UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 1
5 Post Office Square, Suite 100
BOSTON, MA 02109-3912

January 26, 2016

Kim Damon-Randall
Assistant Regional Administrator
Protected Resources Division
National Marine Fisheries Service
55 Great Republic Drive
Gloucester, MA 01930

Re: Reissuance of the NPDES Permit for Schiller Station Electric Generating Facility (Permit No. NH0001473) - Endangered Species Act Correspondence

Dear Assistant Regional Administrator Damon-Randall:

The U.S. Environmental Protection Agency, Region I, New England (EPA) is preparing to reissue the NPDES permit for the Schiller Station Electric Generating Facility (Schiller Station, the Station) located on the southwestern bank of the Piscataqua River in Portsmouth, New Hampshire. The Fact Sheet and Draft Permit were placed on public notice on September 30, 2015, and are available for review at: http://www2.epa.gov/aboutepa/public-notice-draft-permit-schiller-station-portsmouth-nh-nh0001473. The comment period was originally scheduled to close on November 28, 2015. However, based on a request by the permittee, the comment period has been extended to January 27, 2016. The Draft Permit is intended to replace the existing NPDES permit in governing the discharges from the Station.

The purpose of this letter is to present EPA's assessment of the potential impact(s) of this permit action on protected species. Section 7(a) of the Endangered Species Act of 1973, as amended (ESA) grants authority to and imposes requirements upon Federal agencies regarding endangered or threatened species of fish, wildlife, or plants ("listed species") and habitat of such species that has been designated as critical ("critical habitat"). The ESA requires every Federal agency, in consultation with and with the assistance of the Secretary of Interior, to insure that any action it authorizes, funds, or carries out, in the United States or upon the high seas, is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat. The United States Fish and Wildlife Service (USFWS) administers Section 7 consultations for freshwater species. The National Marine Fisheries Service (NMFS) administers Section 7 consultations for marine species and anadromous fish. The federal action being considered in this case is EPA's proposed Draft NPDES Permit for Schiller Station.

Schiller Station is a four-unit, 163 megawatt (MW) steam electric generating facility. The Station is a base load plant and generates approximately 1 million MW-hours annually, with a third of the power being provided by a renewable energy resource. The Station withdraws water from and discharges wastewater to the lower Piscataqua River. The site maintains 16 permitted outfalls. The regulated discharges include non-contact cooling water, operational plant wastewater, process water, and runoff.

EPA has reviewed the federal endangered or threatened species of fish, wildlife, or plants to determine if any listed species might potentially be impacted by the re-issuance of this NPDES permit. Based on the expected distribution of the species, EPA has determined that Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) may be present in the action area and this species may be affected by the discharges authorized by the proposed permit.

Based on an analysis of potential impacts to Atlantic sturgeon, EPA has made the preliminary determined that impacts to this protected sturgeon species from Schiller Station, if any, will be insignificant or discountable and the reissuance of this permit is not likely to adversely affect Atlantic sturgeon or its habitat. A full justification to support EPA's finding is included in Attachment 1 to this letter. Detailed information supporting the permit reissuance is included in the Fact Sheet accompanying the NPDES Draft Permit for Schiller Station. EPA has judged that a formal consultation pursuant to Section 7 of the ESA is not required and is seeking concurrence with this determination from NMFS through the submittal of this letter attachment and the published Draft Permit and Fact Sheet.

Reinitiation of consultation will take place: (a) if new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered in the consultation; (b) if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the consultation; or (c) if a new species is listed or critical habitat is designated that may be affected by the identified action. Please contact Michael Cobb at (617) 918-1369 with any questions related to this letter.

Sincerely,

John H. Nagle
Environmental Scientist/Biologist
Office of Ecosystem Protection

cc: Michael Cobb, EPA w/attachment
Christine Vaccaro, NMFS w/attachment

ATTACHMENT 1 – ESA ASSESSMENT

Schiller Station Electric Generating Facility,
Portsmouth, New Hampshire
Permit No. NH0001473
January 2016

Section 7(a) of the Endangered Species Act of 1973, as amended (ESA) grants authority to and imposes requirements upon Federal agencies regarding endangered or threatened species of fish, wildlife, or plants ("listed species") and habitat of such species that has been designated as critical (a "critical habitat"). The ESA requires every Federal agency, in consultation with and with the assistance of the Secretary of Interior, to insure that any action it authorizes, funds, or carries out, in the United States or upon the high seas, is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat. The United States Fish and Wildlife Service (USFWS) administers Section 7 consultations for freshwater species. The National Marine Fisheries Service (NMFS) administers Section 7 consultations for marine species and anadromous fish.

EPA has reviewed the federal endangered or threatened species of fish, wildlife, or plants to determine if any listed species might potentially be impacted by the re-issuance of the Schiller Station NPDES permit. The two listed species that have the potential to be present in the vicinity of Schiller Station (the Facility) are the shortnose sturgeon (*Acipenser brevirostrum*) and the Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*).

Shortnose sturgeon

The shortnose sturgeon was placed on the original endangered species list in 1967 [32 Fed. Reg. 4001 (1967)] by the USFWS. Currently, NMFS has authority over this species under Section 4(a) (2) of the ESA, 16 U.S.C. Section 1533 (a) (2). At present, there are 19 recognized distinct population segments (Shortnose Sturgeon Recovery Plan, NMFS, 1998), which all remain listed as endangered.

The Shortnose Sturgeon Recovery Plan states that "There are no known shortnose sturgeon populations in the rivers between the Androscoggin and Merrimack rivers." However, information contained in the NMFS Protected Resources website at http://www.nmfs.noaa.gov/pr/species/fish/shortnosesturgeon.htm lists the shortnose sturgeon as occurring in the Piscataqua River. In addition, the Atlantic States Marine Fisheries Commission, *Atlantic Sturgeon Stock Assessment, Peer Review Report*, March 1998, reported that "… two captures of shortnose sturgeon have been documented [in the Piscataqua River] (New Hampshire Fish & Game, 1989)."

In order to obtain the most up-to-date assessment regarding the occurrence of shortnose sturgeon in the Piscataqua River, EPA contacted NMFS directly. As part of a communication with NMFS for the Dover Wastewater Treatment Facility (WWTF), NMFS reported that shortnose sturgeon

are not known to utilize the portion of the Piscataqua River in the vicinity of the Dover WWTF (e-mail from C. Vaccaro, NMFS to D. Arsenault, EPA, September 12, 2011). Since Schiller Station is approximately five and a half miles downstream of the Dover WWTF, shortnose sturgeon are not expected to be present in the vicinity of this facility either.

Based on this evaluation and the expected distribution of the species, EPA has determined that there are no shortnose sturgeons in the action area and that the reissuance of the permit will have no effect on the species. Therefore, consultation under Section 7 of the ESA with NMFS for shortnose sturgeon is not required.

Atlantic Sturgeon

On February 6, 2012, NOAA's Fisheries Service published in the federal register a final decision to list five distinct population segments of Atlantic sturgeon under the Endangered Species Act. The Chesapeake Bay, New York Bight, Carolina, and South Atlantic populations of Atlantic sturgeon were listed as endangered, while the Gulf of Maine population was listed as threatened. The decision became effective on April 6, 2012. Atlantic sturgeon found in the Piscataqua River are part of the Gulf of Maine population and therefore listed as threatened. The Atlantic States Marine Fisheries Commission, *Atlantic Sturgeon Stock Assessment, Peer Review Report*, March 1998, reported that, "An occasional Atlantic sturgeon (Hoff 1980) has been captured in the Piscataqua River…". However, since 1990, NH F&G has not observed or received any reports of Atlantic sturgeon of any age-class being captured in the Great Bay Estuary and its tributaries (B. Smith, NH F&G, Pers. Comm. to the Atlantic Sturgeon Status Review Team, 2006). The Atlantic Sturgeon Status Review Team and NH F&G biologists concluded that the Great Bay Atlantic sturgeon population is likely extirpated. *See* Atlantic Sturgeon Status Review Team. 2007. Status Review of Atlantic sturgeon (Acipenser oxyrinchus oxyrinchus). Report to National Marine Fisheries Service, Northeast Regional Office. February 23, 2007. 174 pp.

As part of a more recent communication with NMFS for the Dover WWTF, NMFS reported that Atlantic sturgeon do in fact use the portion of the Piscataqua River in the vicinity of the Dover WWTF (E-mail from C. Vaccaro, NMFS to D. Arsenault, EPA, September 12, 2011). Since Schiller Station is approximately five and a half miles downstream of the Dover WWTF, Atlantic sturgeon are expected to be present in the vicinity of this facility as well.

Based on this information and the expected distribution of the species, EPA has determined that Atlantic sturgeon may be present in the action area and this species may be affected by the discharges authorized by the proposed permit. EPA must consult with NMFS under Section 7 of the ESA. EPA has evaluated the potential impacts of the permit action on Atlantic sturgeon. On the basis of this evaluation, which is discussed below, EPA's determination is that this action "is not likely to adversely affect listed species or critical habitat." [1] 16 C.F.R. § 402.13(a). As a

[1] A project can be considered "unlikely to adversely affect" a listed species "when direct or indirect effects of the proposed project on listed species are expected to be discountable, insignificant or completely beneficial." August 20, 2009, Letter from Patricia A. Kurkul, Regional Administrator, NOAA, National Marine Fisheries Service, Northeast Region, to Melville P. Cote, EPA Region 1 ("NOAA's August 20, 2009, Rockport Consultation Letter") (addressing ESA issues concerning EPA's proposed NPDES permit for the Rockport, MA, POTW).

result, based on the justification contained in this attachment, EPA requests NMFS's written concurrence with EPA's determination in order to complete the consultation with NMFS on an "informal" basis. *See* 16 C.F.R. § 402.13(a). If NMFS does not concur, then a "formal consultation" will be necessary.

Receiving Water Description

Schiller Station withdraws water from and discharges effluent to the lower Piscataqua River. The Piscataqua River is high value habitat for a variety of marine and estuarine species, and serves as the only conduit between the Gulf of Maine and Great Bay Estuary. While some fish species permanently reside in the river, most use it to either access spawning or nursery habitats in the Great Bay Estuary and associated rivers, or to migrate from these areas to marine habitats in the Gulf of Maine and beyond. Still others are seasonally present, preying on the concentrated but temporal influx of migrating forage species.

The Piscataqua is a tidal river approximately 13 miles long, which empties into Portsmouth Harbor/ Atlantic Ocean. The tide in this river is semi-diurnal with an average period of 12.4 hours. The lower portion of the Piscataqua River has been characterized as a well-mixed estuary. Tidal flushing requires six to 12 tidal cycles (3 to 6 days) and tidal mixing forces cause the water column to be vertically well mixed.

The Piscataqua River is classified as a Class B water body pursuant to the State of New Hampshire Surface Water Quality Regulations (N.H. Code of Administrative Rules, PART Env-Wq 1703.01) and N.H. RSA 485-A:8. Class B waters are "considered as being acceptable for fishing, swimming and other recreational purposes and, after adequate treatment, for use as water supplies." (RSA 485-A:8, II)

Section 303(d) of the Federal Clean Water Act (CWA) requires states to identify those water-bodies that are not expected to meet surface water quality standards after the implementation of technology-based controls and, as such require the development of total maximum daily loads (TMDL). The section of the Piscataqua River that Schiller Station discharges into is on the 2010, CWA 303(d) list for polychlorinated biphenyls (PCB's), mercury and dioxin.

Facility Description

Schiller Station, located on the southwestern bank of the Piscataqua River in Portsmouth, New Hampshire, is a four-unit, 163 megawatt (MW) steam electric generating facility. The three main generators are designated as 4, 5, and 6; all rated at 48 MW each. Units 4 and 6 are equipped with dual fuel boilers capable of firing both pulverized bituminous coal and #6 fuel oil. Unit 5 was converted to a dual fuel fluidized bed boiler that is capable of burning both wood and coal, with wood being its primary fuel. The remaining unit, designated CT-1, is a 19 MW combustion turbine fired with #1 fuel oil that is typically operated during periods of highest seasonal peak demand. Schiller Station is a base load plant and generates upwards of 1 million MW-hrs annually, with a third of the power being provided by a renewable energy resource. Schiller Station produces enough energy to supply 65,000 New Hampshire homes. However,

operations over the past few years have been significantly reduced in the 2 coal-burning units (Units 4 and 6).

Schiller Station's current National Pollutant Discharge Elimination System (NPDES) Permit allows the withdrawal of cooling water from and the discharge of pollutants to the Piscataqua River. See Attachment A of the Draft Permit's supporting Fact Sheet, showing a map of the facility including outfall locations. The Station is permitted to discharge non-contact cooling water, operational plant wastewater, process water, and runoff. The majority of stormwater runoff on the site is commingled with other non-stormwater waters, so much of the runoff is regulated under the individual permit. For any stormwater that is directly discharged, a Stormwater Prevention Pollution Plan has been drafted and a NOI will be filed to cover these outfalls under a Multi-Sector General Storm Water Permit.

Schiller Station operates two intake structures that withdraw water directly from the Piscataqua River. Each intake structure has two openings which provide cooling water to the two circulation pumps. Unit 4 has a submerged offshore intake pipe that is 6.5 feet in diameter. The opening is located 32 feet out into the river and is equipped with a coarse mesh (12 inch by 12 inch grating) stationary bar rack, designed to prevent large debris from entering the intake. In addition, there is another fixed screen at the bottom of the tunnel entrance to divert lobsters from crawling into the intake. PSNH reports that the through-screen velocity is 1.38 fps at mean low water (MLW). However, the intake velocity at the tunnel entrance is 1.97 fps. Enercon, 2013, p.6.

The four screen openings used for Units 5 and 6 are approximately 5.5-feet wide each. The openings are protected by bar racks with 4 3/8-inch by 4 inch gratings. Enercon, 2008, p. 5. Furthermore, the through-screen velocities of these two units is 0.68 feet per second (ft/sec or fps). *Id*., p. 12.

Schiller Station still utilizes the same traveling screen design and technology that was originally installed with each unit: Unit 4 in 1952, Unit 5 in 1955, and Unit 6 in 1957. The mesh size of the traveling screens is 3/8-inch square, which is a size commonly used in the industry for CWIS screens. This mesh size should be small enough to prevent the entrainment of adult fish and most juvenile fish through the plant's cooling water system, but not younger and smaller lifestages (*i.e.*, eggs and larvae). In addition, narrow shelves (2–3 inches wide) are attached to the screens which carry debris and fish up as the screen rotates. These shelves are designed primarily for moving debris, not fish. Since there are no buckets or troughs used to carry fish safely to the fish return trough, fish can fall off the screen shelves as the screens emerge from the water. Consequently, fish can suffer injury or exhaustion from being dropped and re-impinged as the screens rotate.

Schiller Station maintains 16 permitted outfalls. A detailed description of each discharge is found in Section 6.3 of the Draft Permit's supporting Fact Sheet, at http://www.epa.gov/sites/production/files/2015-09/documents/draftnh0001473permit.pdf. (Fact Sheet).

Action Area of Schiller Station Effluent

As described in detail in Section 6.4.3. of the Schiller Station Fact Sheet, EPA performed an analysis to determine the volume and configuration of the thermal plume that is discharged from outfalls 001, 002, 003 and 004. EPA used temperature data collected in the summer and fall of 2010 from eleven fixed monitoring stations placed approximately 200 feet from the four thermal discharge outfalls. Each station collected continuous river temperature data at near-surface, mid-depth and near- bottom positions in the water column. Two monitoring stations were placed well outside the influence of the station discharge (one upstream and one downstream) to collect ambient river temperature data (see Figure 6.1 of the Draft Permit's supporting Fact Sheet).

In addition, on August 31, 2010, an EPA field crew recorded river temperatures by conducting multiple transects through the Station's discharge plume while towing a boat mounted temperature sonde. A pressure transducer on the temperature sonde recorded its exact depth as it recorded the temperature measurements. Temperature, depth and GPS positioning data were recorded and stored every 10 seconds during a transect run. Multiple bank-to-bank transects, perpendicular to the flow of the river, as well as down river and up river, were conducted within and outside of the Station's thermal plume. This one-day monitoring effort was designed to be a "snap shot" of thermal plume conditions over a brief time period. Late August was selected for the monitoring effort to capture seasonally high ambient river temperatures along with expected high electric generation by the facility, which would result in near maximum permitted discharge flows and temperatures. This constituted approximate "worst-case" conditions for the receiving water (see Figure 6.2 of the Fact Sheet).

Based on these data sets, EPA confirmed that the receiving water did not exceed a maximum temperature of 84°F at any point beyond a distance of 200 feet in any direction from the thermal discharge outfalls. The selection of 84°F as defining the edge of the mixing zone of the thermal discharge was established in this site-specific case in consultation with the New Hampshire Department of Environmental Services (NHDES) and the New Hampshire Fish and Game Department (NHF&G) to meet state water quality standards. In fact, during the entire three month study (see Table 6-B of the Fact Sheet), temperature data from the fixed monitoring stations did not record a temperature within 5°F of the mixing zone limit. The highest instantaneous maximum temperature recorded during the study was 78.8°F, at one surface station (Station A7). This station was approximately 200 feet directly offshore from outfalls 003 and 004 (see Figure 6.1 of the Fact Sheet). This monitoring station consistently recorded the highest relative temperatures throughout the study. In general, the temperatures recorded at Station A7 were approximately 3.6°F to 5.4°F above ambient river temperatures in most cases, with highs briefly reaching a difference of approximately 7.2°F, likely during slack tide events. The near ambient temperatures recorded throughout the study at the mid-depth and near bottom fixed monitors confirmed that the thermal plume from Schiller Station is a surface feature in the receiving water.

In addition, during the one-day thermal mapping field event, the highest temperature recorded was a surface reading of 82.4°F, noted as a small "hot spot" well within the 200 foot mixing zone. The thermal mapping results (see Figure 6.2 of the Fact Sheet), along with the fixed temperature monitoring station data, confirm that the high energy tidal exchange and volume of

the Piscataqua River in the vicinity of Schiller Station results in an action area that is confined to the near-surface of the river and encompasses an area approximately 200 feet in all directions from the discharge. While this limited action area is based on an analysis of the thermal component of the Schiller Station's effluent, other pollutants in the Draft Permit are regulated to meet water quality standards at the point of discharge (unlike the CWA § 316(a) thermal variance). Also, other regulated pollutants at Schiller Station, including total suspended solids and heavy metals, are discharged at much lower flows than the thermal effluent (360,000 gallons per day as opposed to 40 million gallons per day), further reducing the action area of these pollutants before mixing with the Piscataqua River makes their presence in the receiving water insignificant or discountable to protected species.

Potential Impacts to Atlantic Sturgeon from Facility Operation

Schiller Station, like all facilities that utilize a natural waterbody for cooling purposes, can impact aquatic resources in three major ways: (1) by the impingement of larger organisms on the intake screens and the entrainment of small organisms into and through the cooling water system; (2) by creating adverse conditions in the receiving waters from the discharge of heated effluent; and (3) by creating adverse conditions in the receiving waters from the discharge of pollutants. The following information details these three potential impacts.

Impingement

Organisms that have grown to a size too large to pass through intake screens are still vulnerable to being impinged on these screens. Juvenile lifestages are particularly vulnerable to impingement, but adults of certain species are also at risk. As with entrainment, the intake location, design and cooling water flow requirements are major factors in assessing impingement potential.

Fish species that are especially vulnerable to impingement tend to have one or more of the following characteristics:

- pass intake structure in large, dense schools as juveniles or adults;
- are actively pursued as major forage species;
- are attracted to the intake structure as a source of forage or refuge;
- are slow moving or are otherwise unable to escape intake current; and
- are structurally delicate, and likely to die if impinged.

Fish from impingement sampling were collected in the fish and debris return sluice coming off of the traveling screens for each unit. Impingement sampling was conducted from August 31, 2006, through September 27, 2007. Impingement samples were collected over a continuous 24 hour period, once a week for 57 consecutive weeks. Each individual sample represented a six hour collection period. Impingement sampling was only conducted when the plant was operational. Operational is defined as having at least 1 circulating pump running at the time of sampling.

Schiller Station conducted an impingement collection efficiency study to determine what

percentage of impinged fish on the screens they were able to collect within the fish return sluice as well as an impingement survival study.

Fish impingement losses peaked in April, with secondary peaks in the fall and early winter. White hake, Atlantic herring and cunner were fish exhibiting the highest impingement losses in April (Normandeau, 2008). In the fall, rainbow smelt, grubby and white hake were the species with the highest impingement losses (Normandeau, 2008).

The table below presents entrainment losses by species (adjusted raw numbers at design flow);

Estimated Annual Fish Impingement Losses from Schiller Station

Common Name	Fish Impinged
Alewife	25
American sand lance	9
Atlantic cod	38
Atlantic herring	297
Atlantic menhaden	328
Atlantic silverside	122
Atlantic tomcod	50
Blueback herring	68
Bluegill	64
Cunner	668
Emerald shiner	33
Grubby	491
Herring family	9
Inland silverside	16
Lumpfish	357
Ninespine stickleback	149
Northern pipefish	621
Pollock	25
Pumpkinseed	9
Rainbow smelt	622
Red hake	9
Roch gunnel	26
Sea raven	16
Shorthorn sculpin	8
Silver hake	9
Skate family	17
Striped bass	25
Tautog	9
Threespine stickleback	53
Unidentifiable	0
White hake	736
White perch	198

Common Name	Fish Impinged
Windowpane	75
Winter flounder	573
Total Impingement	**5,557**

No Atlantic sturgeon were collected as part of the impingement study at Schiller Station. Section 8.2.3 of the Fact Sheet contains a complete discussion of impingement mortality impacts from Schiller Station operation.

Finfish Impingement Mitigation

As part of the proposed permit Best Technology Available (BTA) requirements, EPA has identified the following technology to further mitigate adult and juvenile finfish losses, including the potential for Atlantic sturgeon impacts, from current expected impingement mortality levels at the cooling water intake structure (CWIS).

EPA proposes the installation of wedgewire screen intake structures with a mesh or slot size of 0.80 mm, 0.69 mm, or 0.60 mm to maintain an intake through-screen velocity of 0.5 feet per second (fps) or less. These slot sizes are estimated to reduce adult and juvenile finfish impingement by approximately 87% from current levels. The torpedo shaped intake structures will be installed parallel with the tidal currents of the river, approximately three feet off the bottom. EPA assumes that the expected swim speed of adult and juvenile Atlantic sturgeon can overcome a through-screen velocity of 0.5 fps (the average critical swim speed velocity of white sturgeon is estimated to be approximately 1.9 fps; see EPRI, 2000, Table A). Based on this information, EPA has made the preliminary determination that impingement of Atlantic sturgeon by the wedgewire screen CWIS will be unlikely.

Entrainment

The potential to impact aquatic organisms by entrainment largely depends on the presence and abundance of organisms that are vulnerable to entrainment, and the flow required for cooling. Organisms (including forage species) most vulnerable to entrainment in the vicinity of this proposed facility are species that have positively buoyant eggs, and/or pelagic larvae. Other important considerations include the location and design of the intake structure. According to section 316(b) of the Clean Water Act, any point source that uses a cooling water intake structure (CWIS) must ensure that its location, design, construction, and capacity reflects the best technology available (BTA) for minimizing adverse environmental impact.

Entrainment monitoring was conducted at Schiller Station for 41 weeks over a 13-month period with the following frequency. Samples were collected 1 day a week from January 2007 to March 2007 and June 2007 to September 2007. From September 2006 to December 2006 and from April to May 2007, samples were collected every other week.

Sorting, species and life stage identification and enumeration were all completed to generate entrainment rates (# of eggs or larvae per volume of water). Entrainment losses were calculated by multiplying the entrainment rate by the weekly plant cooling water flow.

At Schiller Station, entrainment losses of ichthyoplankton peaked in July, with a much smaller peak in the winter (January-March). Cunner eggs accounted for a large percentage of the losses in the July period (Normandeau, 2008). The peak in entrainment losses in the winter was comprised of winter spawners, such as American sand lance and rock gunnel (Normandeau, 2008). Macrocrustacean entrainment losses also peaked in July and were essentially almost non-existent during spring, fall and winter.

The table below presents entrainment losses by species (adjusted raw numbers at design flow);

Estimated Annual Entrainment Losses for Fish from Schiller Station

Common Name	Eggs & Larvae
Alligator fish	134,305
American eel	8,420
American plaice	1,061,867
American sand lance	13,677,174
Atlantic cod	329,888
Atlantic cod/haddock	161,177
Atlantic cod/haddock/witch flounder	344,498
Atlantic herring	1,921,628
Atlantic mackerel	5,846,389
Atlantic menhaden	633,228
Atlantic seasnail	389,677
Atlantic tomcod	53,043
Cunner	32,539,552
Cunner/yellowtail flounder	72,955,812
Fourbeard rockling	1,723,189
Fourbeard rockling/hake	6,394,256
Goosefish	135,665
Grubby	3,393,233
Gulf snailfish	21,770
Haddock	7,072
Hake family	1,397,166
Longhorn sculpin	424,745
Northern pipefish	716,836
Pollock	661,273
Radiated shanny	201,269
Rainbow smelt	1,752,755
Rock gunnel	7,634,337
Sculpin family	59,139
Sea raven	13,329
Sea robin family	71,494
Shorthorn sculpin	93,113

Common Name	Eggs & Larvae
Silver hake	275,997
Striped killifish	8,420
Summer flounder	11,904
Tautog	56,294
Unidentified	246,244
Windowpane	547,224
Winter flounder	372,846
Witch flounder	17,617
Wrymouth	5,790
Total Entrainment	**156,179,633**

According to entrainment monitoring at Schiller Station, no early life stages (ELS) of Atlantic sturgeon were identified in entrainment samples at the facility.

Section 8.2.3 of the Fact Sheet contains a complete discussion of entrainment mortality impacts from Schiller Station operation.

The area of the Piscataqua River influenced by Schiller Station is not considered to be a likely spawning area for Atlantic sturgeon due to its salinity range of up to 30 parts per thousand at high tide. If any limited spawning does occur in the vicinity, sturgeon egg and larval stages are not considered vulnerable to entrainment. That is because sturgeon eggs are highly adhesive and are deposited on the bottom, usually on hard surfaces (i.e. cobble) (Smith and Clugston 1997). The yolksac larval stage and older life stages of young also assume a demersal existence. The habitat utilized by these early life stages keeps them away from the influence of the facility's current intake, which is closer to the surface.

Finfish Entrainment Mitigation

As part of the proposed permit Best Technology Available (BTA) requirements, EPA has identified the following technology to further mitigate ELS finfish losses, including EFH species, from current expected entrainment mortality levels at the cooling water intake structure (CWIS).

EPA proposes the installation of wedgewire screen intake structures with a mesh or slot size of 0.80 mm, 0.69 mm, or 0.60 mm to maintain an intake through-screen velocity of 0.5 fps or less. These slot sizes are estimated to reduce finfish ELS entrainment by approximately 37%, 44% and 49% from current levels, respectively. The actual screen slot size selected will be subject to EPA approval and based upon the results of the Facility's pilot testing and demonstration report submitted to the agencies.

In addition, EPA proposes that the annual maintenance outage at Unit 5, when no water is withdrawn, take place in June. This is estimated to reduce finfish ELS entrainment mortality by another 4% from current levels.

The proposed BTA will also reduce the entrainment levels of macrocrustacean ELS, which are a

food source for Atlantic sturgeon. Section 10 of the Fact Sheet includes a full discussion of a number of potential mitigation measures and their expected reduction of finfish as well as macrocrustacean ELS entrainment mortality.

In summary, EPA proposes permit requirements that are estimated to reduce finfish ELS entrainment by approximately 41% to 53%, depending on the wedgewire slot size selected.

Based on the expected location in the Piscataqua River of Atlantic sturgeon early life stages vulnerable to entrainment, the habitat where they reside, and the expected performance of the proposed BTA for entrainment reduction, EPA has made the preliminary determination that there is minimal potential for Atlantic sturgeon ELS entrainment, if at all. The operation of the CWIS is expected to have an insignificant or discountable effect on Atlantic sturgeon.

Discharge of Heated Effluent

The discharge of heated effluent may kill or impair organisms outright, or create intolerable conditions in otherwise high value habitats, and interfere with spawning. Thermal impacts associated with the discharge are related primarily to the dilution capacity of the receiving water, the rate of discharge, and the change in temperature (detla-T or ΔT) of the effluent compared to ambient water temperatures. Another important consideration is the presence of temperature-sensitive organisms and vegetated habitats.

As discussed in detail in Section 6.4 of the Fact Sheet, Schiller Station's existing permit's thermal discharge requirements are based on a CWA § 316(a) variance. The Facility initially requested that its new permit retain the same thermal discharge limits based on a renewal of its CWA § 316(a) variance. Schiller's request maintains, in essence, that the Facility's existing thermal discharge has not caused appreciable harm to the BIP and, indeed, could not have caused such harm given how small it is relative to the large volume and cold temperatures of the waters of the Piscataqua River estuary.

Based on the analysis of thermal plume monitoring and mapping data collected in the summer and fall of 2010, along with other supporting information (see Section 6.4.4. of the Fact Sheet), EPA concludes that Schiller Station's existing thermal discharge has not caused appreciable harm to the BIP. Moreover, EPA concludes that the record provides reasonable assurance that with the same thermal discharge limits in place, the Facility's thermal discharge will not cause such harm to the BIP in the future – in other words, will allow for the protection and propagation of the BIP. Indeed, the Facility's declining capacity factors indicate that, if anything, Schiller Station's thermal discharges will decrease overall in the future, though EPA cannot be sure of whether or when such reductions may occur.

Thus, EPA's new Draft Permit for Schiller Station proposes to retain the thermal discharge limits from the existing permit.

- A daily maximum discharge temperature limit (Max-T) of 95ºF;
- A daily maximum temperature differential between the intake and discharge

temperatures (Delta-T) of 25ºF (this limit is increased to 30ºF for a two-hour period during condenser maintenance); and

- A prohibition of discharges that cause the receiving water to exceed a maximum temperature of 84°F at any point beyond a distance of 200 feet in any direction from the point of discharge.

Consistent with the Facility's request, EPA is proposing to issue these permit limits pursuant to a variance under CWA § 316(a).

Since the thermal plume has been documented as a near-surface feature which is relatively small in surface area (approximately 200 feet in any direction from the thermal outfalls; see Action Area of Schiller Station Effluent, above) and the maximum temperatures observed have not exceeded 82.4°F, the potential for acute or chronic impacts to finfish in the vicinity of the facility is discountable. In addition, since adult and juvenile Atlantic sturgeon are expected to be more closely associated with the benthic habitat, their encounter with the Schiller Station thermal plume is not likely.

It is unlikely that early lifestages of Atlantic sturgeon are present in that reach of the river. However, any larvae that are adrift in the water column and cannot avoid the discharge may become entrained in the plume. Lethal thermal conditions are not expected within the defined mixing zone. Non-lethal effects may render some organisms less fit for survival, but since organisms will be exposed for such a brief period of time (in most cases, a matter of seconds) adverse effects will likely be limited to a temporary increase in vulnerability to predation.

Based on relatively small size and intensity of the temperature plume and the brief exposure time of any lifestage of Atlantic sturgeon that may encounter the plume, this discharge is likely to have an insignificant or discountable effect on Atlantic sturgeon. Section 6.4 of the Fact Sheet discusses the thermal discharge from Schiller Station in detail.

Discharge of Pollutants

The Draft Permit also proposes limits on the following pollutants:

Effluent Characteristic	**Average Monthly**	**Maximum Daily**
Total Residual Chlorine	---	0.2 mg/L
Oil and Grease	15 mg/L	20 mg/L
Total Suspended Solids (TSS)	30 mg/L	100 mg/L
Total Copper	1.0 mg/L	1.0 mg/L
Total Iron	1.0 mg/L	1.0 mg/L
pH	6.5 – 8.0 S.U. (range)	

These limits are calculated to meet water quality standards and protect all aquatic organisms in the receiving water, including EFH species.

Chlorine

The Draft Permit limit for total residual chlorine is based on the existing permit in accordance with the antibacksliding requirements found in 40 CFR §122.44. This limit was originally established based on New Source Performance Standards (NSPS) established in the Federal Guidelines for the Steam Electric Power Generating Point Source Category (40 CFR Part 423.15(j)(1)).

Section 423.15(j)(1) limits the maximum and average concentration of free available chlorine discharged in cooling tower blowdown as shown below. The quantity of pollutant (mass limit) is determined by multiplying the flow of cooling tower blowdown by the concentration listed in the table. However, the existing and Draft Permit limits' are expressed as concentration limits pursuant to Section 423.15(m).

40 C.F.R. Part 423.15(j)(2) prohibits the discharge of free available chlorine or total residual chlorine (TRC) from any unit for more than two hours in any one day, and; not more than one unit in any plant may discharge free available or total residual chlorine at any one time unless the utility can demonstrate that the units in a particular location cannot operate at or below this level of chlorination.

At these extremely low chlorine concentrations, coupled with the limited duration of such an event, the discharge of this pollutant is likely to have an insignificant or discountable effect on Atlantic sturgeon.

Total Suspended Solids

The Draft Permit limits for Total Suspended Solids (TSS) and Oil and Grease (O&G) are based on the existing permit in accordance with the antibacksliding requirements found in 40 CFR §122.44. These limits were originally established based on NSPS established in the Federal Guidelines for the Steam Electric Power Generating Point Source Category (40 CFR Part 423.15(c) for low volume waste source(s)).

Section 423.15(c) limits the maximum and average concentration of TSS and O&G discharged in low volume waste source(s) as shown below. The quantity of pollutant (mass limit) is determined by multiplying the flow of low volume waste source by the concentration listed in the table. However, the existing permit, as well as the Draft Permit limits, are expressed as concentration limits pursuant to Section 423.15(m). The permit reflects these limits prior to mixing with cooling water in the tower.

Studies of the effects of turbid waters on fish suggest that concentrations of suspended solids can reach thousands of milligrams per liter before an acute toxic reaction is expected (Burton 1993). The studies reviewed by Burton demonstrated lethal effects to fish at concentrations of 580 mg/L to 700,000 mg/L depending on species. Sublethal effects have been observed at substantially lower turbidity levels. For example, prey consumption was significantly lower for striped bass larvae tested at concentrations of 200 and 500 mg/L compared to larvae exposed to 0 and 75 mg/L (Breitburg 1988 in Burton 1993). Studies with striped bass adults showed that pre-

spawners did not avoid concentrations of 954 to 1,920 mg/L to reach spawning sites (Summerfelt and Moiser 1976 and Combs 1979 in Burton 14 F993). While there have been no directed studies on the effects of TSS on Atlantic sturgeon, shortnose sturgeon juveniles and adults are often documented in turbid water. Dadswell (1984) reports that shortnose sturgeon are more active under lowered light conditions, such as those in turbid waters. Based on the general similarity of the two sturgeon species, Atlantic sturgeon are assumed to be as least as tolerant to suspended sediment as other estuarine fish such as striped bass. Based on this information, it is likely that the discharge of total suspended solids in the low concentrations allowed by the Draft Permit will have an insignificant effect on Atlantic sturgeon.

Oil and Grease

This extremely low concentration of oil and grease will be localized within a small mixing zone area. Levels of O&G will quickly drop below the detection limit in the high energy tidal currents of the Piscataqua River. Based on this information, it is likely that the discharge of O&G in the low concentrations allowed by the Draft Permit will have an insignificant effect on Atlantic sturgeon.

pH

EPA, in consultation with NHDES has determined that the current permit as well as this Draft Permit retains the pH limited range of 6.5 - 8.0 S.U. Since this pH range is generally considered harmless to marine life in Great Bay, no adverse effects to Atlantic sturgeon are likely to occur as a result of a discharge meeting the permitted pH range.

Metals

The persistence of a regulated effluent containing metals can vary, but typically, near field regions (i.e. the point of discharge/regulatory mixing zone) may experience some persistence in the environment, whereas far field locations tend to experience effluent decay (EPA Water Quality Based Toxics Control, 1991). In this site-specific case, with the high energy tidal exchange and volume of the Piscataqua River in the vicinity of Schiller Station, the zone of initial dilution (ZID) is expected to be relatively small and complete mixing will occur through dispersion and advection, thus limiting any potential exposure routes for Atlantic sturgeon. Additionally, with the expected large dilution in the near-field, persistence will be reduced and far-field areas will likely experience insignificant effects from these pollutants.

Heavy and trace metals may accumulate in the metabolically-active tissues of aquatic organisms, particularly in benthic feeders such as Atlantic sturgeon, and may lead to lethal and sublethal effects including reduced fecundity, body malformation, inability to avoid predation, and susceptibility to infectious organisms (Post, 1987, Alam *et al.*, 2000). Alam *et al.* (2000) indicate that Gulf sturgeon from the Suwannee River (a threatened species) tend to accumulate iron and lead in their blood, although the direct toxicity of iron is unknown (Vuorinen, 1999).

EPA's Draft Permit proposes to require (a) that the non-chemical metal cleaning waste be discharged from Outfall 016A subject to the 1.0 mg/L limits for total copper and total iron, and

(b) that compliance monitoring for this type of metal cleaning waste occur after treatment but before discharge being comingled with any other waste streams. Furthermore, the Draft Permit allows low volume, runoff and drainage waste streams to be combined and discharged through Outfall 016 subject to the relevant effluent limits other than the technology-based copper and iron limits. Copper and iron limits will no longer be in Outfall 016 but will instead be in Outfall 016A.

In addition, any metals discharged from Schiller Station Outfall 016A will be mixed in the upper layers of the water column of the Piscataqua River by the high energy of the tidal currents in the near field of the discharge. The effluent is not expected to reach the deeper waters or benthic habitat where Atlantic sturgeon are found the majority of the time.

These limits are calculated to meet water quality standards and protect all aquatic organisms in the receiving water, including protected species. Based on this information, it is likely that any discharge of metals allowed by the restrictive limits of the Draft Permit will have an insignificant effect on Atlantic sturgeon.

Polynuclear Aromatic Hydrocarbons (PAHs)

PAHs are a group of organic compounds that form through the incomplete combustion of hydrocarbons. PAHs are also present in crude oil and some heavier petroleum derivatives and residuals such as No. 6 fuel oil. Discharge of these products can introduce PAHs into the environment where they strongly adsorb to suspended particulates and biota. PAHs can also bio-accumulate in fish and shellfish. The ultimate fate of those PAHs which accumulate in the environment is believed to be biodegradation and biotransformation by benthic organisms. Several PAHs are well known animal carcinogens, while others are not carcinogenic alone but can enhance the response of the carcinogenic PAHs.

There are 16 PAH compounds identified as priority pollutants under the CWA (*see* Appendix A to 40 C.F.R. Part 423). In view of evidence of PAH-induced animal carcinogenicity and the type of petroleum products stored at the facility, the Draft Permit establishes monitoring requirements, without limits, for these Group I and II PAHs, as listed below.

Group 1 PAHs comprise seven known animal carcinogens:

- Benzo(a)anthracene
- Benzo(a)pyrene
- Benzo(b)fluoranthene
- Benzo(k)fluoranthene
- Chrysene
- Dibenzo(a,h)anthracene
- Indeno(1,2,3-cd)pyrene.

Quarterly monitoring of the above Group I PAHs, without limits, is required.

Group II PAHs comprise nine priority pollutants which are not considered carcinogenic alone, but which can enhance or inhibit the response of the carcinogenic PAHs:

- Acenaphthene
- Acenaphthylene
- Anthracene
- Benzo(g,h,i)perylene
- Fluoranthene
- Fluorene
- Napthalene
- Phenanthrene
- Pyrene

Quarterly monitoring of the above Group II PAHs, without limits, is required. Of these, naphthalene is considered an important limiting pollutant parameter based upon its prevalence in petroleum products and its toxicity (i.e., naphthalene has been identified as a possible human carcinogen).

For the maximum protection of human health from the potential carcinogenic effects of exposure to PAHs through ingestion of contaminated water and contaminated aquatic organisms, EPA established human health "organism only" *National Recommended Water Quality Criteria* for individual PAH compounds based on the increase of cancer risk over the lifetime and consumption of contaminated fish. The human health criteria for Group I PAHs were established in ng/L, which is many orders of magnitude below the current Practical Quantitation Limits (PQLs) for determining PAH concentrations in aqueous solutions.

The Draft Permit also requires that the quantitative methodology used for PAH analysis must achieve a minimum level for analysis ("ML") using approved analytical methods in 40 C.F.R. Part 136. The ML is not the minimum level of detection, but rather the lowest level at which the test equipment produces a recognizable signal and acceptable calibration point for an analyte, representative of the lowest concentration at which an analyte can be measured with a known level of confidence. The ML for each Group I PAH compound must be <0.1 µg/L. The ML for each Group II PAH compound must be <1 µg/L. These MLs are based on those listed in Appendix VI of EPA's Remediation General Permit. Sample results for an individual compound that is at or below the ML should be reported according to the latest EPA Region 1 *NPDES Permit Program Instructions for the Discharge Monitoring Report Forms (DMRs)*. These values may be reduced by modification pursuant to 40 CFR §122.62 as more sensitive tests become available or are approved by EPA and the State.

EPA believes these requirements are necessary for the protection of human health, to maintain the water quality standards established under Section 303 of the CWA, and to meet New Hampshire's water quality criteria. Should monitoring data indicate the presence of PAHs in concentrations that may cause or contribute to an excursion above water quality criteria, the permit may be modified, reissued or revoked pursuant to 40 CFR §122.62.

Finding

As detailed in this attachment and the Draft Permit's Fact Sheet, the proposed CWIS BTA is designed to reduce current levels of impingement by 87% and entrainment by from 41% to 53%. The thermal discharge has been granted a CWA §316(a) variance. During discharge, any regulated pollutants rapidly mix in all tidal occurrences, with the exception of the brief slack tide period. Based on these factors and the analysis of potential impacts to Atlantic sturgeon presented in this attachment, EPA has determined that impacts to Atlantic sturgeon from Schiller Station's CWIS and regulated effluent, if any, will be insignificant or discountable and the reissuance of this permit is not likely to adversely affect Atlantic sturgeon or its habitat.

Therefore, EPA has judged that a formal consultation pursuant to Section 7 of the ESA is not required. EPA is seeking concurrence from NMFS regarding this determination through the information in this attachment and cover letter, as well as supporting information contained in the Fact Sheet and the Draft Permit.

Reinitiation of consultation will take place: (a) if new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered in the consultation; (b) if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the consultation; or (c) if a new species is listed or critical habitat is designated that may be affected by the identified action.