report. ACC is correct in noting differences in the annualization periods in the various analyses; however, the different periods reflect differences between private and social cost and the methodologies that EPA has used to calculate these costs. EPA is confident that its approach reflects widely accepted practices with respect to estimating these different costs.

For the economic analysis of the section 316(b) Existing Facilities Rule, EPA evaluated two different categories of the compliance costs. EPA evaluated *private cost* to measure the cost and impact to regulated facilities and permitting authorities, and evaluated *social cost* to measure the cost of the section 316(b) regulation to society. EPA's choice of annualization periods reflects widely accepted methods of accounting for these costs and is consistent with direction from the Office of Management and Budget.

As discussed in Chapter 3 of the EBA and the Economic Analysis for Final Section 316(b) Existing Facilities Rule (EA) reports, EPA calculated private costs at the level of the *individual regulated facility* and annualized the cost of compliance technology expenditures and other non-annually recurring outlays over various time periods based on (1) the estimated useful life of individual capital cost components or (2) the frequency of recurrence for other non-annual outlays (e.g., permit renewal). EPA discounted and annualized cost values using a 7-percent discount rate, which is an estimate of the opportunity cost of capital to society. In this analysis, the annualized period for a given technology outlay may be for as long as 30 years.

The analysis of social costs differs in concept. Here, EPA looked over the *full set of regulated facilities* and explicitly accounted for the year in which each facility is expected to reach compliance, the duration of costs and benefits for each facility, recurrence of cost outlays. Because not all facilities are expected to reach compliance in the same year, the length of the analysis period and, correspondingly, the annualization period, is longer than the annualization period that would be used for an individual facility. As explained in Chapter 11 of the EBA report, EPA used a 50-year annualization period for the social cost analysis. This period includes (1) a 45-year compliance cost period during which costs are assigned on a year-explicit basis, and (2) an additional five-year benefit phase-down period. The 45-year compliance cost period starts at the promulgation year and reflects (1) the *latest* year in which any facility achieves compliance, and (2) the useful life of the longest-lived technology under any analyzed regulatory option. The benefit phase-down period reflects the expectation that benefits from reduced impingement and entrainment will continue for five years after compliance technology is assumed to have ceased functioning.

In this analysis, EPA developed a year-specific stream of costs – which includes accounting for technology installation outlays, other non-annually recurring costs, and annually recurring costs in the year that they occur – and a year-specific stream of benefits. The year-specific stream of costs accounts for the longest life of any technology considered for the final rule – e.g., 30 years – and provides for reinstallation of a compliance technology if it reaches the end of its useful life *before* the end of the 46-year compliance cost analysis period. In this way, the compliance technology life – whether, for example, 20 years, 25 years, or 30 years – is accounted for *within* the overall analysis and annualization period of 50 years. *Thus, there is no inconsistency between the technology-specific annual periods used in the private cost analysis and the longer annualization period used in the social cost analysis*.

EPA then discounted the resulting streams of costs and benefits to the promulgation year, and annualized them over the 50-year analysis period. EPA discounted and annualized these values using both the 3-percent and the 7-percent discount rates. These discount rate values reflect guidance from the Office of Management and Budget (OMB) regulatory analysis guidance document, Circular A-4 (OMB, 2003; updated 2009). EPA used the same approach to estimate total social costs for the final rule. However, for the analysis done in support of the final rule, the assumptions described above resulted in a 51-year annualization period due to a slightly longer (by one year) initial technology-installation window which resulted in a 46-year compliance cost period. EPA explained more explicitly the differences in the analytic approaches used to estimate private and social costs in EA report.

The 50-Year Annualization Period Used for the Proposed Rule Understates Costs; Recommendation to Use 10-Year Annualization Period Based on Congressional Budget Office (CBO)

As described above, the 50-year analysis period used for proposed rule, and resulting annualization period, embeds information on the performance life of the various compliance technologies, including recurrence of technology outlays based on their useful life. As a result, EPA disagrees that the 50-year annualization period understates technology costs. For the final rule, EPA used a slightly longer analysis period of 51 years due to the assumption of a longer initial technology-installation period.

In addition, EPA also does not agree that the CBO's recommended 10-year analysis period is appropriate for the analysis. The CBO recommendation applies to analysis of public sector investments and pertains specifically to the life of *financing* for those investments – e.g., use of 10-year bonds to finance public investments, even though the resulting asset may have a useful life that is longer than 10 years. In contrast, EPA's analysis for the 316(b) rule focuses on the *cost* of compliance outlays and the *length of time* that the outlay is expected to provide the benefits to society through reduced impingement and/or entrainment of aquatic organisms. Using a shorter period for annualizing compliance costs than the period over which the compliance outlay will provide benefits, would *overstate* the cost of the compliance technology outlay – on an annualized cost basis – in achieving benefits on behalf of society.

Use of Annualization Periods for the Proposed 316(b) Existing Facilities Rule Analysis that Differ from the Periods Used in the Previous 316(b) Rulemaking Analyses

EPA used the same methodology to calculate private costs of the remanded Phase II Rule, Phase III Rule, and the Proposed and Final Section 316(b) Existing Facilities Rules. Specifically, to estimate total private costs, EPA annualized each cost component over its useful life and used the 7-percent discount rate for discounting and annualization. As described above, the annualization periods in the private cost analysis vary by useful life of the compliance outlay. The analysis concept and procedure are the same across the various 316(b) rulemaking analyses.

For the analysis of social costs, EPA used a different annualization period for the proposed and final 316(b) existing facilities rule analyses from that used in the earlier Phase II and Phase III analyses. In the Phase II rulemaking analyses, EPA used the same annualization method and period in the social cost analysis as that used in the private cost analysis. This approach did not reflect the range of years in which facilities would achieve compliance, or the expected period over which benefits would decline after the compliance technology is assumed to have ceased functioning. As such, EPA concluded that this approach did not present as accurate or complete a profile of social costs and benefits *across all regulated facilities as a group* as the approach used in the proposed and final existing facilities rule analyses. On this basis, EPA has determined that the approach used for today's existing facilities rule analyses is appropriate because it represents further refinement, and hence an improvement, to the approach used for the Phase II rule analysis.

Concerning the annualization approach used in the Phase III rulemaking analyses, EPA notes that the *concept* underlying the duration of the annualization period in the Phase III analyses is the same as that used in the proposed and final existing facilities rule analyses. However, the resulting *annualization periods* for social cost and benefits differ among the three analyses due to differences in the period during which facilities were expected to install compliance technologies: the technology-installation period for the final existing facilities rule is slightly longer than that used for the proposed existing facilities rule, which is longer than that used for the Phase III rule. As such, use of a different annualization period is appropriate and necessary because of the longer technology installation period.

Use of 30-Year Period for Modeling Benefits for the Individual Facility

EPA disagrees with EME's claim that EPA should have modeled benefits associated with closed-cycle cooling installation over a shorter time period because of potential facility retirements resulting from the existing facilities rule. First, EPA's analysis indicates there will be few retirements of generating capacity among electric power generators and *no* facility closures among manufacturing facilities. As a result, adjusting the annualization period for *all regulated facilities* based on unsupported speculation that some facilities might retire because of the rule, would understate the profile of benefits achieved for the much larger number of facilities that do not close because of the rule. Second, EPA notes that if it were to account for facility retirements in the benefits analysis, the appropriate treatment would be to recognize that the reduction in impingement and entrainment would in effect be *permanent* or even longer than assumed in the current analysis.

Cost and Economic Impact Analysis Assumptions and Analytic Approach

Use of Sum of Facility-Level Revenue for Entity-Level Cost-to-Revenue Analysis

EPA disagrees with KCBPU that the Agency incorrectly used the sum of revenue from facilities owned by a given entity in its entity-level cost-to-revenue analysis. EPA did not. In fact, as discussed in Chapter 4 of the EA report, for that analysis, EPA used *parent entity revenue* values in that analysis.

Underestimation of Cost Per Unit in Sales to Customers

EPA disagrees with KCBPU's concern that it has underestimated total cost of compliance in general and compliance cost per unit in sales to customers in the Proposed Section 316(b) Existing Facilities Rule. EPA is confident that the analysis it conducted for the final rule reflects a careful consideration of the available information and its judgment reflects the Agency's years of experience in evaluating economic data in developing its rules. In addition, because KCBPU did not present any detailed information to support its claim that EPA underestimated costs, EPA is unable to evaluate KCBPU's particular situation.

Underestimation of the Rule's Costs because of Failure to Account for Closing Facilities

EPA disagrees with AMP that EPA did not properly account for generating unit retirements as the result of the 316(b) regulation. First, EPA notes that the 13 percent of manufacturing facilities referred to by AMP as estimated to retire because of the rule, are in fact projected *baseline closures* and not projected closures due to the 316(b) regulation. Second, EPA similarly identified projected *baseline closure* facilities in the electric power industry and excluded these facilities from the economic analysis in the same way the Agency did for manufacturing facilities baseline closures. This is appropriate because units that are projected to close for reasons other than this rulemaking will not incur costs associated with this rule. As such, EPA did not assign any compliance costs to these facilities. Specifically, EPA excluded from its costing estimates electric power facilities that have either already retired all of their steam generating units or will do so by 2021, according to the 2011 EIA-860 database, from cost and economic impact analyses. EPA notes that according to the 2012 EIA database, additional regulated electric generators either already retired all of their steam generating units or expect to do so by 2021. To the extent that EPA included these facilities in their cost and economic impact analysis of the final rule, the total national cost of the final rule is overestimated.

AMP wants EPA to treat these baseline closures as a cost of the rule. As described in the preceding paragraph, the facilities cited by AMP are baseline closures and do not represent a cost or impact of the existing facilities rule.

Finally, apart from the recognition of baseline closures, EPA used discounted cash flow analysis to assess which manufacturing facilities may close as the result of the final rule. For electric generators, EPA made this assessment as part of the electricity market analysis conducted using IPM. EPA reports any manufacturing facilities or electric generators closures *that are estimated to occur as a result of the rule* as an impact of the rule.

Assertion that Cost-to-Revenue Analysis is Not an Appropriate Measure of Impact

EPA acknowledges that USS may be correct in its assertion that the EPA cost-to-revenue analysis does not fully account for different cost structures and operating margins across industries and individual firms/facilities within those industries. As described in the economic analysis reports for the proposed rule and final rule, however, EPA views the cost-to-revenue analysis as a screening analysis and does not use it to identify closures or other significant impacts from the rule. In addition, as also documented in the economic analysis reports for the proposed rule and final rule, EPA relies on more robust measures of economic/financial impact in its assessment of severe and moderate impacts among manufacturing facilities. Specifically, EPA uses discounted cash flow analysis of the change in facility business value for the assessment of severe impacts (closure), and interest coverage ratio and return on assets for the assessment of moderate financial impacts. The after-tax cash flow analysis of change in business value uses essentially the same financial concept as EBITDA, as recommended by USS.

In addition, these analyses are based on detailed accounting statements received from facilities as part of the 316(b) survey, and thus reflect in a very detailed way the operating financial performance of actual manufacturing facilities that are expected to be subject to the Section 316(b) Existing Facilities Rule.

Assertion that the Cost and Economic Impact Analysis Does Not Account for Conditions in Specific Industries

EPA disagrees that the current cost and economic impact analysis does not account for the specific business and financial circumstances of individual manufacturing industries. The EPA is confident that its analyses adequately account for variations in business and financial circumstances. The current analysis accounts for specific business characteristics of industries and facilities in several ways: (1) as noted above, EPA uses specific business characteristics of regulated facilities based on survey data, (2) EPA adjusts those survey data to the present based on changes in industry-specific business conditions over time and also adjusts based on business cyclicality considerations, and (3) EPA uses appropriate economic/financial analytic methods based on discounted cash flow analysis and other financial metrics, which, as discussed above, account for different cost structures and operating margins across industries and individual firms/facilities within those industries.

Assertion that Cost Pass-Through Assumptions are Overly Conservative

EPA acknowledges Riverkeeper's assertion that some aspects of the cost pass-through treatment may possibly overstate impacts to regulated facilities or to consumers. However, EPA does not view the cost pass-through treatment as yielding *overly conservative* results. As discussed in the Economic Analysis for the Final Section 316(b) Existing Facilities Rule (EA) report, EPA made the cost-pass-through assumptions in large part because of the substantial difficulty in determining the extent to which facilities will be able to pass their costs onto their consumers on a facility-by-facility basis – a virtual impossibility in an assessment of effects on 544 implicitly and explicitly analyzed regulated electric generators and 521 sampled and sample-represented regulated manufacturing facilities. EPA acknowledges, as stated in the EA report, that these treatments may overstate impacts – whether in the assumption that all costs would be absorbed by facilities in the facility impact assessment, or, in the alternative case, that all costs would be passed through to consumers for the assessment of rate impact to electricity consumers. However, EPA views these treatments as appropriate in order to ensure that impacts, whether to regulated facilities or to consumers, are not understated. Furthermore, EPA concluded that these analyses yield sufficiently accurate results for EPA's assessment purposes. Even though facility- and entity-level impacts may be overstated due to the no-cost-pass-through assumption and impacts on electricity rates may be overstated due to the 100-percent-cost-pass-through assumption, these analyses show very small effects for the final rule.

EPA further points out that the assumption of no cost pass-through for the manufacturing facilities impact analysis is based on detailed assessment of a range of economic factors for the industries that are expected to be primarily subject to the final rule.

Finally, EPA agrees with Riverkeeper's statement that compliance costs are likely to be shared by regulated facilities and by consumers. However, as stated above, given the uncertainty in estimating the distribution of compliance cost burden between regulated facilities and consumers, EPA views its approach as reasonable and appropriate for regulatory analyses.

Essay 35: Installation Downtime for Manufacturing and Non-Electric Power Generating Facilities

Introduction

A number of commenters state that EPA assumed no downtime for manufacturing facilities that would be subject to the rule as they install compliance technologies, and that this assumption is incorrect. These statements reflect incorrect understanding of information presented in the Economic and Benefits Analysis for Proposed Section 316(b) Existing Facilities Rule (EBA) report, and described again in the Economic Analysis for Final Section 316(b) Existing Facilities Rule (EA) report. As explained below and in these documents, in evaluating compliance costs, where appropriate, EPA assigned costs associated with downtime for manufacturers. In addition, a number of commenters stated that where EPA had estimated downtime, it had underestimated the costs to the manufacturer associated with that downtime. In general, they noted that EPA only included costs to purchase electricity and that it should have also included costs of associated manufacturing production downtime.

History of the Development of Downtime Estimates for IM Controls for Manufacturers

EPA's determination of the length of possible downtime associated with various IM controls for this final rule is largely based on its prior analysis and evaluation that was done for the Phase III rule promulgated in 2006 which covers, among others, certain existing manufacturing facilities. See Chapter 5 of the TDD for the Final 316(b) Phase III rule. As explained there, the length of downtime, when incurred, is a function of which technology is being retrofitted and the size of the intakes. Because the technological approaches and the size of the intakes to which this final rule applies are not exactly the same as the Phase III final rule, EPA made slight adjustments to its earlier approach. For example, for the final rule, EPA developed downtime estimates for four ranges of intake flow rather than the three ranges in the Phase III rule. Also, for the reasons explained in Chapter 5 of the TDD for the Final 316(b) Phase III rule, EPA continued to conclude that it is appropriate to use a different methodology to estimate downtime for electric generators than for manufacturers for both the proposed and final existing facilities rule. EPA notes it did not receive any comments suggesting its overarching methodology for estimating the length of downtime for manufacturers was inappropriate.

Length of Downtime for Installation of IM Controls

As explained above, EPA's estimates of the length of compliance downtime for installing technologies to comply with the final existing rule's IM standards are largely based on analysis from the final Phase III rule. With the exception of those commenters that inaccurately concluded that EPA assumed no downtime would be associated with IM compliance for all manufacturers, EPA did not receive any specific comments on its proposed estimates of downtime for manufacturers to install the various technological approaches to comply with the proposed existing facilities rule. As such, the methodology for today's final existing facilities rule is the same as the proposed existing facilities rule.

Also, as explained above, the length of downtime, when incurred, is a function of which technology is being retrofitted and the size of the intakes. In the cost analysis for compliance with the impingement mortality standards in today's final rule, EPA assigned one of seven compliance modules to existing model manufacturing facility intakes, depending on site-specific conditions. See Chapter 8 of the TDD. These modules include the following technologies and/or combination of technologies: larger intakes, wedgewire screens, modified traveling screens, barrier nets, and variable speed pumps. After careful consideration of the installation requirements for each technology, consistent with its prior approach for manufacturing facilities (Phase III rule), EPA concluded that significant downtime would be required only for larger intakes or technologies that required modifications to the intake civil structures and/or modifications or tie-ins to intake piping. For the reasons explained below, of the five technologies in the cost modules, in most cases only larger intakes (associated with Cost Module 3) and wedgewire screens (associated with Cost Module 4) would fit into that category as they would require modifications to the intake civil structures or piping. EPA generally assigned these two technologies to intakes that did not already employ traveling screens because EPA does not know whether traveling screens would be compatible with the existing intake structure without significant modifications. EPA chose to assign these two technologies because they are compatible with most intakes (with some restrictions for wedgewire) and attain compliance via the low velocity compliance alternative, which could be guaranteed through engineering design. EPA notes that the final rule includes seven compliance alternatives for the IM standards and EPA does not know whether manufacturing facilities that currently lack traveling screens will comply by increasing their intake size to accommodate low velocity screens and/or by adding wedgewire screens. EPA's costing approach is likely conservative (high cost) because these approaches generally incur higher costs than other compliance alternatives, if available to the facility. Because EPA does not have data to predict which of the lower cost options (e.g., fish avoidance, barrier nets, flow reduction, etc.) would be available, EPA chose this more conservative approach. Thus, in many cases, this approach will likely result in overestimating both the compliance technology costs and downtime requirements for these intakes.

As explained above, EPA concluded that upgrades of existing traveling screens, installation of barrier nets and variable speed pumps would result in no downtime. First, 45 percent of intakes at manufacturing facilities already employ traveling screens. In these cases, EPA assigned modified traveling screen upgrades only if the existing technologies were not deemed already compliant. This virtually guarantees that upgrades will involve only screen removal and replacement, which screen vendors have indicated could be performed in one to three days where fish troughs and new spray water piping are required (see the Phase II TDD). In most cases, these upgrades can be accomplished while an intake continues to operate, given that most facility intakes include more than one traveling screen. This allows sequential upgrading of the individual screens without shutting down the entire intake. EPA notes that existing screens already require periodic replacement/refurbishment and that operating contingencies for these activities should have already been established in most cases.[55] At facilities where a continuous supply of water is required, various contingencies such as multiple parallel intake equipment, alternative sources of cooling water, and operational measures are often standard design components that ensure system reliability.

---

[55] For example, some commenters discussed the use of fixed screens as a temporary replacement for traveling screens that are being replaced or refurbished.

Upgrade of fixed speed pumps to variable speed pumps may take several days to several weeks depending on the project scope. However, most intakes utilize multiple parallel pumps, including backup pumps, which, like traveling screens, allow for one or more pumps to be taken out of service for maintenance/replacement while others continue operation. Thus, the relatively short duration, combined with availability of parallel and alternative equipment, make it very unlikely that variable speed pump technology upgrades would require any significant facility downtime.

No downtime is needed for barrier nets because they are independent of the intake structure and can be installed while intakes are operating.

Chapter 8 of the final TDD shows the number of model facility intakes that were assigned each cost module. Out of 735 intakes at manufacturing facilities, EPA assigned some combination of Cost Module 3 and/or 4 to 213 intakes. EPA assigned other cost modules to the remainder of the intakes. Because, as explained above, the technologies associated with these other cost modules would not require downtime, EPA appropriately did not include downtime for these intakes.

For those intakes that were assigned some combination of Cost Module 3 and/or 4, EPA assigned installation downtime as indicated in the following table (reproduced from Chapter 8 in the final TDD).

Exhibit 8-4. Net Construction Downtime for Impingement Mortality Compliance Technologies

Cost Module Number[1]	Manufacturers (Weeks)				
	Flow < 6,944 gpm	Flow < 6,944 gpm	Flow 6,944 to 400,000 gpm	Flow 400,000 to 800,000 gpm	Flow > 800,000 gpm
1	0	0	0	0	0
3	0	0	0	1	2
4	3	3	7	8	9
5	0	0	0	0	0
10.2 (3 & 5)	0	0	0	1	2
10.3 (1 & 5)	0	0	0	0	0
15	0	0	0	0	0

As described in Chapter 8 of the TDD, because the scope of construction projects at the lower flow facilities is much smaller than at larger flow facilities, where EPA determined downtime would likely occur, it projected longer shut down periods with larger flow facilities. EPA notes that it did not receive any specific comments on its proposed estimates of downtime for any of the flow levels for the cost modules, and as such, the downtime estimates for the final rule are the same as those in the proposed rule.

Costs of Downtime for Installation of IM Controls

Where EPA assigned downtime associated with installation of IM controls, EPA assigned costs for manufacturing facilities to purchase power from the grid. Because electricity generated onsite may be needed by many processes simultaneously, EPA concluded that many facilities would not be able to modify operations in a manner that would avoid impact on electricity generation during downtime. Therefore, downtime likely requires manufacturers to temporarily curtail electricity generation and to purchase power from the grid to continue operation. Where applicable, the cost of this temporary suspension of power generation includes the cost of purchasing replacement power plus the loss of any revenues received from selling power minus the variable costs of generating electricity. Commenters asserted that EPA wrongly concluded that they would incur only the costs associated with obtaining electricity associated with downtime. They asserted that EPA should similarly include costs of production downtime. As explained in more detail below, EPA disagrees with these comments as its record supports the conclusion that it is unlikely that an entire facility would shut-down and lose revenue associated with lost production of goods.

Manufacturing facilities typically involve numerous sequential processes with varying water requirements for the processes and in many cases, additional water requirements for plant electric power and steam generation. Many large, manufacturing facilities not only have multiple types of processes, but also have multiple parallel process trains. Maintenance for the more complex operations may involve the shutdown of individual process trains or series of trains, but this leaves the remainder of the facilities in operation. The sequential processes often have storage capacity for the intermediate products, enabling such processes to continue operating while "upstream" processes are offline. As such, while the need for cooling water for the various manufacturing process steps is variable and flexible, the need for electricity which serves multiple processes simultaneously tends to be continuous and is often a major component of cooling water requirements.

Nearly all manufacturing processes will require maintenance of production equipment and cooling water systems that will require interruption of the operation of equipment at various time intervals. Some manufacturers contacted by EPA did not generally report scheduled whole facilities shut-downs, which led EPA to conclude that they have vast experience in engineering alternate solutions to plant shutdowns during times of maintenance interruptions and major construction. In order to determine how a manufacturing facility might respond if faced with the potential need to enlarge intakes or install technologies that may require modifications to the intake civil structures, EPA collected information from eight manufacturing site visits and from phone calls to six manufacturing facilities. In general, facilities reported that they would likely use an approach or engineer a solution to minimize plant shutdown to the maximum extent possible. The record demonstrates that large, complex facilities, such as chemical manufacturing and steel mills, may seldom shut down the entire facility. But they do shut down individual process lines for extended maintenance periods and/or have redundant process equipment that can be rotated into service for maintenance or upgrades. This redundant process equipment often includes multiple intake screens and pumps. In cases where the cooling water flow from an intake may need to be interrupted, engineering solutions such as an alternative cooling water source, temporary bypass, or backup equipment may be employed.

EPA notes that implementation of the various contingencies that may need to be employed to minimize downtime costs as described above may require flexibility in the selection of the compliance alternatives and establishment of compliance schedules taking into consideration site-specific technical and operational limitations. The final rule was revised to address these special considerations by giving the Director discretion to establish different compliance schedules for manufacturing facilities where extenuating circumstances (e.g., lengthy scheduled outages, future production schedules) warrant establishing a different compliance date. See Section VIII of the preamble. Also, the final rule gives a facility greater flexibility in determining a compliance method, including a larger selection of IM compliance alternatives such as an alternative (system of technologies) that considers cumulative reductions of multiple technologies. This flexibility allows facilities to choose compliance alternatives that will minimize financial impacts such as lost production of goods. See Section IV of the preamble. EPA has concluded that these changes address the concerns expressed in public comments concerning compliance outages by minimizing impacts and by giving greater flexibility in scheduling compliance dates to allow for coordination of the timing of any outages caused by the installation of compliance technologies with production and long term maintenance schedules.

Some examples from EPA site visits and industry contacts that support the assumptions used in EPA's approach are described below.

A steel mill noted that the blast furnaces are taken offline for maintenance for 10 days per year but only for one day at a time. However, the steel shops are batch processors and have opportunities for longer downtime periods. Many of the steel shops (including the smaller specialty shops) can operate independently of the remainder of the facility and can share materials with other sites to remain operational. They also reported that the facility uses modular (temporary) cooling towers when existing tower units are being repaired or replaced. (See DCN 10-6551.)

A chemical manufacturer explained that even though the entire facility rarely shuts down, individual process lines are periodically taken offline for maintenance and that there is sufficient redundancy within the facility to prevent widespread downtime; for example, multiple boilers can be rotated to continue to provide steam while any single one is out of service. Each cogeneration unit is taken offline once per year and other process units go offline as often as twice per year or as infrequently as every 2-3 years. (See DCN 10-6556.)

A refinery stated that they were able to rebuild a collapsed cooling tower while the facility continued to operate. Facility representatives stated that the facility operated with a temporary cooling water tower and at a lower production capacity, but did not experience any plant-wide shutdowns as a result of the rebuilding process. The affected process unit was only taken fully offline during the tie-in. During the replacement of another old inefficient cooling tower, they were able to adjust production rates and share (or purchase) intermediate products to minimize any construction-related downtime. The majority of construction took place during a major maintenance outage of 6-9 months (unrelated to the conversion to closed-cycle cooling). Major outages typically occur every 4-5 years and last approximately 6 weeks, although a recent outage lasted 3 months due to low demand. Facility representatives stated if the extended outage had not occurred, much of the construction of the replacement tower would have been done while the unit was operating. EPA has concluded that tie-in and startup activities should take no more than 6-8 weeks to complete. (See DCN 10-6542.)

A food processing facility stated that a planned replacement of the intake traveling screen would occur during their four day annual boiler inspection shut down. This 10 mgd average intake flow facility has one screen and two pumps but one is a backup pump. The facility has a backup intake that can provide an alternate source of water to the pumps if needed. (See DCN 12-6552.)

In developing the Phase III rule, EPA also contacted several refineries and chemical facilities to inquire about experience with intake upgrades, availability of scheduled downtime and strategies they might employ. One facility, a refinery, had installed wedgewire screens without experiencing any downtime by sequentially working on one intake at a time. (See DCN 9-0043, EPA-HQ-OW-2004-0002-2184.)

Finally, only one commenter on the existing facility rule, (Georgia Pacific, comment 2272), provided an actual estimate of downtime duration. This commenter indicated downtime was limited to no more than one day to modify an intake.

Therefore, as a result of the small number of intakes that EPA projects would likely incur downtime, information from facilities that demonstrates multiple approaches, flexibility, redundant systems, contingency strategies, and engineering solutions, etc, EPA appropriately concludes for manufacturing facilities as a whole there will be no, or only very limited, lost production costs for facilities to install technology to meet the final rule's impingement mortality (IM) requirement.

Length of Downtime and Associated Costs for Installing Entrainment Controls

As explained in the preamble, the final rule establishes a BTA standard for entrainment that requires the determination of required entrainment reduction measures in a structured, site-specific permitting proceeding. The BTA standard for entrainment requires that certain prescribed factors must be considered in the decision and must reflect the maximum reduction in entrainment warranted after consideration of relevant factors, including the number and types of entrained organisms. As such, the final rule does not establish a national numerical entrainment reduction performance standard nor identify a nationally applicable BTA technology. Also as explained in the preamble, while EPA considered costs in evaluating technologies as BTA on a national basis, costs were not dispositive. Rather, EPA was unable to identify a technology or combination of technologies that is BTA for entrainment on a national basis either because they were not uniformly effective and/or not technically available on a national basis. Therefore, comments related to potential costs associated with potential downtime to install entrainment controls, including closed-cycle cooling, are not relevant to EPA's national BTA entrainment determination.

However, EPA did consider options that would have subjected approximately 90 percent of the cooling water intake flows on a national basis to entrainment requirements based on closed-cycle cooling. For generating facilities, EPA has assumed that the duration of an outage for a closed-cycle retrofit would average about 8 weeks and that costs for lost generation would be based on the additional net 4-week period that a generating unit would be shut down if the retrofit were scheduled to occur concurrently with a scheduled maintenance outages that typically lasts about

4 weeks. At proposal, EPA assumed that, unlike generating facilities, there would be no downtime costs for closed-cycle cooling retrofits at manufacturing facilities due to the fact that manufacturers are often more segmented in their production and use of cooling water and are therefore more likely to be able to shut down individual intakes or process lines without interrupting the production of the entire facility. However, several public comments noted that, at some facilities, generating systems provide electricity or electricity and steam (cogeneration) to many processes within the facilities and that interruption of the cooling water source and thus the operation of generating/cogenerating system could impact facilities production. In response, for today's final rule, EPA revised the compliance cost methodology used in evaluating closed-cycle cooling costs under Proposal Options 2 and 3 to include downtime and associated costs for manufacturing facilities. Where EPA estimated downtime to retrofit to closed-cycle, it applied costs in a similar manner as downtime applied to IM technologies. That is, as its record demonstrates, the overall manufacturing process will not suffer significant production losses and that the effect of downtime is primarily associated with the effect on the generation system. These costs are assessed as the equivalent cost of replacement electricity and lost revenue for offsite sales of excess generation.

For closed-cycle retrofits at manufacturing facilities, EPA applied a downtime duration of 4 weeks. This is consistent with the downtime EPA included for non-nuclear generating facilities, but the value reflects a somewhat different basis. At generating facilities, most of the power generated is distributed offsite and lost power due to downtime is replaced by other generating units and facilities via the grid. However, most of the power/steam generated onsite at manufacturing facilities is used onsite. This configuration requires that interruptions to the operation of the generating system must be accounted for using various contingencies including: offsite replacement sources (e.g., utility grid connections); redundant (spare) generating capacity; temporary replacement generating units; or temporary replacement cooling water sources. The availability of these various contingencies varies by facility type and location and insufficient data was available to enable EPA to assess availability of different contingency methods. Rather, EPA developed a downtime value to represent a nationwide average. Because generating units at manufacturing facilities will require periodic maintenance, it is reasonable to assume that many manufacturing facilities will have included in their design and operating schedule consideration of this contingency by including sufficient spare generating capacity, access to replacement power through utility connections, or planned outages. This would allow for rotating maintenance downtimes for individual generating units, at least during periods of reduced demand. At many of these facilities, the downtime costs will be minimal because the closed-cycle retrofit (which EPA estimates may take up to 8 weeks) can be performed on individual generating units in a manner that avoids interruption of the supply of electricity and steam. EPA expects that a large portion of manufacturing facilities fall within this category. For those facilities that rely upon replacement electric power from the grid, the costs would be for replacement power for the generating unit downtime duration that exceeds the normal downtime for generating unit maintenance. For power generating units this is four weeks, which EPA expects to be reasonable for these manufacturing facilities as well. EPA recognizes that for those facilities that cannot rely upon multiple generating units and excess capacity or replacement power from offsite, costs for replacement of electricity and steam generation capacity or replacement cooling water for the estimated 8-week retrofit duration may be necessary. While the cost of these temporary solutions may exceed the costs for replacement electricity, based on site visit data and the number of relevant comments received, EPA concluded that such facilities are in the minority and that the aggregate downtime, when balanced against those facilities where EPA expects the downtime will be zero, should result in an overall facility downtime (average across all facilities) that is similar in magnitude to the 4-week downtime. Therefore, because EPA was unable to distinguish which facilities would utilize the different types of contingency methods described here, EPA applied the 4-week downtime costs to all manufacturing facilities when evaluating compliance options that involved a closed-cycle cooling retrofit.

EPA notes that because costs were not dispositive in rejecting closed-cycle cooling as BTA on a national basis, in instances where EPA may have underestimated downtime associated with options based on closed-cycle cooling for manufacturers, it would not have altered EPA's determination. Also, where facilities are providing costs for entrainment controls for their site-specific BTA entrainment determination, if they can demonstrate downtime would be required for their specific site, the facility can include downtime related costs and the Director may consider them as part of the site-specific BTA entrainment determination.

Industry or Facility-Specific Downtime

A commenter stated that EPA has misinterpreted the "downtime" for facilities trying to meet the impingement standards, noting that while their cogeneration plant can sustain downtime for one of the boilers, they must be able to continuously withdraw water to supply steam to customers, including a hospital. They note that the cost of replacement city water is exorbitant and depending on water utility demand at the time, replacement water may not be available. The commenter provided no details regarding their intake design or under what circumstances intake flow would need to be interrupted. EPA understands that facilities with small intakes, particularly those with only one screen, may not have a backup or second screen to use when intake or screen modifications are required. However, EPA concluded that in virtually all circumstances, the time needed to modify the intake to meet impingement requirements will be brief and that solutions such as temporary screens or alternative water sources can utilized. In this particular case, the commenter's concern about potential inability of city water capability to meet demand can be resolved by appropriate scheduling because the Director will have flexibility in establishing the compliance date; the purchase of city water, if necessary, can be scheduled during periods when both the city water demand and cogeneration steam demand are lowest. Because water will likely only be needed for a relatively short duration, the cost should not be excessive. In other cases, where an alternative source is not available, engineering solutions such as temporary intakes and bypass pumps may be employed. EPA has provided flexibility and options for IM compliance in the final rule so that facilities such as this one would have a range of options to choose from.

A commenter stated that their facility cannot lose power for greater than 12 hours without very high restart cost, which was not considered by EPA. They also state that they cannot purchase enough power without extensive investment in infrastructure unless they radically curtail production at huge costs. This example was provided in support of their statement that EPA should provide a more flexible approach in regulating industrial facilities. EPA notes that the commenter suggests that the scenario that would potentially create such an interruption is a requirement to replace the intake structure. The final rule includes revisions that provide for additional alternatives for complying with the BTA IM standard that do not require replacing the intake structure (see Section IV of the preamble.) The commenter provided no information to suggest that any of the other options are not available and that such a shutdown would be necessary nor do they provide any information concerning the potential cost of infrastructure investment. In the final rule, EPA has provided the Director more flexibility in determining compliance scheduling and more flexibility through additional options for IM compliance. As a result, given the alternatives, facilities would have many options to choose from and greater ability to schedule compliance upgrades to accommodate their specific circumstances.

Another commenter argued that downtime costs for petroleum refineries would be relatively higher than downtime for power plants because facilities often rely on a single intake for multiple process units and are often located in highly developed areas where modifying an intake may be more complex and time for making modifications may be limited. During development of the Phase III Rule, EPA obtained information from three refineries concerning scheduled downtime, experience, and potential solutions that might be employed to address the possibility of intake operations interruptions associated with intake technology retrofits (see DCN 9-0043 in the Phase III Final Rule). EPA found that two refineries did have scheduled, whole facility downtime but only infrequently every 4 to 6 years, but that both had two intakes that could be retrofitted independently without a need for downtime. The third refinery did not normally schedule a whole facility shut-down but had already installed wedgewire t-screens without the need to shut down production by connecting the screens to each pump one at a time. This information supports EPA's conclusion that downtime for refineries should be negligible.

Other Downtime Comments

Some commenters state that facilities may not be able to purchase electricity for a number of reasons, such as insufficient transmission or step-down transformer capacity, and that steam will be available for purchase only in rare instances. For example, a commenter states that because its facility is a stand-alone facility, it cannot purchase enough power, without substantial investment in infrastructure, unless production is curtailed. EPA acknowledges that it may not be possible in each and every case for facilities to purchase power. But as discussed above, facilities have several methods for replacing power or avoiding the need to replace power. Because EPA does not have the ability to say with certainty which facilities may have to purchase power and which facilities may have alternative ways to avoid needing to purchase power, as explained above, EPA included costs to purchase power where it estimated downtime for manufacturers. However, EPA also concluded that revisions to the final rule that provide additional compliance flexibility will enable many manufacturers to minimize or avoid downtime altogether and that those requiring downtime or other engineering solutions are in the minority. As such, the estimated costs for full power replacement represent a middle ground between facilities where no power replacement will be necessary and those where the cost of additional engineering solutions may be necessary. EPA concluded that this approach is reasonable because these over- and under-estimations of costs will tend to balance out in the overall national estimate.

Some commenters argued that the measures EPA suggested could be used to avoid production-related downtime impacts – such as building up inventory in advance – are costly, and that avoiding production losses that would otherwise occur during downtime does not eliminate adverse economic impacts. However, these commenters failed to support this very general statement with details on the potential costs. As stated, there are a number of possible ways for facilities to avoid downtime and while any one option may not be available for a given facility, EPA concluded that facilities will be able to avoid downtime for manufacturing processes using one of the above methods.

Commenters point to EPA's statement, "In EPA's extensive experience with manufacturers while developing effluent guidelines, EPA found manufacturers are generally able to shut down individual intakes for specific process lines, use inventory approaches such as temporary increases of intermediate products, and develop other workarounds without interrupting the production of the entire facility" (see 76 Fed. Reg. at 22,214) and state that EPA's support for this statement is illogical. Commenters state that EPA's development of effluent guidelines has not involved any consideration of intake structures or their modification. EPA disagrees that its historical understanding of plant operations obtained during development of effluent guidelines is not relevant or transferable to the water requirements associated with an intake structure. While EPA did not specifically focus on water intakes during the development of its development of effluent guidelines for over 56 industrial categories and over 450 subcategories, in the course of developing the Phase II and Phase III rules for manufacturing facilities and today's final rule, EPA visited cooling water intake structures and associated manufacturing operations at more than 50 power plants and manufacturing sites. During these visits, the EPA gathered information on the intake technologies and cooling water systems. EPA also obtained operating information concerning process operating schedule and water use for many individual industrial processes. Such information is useful in assessing the source, volume and character of individual waste streams and potential management strategies such as pretreatment and source reduction. EPA notes that the implementation of wastewater management strategies also requires consideration of process interruptions due to technology retrofits. EPA's engineering judgment, developed over years of the ELG development process and consideration of 316(b) requirements, supports its conclusions on downtime and associated costs to the industry.

Essay 36: Employment Effects Analysis

Overview of Comments

The comments concerning potential employment effects range quite widely with some commenters offering favorable assessments of the employment effects analysis while other commenters raised various issues about the analysis or its findings. Comments include:

- Argument that EPA did not present quantified estimates on the rule's potential employment effects and thus did not meet the requirements of executive orders for regulatory analysis.
- Some commenters expressed concerns with aspects of EPA's approach for estimating employment effects, including in particular concerns about how EPA accounted for the effect of potential increased electricity rates on employment throughout the general economy:
    - Assumption of full cost pass-through in estimating potential electricity price increases.
    - Use of more than one analysis case for the assumed elasticity response to electricity and electricity-dependent product price increases.
- Recommendation that EPA look at previous empirical studies of potential employment effects associated with electricity price increases. Some commenters claim that other studies found higher employment losses than estimated by EPA in its analysis for the proposed rule and other options considered. Other commenters argue the opposite.
- Recommendation that EPA estimate job effects in the electric power sector based on potential loss in electric generating capacity from the market model analysis and the employment intensity of electric power generation.
- Criticism that EPA did not account for employment losses in baseline closures in Manufacturers.
- Argument that Option 3 (all cooling towers in the proposed rule analysis) would result in the least adverse overall employment effect and would achieve the most positive near-term employment and economic effects, and that this factor would support selecting all cooling towers as the basis for the 316(b) existing facilities rule.
- Arguments supporting the existing facilities rule based in part on the potential employment *requirements* for achieving regulatory compliance.

General Response

Throughout the development of 316(b) regulations, EPA has conducted extensive analysis of the economic effects of the actions it considered and provided that information to the public. In addition, as required by Executive Orders 12866 and 13563, EPA assessed the potential employment effects of the 316(b) regulation at the time of the proposed rule in 2011 and now again as it promulgates the Final Section 316(b) Existing Facilities Rule (final rule).

EPA used different methods in assessing employment effects for the proposed and final rules, both of which provide useful insight into the rule's potential employment effects.[56] As documented in Chapter 9 of the *Economic Analysis for Final Section 316(b) Existing Facilities Rule* (EA) report, EPA notes that the analysis of employment effects presents significant challenges due to the multiple ways in which regulatory requirements may affect employment. To illustrate, on the one hand, the installation of equipment to achieve compliance with a regulation may result in employment increases, particularly in the near term during the period in which regulated facilities meet compliance requirements. However, the costs incurred for installing and operating compliance technology may lead to price increases in affected industries. Looking longer term, these price increases may lead to reduced purchases of the output of these industries, and, as a consequence, reduced production activity and employment. At the same time, environmental regulations may have other employment effects as industries adjust their production processes in response to regulatory requirements, which may lead to increases or decreases in employment. Finally, compliance response actions in the directly regulated industries may affect employment in economically linked industries. Again, these effects may be positive or negative, will likely vary over time, and involve considerable uncertainty in their estimation.

Given the multiplicity of factors affecting employment, the conflicting character of their effects, and the likelihood that effects will vary substantially by industry, EPA concluded that the 316(b) regulation could have a range of employment effects – overall increases or decreases in employment, and with varying effects over time. *Ultimately, however, the EPA concluded that, in no event, would these employment effects be so substantial that they would change EPA's decision about what standards it should adopt for the final rule.* In this regard, the comments concerning the employment effects analysis – which to a large degree focus on some element of EPA's analyses or suggest alternative approaches and data – are useful in furthering the academic discussions of how to assess potential employment effects, but were not dispositive in EPA's determinations for the final rule.

Moreover, the available evidence from peer-reviewed econometric studies that use a structural approach to estimating the employment impacts of environmental regulations, applicable to overall net effects in the regulated sectors, converge on the finding that such effects, whether positive or negative, have been small and have not affected employment in the national economy in a significant way. Based on this evidence and additional information on regulated sectors impacted by the rule presented in Chapter 9 of the EA, EPA expects that the final rule's employment impacts are not likely to be substantial.

EPA's responses to the employment effects comments follow below.

Failure to Perform a Quantitative Employment Effects Analysis

EPA disagrees with some commenters' claim that EPA did not conduct quantitative employment effects analysis for the existing facilities rule. For proposal, EPA presented a quantitative analysis of employment effects in *Chapter 10* of the *Economic and Benefits Analysis for the Proposed Section 316(b) Existing Facilities Rule (EBA)* report.

[56] See *Economic and Benefits Analysis for the Proposed Section 316(b) Existing Facilities Rule (EBA)* report, Chapter 10, and *Economic Analysis for the Final Section 316(b) Existing Facilities Rule (EA)* report, Chapter 9.

For the final rule, EPA approached its analysis of employment effects differently than for the proposed rule. Specifically, unlike for the proposed rule, for the final rule, EPA did not estimate quantitative employment impacts but instead included only a qualitative discussion. In considering an approach for the final rule, the Agency concluded that the methods used at proposal were not sufficiently robust, largely because they relied on an input-output analysis that assumed fixed production relationships and used historical data to estimate the labor and other inputs required for compliance with the rule. Since publication of the proposed rule, EPA has concluded that an input-output analysis-based approach is inappropriate for assessing employment impacts of national-level regulations. Input-output models are static, do not include prices, and assume the supply of all inputs is inexhaustible. They do not model a wide variety of adjustments that are expected to occur over time, such as changes in production processes, technology or trade patterns.[57] After reviewing the public comments EPA received on the proposed rule, the Agency concludes that the commenters have not identified any specific improvements to the employment analysis of the proposed rule. Thus, because EPA does not have a robust methodology to calculate quantitative employment effects, nor did commenters provide alternatives, the final rule EA includes a qualitative discussion highlighting the variety of potential adjustments in the labor market that may follow the rulemaking.

For the final rule, EPA sought methods that would circumvent the shortcomings of the methodology used for proposed rule. As discussed in Chapter 9 of the EA report, however, because of the complexity of factors through which an environmental regulation may affect employment, the myriad uncertainties in assessing economy-wide, long-term employment effects of a regulation, EPA conducted only a qualitative assessment of employment effects for the final rule. Because EPA does not currently have a sufficiently robust methodology to quantitatively assess the impact of today's final rule on employment, the qualitative employment effects analysis undertaken for the final rule is appropriate.

Analysis of Electricity Rate Effects on Employment

Some commenters disagreed with EPA's assumptions and methodology for assessing the effect of increased electricity rates on employment. Criticisms included the assumption of full cost pass-through in estimating potential rate effects, and the use of more than one analytic case for assessing potential effects on businesses from rate changes. EPA points out, as noted above, that there are myriad uncertainties in estimating employment effects and that estimated effects could range from positive to negative impacts overall, and with varying effects over time. At present, the EPA lacks a method basis for quantitatively estimating employment effects, and commenters' concerns fall within the range of EPA's expected uncertainty for employment effects estimates.

In addition, as discussed above, EPA notes that it approached consideration of employment effects for the final rule differently than for the proposed rule. Specifically, in considering an approach for the final rule, the Agency concluded that the methods used at proposal were not sufficiently robust, largely because they relied on an input-output analysis that assumed fixed production relationships and used historical data to estimate the labor and other inputs required for compliance with the rule. For the final rule, EPA did not estimate the change in employment

[57] For a discussion of input-output models see Chapter 8 of the EPA Handbook on the Benefits, Costs, and Impacts of Land Cleanup and Reuse (2011).

quantitatively; instead, the Agency assessed qualitatively the many ways the final rule may affect employment levels in the directly affected industries, the environmental protection sector, and the U.S. economy overall. See EA Chapter 9 for discussion of the final rule's potential employment effects.

As stated above, in EPA's view, in the absence of a robust quantitative employment effects methodology and adequate data, the qualitative employment effects analysis undertaken for the final rule is appropriate to produce an informed regulatory result.

Use of Other Methodologies and Data for Performing Employment Effects Analysis

As stated above, EPA recognizes the importance of assessing the employment effects of environmental regulations, and acknowledges commenters' recommendations for potential improvements in the methods and data for assessing employment effects. At the same time, EPA disagrees with some of the proposed approaches for assessing employment effects.

Recommendation to Use the Labor Intensity Coefficient Developed from NERA Study for the Employment Analysis

One commenter recommends using a labor intensity coefficient from a NERA study (1 job per 28.8 MW of capacity) in conjunction with estimated capacity losses as the basis for estimating potential employment losses in the electric power industry due to the 316(b) existing facilities rule. EPA disagrees with the commenter's recommendation for several reasons. First, in making the calculations, the commenter used capacity losses estimated for the group of regulated facilities only, and not for the overall electricity market. Second, the commenter accounted only for the amount of retired capacity and failed to account for the amount of capacity gained through new builds. Given that in the context of the Electricity Market Analysis EPA conducted using the Integrated Planning Model (IPM®), when looking at the overall electricity market, the retired capacity is essentially replaced by the equivalent amount of new capacity, the overall net change in jobs, if any, is likely to be small at the level of the electricity market.

Because the commenter did not provide the referenced study conducted by NERA, EPA was unable to verify the assumptions/conclusions/analyses underlying the fixed labor intensity coefficient. Therefore, EPA could not determine whether this coefficient can be applied to an increase in capacity, to estimate increased jobs, just as the commenter applied it to retired capacity to estimate job losses. Assuming this labor intensity coefficient can be used regardless of the direction of changes in capacity, the net change in jobs due to the final rule estimated using the proposed methodology would be small.

Recommendation That EPA Estimate Job Effects in the Electric Power Sector Based on Potential Loss in Electric Generating Capacity from the Market Model Analysis

In its analysis for the final rule, EPA did not specifically assess the employment effects from early retirement of generating units for several reasons. First, only 23 units (out of 14,920 generating units analyzed in IPM) accounting for 0.1 percent of total market capacity, are projected to retire early due to the final rule. Second these retired units do not contribute significantly to electricity supply in the baseline case, with 15 units having a capacity utilization rate of zero, seven units with less than 11 percent, and only one unit with substantial capacity utilization of approximately 66 percent. Third, some jobs will be gained as the result of new generating units being constructed and/or increased utilization of existing units to replace the relatively small amount of electricity otherwise generated by the units projected to retire early. As a result, EPA does not expect significant, if any, job losses from capacity effects associated with the final rule.

Recommendation to Use Results from Other Studies in the Employment Effects Analysis

EPRI suggested that EPA compare the results from its employment effects analysis with results from other, empirically based studies. As an example of an empirical study, EPRI referred to a study conducted by the National Bureau of Economic Research (NBER) that found that job losses resulting from electricity price increases could be "roughly double" EPA's employment effects estimated in support of the proposed rule. Other studies investigating the relationship between electricity prices and employment in the United States that EPRI mentioned are: Jaffe et al. (1995), Berman and Bui (2001), Greenstone (2002), and a study conducted for the National Bureau of Economic Research, Deschenes (2010).

Prior to deciding on its approach for the final rule, EPA reviewed various studies looking at employment effects, including those cited above. These studies revealed a complex array of factors through which an environmental regulation may affect employment, and discuss myriad uncertainties in assessing economy-wide, long-term employment effects of a regulation. These studies support EPA's conclusion that its proposed quantitative methodology was not sufficiently robust.

Chapter 9 of the EA report provides a substantial discussion of the ways a regulation can affect employment in the directly affected and other industries and resulting uncertainties in employment effects assessment. EA Chapter 9 also describes the considerable complexity in estimating the employment effects of a regulation and issues in the currently available approaches for estimating these effects. In EPA's view, the development of a comprehensive and sufficient approach for quantitatively estimating employment effects remains an ongoing challenge, which EPA is addressing via a carefully structured review of methods for analyzing the economy-wide effects of environmental regulations, including employment effects. Until completion of this effort, and associated development of improved methods for analyzing employment effects, EPA will not provide estimates that, in EPA's view, are based on an inadequate or insufficiently validated methodology.

Failure to Account for the Employment Loss in Baseline Closure of Manufacturers Facilities

EPA acknowledges the commenter's comments that the Agency did not assess employment effects resulting from closure of the 13 percent of regulated manufacturing facilities that EPA estimated as baseline closures at proposal. However, EPA disagrees that EPA should have accounted for these employment effects. The purpose of the cost and economic impact analysis is to assess the impact of the rule. Any employment effects in baseline closure facilities would not result from the rule, but would result from significant economic/financial weakness, and likelihood of closure, among the baseline closure facilities, independent of the requirements of the 316(b) existing facilities rules.

Failure to Recognize that Proposal Option 3 Would Result in the Least Adverse Impact on Employment

One commenter (Riverkeeper) argued that EPA should have (1) accounted for the findings at proposal that Option 3 (all cooling towers) would have the least adverse impact of employment and could boost the economy in the near-term, and (2) relied on those findings in selecting "all cooling towers" as the basis for the regulation. As described above, EPA views the employment effects analysis undertaken at proposal, and now for the final rule, as involving considerable uncertainties. Moreover, regardless of the methodology, EPA concluded that the existing facilities rule will not have a substantial impact on employment – positive or negative – and does not consider the rule's potential employment or total economic effects a key factor in defining the final rule. Finally, EPA notes that it did not find employment effects to be dispositive in its decision to reject closed-cycle cooling on a national basis as BTA. Rather, EPA rejected closed-cycle cooling based on three factors: land availability, air emissions, and remaining useful life. See the final preamble for additional information.

Arguments Supporting the Existing Facilities Rule Based on Potential Employment Requirements

As described above, EPA assesses that the final rule could have a range of employment effects – overall positive or overall negative – and with a varying profile over time; however, none of the analyses undertaken, or information provided by commenters indicate these effects would be substantial.

Essay 37: Adverse Impacts on National, State, and Local Economies

The commenters expressed a range of concerns regarding the potential adverse impact of the 316(b) regulation on the overall economy, at the national, state, and local levels. Commenters also argue that this regulation is likely to impede economic recovery both at the national level and in the individual States represented by the commenters. Commenters' arguments include:

- Given that the current nationwide recession forced many people out of jobs and many companies, and state and local governments into financial distress, EPA must ensure that new regulations are "thoroughly necessary, justified, and produce maximum net benefits" for each regulated facility. These commenters believe that the 316(b) regulation does not yet meet these standards.
- High compliance costs of the 316(b) regulation will lead to premature retirements of generating facilities, reduced electricity availability, higher costs of manufactured goods, and higher electricity costs to consumers at a time when they can least afford them without providing corresponding benefits.
- The 316(b) regulation by itself and combined with other recently promulgated and currently pending regulations, will slow economic recovery.
- The very high cost of cooling towers would lead to higher electricity rates for State residents and present reliability concerns.

EPA acknowledges commenters' statements about the state of the U.S. economy overall and of certain States, in particular. However, EPA disagrees that the 316(b) regulation will adversely affect the national and State economies. EPA notes that some of these comments were made specifically in the context of the higher cost and operating impact of a regulation that would require facilities to meet BTA based on entrainment mortality technology – i.e., cooling towers. The final rule establishes a BTA standard for impingement mortality based on the performance of modified traveling screens with a fish return system. The rule provides seven alternatives for complying with the standard, only one of which is cooling towers (for details on these requirements, please see the preamble for the final rule). Further, the final rule does not establish a BTA standard for entrainment that requires installation of cooling towers or achievement of equivalent flow reductions. Therefore, to the extent that commenters' concerns about the potential effects of the final rule on the national, State and local economies, including effects on the economic recovery and electricity rates, are premised on the assumption of a nationally-mandated requirement for cooling towers, the assumption is in error.

The BTA entrainment standard for the final rule requires the development of BTA entrainment controls for each facility subject to the rule in a site-specific permitting proceeding. In that proceeding, the Director must consider specified factors in determining required controls. The final rule specifies a range of information that must be submitted and considered by the Director as part of the NPDES permit application. Among items and where applicable, this includes entrainment performance studies, a comprehensive technical feasibility and cost evaluation study, a benefits evaluation study, and a non-water quality environmental and other impacts assessment. See additional discussion in section VI.I of the final preamble.

EPA estimated nationwide total annual costs for the final rule accounting for facilities' compliance costs to meet the BTA standards. This includes costs to comply with the IM performance standards and the study/reporting requirements associated with the site-specific permitting framework established for entrainment. While EPA acknowledges that some facilities will likely incur costs to comply with site-specific entrainment determinations as a result of this framework, EPA could not reliably predict the outcome of such proceedings, and therefore, the cost of any entrainment control measure a facility might be required to implement. See Essay 14 and 15. Also see Essay 31and Essay 39. The EPA estimates that the total annual cost of the final rule, including costs of complying with the BTA impingement standard and costs to conduct the required permit application studies and gather and submit the additional data and information, is between $275 million and $297 million, depending on the discount rate. This is extremely small in relation to the total economy – less than 0.01 percent of GDP in 2012. Accordingly, EPA disagrees that the final rule will impede the economic recovery.

As stated above, the final rule does not establish a BTA standard for entrainment that requires installation of cooling towers or achievement of equivalent flow reductions and EPA did not estimate the cost of requiring cooling towers everywhere for the final rule. However, in the EA report for the final rule, EPA did estimate the cost for requiring entrainment control measures, e.g., cooling towers, at all facilities with 125 mgd or greater (Proposal Option 2), which account for 90 percent of actual flows. The total annualized cost for that option would be approximately $3.6 billion at the three percent discount rate, which is under 0.03 percent of GDP in 2012 and would not be large enough to adversely affect the economic recovery.

In addition, EPA does not agree that the final rule will lead to consequential early retirements of electric generating capacity. As described in Chapter 6 of the EA report, EPA found that the final rule will lead to a very modest increase in capacity retirements – less than 0.1 percent of total baseline capacity at the national level and no more than 0.8 percent of baseline retired capacity in any North American Electric Reliability Corporation (NERC) region, projected to occur in TRE. EPA assesses that these very small retirements are inconsequential relative to total national and regional generating capacity. As a result, the final rule will not significantly affect electric supply reliability – both nationally and by NERC region.

Further, EPA also disagrees that the final rule will have a significant adverse impact on electricity rates. As documented in Chapter 4 of the EA report, EPA estimates very small electricity rate increases in general and by consumer group, and very small increases in annual household bills. For the final rule, under an assumption that all compliance costs would be passed through to consumers in electricity rate increases, EPA estimated that rates would increase by approximately one one-hundredth of a cent per kWh across the United States. On a percentage basis, the estimated rate increases are comparably small, both nationally and by region: the estimated percentage increase in electricity rates averages 0.09 percent nationally, with the largest increase by region being only 0.15 percent. EPA concludes that these small increases are reasonable in relation to the Clean Water Act-mandated environmental improvements achieved by this regulation.

Finally, EPA notes that the final rule does not specify a timeline for compliance with any entrainment requirements that result from the site-specific determination. Instead, the rule gives Permit Directors authority to establish compliance schedules and specific compliance requirements based on identified concerns, if any, over capacity losses and electric supply reliability. Further, this authority given to Permit Directors to establish compliance schedules and compliance requirements at the local level addresses commenters' concern that the rule be implemented in a way that will maximize net benefits to society – both overall and locally. For details, see Essay 22.

Essay 38: Impact on Rural Electric Cooperatives

Multiple commenters argue that this regulation would adversely affect rural cooperatives in a disproportionate manner. Commenters' arguments include:

- Because electric cooperatives are not-for-profit, they would have to pass all compliance costs directly onto consumer-owners.
- Electric cooperatives, being rural, have "fewer consumers" to which they may pass compliance costs, leading to disproportionately higher impacts on electric cooperatives and their customers.
- Businesses that are cooperatives' electricity consumers will lose competitiveness due to higher electricity prices.
- Communities with already stressed budgets for schools and other public services will be adversely affected as they enact budget cuts in response to increased rates.
- Rural cooperatives may close due to regulatory requirements, leading to job losses.

EPA does not agree with the commenters' arguments on several grounds.

- EPA notes that the commenters provided no substantive information to support their claim that electric cooperatives, as an ownership category, would incur impacts that are disproportionately greater than that of other ownership categories. The arguments are all qualitative and conjectural with respect to how electric cooperatives and their customers might be disproportionately affected by the final rule. Commenters argue that the business profile of electric cooperatives in terms of a requirement to pass through compliance costs in electricity rates is somehow different from other categories of ownership in terms of potential for adverse impact. EPA does not agree with this claim. Much of the generating capacity estimated subject to the final rule (61 percent) continues to operate in States with rate-regulated electricity generation markets where costs are passed forward in rate increases to electricity customers. Customers of electric cooperatives will experience similar rate effects to those experienced by the customers of regulated utilities and municipally owned generators that incur costs from the final rule: both of these categories of generators will pass forward essentially all compliance costs to their customers. EPA also notes that estimated rate effects are uniformly quite low by electric power market region.
- Commenters argue that electric cooperatives have "fewer" customers and that this profile again will somehow lead to a disproportionate adverse impact from the final rule. EPA notes that the scale of compliance technology requirements and associated costs increase in an approximately proportional manner to the size of affected generating facilities and presumably the customer base that they serve. As a result, just because electric cooperatives have a smaller generation and customer base does not mean that their customers will incur disproportionately higher rate effects. Some commenters pointed out that electric cooperatives have very low customer density on an area basis, and that this

operating profile would somehow lead to disproportionately higher rate effects. This argument might have validity if the final rule applied requirements to electric power distribution systems. However, the rule applies only to the cooling water intake systems of the generating facilities; customer density on an area basis will have no effect on the costs incurred by those customers.

- Finally, EPA's analysis finds that electric cooperatives, like parent entities of regulated facilities in other ownership categories, will generally incur low costs relative to their baseline revenue. In addition, EPA's analysis also finds that cooperatives will not be disproportionately affected in terms of compliance costs compared to parent entities of regulated facilities in other ownership categories. As reported in Chapter 4 of the Economic Analysis of the Final Section 316(b) Existing Facilities Rule (EA) report, EPA used a cost to revenue analysis at the level of the parent entity to assess potential cost impacts on owners of electric power facilities that are subject to the final rule. From this analysis, EPA estimates that all electric cooperatives that own regulated facilities will incur costs of less than 1 percent of revenue under the final rule. This finding is almost identical to the finding for all other ownership categories, with majority of owners of regulated facilities incurring costs of less than 1 percent of revenue under the final rule. Based on this analysis, EPA does not agree that electric cooperatives, as an ownership category, will incur costs that are systematically higher than those of other ownership categories.
- Some commenters raised the possibility that electric cooperatives that own regulated facilities might close because of the final rule. EPA notes that its analysis of the impact of the final rule on generating capacity conducted using the Integrated Planning Model (IPM) found very limited closure effects, with only 23 of the 14,920 generating units modeled in IPM closing under the final rule, which accounts for only 0.1 percent of total national capacity. The vast majority of these generating units are at facilities not owned by cooperatives.
- Given these overall findings, EPA does not agree that commenters' other arguments concerning, for example, impact of public budgets and public services, are valid in terms of disproportionate adverse impacts.

Essay 39: Reliability and Electricity Rate Impacts

Overview of Comments

Commenters expressed concern over the potential effects of the regulation on generating capacity and electric supply reliability, and on electricity rates at the national and State levels. The comments include:

- Commenters pointed to potential premature plant retirements, resulting from the large expenditures otherwise required to comply with the Section 316(b) Existing Facilities Rule, leading to capacity shortfalls, decreased electricity supply and reliability issues. In turn, these effects would lead to higher electricity rates for consumers.
- Some commenters specifically pointed out that the cost of installing cooling towers would be too burdensome for some facilities forcing them to retire. Other commenters, to support their reliability and electricity rates concerns, cited studies published by the North American Electric Reliability Corporation (NERC) and Electric Power Research Institute (EPRI).
- Some commenters stated that it is unrealistic to assume that this rule would not result in any closures, given that one facility they used as an example is likely to shut down.
- Some commenters pointed out that the electric generating facilities subject to the final rule are base-load steam electric generating units, which are essential to meeting electricity demand, maintaining adequate reserve margins, and providing electricity at affordable rates. These commenters pointed out that making sure that these units are not adversely affected is essential to meeting ever growing electricity demand as the economy recovers from recession.

Riverkeeper, on the other hand, argued that even the most stringent option analyzed in support of the Proposed Section 316(b) Existing Facilities Rule – Option 3, which would require closed-cycle retrofit for all facilities – would not have adverse reliability effects or result in large electricity rate increases at the national or NERC region level. Even the small estimated capacity retirements, Riverkeeper argued, are likely to be overestimated. Further, Riverkeeper added that, potential reliability effects, if any, under this option, can be mitigated by new energy efficiency, demand side measures, and usage of renewable resources. The absence of plausible electric reliability concerns associated with Option 3, Riverkeeper argued, is another reason that EPA should select Option 3 when promulgating the Section 316(b) Existing Facilities Rule. Riverkeeper specifically challenged assumptions used in two studies that assessed the reliability effects of a closed-loop cooling tower requirement under the 316(b) regulation – (1) the NERC 2010 Special Reliability Scenario Assessment; Resource Adequacy Impacts of Potential U.S. Environmental Regulations and (2) the 2011 Review of the Potential Impacts of Proposed Environmental Regulations on the ERCOT System – and argued that because of these assumptions, the impacts estimated in these studies are overstated.

- Riverkeeper argued that the assumption of no cost-pass-through EPA made in the cost-to-revenue analysis conducted at the facility and entity level and the assumption of 100 percent cost pass through EPA made in the electricity rate and household impact analyses are overly conservative and unrealistic.

- Florida Public Service Commission (FPSC) expressed concerns regarding the impact the section 316(b) regulation will have on electricity rates and consequently, Florida residents and economy. FPSC also presented results of its own electricity rates analysis.
- One commenter suggested that the final rule should encourage the operation of units with the lowest cost and lowest emissions in order to minimize the increase in electricity rates.
- Some commenters noted that because there is only a short period is which regulated facilities are expected to install compliance technologies to meet impingement mortality limits, all these facilities, which make up nearly 50 percent of all electricity power facilities in the industry, will be competing for scarce resources during the same time.
- Some commenters argued that because of the dynamics of deregulated wholesale markets, facility closures in those markets will result in higher profits to facilities that will not need to do anything to comply with the 316(b) regulation, and in higher electricity prices to consumers even when there are no environmental improvements in the areas they live in. These "unproductive" costs, these commenters argued, "represent a diversion of funds that would be better spent on environmental improvements or on reducing costs to already overburdened consumers."
- EPRI expressed concern that EPA did not assess the impact of changes in electricity rates due to regulation on low income consumers as part of the environmental justice (EJ) analysis.

Still, other commenters urged EPA to consider alternative compliance standards for load-following and peaking generating units.

- "...several urban areas were identified where the existing transmission system would not be able to transfer sufficient electricity during periods of extended downtime." (EPA 2011a, p. 22208)
- "While BLE is not located in an urban area, it does serve an area that has been transmission-constrained. EPA found that, in some areas, even though excess capacity could be generated by other plants within the area, it may not be enough to replace the capacity lost during the extended downtime." (EPA 2011a).

General Concerns Regarding Reliability and Electricity Rate Impact

EPA acknowledges commenters' concerns regarding the potential impact of the 316(b) regulation on reliability and electricity rates. However, as documented in the economic analysis for the final rule, EPA's analyses found no material adverse effect on reliability and electricity rates from the final rule. Accordingly, EPA does not agree with commenters' claims of adverse impact. Moreover, EPA notes that most of these commenters did not provide specific information to substantiate these concerns – in particular, as the concerns relate to the 316(b) existing facilities rule. Some commenters cited the fraction of electric power generating capacity subject to the 316(b) regulation as a sign of potential reliability issues and large electricity price increases. However, EPA does not agree that the fraction of generating capacity subject to regulatory requirements, by itself, is a meaningful indicator of reliability issues, or of large increases in electricity rates.

First, under the final rule, specific regulatory requirements, and associated compliance costs, will vary by facility and depend on baseline characteristics of a given facility; some facilities will not have to install any compliance technology. For those facilities that install compliance technology, the impingement control performance that is specified by the rule is considerably less expensive, and results in considerably smaller energy effects, than entrainment control technology (cooling tower), the technology standard on which a number of the commenters based their concerns. In particular, the NERC, EPRI and ERCOT studies that were referenced in some of these comments all assume a requirement for installation of closed-cycle recirculating systems, which is not established as Best Technology Available under the final rule. In addition, the final rule establishes a structure, information requirements, decision criteria, schedule and an overall process for assessing entrainment on a site-specific basis that will serve to guide permittees and permitting authorities in implementing the rule requirements. To the extent that facilities believe non-water quality impacts such as reliability (including localized transmission concerns), etc. should be considered in the site-specific determinations, the final rule provides for the opportunity for facilities to provide such information and for the Director to consider it, as appropriate.

Second, the magnitude of electricity rate effects will vary by region and depend on the cost of compliance technology, the fraction of capacity affected by the regulation, and the extent to which regulated facilities in that region will be able to pass their compliance costs through to consumers. Whether and to what extent regulated facilities are able to pass their compliance costs to consumers will also affect the magnitude of financial impact on those facilities. As discussed in Chapters 4 and 6 of the Economic Analysis for Section 316(b) Exiting Facilities Rule (EA) report, EPA found no indication that the final rule will have substantial adverse financial effects on either regulated facilities or their parent entities, result in adverse reliability impacts, or lead to significantly higher electricity rates. While EPA did not conduct its cost and economic impact analyses at the level of the individual State, the Agency did perform analyses by NERC region, which is a more appropriate market concept than individual states for understanding potential reliability and electricity rate effects. None of the analyses, whether at the national level or by NERC region, found a substantial adverse effect on reliability or rates.

Concerning a potential impact of the existing facilities rule to not use the lowest production cost and lowest emission generating units, the rule does nothing to interfere with dispatching the lowest production cost units to meet electricity demand. Regional power pools and system operators are expected to continue use of economic dispatch. Given the finding of small effect on electric supply reliability and electricity rates, EPA further concludes that the final rule does not alter production costs and dispatch patterns in a way that leads to higher electricity rates.

Potential Capacity Closures Due to the Final Rule

Some commenters argued that EPA estimated no capacity closures at proposal for the existing facilities rule and disagreed with this finding. In fact, EPA did estimate and report capacity retirements as part of the cost and economic impact analysis for the proposed and final rules. As discussed in Chapter 6 of the EA report for the final rule, EPA found that the final rule will result in some capacity closures. However, the capacity retirements estimated for the final rule represent very small shares of total generating capacity in the United States (e.g., 0.1 percent of total generating capacity in 2030 for the analysis of the final rule) and would not result in adverse reliability effects. Further, the small capacity retirements are likely to be easily replaced by new capacity.

Given the finding of minimal expected capacity closures across the regulated industry due to the final rule, EPA also found the concerns regarding base-load units are not likely to be realized.

Argument that Capacity Closures and Related Reliability and Rate Effects under an All-Cooling Tower Regulation Would be Acceptable

Riverkeeper stated that capacity retirements estimated for each of the regulatory options analyzed in support of the Proposed Section 316(b) Existing Facilities Rule are not nearly enough to cause reliability concerns, given the very small absolute amount and share of total generating capacity they represent. Further, Riverkeeper stated that the outlined compliance schedule provides enough lead time to construct capacity required to replace any capacity retired under Option 3 (all cooling tower). Riverkeeper further argued that even these small effects are likely overstated because the Integrated Planning Model (IPM) platform EPA used for the market model analysis conducted for the proposed rule – IPM V3.02_EISA – reflects out-of-date demand forecasts (from Department of Energy's Annual Energy Outlook for 2008), which are higher than current demand forecasts. According to Riverkeeper, in DOE's more current projections – AEO2011 – electricity demand in 2030 is more than 12 percent below that projected in AEO2008. Therefore, Riverkeeper claimed, less retired capacity would need to be replaced by new cleaner capacity, thereby reducing the overall cost of analyzed options and reliability concerns.

Riverkeeper also cites IPM analyses that it undertook using a more recent IPM platform – IPM V4.10 – which also showed small adverse capacity effects from an all-cooling towers regulatory option.

EPA acknowledges Riverkeeper's arguments concerning the IPM platform and capacity impact findings from proposal. For its market model analysis of the final rule, EPA used a more current IPM platform – IPM V4.10_MATS – which reflects more current electricity demand forecast and includes costs associated with Final Mercury and Air Toxics Standards (MATS) and Cross-State Air Pollution Rule (CSAPR). This platform is also more current than the IPM V4.10 platform that Riverkeeper used in its own analyses. As discussed in Chapter 6 of the EA report, EPA found minimal capacity effects from this analysis.

EPA notes that while it considered closures, reliability, and rate effects in evaluating regulatory options for the final rule, none were dispositive. See section VI of the final preamble.

Argument that Adverse Capacity Effects are Overstated because of Overly Conservative Assumptions in the IPM Analysis

Riverkeeper noted that retirements are likely overstated in the IPM analysis because EPA assumed that none of the rule's compliance costs would be passed to consumers, which Riverkeeper argues is an overly conservative assumption, and leads to overstatement of adverse effects. In response, EPA notes that Riverkeeper's understanding of the IPM analysis is not entirely correct in that to the extent that IPM models purely competitive wholesale markets, it allows for some pass-through of compliance costs. As a result, some regulated facilities may be able to recover some of their compliance costs in the context of IPM analysis. To the extent that some facilities actually operate under a cost of service rate regulation framework, they will likely be able to pass nearly all of their compliance costs through higher electricity rates. As a result, regulatory impacts as modeled in IPM may be overestimated. Regardless, as described above, EPA found minimal adverse capacity impact for the existing facilities rule – in both the analyses at proposal and for the final rule.

As noted above, EPA notes that while it considered closures, reliability, and rate effects in evaluating regulatory options for the final rule, none were dispositive. See section VI of the final preamble.

Argument that Overly Conservative Consumptions Regarding Cost Pass-Through Lead to Overstatement of Impacts on Consumers *and* Overstatement of Impacts on Regulated Facilities

Riverkeeper argued that the assumption of no cost pass through EPA made in the cost-to-revenue analysis conducted at the facility and entity level, and the counter-case assumption of 100 percent cost pass-through for the electricity rate and household impact analyses, are overly conservative and overstate impacts in either direction. EPA acknowledges Riverkeeper's concerns that these assumptions are conservative and likely to overstate impacts. However, EPA made these assumptions to avoid understating the potential impact of the existing facilities rule *in either direction of effect* – that is, for either the potential impact on regulated facilities that would incur compliance cost impacts at the outset, or for the impact on electricity consumers who would bear any rate increases resulting from the regulation. Given the analytic challenges and uncertainty in accurately assessing the cost incidence of the rule, EPA judges these assumptions as reasonable and appropriate for assessing the rule's potential impacts on affected parties (see Chapter 3 of the EA document for further discussion of these considerations).

EPA notes that while it considered impacts to the regulated facilities and their parent entities as well as electricity consumers in evaluating regulatory options for the final rule, neither were dispositive. See section VI of the final rule preamble.

Overall Argument Favoring an All Cooling Tower Regulation

Overall, Riverkeeper argues that findings of low adverse impact on capacity, electric supply reliability, and electricity rates provide a basis for EPA to adopt closed-cycle recirculating system technology as the technology basis of the final rule (Best Technology Available or BTA). EPA acknowledges Riverkeeper's statements and presentation of findings from EPA's analyses. However, as described in the Federal Register notice for the final rule, and as documented in the TDD and EA reports, EPA based its determinations for the 316(b) existing facilities rule on a range of factors. While EPA considered non-water quality and other impacts described above in evaluating all of the regulatory options for the final rule, they were not dispositive. As explained in section VI of the preamble, three factors collectively support rejecting closed-cycle cooling systems as a uniformly applicable BTA for existing facilities (except new units). These are land availability, increased air emissions and remaining useful life. Also, see Essay 10.

Potential Impact of Rule on Electricity Consumers

EPA acknowledges FPSC's concern regarding the potential impact of the existing facilities rule on Florida residents. EPA notes that while FPSC presented results of its electricity rates assessment, it did not provide enough information to validate these results. Further, FPSC estimated an average increase in a monthly residential bill per $100 million in environmental compliance costs. As shown in Table 4-6 of the EA report, EPA estimates that FRCC, which covers the vast majority of Florida (the entire area east of the Apalachicola River; areas west of the Apalachicola River are within the SERC Region), will incur approximately $32 million in compliance costs under the final rule or $0.14 per MWh of electricity sales. As shown in Table 4-8 of the EA, this cost results in an average *annual* household bill increase of $1.91 or an average household *monthly* bill increase of $0.16. Using FPSC's assumption that a typical residential Florida consumer uses 1.2 MWh of electricity per month, the average increase in a monthly household bill would be $0.17. EPA judges that this small increase in an average monthly bill is reasonable in relation to the Clean Water Act mandated environmental protection achieved by this regulation.

Argument that Limited Timeframe for Regulatory Compliance May Lead to Difficulties in Facilities Achieving Compliance with the Rule, with Associated Reliability and Rate Impacts

Commenters express concerns that the large number of facilities subject to the Section 316(b) Existing Facilities Rule and the limited number of years for facilities to meet the rule's impingement mortality limits could lead to challenges in facilities obtaining the capital, materials, and/or labor needed to install compliance technology. As a result, inability to achieve compliance would adversely affect supply reliability and rates if facilities are not able to generate electricity. EPA acknowledges these concerns; however, EPA does not agree with the commenters.

To address concerns about the compliance schedule in the proposed rule, EPA revised the compliance requirements in the final rule so that the Director is required first to establish entrainment requirements in the final permit. The facility will then be required to comply with the impingement mortality standard as soon as practicable thereafter. In addition, because an entrainment requirement could require controls that take many years to design, finance and construct, the Director may establish interim milestones related to meeting the final requirements to ensure that the facility is making progress. These changes in the compliance timeline in the final rule, including the flexibility provided to Permit Directors to adjust compliance schedules and permit application requirements based on local considerations, should further reduce any compliance scheduling difficulties or inefficiencies facilities may have anticipated under the proposed rule. See section VIII on implementation in the preamble for more detailed discussion.

Finally, in addition, discussed in the EA, the incremental resource requirements of the final rule are relatively small.

Undesirable Transfers of Income from Consumers to Electricity Generators

Commenters argue that some electricity generators may receive higher rates and profits in deregulated wholesale electricity markets, even if they do not install compliance technology as a result of the regulation. EPA acknowledges the commenters' argument. However, EPA notes that once the Agency promulgates a regulation in a deregulated market, the Agency does not control which facilities will close, which facilities will incur additional compliance costs, and which will be deemed to already be in compliance because of technologies or practices they have already installed or undertaken. That is the nature of a deregulated market. Therefore, in a deregulated electricity market, it is possible that electricity prices may increase in certain locations as a result of the rule, but on average nationally, EPA estimates an average increase of $1.03 per household as a result of the final rule.

Assertion that EPA Assess the Potential Impact of Electricity Rate Increases on Low Income Consumers

EPRI argued that EPA should account for the potential impact of regulation-induced increases in electricity rates on low income consumers in the context of the environmental justice (EJ) analysis for the regulation. EPA acknowledges EPRI's concern. However, EPA met the requirements for EJ analysis in accordance with Executive Order 12898 on Environmental Justice. Moreover, as discussed in the EBA report for the proposed rule and EA report for the final rule, EPA assessed the impact of electricity price effects based on 'typical household' electricity consumption levels independent of household income level, and did not find a substantial impact.

EPA Should Consider Alternative Compliance Standards for Load-Following and Peaking Generating Units

EPA has addressed the issue of using capacity utilization rates as a basis for alternative compliance standards in Essay 19. See that essay for a detailed discussion.

Essay 45: Market Model Analysis Conducted Using IPM

The Electric Power Research Institute (EPRI) and Riverkeeper commented on various aspects of EPA's electricity market model analysis using the Integrated Planning Model (IPM).

Commenters' arguments include:

- **Some results appear contradictory and/or counterintuitive:** EPRI argued that some of the results of EPA's market model analysis using IPM appear contradictory, and stated that EPA should better defend or explain these counterintuitive results:
    - Electricity prices decrease in several North American Electric Reliability Corporate (NERC) regions despite the cost of regulatory requirements analyzed for the proposed rule. EPRI found it especially counterintuitive because these same NERC regions are projected to have less retired capacity under regulatory options.
    - Some generating units avoid closure in the analysis – i.e., units closing in the baseline scenario but remaining open in the policy scenario – despite electricity price decreases.

EPRI does not explicitly state that these concerns refer to results reported for the steady-state analysis year of 2028; however, the analysis results to which EPRI referred are for that year. Further, the concept of capacity retirement is relevant only in the context of the steady-state analysis.

- **Use of an older IPM platform and potential overstatement of rule impacts:** Riverkeeper expressed concern that EPA's market model analysis for the proposed rule is based on an older platform – IPM V3.02_EISA – which (1) does not reflect newer air regulations (most notably, the final Cross-State Air Pollution Rule (CSAPR) and Mercury Air Toxics Standards (MATS)), (2) incorporates an older, pre-recession electricity demand forecast, and (3) does not incorporate the most current universe of electric generating units. As a result, Riverkeeper argues that EPA's proposal analysis was not as "accurate as it could have been," and, more specifically, overstated the potential impacts of the existing facilities rule options, in particular, the previous Option 3 ("all cooling towers").

  Following publication of the proposed rule analyses, Riverkeeper commissioned its own analysis of the 316(b) "all cooling towers" option, using a more current IPM platform – IPM V4.10 – which incorporates final CSAPR and MATS, a more recent electricity demand forecast, and an updated universe of generating units. In this analysis, Riverkeeper found lower capacity retirements for the "all cooling towers" option than EPA reported in its analysis at proposal. Riverkeeper argues that EPA should take these findings into account in deciding on the final rule.

EPA acknowledges the comments from both parties, and has responded directly to parts of these comments in its analyses and documentation for the final rule. Specific responses to EPRI's and Riverkeeper's comments concerning the IPM-based market model analysis follow below.

Also, the EPA also would stress that its decision about what national standards for impingement and entrainment to promulgate took a variety of factors in addition to the impacts of different control options, into consideration. In deciding on its final regulatory option (and in rejecting others), projected impacts from IPM were not a dispositive factor. See section VI.E of the final preamble for additional discussion.

Some Results Concerning Electricity Rates Appear Contradictory and/or Counterintuitive

EPA understands EPRI's comments that the IPM-based findings of lower electricity rates in some NERC regions for the 316(b) regulatory options may be counterintuitive, and has provided stronger explanation of these results in its documentation for the final rule.

Responding more specifically to EPRI's comment regarding decreasing electricity rates in certain regions, EPA emphasizes that the findings of potential increases or decreases in electricity rates are very small for all of the regulatory options analyzed in IPM, and in particular, for the final rule specification. EPA views these small changes – increase or decrease – as being well within the uncertainty range of the IPM analysis system.

Responding specifically to EPRI's comment regarding avoided capacity losses despite electricity rate decreases, EPA observed similarly small retirements of generating capacity for the regulatory options and by NERC region. EPA also notes, as did EPRI, that some capacity estimated as a baseline closure in IPM becomes an avoided closure under a given regulatory option. This finding would result from differences in compliance costs across generating units: some units that are closures in the baseline return to economic viability in the policy case because they would incur lower or no compliance costs due to some operating characteristic and consequently, will become less expensive to run, compared to other operating units that incur higher compliance costs. To address these counterintuitive findings, EPA has strengthened its discussion in the economic analysis report for the final rule.

Regarding EPRI's comments that EPA did not account for electricity rate effects in its environmental justice analysis, or in the employment impact analysis, EPA refers the commenter to EPA's responses to comments on environmental justice (Essays 39 and 73) and employment effects (Essay 36).

Use of an Older IPM Platform and Potential Overstatement of Rule Impacts

EPA acknowledges Riverkeeper's observation that it used an IPM platform for the proposed rule analyses (IPM V3.02_EISA) that is not as current as platforms developed since that time. After the proposed rule analysis, EPA developed the IPM V4.10 platform, which was used in Riverkeeper's analyses, and later the IPM V4.10_MATS platform. EPA also acknowledges that using a more current IPM platform might have shown different regulatory effects. As discussed in Chapter 6 of the Final Economic Analysis for the Final Section 316(b) Existing Facilities Rule (EA), EPA conducted a market model analysis of the final rule using the most current IPM platform available at the time of analysis – IPM V4.10_MATS; this platform is updated from the IPM platform – IPM V4.10 – used for Riverkeeper's analysis of Option 3. While the IPM V4.10 embeds the Proposed Transport Rule and the Proposed Toxics Rule, the IPM V4.10_MATS platform embeds both Final CSAPR and MATS. The analysis using the more current platform continues to find very small rate and capacity effects. Given these findings, EPA continues to conclude that the rate and capacity effects of the final regulatory option are acceptable.

Essay 47: Economic Impacts on Manufacturers

Commenters claim that EPA's assessment of economic impact on manufacturers fails to appropriately consider a number of adverse impacts.

- EPA did not account for the impact of increased electricity rates on manufacturers.
- Manufacturers face stiff competition from foreign producers who are not subject to the 316(b) regulation.
    - EPA acknowledges no cost pass-through and that costs will be absorbed by facilities.
    - Reducing competitiveness of manufacturers will hurt balance of trade and domestic employment.
    - EPA concludes foreign trade (really export dependence) is not a significant factor because manufacturers sell only 17 percent of output abroad.
- Manufacturers also face costs from other regulations addressing air emissions from boilers and heaters.
- Manufacturers are uniquely affected because unlike regulated public utilities, they cannot recover costs; therefore, profit margins will be directly affected as will facility's ability to hire and retain workers.
- Manufacturers are very important to both the local and national economies and a closure could have severe negative economic impacts on the local economy.

Additionally, one commenter argued that EPA did not consider the cost or the economic impact for non-manufacturing facilities that may be affected by the rule if, in fact, the intent of the proposed rule was to regulate these facilities.

A number of commenters argued that EPA did not adequately account for the impact of the existing facilities rule on manufacturers that face competition from foreign producers, whether in domestic markets or in export markets. Commenters argued specifically that EPA did not adequately account for the fact that foreign competitors would not face the rule's compliance requirements and would therefore gain a competitive advantage over U.S. producers who are subject to the rule. Some commenters stated that EPA did consider the impact of foreign competition – for example, in assuming no pass-through of compliance costs – but did not go far enough in considering the impact of reduced competitiveness on balance of trade and domestic employment. In particular, one commenter argued that EPA did not consider export dependence to be a significant factor because on average, facilities sell only a certain percentage of their output abroad. In addition, some commenters argued that many manufacturers faced compliance costs from other regulations, which again will not affect their competitors abroad.

The EPA did account very specifically for the impact of compliance costs on the ability of regulated facilities to compete with other producers, both foreign and domestic, who do not face compliance requirements under the existing facilities rule in its assessment of the cost and economic impact on manufacturers. As acknowledged by commenters, EPA's analysis of cost pass-through potential accounted for a range of factors – including export dependence and import penetration – in determining that facilities operating in any of the Primary Manufacturing Industries would not likely be able to recover compliance costs from their customers (for a complete discussion of the cost pass-through analysis, see Appendix K of the EA). Given this finding, EPA analyzed the impact of the regulation on manufacturers assuming that none of the regulated facilities would be able to raise prices to recover compliance costs and would have to absorb these costs in their baseline income and cash flow. While EPA's analysis may reflect overall conditions due generally to competition within the affected industry segments that will not experience a regulation-induced cost increase, there are likely to be instances in which some regulated facilities will be able to recover some costs through price increases. Such instances may occur in niche markets – for example, based on specific product or regional segmentation – in which facilities would have flexibility to increase prices. Alternatively, some cost recovery could occur in specific product markets in which a substantial share of production would incur regulation-induced cost increases. To the extent that some manufacturers will be able to pass the increase in their costs due to the final rule onto consumers, the assumption that no facilities would be able to increase prices is conservative and likely to overstate impacts on regulated facilities. Nevertheless, even with this conservative assumption, EPA found no significant adverse impact of the final rule on the sample of surveyed facilities in its economic/financial analysis. EPA's analysis found that no facilities would close as a result of the rule and that only three percent of facilities would encounter financial stress short of closure, i.e., adverse changes in a facility's financial position that are not threatening to its short-term viability, but may present challenges in obtaining financing, as a result of the final rule (for details see Chapter 5 of the EA).

With specific regard to the concerns about foreign competition, EPA assumed that facilities would not be able to recover compliance costs through increased prices. Given no changes in price, EPA concluded that there would be no change and certainly no negative effect on facilities' competitive position in the global market or resulting effects on domestic employment and balance of trade.

EPA recognizes that manufacturers must also comply with and will incur costs from other regulations. For this reason, EPA conducted a sensitivity analysis that accounted for the cost of other regulations that have been recently promulgated, and that could impose costs on regulated facilities. This analysis found that no facilities would incur severe impacts as a result of the combination of the final rule and other regulations (for details see Appendix N of the EA).

With respect to the potential impact on facilities' profit margins and related impact on their ability to hire and retain workers, as described in the EA document (Chapter 5), EPA performed financial analyses based on detailed income statement and baseline sheet information from an extensive sample of facilities. This analysis assessed the impact of compliance costs on facilities' cash flow and measures of financial performance and condition. As stated above, in these analyses, EPA found that no facilities would close and that only 3 percent of facilities would encounter financial stress short of closure, i.e., adverse changes in a facility's financial position that are not threatening to its short-term viability, but may present challenges in obtaining financing, as a result of the final rule.

Therefore, EPA does not expect material effects on facilities' ability to hire and retain employees. Some commenters pointed to facility closure and associated employment losses as an outcome of the regulation. Again, as described above and documented in the EA report for the final rule, EPA's analysis found no facility closures as a result of the final rule's compliance requirements.

Some commenters argued that the cost and economic impact analysis that EPA conducted is flawed because it did not account for the impact of increased electricity rates on manufacturers. Commenters contend that even a rate increase of one percent would have a major effect on manufacturers because of the large amount of electricity they purchase. As part of the impact analysis for regulated electric power facilities, EPA estimated potential rate impacts by customer class for each NERC region. This analysis assumed that regulated electric generating facilities would pass through all of their compliance costs under electricity rate regulation procedures, which may not be the case in all States, and thus may overstate the overall potential rate impact of compliance outlays on electricity consumers. For industrial customers, which would include regulated manufacturing facilities, EPA estimated an average national increase of 0.1 percent, with the highest impact, 0.2 percent, in the SERC NERC region. EPA concludes that these very small rate increases, which apply to only the electricity component of a manufacturing facility's production inputs, will have a minimal impact on U.S. manufacturers, regardless of the amount of electricity they purchase.

Finally, EPA disagrees with the assertion that it did not consider cost and economic impacts to non-manufacturing facilities, i.e., cooling water-dependent facilities that responded to the 316(b) industry survey whose principal operations lie in businesses other than the electric power industry or the Primary Manufacturing Industries. Throughout its cost and economic impact analyses, EPA refers to these additional industries as "Other Industries," but refers to facilities in these industries under the broad terminology of manufacturers. In the analyses EPA conducted for manufacturers, EPA considered impacts to both facilities in the Primary Manufacturing Industries as well as facilities in the Other Industries.

Essay 48: Rule Should Establish Performance Metrics to Track and Validate Public Policy Value of Rule's Requirements

EPA has complied with the requirements of the Unfunded Mandates Reform Act. The statute requires federal agencies, unless otherwise prohibited by law, to assess the effects of their regulatory actions on State, local, and Tribal governments and the private sector. The preamble to the final rule explains EPA assessment of the effects of EPA action and how EPA developed the information used for its assessment. In doing so, EPA has followed its traditional approach, relying on EPA standard models for its evaluations. EPA did not develop any new tools for its assessment or new models to test the impact of its regulation going forward given existing resource constraints. Based on the historic performance of its analytical tools, EPA is confident that today's assessment will appropriately reflect real word outcomes.

Essay 50: Alternative Compliance Responses

Riverkeeper claims that EPA overstated the costs of complying with any option because EPA did not consider energy efficiency, renewable energy, or repowering as alternatives. Riverkeeper points to the fact that compliance methods were inputs, as opposed to outputs, of the IPM modeling and therefore only options that directly met regulatory requirements were considered. Riverkeeper argues that repowering to combined cycle while converting to CT might provide a lower cost option than replacement with new generation, and indicates that this was not considered. Riverkeeper also highlights demand reduction through energy efficiency/demand response and replacing generation with renewable energy that doesn't require cooling water, as two additional options that EPA failed to consider. Specifically, Riverkeeper points to the results of the energy efficiency sensitivity completed for the Utility MACT, which showed a major reduction in cost.

EPA analyzed compliance responses to regulatory requirements based on detailed information for regulated facilities, including cooling water requirements, baseline cooling water intake systems, and other site and operating information that is important in determining the type, size and operating characteristics of equipment that would be needed to achieve compliance with the existing facilities rule. The technology needed to achieve compliance underlies, in turn, EPA's estimates of capital and operating costs and other operating effects (e.g., downtime, auxiliary energy requirements, and energy penalty) at the level of the regulated facility. These costs and operating effects are also the basis for EPA's estimates of the total social cost of the rule.

EPA views this approach as an appropriate and credible basis for estimating the cost of the rule. In complying with the rule, facilities may implement designs and/or changes in facility operations that differ from those estimated by EPA, and that may result in lower costs to the facilities and to society. Different approaches could include, for example, conversion of existing generating capacity to natural gas/combined cycle or renewable energy-based generation, or use of demand management approaches to offset need for electric generating capacity as part of a comprehensive strategy for regulatory compliance, as suggested by the commenter. However, whether and how facilities would implement such approaches depends on assessments of facility circumstances, business objectives, and business planning. It is beyond EPA's ability to try to account for such considerations in its analyses, given the information currently available. Accordingly, EPA acknowledges that facilities may choose less costly approaches than those embedded in its cost estimates for the final rule. In that case, the rule may prove less costly to society than EPA has estimated in its cost analysis. As a result, EPA's determinations in support of the final rule would only be strengthened as the rule's benefits would be achieved at lower cost to society.

The EPA also would stress that its decision about what national standards for impingement and entrainment to promulgate took a variety of factors in addition to the cost of different control options, into consideration. In the case of EPA's decision to adopt a prescribed national framework for determining entrainment controls on a site-specific basis as its best technology available (BTA) 316(b) standard, cost was not a direct factor in rejecting a single, national technology standard. The EPA did not reject closed-cycle cooling as the sole technology basis for the national standard because of its costs. Rather, EPA concluded that land availability, air emissions and the remaining useful plant life supported a decision to rely on a case-by-case determination of entrainment controls in a nationally-prescribed process mandating the consideration of these and other factors.

Essay 53: Electricity Rate and Reliability Impact to be Considered During Site-Specific Evaluation

Utility Water Act Group (UWAG) recommended the site-specific determinations for permit decisions should not only consider benefit and cost information, but also assessments of (1) electricity rate impacts, by consumer group and (2) reliability concerns. UWAG stated that these assessments should be made using electricity models specific to a given electric power facility's regional system.

UWAG also requested that EPA remove the phrase "within the immediate area" so it could not be misinterpreted by permit Directors to mean that reliability impacts should only be assessed within the immediate surrounding area of a power plant. Instead, UWAG believes permit Directors should assess impacts on a local, state, and regional basis.

The commenter argues that site-specific permit determinations should consider electricity rate effects and reliability concerns, in addition to more traditional benefit-cost considerations. EPA acknowledges the commenter's recommendation and points out that the final rule provides that the Permit Director may consider a range of factors in determining best technology available (BTA) on a site-specific basis, which may include entrainment control technology. Section 122.21(r)(12), Non-Water Quality Environmental and Other Impacts Assessment, of the preamble discusses the minimum information that facilities will have to submit, which includes a reliability assessment. The phrase "within the immediate area" no longer appears in the preamble at § 122.21(r)(12), Non-Water Quality Environmental and Other Impacts Assessment and EPA does not specify the geographic limits for this reliability assessment in the final rule. Instead, EPA gives latitude to Permit Directors to interpret reliability issues within an appropriately defined region. Permit Directors may account for such considerations as the market region in which generators operate, the extent of generation reserve margins at the time of installation downtime, and presence of any transmission constraints that could limit the ability of other generators to offset reductions in generating capacity due to the final rule.

In addition, facilities can submit additional information for the Director's review, which may include electricity rate assessment and any other information that facilities view as important to submit. Facilities can also submit this information as part of the comprehensive technical feasibility and cost evaluation study discussed in § 122.21(r)(10) of the preamble.

Concerning the commenter's recommendation that electricity market models specific to a given region *should* be used as the basis for information on electricity rates and reliability, EPA disagrees with the *should* element of this comment. If facilities decide that such assessments are appropriate for developing electricity rates and reliability information, then nothing in the final regulation precludes the facilities from using such models and submitting the information to the Permit Director. However, EPA does not agree that such methods for electricity rate and reliability should be a requirement or expectation for developing and submitting such information as part of permit submissions.

Essay 55: Facility-Level Compliance Costs, Social Costs, and Costs to be Submitted as Part of the Comprehensive Technical Feasibility and Cost Evaluation Study

Many commenters asked EPA to clarify the relationship between facility-level compliance costs and social costs and specify the costs each of these concepts accounts for. Further, commenters asked EPA to be more specific on what cost information facilities have to submit to Permit Directors for review; some of these comments made suggestions about what information EPA may consider requiring. These comments include the following:

- EPA should explicitly state what the facility-level compliance costs and social costs include and how these two cost concepts are related.

- EPA should clarify what cost information must be considered by permitting authorities in evaluating the comprehensive technical feasibility and cost evaluation study required under the Existing Facilities Rule. Some of these commenters noted that while EPA did state that social costs, required for submission, should include outages, downtime, and other impacts to facility revenue, the Agency should be more specific regarding what these categories should include.

- EPA should provide Permit Directors with flexibility in identifying what social costs should include to account for regional differences in economic conditions. This suggestion is based on the assumption that because of regional differences, different regulatory impacts may constitute cost to society.

- EPA should explicitly state that social costs account for fogging, icing, salt drift, and visibility impacts, which are commonly recognized public welfare impacts of closed-cycle cooling systems (Santee Cooper).

- The social costs estimated for the proposed rule (Proposal Option 1) include only costs associated with the impingement requirement and do not account for entrainment costs that will be required (Western Business Roundtable).

- EPA should include production losses associated with both manufacturing facility retirements as the result of the Proposed Section 316(b) Existing Facilities Rule and temporary facility shut downs required to install compliance technology, in social costs (American Chemistry Council (ACC)). ACC also expressed concern regarding high costs of manufacturing facility downtime, which EPA did not include in the social costs estimate.

- EPA should account for the social cost of grid reliability effects arising from electric power facility retirements and technology installation downtime (Utility Water Act Group (UWAG) and Edison Electric Institute (EEI)). UWAG and EEI further noted that

> according to studies conducted by NERA and EPRI, these reliability effects are substantial.

EPA clarified the relationship between facility-level compliance costs and social costs in the Economic Analysis for the Final Section 316(b) Existing Facilities Rule (EA) report by listing the specific cost components covered under each cost concept that EPA used in its assessment. The Agency also provided a more detailed explanation of differences in the methodologies used to estimate facility-level compliance costs and social costs. Further, EPA provided more detail on the cost information that facilities will submit as part of the technical feasibility and cost evaluation study in the preamble to the Final Rule and in the Information Collection Request for Cooling Water Intake Structures at Existing Facilities (Final Rule ICR). This information is available to guide facility representatives and Permit Directors in preparing and reviewing permit applications. Following promulgation of the rule, through outreach activities, EPA will consider the need for providing State Directors and facilities with any more detailed guidance on what cost information should be submitted for review and how certain cost may be calculated.

The final rule accommodates commenters' recommendation to provide Permit Directors with flexibility to account for regional differences in economic conditions in identifying and evaluating the specific social cost components as part of the technical feasibility and cost evaluation study. EPA notes that in discussing the permit application requirement at § 122.21(r)(10) of the rule, the rule explains the minimum information that facilities will be required to submit as part of the technical feasibility and cost evaluation study. In addition, facilities may always submit additional information for the Director's review. That information could include data on other cost components that facilities consider to be a cost to society and view as important for the Director to consider in the permitting decision.

Regarding Santee Cooper's recommendation to explicitly state that social costs of closed-cycle cooling systems account for fogging, icing, salt drift, and visibility impacts, the Agency understands that operation of closed-cycle cooling systems may indeed have these kinds of impacts depending on local circumstances. However, EPA notes that it did not adopt closed-cycle cooling as the basis for the BTA entrainment standard for existing facilities under the final rule, and the ancillary effects that may be associated with installation of a closed-cycle recirculating cycle may not necessarily be associated with other entrainment reduction technologies. Some existing facilities may install closed-cycle cooling systems to meet entrainment reduction requirements established on a site-specific basis or to comply with the new unit provision of the final rule. However, EPA cannot predict with confidence the outcome of the site-specific BTA entrainment standard-setting proceedings, and therefore, which facilities will undertake such installations. Consequently, the EPA did not specifically identify these as factors to be considered by the Director in site-specific determinations. The final rule, however, does not preclude any facility from including in its determination of social costs the elements identified above or other elements as reflecting social costs associated with closed-cycle cooling or another entrainment reduction technology. EPA notes that facilities can submit this information for the Director's review as part of the comprehensive technical feasibility and cost evaluation study if facilities consider these impacts to be of concern in their area and view the information as important to submit.

The social costs of the final rule, which closely align with Option 1 as analyzed for the proposed rule, appropriately include only direct technology costs associated with the impingement requirement and do not account for possible entrainment control technology costs for facilities for which entrainment BTA requirements will be established on a site-specific basis. As discussed in the preamble and in Essays 14 and 37, EPA did not estimate costs for entrainment controls under the final rule because the final rule does not establish a nationally applicable BTA for entrainment, but rather a framework for determining BTA for entrainment on a site-specific basis. As such, EPA cannot reliably predict the outcome of the site-specific BTA entrainment determinations. EPA did, however, estimate the cost for requiring entrainment control measures, e.g., cooling towers, at all regulated facilities with 125 mgd or greater (Proposal Option 2), which account for 90 percent of actual flows. The total annualized cost for that option would be approximately $3.6 billion at the three percent discount rate, which is under 0.03 percent of GDP in 2012 (see Essay 37).

For a response to comments regarding downtime for manufacturers to install technologies to comply with today's final rule, see Essay 35.

In terms of potential facility closures, as discussed in Chapter 5 of the EA report, EPA found that no regulated manufacturing facility will close because of the final rule. Therefore, the social cost of production lost due to facility retirements is zero.

The EPA concluded that any social costs potentially associated with the reliability effects from temporary and permanent shut downs of electric power generating facilities would not be significant for the following reasons. First, the EPA notes that its estimate of social cost did include the cost of downtime to society, which is the increase in electricity production costs from generators needing to supply the electricity otherwise produced by units that have temporarily shut down to install compliance technologies. In addition, where EPA's analysis found that capacity would be retired because of the rule, EPA assigned a social cost to this capacity loss based, again, on the differential cost of generating the replacement electricity from alternative generating capacity. However, as discussed in Chapters 4 and 6 of the EA report, EPA found that the final rule would not result in significant capacity losses either at the national level or at the level of the North American Electric Reliability Corporation (NERC) region. As a result, EPA concluded that the final rule would not result in adverse reliability effects. Finally, EPA would note that the cited NERA and EPRI studies assessed capacity and reliability impacts in the context of a requirement for closed-cycle cooling installation and operation, which is not a required compliance technology for existing units at existing facilities.

Essay 58: EPA's Consultation and Stakeholder Outreach

Several commenters stated that EPA has failed to comply with Executive Order 13132 with regards to Federalism. Specifically, commenters claim that EPA did not adequately consult with state agencies in developing the rule. One commenter stated that the Executive Order promotes localized policymaking. Commenters also requested that EPA document its compliance with this Executive Order.

Other commenters stated that this rule is important to them and can have far-reaching effects; as a result, these commenters encouraged EPA to maintain an open dialogue with stakeholders (e.g., industry, state regulators, etc.) throughout the rulemaking process.

First, for the reasons explained in Section XI. D. of the preamble and in Chapter 12 of the EA, EPA determined this final rule does not have federalism implications. Therefore, EO 13132 does not apply to this final rule.

Nevertheless, EPA has actively engaged the states in developing the final rule. As stated in the preamble, EPA has conducted significant consultation and stakeholder outreach activities during the development of the final rule. EPA also disagrees that it did not engage states "early in the process," as states have been active participants in the 316(b) rulemaking process since 2000 with the Phase I new facility rule. Many states have actively participated throughout the several phases of rulemaking. In particular, given that the final rule addresses facilities that had been previously regulated by the Phase II and Phase III rules, states have been provided with ample opportunity to participate in the process.

In addition to collection and consideration of the states' comments, EPA has also conducted outreach by staging symposia, periodic calls with states, and other activities where EPA sought the input from local, state and tribal governments. As noted in section XI (D)(1)(c) Summary of State, Local, and Tribal Government Input of the preamble, EPA has conducted several conference calls with the Association of Clean Water Administrators (ACWA), including numerous states; and small business representatives, including some local government officials. EPA also combined its efforts and collected input from state and local government entities during development of the proposed Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category, to which many of the same facilities are subject, as today's final rule; see 78 FR 34530 (June 7, 2013) for more information. State and local officials attended numerous site visits with EPA's staff, enabling EPA to gather their input; see DCNs 10-6510, 10-6518, 10-6520, 10-6521, 10-6523 and 10-6524. EPA also responded to requests for information from multiple state and local governments. In addition, EPA attended conferences and participated in workgroups (such as NARUC's 2013 Winter Committee Meetings) where additional information about state and local government interests was presented.

EPA also disagrees that it has not considered input from facilities that are owned by state and local governmental entities. As noted above, these facilities have participated in the rulemaking process for some time, including comments submitted by the commenter itself under the Phase I, II, and III rules. Government-owned generators have submitted comments throughout the process as well; see, for example, comments from the City of Orrville Department of Public Utilities in the Phase I rule and the Lansing Board of Power and Light in the Phase II rule. EPA also conducted site visits to two municipally-owned electric generators; see DCNs 10-6523 and 10-6524.

EPA also notes that the final rule embodies the principles of the Executive Order by delegating significant decision-making to the Director, who in many instances is the State permitting authority. For example, entrainment requirements are determined entirely on a site-specific basis by the state permitting authority; this is in complete agreement with section 3(d) of EO 13132. For impingement requirements, as noted in the preamble, EPA is promulgating a national performance standard, but has provided multiple compliance alternatives, in effect allowing state and local entities to determine the best path to comply.

Essay 59: Executive Orders 12866: Regulatory Planning and Review and 13563: Improving Regulation and Regulatory Review

Many commenters stated that EPA failed to comply with Executive Orders (EOs) 12866: Regulatory Planning and Review and 13563: Improving Regulation and Regulatory Review. These comments include the following:

- One commenter stated that EPA violated EO 13563 by failing to present the time profile of social costs for Option 4 analyzed in support of Proposed Section 316(b) Existing Facilities Rule.

- Some commenters stated that EPA failed to quantify the effect on employment and job creation required under the Executive Order 13563: Improving Regulation and Regulatory Review. Some of these commenters conducted their own analysis of employment effects and presented analysis results as part of their comments. Further, the United States Chamber of Commerce noted that in order to produce a better informed regulatory result and provide the public with sufficient information to comment effectively, the employment impact analysis, among other things, must account for construction effects of modifying existing facilities, increased electricity rates, early facility retirements, and regional changes in employment distribution.

- Some commenters stated that EPA failed to explain how benefits justify costs, as required under EO 13563, given that costs significantly exceed benefits under all options analyzed in support of the Proposed Section 316(b) Existing Facilities Rule.

- Eastman Chemical urged EPA to carefully consider the need for and the cost of the Section 316(b) Existing Facilities Rule given that the U.S. economy is barely recovering from the biggest economic downturn since the Great Depression, which is what the President tried to encourage policymakers to do by issuing EO 13563.

- Electric Power Research Institute (EPRI) noted that out of 12 requirements of the Executive Order 12866, EPA addressed only one – the benefit-cost comparisons. Some commenters stated that EPA must publish a complete EO 13653 review addressing all issues addressed by that EO, including, aside from employment effects (discussed above), efficacy metrics (i.e., metrics that the Agency and the public may use to judge and determine the CWIS Rule's burden and effectiveness), economic development, and information on quality certification. Regarding quality certification, the U.S. Chamber of Commerce specifically stated that EPA should have "evaluated, addressed and disclosed to the public a comprehensive Information Quality Act ("IQA") analysis as part of its EO 13563 review." Unless EPA corroborates the quality of its information, the United States Chamber of Commerce continued, "the sufficiency of its science and statistics, and hence the integrity of its regulatory choices, are in doubt."

- Some commenters stated that EPA failed to comply with EO 13563 because the Agency did not assess the cumulative impact of all recently proposed and currently pending regulations affecting the electric power industry. Some of these commenters urged EPA to conduct cumulative costs and benefits analysis of these regulations, including assessment of reliability effects, required under EO 13563. Midwest Generation, Edison Mission Energy, LLC (EME) urged EPA to keep all goals of the EO 13563 in mind when developing the Final Section 316(b) Existing Facilities Rule, including "coordination, simplification, and harmonization."

- Alcoa pointed out that the Section 316(b) Existing Facilities Rule is too prescriptive and instead of setting performance objectives, as required under the EO 13563, it sets out specific ways to comply with the rule. Further, Alcoa continued, the rule sets inappropriate standards given that the compliance responses required by the rule were developed based on the information on electric power facilities but also apply to manufacturers.

EPA complied with Executive Order 12866 and 13563. See section XI.A of the final preamble and associated analysis in Chapter 12 of the EA.

EPA also complied with requirements in the Data Quality Act and EPA's Information Quality Guidelines. For example, EPA performed its analysis supporting this rulemaking within EPA's data quality system. The commenter is incorrect that EPA must develop a comprehensive analysis that describes EPA's data quality. EPA discusses this throughout the documents supporting the rulemaking. Further, the data and analysis underlying this rulemaking have undergone multiple levels of review including many opportunities for public comment and interagency review. Finally, where commenters have provided corrections to the data, as appropriate, EPA updated it.

Comments on the Relationship between Social Cost and Benefits and EPA's Selection of and Support for the Proposed Rule

EPA acknowledges commenters' input concerning the relationship between social cost and benefits. The Agency has carefully considered both the costs of and the need for the section 316(b) Existing Facilities Rule. EPA judges that the compliance costs and resulting cost and economic impacts estimated for the final rule and detailed in the EA report are reasonable in relation to the Clean Water Act-requirement to implement section 316(b).

Failure to Provide Time Profile of Social Costs and Benefits

EPA disagrees with commenter's statement that the Agency did not present a time profile of social costs and benefits of Option 4. The Agency presented that information in Chapter 13 of the Economic and Benefits Analysis for the Proposed Section 316(b) Existing Facilities Rule (EBA) report. EPA also presented the updated time profiles of social costs and benefits for all three analyzed options in Chapter 8 of the Final Economic Analysis for the Final Section 316(b) Existing Facilities Rule (EA) report.

Failure to Explain How Benefits Justify Costs

EPA disagrees with commenter's statements that the Agency did not explain how the benefits of this rule justify its costs. See section V.H in the final preamble. Also see section X of the final preamble for a detailed discussion of the benefits analysis and section IX for a discussion of the cost and economic impact analysis.

Failure to Quantify the Effect on Employment

EPA disagrees with commenter's statements that the Agency did not quantify the effect of the proposed rule on employment and job creation as required under Executive Order 13563: Improving Regulation and Regulatory Review. For proposal, EPA presented quantitative analysis of employment effects in *Chapter 10* of the *Economic and Benefits Analysis for the Proposed Section 316(b) Existing Facilities Rule (EBA)* report.

For the final rule, EPA approached its analysis of employment effects differently than for the proposed rule. Specifically, unlike for the proposed rule, for the final rule, EPA did not estimate quantitative employment impacts but instead included only a qualitative discussion. In considering an approach for the final rule, the Agency concluded that the methods used at proposal were not sufficiently robust, largely because they relied on an input-output analysis that assumed fixed production relationships and used historical data to estimate the labor and other inputs required for compliance with the rule. Since publication of the proposed rule, EPA has concluded that the input-output analysis-based approach is inappropriate for assessing the employment impacts of national-level regulations. Input-output models are static, do not include prices, and assume the supply of all inputs is inexhaustible. They do not model a wide variety of adjustments that are expected to occur over time, such as changes in production processes, technology or trade patterns.[58]

After reviewing the public comments EPA received on the proposed rule, the Agency concludes that the commenters have not identified any specific improvements to the employment analysis of the proposed rule. EPA acknowledges some commenters' submissions of an employment effects analysis. However, because the commenters did not describe the methodology they used to generate these estimates, EPA was not able to compare the approaches and assess whether any changes to the analysis the Agency conducted were warranted.

The final rule EA includes a qualitative discussion describing potential adjustments in the labor market that may follow the rulemaking. For the final rule, EPA sought methods that would circumvent the shortcomings of the methodology used for the proposed rule. However, as discussed in Chapter 9 of the EA report, because of the complexity of factors through which an environmental regulation may affect employment, the myriad uncertainties in assessing a regulation's economy-wide, long-term employment effects, EPA conducted only a qualitative assessment of employment effects for the final rule. EPA does not currently have a sufficiently robust methodology to assess the impact of *all* possible changes in employment and quantify those changes. Moreover, based on the available evidence from several peer-reviewed econometric studies that are applicable to net employment effects in the regulated sectors (see Chapter 9 of the EA) and because closed-cycle cooling was rejected as national BTA for entrainment, EPA expects that employment impacts of today's rule are not likely to be substantial. In EPA's view, the qualitative employment effects analysis undertaken for the final

[58] For a discussion of input-output models see Chapter 8 of the EPA Handbook on the Benefits, Costs, and Impacts of Land Cleanup and Reuse (2011).

rule is appropriate to produce an informed regulatory result and therefore satisfies the requirements of the Executive Order 13563: Improving Regulation and Regulatory Review.

EPA Should Consider the Current State of the U.S. Economy

EPA considered the costs of the rule and related possible impacts of these costs on the U.S. economy. See Essay 37.

Failure to Consider the Costs and Effects of Other Rules

EPA disagrees; see Essay 29.

Need to Assess Reliability Effects

EPA addresses reliability effects in Essay 45. EPA used the most up-to-date IPM platform available at the time EPA conducted the IPM analysis for the final rule, so all relevant final rules are taken into account in the analysis. EPA cannot incorporate into its analyses, including its IPM analysis, rules that have not been finalized because it would be impossible to predict with certainty in advance what the final rule will actually be.

Need for Performance Metrics Pursuant to EO 13563

See Essay 48. Also, the final rule requires data monitoring and reporting with precisely the objective of understanding the rule's effectiveness – at the level of the individual regulated facility. Permit Directors will collect biological characterization and other performance-related data for the initial post-promulgation permit, and then with each successive permit renewal. Permit Directors will use this information to evaluate the performance of compliance approaches and to adjust permit requirements at the time of permit renewal.

Rule Does Not Set Performance Objectives

EPA disagrees. See Essays 10 and 14.

Essay 60: Other Federal Statutes

One commenter indicated that EPA has a duty under a number of Federal statutes to protect and conserve wildlife, and to cooperate with other Federal agencies in the protection and conservation of wildlife. In this connection, the commenter pointed to a number of statutes, including the National Environmental Protection Act, the Endangered Species Act (ESA), the Fish and Wildlife Coordination Act, the Bald and Golden Eagle Protection Act, the Migratory Bird Treaty Act, the Migratory Bird Conservation Act, the Marine Mammal Protection Act, the Wilderness Act, the Coastal Zone Management Act (CZMA), the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006 (Magnuson-Stevens), Federal Land Policy and Management Act, and the National Forest Management Act. The commenter states that EPA could not promulgate the final 316(b) rule without meeting its particular duties under these acts.

EPA notes that the commenter's statement was an overarching statement that covered a broad list of possibly applicable statutes and did not include any specific concerns, signaled by details or other information. EPA's rule complies with these many statutes and furthers their objectives. Furthermore, with respect to these statutes generally, EPA's final rule ensures broad cooperation between EPA, State permitting authorities and other Federal agencies to protect and conserve wildlife by establishing a permitting process that will ensure full ventilation of these wildlife conservation issues. In the case of EPA's duties under ESA, as explained in detail in DCN 12-4543, EPA has consulted with the U.S. Fish and Wildlife Service (FWS) and National Marine Fisheries Service (NMFS) (collectively, "the Services") under section 7 of the ESA on today's final rule. As to the other statutes, the contours of the final rule reflect EPA's efforts to ensure full coordination and cooperation with other Federal agencies exercising responsibilities under these statutes.

The final rule requires the Director to establish impingement and entrainment controls in a facility's NPDES permit, based on the BTA standards promulgated today. As explained in detail elsewhere, the Director determines these permit conditions in a structured setting in which the permit application requires the provision of detailed information characterizing the biological community in the vicinity of cooling water intake structures. This information must identify all Federally-listed threatened and endangered species and/or designated critical habitat that are or may be present in the action area. The rule requires that the Director must transmit the application to the appropriate Field Office of the FWS and/or Regional Office of NMFs upon receipt as well as, among other things, subsequently providing them copies of any draft permit. The information sharing provisions of this rule and the opportunity for the Services to make suggestions prior to the NPDES permitting decision will facilitate the FWS and NOAA's implementation not just of the ESA but also of many of the statutes listed above (e.g., the Fish and Wildlife Coordination Act, the Bald and Golden Eagle Protection Act, the Migratory Bird Treaty, the Migratory Bird Conservation Act and the Marine Mammal Protection Act). EPA's permit application requirements ensure that FWS and NMFS – and other Federal agencies as well -- will have a broader information base from which to make informed decisions. Thus, the rule provides ample opportunity for the Services to identify concerns related to any specific NPDES 316(b) permit and requirements under other statutes during the permit issuance process.

Consequently, the Director will have adequate information before him to develop control measures and monitoring and reporting requirements that will provide adequate protections to species. Further, the final rule provides the Director with explicit authority to require additional measures to protect Federally-listed T&E species and designated critical habitat.

For the final rule, EPA has also complied with its duties under Magnuson-Stevens, as well as the CZMA. Section 305(b)(2) of Magnuson-Stevens requires that "[e]ach Federal agency shall consult with the Secretary [of Commerce] with respect to any action authorized, funded or undertaken, or proposed to be authorized, funded, or undertaken, by such agency that may adversely affect any essential fish habitat identified under the statute]…" 16 U.S.C. § 1855(b)(2). Because the effect of the implementation of EPA's rule through NPDES permits will be to ameliorate current conditions with respect to the impingement and entrainment of aquatic organism, EPA's 316(b) rulemaking will not "adversely affect" any essential fish habitat and consultation was not required. The effects on essential fish habitat from the imposition of restrictions on cooling water intake structures will be beneficial.

EPA similarly concluded that the requirement of the CZMA for a consistency determination for certain Federal agency activities was not implicated by its 316(b) rule. This is because the final rule is not an activity under the Act, as it does not physically alter coastal resources or alter uses of the coastal zone. Further, no commenters specifically explained how this rule in any way would affect the coastal zone or be inconsistent with any enforceable policy of any coastal zone management plan. Even if it did in some way have any such effect, which it does not, any such effects will be addressed in the subsequent permitting proceeding. This approach is consistent with the preamble to NOAA's amendments to the Part 930 regulations, where NOAA stated that there are circumstances where rulemaking actions are not subject to federal consistency review because 1) they "do not authorize activities with coastal effects," and (2) even if they did result in activities with coastal effects, the activities and coastal effects would be addressed in a subsequent consistency review. 71 Fed Reg. 788, 792, 807 (2006). In forty-six states, the State is the permitting authority and will coordinate with the "State agency" designated to administer the approved coastal zone management program. In the very few states where the EPA issues the NPDES permit, the EPA will undertake any required CZMA consultation with the appropriate coastal zone management program. EPA's NDPES permitting regulations specifically require adherence to the CZMA when issuing NPDES permits at 40 C.F.R. § 122.49(d) and prohibits EPA from issuing an NPDES permit unless the applicant certifies that its activity complies with the State's program or the State concurs with the certification.

Essay 64: Inter-Agency Review

Multiple commenters raised issues concerning the extent of review and participation by other agencies in developing the proposed rule. In particular, the Louisiana Department of Environmental Quality argued that EPA should encourage agencies such as the Army Corps of Engineers, Coast Guard, Occupational Safety and Health Administration, and Department of Commerce to review the rule, as it will affect the navigation of waterways, worker safety, and commerce.

Riverkeeper criticized OMB's review and participation in development of the proposed rule.

EPA disagrees that it did not seek review and comment from other agencies in developing the proposed rule. Specifically, EPA conducted an interagency review under OMB pursuant to EOs 12866 and 13563, which provided all interested Federal agencies with the opportunity to review and comment on the draft regulation. Also, more than 40 state government agencies submitted comments on the proposal and seven additional agencies submitted comments on the NODA.

Regarding OMB's participation in developing the proposed rule, EPA submitted the proposed and final rule to OMB for review in accordance with EO 12866. OMB's participation in the rulemaking process is part of the ordinary process for interagency review, as required by law.

Essay 68: New Capacity

In the Federal Register publication for the proposed rule, EPA requested comment on the number of new units and the amount of new capacity construction projected. Several commenters responded to this request with “no comment.” Riverkeeper responded with a comment on the quantity of capacity that might retire early because of the existing facilities rule, and indicated that new capacity additions would offset any capacity losses due to early retirement.

EPA agrees that only a small quantity of generating capacity would be expected to retire prematurely because of the existing facilities rule. Comments to this effect are consistent with the results EPA obtained on potential capacity effects from its IPM-based electricity market analysis undertaken for the final rule. EPA agrees that any capacity effects due to the final rule will be managed within the electricity supply system without adverse impact on electric supply reliability or electricity rates. EPA views this finding as supportive of the Agency’s determinations regarding requirements of the final rule.

Essay 70: General Comments on Nonuse Benefits

EPA received a number of comments on the issue of nonuse benefits arising from the impingement and entrainment (I&E) controls under the regulatory options. This essay responds to those comments. Additional essays respond to specific issues related to the estimation of nonuse benefits.

In comments 2200, 2210, 2192, and others, the Electric Power Research Institute (EPRI), the Utility Water Act Group (UWAG), PSEG Services Corporation, and others commented on what they considered to be EPA's reliance on nonuse values to justify the costs of the rule, the likelihood that these values are significant, and the application of EPA's methods to site-specific analyses. For example, two private citizens find EPA's figures puzzling, specifically asserting that the broad range of annualized nonuse benefits is unreasonably expansive, and that EPA fails to explain the range. These commenters also cite Data Quality Act (DQA) and EPA guidelines in questioning the quality of this information.

In comment 2156, the Edison Electric Institute (EEI) finds that nonuse benefits are unlikely to justify the rule's costs, and calls EPA's assumption that the public will perceive enormous nonuse benefits from marginal increases in populations of little-known forage fish, a serious error. In comment number 2200, EPRI states that there is a large difference between quantified benefits and costs and no description of the record that indicates that nonuse values will be sufficient to make up this difference. EPRI supposes that the record potentially includes EPA's habitat basis for estimating nonuse values and breakeven analysis for the proposed rule, as well as analyses conducted for the proposed 2004 promulgated rule (Habitat Replacement Cost, Societal Revealed Preference, the Fisher-Raucher Approximation, and Production Foregone). EPRI claims that currently, none of this "record" is indicative of reliably estimated benefits of a magnitude that exceed the costs of the rule.

In comment 2156, the EEI points to comments by NERA Economic Consulting which state that the key issue is how benefit-cost decisions should be made when there is no reliable information on nonuse benefits. NERA asserts, "… EPA appears to rely upon the possibility of nonuse benefits to justify a decision to require impingement controls at all plants/facilities, even when the estimated "use" benefits are a small fraction of the estimated social costs. If this logic were used by individual permit writers, very expensive entrainment controls (such as cooling towers) could be "justified" on benefit-cost grounds."

In comment 2192, PSEG Services Corporation points to its 2006 permit renewal application for Salem, stating that nonuse values are not appropriate in most instances because the benefits of most organisms lost to entrainment (and impingement) have otherwise been monetized. If nonuse benefits were relevant, it would be very difficult to monetize the benefits in an appropriate and defensible manner. In contrast to EPA's position that nonuse values are important because most organisms lost do not have a direct use value, PSEG claims to have consistently been able to estimate benefits for all of the organisms entrained through well-established trophic transfer methodologies that estimate values for forage organisms by converting the pounds lost to pounds of commercially or recreationally important species.

In comment 2210, UWAG states that EPA appears to rely upon the possibility of additional nonuse benefits to justify a decision to require impingement controls at all plants/facilities, and that it is arbitrary and irrational simply to assume, without empirical evidence, that people will be willing to pay the cost of EPA's program no matter what it is, provided it amounts to mere pocket change when divided among all the households in the country. UWAG further states that EPA should require that benefit studies in site-specific assessments use specific criteria to determine the likely significance of nonuse benefits. If these criteria indicate that nonuse benefits are not likely to be significant, the site-specific assessment should not require that they be quantified, citing EPA criteria from earlier rulemaking. UWAG cites Freeman (2003; DCN 12-4815) for a review of the literature on nonuse values and situations in which nonuse values are likely to be significant when the resource in question is special or unique and the loss or injury is irreversible (or subject to a prolonged recovery). UWAG concludes that in most cases involving section 316(b), Freeman's criteria are not likely to be satisfied. UWAG also states that nonuse benefits may be negative if undesirable fish are affected, with the example of alewife in the Great Lakes, and that EPA does not adequately consider the possible ecological costs of cooling towers.

EPA disagrees with these comments. The preamble to the final rule fully describes EPA's reasoning for selecting the best technology available for minimizing adverse environmental impacts from cooling water intake structures (CWIS). Specifically, EPA first considered the availability and feasibility of various technologies, the costs (including potential costs to facilities and households), and the economic impacts associated with these technologies. EPA reviewed the efficacy of these technologies in reducing impingement mortality and entrainment. EPA also considered additional factors set out in CWA section 304(b), including location, age, size, and type of facility. EPA next considered the non-water quality environmental and other impacts of different technologies on energy production and availability, electricity reliability, and potential adverse environmental effects that could arise from the use of the different technologies evaluated.

As described in the preamble, as a result of this thorough evaluation, EPA is establishing a rule that includes a BTA standard for impingement mortality based on modified traveling screens with a fish handling and return system whose performance has been optimized to minimize IM. A facility has several alternatives for compliance. For entrainment, EPA establishes a detailed regulatory framework for the determination of BTA entrainment requirements by the permitting authority on a site-specific basis. EPA identified the following specific factors as the key elements in its decision not to prescribe a single technology, closed-cycle cooling as the basis for a national BTA determination: land availability, air emissions, and remaining useful plant life.

The preamble also describes the record and EPA's determination that the impingement mortality and entrainment controls will result in benefits that justify the costs of the rule. EPA describes that it was able to generate only a partial estimate of benefits for the rule. In particular, EPA's analysis does not fully quantify or monetize certain potentially important categories of benefits, such as existence values for threatened and endangered species, secondary and tertiary ecosystem impacts, benthic community impacts, shellfish impacts and the impacts arising from reductions in thermal discharges that would be associated with closed-cycle cooling. Changes in fish assemblages due to impingement, entrainment and thermal effects are also not fully quantified or valued.

As discussed in the preamble, EPA may consider, but is not required to consider, the costs and benefits associated with various control options. In addition, EPA explains (in section II.C and VI.E of the preamble) why consideration of costs and benefits is appropriate in the site-specific determinations when establishing entrainment controls. In the site-specific proceeding, the Director is to consider, among other factors, quantified and qualitative social benefits and social costs of available entrainment controls, including ecological benefits and benefits to any threatened or endangered species. The Director may reject otherwise available entrainment controls if the costs of the controls are not justified by their associated benefits (taking into account both quantified and non-quantified benefits), and the other factors discussed in the final rule. In evaluating benefits, the Director should not ignore benefits that cannot be monetized or consider only the I&E reductions that can be counted. To result in appropriate decisions from society's standpoint, the assessment of benefits must take into account all benefits, including categories such as recreational, commercial, and other use benefits; benefits associated with reduced thermal discharges; reduced losses to threatened and endangered species; altered food webs; benefits accruing non-locally due to migration of fish; nutrient cycling effects; and other nonuse benefits. Merely because it is difficult to put a price tag on those benefits does not mean that they are not valuable. EPA notes that Executive Order 13563 recognizes that some benefits are difficult to quantify, and calls for agencies and departments to consider qualitative benefits.

A national evaluation of benefits, no matter how accurate, would fail to account for the variations in benefits from location to location. On the basis of available information, EPA's analysis of benefits relied on extrapolating data from existing I&E characterization studies to all facilities in the same region on a flow-weighted basis. Differences in species, life stages, and biological abundance across intake locations (even within a region) could lead to very different results for a site-specific analysis of a facility as compared to that facility's share of national costs and benefits, even if the national results are, on average, accurate. A national assessment tends to mask variations in benefits and costs from different geographical locations for different waterbodies. For example:

- Some fish species at coastal facilities have biological spawning attributes that differ from those at other locations.
- The proportion of the receiving water withdrawn for cooling could also vary among sites.
- The values that communities place on their resources could vary from site to site.
- One ecological environment might experience large masses of hardier eggs and larvae subject to potential entrainment; another will have fewer but less hardy eggs and larvae susceptible to entrainment. Without detailed study information, it is difficult to ascertain which facility has the greater adverse environmental impact.

The resulting differences in the value of reduced entrainment—which could be dramatic for some sites—necessarily disappear in a national aggregation of results. The Agency has decided that this masking of variation in benefits further supports EPA's decision to require consideration of the site-specific benefits of entrainment control technologies in the site-specific process to establish entrainment controls.

EPA disagrees with PSEG's assertion that trophic transfer methods are appropriate for estimating the benefits of all entrained organisms. Most of the value for forage fish is nonuse because most are not consumed by recreational or commercial species, or caught. The portion of the value that the commenter is estimating by converting the pounds lost to pounds of commercially or recreationally important species is the indirect use value. Therefore, the indirect use value determined through trophic transfer methods has no bearing on the magnitude of nonuse value for the remainder of forage fish.

EPA disagrees with UWAG's assertion that the Agency assumes that people are willing to pay no matter what the rule costs, or that it has no empirical evidence of WTP. Focus groups provide evidence that most people have positive WTP for reducing fish mortality at CWIS (U.S. EPA forthcoming; DCN 12-4656). EPA also found, as described in the benefits analysis accompanying the final rule, that WTP varied with the amount of fish protected. The preamble to the final rule describes how EPA considered economic factors, and that some costs and benefits are difficult to quantify.

EPA acknowledges that in previous rulemaking it established criteria for permittees and permit writers to use in determining whether to monetize nonuse benefits. These criteria do not change EPA's decision regarding addressing nonuse benefits in site-specific decision-making for today's rule. As stated in the preamble, EPA recognizes the resource limitations faced by permitting authorities, and is committed to working with the states to support their site-specific permitting decisions. The benefits assessment would typically look at a range of potential benefit mechanisms, including increased harvest for commercial fisheries, increased use values for recreational fisheries, and nonuse values (existence and bequest values). EPA recognizes that the latter may be difficult to quantify or monetize. If appropriate data are available from benefits transfer or conducting stated preference studies or other sources that can be applied to the site being evaluated, these should be used to monetize nonuse values. Otherwise, nonuse values should be evaluated qualitatively.

EPA disagrees with UWAG's assumption that nonuse values of reducing I&E losses are trivial. EPA is aware of no research—empirical or otherwise—that demonstrates that individuals have limited or no existence values for the aquatic resources affected by the 316(b) regulation.

To the contrary, prior research demonstrates public willingness to pay for similar types of resource improvements to those addressed here (e.g., Johnston et al. 2011; DCN 12-4866; Johnston et al. 2012; DCN 12-4865). Moreover, there are no theoretical necessary conditions for the existence of nonuse values. For example, resources do not have to be unique to be the source of nonuse WTP. While factors such as uniqueness can affect willingness to pay, the significance of nonuse values depends on individual responses to given conditions. Although the EPA recognizes the possibility of low nonuse values in this case, significant nonuse values are also a strong possibility. EPA notes that when a substantial fraction of the population holds even small per capita nonuse values, these nonuse values can be very large in the aggregate. As stated by Freeman (2003, p. 138; DCN 12-4815), "If nonuse values are large, ignoring them in natural resource policymaking could lead to serious errors and resource misallocations." Both EPA's own Guidelines for Preparing Economic Analysis and OMB's Circular A-4, governing regulatory analysis, support the need to assess nonuse values (USEPA 2010; DCN 12-5027; USOMB 2003; DCN 12-5043).

Regarding the effect of the presence of undesirable species on nonuse benefits, EPA agrees that invasive species may represent a disamenity, although anglers may hold value for some introduced species (e.g., salmon in the Great Lakes). EPA disagrees that the nonuse value of reducing impingement mortality and entrainment under the rule is negative. EPA notes that: (1) undesirable species represent only a very small fraction of organisms saved under the final rule, and (2) the Agency did not estimate nonuse benefits for the Great Lakes region using a benefit transfer approach because it did not identify a benefit transfer study that would provide a good match to the fisheries resources affected in the Great Lakes region.

Regarding the ecological costs of cooling towers, of the examples of categories that EPA is aware of, the likelihood of the ecological cost is sufficiently low that EPA has no reason to change its decision about the BTA in today's rule.

Essay 71: Benefit Categories

EPA received a number of comments on the economic benefit categories associated with impingement mortality and entrainment (IM&E) reduction. This essay responds to those comments.

Excluded Benefit Categories

In comment 2391, Riverkeeper states that EPA's benefits calculations include only parts of the two direct use categories of benefits from IM&E losses, and an estimate of nonuse values for two regions of the country. With respect to use values, Riverkeeper commented that EPA did not estimate the following types of indirect-use, marketed-goods benefits: increases in equipment sales, rental, and repair; bait and tackle sales; consumer choices in stores and restaurants; property values near the water; and ecotourism. Riverkeeper also commented that EPA did not estimate direct-use benefits from non-market goods, including increases in rates of participation in recreational fishing, and the improved value of subsistence fishing; and the increased value of, and increased participation in, boating, scuba diving, and near-water recreation based on enjoying observation of fish (or of birds catching fish). With respect to nonuse values, Riverkeeper commented that EPA offers a benefits transfer estimate of nonuse values for only two of the seven regions of the country, along with what Riverkeeper finds to be a conceptually mistaken (and quantitatively trivial) estimate of the unique value attached to threatened and endangered species. Riverkeeper further points to EPA's original discussion of the limitations of the benefits calculations ("Original CWIS rule, p.166").

In comment 1968, the commenter asks why qualitative benefits of recreational fishing were "ten times more "valuable" than the quantifiable benefits of commercial fishing."

EPA agrees that the estimates of use and nonuse benefits are incomplete, but has done the best job at estimating benefits that it could, given limitations in data, information and tools for estimating benefits. EPA acknowledges that the list of use values presented by the commenter include potential benefit categories. The difficulty is having enough data on these behaviors and expenditures, and being able to link increased fishing success (from fish protection at CWIS) to increases in these items. However, EPA does not expect that these indirect-use market benefits, had EPA been able to calculate them, would have been significant enough to affect the choice of BTA in today's rule.

In the absence of complete estimates of nonuse benefits, EPA estimated partial nonuse benefits for the final rule using a benefits transfer approach. This approach is still a partial estimate because it concerns only one species in two coastal regions. EPA fully documents these limitations to practical implementation of cost-benefit analysis in the record for the rule, and explains fully in the preamble how the information from the analysis factored into its decision-making.

For example, as described in the preamble to the final rule in Section VII. Response to Major Comments on the Proposed Rule and Notices of Data Availability (NODAs), EPA considered both monetized and nonmonetized benefits, and has concluded that the benefits of the rule justify the costs when all categories of benefits of the final 316(b) regulation are considered. With respect to entrainment, the rule authorizes the Director to consider costs and benefits on a site-specific basis. With respect to impingement mortality, the rule provides seven compliance alternatives based on a set of widely used, demonstrated, proven technologies, many of which have been in use for decades and the efficacy of which is well-supported in EPA's record.

By reducing impingement mortality and entrainment, the final existing facilities rule is likely to increase the number of fish, shellfish, and other aquatic organisms in affected waterbodies resulting in healthier aquatic environments. In turn, this healthier aquatic environment directly improves welfare for individuals using the affected aquatic resources. It generates use benefits such as increases in the value of recreational and commercial fisheries, or increases in property values, which may reflect increased use values. Reductions in impingement mortality and entrainment also improve welfare for individuals without use of the affected resources, and generate nonuse benefits, such as existence of healthier ecosystems and resource bequest values.

EPA notes that qualitative benefits, by definition, are not monetized, and so cannot be cardinally compared to monetized benefits. EPA also notes that both recreational and commercial fishing benefits were quantified and monetized for the final rule. The relationship between commercial and recreational fishing benefits resulting from environmental improvements depends on many factors including the species affected, the magnitude of commercial versus recreational harvest (e.g., in some cases only recreational harvest is allowed), the presence of a commercial fishery (e.g., fish in some waters are below harvestable or marketable size), and the market and nonmarket value of the incremental catch. EPA notes that while commercial fishing benefits are based on the market value of incremental catch, recreational fishing benefits reflect anglers' willingness to pay for the enhanced fishing experience and depend on both willingness-to-pay for an increased catch rate and angler populations. It is possible for fishing benefits to be only recreational, and for recreational fishing benefits to exceed commercial fishing benefits where both types of fisheries exist. For example, the Agency estimated substantive recreational benefits and no commercial fishing benefits stemming from the final rule for the Inland region (see Chapters 6 and 7 in the BA).

Economic and Cultural Benefits

Commenters stated that America's fisheries also provide enormous economic and cultural benefit that should be protected. For the Great Lakes specifically, a commenter provided studies indicating that investment in protection yields an even greater return in economic benefits to the region. According to the commenter, once-through cooling water withdrawals from the Great Lakes are a key contributor to fish population loss and ecosystem decline, and allowing the activity to continue is inconsistent with the evidence of the economic growth and opportunities of restoration and the spending of hundreds of millions of dollars to protect and restore the Great Lakes.

EPA agrees that the nation's fisheries need and are worth protecting, and that restoration of the Great Lakes will yield large economic and cultural benefits. EPA has considered these benefits in developing the final rule. For example, as described in the preamble to the final rule, in assessing the benefits of entrainment technology installation, the Director would assess the value to society from the reductions in impingement mortality and entrainment that would result from installation of a closed-cycle cooling system, fine mesh screens, or other impingement and entrainment technologies. All benefits, including monetized, quantified and qualitative benefits, should be considered in this assessment.

EPA disagrees that the rule is inconsistent with the protection of economic and cultural resources. The preamble to the final rule describes in detail the factors EPA considered in selecting BTA for impingement mortality and entrainment, which include economic factors, and recognition that all costs and benefits may be difficult to quantify. Further, the final rule does not preclude taking cultural or regional site-specific decision-making. The final rule for existing facilities establishes a detailed regulatory framework for determining BTA entrainment requirements by the permitting authority on a site-specific basis. The rule identifies what information must be submitted in the permit application, prescribes procedures that the Director must follow in its decision-making, and factors the Director must consider in determining what entrainment controls will represent the BTA requirements on a site-specific basis.

EPA does not include a specific category of subsistence fishing benefits in the analysis. However, because EPA uses the value of catching an additional fish to value recreational fishing benefits in conjunction with the total increase in noncommercial catch, the benefits to subsistence fishers are included in this estimate. This is despite the fact that EPA does not allocate the total change in recreational (or rather, noncommercial catch) between subsistence and recreational fishers because data on the extent of subsistence fishing are not available. Also, separate willingness to pay (WTP) estimates for changes in catch rates for substance fishers are not available in economic literature. If WTP for changes in catch rates for subsistence fishers is significantly different from recreational fishers, the recreational benefits may be over or understated.

EPA also does not include a specific category of cultural benefits in the analysis because separate estimates for this category are not available. Moreover, the current valuation literature advocates the use of total values as opposed to summing separate categories. EPA also does not include a specific category of cultural benefits in the analysis because separate estimates for this category are not available. Moreover, the current valuation literature advocates the use of total values as opposed to summing separate categories. Accordingly, EPA used benefit transfer to estimate total WTP (including aesthetic, cultural, and other use and nonuse values) for reducing fish mortality in the Northeast and Mid-Atlantic regions, and does not estimate cultural or aesthetic benefits separately. EPA was unable to quantify total WTP for reducing IM&E mortality using the benefit transfer for Inland, South Atlantic, Gulf of Mexico, and CA regions due to data limitations. EPA's also used the 316(b) stated preference survey to estimate total WTP for all regions and has included the estimates in Chapter 11 of the BA for illustration purposes. Estimates based on the 316(b) stated preference survey are not included in the cost-benefit comparison for the final rule.

Accordingly, EPA estimated total WTP (including aesthetic, cultural, and other use and nonuse values) for reducing fish mortality in the Northeast and Mid-Atlantic regions, and does not estimate cultural or aesthetic benefits separately. EPA was unable to quantify total WTP for reducing IM&E mortality for Inland, South Atlantic, Gulf of Mexico, and CA regions due to data limitations.

Site Benefits

A commenter states that the rule should make clear that benefits, whether quantitative or qualitative, must be likely to occur at the site in question, that impacts on aquatic life must be more than theoretical, and the likelihood of the risk should be evaluated based on all the available evidence for the site. Another commenter stated that, in general, greater emphasis needs to be placed on adequately assessing the benefit side of any cost-benefit analysis - the costs of compliance options will be determined by the facilities owners in very quantifiable terms of dollars.

EPA disagrees that the benefits have to occur at a particular site to be considered as benefits associated with fish protection at that site. Because many fish migrate, preventing the death of larvae in one location may result in local benefits only or benefits being realized on a much larger geographic scale. EPA disagrees that impingement mortality and entrainment controls yield theoretical benefits. However, as noted above, the preamble to the rule describes fully the site-specific decision-making for entrainment controls under the rule.

EPA agrees with the comment regarding emphasis in cost-benefit analysis. Costs of compliance are typically more readily discernable than the environmental benefits, the inclusion of which are often limited by data and the current state of scientific and economic understanding.

Distributional Effects

One commenter referred to dubious cost-benefit calculations at administrative agencies, and past comments to EPA in which they noted that agencies have counted costs imposed on businesses as benefits to the broader economy.

EPA disagrees that it has counted the estimated costs of the proposed rule as social benefits. Compliance costs, regardless of any stimulating impacts of construction work on the economy, do not represent benefits. However, the environmental improvements resulting from the installation of compliance technologies may have indirect economic benefits in the form of stimulating business activity such as equipment or bait sales associated with an increase in recreational or commercial fishing activities. This related stimulating effect would represent benefits of the proposed rule, although EPA was not able to quantify such benefits for the final rule.

Essay 72: Benefits to Threatened and Endangered Species and Endangered Species Act Consultation

EPA received several comments on the benefits of the rule to threatened and endangered (T&E) species. This essay responds to those comments.

Monetized Benefits of Threatened and Endangered Species

In comment 2260, New York State Department of Environmental Conservation (NYSDEC) stated that EPA has not appropriately characterized the social value of reducing the impingement and entrainment of T&E species. Society has already indicated that it places a high value on T&E species protection, which is already provided by current law. Fines for illegally taking several aquatic organisms commonly impinged by CWIS, and the funding of efforts to restore populations of affected species, are reflective of this value and protection. If EPA assessed the nonuse value of all T&E species that are impinged annually, these alone would provide the cost benefit justification for EPA to select Option 2 or 3 and require closed-cycle cooling or the equivalent as BTA for the national rule.

In comment 2188, National Wildlife Federation (NWF) states that the protection of Federally-listed species is paramount, and protection of these species cannot be weighed against a cost-benefit analysis. Further, with this rule, the cost of protecting these species is low. Therefore, rather than wrestle with difficult to quantify "nonuse" values, EPA should require closed-cycle cooling and ensure that the risks to T&E from power plants are greatly reduced.

EPA agrees that it has not been able to fully monetize the value of T&E species in the monetized benefits estimates for the rule. As described in the preamble, EPA concluded that the costs of the rule are justified by the benefits, which includes considering the unmonetized benefits, including T&E species. However, as explained in the preamble, EPA did not reject closed-cycle cooling on the basis of costs and benefits. EPA rejected closed-cycle cooling as the technology basis for a uniform national BTA entrainment standard based on three factors: land availability, air emissions, and remaining useful plant life.

EPA also notes that its stated preference survey of use and nonuse benefits of reducing impingement mortality and entrainment (IM&E), which it did not incorporate into the cost-benefit analysis for the final rule, does not specifically refer to T&E species (in order to be more generally applicable). It is an open question as to whether the survey results fully capture these benefits.

Assumptions Regarding Baseline Losses

In comment 2391, Riverkeeper disputed the seemingly arbitrary percentages of the affected populations attributable to baseline impingement and entrainment that EPA used in developing the estimates that it did not include in the overall estimate of benefits (0.25 percent or 0.5 percent reduction in the Inland region T&E species; and a 1 percent reduction in endangered sea turtle populations), noting that the results are dependent on the assumed percentages. Riverkeeper asked why EPA selected these percentages rather than others. Since elsewhere EPA considers a 1 percent losses for sea turtles, and uses estimates as high as 6.6 percent baseline losses for winter flounder in the North Atlantic and Mid-Atlantic, Riverkeeper suggests using numbers that fall between the sea turtle and winter flounder loss estimates, such as 2 percent or 4 percent losses of Inland region T&E species. Riverkeeper notes that the fact that species are classified as T&E implies that their numbers are limited, and that annual mortality of a few percent due to cooling water intake does not seem impossible.

With respect to the percentages EPA employed in the illustrative estimate of benefits, EPA points out that, for sea turtles, the percentage does not represent a change in population but a percentage decrease in the probability of extinction for sea turtles. EPA did not have adequate data to estimate this probability. However, as an illustrative example, EPA used a 1 percent decrease in the probability of extinction over 25 years for sea turtles as an extremely high boundary condition. The number of takings that NOAA permits by shrimp and high seas longline fisheries, as well as military operations, is orders of magnitude greater than the permitted number of takings by regulated facilities, and yet these activities have Incidental Take Statements because they are unlikely to jeopardize the continued existence of species (NOAA, 2012; DCN 12-5081).

Winter flounder is not a T&E species. EPA conducted a benefits transfer to estimate nonuse values based on winter flounder. As such, the estimates of winter flounder mortality due to IM&E are not relevant in the context of T&E species. Winter flounder are commercially targeted species, and commonly appear in facility IM&E studies. Species protected by the ESA cannot be targeted commercially, and rarely (if ever) appear in IM&E studies. Consequently, using mortality estimates of winter flounder would be inappropriate in the context of estimating effects of the rule on T&E species.

For inland species, less data are available, and the data are older; documented IM&E of T&E species in the Inland region come from a single study in 1976. Additionally, many inland species (e.g., pallid sturgeon) have extensive restocking programs that make estimating the effects of IM&E on populations extremely difficult. Given these uncertainties and that the WTP study EPA used in developing its benefit estimates reflects population changes across all species, an estimated population change of 0.25 percent – 0.5 percent represents a reasonable estimate of the likely effects of CWIS.

Essay 73: Commercial and Recreational Fishing Benefits

EPA received a number of comments on its analysis of commercial and recreational fishing benefits. This essay responds to those comments.

Fishery Yield

The model for estimating changes in fishery yield is common to the analysis of commercial and recreational fishing benefits. In comment number 2391, Riverkeeper states that the use of a global average trophic transfer value may not be appropriate for the individual regions evaluated by EPA, and that the detailed local data developed for these regions by EPA should be accompanied by local calculations of trophic transfer rates. In comment number 2200, the Electric Power Research Institute (EPRI) states that the approach applied to the rule benefit analysis to calculate changes in fishery yield in the 316(b) context is an approximation that does not consider important biological processes such as compensation and reproduction.

Regarding the average trophic transfer value, EPA responds that, notably, the values of trophic efficiency (TE) compiled by Pauly and Christensen (1995; DCN 12-4954) are not habitat specific, but are specific to trophic-levels within specific geographic regions (e.g., the 140 estimates come from 48 food webs). The raw data indicate substantial variability not only among sites within aquatic ecosystem (e.g., freshwater ponds and lakes, coastal areas, shelves and open ocean), but also among trophic levels within sites (e.g., TE within Lake Kinneret varied between 3 and 19 percent) (Christensen and Pauly, 1993; DCN 12-5070). Accordingly, because of the complexity of multi-species food webs and the trophic-level, and the location-specific nature of trophic transfer rates, EPA did not develop individual estimates at local or regional scales but used the average rate. EPA agrees that calculating changes in fishery yield is an approximation that does not consider important biological processes. However, it is not clear that the effects of these processes would play a substantial role in changing the effects of impingement mortality and entrainment (IM&E) on fishery yield because populations of harvested fish are already quite depressed, and it is unlikely that intraspecies competition will play a substantial role in determining the number of harvestable fish.

Commercial Fishing Market Complexity

In comment number 2458, the commenter notes that commercial fishing markets are complex and, as harvest increases, there may be a decrease in the dockside market price as a result of competition and fully accounting for market complexity could result in either overestimating or underestimating benefits.

EPA understands that there are complexities in estimating dockside market prices, but expects changes in dockside prices resulting from the rule to be negligible due to relatively small changes in commercial fisheries landings under the various options considered for the final rule. As described in the BA, EPA measured commercial fishing benefits as changes in producer surplus assuming no change in the market price. EPA considered potential consumer surplus values associated with IM&E, but did not estimate changes in consumer surplus for the final rule and options considered because it found that dockside prices would not change enough to produce measurable shifts in consumer surplus. See Chapter 6 of the BA for more detailed discussion of how EPA addressed changes in consumer and producer surplus for commercial fishing.

Great Lakes Study

On the basis of a study of damages caused by IM&E at the Bay Shore Power Plant (BSPP) in Ohio (Gentner and Bur, 2009; DCN 12-5071), in comment number 2391 Riverkeeper claims that EPA's estimates of baseline mortality of walleyes in the Great Lakes are low, in the hundreds of fish per year. The BSPP study, looking only at one Great Lakes plant, counted impingement of tens of thousands of walleyes per year in the data for that plant, along with entrainment of larvae amounting to hundreds of thousands of adult-equivalent fish. The commenter cites the same study by Gentner and Bur (2009; DCN 12-5071) to argue that EPA used an incorrect (lower) per fish value of walleye in the analysis of recreational fishing benefits.

EPA agrees with the comment regarding the study data. After reviewing the study, EPA incorporated the data from the BSPP study into the BA. As a result, EPA's estimates of mortality for walleye in the Great Lakes increased substantially, and recreational fishing benefits for the Great Lakes Region increased. See the BA for the revised estimates.

EPA disagrees regarding the per fish value of walleye. EPA acknowledges that different primary studies report different values ranging from $3.66 to $22.63 per fish, with the majority of values being less than $10.00 (2004$); see U.S. EPA, 2006 (DCN 12-5024). EPA notes that the benefit value transfer described by the commenter may result in a different estimate compared to a benefits transfer based on a meta-analysis of relevant values of willingness to pay (WTP) for catching an additional fish per trip (hereafter per-fish WTP) [including values from a study by Besedin et. al (2004; DCN 12-5072) used by the commenter]. EPA also notes that the general consensus in economic literature is that function transfers typically outperform unit value transfers (Rosenberger and Stanley, 2006; DCN 12-5073), although contrary or inconclusive findings have been reported in the resource valuation literature (Brouwer and Bateman, 2005; DCN 12-5074). Finally, EPA points out that the authors chose a WTP estimate from Besedin et al. (2004; DCN 12-5072) for boat anglers ($18.43, in 2004$), and did not account for the WTP estimates for shore anglers which were significantly lower ($9.96, 2004$). EPA acknowledges that higher per fish WTP would increase benefits of the final 316(b) regulation, but not to the extent that EPA would expect to change the final rule option EPA selected because of the factors discussed in the preamble to the final rule.

Recreational Fishing Benefits Analysis Method

In comment number 2200, EPRI states that EPA's approach of applying marginal per-fish values to identify fishery impacts is not a standard approach for evaluating the economics of a fishery, and that a more thorough explanation of the limitations of the approach and the rationale for the approach would be helpful for making the analysis and rationale more transparent to stakeholders. The commenter argues that instead of using per-fish WTP to estimate changes in anglers' welfare, the Agency should use the individual's demand for fishing trips to recreational sites affected by the rule to estimate consumer surplus from an increase in the number of trips. The commenter claims that EPA's approach for the analysis of benefits does not adequately reflect the state of the world, nor individual behaviors, under baseline conditions, consistent with

EPA guidelines for preparing economic analyses. In comment number 2245, Midwest Generation, Edison Mission Energy, LLC commented that EPA did not consider fish consumption advisories (FCA), which it believes would decrease the value of fish.

EPA disagrees with these comments. EPA's method for estimating recreational fishing benefits is based on a benefits transfer approach. Benefits transfer, which is an approach to estimating benefits in which results from one study are applied to another context for which original data cannot be collected, are increasingly applied as a core component of benefit-cost analyses conducted by EPA and other government agencies. EPA's Economic Analysis Guidelines (U.S. EPA 2010; DCN 12-5027) consider benefits transfer to be a standard approach. As noted in Chapter 7 of the BA, the validity and reliability of benefit transfer depend on a variety of factors, including the quality of underlying studies and the fit and validity of the estimated econometric models.

EPA carefully reviewed and vetted all studies included in the meta-analysis prior to including them in the meta-data which provided the basis for the benefits transfer. Results of the meta-analysis of the recreational fishing studies appeared in peer reviewed journals (e.g., Johnston et al. 2005; DCN 12-5075; Johnston et al. 2006; DCN 12-4862). Therefore, the Agency concludes that the meta-analysis approach provides valid estimates for marginal changes in recreational catch that are consistent with the economic analysis guidelines and the Agency's data quality requirements for data used in regulatory analysis. The Agency, however, acknowledges that the meta-analysis model used in the analysis of recreational fishing benefits of the final 316(b) rule provides a reasonable but not perfect match to the context in which values are desired.

EPA also discusses the difference between what would be calculated for benefit estimates using recreational demand models described by EPRI and EPA's methods. As described in the preamble to the final rule, the methodologies used to estimate benefits of the final existing facilities rule are largely built on those used to estimate benefits for the remanded Phase II and Phase III. The BA provides references to (i) Part A of the Regional Analysis Document for the Final Section 316(b) Phase II Rule (U.S. EPA 2004; DCN 12-5021), and (ii) Part A of the Regional Benefits Analysis for the Final Section 316(b) Phase III Existing Facilities Rule (U.S. EPA 2006; DCN 12-5024) for analyses using similar methodologies. EPA validated estimates of recreational benefits based on the meta-analysis of WTP for catching an additional fish as part of its benefits assessment of the Phase III regulation.

Specifically, EPA used regional models of recreational fishing behavior developed for the Phase II analysis to estimate benefits from reduced IM&E at potentially regulated Phase III facilities for the four coastal regions and the Great Lakes region. Results of the random access utility (RUM) models are presented in Chapter B4 through F4 of the Regional Analysis Document (U.S. EPA, 2006; DCN 12-5024). In general, EPA found that the RUM-based recreational fishing benefits fall within the range of values estimated for a given study region based on the meta-model. That the values from the two independent analyses are relatively close corroborates the use of meta-analysis in estimating the value of incremental recreational fishing improvements.

EPA notes that RUM models were not available for the Inland region due to the lack of data required for model estimation. Primary studies are also more resource intensive. Given a close match between the results from both methods, EPA continued using meta-analysis only in estimating recreational fishing benefits for the final Phase III regulation, and for the final section 316(b) regulation for existing facilities. EPA acknowledges that local detail may be lost in a national level analysis, but this situation would occur with the use of other methods and models due to data limitations.

The record provides detailed information on a comparison of the methods that supports use of the benefit transfer approach EPA used in the analysis of recreational benefits of the final section 316(b) rule for existing facilities. Specific limitations and uncertainties associated with the estimated regression model and the underlying studies are discussed in section A5-3.3e of U.S. EPA (2006; DCN 12-5024). Additionally, Chapter 7 of the BA describes the limitations and uncertainties inherent in EPA's analysis of recreational fishing benefits of the final rule.

EPA understands that the use of recreational demand models is a standard approach to estimating welfare changes stemming from increased visitation to recreational sites, but did not estimate such benefits for the 316(b) rule for existing facilities. As stated in Chapter A11 of the Section 316(b) Phase II Final Rule – Regional Studies (U.S. EPA 2004; DCN 12-5021), the benefit to anglers from an increase in recreational catch may occur in two ways: (1) an angler may receive greater enjoyment from a given fishing trip when catch rates are higher, and thus receive a greater value per trip, and (2) anglers may take more fishing trips when catch rates are higher, resulting in greater overall value for fishing in the region. As shown by EPA's 2004 recreational benefits analysis, the estimated welfare changes stemming from an enhanced trip value due to improvements in catch rates greatly outweigh benefits from an increase in recreational participation (see Chapters B4, C4, D4, F4, and G4 in the Phase II report (U.S. EPA, 2004; DCN 12-5021).

The number of recreational trips taken by anglers is influenced by many factors, including availability of leisure time, income, family obligation, and others. As a result, general changes in catch rates do not necessary result in significant changes in the number of trips. If changes in catch rates are small, then the change in the number of trips is likely to be negligible. EPA's model of the number of fishing trips per season developed for the Phase II rule shows a positive coefficient on the variable denoting the quality of recreational fishing sites (i.e., IVBASE) indicating that an increase in catch rate would have a positive effect on the number of fishing trips per recreational season. However, the coefficient on this variable is very small compared to other variables that influence the number of fishing trip taken per season (e.g., intercept, gender, whether an individual owns a boat, etc.). Thus, the slight improvements in recreational catch expected under the final rule are unlikely to lead to a significant increase in the number fishing trips to the affected sites.

EPA did not estimate the percent change in recreational catch rates for the final rule. However, the Phase II analysis suggested that the expected increase in catch is likely to be small (less than 5 percent) for most fish species (with the exception of bottom fish and non-targeted catch in the Mid-Atlantic region which EPA expects to increase by 22 and 12 percent, respectively). See Chapters B4, C4, D4, F4, and G4 in the Phase II report (U.S. EPA, 2004; DCN 12-5021). The application of per-fish WTP to estimating recreational fishing benefits of the final 316(b) regulation allows estimating welfare changes from enhanced recreational experience due to an increase in catch rates, assuming that the number of recreational trips remains constant. Based on the results of recreational fishing analysis for the Phase II rule, including participation effects would not substantially change the estimated recreational benefits.

EPA disagrees that its approach for the analysis of benefits does not adequately reflect the state of the world or individual behaviors under baseline conditions, consistent with EPA guidelines for preparing economic analyses. As a baseline for the analysis of fishing benefits, EPA used current mortality from IM&E, and the corresponding current angler catch rates. This reflects estimated conditions without the regulation. To estimate the change from these baseline conditions resulting from the final rule, for the reasons explained in Chapter 3 of the BA, EPA assumed that the controls would eliminate the mortality in proportion to the reduction in entrainment, and that the reduced mortality translates into an increase in catch rates (see detailed discussion in Chapter 3 of the BA). This estimate reflects an estimate of conditions with the regulation. Note that EPA presents this approach in terms of valuing the forgone catch without the regulation (benefits of eliminating baseline IM&E losses). See in section 7 of the BA for detail.

EPA disagrees that it did not consider Fish Consumption Advisories (FCAs). First, EPA notes that FCAs do not affect catch and release values. According to U.S. FWS data (2006 DCN 12-5076), approximately 23.3 percent of freshwater anglers release all the fish they catch ("catch-and-release" anglers). The catch and release rate is much higher (60 percent) for the most commonly caught saltwater species such as sea trout (NOAA NMFS, 2011; p.10 DCN 12-5077).

EPA notes that the analysis of recreational fishing benefits was conducted at the regional level (see Chapter 7 of the BA). Although a FCA may affect the value of fishing at the FCA affected sites and visitation patterns in the baseline, the estimated change in anglers' welfare due to increased catch is unlikely to be significantly influenced by the FCA presence in a given region. Consistent with the Phase II and Phase III analyses described above, EPA assumed that the regional pattern of visitation to fishing sites will not change, but the catch rate would increase with increased fish abundance at the sites visited by anglers under the baseline scenario.

Declining Marginal Utility

In comment number 2200, and others, EPRI and other commenters claim that EPA does not account for decreasing marginal utility in the estimate of per-fish value.

EPA agrees that the marginal value of catching additional fish declines as catch rates increase. The Agency, however, disagrees that the per-fish values based on the meta-analysis were applied incorrectly, and thus are likely to produce biased benefit estimates.

The per-fish WTP values predicted by the meta-analysis are based on per-fish values taken from a set of valuation studies, many of which were published in peer-reviewed academic journals, and all of which have been vetted by EPA to ensure that they use valid economic valuation techniques. The original studies reflect willingness-to-pay for catching an additional fish given the baseline catch rates. Given the variety of geographic locations and waterbody types included in the original studies, EPA concludes that these studies provide a reasonable approximation of baseline catch rates at the fishing sites affected by the section 316(b) regulation.

As noted in Chapter 7 of the BA, the average baseline catch rates for the affected species range from 0.2 to 3 fish per trip. The only exception is the average catch rate for panfish (4.7 fish per trip) in the Inland and Great Lakes regions. Where both the baseline catch rate and the expected changes being considered are relatively small, the marginal per-fish values predicted by the meta-analysis are likely to be more accurate because it is not necessary to account for the decreasing marginal value of multiple fish that are caught by the same angler.

Environmental Justice

In comment number 2200, the commenter (EPRI) states that EPA's assessment of environmental justice-related to recreational fishing benefits is very cursory, and does not consider the impact of higher electricity prices on low income groups.

EPA disagrees. EPA did consider the effect of the rule on electricity prices. As shown in Table 4-5 of the Economic Analysis report, the estimated percent change in electricity prices for residential consumers is negligible (0.08 percent). Therefore, this increase did not a warrant further examination of the effects of the price increases on sensitive populations. EPA notes that this rule does not prevent the adjustment of utility rates for sensitive populations. In addition, EPA found that neither low-income nor minority population groups participate to a lower extent, in a statistically significant way, in the benefits of the final rule than the general population in states with regulated facilities (see Chapter 12 of the EA).

Essay 74: Nonuse Benefits Analysis Methods

EPA received a number of comments on the use of a study of fish habitat restoration in Rhode Island to estimate the potential nonuse benefits of the rule using a benefits transfer approach. The study provides estimates of the willingness to pay (WTP) of Rhode Island residents for anadromous fish habitat restoration, and EPA used a model variant presented by Zhao et al. (2013; DCN 12-5060) for the final rule analysis. This essay responds to comments on this study.

Limiting the Transfer to Two Regions

In comment number 2391, Riverkeeper states that it is not appropriate to limit the transfer of nonuse benefits from the Rhode Island study to only the North Atlantic and Mid-Atlantic regions as EPA did in the BA. Riverkeeper commented that EPA needs to locate other studies, transfer the Rhode Island study results to the remaining regions, or complete and apply its own stated preference study to estimate nonuse benefits in other regions. Riverkeeper faults EPA's conclusion that only the Rhode Island study is usable for estimating nonuse benefits of reducing impingement and entrainment. Riverkeeper cites work on the geographic scope of nonuse values by Loomis (2000; DCN 12-4890), proposing that it is appropriate to increase EPA's nonuse values for impingement and entrainment losses in the North Atlantic and Mid-Atlantic regions to 2.72 times as large as EPA's estimate to reflect the reduced but non-zero value per household of this region's fish to the rest of the nation. To account for the remaining regions, Riverkeeper proposes that, until regionally specific numbers become available, nonuse benefits might be roughly proportional to age-one equivalent (A1E) baseline mortality, resulting in an extrapolated national total of nonuse benefits of 2.085 times the two-region total.

EPA disagrees that it is appropriate to transfer the estimates of nonuse benefits based on the Rhode Island study beyond the North Atlantic and Mid-Atlantic regions to obtain an extrapolated, national, total nonuse benefits estimate. Among the best practices for implementing benefits transfer techniques are ensuring the similarity of the resources and population characteristics. EPA did not extend the benefit transfer beyond the North Atlantic and Mid-Atlantic regions because of the potential for substantial differences in species characteristics, aquatic resource conditions, preferences, and demographics in other regions compared to the original context of the transfer study. For example, the Rhode Island study focused on regional environmental issues, notably, the inability of fish to migrate upstream for spawning due to dams. The fish specifically mentioned in the study, anadromous alewife, shad, American eel, and Atlantic salmon, are not lost to impingement and entrainment in the South Atlantic, Gulf of Mexico, or Inland regions. Losses of anadromous fish in the California region occur at facilities that will have closed-cycle cooling based on State regulations. Although there may be inferences that can be drawn more widely from the study results regarding national nonuse values associated with aquatic resources, EPA does not consider the study results to be nationally representative.

As noted in the Information Collection Request (ICR) supporting statement for its stated preference study (U.S. EPA, 2012; DCN 12-5033), EPA has not identified any previous studies that would provide a good match for the final rule. The ICR indicates that, although there are many studies in the environmental economics literature that quantify WTP associated with various types of water quality and aquatic habitat changes, none of these studies allows the isolation of non-market WTP associated with quantified reductions in fish losses (or increases in fish populations) for forage fish. Most available studies estimate WTP for broader, and sometimes ambiguously defined, policies that simultaneously influence many different aspects of aquatic environmental quality and ecosystem services, but for which WTP associated with fish or aquatic life alone cannot be identified. Among available studies, the most closely related is the Rhode Island study, which provides estimates of total WTP for multi-attribute aquatic ecosystem changes related to improvements in small migratory (diadromous) fish. For a more detailed description of available study examples, see section 3(a) on non-duplication of the 316(b) ICR supporting statement.

EPA agrees that the work by Loomis (2000; DCN 12-4890) suggests that households outside of the North Atlantic and Mid-Atlantic Regions are likely to have nonuse values for reductions in impingement mortality and entrainment under the final rule. However, the percent of households affected, and the effect on WTP by distance from specific sites, varies greatly by species. The species addressed in the Loomis study (2000; DCN 12-4890) (e.g., salmon, Mexican Spotted Owl) are not similar to those affected by the final rule (the majority of which are forage fish), and the Rhode Island study did not address WTP for households outside of the state. Therefore, EPA does not use this study to support a benefits transfer of the Rhode Island study results to households beyond the two regions that it deems similar to the original study area.

EPA agrees with the commenter that estimating national-level nonuse benefits would improve the analysis of benefits for the final section 316(b) existing facilities regulation. As stated in the preamble to the final rule, and described in the BA accompanying the proposed and final rules, EPA conducted a stated preference survey to calculate benefits associated with minimizing adverse environmental impacts to aquatic ecosystems from cooling water intakes. EPA expects to seek Science Advisory Board (SAB) review of its survey prior to using the results in benefits analyses of national rulemakings. Although it will delay use of the results, EPA considers SAB review to be essential given the importance of this issue for the evaluation of ecological benefits generally.

Criticism of the Rhode Island Stated Preference Study

In comment numbers 2210, 2200, 2156, and others, the Utility Water Act Group (UWAG), Electric Power Research Institute (EPRI), Edison Electric Institute (EEI), and some power generating facilities argue that limitations inherent in the stated preference approach generally, and the Rhode Island study specifically, render the results nontransferrable. Commenters assert that the Rhode Island stated preference study creates preferences through formulation of the ecological indicators presented to respondents; is subject to potential bias related to inherent double-counting in the underlying attributes respondents are valuing, and potential hypothetical bias. Commenters also assert that pre-testing does not ensure the elimination of biases, and a study by Murphy et al. (2005; DCN 12-5078), who conduct a metastudy of studies that compared actual and stated WTP, and an empirical analysis relating the amount of overstatement bias in stated WTP to various features of the study, suggests an overstatement of WTP in the Rhode Island study.

EPA disagrees with these comments. The published literature supports the use of the stated preference approach generally for nonmarket valuation or estimating nonuse benefits, and for use in benefit-cost analysis (e.g., Freeman, 2003; DCN 12-4815; Boardman et al., 2006; DCN 12-5066). Although EPA recognizes that controversy exists over the use of stated preference methods, by definition, market-based information does not exist for valuing nonmarket goods and services. Nonuse values can only be estimated by extracting information on preferences. Carefully constructed stated preference surveys represent one means of obtaining this information.

The "creation of preferences" claim has been a common argument of stated preference skeptics for over two decades, but has not been found to be a convincing argument against the use of the method, including in the National Oceanic and Atmospheric Administration (NOAA) Blue Ribbon Panel (Arrow et al. 1993; DCN 12-4730). Moreover, the Rhode Island study in question has been published in the peer reviewed literature on multiple occasions as an example of how to *improve* stated preference valuation of aquatic ecological changes. More specifically, it has been cited as an example of the improved use of ecological indicators within stated preference surveys, and the appropriate design of such surveys to value aquatic ecological changes (e.g., Johnston et al., 2011a, 2011b, 2012, and 2013; DCNs 12-4864, 12-4866, 12-4865, and 12-5079; Schultz et al., 2012; DCN 12-5080; Zhao et al., 2013; DCN 12-5060). Counter to the claim that there is "potential bias" related to the use of ecological indicators in this study, the scientific literature has repeatedly published this work as an example of how researchers *should* construct SP surveys for valuation of aquatic ecological changes, including the use of ecological reference conditions to help respondents comprehend the scope of ecological change (Johnston et al., 2012; DCN 12-4865).

EPA emphasizes that all aspects of the Rhode Island stated preference survey were developed based on extensive focus group and interview testing to evaluate outcomes that were relevant to respondents' welfare, and effective methods of communicating these attributes (Johnston et al. 2011a, 2011b, 2012, and 2013; DCNs 12-4864, 12-4866, 12-4865, and 12-5079; Schultz et al., 2012; DCN 12-5080; Zhao et al., 2013; DCN 12-5060). As detailed in these peer reviewed articles, the study included multiple focus groups and cognitive interviews to determine, among other things, the type and quantity of information that the respondents required in order to make an informed, comfortable decision, as recommended by Bateman et al. (2002; DCN 12-4740) and many others (e.g., Arrow et al., 1993; DCN 12-4730; Mitchell and Carson, 1989; DCN 12-4909). The authors used these focus group and interview results to determine the type and quantity of information provided in the survey, including the communication of ecological attributes.

Regarding potential bias related to inherent double-counting in the underlying attributes, the commenter does not provide evidence to support the claim. The Rhode Island study was explicitly designed to mitigate any potential for double-counting in the valuation of aquatic ecological changes. This issue is addressed explicitly in Johnston et al. (e.g., 2011a and 2013; DCNs 12-4864 and 12-5079), who demonstrate both theoretically and empirically that the inclusion of the aquatic ecological condition index does not double-count welfare gains from aquatic ecological improvements. The authors also demonstrate that inclusion of this indicator is necessary (in this case study) to prevent respondent speculation and bias that could lead to embedded values being inadvertently double-counted in analysis.

Regarding potential hypothetical bias, as noted in the above cited peer reviewed publications, the Rhode Island stated preference questionnaire was developed based on more than two and a half years of testing, in a collaborative process that included participation of economists, ecologists, resource managers, natural scientists, and members of stakeholder groups. The study included 12 focus groups with Rhode Island residents. These pretests included verbal protocols (Schkade and Payne, 1994; DCN 12-4978) to assess how respondents understood and answered choice questions. Among the goals of this survey design process, which was much more extensive than that found in the majority of studies in the peer reviewed literature, was the amelioration of potential hypothetical bias.

Moreover, this comment provides no specific theoretical or empirical evidence that hypothetical bias is prevalent in the transferred estimates of WTP, beyond ad hoc claims regarding the amount of information provided to respondents and the familiarity of respondents with the policy context. Both of these issues are addressed explicitly and extensively in the papers published from this research study (Johnston et al. 2011a, 2011b, 2012, and 2013; DCNs 12-4864, 12-4866, 12-4865, and 12-5079; Schultz et al., 2012; DCN 12-5080; Zhao et al., 2013; DCN 12-5060).

Regarding potential bias due to the failure to remind respondents of substitutes and alternatives, the comment is based on incorrect information. The Rhode Island survey reminded respondents both of substitutes and alternatives at the local level (including a map showing all rivers in Rhode Island that provide passage for migratory fish, as well as all other rivers in which fish passage could be restored) as well as the national level (e.g., public safety, homeland security, economic improvement and jobs).

Regarding tests of internal validity, the comment is based on incorrect and misleading information. The Rhode Island study involved a variety of tests of internal validity. The comment incorrectly claims, for example, that alternative surveys were not administered. As reported by various peer reviewed publications (Johnston et al. 2011a, 2011b, 2012, and 2013; DCNs 12-4864, 12-4866, 12-4865, and 12-5079; Schultz et al., 2012; DCN 12-5080; Zhao et al., 2013; DCN 12-5060), the Rhode Island study authors developed multiple versions of the survey, enabling multiple tests of sensitivity and internal validity. None of these tests suggested a lack of validity.

EPA agrees that pretesting cannot guarantee that all biases are eliminated. However, there is overwhelming consensus in the literature that biases can be greatly reduced, and in some cases eliminated, by proper and extensive development and pretesting (cf. Mitchell and Carson 1989; DCN 2-4909; Bateman et al., 2002; DCN 12-4740; Arrow et al., 1993; DCN 12-4730). As noted above, the Rhode Island survey was subject to more extensive development and pretesting than the great majority of studies found in the peer reviewed literature, and has been the basis for multiple publications on improved stated preference methods. This comment provides no empirical or theoretical evidence of bias in EPA's benefit transfers, only the general claim that pretesting cannot always guarantee that biases are eliminated.

EPA disagrees with the comment regarding a study by Murphy et al. (2005; DCN 12-5078) that applying "Model 2B" yields an overstatement of WTP of over 100 percent. This comment is based on a misuse of the meta-analysis of Murphy et al. (2005; DCN 12-5078), resulting in misleading and biased inferences regarding hypothetical bias. First, the meta-analysis is misapplied, based on a misinterpretation of the variables in the model. For example, the hypothetical value variable (lnHypValue) in the meta-analysis of Murphy et al. (2005; DCN 12-5078) is the WTP value directly stated by respondents (or directly inferred from choice responses) in the original study. For a study with an annual payment vehicle, this would reflect the stated annual WTP. The commenter's interpretation of the direct WTP from the Rhode Island study (Johnston et al. 2011; DCN 12-4864) for this comparison (as payable forever, at a 25 percent discount rate) artificially and improperly inflates the original hypothetical WTP estimate, and as a result generates a misleadingly high estimate of the projected difference between stated and actual WTP. Hence, this comment misinterprets the variable definitions of Murphy et al. (2005; DCN 12-5078).

Second, and perhaps more importantly, Murphy et al. (2005; DCN 12-5078) did not intend the meta-analysis to be used in this manner; that is, to project an estimate of hypothetical bias for studies that were not in the original metadata. In fact, Murphy et al. (2005; DCN 12-5078) are very careful to indicate the severe limitations of their results. For example, as stated on pages 322-323, "We are reluctant to over-emphasize the significance of the dummy variables because a meta-analysis of hypothetical bias appears to be very sensitive to model specification, a lack of variability in the data, and treatment of extreme values. In addition, some of our key findings differ from those reported in previous research…This means that our ability to determine the factors responsible for this bias is quite limited, and that estimates of statistical significance associated with several potentially important determinants of bias should be viewed with caution."

For both of these reasons, the Agency has determined that the estimate of hypothetical bias provided in this comment does not provides useful information regarding the presence or extent of possible hypothetical bias in the Rhode Island study.

EPA's Application of the Rhode Island Study

Commenters critical of EPA's use of the Rhode Island study to estimate nonuse values for the 316(b) existing facilities rule claim that EPA fails to explain how the study correlates to the rule, or account for site-specific differences in the types of species being impinged and entrained. UWAG states that a number of the assumptions required to conduct the benefits transfer may be invalid, including that Rhode Island ecological indicators may not be representative of the entire North Atlantic and Mid-Atlantic Regions; that the Rhode Island baseline is different than the baselines in the whole North Atlantic and Mid-Atlantic Regions; and that stated WTP is unlikely to be linear in the percentage of the maximum possible number of fish that the policy would restore. UWAG concludes that it is not appropriate to use the Rhode Island survey to calculate national nonuse benefits or for permit writers to use this survey in site-specific determinations of potential nonuse benefits from forage fish gains.

EPA disagrees with these comments. EPA acknowledges that no study represents a perfect match to the 316(b) existing facilities rulemaking alternatives, including specific baseline resource conditions (except for EPA's stated preference survey). However, benefits transfer is an accepted practice for estimating environmental benefits when similar studies are available. EPA fully describes the study and the parallels to the rulemaking in the benefits analysis accompanying the proposed and final rules. Specifically, EPA points out that, "The choice experiment addresses forage species such as alewife and blueback herring that neither are subject to current recreational or commercial harvest in Rhode Island nor are charismatic species. Hence, the species affected are a close analog to the forage fish affected in the 316(b) policy context. Moreover, the policy context of the Rhode Island study involves changes to technologies used within in-water structures (i.e., the use of fish ladders or fish lifts at dams), providing another parallel to the 316(b) context, which also involves the use of new technologies within in-water structures to mitigate harm to aquatic organisms."

EPA also provided analysis specific to the issues of scope noted by the commenter. As discussed in the benefits analysis, within the choice scenarios of the Rhode Island study each ecological attribute is expressed in relative terms with regard to upper and lower reference conditions (i.e., best and worst possible in the Pawtuxet) as defined in survey informational materials. Relative scores represent percent progress towards the upper reference condition (100 percent), starting from the lower reference condition (0 percent). This also implies bounds on the potential attribute levels that might occur in the choice questions, following guidance in the literature to provide visible choice sets (Bateman et al., 2004; DCN 12-4739). The number of fish affected by 316(b) regulations is many times larger than that considered in the Rhode Island study, such that using the per fish values would likely be an overestimate. Therefore, EPA transferred the results based on percentage improvements in the fish condition, relative to the reference condition for each ecosystem, to address the scale concern described above.

EPA also addressed these issues in the uncertainty section of the BA. Although some uncertainties would result in overstatement of benefits, others are likely to understate benefits. EPA disagrees that site-specific differences precludes the use of the study to estimate potential benefits for these two regions as a whole. EPA defined its study regions based on similarities of species affected by impingement and entrainment, and fisheries regions defined by NOAA. NOAA's delineation of fisheries regions is based on similarities of fish species and characteristics of commercial and recreational fishing activities in the areas. For example, the habitat range for many pelagic species (including shad, herring, striped bass) spans from North Carolina or Virginia to Maine. Therefore, EPA transferred the results of the Rhode Island study to both the North Atlantic and Mid-Atlantic regions. The North Atlantic region includes all estuary, tidal river and ocean facilities in Maine, New Hampshire, Massachusetts, Connecticut, and Rhode Island. The Mid-Atlantic region includes all estuary, tidal river and ocean facilities in New York, New Jersey, Pennsylvania, Maryland, the District of Columbia, Delaware, and Virginia.

Indeed, as discussed above, other commenters strongly suggest extrapolating the study beyond the North Atlantic and Mid-Atlantic Regions. Although EPA did not use the Rhode Island survey to calculate national level nonuse benefits (for reasons described above), EPA disagrees that the study is not appropriate for site-specific determinations of potential nonuse benefits when there is a close match between the resource and populations characteristics.

Essay 75: Nonuse Benefits on Reducing I&E Mortality: Habitat-based Approach

EPA received a number of comments on the habitat-based methods for estimating nonuse values of reducing fish losses at cooling water intakes.

Role of Habitat-Based Approach Results

EPA received conflicting comments on the role of the habitat-based approach results in the analysis of benefits of the section 316(b) final rule. In comment number 2391, Riverkeeper states that use of nonuse values calculated with the "habitat restoration area equivalent" method would close the entire gap between estimated costs and benefits under Option 1, or about half the gap under Options 2 and 3 in the proposed rule, yet EPA does not include it in its best estimate of costs and benefits. In comment number 2210, the Utility Water Act Group (UWAG) asserts that EPA should not use the habitat-based method indirectly as a justification for the national impingement rule, or to provide estimates in site-specific determinations, because it is based on a large number of assumptions. UWAG notes that use of such a method in oil spill damage assessments is for developing estimates of the relative similarities of lost and gained habitats, not for estimating dollar values for fish protection. In comment number 2200, the Electric Power Research Institute (EPRI) claims that it is not clear how the estimates fit into the proposed rule benefit analysis or to what extent they are to be used as part of the record to determine that the rule will produce benefits that justify the costs of the rule. UWAG also claims that the estimates EPA develops do not distinguish between use and nonuse benefits. As such, it would not be desirable to replace all of the other careful analyses with the habitat-based results as EPA would need to do without being able to distinguish between use and nonuse benefits.

Assumptions in the Habitat-Based Approach

In comment numbers 2210 and 2200, UWAG and EPRI comment on the assumptions underlying the habitat-based method results. UWAG terms EPA's numerous assumptions unrealistic, including: that all fish species are aggregated in the calculations; a single habitat (e.g., eelgrass) is assumed to be relevant within a region; willingness to pay (WTP) values for habitat restoration were based upon stated preference studies; WTP for habitat restoration can be converted to meaningful estimates of WTP for fish habitat; a single study (from salt marsh restoration in Narragansett Bay in Rhode Island) was used to estimate the proportion of value associated with fish habitat in the Mid-Atlantic, South Atlantic and Gulf of Mexico regions; arbitrary values of 10, 20, and 100 percent to estimate the proportion of value associated with fish habitat in other regions; that the resulting per acre value was associated with nonuse values; and that all residents within a state with an affected waterbody would have nonuse values. EPRI claims that there appears to be significant differences between the hypothetical choice scenario and policy context. EPRI cites the National Oceanic and Atmospheric Administration's proposed natural resource damage assessment (NRDA) regulations list of three basic issues that researchers should consider when selecting transfer. In addition, EPRI claims that the populations having knowledge of and being affected by changes in impingement mortality and entrainment (IM&E) are likely to be quite different from those knowing about and being affected by changes in habitat.

The Habitat-Based Method's Unrealistic Results

In comment number 2210, UWAG terms EPA estimates of nonuse benefits resulting from the habitat-based method implausible because the results are more than a factor of 30 larger than those developed using other methods, as well as that the results imply each household in the Mid-Atlantic region would be willing to pay $89 each year for the fish saved due to the national impingement rule, again stating that the method should not supplant careful benefits assessments of the potential for significant nonuse benefits in section 316(b) site-specific benefit assessments.

Response to Comments

Although EPA disagrees with many of the specific comments, the comments are not relevant for purposes of the final rule because EPA decided not to employ the habitat-based approach to nonuse values in the final rule analysis. EPA included the habitat-based approach at proposal because it illustrated the potential magnitude of nonuse values, and provided additional support for both the benefits transfer and SP survey approaches to benefit estimation, described in Chapters 8 and 11 of the BA. However, EPA did not consider the habitat-based approach appropriate for primary analysis of nonuse benefits, and thus did not include habitat-based estimates in the total benefits of eliminating or reducing IM&E under the final rule.

EPA agrees that more information is needed on nonuse benefits in comparing the benefits and costs of the rule. EPA considered the monetization of the nonuse benefits from the rule to be incomplete. This is why the agency adopted the habitat-based analysis for the proposal while working on methods (i.e., a stated preference study) for the final rule to enable it to estimate and incorporate such benefits in the benefit-cost comparison.

EPA disagrees that it is using the habitat-based method as an indirect justification for the national impingement rule. EPA chose not to employ the habitat-based approach for estimating nonuse values for the final rule or include them in assessing the total benefits of the rule. Thus, these estimates and methods are not applicable to EPA's final decision-making.

Rather, as explained in the preamble to the final rule, EPA looked at a number of factors, consistent with the Courts' rulings regarding making this determination. EPA first considered the availability and feasibility of various technologies, the associated costs (including potential costs to facilities and households), and the economic impacts. EPA reviewed the efficacy of these technologies in reducing impingement mortality and entrainment. EPA also considered additional factors set out in CWA section 304(b), including location, age, size, and type of facility. EPA next considered the non-water quality environmental impacts of different technologies on energy production and availability, electricity reliability, and potential adverse environmental effects that could arise from the use of the different technologies evaluated.

As a result of this thorough evaluation, EPA is promulgating a rule that includes a best technology available standard for impingement mortality based on modified traveling screens with a fish handling and return system whose performance has been optimized to minimize IM, and several options for compliance.

EPA cannot rule out at this time that habitat based approaches to benefits analysis may be informative for site-specific determinations.

Essay 76: Break Even Analysis

Introduction

EPA received a number of comments on the estimated break-even comparison of total national social benefits to total national social costs. (The break-even approach enables EPA to work backwards to estimate what the non-monetized values would need to be, in terms of willingness-to-pay, per household, per year, in order for total annualized benefits to equal annualized costs.) This essay responds to those comments.

At the outset, EPA emphasizes that section 316(b) does not require impingement mortality and/or entrainment controls to be justified by an exact balance of costs and benefits. See *Entergy Corporation v. Riverkeeper*, 556 U.S. 208 (2009) (permitting, but not requiring, cost-benefit analysis). Instead, the reasons for the requirements are discussed in the rule. EPA understands that Executive Order (EO) 13563 requires that costs of a rule be justified by the benefits, but this same EO recognizes that some benefits are difficult to quantify. Values that the public holds for ecosystems are difficult to quantify and, as the guidance for implementing EO 13563 states, do not take into account equity and fairness.

These issues of equity and fairness are relevant when dealing with externalities, such as one entity harming a public good such as a fishery or recreational water. In its analysis, EPA attempts to monetize benefits, and where monetizing benefits is not possible, to quantify benefits. Where EPA is not able to quantify benefits, EPA attempts to describe benefits. However, EPA's conclusion under EO 13563 that the benefits of the rule justify the costs is not based on a simple comparison of monetized benefits and total costs. Instead, EPA incorporates the non-monetized, nonuse benefits into its consideration of the benefits of the rule. The comments below take issue with that incorporation. EPA's responses to those critiques then follow.

Riverkeeper Comments

In comment 2391, Riverkeeper states that EPA's break-even calculation assumes that only households in States with regulated facilities care about the fish affected by these facilities (although those State encompass almost all of the population), and criticizes EPA's use of 2000 Census data on the number of households. Riverkeeper claimed that using more recent Census data would lower the break-even estimate.

EPA agrees with this comment and used 2010 Census data on the number of households in its analysis for the final rule. EPA concurs that although including the States in which affected facilities are located encompasses most of the population, households in the omitted States of Idaho and Nevada, and the District of Columbia are also likely to hold nonuse values for fish affected by the final rule. Including those additional States and the District of Columbia added 1.9 million households to the 114.9 million households EPA used in the analysis for the final rule.

Riverkeeper performs a break-even calculation with its own estimates of omitted benefits. However, Riverkeeper suggests that the estimates of the per household gap between total costs and monetized use-value benefits in EPA's original analysis could be used to describe the benefits of not killing large numbers of fish, shellfish, etc. and asking whether people are willing to pay the indicated amount in higher electricity bills. Riverkeeper states that this provides what might be called a "holistic" comparison of costs and benefits, citing Ackerman and Heinzerling (2004; DCN 12-5065). Riverkeeper stated that this would be a more meaningful and accessible approach than a complex academic analysis of the inference of what individuals must be willing to pay; instead, it involves asking them directly, with the question tailored to this decision in particular.

EPA disagrees with the commenter's approach to using the break-even results. The results are not appropriate for use in survey design, but rather, for comparison to other study results. One such study is EPA's own stated preference survey, which used electricity bills as a payment vehicle to estimate the public's total willingness-to-pay (use plus nonuse value) to avoid fish losses, following standard practices for survey design and value elicitation. This method involves directly asking people the question tailored to this decision in particular. Focus groups indicated that individuals are willing to pay an amount in the range of the break-even result which EPA calculated.

UWAG Comments

In comment 2210, the Utility Water Action Group (UWAG) compares the break-even value to estimated use values, and finds the result (the number of times that the break-even value exceeds the use value) to be implausible. UWAG calls EPA's conversion of the gap in estimated costs and benefits into a dollar value per household misleading because per household break-even values would be only about 4 percent higher for an option that costs as much, but has only 1/10th the impact on fish mortality based on use benefits that UWAG estimates by dividing EPA's estimate by 10. Also, UWAG states that EPA could make the cost look even smaller by using the number of individuals rather than the number of households, or all the households in the world. UWAG states that the flawed reasoning based on a "break-even" analysis resembles the use of "habitat replacement costs" to represent the "value" of fish in the Phase II rulemaking.

EPA disagrees with these comments. Regarding the comparison of the break-even value to use values, there is no a priori evidence to suggest that the ratio is implausible, and UWAG offers none. EPA notes that a very large number of users[59] plus nonusers holding even relatively low nonuse values, compared to a relatively small number of users holding use values – even if use values are higher than nonuse values for users – could still result in a total nonuse value that exceeds the total use value. Even if both costs and monetized benefits are reasonably accurately measured, it is not implausible for the public to hold high values for avoiding resource loss, and these values may increase the greater are the losses this regulation is designed to reduce.

EPA estimated use benefits on a per household basis, and it is appropriate to judge nonuse values on a per household basis as well. WTP values in the literature are typically reported on a per household basis because the household is the fundamental consumer decision-making unit (many households include members who are not independent consumers or economic agents). For this reason, EPA disagrees that the number of individuals rather than the number of households is the appropriate unit for comparison. EPA further notes that the comment is moot because EPA did

[59] Users clearly hold use values, but users may also hold nonuse values.

not use the overall population in its break-even analysis. EPA disagrees with the commenter's hypothetical analysis; the comment is not relevant because such an option was not available to EPA, and the commenter has no basis for speculating that EPA would have selected an option that costs the same but is $1/10^{th}$ as effective. EPA agrees with the commenter foreigners may hold nonuse values for U.S. resources. However, EPA does not include their nonuse values in benefits analyses because the Agency is comfortable making the determination that total benefits justify total costs on the basis of the U.S. population alone. Incorporating values held by foreigners would simply make a stronger case for the same determination.

Finally, EPA disagrees that the break-even analysis and habitat replacement cost analysis represent flawed reasoning. Rather, EPA recognizes that it is flawed to compare total costs to partial benefits, and provides these approaches to shed as much light on the cost-benefit results as possible in the absence of complete information on society's values.

Essay 77: 316(b) Stated Preference Survey

EPA received a large number of comments on the proposed rule and NODA addressing the use of stated preference (SP) surveys to determine benefits associated with the rule. EPA conducted a SP survey to calculate benefits associated with minimizing adverse impacts to aquatic ecosystems from cooling water intakes.

For some commenters, the use of SP surveys to evaluate benefits remains controversial, and they objected to using such surveys. Other commenters acknowledge the decades of technical development and improvement of these methods and support using SP surveys. In part to address the issues surrounding the use of SP surveys, as discussed in Chapter 11 of the Benefits Analysis document, EPA plans to obtain Science Advisory Board (SAB) review of its SP survey.

The upcoming SAB review is in addition to the external peer review EPA already conducted on the survey. SAB review will provide another high-caliber, independent professional judgment concerning the quality of the survey, including possible improvements EPA could make to the analysis. EPA also plans to seek SAB input on whether, how, and in what circumstances this or similar surveys could be used as support for other national rulemakings or for 316(b) NPDES permits. EPA expects that this SAB review will delay when EPA considers the survey results appropriate for use in supporting a rulemaking or a permit proceeding. Given the importance of answering the outstanding questions about use of the survey for the evaluation of ecological benefits, however, EPA has concluded that this additional time and effort is justified. Given the contemplated SAB review, using the SP survey results prior to completion of review would be premature. EPA notes that the survey was designed to estimate respondents' willingness to pay for changes in the health of fish populations and aquatic ecosystems and be statistically representative at large (regional and national) scales; the results were not designed to be statistically representative at the facility level for the assessment of benefits for individual site-level permitting decisions. That the survey was not designed for site-specific permitting does not necessarily mean that it cannot be adapted for such use. At this time, EPA has not attempted such an adaptation, although it may do so in the future. Regardless, EPA is committed to working with the States to support their 316(b) site-specific permitting decisions with the benefit of the SAB review once it is completed.

This essay summarizes key comments received by EPA, both critical and supportive of the SP survey, and provides EPA's response to these comments. In many instances, the comments are moot, given that EPA did not rely on the results of the stated preference survey for the final rule. These comments are divided into two categories: (1) nonuse values, and (2) use of the SP survey results for cost-benefit analysis.

The commenters also reference numerous comments on EPA's earlier Information Collection Requests (ICR) from 2005 to 2011, asserting that these comments are still relevant. EPA provided detailed responses to all ICR comments submitted under previous 316(b) rulemakings, which can be found in the following EPA dockets: W-00-03: Phase I rule proposal;EPA-HQ-OW-2002-0052: Amendment to Phase I Final Rule; W-00-32: Phase II rule proposal; EPA-HQ-OW-2002-0049: Phase II NODA and Final Rule; EPA-HQ-OW-2003-0005: Phase III Detailed

Industry Questionnaire; EPA-HQ-OW-2004-0002: Phase III proposal; EPA-HQ-OW-2004-0020: Phase III stated preference survey focus groups ICR; EPA-HQ-OW-2004-0027: Phase I ICR renewal; EPA-HQ-OW-2005-0006: Phase III stated preference survey ICR; EPA-HQ-OW-2007-0142: Phase II ICR renewal; EPA-HQ-OW-2008-0667: Existing Facilities rule; EPA-HQ-OW-2008-0719: Phase I ICR renewal; and EPA-HQ-OW-2010-0595: Stated Preference Survey.

Nonuse Values

Potential for nonuse values—existence of nonuse values for marginal effects on fish stocks—is highly subjective and the use of these in support of this rulemaking is inconsistent with EPA's previous approaches. The SP survey and assessment of nonuse values is inappropriate because the resources are not unique or limited and the impacts are not substantial or irreversible. The necessary conditions for the presence of significant nonuse values have not been met. A misunderstanding of the restoration probability is likely to result in the overstatement of nonuse values.

Response: There are no theoretical, necessary conditions for the existence of nonuse values. For example, resources do not have to be unique to be the source of nonuse willingness to pay (WTP). While factors such as uniqueness can affect the magnitude of willingness to pay, the significance of nonuse values depends on individual responses to given conditions. While the EPA recognizes the possibility of low nonuse values in this case, significant nonuse values are also a strong possibility. In addition, prior research demonstrates public willingness to pay for types of resource improvements that are similar to those addressed here (e.g., DCNs 12-4865; 12-4866).

EPA notes that participants in focus groups and one-on-one cognitive interviews cited a variety of motivations for preventing fish losses, including the satisfaction of knowing that fish exist, the desire to bequeath healthy fish populations to future generations, and the desire to protect the functioning of aquatic ecosystems. Debriefing questions in the survey instrument verified these motivations. EPA is aware of no research—empirical or otherwise—that demonstrates that individuals ascribe limited or no value to the aquatic resources affected by the 316(b) regulation.

EPA agrees that nonuse values are inherently subjective, as are use values revealed through behavior, which is why it is important to conduct a public survey to elicit those values. Once survey data was collected, EPA conducted a transparent analysis with the goal of reporting objective, nationally representative results. The EPA further notes that the referendum format of the survey allowed respondents who do not attach nonuse values to fish to choose policy options that reflect their preferences; respondents need not value the existence of fish, nor do they need to be able to separate their use and nonuse values to respond to the survey questionnaire. EPA emphasizes that these comments reflect an *assumption*, unsupported by data, that nonuse values are trivial in this case. The stated preference survey and resulting data provide a direct means to test this assumption and evaluate its accuracy.

Use for Cost-Benefit Analysis

The survey captures benefits which were previously "zeroed out"—the vast majority of benefits (98 percent) have been routinely "zeroed out" or ignored by EPA and State agencies, and this has skewed decision-making against environmental protection. Benefits now clearly outweigh costs, even while the survey estimates are undervaluing benefits. The SP study confirms what EPA has known all along, that benefits of closed-cycle cooling are significant and certainly are not wholly disproportionate to its costs.

Response: It is true that only a small portion of the benefits, particularly the nonuse benefits, associated with the 316(b) regulation were quantified in the Environmental and Economic Benefits Assessment (EEBA) for the proposed rule. EPA followed a similar analytical approach for the final rule, adding new analyses of the benefits of reduced carbon emissions and some nonuse benefits estimated via benefits transfer. However, EPA disagrees that the nonmonetized benefits were "zeroed out" or ignored. While EPA has not relied on the results of the stated preference survey, it is not clear that even if the Agency had that the net benefits of requiring closed-cycle cooling would exceed the net benefits of the final rule because of the significance of the social cost of carbon. The social cost of carbon is a positive benefit for the final rule, but a negative benefit for Proposal Option 2.

Survey results are invalid and should not be used for cost-benefit analysis—the unprecedented application of SP methodology would have broad and long-term negative implications. Using a benefits calculation method based on public opinion survey would directly and materially jeopardize prospects for a reasonable final EPA rule and subsequent site-specific compliance decisions. EPA should rely on traditional methodologies that are based on biological science and economic principles, and not on a survey methodology premised on hypothetical scenarios and questions.

Various deficiencies prevent the SP survey from accurately estimating benefits, which is critical to the rulemaking process. EPA and other agencies rarely use SP surveys to monetize nonuse environmental benefits, and have not previously done so in a national rulemaking covering multiple species without the risk of endangerment. EPA's limited experience in this complicated area of experimental economics has not given EPA sufficient opportunity to fully assess SP methods.

Response: Although EPA is not relying on the results of the stated preference survey, EPA disagrees strongly with the basic premise of these comments. It is well-documented that there are difficulties associated with measuring and monetizing all categories of benefits. While using benefit-cost analysis can be illuminating and useful in producing better decision-making, it can also be subverted to produce skewed outcomes that allocate resources in a manner contrary to the best interests of society at large. This can occur, in particular, through blind reliance on only those benefits that can be monetized using traditional approaches, especially when that results in an incomplete analysis. EPA notes the significant overlap of the commenters who suggest that benefit-cost analysis should be mandatory in decision-making, and those who suggest that stated preference methods are too controversial to be used. EPA notes that some of these same commenters have a self-interest that appears to be at odds with putting better and more illuminating analyses in front of decision makers. Rarely do these comments offer constructive suggestions that would rationalize their support for benefit-cost analysis in decision-making with improving such analyses to make them more useful in societal decision-making.

EPA recognizes that there is some controversy over the use of stated preference valuation methods. A recent evaluation of this controversy, by Kling et al. (DCN 12-5084. p. 23), however, concludes that “the last 20 years of research have shown that some carefully constructed number based on stated preference analysis is now likely to be more useful than no number [for] cost–benefit analysis.” Stated preference methods have also “been tested and validated through years of research and are widely accepted by Federal, State, and local government agencies and the U.S. courts as reliable techniques for estimating nonmarket values” (DCN 12-4747, p. 26; DCN 12-5027). The Agency has concluded that the expansive stated preference and choice experiment literature demonstrate that a properly design survey may provide a useful tool for evaluating WTP for resources impacted by CWIS. The Agency recognizes the commenter’s perspectives on the validity of stated preference methods. The EPA, however, notes the absence of any clear consensus in the academic literature that indicates that the survey results are necessarily invalid or their use inappropriate as one of a number of tools in decision-making. These methods have now been applied in numerous cases to value nonmarket environmental resources and related policy changes. The Agency is aware of no theoretical distinction between national policy analysis and other policy contexts (including damage assessments) that would render stated preference methods unsuitable for such applications. Official guidance documents (DCNs 12-5027; 12-5027) and the Blue Ribbon Panel (DCN 12-4730)—while explicitly recognizing the controversies and challenges—all consider stated preference methods, when conducted using best practices, to be a valid source of information.

As discussed earlier in this essay, EPA decided not to employ the survey results for purposes of decision-making in this rule, or include them in assessing the total benefits of the rule. EPA plans to continue review of the survey by submitting it to EPA’s SAB. SAB review will provide independent professional judgment concerning the quality of the survey, including improvements EPA could make to the analysis, and how and in what circumstances this or similar surveys could be used, as support for national rulemaking or NPDES permitting whenever benefit-cost analysis is considered in the decision-making process.

Essay 78: National Benefits

EPA received a number of comments on the national benefits of the rule, some asserting that benefits are underestimated, and some asserting they are overestimated, with detailed arguments for both claims. This essay responds to those comments.

Benefits are Underestimated

In comment 2391, Riverkeeper states that EPA cannot accurately monetize the benefits of saving nonmarket fish, other aquatic organisms, and ecosystems. Riverkeeper concludes that until and unless EPA corrects its estimates of fish kills and recreational fishing benefits, completes its planned willingness to pay study, accounts for the substantial value that people place on environmental preservation (even from a distance), and corrects the serious deficiencies in its approach to valuing threatened and endangered species, EPA will continue to dramatically undervalue the benefits of a uniform national standard based on closed-cycle cooling. The commenter asserts that the flaws in EPA's analysis, both in quantification and monetization of the benefits, are sufficiently large that to rely upon it would be arbitrary, capricious and an abuse of discretion.

The commenter also states that EPA should correct its national estimate to account for the deficiencies identified in the Stockholm Environment Institute's (SEI) report, which it provides. SEI applies EPA's habitat-based method for estimating nonuse values, but extrapolates the results nationally. SEI also used a benefits transfer method to infer national threatened and endangered species benefits and modified EPA's estimated recreational fishing benefits based on the Bay Shore Power Plant study. The commenter states that these basic modifications result in benefits estimates that approach or are greater than EPA's cost estimates for all of the options that EPA considered, including for a uniform national standard based on closed-cycle cooling. Also, the commenter states that correcting errors in (the costs and) the benefits estimates leads to the conclusion that the benefits of the regulation are greater than the costs for every option.

In comment 2260, the New York State Department of Environmental Conservation (NYSDEC) states that the rule will result in an 82 percent decrease in the reduction of annual mortality of age-1 equivalent fish over the remanded Phase II Rule, despite covering an estimated 140 percent additional existing facilities and increasing the required reduction in impingement mortality from 80 percent to 88 percent. NYSDEC asserts that, even considering that entrainment mortality reductions are not counted, the drop in benefits does not add up, and either EPA has substantially underestimated the benefits or the rule is ineffective.

EPA agrees that the benefits of the final rule are underestimated as presented, but, for the reasons stated in the preamble, EPA would not change its final rule even if it had a more complete benefits estimate. EPA has also completed its stated preference survey of willingness to pay (see Essay 77 for EPA's response to comments on the stated preference survey). EPA responds to the other suggested adjustments to its benefits estimates elsewhere, and disagrees that it relied heavily on the monetized benefits estimates.

As described in the preamble to the final rule, EPA assessed the benefits of the rule in order to comply with Executive Orders (EOs) 12866 and 13563. Pursuant to EO 13563, EPA finds that the benefits of the BTA requirements in this final rule justify the costs, despite the fact that monetized benefits are numerically lower than the social costs. EPA notes that the monetized benefits are only a subset of all benefits. In the absence of complete estimates of nonuse benefits, EPA estimated partial nonuse benefits for the final rule using the benefits transfer approach from proposal. This approach is still a partial estimate because it concerns only two coastal regions and because the original study focused on fish population improvements for a few species (river herring, shad, American eel, and Atlantic salmon) in one watershed only. Scaling benefit estimates to represent multiple watersheds in the Northeast and Mid-Atlantic region may not be sufficient to capture true benefits of aquatic habitat improvements over a large geographic scale and dozens of species. In addition, the estimated nonuse value of reducing impingement mortality and entrainment (IM&E) was based on the expected improvements to population of one species (winter flounder) due to the lack of population data on most species affected by IM&E. EPA notes that winter flounder accounts for only 0.9 percent of IM&E losses in the North and Mid-Atlantic regions and 0.3 percent of the national IM&E losses. Although it not appropriate to estimate nonuse values for reducing IM&E for each species and sum them, the value of reducing IM&E for multiple species is likely to be greater than the value of preventing losses of a single species. With respect to site-specific BTA entrainment determinations, the *Entergy* decision by the Supreme Court allows benefits and costs to be considered in 316(b) determinations on a national or site-specific basis, and the final existing facility rule requires the Director to consider costs versus benefits in the site-specific determinations. Note that requiring that costs and benefits be considered does not mean that such consideration is paramount to the consideration of other factors.

EPA has added the Bay Shore Power Plant mortality study to the studies it used to model regional IM&E for the analysis of benefits. As noted above, EPA describes fully in the preamble to the final rule that the benefits of the rule justify its costs. Under EO 13563, agencies "must take into account benefits and cost, both quantitative and qualitative," and to the extent permitted by law, only promulgate regulations that are based on "a reasoned determination that its benefits justify its costs (recognizing that some benefits and costs are difficult to quantify)." In choosing among regulatory alternatives, agencies must select "those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity) to the extent permitted by law," including when nonmonetized benefits are considered). EPA notes that even if the benefits of the rule or other options are somewhat underestimated, it would not have selected a uniform national standard based on closed-cycle cooling for entrainment controls, because lack of monetized benefits was not part of the rationale for rejecting closed-cycle as a national BTA basis. See the final preamble for additional information on options selection and the final regulatory requirements. EPA disagrees that the commenter's analysis of a decline in benefits indicates that the rule is ineffective. EPA used the same method of calculating IM&E benefits for the final existing facility rule and the Phase II rule. The differences in the estimated IM&E reductions are due to changes in input data, in particular, data on state regulations and technologies in place under the baseline scenario. Since the initial Phase II analysis, State regulations more stringent than the proposed rule have been instituted. Therefore, the estimated reduction in IM&E associated with the national rule for facilities in these states is zero, as are the costs.

In addition, several facilities have improved baseline levels of environmental protection, either by newly installing technologies that reduce IM&E, or installing improved technologies, including the installation of closed-cycle cooling in several locations; see Technical Development Document for the Final Section 316(b) Existing Facilities Rule (DCN 12-0003), Plant McDonough in Georgia (retrofit in 2008), Canadys Station in South Carolina (retrofit in 1992), and Nearman Creek in Missouri (retrofit in 2006) for examples of the implementation of closed-cycle cooling for reasons of either Clean Water Act Section 316(a) (thermal) or water supply/availability concerns. These changes reduce baseline losses, and thus, the overall reduction in IM&E that will result from the final rule.

Finally, EPA has substantially increased the number of model facilities reflected in the benefits analysis since the Phase II analysis from 48 for the Phase II rule to 98 for the Final 316(b) Existing Facilities Rule to improve its estimates of IM&E. This change affected EPA's estimates of total IM&E losses in several study regions and at the national level.

Together, these changes explain the reduced national effects of the final rule when compared to the Phase II rule.

Benefits are Overestimated

Other commenters claim that EPA overestimated the benefits of the final rule. In comment 2458, AES North America, L.P. refers to the National Benefits of a Closed-Cycle Cooling Retrofit Requirement Report finalized by the Electric Power Research Institute (EPRI) in August of 2011, finding that many of EPRI's and EPA's assumptions overstate benefits: assuming 100 percent mortality for entrainment; not accounting for the ability of fish and other aquatic species to compensate for losses of individuals by generating large numbers of eggs; not fully accounting for fish that are not likely to survive regardless of I&E; assuming all forage biomass is consumed by harvested species; not accounting for water quality benefits of cooling water flow that would be lost; and not accounting for facility closures for other reasons. AES further outlines assumptions that it states could result in either an over- or underestimate of benefits, such as annual variability, constantly changing fishery conditions, and lack of data.

In comment 2215, Duke Energy Business Services, LLC argues that nonuse benefits are independent of any current or anticipated use of the resource, and thus have little connection to I&E at affected facilities, claiming it a stretch to include such benefits when costs are limited to State and Federal administrative agencies, manufacturers, and electric utilities.

In comment 2215, Duke Energy Business Services, LLC stated that EPA chose artificially low discount rates, thereby increasing the value of benefits. The commenter also provided a comparison to personal discount rates of fishermen.

In comment 2347, Entergy Corporation states that to ensure that potential benefits are real, not fictional, the final rule should account for cumulative benefits resulting from use of readily installed technologies over technologies with longer installation times.

In comment 2245, Midwest Generation, Edison Mission Energy, LLC states that EPA's assumption in extrapolating benefits that impingement and entrainment mortality rates recorded at model facilities are representative of such rates at other facilities in the region is problematic.

A variety of reasons were offered, including that site-specific considerations such as debris load and the mix of species impinged or entrained can greatly impact the performance of a given facility. The commenter finds that EPA does not provide the data, information regarding the data or the selection of model facilities, making it difficult to reproduce the data published in the Environmental and Economic Benefits Analysis (EEBA) for the proposed rule. The commenter states that if the data are biased in any way, the monetized benefits will also be biased. The commenter calls for acknowledgement that the rates of I&E losses at some facilities are very low, and consideration of alternative measures as well as a site-specific variance provision that would be based on locally estimated adverse environmental impacts and cost and benefit considerations.

EPA understands the uncertainties in the benefits analysis regarding the population dynamics of aquatic species. EPA supports its analysis of benefits with recent scientific literature. The cumulative losses from I&E may also have ecosystem effects that EPA has not identified and monetized. EPA disagrees with the comment regarding not accounting for premature facility closures due to economic reasons other than closed-cycle cooling retrofits: the analysis of benefits is consistent with the assumptions regarding economic viability and installation of control technologies reflected in the cost analysis. The benefits analysis measures benefits associated with the regulation, and such closures are not caused by the regulation. EPA has taken into account the demand for electricity in projecting the benefits of the rule, and if there are premature closures, the electricity that would be generated by that facility must be generated by another facility. However, as described above and in the preamble to the final rule, EPA considered a number of factors not related to benefits and costs in selecting the option for the final rule.

EPA disagrees that nonuse values have little connection to I&E at affected facilities. I&E affects the condition of the resource, the existence of which is valued by many regardless of use (i.e., nonuse benefits) as demonstrated in focus groups conducted as part of EPA's stated preference survey. Note also that compliance technology costs to manufacturers and utilities may be passed on to consumers, and agency costs are borne by taxpayers.

EPA disagrees that it chose low discount rates. EPA discounted the various categories of benefits for comparison to compliance costs, consistent with Office of Management and Budget guidance. Such comparisons reflect the time paths for realizing both costs and benefits, and are based on a discount rate reflective of society as a whole as opposed to individual members.

EPA understands the time considerations in realizing benefits. As noted by the commenter, EPA developed a time profile for realization of benefits. EPA developed a similar timeline for compliance technologies. Thus, cumulative benefits from the use of readily installed technologies as well as technologies associated with long installation periods, such as closed-cycle cooling, will be reflected appropriately in both benefits and costs.

EPA disagrees with the comments regarding the information on model facilities or I&E data used in the benefits analysis. IM&E data from facilities is in the docket for the rulemaking. EPA provides total flow from each region in Chapter 1 of the Benefits Analysis for Final Section 316(b) Existing Facilities Rule (BA; U.S. EPA, 2014; DCN 12-4500 to DCN 12-4700), which allows calculation of average I&E per million gallons per day. The Agency, however, notes that the facility input data for the I&E model is treated as Confidential Business Information (CBI) in the record because it includes a combination of I&E data and information from the industry survey, which is treated as CBI. Chapter 3 of the BA for the final rule describes the use of IM&E data from model facilities and extrapolation of these data to develop regional IM&E estimates; also, Appendix A of the EEBA (U.S. EPA, 2011; DCN 12-5032) describes the extrapolation methods, based on the data noted in the record for the previous rulemakings.

EPA agrees that site-specific variability in IM&E and expected benefits of the rule exist. EPA has incorporated site-specific considerations into the final rule through the flexibility provided in the selected options, rather than a site-specific variance provision. As described fully in the preamble to the final rule, EPA provides seven alternatives for compliance with the national impingement mortality standard at existing facilities. The seventh alternative (at 40 CFR 125.94(c)(7)) for complying with the BTA impingement mortality standard requires the owner or operator to conduct biological compliance monitoring to demonstrate compliance with the numeric impingement mortality performance standard. Under this alternative, the owner or operator has the flexibility to choose any technology, including a new or innovative technology, provided the compliance monitoring demonstrates the standard is achieved.

EPA is promulgating an entrainment standard based on site-specific entrainment controls determined by the EPA or the State permitting authority for existing facilities (other than new units) that withdraw amounts of cooling water that exceed the applicability threshold. Requiring a structured site-specific analysis of candidate BTA technologies for entrainment control will allow the Director to determine where it is appropriate to require such controls. One outcome of the site-specific analysis could be that the Director would determine that no other technologies beyond impingement control meet the criteria for selection as BTA. For example, the Director could determine that no other technologies are feasible and/or the benefits do not justify the costs.

As described in the preamble to the final rule, EPA obtained estimates of regional impingement mortality and entrainment by extrapolating IM&E observed at 97 facilities with IM&E studies (model facilities) to all regulated facilities in the same region. EPA used regional estimates to more accurately estimate impacts by accounting for differences in ecosystems, aquatic species, and characteristics of commercial and recreational fishing activities across regions. EPA extrapolated on the basis of actual intake flow reported for the period 1996–1998 by facilities in response to EPA's Section 316(b) Detailed Questionnaire and Short Technical Questionnaire. Because the goal of the analysis is to provide estimates of IM&E at regional and national scales, EPA recognizes that these averages may not reflect the substantial variability at individual facilities. In spite of this variability, this extrapolation is a reasonable basis for developing estimates of regional and national benefits.

Essay 81: Loss Metrics

Several commenters criticized EPA's use of age-one equivalents (A1E), foregone yield, and biomass production foregone as inappropriate. This essay responds to these comments.

The New York State Department of Environmental Conservation (NYSDEC; comment 2260) and National Wildlife Federation (comment 2188) suggest that the use of A1E, Foregone Fishery Yield (FFY), and Biomass Production Foregone (BPF) are inappropriate for establishing a national rule because these metrics do not account for nonuse benefits (e.g., ecosystem processes, food web stability, etc.) associated with the regulation of CWIS. Instead, these commenters state, and Riverkeeper (comment 2391) implies, that the correct metric to use is the raw number of individuals (e.g., the count of all eggs, larvae, juveniles, and adult fish) lost due to CWIS operation. All comments asserted that nonuse benefits are the primary benefits to be gained by the rule.

EPA agrees that nonuse benefits are the primary environmental benefits to be achieved as a result of the rule. However, it disagrees with the suggestion that its use of A1E, FFY, and BPF are not suitable for its analysis. Although nonuse benefits are the primary benefits to be gained by the rule, they are not the only benefits to be gained. EPA used FFY and BPF metrics in its estimates of commercial and recreational fishing benefits likely to occur following rule implementation (see Chapters 6 and 7 of the BA for further discussion).

In comment 2260, NYDEC argues that the raw number of organisms lost to IM&E is the correct metric for analysis (a metric presented in Appendix C of the BA), because it incorporates all adverse environmental impacts caused by CWIS. Additionally, in comment 2188, NWF argues that the use of A1E ignores the importance of early life history stages in the ecosystem. EPA disagrees with both commenters, and notes that the derivation of the A1E metric includes a count of all organisms lost to IM&E (e.g., the metric suggested by NYDEC, including counts of eggs, larvae, juveniles, adult fish, etc.), weighted by the probability of survival to age one. Thus, the metric includes all raw organism count data, and acknowledges the importance of early life history stages in the food ecosystem, but also recognizes that the importance of each organism to the ecosystem is not equivalent. For example, an average fish egg plays a substantially less important role in an ecosystem than an adult fish of the same species. This is true when measuring the importance of an individual to inter- and intra-specific competition, population, nutrient and energy flows, and other ecosystem processes.

EPA does not agree with NYDEC (comment 2260) that metrics used in the analyses provide no accounting for nonuse benefits. In the proposed rule, EPA presented a habitat based methodology for estimating nonuse values of fish production. Although not incorporated into the final rule, this analysis explicitly used A1E losses to estimate nonuse benefits. Additionally, in the final rule, EPA uses a benefits transfer approach to estimate the nonuse benefits of regulation through application of a model that estimates willingness to pay (WTP) for anadromous fish habitat restoration (Zhao et al. 2013; DCN 12-5060). Finally, EPA used the A1E metric in the development of a stated preference survey for the final rule to enable nonuse benefits to be incorporated into the benefit-cost comparison (see Chapter 11 of the BA for further discussion).

EPA notes that the extensive focus group testing conducted as part of developing the survey demonstrated that the public understood the concept of young fish as having value, which can be restated in technical terms as age-one equivalents having nonuse value.

Essay 82: Assessment and Extrapolation of Impingement Mortality and Entrainment

While attempting to estimate national IM&E, EPA faced several difficulties. As was noted in several comments, much of the data used to generate these estimates come from the 1970s and 1980s. EPA recognizes that there have been many changes in the ecosystem over the past decades, and agrees that estimates of IM&E generated from modern facility-level IM&E studies may produce results that are very different. Additionally, EPA recognizes that there are many sources of potential error in IM&E studies, the use of age-equivalent models, and the use of an extrapolation model to estimate losses at facilities without studies. However, EPA notes that in each case (with two notable exceptions), commenters do not provide new data nor do they suggest how the use of available data could be improved.

Data Quality and Age

Several commenters (e.g., Riverkeeper: comment 2391; AES: comment 2458) noted that the data used by EPA to extrapolate losses are sometimes decades old, and that changes to environmental quality and status of fisheries insert substantial uncertainty into estimates of IM&E. EPA recognizes that the age and quality of IM&E studies used to estimate baseline losses nationally are a major source of uncertainty, and would have preferred to use more recent studies to estimate regional and national losses. However, the decades-old studies are, in most cases, the only data currently available and suitable for extrapolation. As noted by commenters, whenever possible, EPA corrected IM&E loss rates to account for several factors, including the installation of IM&E-reducing technologies (e.g., velocity caps, periodic flow reductions, etc.), seasonality, diel cycles, etc, in order to make these old studies comparable. However, other quality issues associated with some studies (e.g., not all species suffering from IM&E were reported) cannot be corrected, leading to an underestimate of losses for some species. EPA notes, however, that the most commonly captured species were reported (whenever identifiable) in all studies, suggesting that any species-level underestimates are unlikely to have a significant impact on estimates of national IM&E. Regardless of age and quality issues associated with some studies used in regional extrapolation models, the inclusion of these studies was necessary to obtain the data sufficient to estimate national baseline losses.

Cognizant of the fact that many old IM&E studies have substantial uncertainty, and because EPA's estimates of baseline losses propagate through the entire benefit analysis, modern IM&E studies are incorporated into the extrapolation models whenever they have been identified. Additionally, best practices for the use of age equivalency and production foregone models (e.g., EPRI report 1008471, DCN 11-6506C) identified in comment 2962 (EPRI) were reviewed, and their recommendations compared against EPA's approach: no changes were necessary. Furthermore, "default" estimates of fish life history parameters provided by commenters (e.g., EPRI reports 1008832 and 1023103; provided in comment 2962) were compared against parameters used by EPA (as reported by individual facilities used in extrapolation). In all cases, parameters were very close to each other, and no modifications were made to the values used in extrapolation by EPA.

In some cases, the incorporation of modern IM&E studies may substantially alter regional estimates of losses. For example, within comment 2391, Riverkeeper claims fish losses in the Great Lakes region were underestimated by an order of magnitude, based upon a recent (2008), high quality study of IM&E at the Bay Shore power plant. EPA thanks Riverkeeper for identifying this study, which was included in regional IM&E calculations used in the final rule. The direct result of this study's incorporation is clear: EPA's estimates of raw losses for many fish species in the Great Lakes increased by several orders of magnitude, despite an overall decrease in baseline intake flow (> 15 percent), due to New York's state standards requiring closed-cycle cooling at all in-state facilities with design intake flow greater than or equal to 20 million gallons per day, many of which are in the Great Lakes region (Table 1).

Table 1: Changes in EPA's estimate of raw losses for several species of fish in the Great Lakes Region (all values in millions of raw losses)

Species	Initial Estimate	Revised Estimate
Walleye	< 0.01	25.96
Freshwater Drum	221.27	4,153.88
Logperch	10.48	88.35
White Perch	< 0.01	704.63

Without the inclusion of several new studies, however, EPA is unable to determine the extent to which new studies would alter regional IM&E estimates in other regions.

Overall, EPA agrees with the comments suggesting that its estimates of baseline fish IM&E are greatly affected due to the (necessary) use of old data. However, EPA disagrees that its estimates are unreliable and likely to be an underestimate of baseline losses. Although EPA agrees that new data would increase the overall accuracy of regional and national estimates, these data do not exist (but will be collected as a consequence of rule implementation), and EPA has used the best data available when producing estimates of regional and national IM&E losses.

Problems with Age Equivalency Models

In addition to the age and data quality issues, commenters noted several potential problems with the data used to parameterize the age equivalency (e.g., age-one equivalent, or A1E) model to estimate baseline national values of IM&E. These issues include separation of IM&E data into correct life history stages by species, and accurate survivorship factors.

In many IM&E studies used by EPA to estimate national baseline losses, specific ages of impinged fish were reported. EPA agrees with Riverkeeper (comment 2391) that determining the age of fish can be inexact and time-consuming. However, EPA notes that age-length relationships are well-established in the fisheries biology literature, and that such a conversion (either from age to length, or from length to age) was necessary to make all studies comparable. Moreover, EPA notes that age-length relationships are based upon averages. Therefore, the use of such relationships is statistically unbiased, and therefore may underestimate or overestimate actual ages (and therefore age-equivalent losses).

As is noted by Riverkeeper in comment 2391, the determination of accurate survivorship factors is exceptionally difficult. In many cases, survivorship factors may change annually as a function of natural variability (e.g., of water temperature, sunlight, etc.) and anthropogenic factors (e.g., fishing pressure, water quality, etc). Based upon these (and other) factors, fish populations vary from year to year, although they are expected to be stable over the long term. Accordingly, although survivorship may vary among years, survivorship factors are fixed within the model. EPA recognizes that the assumption of fixed survivorship factors increases model uncertainty, but that estimates are likely to be unbiased and that accordingly, the overall direction and magnitude of this uncertainty is unknown. However, given that EPA used a total of 270 survivorship schedules in its estimation of regional IM&E losses, it is likely that survival is underestimated for some species, overestimated in others, and that across all species, the directional error aggregated across all species is likely to be a small proportion of total losses.

With respect to survivorship factors, commenters also note that survivorship may vary among sites, particularly at the geographic extremes of species ranges. EPA agrees with this assessment, and notes that the extrapolation model incorporates multiple survivorship schedules for species with wide-ranging habitat ranges. For example, there are five separate survivorship schedules for Alewife, with one schedule used in each of the Great Lakes, Inland, and North Atlantic regions, and two schedules used (for northerly and southerly facilities) within the Mid-Atlantic region.

In comment 3006, Entergy suggests that the life stages of fish subject to impingement and entrainment should be considered in the analysis, since the impact to a fish population varies by life history stage. EPA notes that the use of age equivalency models expressly takes life history into account, weighting the loss of early life history stages (e.g., egg and larval stages) lower than the loss of adult fish. EPA also notes that none of its analyses assess changes in fish populations, and consequently, suggestions relating to the accurate calculation of changes in local fish populations occurring due to CWIS are not relevant.

Although commenters recognize the utility of age equivalency models, some noted that they do not take into account for ecological effects of CWIS operation beyond IM&E. Whenever possible, EPA took broader ecological impacts into account (e.g., the value of forage fish was recognized through the use of trophic transfer), though this was not possible in many cases. For example, EPA acknowledges that there are other effects of CWIS operation, including flow and thermal alteration, effects on non-aquatic organisms (e.g., birds), and the potential for impacts on decomposers. EPA agrees with Riverkeeper that these effects are poorly studied, are difficult to detect reliably, and may be hidden by other anthropogenic impacts (e.g., fishing, climate change, channelization, nutrient cycling, land use change, etc.). EPA notes, however, that it may be possible to characterize such impacts of CWIS operation at individual facility locations with additional study. Similarly, positive, localized impacts of CWIS operation (e.g., thermal refugia for manatees, as identified by in comment 2458) may be identified more readily using site-specific studies.

Biomass Transfer Among Trophic Levels

In estimating the benefits of reduced fish kills, EPA assumed a trophic transfer efficiency of 0.10 for all trophic levels. This value indicates that 10 percent of the biomass at one trophic level (e.g., forage species) is incorporated into the next highest trophic level (e.g., predatory fish).

Although EPA recognizes that there may be substantial variability among habitats, this assumption is derived from the work of Pauly and Christensen (1995; DCN 12-4954) and is used as a baseline assumption by many ecologists when the true underlying trophic dynamics of an ecosystem are unknown.

Notably, the values of trophic efficiency (TE) compiled by Pauly and Christensen are not habitat-specific, but are specific to trophic levels within specific geographic regions (e.g., the 140 estimates of trophic efficiency compiled by Pauly and Christensen (1995) come from 48 food webs). The raw data indicate that there is substantial variability not only among sites within aquatic ecosystem (e.g., freshwater ponds and lakes, coastal areas, shelves and open ocean), but also among trophic levels within sites (e.g., TE within Lake Kinneret varied between 3 and 19 percent) (Christensen and Pauly 1993; DCN 12-5070). Accordingly, due to the complexity of multi-species food webs and the trophic-level and location-specific nature of trophic transfer rates, EPA agrees with commenters that "the efficiency with which food passes from one trophic level to another is very difficult to estimate" and is likely to "vary greatly from ecosystem to ecosystem and from species to species." Given that (i) species- and ecosystem-specific estimates of trophic transfer efficiency are not available in the literature, and (ii) it was not feasible to develop individual estimates at local or regional scales, EPA concluded that the use of an average rate of 10 percent for all regions and trophic interactions was an appropriate choice.

Extrapolation from Facilities to Regions

Many facilities subject to the final rule have never conducted impingement or entrainment studies. Accordingly, to generate regional and national estimates of baseline IM&E losses, EPA was forced to group these stations into regions, and extrapolate within these regions. Accordingly, EPA does not report nor estimate facility-level estimates of impingement and entrainment. Site-specific data were, however, used to populate regional loss models. In doing so, EPA incorporated data collected during Phase II and III implementation, and newer data whenever identified. In all cases, losses reported in IM&E studies were modified to account for modifications in facility CWIS design, including new IM&E mitigation measures.

EPA notes that because there is a great deal of variability in fish production among sites within regions, these extrapolations are highly uncertain. The direction and magnitude of uncertainty in regional-scale model extrapolations, however, are unknown. In some cases, facility IM&E studies were conducted in a geographically dispersed manner over several decades, and are therefore likely to be unbiased estimators of regional losses. In other cases, however, facilities may have been forced to conduct IM&E studies because of regionally high losses of species or the presence of important commercial and recreational fish species, in which case the use of these studies is likely to overestimate losses. Although EPA would prefer not to have to use an extrapolation procedure to estimate regional and national baseline losses, such a procedure is necessary given the overall lack of sampling data. Importantly, in comment 2391, Riverkeeper agrees, stating that using extrapolated data is "probably the only method available."

Limitations and Uncertainty

EPA acknowledges that its regional and national estimates of IM&E losses are uncertain, and agrees with commenters (e.g., AES in comment 2458, Riverkeeper in comment 2391; Entergy in comment 3006; Midwest Generation in comment 2245) that many factors contribute to this uncertainty. Whenever possible, EPA incorporated methods to minimize these uncertainties. Uncertainties include (but are not limited to):

- Site-specific field sampling and scaling. This uncertainty is driven by field sampling protocols developed for individual facilities that may miss or capture episodic events. Whenever possible, EPA averaged across annual IM&E estimates to obtain loss estimates representative of the facility. Uncertainties in sampling and site-specific scaling may over- or under-estimate IM&E.
- Site-specific rates of trophic transfer efficiency. As noted above, there is a great deal of variability in trophic transfer efficiency both among species within ecosystems, and among ecosystems. Although published estimates of trophic transfer efficiency range from approximately 2 to 25 percent, EPA used an estimate of 10 percent for all species and ecosystems. Accordingly, the use of a global mean may over or underestimate true levels of IM&E.
- Species-specific feeding patterns. In its models, EPA assumes that all forage fish species are consumed by harvested species, but recognizes that this represents an upper bound.
- Species identification. In many cases, it is not possible to identify organisms to species due to inadequate study, inadequate morphological development necessary to differentiate among species (this is particularly true for early life history stages), and/or physical damage to organisms caused by impingement or entrainment. When organisms were not identified to species, EPA classified these losses either by species group (e.g., "salmon"), or categorized these losses as "other species." Miscategorization of individuals will overestimate losses of the species assigned inappropriately while underestimating losses of the species misassigned. Because of these offsetting values, it is unlikely that inaccurate species identification will meaningfully affect regional or national IM&E estimates.
- Impinged and entrained organism health. In some cases, the health of impinged and entrained organisms may be impaired, or they may be dead upon arrival at the intake. Whenever possible, EPA took organisms health into account. However, the vast majority of facility IM&E studies did not note the health or impinged organisms, and it is not possible to extrapolate organism health among facilities.
- Entrainment survival. EPA models entrainment mortality to be 100 percent, but recognizes that this is an upper bound. Actual entrainment mortality may be less than 100 percent for some facilities, times of year, or species.
- Undercounting. Many facility IM&E studies report that many fish eggs and larvae were damaged by the sampling protocol, and could not reliably identified or even counted. Consequently reported entrainment estimates from facility IM&E studies are likely to be underestimates.
- Periodic nature of mass impingement and entrainment events. In some facility studies, a high percentage of annual IM&E was observed in one or two sampling periods. To the extent that these events are included (or missed) in facility sampling protocols, and important to average IM&E by species or region, EPA may over- or underestimate IM&E.

- Annual variability in loss rates driven by changes in local fish populations. Whenever possible, EPA obtained multiple years of data for each model facility. However, there are many facilities for which only a single year of data were available. Because fish populations and communities may vary substantially on an annual basis, IM&E estimates bay be over- or underestimated for individual species, and for the community as a whole. The direction of this uncertainty, however, is unknown.
- Changes in life histories driven by population changes. EPA recognizes that survival rates may vary substantially from year to year, based upon changes in food ability, predator density, water temperature, etc. EPA was unable to account for annual changes in life history parameters. The effect of life history uncertainty is unknown, and may over- or underestimate IM&E losses.
- Changes in waterbody characteristics and populations due to the age of facility data. As noted above, EPA incorporated the most recent IM&E studies available, but notes that studies in many areas of the country may be decades old, and fish populations may be substantially different (higher or lower) than when data were collected. However, the decades-old studies are, in most cases, the only data currently available and suitable for extrapolation. In these cases, actual IM&E losses may be higher or lower than estimated from historical data.

Overall, EPA acknowledges that there are many sources of uncertainty in the data underlying IM&E estimates, and agrees that regional and national estimates of IM&E are highly uncertain. However, the direction of many sources of uncertainty is unknown (e.g., uncertainty may result in either over- or under-estimates of IM&E), while other uncertainties are offsetting (e.g., for some factors, uncertainty will result in over-estimates, while for other factors, uncertainty results in under-estimates). On the whole, and at regional and national scales, EPA judges its estimates of IM&E to be unbiased.

Essay 83: Entrainment Mortality

EPA received several comments with respect to entrainment mortality. This essay responds to these comments.

Assumption of 100 Percent Entrainment Mortality

Comments by Riverkeeper (comment 2391) were strongly supportive of EPA's assumption for national modeling, namely that the mortality rate of entrained organisms is 100 percent. Comments by Entergy, Midwest Generation - Edison Mission Energy, AES North America, and EPRI (comments 2347, 2245, 2458, and 2200) are in direct opposition to EPA's stance, noting that the mortality rate of entrained organisms will not be 100 percent at all facilities.

Consistent with its treatment of entrainment in past national 316(b) rules, EPA has not changed its long standing views that 100 percent of entrained organisms suffer mortality. See Essay 18. Commenters failed to provide new information or basis for changing EPA's position regarding entrainment mortality.

Through-plant entrainment survival has been studied extensively, with EPRI's Review of Entrainment Survival Studies being amongst the most comprehensive. See DCN 2-017A-R7 from the Phase I docket. With respect to the regional and national IM&E modeling, EPA notes that facility characteristics relevant to entrainment survival (e.g., heat load, biocide concentrations, transit time, turbulence and shear stress, etc.) vary among CWIS systems (i.e., at different facilities), and differ throughout the year within CWIS systems (e.g., due to seasonal changes in CWIS operation). The extent to which these factors may affect survival in facilities whose data were used to model entrainment remains unknown. Notably, EPA identified no suitably designed studies of entrainment mortality that (1) occurred parallel to a suitable entrainment sampling protocol used to develop regional estimates of IM&E, (2) assessed intra-annual variability, and (3) assessed entrainment survival rates for a sufficient number of species that would justify regional extrapolation to dozens of species.

Second, because fish eggs and larvae are soft bodied and are frequently extremely fragile, counts of entrained eggs and larvae (and to a lesser extent, juvenile fish) are under-counted by studies of entrainment at regulated facilities. Several IM&E reports suggest that entrainment samples may contain a high (but unquantifiable) number of eggs and larvae destroyed by mechanical stress. Thus, uncertain rates of entrainment survival will be offset by similarly uncertain rates of under-reporting.

Third, EPA notes that a high proportion of the studies used to extrapolate entrainment losses to the regional level may be decades old. To the extent possible, EPA accounted for changes in CWIS operation, design, and the installation of IM&E reducing technologies. However, the extent to which these changes may affect entrainment survival is unknown. When combined with a poor understanding of existing entrainment mortality, these changes make EPA unable to entertain estimates of entrainment survival in its calculations.

Fourth, EPA notes that long-term survival rates of entrained organisms (e.g., eggs, larvae, juveniles) due to shock, behavioral disturbance, and other factors, are dramatically lower than organisms that were never entrained. Thus, survival through the cooling water system does not indicate that mortality has been avoided.

Consequently, on the basis of the record information it has reviewed, EPA concluded for purposes of this rule that no entrained organisms survive. (See, for example, 76 FR 22188 [April 20, 2011] and 69 FR 41620 [July 9, 2004]. Also see Chapter A7 of the Phase II Regional Studies Document (DCN 6-0003; EPA-HQ-OW-2002-0049-1490.)

Relevance to the Final Rule and Determination of BTA

Although EPA disagrees with commenters that its modeling assumption of 100 percent entrainment mortality is faulty, these commenters' concerns are not relevant for purposes of the final rule because the rule does not establish a specific national numeric entrainment reduction standard. Instead, the rule establishes a national BTA standard for entrainment that requires the establishment of entrainment reduction control measures on a site-specific basis in a prescribed permitting setting (see Section VI of the preamble and Essay 15 for additional information).

Moreover, EPA notes that a significant amount of information will be collected and submitted for review as a consequence of rule implementation. Notably, EPA does allow for consideration of entrainment survival: the rule allows for facilities to demonstrate to the Director that entrainment mortality is less than 100 percent, as long as such a demonstration is general, and therefore not a demonstration specific to those species whose eggs and/or larvae are hardier.

Essay 84: Impacts on Threatened and Endangered Species

EPA received several comments with respect to impacts on threatened and endangered species. This essay responds to these comments.

Inability to Account for All Impacts

In its comments, the National Wildlife Federation (NWF; comment 2188) reiterates many of EPA's findings with respect to the effects of CWIS on threatened and endangered (T&E) species, and notes that impacts on T&E species are not fully accounted for in the Benefits Analysis (BA). EPA has noted that data and other limitations limit EPA's ability to take effects on T&E species fully into account in its analyses.

Impacts of Regulated Facilities on T&E Species

In its comment, NWF (comment 2188) highlights four regulated facilities as causing IM&E of T&E species protected by the ESA: the Contra Costa and Pittsburg power plants in San Francisco Bay, the Indian Point Energy Center (a nuclear power facility) on the Hudson River (NY), and facilities at the Crystal River Energy Complex (CREC) in Florida. Although likely chosen by NWF as example facilities, EPA points to the effectiveness of existing regulation in protecting T&E species at these facilities.

The Contra Costa facility has closed. Therefore, it has ceased to be a source of IM&E of T&E species, and any facilities brought online to replace generating capacity will not be subject to this rule.

The Pittsburg power plant, located in California, is subject to 316(b) regulations in the State of California. The policy of the California State Water Resources Control Board requires closed-cycle cooling for all power plants that withdraw water from estuaries and coastal waters. Therefore, the facility is subject to regulation that significantly reduces IM&E (see Section IX.A of the preamble to this rule for details) of species generally and T&E species in particular.

The Nuclear Regulatory Commission recently consulted with the National Marine Fisheries Services (NMFS) on the effects of the continued operation of the Indian Point power plant in New York to listed species and designated critical habitat. In the Biological Opinion, NMFS determined that the facility was likely to adversely affect but unlikely to jeopardize the continued existence of shortnose sturgeon or Atlantic Sturgeon. As part of this consultation for Indian Point power plant, NMFS included an incidental take statement (ITS) that limits incidental take and requires reinitiation of the consultation process if the amount of take exceeds that permitted by the ITS. EPA also notes that Indian Point is subject to the 316(b) regulations in the State of New York, which have identified closed-cycle cooling as BTA, and will consequently minimize IM&E impacts on shortnose sturgeon (see Section IX.A of the preamble to this rule for details).

CREC, in Florida, has formally consulted with NMFS with respect to the take of T&E turtles. NMFS's biological opinion concluded that the continued operation of the CREC is not likely to jeopardize the existence of any of the five T&E turtle species. As a condition of the consultation, which included an ITS, CREC must submit annual reports for the incidental take of sea turtles, and consultation must be reinitiated if the ITS if permitted take is exceeded.

Therefore, of the four facilities highlighted by NWF, one is closed, two are subject to state-level regulation that will require the installation of closed-cycle cooling technologies to minimize IM&E, and two have conducted formal ESA consultations. EPA also notes that each of the facilities that remain open will be subject to additional requirements to ensure impact on T&E species is minimized, including the identification of all nearby T&E species and/or critical habitat, characterization of source waters, and studies of impingement and entrainment.

Potential for IM&E of T&E Species

In comment 2223, NewPage Corporation asserts that the methods EPA uses to determine the potential for T&E loss is flawed because it does not take into account the life history characteristics of the species at risk, and because EPA did not consider the status of these species. Additionally, several comments (2151, 2180, and 2223) requested clarification about the genesis of IM&E rates for listed species, and expressed concern that the IM&E of T&E species may be extrapolated to the regional scale based only upon geographic proximity to facilities reporting IM&E.

EPA disagrees with comment 2223. In Chapter 5 of the BA, EPA presents two methods to estimate the impact of CWIS on T&E species. In the first method, EPA assesses the overlap between CWIS and T&E species. In this analysis, EPA does not assert that all species with habitat overlapping a CWIS are directly harmed, only that the potential for harm exists. Potential harm to T&E species may be direct (e.g., IM&E), or indirect (e.g., reduction of prey, changes to physical habitat). Because EPA considered the potential for indirect effects of CWIS operation on T&E species, detailed life history characteristics of species at risk, other than the use of aquatic habitat, were not directly relevant for this analysis. Moreover, since EPA collected habitat data only for T&E species, the status of all species in this analysis was considered explicitly.

The second method used by EPA to estimate CWIS effects on T&E species was to identify all species with documented IM&E. For this analysis, an analysis of life history traits is unnecessary, because EPA presents only species with documented IM&E, and does not extrapolate results to regional or national scales. Instead of extrapolating, EPA aggregates reported facility level IM&E of T&E species, and consequently does not map IM&E to facilities based only on geographic proximity. Two categories of T&E species were presented in this analysis: a list of all T&E species with IM&E mortality, and a list of organisms not identified to species, but whose genus matched T&E species lost at a regulated facility's CWIS. In this analysis, EPA recognizes that losses matching T&E species' genus are likely to be dominated by more common congeners (i.e., species not protected by the ESA).

Therefore, in all analyses presented in the T&E chapter of the BA, EPA takes life history characteristics into consideration when necessary, and explicitly considers the status of all species included in the analysis.