FIVE-YEAR REVIEW REPORT FOR
OTTATI & GOSS/KINGSTON STEEL DRUM SUPERFUND SITE
ROCKINGHAM COUNTY, NEW HAMPSHIRE

Prepared by

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5/14/14
Date

SDMS Doc ID 558536

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LIST OF ACRONYMS AND ABBREVIATIONS

ACRONYM	DEFINITION
ABNs	Acid/Base/Neutral compounds
AURs	Activity and Use Restrictions
C&P	Cardboard and Paper
CBD	Conway Barrel and Drum Company
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	Contaminant of Concern
ECC	Environmental Chemical Corporation
EPA	Environmental Protection Agency
ESD	Explanation of Significant Differences
FS	Feasibility Study
GLCC	Great Lakes Container Corporation
GLCC/KSD	Great Lakes Container Corporation and Kingston Steel Drum
GMZ	Groundwater Management Zone
HQ	Hazard Quotient
ICL	Interim Cleanup Level
IRIS	Integrated Risk Information System
IMC	International Minerals and Chemicals Corporation
ISCO	In Situ Chemical Oxidation
KSD	Kingston Steel Drum
MCL	Maximum Contaminant Level
NaOH	Sodium Hydroxide
NCP	National Contingency Plan
NHDES	New Hampshire Department of Environmental Services
O&G	Ottati and Goss, Inc.
O&G/KSD	Ottati & Goss/Kingston Steel Drum
O&M	Operation and Maintenance
OU1	Operable Unit 1
OU2	Operable Unit 2
OU3	Operable Unit 3
OU4	Operable Unit 4
PCBs	Polychlorinated Biphenyls

PID	Photo-Ionization Detector
PRP	Potentially Responsible Party
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Studies
ROD	Record of Decision
SVOC	Semivolatile Organic Compound
Town GMZ	Town of Kingston Groundwater Management Zone
VOC	Volatile Organic Compound
USACE	U.S. Army Corps of Engineers – New England District
USEPA	United States Environmental Protection Agency

EXECUTIVE SUMMARY

This is the fifth five-year review for the Ottati & Goss/Kingston Steel Drum Site (the Site). This review is required by statute because the selected remedy will, upon completion, leave hazardous substances, pollutants, or contaminants on Site above levels that allow for unlimited use and unrestricted exposure. The trigger date for the initial five-year review was the initiation of the remedial actions at the Site in November 1988. The trigger for this statutory review is February 12, 2009, the signature date of the previous five-year review report.

The Site is located in the lower Merrimack River Valley/Coastal Plain portion of southeastern New Hampshire approximately eight miles north of Haverhill, Massachusetts, and approximately three miles south of the center of Kingston, New Hampshire (Figure 1). The Site is also known as the Ottati & Goss/Great Lakes Container Corporation Site.

The Site is comprised of three distinct sections. The first is a 5.88 acre parcel referred to as the Great Lakes Container Corporation and Kingston Steel Drum (GLCC/KSD) portion of the Site. Through an eminent domain action the GLCC/KSD portion of the Site is currently owned by the State of New Hampshire. The second area is 29 acres and is owned by the BBS Realty Trust, Concord Realty Trust and John Peter Sebetes. One acre of the BBS Realty Trust parcel was leased to Ottati and Goss, Inc. (O&G), which resulted in this entire 29-acre parcel being referred to historically as the O&G portion of the Site. The third section is a 23-acre marsh located east of the GLCC/KSD section between Route 125 and Country Pond. This parcel was purchased by the IMCERA Group Inc., in 1984 and the section is referred to as the Country Pond Marsh portion of the Site. The three areas are shown on the Site plan (Figure 2).

Contaminants of concern in Site groundwater include: volatile organic compounds (VOCs) (primarily benzene, trichloroethylene, perchloroethylene and 1,2 dichloroethane), 1,4 dioxane, and some metals (see Table 4). Polychlorinated biphenyls (PCBs) were the primary contaminant of concern in the soil and sediments, although high levels of VOCs, semivolatile organic compounds (SVOCs) and metals were also found. Surface waters historically transported contaminants of concern (notably PCBs) east via surface water into the Country Pond Marsh area.

The remedy selected in the 1987 Record of Decision (ROD) for the Site includes the cleanup of groundwater to drinking water quality using pump and treat technology, building demolition, and the cleanup of soil and sediment to levels protective of human health and the environment under anticipated future Site uses. The Site cleanup consists of four operable units. Operable Unit 1 (OU1) refers to the Potentially Responsible Party (PRP) lead cleanup of soil at the Ottati & Goss (O&G) portion of the Site. Operable Unit 2 (OU2) refers to the PRP lead groundwater design. OU2 was terminated in 1993 and superseded by OU3. Operable Unit 3 (OU3), a Superfund lead effort, was designated to complete the groundwater remediation. Operable Unit 4 (OU4) was designated to complete the building demolition and remediation of soil and sediments at the GLCC/KSD and Country Pond Marsh portions of the Site.

The soil remedy for the O&G portion of the Site (OU1) was completed by the PRPs in 1989. About 4,700 cubic yards of soil contaminated with VOCs to a depth down to the water table were excavated and treated by thermal desorption, then reused as backfill. In 1993 EPA and the NHDES began the response activities for OU 4. The former drum cleaning building (approximately 40,000 square feet) in the KSD area was decontaminated and demolished. The debris was properly disposed of off-Site. In addition, buried debris and underground tanks were removed, cleaned and disposed of off-Site. A temporary cap was placed over the former building area and the remaining area was graded and seeded. The building removal (OU4, Phase 1) was completed in 1994.

An Explanation of Significant Differences (ESD) was issued in 1999 which modified the remedy called for in the ROD. Under the ESD: 1) the volume of soil requiring treatment was increased; 2) the area of sediment requiring remediation was increased; 3) the cleanup standard for PCBs in sediment was changed from 1 ppm to 10 ppm; 4) on-site incineration of contaminated soil and sediment was changed to on-Site thermal desorption of soils and suitable sediment material followed by off-Site incineration of residual hazardous waste; and 5) the establishment of an institutional control on the GLCC/KSD state-owned property to restrict the area to commercial use.

A second ESD was issued in February 2002 which changed the requirement for off-site incineration of the residual hazardous waste from the thermal desorption process to disposal of the material into a hazardous waste landfill.

The soil and sediment remedy for the GLCC/KSD portion of the Site, addressed by the 1999 and 2002 ESDs, (OU4, Phase 2) was implemented in October 2002. Soil and sediments from OU4 were remediated on Site using thermal desorption and the treated waste from the process was disposed off site. Institutional controls (land use restrictions) were established by the State to ensure that the future use of the 5.88 acre GLCC/KSD portion of the Site is restricted to commercial uses with no day care.

The 1987 ROD was amended in September 2007 to change the groundwater cleanup approach for OU3 from pump and treat technology to *in-situ* chemical oxidation (ISCO). The first round of oxidant injection was performed in the summer of 2008. A second round was performed in the fall of 2009 and a third and final round was performed in the fall of 2010. A Preliminary Close Out Report, which signifies that all construction activities have been completed at the Site, was issued by the EPA in September 2008. The OU3 remedy was considered operational and functional in September 2009. A Remedial Action Report summarizing the work was issued by the EPA in October 2012. The ISCO remedy has substantially reduced the concentrations of VOCs in the groundwater. Long-term monitoring of groundwater will continue until cleanup goals are reached.

To address the need for an institutional control required under the 1987 ROD to prevent the use of Site groundwater and disturbance of wetlands, the Town of Kingston adopted a Groundwater Management Zone (Town GMZ) on March 13, 2012. Copies of these institutional controls are included as Attachment 2.

As identified in the last five-year review, two relatively small areas just outside the perimeter of the GLCC/KSD portion of the Site required cleanup to a protective residential soil cleanup level for PCBs. However, a further evaluation of the soil sampling data collected as part of the 2002 OU4 soil cleanup has confirmed that the low-level PCBs that remain at depth do not pose an unacceptable CERCLA risk under future residential use scenarios and therefore no further CERCLA action is necessary for the remedy to be protective. Details regarding this evaluation are presented in a 2014 EPA memo that is attached with this review.

Since the 1987 ROD, 1999 and 2002 ESDs, and the 2007 AROD were issued, the State of New Hampshire has revised and renumbered its environmental regulations, including many of the State ARARs identified for the remedy. In addition, several federal ARARs have changed (including the Toxic Substance Control Act (TSCA) regulations (40 C.F.R. § 761). In the event that the current remedy for the Site needs to be modified, a future CERCLA decision document will be required to update the remedy's ARARs, both to include the revised State and federal standards and to identify additional standards that were not specifically identified in the Site's CERCLA decision documents, but which pertain to the remedy.

The remedial actions at all operable units are currently protective of human health and the environment. However, the remedial action at OU3 may not be protective in the long-term because the existing institutional control (the Town's Groundwater Management Zone ordinance) does not require evaluation of the vapor intrusion pathway before a building is constructed over the plume. While there are currently no plans to construct a building on OU3, the current VOC concentrations in groundwater exceed EPA's screening values for the vapor intrusion pathway. To help ensure protectiveness in the long-term, the existing Town ordinance would need to be amended to create an enforceable restriction concerning building within the Zone to prevent vapor intrusion.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Ottati & Goss/Kingston Steel Drum		
EPA ID: NHD990717647		
Region: 1	**State:** NH	**City/County:** Kingston/Rockingham

SITE STATUS	
NPL Status: Final	
Multiple OUs? Yes	**Has the site achieved construction completion?** Yes

REVIEW STATUS
Lead agency: EPA
Author name (Federal or State Project Manager): William Lovely
Author affiliation: U.S. EPA, Region 1 – New England
Review period: February 2009 – February 2014
Date of site inspection: August 28, 2013
Type of review: Statutory
Review number: 5
Triggering action date: February 12, 2009
Due date *(five years after triggering action date)*: February 12, 2014

Issues/Recommendations

OU(s) without Issues/Recommendations Identified in the Five-Year Review:
OU1, OU2, and OU4

Issues and Recommendations Identified in the Five-Year Review:

OU(s): OU3 (groundwater)	Issue Category: Institutional Controls			
	Issue: There is currently no requirement to evaluate potential risks via the vapor intrusion pathway prior to construction of buildings within the groundwater restriction area established by the Town ordinance, or on the State-owned property. There are currently no buildings over the plume and therefore there is no current vapor intrusion exposure pathway present.			
	Recommendation: Modify existing institutional controls to include a requirement to evaluate the potential for vapor intrusion risks if new construction in the area of the residual VOC plume is proposed.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	EPA/State	EPA	5/2019

Protectiveness Statement(s)

Operable Unit: OU1 (O&G Soil)	*Protectiveness Determination:* Protective	*Addendum Due Date (if applicable):*
Protectiveness Statement: The remedial action taken at OU1 protects human health and the environment because the remediation of soil has been completed to cleanup levels that are protective of human health and the environment.		
Operable Unit: OU3 (in-situ chemical oxidation in Areas A, B, and C	*Protectiveness Determination:* Short-term Protective	*Addendum Due Date (if applicable):*
Protectiveness Statement: The remedy at OU3 currently protects human health and the environment because exposure pathways that could result in unacceptable risks are being controlled. The remedy has been implemented, VOC concentrations in groundwater have been substantially reduced by the ISCO treatments, and VOC concentrations are expected to decline further via natural attenuation. Groundwater monitoring will continue and institutional controls will remain in place until cleanup goals are achieved. There are currently no buildings over the plume and therefore there is no current vapor intrusion exposure pathway present. In order for the remedy to be protective in the long-term, existing institutional controls should be modified to include a requirement to evaluate potential risks via the vapor intrusion pathway prior to construction of buildings within the groundwater restriction area established by the Town ordinance, or on the State-owned property.		

Operable Unit:	*Protectiveness Determination:*	*Addendum Due Date (if applicable):*
OU4 (soil and sediment, GLCC/KSD portion of site)	Protective	

Protectiveness Statement:
The remedy at OU4 protects human health and the environment because: soil and sediments have been excavated to cleanup levels that are considered protective for the anticipated future use of the property; the GLCC/KSD portion of the site is currently unused and the property is surrounded by a fence; institutional controls are in place to limit the uses and exposures to residual soil contamination on the GLCC/KSD portion of the site; and the wetlands (Country Pond Marsh portion of the site) is also surrounded on three sides with a fence.

Sitewide Protectiveness Statement (if applicable)

Protectiveness Determination:	*Addendum Due Date (if applicable):*
Short-term Protective	

Protectiveness Statement:
The remedial actions taken are currently protective of human health and the environment in the short term because: soil and sediment removal has been completed (OU1 and OU4) and exposure to contaminated groundwater is being controlled (OU3). However, to be protective in the long-term, the follow-up actions listed for OU3 need to be taken and groundwater cleanup goals must be attained.

SECTION 1.0
INTRODUCTION

The purpose of this five-year review is to determine whether the remedies for the Ottati & Goss/Kingston Steel Drum Site continue to be protective of human health and the environment. The methods, findings, and conclusions of this review are documented in this Five-Year Review report. In addition, Five-Year Review reports identify issues found during the review, if any, and present recommendations to address them.

EPA Region I has conducted this five-year review pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Contingency Plan (NCP). Section 121(c) of CERCLA 42 USC § 9621(c) states:

> *If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

The Agency interpreted this requirement further in the NCP; 40 CFR §300.430(f)(4)(ii) states:

> *If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

The Ottati & Goss/Kingston Steel Drum (O&G/KSD) Site consists of four operable units. Operable Unit 1 (OU1) refers to Potentially Responsible Party (PRP) lead cleanup of soil in the Ottati & Goss portion of the Site which was completed in 1989. Operable Unit 2 (OU2) refers to the PRP-lead groundwater design which was not completed due to a settlement in 1993. In 1993, EPA, the State of New Hampshire, and a large group of PRPs entered into a settlement which resulted in a Consent Decree that funded continued EPA and NHDES work at the Site. As a result of the settlement, OU2 was terminated and was superseded by Operable Unit 3 (OU3), which was designated to complete the groundwater remediation. Operable Unit 4 (OU4) was designated to complete the remediation of soil and sediments in the Kingston Steel Drum (KSD) and Country Pond Marsh portions of the Site. The KSD portion of the Site is also called the Great Lakes Container Corporation (GLCC) portion of the Site in some documents. Throughout this review, the term GLCC/KSD will be used to refer to this portion of the Site. This five-year review addresses OU1, OU3, and OU4. As mentioned previously, OU2 was a PRP-lead design for groundwater remediation that was not completed and was replaced by OU3.

This is the fifth five-year review for the Ottati & Goss/Kingston Steel Drum Site. This review was performed by EPA Region I - New England and is required by statute because the selected remedy will, upon completion, leave hazardous substances, pollutants, or contaminants on site above levels that allow for unlimited use and unrestricted exposure. The trigger date for the initial five-year review was the initiation of the remedial actions at the Site in November 1988. The trigger for this statutory review is February 12, 2009, the signature date of the previous Five-Year Review report.

SECTION 2.0
SITE CHRONOLOGY

The chronology of the Site, including all significant events and dates is provided below in Table 1.

Table 1: Chronology of Site Events	
Event	**Date**
Drum reconditioning operations were conducted on the GLCC/KSD portion of the Site.	1959 through 1980
Two lagoons established for the disposal of caustic liquid waste from the drum reconditioning operations were backfilled on GLCC/KSD portion of the Site	1973 and 1974
A hazardous materials processing and storage facility was operated on the O&G portion of the Site	March 1978 through July 1979
EPA conducted emergency removal actions on the O&G portion of the Site, including the removal of approximately 4,000 drums	December 1980 through July 1982
Final listing on EPA National Priorities List	September 8, 1983
PRP removal actions on the GLCC/KSD portion of the Site, including the removal of drums and contaminated soil	June 1984 through June 1985
Completion of Remedial Investigation/Feasibility Study	August 1986
Record of Decision is issued for entire Site	January 16, 1987
Several PRPs entered into a Consent Decree with EPA addressing the cleanup of soil on the O&G portion of the Site (OU1) and groundwater design and remediation (OU2)	November 1988
PRP lead cleanup of 4,700 cubic yards of contaminated soil at OU1 was completed	1988 through 1989
EPA, New Hampshire Department of Environmental Services (NHDES), and the remaining PRPs entered into a settlement which resulted in a Consent Decree that funded continued EPA and NHDES work at the Site. All claims which the United States had for injunctive relief (response activities) and costs (past and future) against the potentially responsible parties were resolved, with few exceptions. OU2 (PRP lead groundwater remediation) was terminated and replaced by OU3 (Superfund lead groundwater remediation).	Consent Decree entered December 22, 1993 (modified by the Court on July 19, 1994)
Completion of the first Five-Year Review for the Site.	December 1993
Under OU4, Phase 1, the large building which housed drum reconditioning operations on the GLCC/KSD portion of the Site was demolished. Hazardous materials and toxic substances were removed from the facility for disposal. Several underground storage tanks were also removed from this area.	September 1993 through February 1994
A preliminary design of the groundwater pump and treat system for OU3 was completed. Construction of the treatment system was put on hold to evaluate the potential for natural attenuation of the groundwater contamination.	September 1996

Table 1: Chronology of Site Events	
Event	**Date**
Completion of the second Five-Year Review for the Site.	December 1998
An Explanation of Significant Differences (ESD) was issued which addressed a change in the treatment technology to be used to remediate OU4 Phase 2 contaminated soil and sediment. The ESD also restricted future use of the former GLCC/KSD property to commercial uses, and addressed an increase in the amount of soil to be excavated and treated. Cleanup levels for total PCBs were defined for various areas of the Site, based on an updated ecological risk assessment and the change in future land use of the former GLCC/KSD property to commercial use without day care. PCB residential cleanup standards were established for properties adjacent to the GLCC/KSD portion of the Site.	September 28, 1999
OU4 Phase 2 Remedial Design was completed.	September 6, 2000
State of New Hampshire acquires the former GLCC/KSD property.	Fall 2000
Remediation of contaminated soil and sediment at OU4 and Site restoration activities.	February 2001 through October 2002
EPA prepared a letter indicating that the remedial approach for the OU4 east/wetland soil had changed.	September 19, 2001
Issuance of an ESD addressing a modification in the handling of OU4 residual materials.	February 7, 2002
Final Site inspection for OU4 Phase 2 construction completion	October 1, 2002
Final Remedial Action Report for OU4 Phase 2 is issued	March 28, 2003
Completion of third Five-Year Review for the Site.	December 2003
EPA completes groundwater pump test, pilot scale groundwater treatability study and treatability study report.	November 2004 through February 2005
EPA conducted additional field investigations and evaluated alternatives to groundwater extraction and treatment.	October 2006 through June 2007
State of NH records activity and land use restrictions on the GLCC/KSD portion of the Site.	June 2007
EPA announces Proposed Plan to Amend the 1987 ROD.	July 2007
EPA amends the 1987 ROD to replace groundwater pump and treat with *in-situ* chemical oxidation.	September 2007
EPA completes the *in-situ* chemical oxidation (ISCO) design.	March 2008
EPA performs the first of three planned ISCO injection events.	July 2008 through September 2008
EPA issues a Preliminary Close Out Report documenting the completion of all required construction activities at the Site	September 2008
Groundwater monitoring to evaluate effectiveness of first injection event and collect data to design second injection event.	January and April 2009

Table 1: Chronology of Site Events	
Event	**Date**
Completion of fourth Five-Year Review for the Site.	February 2009
Report documenting results of first injection event and design for second injection event is completed.	June 2009
EPA completes the second of three planned ISCO injection events.	Mid-October 2009
Groundwater monitoring to evaluate effectiveness of second injection event and collect data to design third and final injection event. Soil samples are also collected.	February and April 2010
Report documenting results of second injection event and design for third and final injection event is completed.	August 2010
One year operational and functional period ends	September 2010
EPA completes the third and final ISCO injection event.	October 2010
A series of Groundwater Management Zone (GMZ) wells are installed to establish the geographic boundaries for institutional controls (Town ordinance) to restrict groundwater use in the vicinity of the plume.	May 2011
Groundwater monitoring to evaluate effectiveness of third injection event is performed, and the new GMZ wells are sampled for the first time.	May-June 2011
ISCO Remedial Action Summary Report is completed to document all three injection events and evaluate monitoring results from 2008 through 2011.	February 2012
Town of Kingston adopts an institutional control consisting of an ordinance creating a Groundwater Management Zone for lots affected by the groundwater plume.	March 13, 2012
Groundwater monitoring to evaluate injection effectiveness and attenuation of injection by-products is performed.	June and August 2012
EPA issues the Remedial Action Report that documents completion of the in-situ chemical oxidation Remedial Action for OU3	October 11, 2012
GMZ wells are sampled for the second time.	November 2012
GMZ wells are sampled for the third time.	June 2013
Site Monitoring Report that summarizes all groundwater monitoring results from 2012 and 2013 is prepared, with results incorporated into this five year review.	September 2013

SECTION 3.0
BACKGROUND

3.1 PHYSICAL CHARACTERISTICS AND LAND AND RESOURCE USE

The Ottati and Goss/Kingston Steel Drum Site is located in the lower Merrimack River Valley/Coastal Plain portion of southeastern New Hampshire approximately eight miles north of Haverhill, Massachusetts, and approximately three miles south of the center of Kingston, New Hampshire (Figure 1).

The Site is comprised of three areas:

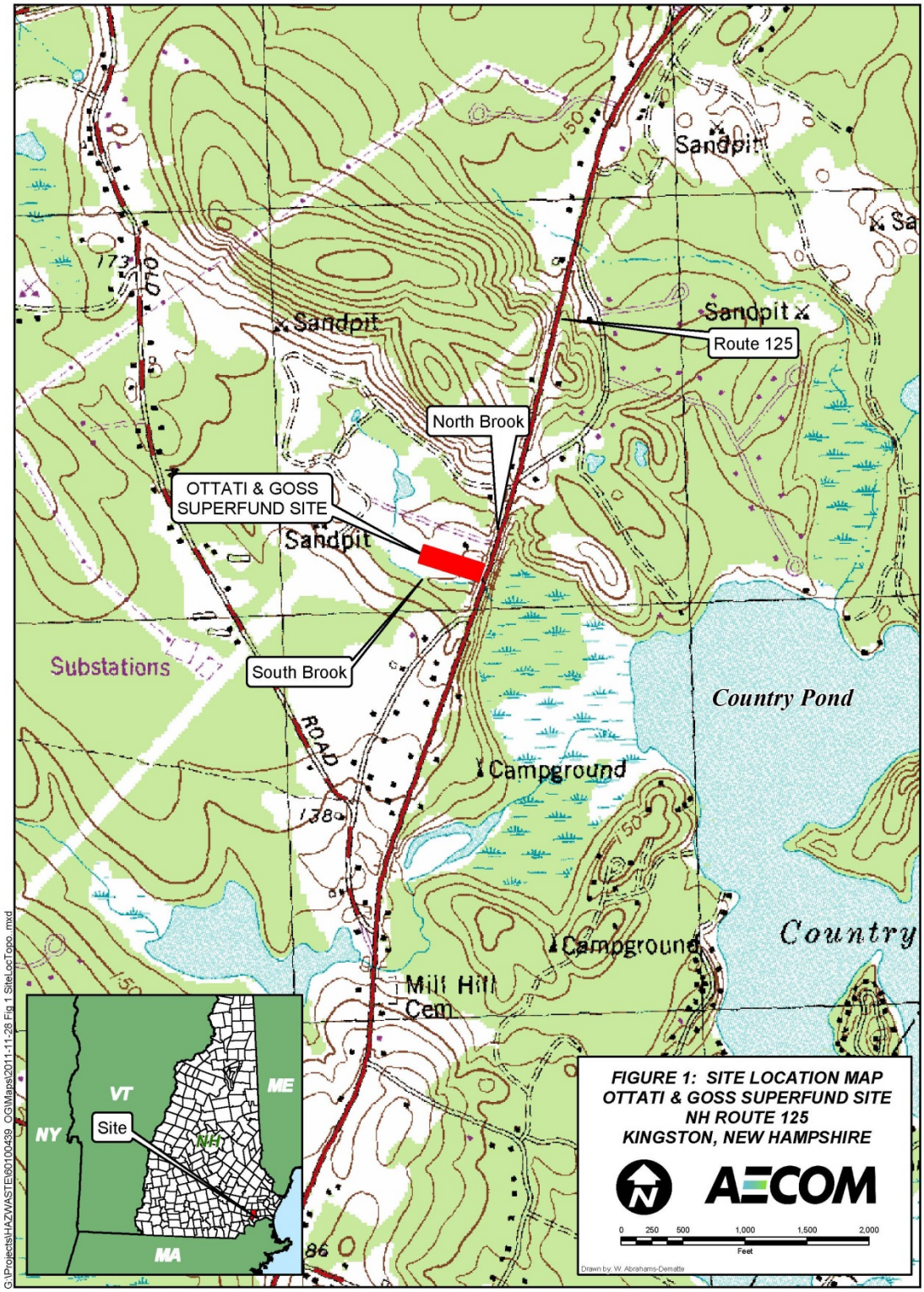
1.) A 5.88-acre parcel referred to as the Great Lakes Container Corporation and Kingston Steel Drum (GLCC/KSD) area. The State of New Hampshire agreed to take this parcel by eminent domain, since no owner of record was available to implement the institutional controls required by the 1987 ROD and subsequent Explanation of Significant Differences. Subsequently, the State of New Hampshire registered a deed for taking the property in the fall of 2000.
2.) A 29-acre parcel owned by BBS Realty Trust, Concord Realty Trust, and John Peter Sebetes. One acre of this parcel was leased to Ottati and Goss, Inc. (O&G), and as a result, this area has historically been referred to as the O&G portion of the Site.
3.) A 23-acre marsh located east of the GLCC/KSD section between Route 125 and Country Pond. This parcel was purchased by the IMCERA Group Inc., in 1984 and the section is referred to as Country Pond Marsh. The three areas are shown on the Site plan (Figure 2).

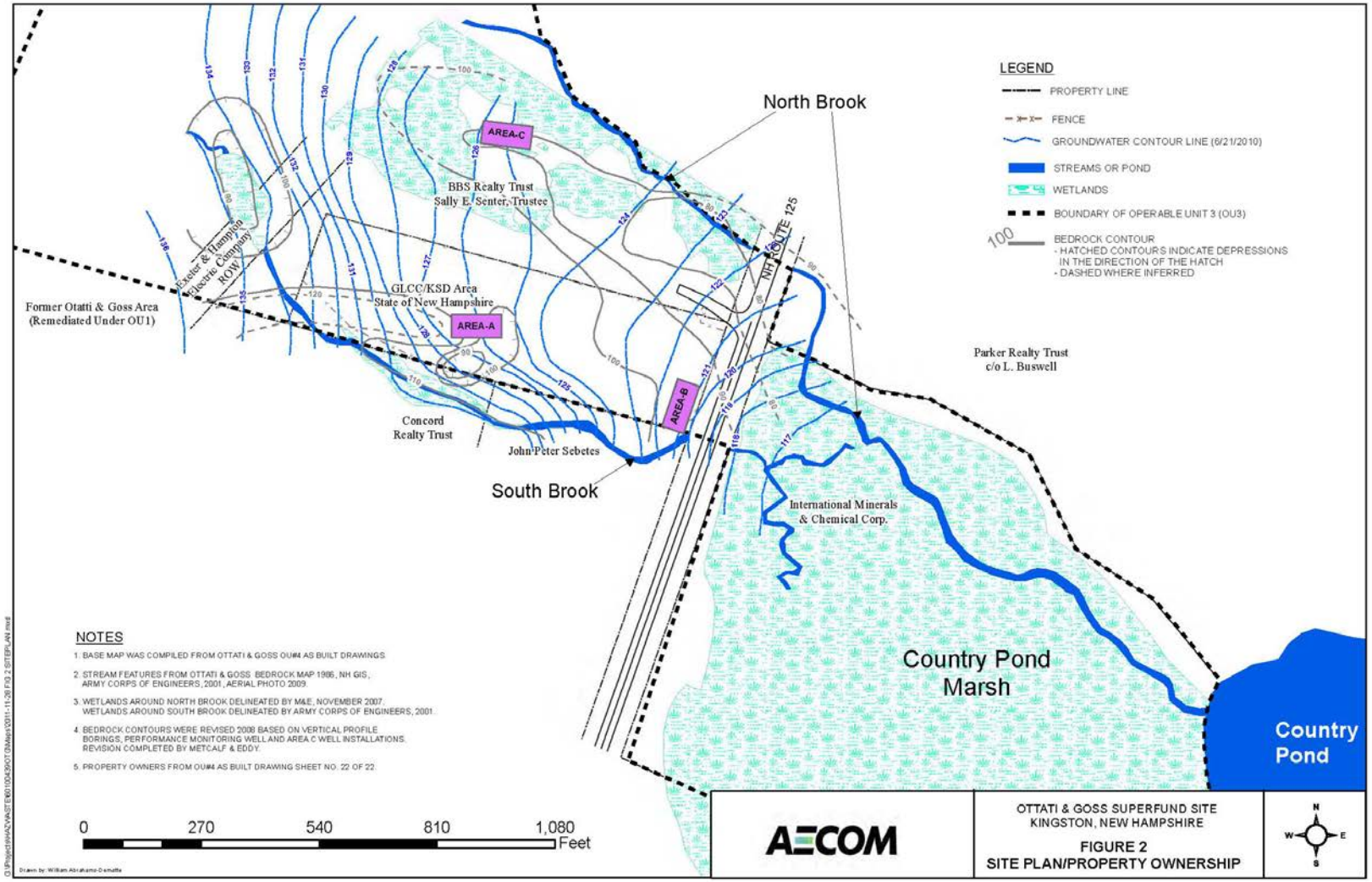
The Site is situated northwest of Country Pond, in a northwest-southeast trending valley. The Site straddles New Hampshire (NH) State Route 125. The Site slopes to the east, from a maximum elevation of 250 feet on a hill on the northwest side of the Site to 116 feet, the average elevation of Country Pond (Riordan, 1984). The valley floor east of Route 125 consists of a triangular shaped marsh of approximately 40 acres. The marsh extends into Country Pond. To the west of NH Route 125, the Site is an upland area of approximately 35 acres that is drained by two small streams on the north and south sides of the valley (North and South Brook, respectively). The streams are channeled under Route 125 via a north and south culvert and discharge directly into the marsh. In addition, there are two small ponds (30 to 60 feet in diameter) located in the uplands of the Site. East of Route 125, a well-defined channel for North Brook is evident through most of the marsh, from the culvert to the discharge point into Country Pond. The South Brook channel is less well defined after it flows through the south culvert, and eventually becomes indistinguishable a few hundred feet after discharging to Country Pond Marsh.

Country Pond has been estimated by the New Hampshire Fish and Game Department to have an area of approximately 255 acres and an average depth of 14 feet (GZA, 1986). There are three basins which comprise the pond (northwestern, eastern and southern). Each basin is adjacent to a central island. The Site is located adjacent to the northwestern basin.

Country Pond acts as a local hydraulic sink, receiving both surface and groundwater discharges. Streams flow into Country Pond on the north, south, east and west shores. The outflow is located beneath a concrete bridge on the northeast side of the Pond (GeoTrans, 1986). The elevation of Country Pond is controlled by the Trickling Falls Dam, located approximately three miles downstream (GeoTrans, 1986). The elevation of the pond has historically ranged from 115 feet to 117 feet (GZA, 1986; GeoTrans,1986).

Surficial (overburden) deposits in the vicinity of the Site include Pleistocene glacial deposits and recent alluvial and organic deposits. Recent deposits at the Site consist of organic deposits, alluvium and artificial fill materials which were remediated as part of OU4. Organic deposits consisting of a fibrous peat are present in several areas of the Site, including areas of Country Pond Marsh that were remediated as part of OU4.


Sandpit
Sandpit
Sandpit
Sandpit
Route 125
North Brook
OTTATI & GOSS
SUPERFUND SITE
Sandpit
South Brook
Substations
Country Pond
Campground
Campground
Country
Mill Hill
Cem
VT
ME
NY
Site
NH
MA
FIGURE 1: SITE LOCATION MAP
OTTATI & GOSS SUPERFUND SITE
NH ROUTE 125
KINGSTON, NEW HAMPSHIRE
AECOM
0 250 500 1,000 1,500 2,000
Feet
Drawn by: W. Abrahams-Dematte
G:\Projects\HAZWASTE\60100439_OGIMaps\2011-11-28 Fig 1 SiteLocTopo.mxd


LEGEND
PROPERTY LINE
FENCE
GROUNDWATER CONTOUR LINE (6/21/2010)
STREAMS OR POND
WETLANDS
BOUNDARY OF OPERABLE UNIT 3 (OU3)
100
BEDROCK CONTOUR
- HATCHED CONTOURS INDICATE DEPRESSIONS IN THE DIRECTION OF THE HATCH
- DASHED WHERE INFERRED
North Brook
South Brook
AREA-A
AREA-B
AREA-C
BBS Realty Trust
Sally E. Senter, Trustee
GLCC/KSD Area
State of New Hampshire
Former Otatti & Goss Area
(Remediated Under OU1)
Exeter & Hampton Electric Company ROW
NH ROUTE 125
Parker Realty Trust
c/o L. Buswell
Concord
Realty Trust
John Peter Sebetes
International Minerals
& Chemical Corp.
Country Pond
Marsh
Country
Pond
NOTES
1. BASE MAP WAS COMPILED FROM OTTATI & GOSS OU#4 AS BUILT DRAWINGS.
2. STREAM FEATURES FROM OTTATI & GOSS. BEDROCK MAP 1906, NH GIS, ARMY CORPS OF ENGINEERS, 2001, AERIAL PHOTO 2009.
3. WETLANDS AROUND NORTH BROOK DELINEATED BY M&E, NOVEMBER 2007. WETLANDS AROUND SOUTH BROOK DELINEATED BY ARMY CORPS OF ENGINEERS, 2001.
4. BEDROCK CONTOURS WERE REVISED 2008 BASED ON VERTICAL PROFILE BORINGS, PERFORMANCE MONITORING WELL AND AREA C WELL INSTALLATIONS. REVISION COMPLETED BY METCALF & EDDY.
5. PROPERTY OWNERS FROM OU#4 AS BUILT DRAWING SHEET NO. 22 OF 22.
0
270
540
810
1,080
Feet
AECOM
OTTATI & GOSS SUPERFUND SITE
KINGSTON, NEW HAMPSHIRE
FIGURE 2
SITE PLAN/PROPERTY OWNERSHIP
N
W
E
S

Groundwater is found at the Site in the unconsolidated stratified drift deposits (sand and gravel) which form the overburden aquifer for most of the Site. Groundwater is also present in the bedrock underlying the Site. Groundwater is contained and transmitted in interstices such as joints and fractures in weathered and un-weathered bedrock.

3.2 HISTORY OF CONTAMINATION

From the late 1950's through 1967 the Conway Barrel and Drum Company (CBD) owned the Site and performed drum reconditioning operations in the GLCC/KSD portion of the Site. The reconditioning operations included caustic rinsing of drums and disposal of the rinse water in a dry well near South Brook. As a result of South Brook and Country Pond pollution, CBD established two leaching pits (lagoons) in areas removed from South Brook. Kingston Steel Drum, the operator of the facility from 1967 to 1973, continued the same operations as CBD.

In 1973 International Minerals and Chemicals Corporation (IMC) purchased the drum and reconditioning plant and operated it until 1976. The lagoons were reported to be filled in 1973 and 1974. The property was purchased in 1976 by the Great Lakes Container Corporation. Beginning in 1978, the Ottati and Goss Company operations consisted of “processed hazardous materials brought to the Site in drums.” Heavy sludges from the wash tank and from drainings, and residues from incinerator operations at GLCC, were transported to the O&G portion of the Site for processing. The O&G operations ceased in 1979. GLCC continued the drum reconditioning operation on its portion of the Site, until July 1980.

3.3 INITIAL RESPONSE

Beginning in 1980, a number of investigations and remedial activities were performed at the Site. From December 1980 to July 1982, EPA conducted emergency removal actions and processed and removed over 4,000 drums from the O&G portion of the Site. The Site was added to the NPL in September 1983. On the GLCC/KSD portion of the Site, IMC removed drums and soil between July 1984 and June 1985. Removal activities included: 12,800 tons of soil, drums, and metals; 101,700 tons of flammable sludge and 6,000 gallons of flammable liquid. The Remedial Investigations and Feasibility Study were completed in 1986. EPA’s Record of Decision (ROD) for the Site was signed in 1987.

3.4 BASIS FOR TAKING ACTION

Remedial Investigation/Feasibility Studies (RI/FS) were completed under a Cooperative Agreement with the New Hampshire Water Supply and Pollution Control Commission in 1986. The RI/FS conclusions were as follows:

Soil throughout the Site was contaminated with volatile organic compounds (VOCs), polychlorinated biphenyls (PCBs), acid/base/neutral compounds (ABNs), metals and cyanide at high concentrations at numerous locations.

Surface water in North and South Brooks and Country Pond contained dissolved VOCs.

Sediments in North and South Brooks and the marsh contained VOCs and PCBs.

Groundwater contaminated with VOCs, arsenic, nickel, iron and manganese was evident in several plumes. The plumes appeared to merge into one plume which migrated under Route 125 and the Country Pond Marsh, eventually discharging into Country Pond.

There were no significant airborne contaminants.

SECTION 4.0
REMEDIAL ACTIONS

4.1 REMEDY SELECTION

The EPA ROD for the Site was signed on January 16, 1987. The ROD specified remedial activities to be implemented at the Site to mitigate contaminated soil, sediment, and groundwater. The ROD did not divide Site soil, sediment and groundwater into separate operable units, but the ROD did establish different PCB cleanup levels for soil vs. sediments. During 1988, several PRPs entered into a Consent Decree with EPA addressing the cleanup of soil on the O&G portion of the Site and groundwater remediation for the entire Site. The 1988 Consent decree defined the O&G soil cleanup as Operable Unit 1 (OU1) and the groundwater remediation as OU2. Following a second Consent Decree in 1993 involving EPA, NHDES, and the remaining PRPs, two additional operable units, OU3 and OU4, were defined to complete the remediation. OU3 addresses the site groundwater contamination, while OU4 addresses the building demolition and the remaining soil and sediment contamination not addressed by the 1988 Consent Decree. The OU1 remediation (cleanup of soil in the O&G area) had already been completed by 1993, and OU2 was superseded by OU3.

This section outlines the selected remedy for the three operable units at the Site (OU1, OU3 and OU4) and the progress made in implementing the remedies. All of the cleanup activities required by the 1987 ROD and the two subsequent ESDs were completed with the exception of the extraction and treatment of contaminated groundwater (OU3). As discussed below, the 1987 ROD was amended in September 2007 to change the groundwater cleanup strategy from extraction and treatment to *in-situ* chemical oxidation. The first of a planned three rounds of oxidant injection was completed in September 2008, the second round was completed in October 2009, and the third and final round was completed in October 2010. Remaining effort consists of long-term groundwater monitoring to evaluate the effectiveness of the injections in reducing contaminant concentrations in the most concentrated portions of the plume, and to continue to monitor post-injection residual contaminant levels as they approach cleanup goals via natural attenuation processes.

4.1.1 Operable Unit 1 (O&G Soil Cleanup)

The remedial objectives for OU1 were:

- Minimize the effects of source area contaminants on groundwater quality; specifically, remove contaminated soil to eliminate precipitation seepage through the source areas and contaminant infiltration into groundwater;
- Meet or exceed all applicable or relevant federal public health or environmental standards, guidance, and advisories; and
- Minimize potential impacts of implementing the selected source control remedy on adjacent surface waters and wetlands.

The selected source control remedy for OU1 (O&G soil) consisted of the following components:

- Excavation of contaminated soil with total VOC concentrations of 1 ppm or more (and 0.1 ppm or more for 1,2-dichloroethane, benzene, trichloroethylene, or perchloroethylene), and on-site treatment by aeration (low temperature thermal desorption);
- Reuse of treated soil as backfill;
- Grading and placement of four inches of sandy loam, followed by hydroseeding to restore grass;
- Off-site disposal of process residuals, stumps, logs, and drums uncovered during excavation; and

- Ambient air quality monitoring during excavation and on-site treatment, to ensure that off-site contaminant concentrations in air did not exceed the air quality standards established for the project.

4.1.2 Operable Unit 3 (Groundwater Cleanup)

The remedial objectives for OU3 are (USEPA, 2007):

- Minimize risks to human health associated with potential future consumption of and direct contact with groundwater;

- Minimize migration of contaminants in groundwater such that groundwater discharging to Country Pond is not harmful to human health or aquatic ecological systems;

- Meet or exceed all applicable or relevant federal public health or environmental standards, guidance, and advisories; and

- Minimize potential impacts of implementing the selected management of migration alternative on adjacent surface waters and wetlands.

The remedial alternative for groundwater (OU3) selected in the 1987 ROD consisted of a management of migration remedy, including installation of a groundwater extraction and treatment system at the Site. Groundwater extraction wells were to be located within source areas, along the eastern boundary of the GLCC/KSD property (*i.e*. along Route 125), and within the marsh area downgradient of the source areas. The 1987 ROD indicates that treated water was to be discharged to upgradient groundwater and possibly surface water. Groundwater extraction and treatment was specified to occur for a period of five years from the date of implementation. At that time, an evaluation of the technical feasibility of the remedy achieving target compound levels was to be conducted, if target levels had not been attained. Achievement of target levels was defined as the continuous detection of specified contaminants of concern at or below target concentrations for a period of three years at the Route 125 Site boundary and at selected on-site monitoring wells.

The OU3 management of migration remedy also included the following components:

- Monitoring on-site wetlands to ensure that groundwater extraction is not negatively impacting the wetlands (*e.g.* lowering water levels within the wetland);

- Initiating a long-term groundwater monitoring program of on-site and off-site monitoring wells; and

- Monitoring residential wells during implementation of the remedy. The frequency and parameters of the monitoring were to be determined during design. Residential wells have been monitored annually for VOCs by NHDES since 1992.

During September 1996, the design of the groundwater extraction and treatment system under OU3 was completed. However, based on Site information and data generated since the issuance of the 1987 ROD and after the careful study of alternative groundwater cleanup technologies, EPA believed that *in-situ* chemical oxidation (ISCO) would be a better approach to remediating the groundwater at the Site than the groundwater extraction and treatment system selected in the 1987 ROD.

In September 2007, EPA amended the 1987 ROD (USEPA, 2007) to change the groundwater cleanup strategy from extraction and treatment to *in-situ* chemical oxidation. The major components of EPA's new cleanup plan include: *in-situ* chemical oxidation (ISCO), environmental monitoring, and institutional controls. Each component is briefly discussed below.

- ISCO involves the injection of an oxidant directly into the groundwater to break down contaminants into non-hazardous by-products such as water, salt, and carbon dioxide. The oxidant selected for this Site was activated sodium persulfate. The goal for *in-situ* chemical oxidation is to achieve significant mass removal of contaminants, with the intent of eventually achieving Federal and State drinking water standards in the groundwater. Three rounds of ISCO injection were performed (2008, 2009, and 2010) and this portion of the remedy is completed.

- Environmental monitoring was and will continue to be performed at numerous historic and newly installed wells in order to evaluate the progress/success of the ISCO remedy. Monitoring of VOCs and 1,4-dioxane, as well as metals is performed to assess contaminant destruction, determine progress towards attainment of remedial action objectives, and evaluate potential metals mobilization. Groundwater geochemical parameters, including dissolved oxygen, pH, oxidation reduction potential, and conductivity, are also monitored. Surface water samples are also collected to monitor potential contaminant migration into Country Pond. This alternative also includes continued monitoring of select residential wells on an annual basis, consistent with the annual residential well monitoring program that NHDES has been performing since 1992.

Institutional controls are administrative actions that minimize the potential for human exposure by restricting access and/or resource usage. A Town ordinance was enacted in March 2012 that established a Groundwater Management Zone (GMZ) intended to prevent unauthorized use of groundwater from lots affected by the residual groundwater contaminant plume. The GMZ includes the Site owned by the State and adjacent properties to the north and south, and areas to the east of Route 125 (see GMZ on Figure 4).

4.1.3 Operable Unit 4 (GLCC/KSD Soil and Sediment Cleanup)

The remedial objectives for OU4 are:

- Eliminate future risks to human health through direct contact with contaminants by removing contaminated soil and sediment;

- Minimize the effects of source area contaminants on groundwater quality; specifically, remove contaminated soil to eliminate precipitation seepage through the source areas and contaminant infiltration into groundwater;

- Meet or exceed all applicable or relevant federal public health or environmental standards, guidance, and advisories; and

- Minimize potential impacts of implementing the selected source control remedy on adjacent surface waters and wetlands.

The selected source control remedy for OU4 consisted of the following components:

- Excavation of approximately 5,000 cubic yards of PCB-contaminated soil and sediment from the upland area, South Brook, and the marsh areas and on-site treatment by incineration. Within the upland areas, soil with detected concentrations of PCBs above 20 ppm would be excavated and treated. For sediments within South Brook and the marsh areas, the ROD sets the action level for PCBs at 1 ppm. Post-ROD remedy changes in volumes, treatment methods, and cleanup levels were made via two ESDs.

- Excavation of an estimated 14,000 cubic yards of contaminated soil and sediment with total VOC concentrations of 1 ppm or more and on-site treatment by aeration (low temperature thermal desorption). Refer to Section 4.2.3 of this Report for description of remedy changes in the ESDs.

- Decontamination and removal of existing structures on Site;

- Reuse of treated soil as backfill within the upland area;

- Re-grading and re-vegetation of the upland areas to minimize the migration of and prevent direct contact with any residual contamination;

- Air emissions testing during on-site treatment to ensure compliance with applicable Resource Conservation and Recovery Act (RCRA) air emission standards;

- Ambient air quality monitoring during excavation activities to ensure that off-site contaminant concentrations in air do not exceed applicable standards; and

- Post-construction activities consisting of groundwater monitoring, Site inspections, and site maintenance.

4.2 REMEDY IMPLEMENTATION

All of the OU1 and OU4 remedial activities had been completed at the time of the last five-year review (USEPA, 2009) and are summarized below. As discussed in Section 4.1.2, EPA amended the 1987 ROD in September 2007 to change the OU3 groundwater cleanup strategy from extraction and treatment (pump and treat) to *in-situ* chemical oxidation (ISCO). Since 2009, the OU3 ISCO remedial action has been completed and this operable unit has now entered a long-term monitoring phase. The OU3 activities over the last five years are also summarized below.

4.2.1 OU1 Remedy Implementation

Pursuant to a Consent Decree entered on November 13, 1988, three PRPs (General Electric Company, Solvents Recovery Service of New England, and Lilly Industrial Coatings, Inc.) performed response actions at the O&G portion of the Site. In 1988 and 1989 these three PRPs excavated and treated about 4,700 cubic yards of soil contaminated with VOCs to the depth of the water table at the O&G portion of the Site. The treatment was by thermal desorption (thermal aeration in the ROD). Additional information on the OU1 remedy implementation can be found in the December 2003 five-year review and previous five-year reviews for the Site.

Site demobilization and Operable Unit 1 closure was completed on August 1, 1989.

4.2.2 OU3 Remedy Implementation

Prior to EPA's decision to change the OU3 component of the overall Site cleanup plan from pump and treat to ISCO, a number of activities were performed to finalize the design of the pump and treat system. From November 2004 through February 2005, EPA completed groundwater sampling, tests and studies whose primary goals were to obtain information needed to update the 1996 groundwater pump and treat design. The sampling, testing and studies included: groundwater monitoring in March 2004, June 2004 (M&E, 2005a) and December 2005 (M&E, 2006); a groundwater pumping test and pilot scale groundwater treatability study in November/December 2004; and preparation of a groundwater treatability study report in 2005 (M&E, 2005b).

The groundwater monitoring data collected in 2004 indicated a noticeable improvement in the site's groundwater quality since OU4 remedial actions were completed, and also identified the presence of three distinct residual source areas (M&E, 2005a):

- Area A was located at the approximate center of the State-owned portion of the Site, and groundwater contamination consisted of a co-mingled plume of BTEX and chlorinated solvent VOCs, primarily TCE, PCE, and cis-1,2-DCE. The highest concentrations and potential source of VOC contamination were noted in the western portion of Area A, in the vicinity of a former caustic lagoon. 1,4-Dioxane concentrations were generally low (<8 ug/L) in Area A.

- Area B was located in the southeast corner of the State-owned portion of the Site, bordering Route 125. Based on historical data prior to the ISCO pilot test, the highest site-wide concentrations of 1,4-dioxane (>200 ug/L) and total VOC concentrations greater than 20,000 ug/L (primarily BTEX) were measured in groundwater samples collected from Area B. Both BTEX and chlorinated solvent VOCs were detected in soil and groundwater samples.

- Area C was located north of the State-owned portion of the Site where a plume of lower total VOC concentrations lies roughly parallel to North Brook. The primary contaminant in Area C is 1,4-dioxane, which was measured at low concentrations (3 to 40 ug/L) in groundwater beneath a large area (greater than 2.5 acres). In addition, moderately elevated concentrations of PCE (60 to 213 ug/L) and TCE (44 ug/L) were detected in groundwater at several vertical profiling locations completed in January 2008.

In the fall of 2006, EPA decided that the pump and treat component of the remedy (OU3) selected in the 1987 ROD should be re-evaluated in light of the noticeable improvements in the groundwater quality and the presence of the three distinct source areas discussed above; and advances in remedial technologies and overall knowledge of the Site since the 1987 ROD was issued. In March and April 2007, EPA investigated Areas A and B using a combination of groundwater vertical profiling and soil vertical profiling. In November and December 2007, EPA investigated Area C. The vertical profiling effort for the three areas was designed to accomplish the following objectives:

- Define the vertical and horizontal extent of the VOC contamination within the three residual source areas (A, B and C).

- Determine the concentrations of 1,4-dioxane within the three residual source areas.

- Determine whether elevated concentrations of 1,4-dioxane are co-located with elevated total VOCs.

- Determine how contaminant concentrations correlate with subsurface soil permeability and organic content.

As mentioned previously (Section 4.1.2), in September 2007, the EPA issued an Amended Record of Decision to change the groundwater restoration component of the remedy (OU3) from groundwater pump and treat to *in-situ* chemical oxidation (ISCO) and monitoring. The rationale for this fundamental change to the original groundwater remedy is provided in the 2007 ROD Amendment (USEPA, 2007). The components of the ISCO remedy are discussed in Section 4.1.2 of this Report. The results of the vertical profiling effort in the three residual source areas and the final design of the ISCO remedy are provided in the Basis of Design Report (M&E, 2008).

ISCO Injection Round 1 (2008). In July 2008, EPA started construction of the numerous ISCO injection wells within the three residual source areas. The chemical oxidant (activated sodium persulfate) was delivered into the groundwater using a combination of permanent wells and temporary direct push injection wells. As of September 12, 2008, oxidant had been injected into all the permanent and direct push injection wells, and EPA prepared a Preliminary Closeout Report (USEPA, 2008). A total of 253 injection wells were installed (119 in Area A, 80 in Area B and 54 in Area C). Approximately 374,100 pounds of sodium persulfate were injected into the subsurface (204,700 pounds in Area A, 127,100 pounds in Area B and 42,300 pounds in Area C).

The effectiveness of the 2008 injection event was evaluated by the collection of groundwater samples from selected monitoring wells and injection wells. Performance monitoring sampling events were performed in January 2009 and April 2009. A second site-wide groundwater and surface water monitoring round was performed in June 2009 to mirror the June 2008 (pre-ISCO) baseline sampling round and to provide data to monitor the overall Site plumes, including wells located outside the ISCO injection areas.

ISCO Injection Round 2 (2009). The results of the 2009 sampling events were used to design a second injection event that was executed in the fall of 2009. This event was approximately one-half the magnitude of the 2008 injection event and targeted portions of Areas A and B where performance monitoring showed that concentrations of contaminants of concern (COCs) still exceeded maximum contaminant levels (MCLs) by significant margins. No injections were performed in Area C in the fall of 2009 based on low concentrations of COCs detected in Area C wells sampled following the 2008 ISCO injection. A total of 204,600 pounds of sodium persulfate were injected into 94 injection wells located in Area A and Area B. Sodium hydroxide (NaOH) was used as the activator. A design persulfate dosage of 18% was applied for both Area A and Area B. In Area B-13, which was in the proximity of South Brook, modified Fenton's reagent (consisting of hydrogen peroxide and catalyzed peroxide), was proposed by the ISCO subcontractor for injection due to concerns about sulfate impacts to the surface water body. Only limited volumes of peroxide ended up being injected in this subarea due to the shallow groundwater table, low permeability around the injection wells, low achieved injection rates and volumes, and the exothermic nature of peroxide injection. As a result, there was a volume of hydrogen peroxide remaining on-site, and it was elected to perform additional modified Fenton's reagent injection into Area A injection wells in the vicinity of the highest residual contamination. This peroxide injection was performed following the completion of the injection of base-activated persulfate in Area A to provide additional oxidation and activation, as peroxide is another potential activator for sodium persulfate.

In February 2010, AECOM performed the first of two planned performance monitoring rounds to assess the effectiveness of the fall 2009 ISCO injection program. The February 2010 event involved the sampling of groundwater with analysis for VOCs, metals, 1,4-dioxane and sulfate. A second sampling event was performed in April 2010 to collect additional groundwater data using the EPA mobile laboratory for analysis of selected VOCs. Soil samples were also collected in April 2010 and analyzed by the mobile laboratory to assess the progress of remediation of contamination adsorbed to soil in Areas A and B, and determine whether the potential for significant contaminant rebound exists. A third site-wide groundwater and surface water sampling event was performed in June 2010. Groundwater samples were analyzed for VOCs, 1,4-dioxane, SVOCs, TAL metals, and sulfate. Select samples (primarily east of Route 125) were also analyzed for alkalinity and chloride. Field analysis for persulfate was performed at locations not previously sampled to confirm that any residual persulfate had decomposed. Surface water samples were also collected during the site-wide groundwater sampling round and analyzed for VOCs, 1,4-dioxane, dissolved TAL metals, alkalinity, chloride, and sulfate.

ISCO Injection Round 3 (2010). Based on the performance monitoring results following the 2008 and 2009 injection events, one more ISCO injection event was implemented in the fall of 2010 to achieve further progress in attaining the remedial goals established for the Site. The first ISCO phase in 2010 was the injection of hydrogen peroxide in areas with the highest residual VOC concentrations or where rebound was observed, to both oxidize VOCs and to encourage desorption. The second phase of ISCO injections was the injection of base-activated sodium persulfate into all injection wells in the 2010 scope of remediation. Lastly, modified Fenton's Reagent was applied at all injection points in the 2010 program. This approach was referred to as the persulfate sandwich (peroxide, persulfate, peroxide). A design persulfate dosage of 15% was applied for both Area A and Area B, and sodium hydroxide (NaOH) was used as the activator. In Area A, a total of 32,250 gallons of base-activated sodium persulfate solution (37,900 pounds of sodium persulfate) and 22,970 gallons of hydrogen peroxide (8%) were injected into 34 injection wells (total volume of 62,590 gallons, including 7,370 gallons of iron catalyst). In Area B, a total of 9,000 gallons of base-activated sodium persulfate (10,600 pounds of sodium persulfate) followed by 4,460 gallons of hydrogen peroxide (8% and 12%) were injected into 24 injection wells (total volume of 14,475 gallons, including 1,015 gallons of iron catalyst). Limited injection of base-activated persulfate was performed in Area B-13 (southern-most portion of Area B, south of the perimeter fence and adjacent to South Brook).

Table 2 summarizes the number of injection locations, quantities of oxidants, and areas treated for all three ISCO injection events.

Table 2
Summary of ISCO Injection Activities
Ottati & Goss/Kingston Steel Drum Superfund Site
Kingston, NH

Year	2008	2009	2010	Total
Source Areas Treated	A, B, C	A, B	A, B	
Area Treated (sq ft)	51,000	17,400	18,400	**52,100**
No. of Injection Points	201	100	63	
Oxidant(s) Used	Base-Activated Persulfate	Base-Activated Persulfate, Modified Fenton's Reagent	Peroxide, Base-Activated Persulfate, Modified Fenton's Reagent	
Liquid Volume Injected (gal)	191,560	147,996	77,065	**416,621**
Sodium Persulfate Used (lb)	394,400	204,600	48,400	**647,400**
Hydrogen Peroxide Used (lb)	0	2,150	83,000	**85,150**

Post-Injection Performance Monitoring and Reporting (2011 and 2012). The 2010 ISCO injection event was the last of the three planned events as envisioned in the original remedy design (M&E, 2008). It was envisioned that following injections, Site groundwater would be monitored on a regular basis to evaluate the progression of the remedy towards attaining Interim Cleanup Levels (ICLs) for the organic COCs that were the targets of the ISCO remedy. The groundwater monitoring rounds performed in 2011 were the first rounds since 2007 that had been performed without an intervening ISCO injection having taken place. In May 2011, groundwater samples were collected from 27 wells identified as Performance Monitoring wells (13 from Area A, six from Area B, and eight from Area C). In June 2011, a total of 23 monitoring wells located across the Site (both east and west of Route 125) were sampled. Surface water was also collected during the June 2011 groundwater sampling round. Samples were collected from the two brooks that flow under Route 125 from west to east, into Country Pond Marsh. In each brook a sample was collected from an upstream location and from immediately upstream of the culvert that carries the surface water under the highway.

An ISCO Remedial Action Summary Report (AECOM, 2012) was completed in February 2012 that provided a summary of the three full-scale ISCO injections performed in 2008, 2009, and 2010; evaluated results from groundwater performance monitoring and site-wide monitoring performed from 2008 through June 2011 and soil sampling performed in April 2010; and provided an overview of the groundwater plumes and conceptual Site model following ISCO remediation. Lessons learned, observations, and recommendations for the near-future at the Site were also discussed in the report. EPA issued a Remedial Action Report in October 2012 to document completion of the ISCO remedial action (USEPA, 2012).

Changes to the performance monitoring program were made for 2012 based on evaluation of previous monitoring results, including elimination of some wells and addition of certain analyses for selected wells, as well as the elimination of surface water sampling (since no impacts to surface water had been observed in prior events) and other minor changes. Samples were collected in June 2012 (site-wide wells) and August 2012 (performance monitoring wells).

Results of the groundwater monitoring performed from 2007 (pre-ISCO) through 2012 are summarized in Section 6 of this five year review.

Groundwater Management Zone Wells (2011, 2012, and 2013). In addition to ISCO performance monitoring and site-wide monitoring, EPA also installed and has monitored a set of wells known as “groundwater management zone” (GMZ) wells. The objective of installing and sampling these wells was to help establish the geographic and hydraulic boundaries of the groundwater institutional controls that are required as part of the selected remedy for the Site. These wells were used to help identify the properties that were included in the Town Ordinance restricting groundwater use that was implemented in March 2012. Groundwater samples from these wells did not show impacts from the Site based on the results of three completed monitoring events, and therefore they were judged to be appropriate for defining the boundaries of the restricted area.

4.2.3 OU4 Remedy Implementation

Phase 1 of the OU4 remedial action (building demolition) was completed in February 1994 and included the following demolition activities: 1) asbestos abatement; 2) building debris removal and disposal; 3) sampling and analysis; 4) utilities removal; 5) removal of above-ground and underground storage tanks; 6) contaminated soil and sediment disposal; and 7) installation of a high-density polyethylene cover over the southeast portion of the former building (ADL, 1994).

In September 1999 EPA issued an Explanation of Significant Differences (ESD) which modified the remedy called for in the ROD. Under the ESD: 1) the volume of soil requiring treatment was increased; 2) the area of sediment requiring remediation was increased; 3) the cleanup standard for PCBs in sediment was changed from 1 ppm to 10 ppm; 4) on-site incineration of contaminated soil and sediment was changed to on-Site thermal desorption of soils and suitable sediment material followed by off-Site

incineration of residual hazardous waste; and 5) the establishment of an institutional control on the GLCC/KSD state-owned property to restrict the area to commercial use. A second ESD was issued in February 2002 which changed the requirement for off-site incineration of the residual hazardous waste from the thermal desorption process to disposal of the material into a hazardous waste landfill.

Environmental Chemical Corporation (ECC) was contracted by the U.S. Army Corps of Engineers – New England District (USACE) to complete Phase 2 of the OU4 remedial action, which included the OU4 soil and sediment excavation, low-temperature thermal desorption treatment and backfill of treated materials, and restoration activities. Between August 2001 and June 2002, 72,347 tons of PCB and VOC-contaminated soil (not including oversized material > 2-inches), were excavated from the GLCC/KSD area of the Site and treated in an on-site low-temperature thermal desorption plant. Prior to treatment, debris (including drums, concrete, metal, wood, timbers, and tires) was removed from the soil and disposed off site. Prior to disposal, representative wipe samples were collected from the debris to confirm that PCB concentrations were not above disposal facility acceptance criteria.

Between October 2001 and February 2002, approximately 9,143 tons of sediment from the Country Pond Marsh were excavated, transported and disposed of as non-hazardous waste at a RCRA Subtitle D disposal facility. Approximately 492 tons of sediment were transported and disposed of as PCB hazardous waste (Toxic Substances Control Act) at a RCRA Subtitle C landfill facility. Confirmatory soil samples from the excavation floor verified the removal of contaminated soil and sediment to the required level. The Country Pond Marsh remediation was divided into two areas, a thirty-inch deep excavation area and a six-inch deep excavation area. A total of six acres of wetland in Country Pond Marsh were remediated and restored.

Site restoration activities included backfilling, grading, seeding, vegetative plantings, and fence installation. Remediated areas of Country Pond Marsh were reconstructed and South Brook, which had been diverted during the remediation, was restored between May 2002 and September 2002. In June 2002, thirteen groundwater monitoring wells were installed at ten locations at the Site. Other restoration activities included removing utilities, construction of permanent access roads, installation of a new chain-link fence with gates, reseeding, and removal of the South Brook diversion swale and recharge galleries. The OU4 remedial action is described more fully in the Remedial Action Report (ECC, 2003).

Monitoring of the restored Country Pond Marsh from 2003 to the present clearly documents establishment of a productive and diverse plant community, dominated almost exclusively by herbaceous hydrophytic (wetland) plants. Hydrology, hummock and hollow topography, and soils are adequate to support development of a diverse, functional, wetland community. Conditions appear favorable for eventual development of a forested wetland, the ultimate objective of the restoration effort.

In July 2007 the State of New Hampshire recorded a notice to the chain of title for the GLCC/KSD property to document the land activity and use restrictions (AURs) required to maintain the protectiveness of the soil remedy and to establish institutional controls over the 5.89 acres of the property (see Attachment 2). The AURs allow for commercial or industrial uses provided soils are not disturbed at a depth greater than six feet. Use of the property as a residence, school, nursery, recreational area or any other use at which a child's presence is likely or intended is not permitted. Installation of groundwater wells or any removal or exposure to groundwater (except for remediation purposes) is not permitted unless such activity is first evaluated and approved by the EPA and NHDES.

On a small portion of the BBS Realty property, adjacent to the GLCC/KSD property, confirmatory sampling showed that in a limited area some PCBs were left in subsurface soil (8 to 10 feet below ground surface) at concentrations likely above residential risk standards for PCBs (see Figure 3 and Section 7.1 of this Report). However, a further evaluation of the soil sampling has confirmed that the low-level PCBs that remain at depth do not pose an unacceptable CERCLA risk under future residential use scenarios and therefore no further CERCLA action is necessary for the remedy to be protective. Details regarding this evaluation are presented in a 2014 EPA memo that is attached with this review.

CSW04-1001-FL
6.9 ppm
CSW04-1002-FL
5.28 ppm
CSW04-1003-FL
7.9 ppm
CSW05-1001-FL
15.1 ppm
CSW05-1002-FL
5.7 ppm
CSW05-1004-FL
5.7 ppm
CSW06-1004-FL
7.15 ppm
CSW06A-1001-FL
3.9 ppm
INSET MAP (Showing PCB concentrations in soil)
125
AECOM
0 30 60 120
Feet
OTTATI & GOSS SUPERFUND SITE
KINGSTON, NEW HAMPSHIRE
FIGURE 3:
AREA OF PCBs > 3 PPM IN SOIL
AT 8 TO 10 FT BELOW
GROUND SURFACE
N
W
E
S

4.3 OPERATION AND MAINTENANCE

There are no treatment systems on Site that require on-going operation and maintenance. The State of New Hampshire owns the GLCC/KSD portion of the Site and maintains the property (primarily mowing the grass and maintaining access restrictions). Monitoring wells remain on site and are inspected for integrity during routine monitoring rounds. Some ISCO injection wells and monitoring wells that were deemed to be no longer necessary were properly abandoned in June-July 2013, including the ISCO injection wells located in Area C, as well as some monitoring wells located in the Former O&G portion of the Site that had not been used for sampling purposes in many years.

Based upon the effectiveness of the three ISCO injection rounds, no more injection rounds are currently planned. Groundwater monitoring of select wells has been and will continue to be performed to evaluate the effectiveness of the oxidant injections. Routine site-wide groundwater monitoring and the residential groundwater well monitoring program will continue to be performed until the groundwater cleanup goals for the Site have been achieved. Residential wells are monitored yearly by NHDES. The next site-wide groundwater monitoring round to assess ISCO effectiveness and progress towards cleanup goals is planned for 2015. Section 6.0 presents the results of the groundwater monitoring performed since the last five year review. The results show reductions in total VOC concentrations in groundwater due to the ISCO injections.

The restoration of the Country Pond Marsh wetland area is judged to have been successful. EPA performed the restoration and monitored and maintained the restored area from 2002 through 2012. The monitoring (performed by the Army Corps of Engineers under contract to EPA) documents the establishment of a plant community dominated almost exclusively by wetland vegetation, and indicated that conditions are favorable for eventual development of a forested wetland, which is the ultimate objective of the restoration effort. Some concerns were identified, however, that could affect achievement of the long-term objective: poor survival of planted trees and shrubs, subsidence of constructed hummocks, and colonization of the wetland by invasive species. In the spring of 2013, EPA transferred responsibility for ongoing maintenance of the wetland to NHDES. The April 2013 letter that transferred O&M responsibility to the State included recommendations for ongoing maintenance to address these concerns.

SECTION 5.0
PROGRESS SINCE THE LAST FIVE YEAR REVIEW

In the last Five-Year Review dated February 12, 2009, EPA identified four issues that required follow-up actions. Those issues and the actions taken since the last Review are discussed below.

5.1 STATUS OF ISSUES THAT REQUIRE FOLLOW-UP ACTIONS

Issue 1: To prevent the future use of Site groundwater, institutional controls on properties where they are not yet established, are needed in the form of deed restrictions and/or notices to establish land-use restrictions and a groundwater restriction area which would also be integrated into a Groundwater Management Zone (GMZ).

To address the need for an institutional control to prevent the use of site groundwater on properties where an institutional control did not exist, the Town of Kingston adopted a Groundwater Management Zone (Town GMZ) on March 13, 2012. The Town GMZ prohibits all uses of groundwater for any purpose whatsoever without prior approval from the Town, EPA and NHDES. No wells of any nature shall be dug, installed, or created within the Town GMZ Site without prior approval from the Town, EPA and NHDES. No groundwater shall be drawn by any means whatsoever or for any use whatsoever from within the Town GMZ without prior approval from the Town, EPA and NHDES. Also, no disturbance of wetlands within the Town GMZ shall be permitted without prior approval from the Town, EPA and the NHDES.

Issue 2: Two relatively small areas just outside the perimeter of the GLCC/KSD portion of the Site required cleanup to the Site's 3 ppm residential soil cleanup level for PCBs. This goal was achieved in one of the areas. In the other area some residual PCB contamination greater than 3 ppm remains at a depth of 8 to 10 feet below ground surface (see Figure 3). Furthermore, the protectiveness of the current 3 ppm residential soil cleanup level for PCBs needs to be re-evaluated. Currently there is no residential use at any portion of the Site.

EPA evaluated all the soil sampling results and other details regarding the soil excavation at the one small area that had low-level PCB concentrations at depth. Based on this review, EPA concluded that the overall average PCB soil concentration in this area does not pose an unacceptable CERCLA risk under future use scenarios and therefore no further CERCLA action is necessary for the remedy to be protective. Details regarding this evaluation are presented in a 2014 EPA memo that is attached with this review.

Issue 3: The soil at the O&G portion of the Site was excavated only to the relatively shallow groundwater table (less than 10 feet below ground surface). The VOC contaminated soils which may still be present below the groundwater table may not allow for unlimited and unrestricted use of this portion of the Site. This portion of the Site is not currently being used.

In April 2010, in conjunction with subsurface soil sampling being performed to evaluate the ISCO remedy, a direct-push boring was advanced in the O&G portion of the Site and soil samples were field-screened for VOCs using a Photo-Ionization Detector (PID). Two subsurface soil samples were submitted to the EPA Mobile Laboratory that was on Site at the time to perform analyses of soil samples from the ISCO remedial areas. The soil samples were collected from 13.5 feet and 19 feet below ground surface. No VOCs were detected in these soil samples. In addition, groundwater contamination with VOCs has not been detected in this portion of the Site for a number of years, which suggests that significant soil contamination with VOCs is also not present in the saturated zone. Therefore, the likelihood of significant residual soil contamination is judged to be very low. There is currently no requirement to evaluate potential risks via the vapor intrusion pathway prior to construction of buildings within the groundwater restriction area established by the Town ordinance, or on the State-owned property. There are currently no buildings over the plume and therefore there is no current vapor intrusion exposure pathway present. However, groundwater VOC concentrations currently exceed EPA's vapor intrusion screening values and

therefore unrestricted future Site uses should not be allowed until an evaluation of the vapor intrusion exposure pathway is performed.

Issue 4: The fish ingestion risk of PCBs in Country Pond was recalculated using the most recent recommended ingestion rates from the "Child-Specific Exposure Factors Handbook" (EPA, 2008b), and the most recent cancer oral slope factor and reference dose from EPA's Integrated Risk Information System (IRIS). The re-calculation indicates that the non-cancer risk of PCBs due to recreational fish ingestion (from Country Pond) has a hazard quotient (HQ) of approximately 3. However, it should be noted that the fish tissue data used in the updated risk calculations was collected prior to the OU4 soil and sediment remediation and is considered to be outdated information.

To support the re-evaluation of the Human Health and Ecological Risk Assessments, EPA collected samples of largemouth bass and yellow perch from Country Pond and Great Pond (a reference water body not in the pathway of historic contaminant migration from the Site) in September and October 2009 (TechLaw, 2012). Eleven samples of each species (each comprised of multiple individual fish) were collected from Country Pond; two samples of each species were collected from Great Pond. Whole body and fillet samples were analyzed for metals, mercury, PCBs as Aroclors, and PCB Congeners. Whole body samples (yellow perch only) were used to evaluate ecological risk, and fillet samples (both species) were used to evaluate human health risk.

It was found that concentrations of metals and PCBs in the fish tissue samples from the two ponds were similar, with the exception of the yellow perch fish fillet samples which had higher concentrations in the samples collected from Country Pond. However, because there were no more than two samples in Great Pond for any tissue type, EPA determined that the data set was insufficient to make definitive comparisons against Country Pond. The results and risk evaluations are discussed further in Section 6.3.5.

SECTION 6.0
FIVE-YEAR REVIEW PROCESS

This section describes the activities performed during the five-year review process and provides a summary of findings.

6.1 COMMUNITY NOTIFICATION AND INVOLVEMENT

On May 9, 2013, EPA issued a press release announcing that EPA was beginning five-year reviews of 16 Superfund Sites across New England, including the Ottati & Goss/Kingston Steel Drum Site. A similar press release will be issued by EPA once the five-year reviews are complete.

Interviews were conducted with local officials and one property owner whose property borders the Site on December 12, 2013. The interview with local officials was done in a group setting after their weekly status meeting and included the EPA Project Manager, NHDES Project Manager, and AECOM. A list of the officials that participated and summary of the interview is included in Section 6.5. The property owner was interviewed by AECOM via telephone; that interview is also summarized in Section 6.5.

6.2 DOCUMENT REVIEW

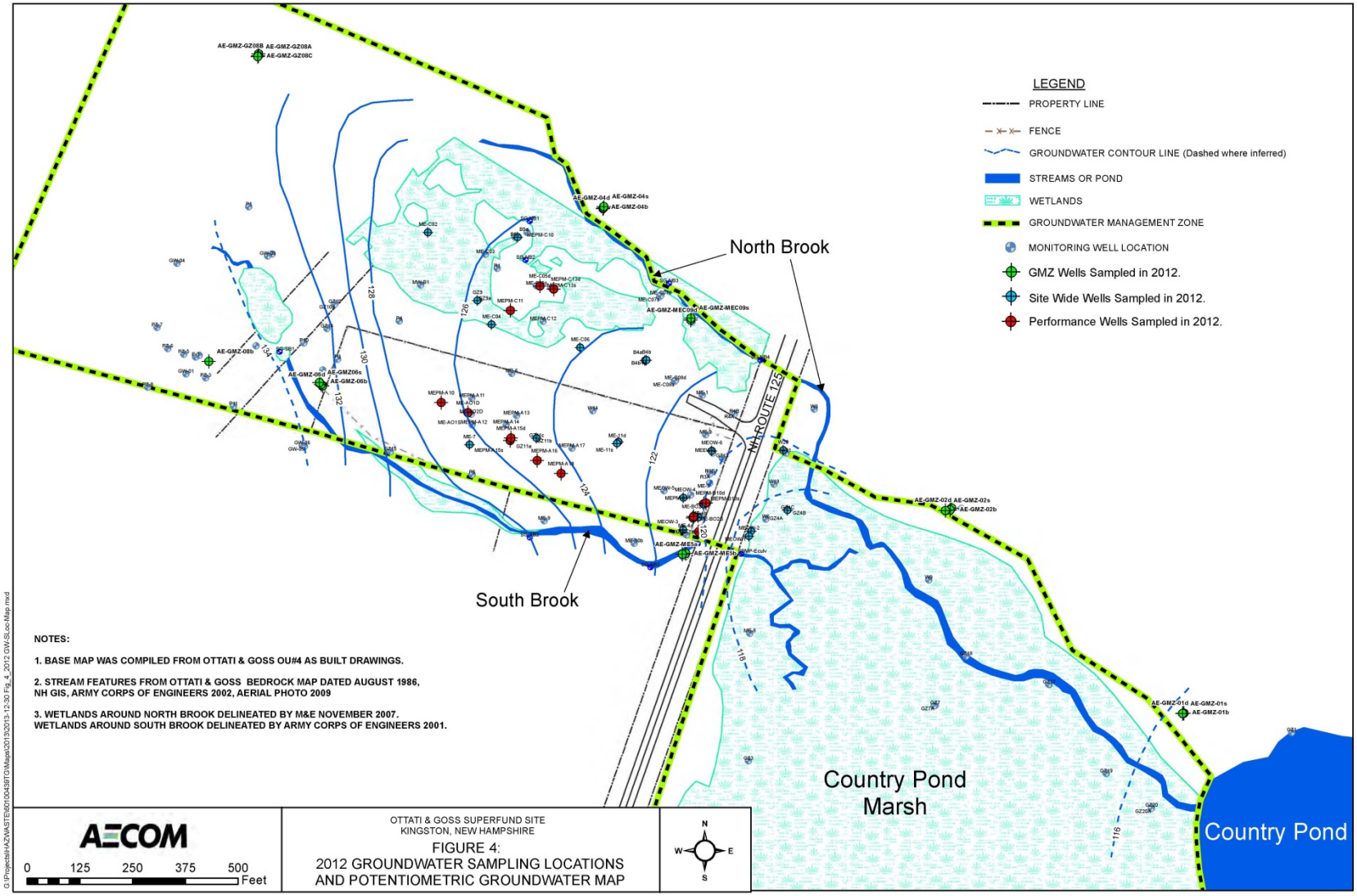
This five-year review included a review of relevant documents for the Site including the ROD, two Explanation of Significant Differences, AROD, the Remedial Action Reports for OU1, OU3, and OU4, the PCOR, Site groundwater monitoring data as presented in various reports prepared by EPA's contractors, and previous five-year review reports. See Attachment 1 for a list of documents that were reviewed and other references.

6.3 DATA REVIEW

As noted in Section 4.2.2, there have been a number of performance and site-wide groundwater sampling rounds performed since the last five-year review that illustrate the progress of the ISCO injections in reducing concentrations of VOCs in Site groundwater. These results are summarized in this section. A summary of the Site hydrogeology, the results of the most recent round of residential well monitoring by NHDES, and the results of fish tissue analyses on samples collected from Country Pond are also provided in this section.

6.3.1 Hydrogeology

Groundwater generally flows from west to east, in somewhat of an arc shape, across the portions of the Site located west of Route 125, eventually discharging to the marsh and Country Pond, located east of Route 125. Figure 4 presents the locations of wells sampled in 2012 and the groundwater elevation contours from water level measurements made in the summer of 2012. Groundwater flows into the site from the southwest, traveling under South Brook, and from the northwest, along the North Brook drainage. Flow onto the Site generally has a higher gradient than that leaving the site to the east. The change in gradient is likely due to the increase in transmissivity related to the thicker overburden deposits to the east. Measurements in paired overburden wells along North and South Brooks and along the central portion of the Site indicate that flow is generally downward. This suggests that there is little discharge to the brook systems from the deeper aquifer system west of Route 125, and that flow is generally more lateral with discharge occurring east of Route 125.

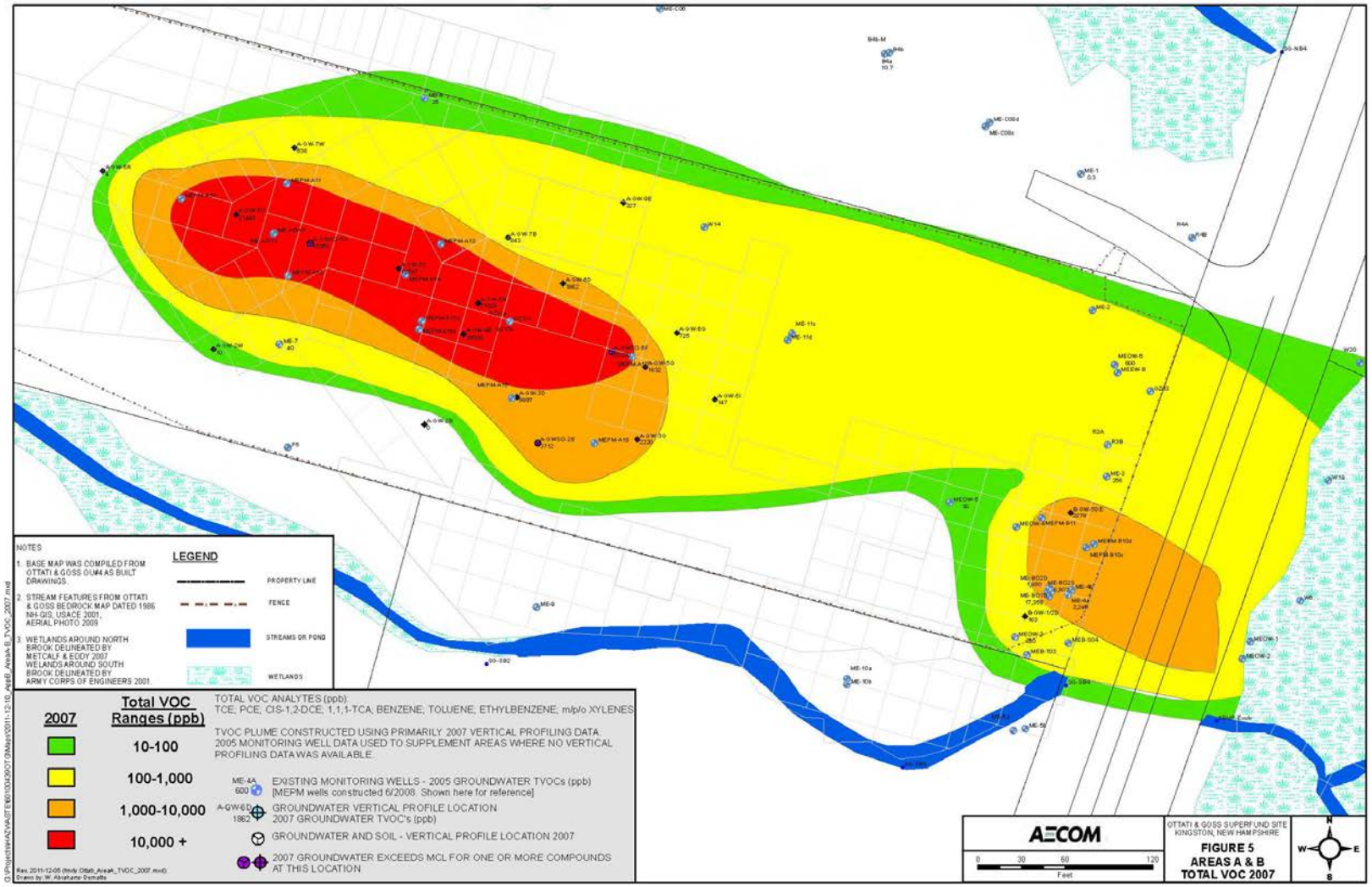

LEGEND
PROPERTY LINE
FENCE
GROUNDWATER CONTOUR LINE (Dashed where inferred)
STREAMS OR POND
WETLANDS
GROUNDWATER MANAGEMENT ZONE
MONITORING WELL LOCATION
GMZ Wells Sampled in 2012.
Site Wide Wells Sampled in 2012.
Performance Wells Sampled in 2012.
North Brook
South Brook
Country Pond Marsh
Country Pond
NH ROUTE 125
NOTES:
1. BASE MAP WAS COMPILED FROM OTTATI & GOSS OU#4 AS BUILT DRAWINGS.
2. STREAM FEATURES FROM OTTATI & GOSS BEDROCK MAP DATED AUGUST 1986, NH GIS, ARMY CORPS OF ENGINEERS 2002, AERIAL PHOTO 2009
3. WETLANDS AROUND NORTH BROOK DELINEATED BY M&E NOVEMBER 2007. WETLANDS AROUND SOUTH BROOK DELINEATED BY ARMY CORPS OF ENGINEERS 2001.
AECOM
0 125 250 375 500 Feet
OTTATI & GOSS SUPERFUND SITE
KINGSTON, NEW HAMPSHIRE
FIGURE 4:
2012 GROUNDWATER SAMPLING LOCATIONS AND POTENTIOMETRIC GROUNDWATER MAP
N
W
E
S

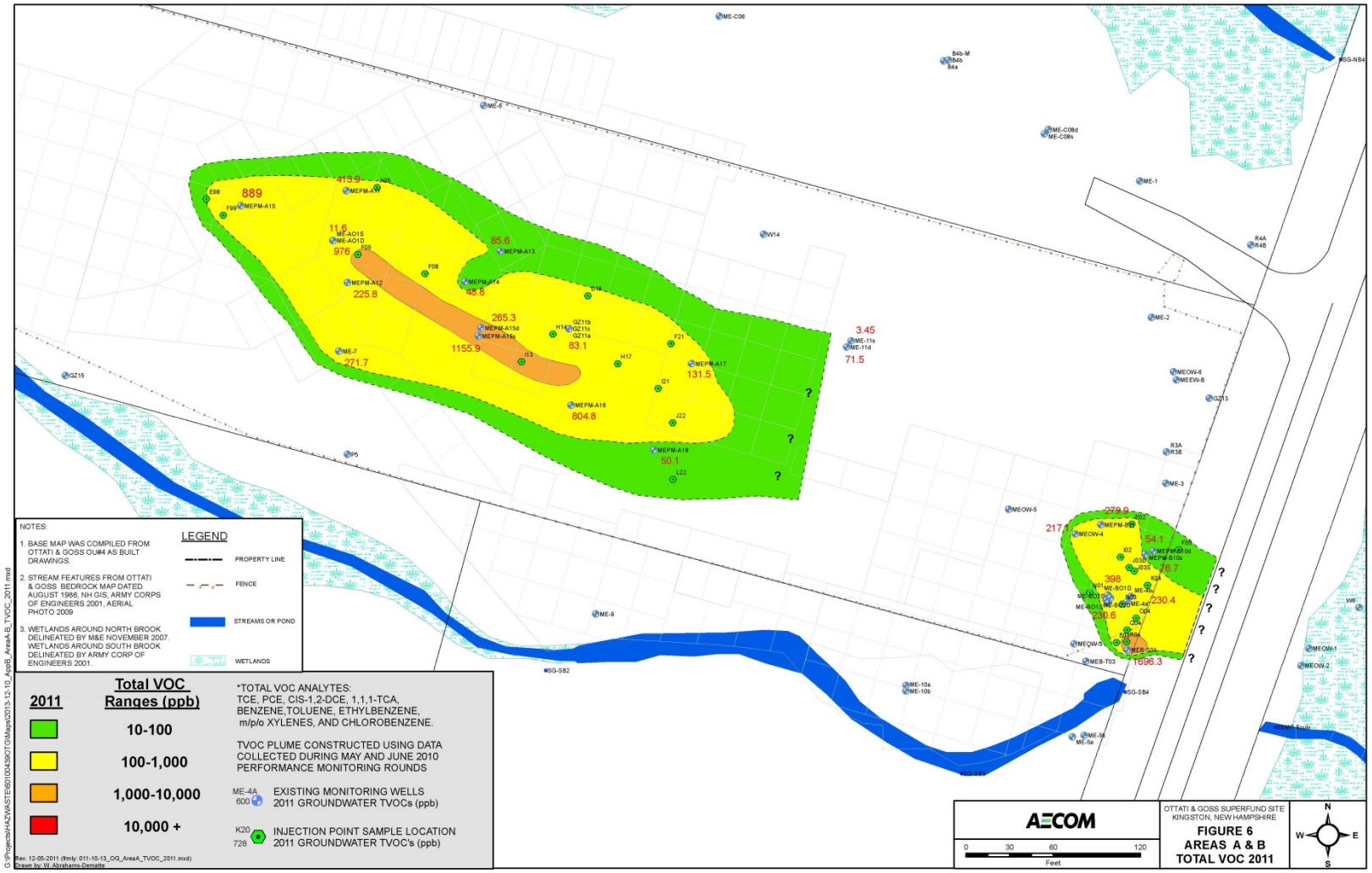
Groundwater exists in the stratified drift deposits in this area. Although a large quantity of sand and gravel from these deposits has been mined from the Site (predominantly from the western portion), a depth of 10 to 45 feet of glacial deposits still exists. At the Site, these deposits tend to deepen to the east. East of NH Route 125, the stratified deposits are overlain by peat and organic matter. To the west of Route 125, boring logs compiled by Metcalf and Eddy from the installation of the ME- (June 2002), MEOW- (May 2004), and ME-C (November 2007) series monitoring wells, indicate that there is some variability in the textures of the stratified sand and gravel deposits in the saturated zone, particularly in the area between monitoring well cluster GZ-11 and NH Route 125. Below five to eight feet from the ground surface, the textures range from fine-medium sand to coarse sand and gravel. Finer texture deposits appear to be located in the southeast corner of the Site, defined by monitoring wells MEOW-4 and ME-4 and by South Brook, while to the north and northeast, the deposits are coarser, more in the medium to coarse sand and gravel textures (MEEW-B, ME-1, ME-C09, ME-CO8, ME-C07). Above five to eight feet below ground surface, the textures are somewhat more consistent across the fenced- in portion of the site due to the OU4 source removal action in 2002 (ECC, 2003), during which the top five to eight feet of soil (the vadose zone) was removed, remediated via incineration and thermal aeration, and replaced. The replacement of the treated soils included compaction of the material before placing a final loam and topsoil cover over the Site.

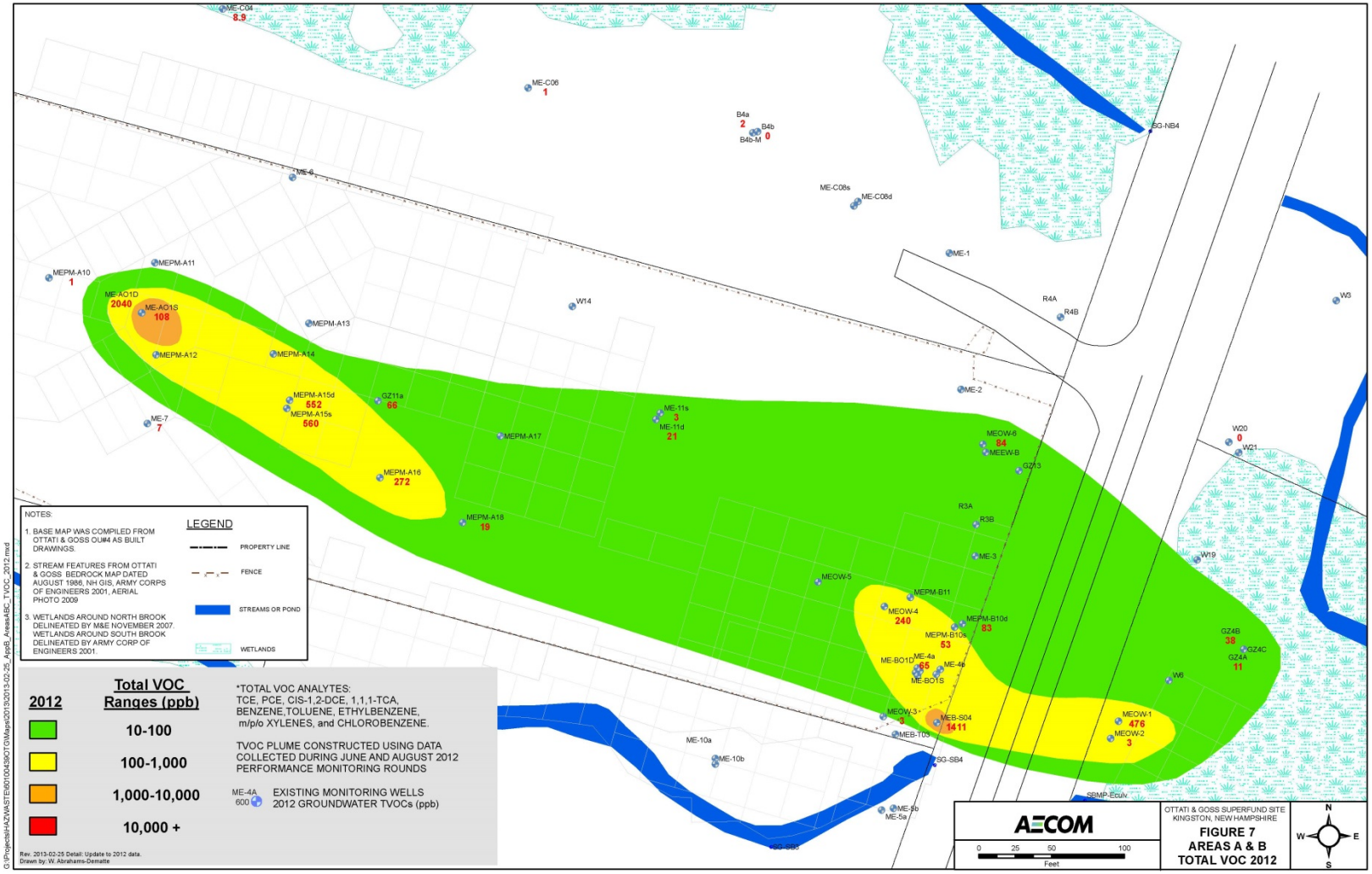
During the evaluation and construction of an infiltration basin for the groundwater pump and treat pilot test in November of 2004, it was noted that the permeability of the treated soils was poor and that after heavy rains most of the infiltrating water remained in the upper two feet consisting of loam and topsoil. Additionally, the infiltrated rain water was observed to move laterally along the contact zone between the loam and the compacted treated soils (~two feet below grade). North of the Site, along North Brook and areas just south of the North Brook (Area C) the top five to eight feet tends to be variable fine sands and fill/disturbed soils.

6.3.2 Groundwater Monitoring Results, 2008-2012

Remediation using chemical oxidation successfully reduced the concentrations of the primary Site VOCs (PCE, TCE, cis-1,2-DCE, benzene, toluene, ethylbenzene, xylenes) in groundwater based on the performance monitoring data through 2012. Figures 5, 6, and 7 respectively depict the plume of total VOCs in 2007 (prior to ISCO injection) and after ISCO in 2011 and 2012. As shown by these figures, total VOC levels have decreased substantially from the ISCO treatments. In addition to reducing total VOC concentrations, the ISCO injections have resulted in the reduction of 1,4 dioxane concentrations in groundwater.


NOTES
1. BASE MAP WAS COMPILED FROM OTTATI & GOSS OU#4 AS BUILT DRAWINGS.
2. STREAM FEATURES FROM OTTATI & GOSS BEDROCK MAP DATED 1986 NH-GIS, USACE 2001, AERIAL PHOTO 2009
3. WETLANDS AROUND NORTH BROOK DELINEATED BY METCALF & EDDY 2007. WELANDS AROUND SOUTH BROOK DELINEATED BY ARMY CORPS OF ENGINEERS 2001.
LEGEND
PROPERTY LINE
FENCE
STREAMS OR POND
WETLANDS
2007
Total VOC Ranges (ppb)
10-100
100-1,000
1,000-10,000
10,000 +
TOTAL VOC ANALYTES (ppb):
TCE; PCE; CIS-1,2-DCE; 1,1,1-TCA; BENZENE; TOLUENE; ETHYLBENZENE; m/p/o XYLENES
TVOC PLUME CONSTRUCTED USING PRIMARILY 2007 VERTICAL PROFILING DATA. 2005 MONITORING WELL DATA USED TO SUPPLEMENT AREAS WHERE NO VERTICAL PROFILING DATA WAS AVAILABLE.
ME-4A 600
EXISTING MONITORING WELLS - 2005 GROUNDWATER TVOCs (ppb) [MEPM wells constructed 6/2008. Shown here for reference]
A-GW-6D 1862
GROUNDWATER VERTICAL PROFILE LOCATION 2007 GROUNDWATER TVOC's (ppb)
GROUNDWATER AND SOIL - VERTICAL PROFILE LOCATION 2007
2007 GROUNDWATER EXCEEDS MCL FOR ONE OR MORE COMPOUNDS AT THIS LOCATION
AECOM
0 30 60 120
Feet
OTTATI & GOSS SUPERFUND SITE
KINGSTON, NEW HAMPSHIRE
FIGURE 5
AREAS A & B
TOTAL VOC 2007
N
W
E
S


NOTES:
1. BASE MAP WAS COMPILED FROM OTTATI & GOSS OU#4 AS BUILT DRAWINGS.
2. STREAM FEATURES FROM OTTATI & GOSS BEDROCK MAP DATED AUGUST 1986, NH GIS, ARMY CORPS OF ENGINEERS 2001, AERIAL PHOTO 2009
3. WETLANDS AROUND NORTH BROOK DELINEATED BY M&E NOVEMBER 2007. WETLANDS AROUND SOUTH BROOK DELINEATED BY ARMY CORP OF ENGINEERS 2001.
LEGEND
PROPERTY LINE
FENCE
STREAMS OR POND
WETLANDS
2011
Total VOC Ranges (ppb)
10-100
100-1,000
1,000-10,000
10,000 +
*TOTAL VOC ANALYTES: TCE, PCE, CIS-1,2-DCE, 1,1,1-TCA, BENZENE,TOLUENE, ETHYLBENZENE, m/p/o XYLENES, AND CHLOROBENZENE.
TVOC PLUME CONSTRUCTED USING DATA COLLECTED DURING MAY AND JUNE 2010 PERFORMANCE MONITORING ROUNDS
ME-4A 600
EXISTING MONITORING WELLS 2011 GROUNDWATER TVOCs (ppb)
K20 728
INJECTION POINT SAMPLE LOCATION 2011 GROUNDWATER TVOC's (ppb)
Rev. 12-05-2011 (fmly: 011-10-13_OG_AreaA_TVOC_2011.mxd)
Drawn by: W. Abrahams-Dematte
G:\Projects\HAZWASTE\60100439\OTGMaps\2013-12-10_AppB_AreaA-B_TVOC_2011.mxd
AECOM
0 30 60 120
Feet
OTTATI & GOSS SUPERFUND SITE
KINGSTON, NEW HAMPSHIRE
FIGURE 6
AREAS A & B
TOTAL VOC 2011
N
W
E
S
889
413.9
11.6
976
85.6
225.8
45.8
265.3
1155.9
83.1
271.7
3.45
71.5
131.5
804.8
50.1
279.9
217.1
54.1
26.7
398
230.4
230.6
1896.3


ME-C04
8.9
ME-C06
1
B4a
2
B4b
B4b-M
0
SG-NB4
ME-6
ME-C08s
ME-C08d
ME-1
MEPM-A10
1
MEPM-A11
ME-AQ1D
2040
ME-AQ1S
108
W14
MEPM-A13
MEPM-A12
MEPM-A14
R4A
R4B
W3
ME-2
MEPM-A15d
552
MEPM-A15s
560
GZ11a
66
ME-7
7
ME-11s
3
ME-11d
21
MEPM-A17
MEOW-6
84
MEEW-B
GZ13
W20
0
W21
MEPM-A16
272
MEPM-A18
19
R3A
R3B
ME-3
W19
MEOW-5
MEPM-B11
MEOW-4
240
MEPM-B10d
83
MEPM-B10s
53
GZ4B
38
GZ4C
GZ4A
11
ME-BO1D
ME-4a
65
ME-4b
ME-BO1S
W6
MEOW-3
4
MEB-S04
1411
MEB-T03
MEOW-1
476
MEOW-2
3
ME-10a
ME-10b
SG-SB4
SBMP-Ecuiv.
ME-5b
ME-5a
NOTES:
1. BASE MAP WAS COMPILED FROM OTTATI & GOSS OU#4 AS BUILT DRAWINGS.
2. STREAM FEATURES FROM OTTATI & GOSS BEDROCK MAP DATED AUGUST 1986, NH GIS, ARMY CORPS OF ENGINEERS 2001, AERIAL PHOTO 2009
3. WETLANDS AROUND NORTH BROOK DELINEATED BY M&E NOVEMBER 2007. WETLANDS AROUND SOUTH BROOK DELINEATED BY ARMY CORP OF ENGINEERS 2001.
LEGEND
PROPERTY LINE
FENCE
STREAMS OR POND
WETLANDS
2012
Total VOC Ranges (ppb)
10-100
100-1,000
1,000-10,000
10,000 +
*TOTAL VOC ANALYTES: TCE, PCE, CIS-1,2-DCE, 1,1,1-TCA, BENZENE,TOLUENE, ETHYLBENZENE, m/p/o XYLENES, and CHLOROBENZENE.
TVOC PLUME CONSTRUCTED USING DATA COLLECTED DURING JUNE AND AUGUST 2012 PERFORMANCE MONITORING ROUNDS
ME-4A
600
EXISTING MONITORING WELLS 2012 GROUNDWATER TVOCs (ppb)
Rev. 2013-02-25 Detail: Update to 2012 data.
Drawn by: W. Abrahams-Dematte
G:\Projects\HAZWASTE\60100439\OTGMaps\2013\2013-02-25_AreaS_Areas\ABC_TVOC_2012.mxd
AECOM
0 25 50 100
Feet
OTTATI & GOSS SUPERFUND SITE
KINGSTON, NEW HAMPSHIRE
FIGURE 7
AREAS A & B
TOTAL VOC 2012
N
W
E
S

A summary for each of the three source areas is presented below:

Area A

In Area A, the overall plume area and concentrations of total VOCs were reduced, and BTEX VOCs were significantly reduced, by the ISCO injections (see Figures 5, 6, and 7).

From samples collected in August 2012 within the injection area of Area A, all overburden monitoring wells had at least one VOC exceed an ICL and/or AGQS (Table 3). In some wells the measured concentration was less than 5 to 10 ug/L over the criteria, and some VOCs that exceed criteria represent chemical oxidation byproducts that were not present prior to ISCO activities, including chloromethane. Groundwater concentrations are below ICLs for all BTEX analytes. The ICL for 1,4-dioxane was exceeded in one well (ME-11S) but in general, 1,4-dioxane has not been a contaminant of concern within Area A proper (ME-11S is to the east of the Area A injection area).

Area B

Groundwater concentrations in 2012 were below Site ICLs in all wells within the injection area for cis-1,2-DCE, vinyl chloride, 1,2-dichloroethane, and all BTEX VOCs (Table 3). In several wells the measured concentration was less than 5 to 10 ug/L over the criteria, including 1,4-dioxane where all performance monitoring wells in Area B are less than 10 ug/L over the AGQS, with the exception of well MEB-S04 in Subarea B-13, south of the perimeter fence and adjacent to South Brook. Subarea B-13 is the area where ISCO injections were attempted in 2009 and again in 2010, with limited success due to the shallow groundwater table, low permeability around the injection wells, and low achieved injection rates and volumes. MEB-S04 was the location of the greatest exceedances for all analytes but PCE. Total VOC concentrations for Area B have been reduced from the pre-ISCO concentrations, as can be seen by comparing the 2007 total VOC map (Figure 5) with the corresponding 2011 and 2012 maps (Figures 6 and 7).

Area C

Eight wells in Area C were sampled in 2012, four of which are within the Area C injection area (Area C was treated only in 2008, unlike Areas A and B where injections were performed in 2008, 2009, and 2010). The wells within the injection area are MEPM-C13D, ME-CO5D, MEPM-C11, and B-5A. Of these four wells, only the sample from B-5A showed exceedances of an ICL for any compound other than 1,4-dioxane (Table 3). 1,4-Dioxane is the primary contaminant of concern in Area C, and concentrations for the four wells in the injection area remained consistent with those observed in 2011, with relatively small exceedances of the NH AGQS for 1,4-dioxane (3 ug/L):

- MEPM-C13D: 8.4 ug/L
- ME-CO5D: 9.0 ug/L
- MEPM-C11: 4.6 ug/L
- B-5A: 8.9 ug/L

Natural attenuation is anticipated to reduce concentrations in Area C below the AGQS within the near future (five to fifteen years) based on observed decreases in 1,4-dioxane concentration in Area C between 2009 and 2012. Since this area is a wetland with limited development potential, it is not anticipated that this area will be developed in the future.

Table 3
VOCs and 1,4-Dioxane Detections in Excess of ICL and/or AGQS: 2012 June and August Sampling Events
Ottati Goss/Kingston Steel Drum Superfund Site
Kingston, NH

			Area A									
Well ID	ICL	NHAGQS	GZ-11a	ME-11d	ME-11s	ME-A01d	ME-A02s	MEPM-A15d	MEPM-A15s	MEPM-A16	MEPM-A18	MEOW-6
Sample Date	ug/L	ug/L	06/19/12	06/18/12	06/18/12	08/23/12	08/23/12	08/22/12	08/22/12	08/22/12	08/22/12	06/18/12
Analyte with ICL where ICL was exceeded in one or more samples												
Tetrachloroethene	5	5	**6.1**	0.54	< 0.5	**300**	**31**	**35**	4.1	**6.3**	**6.2**	2.5
Trichloroethene	5	5	**9.4**	**5.6**	0.55	**130**	3.2	**8.5**	**22**	**37**	< 5	**12**
cis-1,2-Dichloroethene	70	70	11	7.7	1.3	**430**	5	**480**	**440**	**150**	1.2	36
Vinyl chloride	2	2	< 5	**2.7**	< 0.5	< 5	< 5	**22**	**38**	< 5	< 5	**13**
1,2-Dichloroethane	5	5	< 5	0.5	< 0.5	< 5	< 5	3	< 5	< 5	< 5	< 5
Benzene	5	5	< 5	< 0.5	< 0.5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
1,4-Dichlorobenzene	75	75	4.3	4.2	2	12	< 5	< 5	< 5	< 5	< 5	4
1,4-Dioxane	3	3	0.97	1	**4.6**	NA	NA	NA	NA	0.41	NA	1.1
VOCs with no ICL, but NHAGQS was exceeded in one or more samples												
Chloromethane	NS	30	< 5	< 0.5	< 0.5	< 5	< 5	**65**	< 5	< 5	< 5	< 5
Methylene chloride	NS	5	< 5	< 0.5	< 0.5	3.1	4.2	**5.9**	2.3	1.9	**5.2**	< 5
Chlorobenzene	NS	100	< 5	1.5	1.3	< 5	< 5	1.4	< 5	2.3	< 5	< 5

NOTES:
ICL = EPA ROD Interim Cleanup Levels
NHAGQS = New Hampshire Ambient Groundwater Quality Standard
NA = Not Analyzed
NS = No Standard
Exceeds Interim Cleanup Goal
Exceeds NH AGQS

Table 3
VOCs and 1,4-Dioxane Detections in Excess of ICL and/or AGQS: 2012 June and August Sampling Events
Ottati Goss/Kingston Steel Drum Superfund Site
Kingston, NH

			Area B						
Well ID	ICL	NHAGQS	ME-04a	ME-B02d	ME-B02s	MEOW-4	MEPM-B10d	MEPM-B10s	MEB-S04
Sample Date	ug/L	ug/L	06/21/12	08/23/12	08/23/12	06/21/12	08/23/12	08/23/12	08/22/12
Analyte with ICL where ICL was exceeded in one or more samples									
Tetrachloroethene	5	5	2.6	2	**12**	**7.1**	**6.3**	< 5	**7.4**
Trichloroethene	5	5	**7.8**	**11**	**56**	**18**	**5.2**	4.1	**170**
cis-1,2-Dichloroethene	70	70	3.9	14	5.3	12	13	3.5	64
Vinyl chloride	2	2	< 5	< 5	< 5	< 5	< 5	< 5	< 5
1,2-Dichloroethane	5	5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Benzene	5	5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
1,4-Dichlorobenzene	75	75	20	9	36	3.8	< 5	< 5	**120**
1,4-Dioxane	3	3	**10**	**8.4**	**10**	2	**5.3**	**4.1**	**18**
VOCs with no ICL, but NHAGQS was exceeded in one or more samples									
Chloromethane	NS	30	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Methylene chloride	NS	5	3.8	**5.3**	3	4.1	3.8	4.4	**8.6**
Chlorobenzene	NS	100	20	2.6	60	< 5	< 5	< 5	**170**

NOTES:
ICL = EPA ROD Interim Cleanup Levels
NHAGQS = New Hampshire Ambient Groundwater Quality Standard
NA = Not Analyzed
NS = No Standard
Exceeds Interim Cleanup Goal
Exceeds NH AGQS

Table 3
VOCs and 1,4-Dioxane Detections in Excess of ICL and/or AGQS: 2012 June and August Sampling Events
Ottati Goss/Kingston Steel Drum Superfund Site
Kingston, NH

			Area C							
Well ID	ICL	NHAGQS	B-4a	B-5a	GZ-09	ME-C04	ME-C05d	ME-C06	MEPM-C11	MEPM-C13d
Sample Date	ug/L	ug/L	06/20/12	06/20/12	06/20/12	06/20/12	08/21/12	06/20/12	08/21/12	08/21/12
Analyte with ICL where ICL was exceeded in one or more samples										
Tetrachloroethene	5	5	< 0.5	1	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.26
Trichloroethene	5	5	0.82	5.2	6.2	5.8	1.8	< .5	0.84	1.9
cis-1,2-Dichloroethene	70	70	0.82	8.4	2.9	3.1	1.4	0.45	0.52	1.5
Vinyl chloride	2	2	< 0.5	3	3.1	5.3	< 0.5	< 0.5	< 0.5	< 0.5
1,2-Dichloroethane	5	5	< 0.5	0.34	0.22	0.5	< 0.5	< 0.5	< 0.5	< 0.5
Benzene	5	5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,4-Dichlorobenzene	75	75	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
1,4-Dioxane	3	3	9.1	8.9	7.8	12	9	7.1	4.6	8.4
VOCs with no ICL, but NHAGQS was exceeded in one or more samples										
Chloromethane	NS	30	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Methylene chloride	NS	5	0.21	< 0.5	< 0.5	< 0.5	< 0.5	0.22	< 0.5	< 0.5
Chlorobenzene	NS	100	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5

NOTES:
ICL = EPA ROD Interim Cleanup Levels
NHAGQS = New Hampshire Ambient Groundwater Quality Standard
NA = Not Analyzed
NS = No Standard
Exceeds Interim Cleanup Goal
Exceeds NH AGQS

Table 3
VOCs and 1,4-Dioxane Detections in Excess of ICL and/or AGQS: 2012 June and August Sampling Events
Ottati Goss/Kingston Steel Drum Superfund Site
Kingston, NH

			East Route 125		
Well ID	ICL	NHAGQS	GZ-04a	GZ-04b	MEOW-1
Sample Date	ug/L	ug/L	06/19/12	06/19/12	06/19/12
Analyte with ICL where ICL was exceeded in one or more samples					
Tetrachloroethene	5	5	< 5	< 5	**11**
Trichloroethene	5	5	3.4	< 5	**22**
cis-1,2-Dichloroethene	70	70	4.3	2.6	68
Vinyl chloride	2	2	< 5	< 5	**6.4**
1,2-Dichloroethane	5	5	< 5	**5.1**	2.6
Benzene	5	5	< 5	**15**	< 5
1,4-Dichlorobenzene	75	75	< 5	< 5	5.1
1,4-Dioxane	3	3	**4.9**	**140**	**9.2**
VOCs with no ICL, but NHAGQS was exceeded in one or more samples					
Chloromethane	NS	30	< 0.5	< 5	< 5
Methylene chloride	NS	5	< 0.5	2.8	3.6
Chlorobenzene	NS	100	< 0.5	6.5	< 5

NOTES:
ICL = EPA ROD Interim Cleanup Levels
NHAGQS = New Hampshire Ambient Groundwater Quality Standard
NA = Not Analyzed
NS = No Standard
Exceeds Interim Cleanup Goal
Exceeds NH AGQS

An overall summary of ICL exceedances for samples collected in 2012 from all areas is presented in Table 4, inclusive of all analytes for which an ICL was established in the ROD amendment. The range of exceedances, and the locations of the minimum and maximum exceedances, are also presented. For several compounds for which ICLs were established, the ICL was not exceeded at any of the wells sampled in 2012 – this applies to ethylbenzene, MTBE, styrene, tetrahydrofuran, toluene, and total xylenes. Metals concentrations in 2012 are generally similar to those detected before the ISCO injections, since the aquifer has returned to the reducing conditions present before ISCO was performed.

6.3.3 Residential Well Data Review

Residential wells near the Site were most recently sampled by NHDES in late August – early September 2013, and the results were summarized in an October 15, 2013 memo. The VOC Methyl-tert-butyl ether (MTBE), which is not a site-related contaminant, was detected at one location at a very low level (2.7 ppb). No other VOCs were detected in the 2013 residential well water samples. These results are consistent with results from sampling efforts in 2008, 2009, 2010, and 2011, in which no VOCs other than MTBE were detected.

Samples were collected from residential wells for 1,4-dioxane in 2010, 2011, and 2013 and 1,4-dioxane was detected only once (in 2013) in one well at a concentration of 0.21 μg/L, compared to an Ambient Groundwater Quality Standard of 3 μg/L.

Samples were first collected for sulfate analysis in 2008 to establish a base-line level in order to monitor for possible, but highly unlikely, impacts associated with implementation of the full-scale ISCO technology (sulfate is a byproduct of the specific chemical oxidation process used for the OU3 remedial action). The 2008 sulfate concentrations ranged from 5.7 to 31 mg/L compared to an Ambient Groundwater Quality Standard of 500 mg/L. Results for sulfate in samples collected in 2013 were consistent with concentrations detected in 2008, 2009, 2010, and 2011, ranging from 4.6 to 27 mg/L. These results support the judgment that residual sulfate from the ISCO injections would not affect the water quality at residential wells near the Site. While residual sulfate from the ISCO treatments completed in 2010 remains at significant concentrations in groundwater in the injection areas, there has been no measurable effect on groundwater in the vicinity of the residential wells.

Table 4
Interim Cleanup Levels Range of Exceedances 2012 (1)
Ottati & Goss/Kingston Steel Drum Superfund Site
Kingston, New Hampshire

Site/Well ID Date Units	Interim Cleanup Level ug/L	Basis for Cleanup Level	ICL Exceedences June and August 2012				
			Range ug/L	Median ug/L	Sampling Location Lowest and Highest Concentration Low End	High End	# of Locations Exceeding ICL
Volatile Organics							
Benzene	5	MCL	15	-	GZ-04b		1
1,2-Dichloroethane	5		5.1	-	GZ-04b		1
cis-1,2-Dichloroethene	70	MCL	150 - 480	435	MEPM-A16	MEPM-A15d	4
1,4-Dichlorobenzene	75	MCL	120	-	MEB-S04		1
Ethylbenzene	700	MCL	No ICL Exceedence in 2012		-	-	-
Hexachlorobutadiene	0.5	AGQS	Not Sampled in 2012		-	-	-
Methyl-t-butyl ether	13	AGQS	No ICL Exceedence in 2012		-	-	-
Naphthalene	20	AGQS	Not Sampled in 2012		-	-	-
Styrene	100	MCL	No ICL Exceedence in 2012		-	-	-
Tetrachloroethene	5	MCL	5.8 - 300	7.4	MEB-S04	ME-A01d	11
Tetrahydrofuran	154	AGQS	No ICL Exceedence in 2012		-	-	-
Toluene	1000	MCL	No ICL Exceedence in 2012		-	-	-
Trichloroethene	5	MCL	5.2 - 170	11	B-5a	MEB-S04	17
Vinyl Chloride	2	MCL	2.7 - 38	5.9	ME-11d	MEPM-A15s	8
Total Xylenes	10,000	MCL	No ICL Exceedence in 2012		-	-	-
Metals							
Arsenic	10	MCL	10.6 - 284	45	B-5a	MEPM-A15d	32
Lead	15	AGQS	59.2	-	MEOW-3		1
Manganese	300	HA	304 - 18,600	1,640	MEPM-A16	GZ-04b	30
Nickel	100	AGQS	119 - 1040	175	MEOW-6	MEOW-1	4
1,4-Dioxane							
	3	AGQS	4.1 - 140	8.7	MEPM-B10s	GZ-04b	18
Total PCBs							
	0.5	MCL	Not Sampled in 2012		-	-	-

Notes:

(1) Ranges determined from Site Wide (June 2012) and Performance (August 2012) Monitoring Rounds. If only one value is shown under "Range" column, the analyte was detected in only one well.

MCL = Federal Maximum Contaminant Level
AGQS = New Hampshire Ambient Groundwater Quality Standard
HA = EPA Health Advisory
- Does Not Apply

6.3.4 September and October 2009 Fish Collection from Country Pond

To support the re-evaluation of the Human Health and Ecological Risk Assessments, as recommended in the 2009 Five-Year review, EPA collected samples of largemouth bass and yellow perch from Country Pond and Great Pond (as reference water body, since this pond is located upgradient of the Site and is therefore not in the path of contaminant migration from the Site). The sampling procedures, results, and screening-level ecological risk assessment that was performed using the results are summarized in a report prepared by TechLaw for EPA (TechLaw, 2012). An evaluation of the human health risks from consuming the fish was prepared by NHDES (August 2012). Eleven samples of each species (each comprised of multiple individual fish) were collected from Country Pond; two samples of each species were collected from Great Pond. Whole body and fillet samples were analyzed for metals, mercury, PCBs as Aroclors, and PCB Congeners.

Largemouth bass were used to quantify human exposure to Site contaminants (assessing health risks from eating largemouth bass from Country Pond). Yellow perch were used to quantify both human exposures (assessing health risks from eating yellow perch from Country Pond) and environmental exposures (assessing risks to both the yellow perch in Country Pond and to birds and mammals that eat the fish). Whole body samples (yellow perch only) were used to evaluate ecological risk, and fillet samples (both species) were used to evaluate human health risk.

Largemouth Bass Preparation and Analysis: Each sample was a composite of three left fillets from fish of different lengths within the target range of 25-38 cm. This reduced the potential for bias due to fish size. The composites were blended and the resulting paste submitted for analysis for metals, mercury, PCBs as Aroclors, and PCB Congeners. The aliquots for metals and PCB Aroclor analyses were freeze-dried prior to preparation and analysis. The aliquots for mercury and PCB congeners were frozen and analyzed “wet.”

Yellow Perch Preparation and Analysis: Each sample was a composite of six left and right fillets from fish of different lengths. This reduced the potential for bias due to fish size. The composites were blended and the resulting paste submitted for analysis for metals, mercury, PCBs as Aroclors, and PCB Congeners. The aliquots for metals and PCB Aroclor analyses were freeze-dried prior to preparation and analysis. The aliquots for mercury and PCB congeners were frozen and analyzed “wet.”

Whole-body fish were used for the ecological risk assessment. Each sample was a composite of two similarly-sized fish. The composites were homogenized in a food processor. The resulting paste was submitted for analysis for metals, mercury, and PCB Congeners. The aliquots for metals were freeze-dried prior to preparation and analysis. The aliquots for mercury and PCB congeners were frozen and analyzed “wet.”

Largemouth Bass Results: The metals results for the Country Pond largemouth bass fillets showed levels of zinc approximately five times the laboratory’s reporting limit. Several samples also showed low concentrations of iron. The zinc concentrations were comparable to those detected in the reference (Great Pond) samples.

Mercury was detected in all fillet samples from both Country Pond and Great Pond, at similar concentrations.

PCBs, identified as Aroclor 1260, were detected in all fillet samples from both Country Pond and Great Pond, at similar concentrations, from below the reporting limit to approximately two times the reporting limit.

PCB Congeners were also detected in all fillet samples from both Country Pond and Great Pond, at similar concentrations.

Yellow Perch Results: The metals results for the Country Pond yellow perch fillets showed levels of zinc approximately five times the laboratory’s reporting limit. Several samples also showed low concentrations

of iron and manganese. The metals concentrations were comparable to those detected in the reference (Great Pond) samples.

Metals detected in the Country Pond yellow perch whole bodies include barium, copper, iron, manganese and zinc at greater concentrations than seen in the fillets. Several samples also showed low concentrations of aluminum and cobalt. The metals concentrations were similar to those detected in the reference (Great Pond) samples.

Mercury was detected in all fillet and whole body samples from both Country Pond and Great Pond, at similar concentrations. The concentrations were generally less than those seen in the largemouth bass fillets.

PCBs, identified as Aroclor 1260 were detected in all fillet samples from both Country Pond and Great Pond from below the reporting limit to approximately two times the reporting limit. Although the concentrations for the largemouth bass were similar, the PCB concentration in the yellow perch fillets were an order of magnitude higher in the samples collected from Country Pond. However, because there were no more than two samples in Great Pond for any tissue type, EPA determined that the data set was insufficient to make definitive comparisons against Country Pond.

As for the largemouth bass, PCB Congeners were detected in all fillet samples from both Country Pond and Great Pond, at similar concentrations.

Conclusions: Concentrations of metals in the fish tissue samples from the two ponds were similar, indicating that the presence of metals in the fish is not Site-related, given that Great Pond is not in the pathway of migration of contaminants from the Site. However, given the limited data set from Great Pond and the greater PCB concentration in the yellow perch samples collected from Country Pond, EPA performed a risk evaluation of the Country Pond fish data and concluded that the cancer and non-cancer risk were within EPA's acceptable cancer risk range of 1E-04 to 1E-06 and HQ <1. Based on this evaluation, EPA concludes that no further CERCLA action is warranted.

The screening-level ecological risk assessment (SLERA) concluded that ecological risk from metals, total PCBs, and dioxin-like PCBs was negligible for fish and non-existent for fish-eating birds and mammals at Country Pond (TechLaw, 2012).

6.3.5 Future Groundwater Monitoring

The last round of sampling of ISCO performance monitoring wells and site-wide wells was completed in August 2012. The last of the three planned Groundwater Management Zone well monitoring events was completed in June 2013. No groundwater monitoring is planned for 2014. Monitoring will most likely next be performed in the summer of 2015 to evaluate the progress of plume attenuation over the three-year period of 2012 to 2015. The program would use a well network and analyte list similar to that performed in August 2012 to allow for continued evaluation of trends in concentrations of VOCs, 1,4-dioxane, metals, and field parameters indicative of return to pre-ISCO baseline conditions.

6.4 SITE INSPECTIONS

A Site inspection of the upland portion of the Site west of Route 125 was performed by the EPA Project Manager, the NHDES Project Manager, and AECOM on August 28, 2013. The inspection included a cursory examination of the security of the Site fence and field trailer and monitoring wells within visual range of the trailer. A detailed inspection of every well was not performed. The Site was observed to be secure and no evidence of trespassing or vandalism was noted.

The Site inspection checklist is included as Attachment 3. Photos of the Site from August and December 2013, and selected photos from when the Site was undergoing the ISCO remedial action (2008-2010), are included in Attachment 4.

The restoration of the Country Pond Marsh wetland area is judged to have been successful. EPA performed the restoration and monitored and maintained the restored area from 2002 through 2012. Inspections of the restored area performed by the Army Corps of Engineers for EPA over the years have identified several concerns that could affect the long term outcome of the restoration effort: subsidence of hummocks, poor survival of planted trees and shrubs, and colonization of the wetland by *Phragmites* and other invasive species. In the spring of 2013, EPA transferred responsibility for ongoing maintenance of the wetland to NHDES. The April 2013 letter that transferred O&M responsibility to the State included recommendations for ongoing maintenance to address these concerns.

6.5 INTERVIEWS

Town officials were interviewed on December 12, 2013 by the EPA Project Manager, NHDES Project Manager, and AECOM following their weekly department heads meeting. The meeting was held at the Kingston Town Hall and consisted of an update by EPA/NHDES on the progress of the ISCO remedy, a discussion of the Country Pond fish advisory, obtaining feedback from officials regarding community concerns, and responding to questions from officials. Attachment 5 includes a detailed summary of the discussion and a list of attendees and their affiliations.

In general, officials were pleased with the progress being made at the Site. Of most interest was the potential for future use of the Site. The primary concern expressed to officials about the Site related to a fish kill in Country Pond that took place in the spring of 2008, and whether it could have been related to the ISCO pilot testing work that had been performed several months before (winter 2007-2008). There was also general interest in the NHDES revised fish consumption advisory for Country Pond. While not discussed in detail during the interview, it is worth noting that the NHDES evaluation (August 2012) of potential human health risks from fish consumption concluded that eating largemouth bass or yellow perch from Country Pond above certain amounts over many years could be harmful to human health due to PCBs, and therefore, the agency recommended that the State issue a fish advisory. A fish advisory specific to Country Pond was issued that presents guidelines for how frequently bass and other fish species from the Pond can be consumed, with one set of guidelines for young children and women of childbearing age, and a less stringent set for older children and other adults. No fish advisory was issued for Great Pond because only two samples were collected from that pond, which is too small a number from which to draw a conclusion regarding the need for an advisory. Because the PCB contamination found in fish from Country Pond did not exceed EPA's acceptable risk range, the fish advisory is not a reflection on the effectiveness of the remedy, but rather it helps to better inform the public about the ubiquitous presence of PCBs in the environment and how this impacts their fish consumption choices.

The owner of Country Shores Campground (property that borders the Site) was interviewed by telephone by AECOM on December 12, 2013. He had no concerns to report either from himself or his campers, and felt he knew whom to contact if he had any questions. That interview is also summarized in Attachment 5.

SECTION 7.0
TECHNICAL ASSESSMENT

This section discusses the technical assessment of the remedy for the Site and provides answers to the three questions posed in the EPA guidance for five-year reviews (USEPA, 2001).

7.1 Question A: Is the remedy functioning as intended by the decision documents?

Yes. The OU1 source control remedy (O&G soil cleanup) resulted in the removal and treatment of soil to the ROD cleanup level of 1 mg/kg total VOCs that was established to protect groundwater. Groundwater contaminant concentrations in the O&G portion of the Site are steadily declining, indicating that the OU1 remedy is functioning as intended. Cleanup levels for contaminants other than VOCs were not established for OU1, with the underlying assumption that treatment to the target level for total VOCs would also result in non-hazardous levels of other contaminants.

OU2 (PRP lead groundwater remediation) was terminated and replaced by OU3 (Superfund lead groundwater remediation). The components of the OU3 groundwater remediation include: *in-situ* chemical oxidation (ISCO); environmental monitoring (including a residential groundwater monitoring program) and institutional controls.

The OU3 remediation is being implemented in accordance with the September 2007 amended ROD and is functioning as intended. The first round of oxidant injection was performed in the summer of 2008. Subsequent rounds were completed in the fall of 2009 and the fall of 2010. Environmental monitoring (groundwater and surface water) was performed to evaluate the performance of the groundwater remediation and to verify that the injections caused no adverse impacts to nearby surface waters including Country Pond. The results presented in Section 6 show that total VOC concentrations in groundwater have been substantially reduced by the ISCO injections. Monitoring of groundwater is expected to demonstrate that concentrations of VOCs continue to decline through natural attenuation, following the more dramatic declines evidenced after the ISCO injections were completed. Monitoring of select residential groundwater wells has been performed by the NHDES since 1992 and continues on an annual basis. Monitoring will continue until groundwater cleanup goals have been achieved throughout the Site.

The OU4 source control remedy removed most of the soil and sediments that exceeded applicable cleanup levels in the GLCC/KSD portion of the Site, the South Brook area, a small portion of the BBS Realty portion of the Site, and the Country Pond Marsh portion of the Site. Soil cleanup levels were not established in the ROD for contaminants other than PCBs and total VOCs, with the underlying assumption that treatment to the target level for total VOCs would also result in nonhazardous levels of other contaminants. During remediation of the OU4 portion of the Site, some soil exceeding PCB and/or VOC cleanup levels on the GLCC/KSD portion of the Site could not be excavated due to the proximity of the Route 125 embankment.

Institutional Controls, All Operable Units

The institutional controls required by the amended OU3 ROD and the OU4 ROD are partially implemented but some additional restrictions to prevent vapor intrusion into future buildings need to be added for OU3, and potentially OU4. The institutional controls in place include an Activity and Use Restriction (AUR) for the State-owned portion of the Site (July 2007), and a Town ordinance (March 2012) that restricts groundwater use on all properties affected by the plume.

State-Owned Property Institutional Controls. In July 2007 the State of New Hampshire recorded a notice to the chain of title for the GLCC/KSD property to document the AURs required to maintain the protectiveness of the soil remedy and to establish institutional controls over the 5.89 acres of the property. The AURs allow for commercial or industrial uses provided soils are not disturbed at a depth greater than six feet. Use of the property as a residence, school, nursery, recreational area or any other use at which a child's presence is likely or intended is not permitted. Installation of groundwater wells or

any removal or exposure to groundwater (except for remediation purposes) is not permitted unless such activity is first evaluated and approved by the EPA and NHDES. Fencing has been installed and currently the property is unused.

Town Ordinance. On March 13, 2012, the Town of Kingston adopted an ordinance that established a groundwater management zone consisting of three properties that define the Site: Tax Map R10, Lot 1; Tax Map R13, Lot 14; and that portion of Tax Map R13, Lot 16 that is located south of North Brook. The ordinance prohibits all use of groundwater within the GMZ for any purpose without prior approval from the Town, EPA, and NHDES. It also prohibits any disturbance of wetlands within the GMZ without prior approval from the Town, EPA, and NHDES. The Ordinance is still in effect and no one has applied for a variance to be able to use the groundwater within the groundwater management zone.

Items not covered by these current institutional controls are as follows:

- **OU3 - Disturbance of remedial components (monitoring and injection wells):** The AUR does not explicitly address the need to protect these components, but since the State controls this portion of the Site, disturbance of remedial components is not a concern. However, for other properties where monitoring wells exist that need to remain in place, some form of access agreement to ensure their continued accessibility for monitoring, is recommended. Injection wells located on properties other than the State-owned property were decommissioned by EPA in 2013 since they were determined to no longer be needed.

OU3 - Potential for vapor intrusion: There is currently no requirement to evaluate the potential risks via the vapor intrusion pathway prior to construction of any structures being contemplated within the groundwater restriction area established by the Town ordinance, or on the State-owned property. Residual VOC concentrations in groundwater are low throughout most of the plume, with the highest concentrations being on the State-owned property. However, groundwater VOC concentrations currently exceed EPA's vapor intrusion screening values and therefore future construction of any structures within the groundwater restriction area should not be allowed until an evaluation of the vapor intrusion exposure pathway is performed.

7.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of remedy selection still valid?

No. Changes have occurred since the OU1 and OU4 remedies were selected, but the changes do not affect the protectiveness of the remedies

The fish ingestion risk of PCBs in Country Pond calculated in the 1994 human health risk assessment for fish ingestion (ADL, 1994) was recalculated for the 2009 five year review using the most recent recommended ingestion rates from the "Child-Specific Exposure Factors Handbook" (EPA, 2008b), and the most recent cancer oral slope factor and reference dose for PCBs from EPA's Integrated Risk Information System (IRIS). The re-calculation indicated that the non-cancer risk of PCBs due to recreational fish ingestion (from Country Pond) has a hazard quotient (HQ) of approximately 3. However, it should be noted that the fish tissue data used in the re-calculation was collected prior to the OU4 soil and sediment remediation and was therefore outdated information. For this reason, additional fish tissue data was collected by EPA in September and October 2009 (see Section 6.3.5) to support the re-evaluation of the Human Health and Ecological Risk Assessments. EPA collected samples of largemouth bass and yellow perch from Country Pond and Great Pond (as reference water body, since this pond is located upgradient of the Site and is therefore not in the path of contaminant migration from the Site). Concentrations of metals in the fish tissue samples from the two ponds were similar, indicating that the presence of metals in the fish is not Site-related. However, given the limited data set from Great Pond and the greater PCB concentration in the yellow perch samples collected from Country Pond, EPA performed a risk evaluation of the Country Pond fish data.

Largemouth bass were used to quantify human exposure to Site contaminants (assessing health risks from eating largemouth bass from Country Pond). Yellow perch were used to quantify both human

exposures (assessing health risks from eating yellow perch from Country Pond) and environmental exposures (assessing risks to both the yellow perch in Country Pond and to birds and mammals that eat the fish). Whole body samples (yellow perch only) were used to evaluate ecological risk, and fillet samples (both species) were used to evaluate human health risk. Based on this evaluation, EPA concluded that the cancer and non-cancer risk were within EPA's acceptable cancer risk range of 1E-04 to 1E-06 and HQ <1.

The screening-level ecological risk assessment concluded that ecological risk from metals, total PCBs, and dioxin-like PCBs was negligible for fish and non-existent for fish-eating birds and mammals at Country Pond (TechLaw, 2012).

Other Potential Exposure Pathways: The five-year review conducted for the Site in 2003 provided a thorough re-evaluation of the other exposure assumptions, toxicity data, and cleanup levels using EPA risk assessment guidance current at that time. The 2003 five-year review updated the human health exposure assumptions to the sediment in Country Pond Marsh to include recreational exposure. Previous risk assessments evaluated only the ecological risks posed by these sediments. The 2003 five-year review found that the ecologically derived PCB cleanup goal of 10 ppm was also protective of recreational human exposures. The exposure parameters used in 2003 for the recreational user are still valid, and for the cleanup level of 10 ppm, result in a carcinogenic risk of 6.6×10^{-6} and a noncarcinogenic hazard quotient of 1.3. The estimated risks do not exceed risk management criteria set forth in EPA policy. Therefore, the sediment PCB cleanup level is protective of recreational human exposures. It should be noted that professional judgment was used at the time to apply site-specific parameters of 78 days per year and a fraction ingested factor of 0.5. If the fraction ingested factor were changed to the default assumption of 1, the resulting carcinogenic risk would be 1.0×10^{-5} and the noncarcinogenic hazard quotient would be 2.0. Use of the 0.5 factor at the Site is still appropriate based on Site use considerations.

The cleanup level of 20 ppm for PCBs in soil on the former GLCC/KSD property (now owned by the State) which is based on future commercial use without day care, has been reviewed further, using current EPA default exposure parameters for a "composite worker" (spends time both indoors and outdoors). Compared to the evaluation performed when originally establishing the cleanup level, slight changes in the exposure assumptions for the commercial worker have occurred which include a decrease in the soil ingestion rate (from 160 mg/day to 100 mg/day) and surface area exposed term (from 5,700 cm^2 to 3,300 cm^2), and an increase in the soil adherence factor (from 0.03 mg/cm^2 to 0.2 mg/cm^2). Note that, based on accessibility to the soils at the Site, professional judgment has historically been used to apply a fraction ingested value of 0.5. Using the most current exposure parameters, the carcinogenic risk associated with the 20 ppm PCB cleanup level is 2.0×10^{-5} and the noncarcinogenic hazard quotient is 1.4. Therefore, the PCB cleanup level for on the former GLCC/KSD property soil remains protective of human health, as long as deed restrictions preventing residential Site use remain in place. With respect to the BBS Realty Trust portion of the Site, a further evaluation of the data collected as part of the 2002 soil cleanup showed that the low-level PCBs that were detected in a limited number of samples collected from depths greater than 8 feet below the land surface do not pose an unacceptable CERCLA risk. As discussed above the cleanup level of 10 ppm for PCBs in Country Pond Marsh sediment is protective of recreational human exposure and the last review concluded that the 10 ppm level is still protective of ecological receptors.

The soil cleanup level for total VOCs (1 ppm) was not based on direct contact human exposures, but was set at a level designed to be protective of groundwater. The specific limits for individual VOCs in soil (TCE 0.384 ppm; PCE 0.12 ppm; and benzene 0.11 ppm) are below current risk-based levels for both commercial and residential scenarios, based on a 1×10^{-6} carcinogenic risk and noncarcinogenic hazard quotient of 1. Therefore, the total VOC cleanup level for soils and sediments is still considered to be valid.

As discussed in this five-year review, the 1987 ROD was amended in September 2007 to change the OU3 groundwater cleanup approach from traditional pump and treat technology to *in-situ* chemical oxidation. The 2007 ROD amendment updated the remedial action objectives and groundwater cleanup

goals for the Site (including the addition of 1,4 dioxane as a contaminant of concern). There have been no changes to the remedial action and groundwater cleanup goals since issuing the 2007 ROD amendment. The interim cleanup levels for groundwater are based on drinking water standards (Federal MCLs) or New Hampshire Ambient Groundwater Quality Standards, which have not changed since the last five year review.

7.3 Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No. There is no other information that calls into question the protectiveness of the remedy. It should be noted however, that the State of New Hampshire has revised and renumbered its environmental regulations, including many of the State ARARs identified for the remedy. In addition, several federal ARARs have changed (including the Toxic Substance Control Act (TSCA) regulations (40 C.F.R. § 761). Should EPA determine that that the current remedy needs to be modified through a future CERCLA decision document, the current ARARs will need to be reviewed, modified, and updated, as necessary.

SECTION 8.0
ISSUES

Based on the activities conducted during this five-year review, the issues identified in Table 5 have been noted.

Table 5: Issues

	Affects Protectiveness (Y/N)	
Issues	**Current**	**Future**
There is currently no requirement to evaluate potential risks via the vapor intrusion pathway prior to construction of buildings within the groundwater restriction area established by the Town ordinance, or on the State-owned property. There are currently no buildings over the plume and therefore there is no current vapor intrusion exposure pathway present. ICs may be amended to address potential future vapor risk.	No	Yes

SECTION 9.0
RECOMMENDATIONS AND FOLLOW-UP ACTIONS

In response to the issues noted in Section 8.0 it is recommended that the actions listed in Table 6 be taken:

Table 6: Recommendations and Follow-up Actions

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness	
					Current	Future
There is currently no requirement to evaluate potential risks via the vapor intrusion pathway prior to construction of buildings within the groundwater restriction area established by the Town ordinance, or on the State-owned property. There are currently no buildings over the plume and therefore there is no current vapor intrusion exposure pathway present.	Modify existing institutional controls to include a requirement to evaluate the potential for vapor intrusion risks if new construction in the area of the residual VOC plume is proposed.	EPA, NHDES	EPA	February 2019	N	Y

SECTION 10.0
PROTECTIVENESS STATEMENTS

OU1

The remedial action taken at OU1 (O&G soil) protects human health and the environment because the remediation of soil has been completed to cleanup levels that are protective of human health and the environment.

OU2

There is no need for a protectiveness statement for OU2 because OU2 (PRP-lead groundwater remediation) was terminated and replaced by OU3 (Superfund-lead groundwater remediation).

OU3

The remedy at OU3 (*in-situ* chemical oxidation in Areas A, B and C) currently protects human health and the environment because exposure pathways that could result in unacceptable risks are being controlled. The remedy has been implemented, VOC concentrations in groundwater have been substantially reduced by the ISCO treatments, and VOC concentrations are expected to decline further via natural attenuation. Groundwater monitoring will continue and institutional controls will remain in place until cleanup goals are achieved. There are currently no buildings over the plume and therefore there is no vapor intrusion exposure pathway present.

In order for the remedy to be protective in the long-term, existing institutional controls should be modified to include a requirement to evaluate potential risks via the vapor intrusion pathway prior to construction of buildings within the groundwater restriction area established by the Town ordinance, or on the State-owned property.

OU4

The remedy at OU4 (soil and sediment excavation) currently protects human health and the environment because: soil and sediments have been excavated and disposed off-site or treated to cleanup levels that are considered protective for the anticipated future use of the property; the GLCC/KSD portion of the Site is currently unused and the property is surrounded by a fence; institutional controls are in place to limit the uses and exposures to residual soil contamination on the GLCC/KSD portion of the Site; and the wetlands (Country Pond Marsh portion of the Site) is also surrounded on three sides with a fence.

Site-Wide Protectiveness Statement

The remedial actions taken are currently protective of human health and the environment in the short term because: soil and sediment removal has been completed (OU1 and OU4) and exposure to contaminated groundwater is being controlled (OU3). However, to be protective in the long-term, the follow-up actions listed for OU3 need to be taken and groundwater cleanup goals must be attained.

SECTION 11.0
NEXT FIVE-YEAR REVIEW

The next Five-Year Review for the Ottati & Goss/Kingston Steel Drum Superfund Site is due five years from the signature date of this review.

ATTACHMENT 1

LIST OF DOCUMENTS REVIEWED AND REFERENCES

AECOM, 2012. *In-Situ Chemical Oxidation Remedial Action Summary Report*, Ottati & Goss/Kingston Steel Drum Superfund Site, Operable Unit 3, Kingston, New Hampshire. February 2012.

Arthur D. Little (ADL). 1994. *Ecological Risk Assessment at the Ottati & Goss Site, Kingston, NH.* May, 1994

Arthur D. Little (ADL). 1994. *GLCC Building Demolition Remedial Action, Ottati & Goss Site, Kingston, NH.* March 18, 1994

Canonie Environmental Services Corporation (Canonie). 1989. *Report: Soil Remediation and Site Closure - Ottati & Goss Site, Kingston, New Hampshire.* Prepared for Settling Parties, Ottati & Goss Superfund Site, Kingston, New Hampshire. September 21, 1989.

Environmental Chemical Corporation (ECC). 2003. *Final Remediation Action Report, Ottati & Goss/Kingston Steel Drum Superfund Site, Soil and Sediment Remediation, Operable Unit No. 4.* Prepared for U.S. Environmental Protection Agency, U.S. Army Corps of Engineers, and New Hampshire Department of Environmental Services. March 2003.

GeoTrans Inc. 1986. *Analysis of Groundwater Flow and Chemical Transport from the Ottati and Goss/Great Lakes Container Corporation Sites, vol. 1,* for the U.S. EPA.

Goldberg-Zoino Associates (GZA). 1986. *Remedial Investigation - O&G/GLCC Site, Kingston, NH.* Prepared for the New Hampshire Water Supply and Pollution Control Commission, Concord, NH.

Metcalf & Eddy, Inc. (M&E). 2005a. *Groundwater Monitoring Report for the March 2004 and June 2004 Events.* Ottati & Goss/Kingston Steel Drum Superfund Site, Kingston, New Hampshire. EPA Contract No. 68-W6-0042, Work Assignment No. 152-RDRD-0105. March 2005.

Metcalf & Eddy, Inc. (M&E). 2005b. *Draft Treatability Report.* Ottati & Goss/Kingston Steel Drum Superfund Site, Kingston, New Hampshire. EPA Contract No. 68-W6-0042, Work Assignment No. 152-RDRD-0105. February 2005..

Metcalf & Eddy, Inc. (M&E). 2006a. *Technical Memorandum for December 2005 Groundwater Monitoring Event.* Ottati & Goss/Kingston Steel Drum Superfund Site, Kingston, New Hampshire. EPA Contract No. 68-W6-0042, Work Assignment No. 152-RDRD-0105. May 2006.

Metcalf & Eddy, Inc. (M&E). 2007. *Feasibility Study Addendum Report, Ottati and Goss/Kingston Steel Drum Superfund Site, Kingston, NH.* July 2007.

Metcalf & Eddy, Inc. (M&E). 2008. *Basis of Design Report for In-Situ Chemical Oxidation, Ottati and Goss/Kingston Steel Drum Superfund Site, Kingston, NH*. March 2008.

NHDES, 2012. *Letter Health Consultation: Evaluation of PCB Contamination in Fish Sampled from Country Pond.* Ottati & Goss and Great Lakes Container Corporation Site, Kingston, New Hampshire. August 21, 2012.

Riordan, P. J., 1984. *Groundwater Study - Kingston Steel Drum Site, Kingston, NH.*

TechLaw, 2012. *Summary of fish collection, tissue residue analyses, and ecological risk evaluation at the Ottati & Goss Superfund Site, Kingston, NH*. TDF No. 2497A, Task Order No. 86, Task No. 01. March 2, 2012.

U.S. Environmental Protection Agency (USEPA). 1987. *Record of Decision*. Ottati & Goss/Great Lakes Container Corporation, Kingston, New Hampshire. January 1987.

U.S. Environmental Protection Agency (USEPA). 1993. *Five Year Review, Ottati and Goss/Kingston Steel Drum Superfund Site, Kingston, New Hampshire.* December 15, 1993.

U.S. Environmental Protection Agency (USEPA). 1997. Letter regarding Recalculation of Risks associated with Soil Cleanup Levels for the Ottati and Goss Superfund Site. July 28, 1997.

U.S. Environmental Protection Agency , 1997. *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments.* June 1997. Document No. EPA-540-R-97-006.

U.S. Environmental Protection Agency (USEPA). 1998. *Five Year Review, Ottati and Goss/Great Lakes Container Corporation Superfund Site, Kingston, New Hampshire*. December 1998.

U.S. Environmental Protection Agency (USEPA). 1999. *EPA Superfund Explanation of Significant Differences, Ottati and Goss/Kingston Steel Drum Superfund Site*. September 28, 1999.

U.S. Environmental Protection Agency (USEPA). 2001. *Comprehensive Five-Year Review Guidance.* June 2001.

U.S. Environmental Protection Agency (USEPA). 2002. *EPA Superfund Explanation of Significant Differences, Ottati and Goss/Kingston Steel Drum Superfund Site.* February 7, 2002.

U.S. Environmental Protection Agency (USEPA). 2003. *Five Year Review, Ottati and Goss/Great Lakes Container Corporation Superfund Site, Kingston, New Hampshire.* December 2003.

U.S. Environmental Protection Agency (USEPA). 2007. *Amended Record of Decision, Ottati and Goss/Great Lakes Container Corporation Superfund Site, Kingston, New Hampshire*. September 2007.

U.S. Environmental Protection Agency (USEPA). 2008a. *Preliminary Closeout Report for the Ottati & Goss/Kingston Steel Drum Superfund Site, Kingston, New Hampshire*. September 2008.

U.S. Environmental Protection Agency (USEPA). 2008b. *Child-Specific Exposure Factors Handbook.* EPA/600/R-06/096F. September 2008.

U.S. Environmental Protection Agency (USEPA). 2009. *Five Year Review, Ottati and Goss/Great Lakes Container Corporation Superfund Site, Kingston, New Hampshire*. February 2009.

U.S. Environmental Protection Agency (USEPA). 2012. *Remedial Action Report. Ottati and Goss/Great Lakes Container Corporation Superfund Site, Operable Unit 3.* October 2012.

ATTACHMENT 2

INSTITUTIONAL CONTROLS

Notice of Activity and Use Restrictions, GLCC/KSD Portion of the Site
Town Ordinance Restricting Groundwater Use

Superfund Records Center
SITE: Ottati & Goss
BREAK: 8.7
OTHER: 269685

NH DEPT OF
ENVIRONMENTAL SERVICES
OCT 10 2006
RECEIVED

SDMS DocID 269685

plan # D 34820

NOTICE OF ACTIVITY AND USE RESTRICTION

Site: Ottati & Goss/Great Lakes Container Corp. (a/k/a Kingston Steel Drum) Superfund Site
120 Route 125
Kingston, New Hampshire
Rockingham County Tax Map R13, Lot 14

NHDES Site No.: 199004006

037854

This Notice of Activity and Use Restriction ("Notice") is made on this sixth day of October, 2006 by the State of New Hampshire, together with its successors and assigns (collectively "Owner").

2007 JUN 29 AM 11:21

WITNESSETH

WHEREAS, in May 1980, the United States on behalf of the U.S. Environmental Protection Agency ("EPA") brought a lawsuit in the United States District Court for the District of New Hampshire under the Resource Conservation and Recovery Act ("RCRA"), 42 U.S.C. § 6973, and the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"), 42 U.S.C. §§ 9601-9675, and thereby sought the cleanup of the Ottati & Goss/Great Lakes Container Corp. (a/k/a Kingston Steel Drum) site in Kingston, New Hampshire;

WHEREAS, the State of New Hampshire (the "State") intervened in the EPA's lawsuit, raising claims under RCRA, CERCLA, and the State of New Hampshire Hazardous Waste Management Act, NH RSA chapter 147-A;

WHEREAS, a Consent Decree settling the EPA's lawsuit (Civil No. 80-225-L) and a consolidated matter (Civil No. 89-400-D) was approved and entered by the United States District Court for the District of New Hampshire on December 22, 1993 (as modified July 19, 1994);

ROCKINGHAM COUNTY
REGISTRY OF DEEDS

WHEREAS, the original remedy for the Kingston site, set forth in the January 16, 1987 Record of Decision ("ROD"), required a soil cleanup level within EPA's acceptable risk range for residential uses and therefore did not call for institutional controls;

WHEREAS, a modified remedy, set forth in a September 28, 1999 Explanation of Significant Differences ("ESD"), was based on a change in future land use from residential to commercial, and requires the implementation of institutional controls to restrict the Property, identified on Tax Map R13 as Lot 14, to commercial use;

WHEREAS, by eminent domain proceedings the State ("Property Owner") is the owner in fee simple of part of the Kingston site, a certain parcel of land located at 120 Route 125 in Kingston, New Hampshire with the buildings and improvements thereon, identified on Tax Map R13 as Lot 14, recorded at the Rockingham County, New Hampshire Registry of Deeds at Book

3521, Page 1105, which is more particularly bounded and described in Exhibit A, attached hereto and made a part hereof, and which is depicted in plan B, attached hereto and made a part hereof, (the "Property").

WHERAS, if the State transfers ownership of the Property the State will retain a grant of activity and use restrictions that will run with the land, which will include the activity and use restrictions included in this Notice. The grant will provide the State and EPA access to the Property to implement the CERCLA remedy and will permit the State and EPA, as a third-party beneficiary, the right to enforce the terms of the grant in order to protect any components of the CERCLA remedy on the Property and to protect human health and the environment by reducing the risk of exposure to contaminants.

WHEREAS, the State, acting by and through the Department of Environmental Services ("NHDES"), and the EPA have reviewed and approved this Notice of Activity and Use Restrictions for the Property,

NOW, THEREFORE, notice is hereby given that the Activity and Use Restrictions ("AUR") set forth below apply to the Property:

1. **Permitted Activities and Uses Set Forth in the AUR.** No significant risk from soil exists to human health, safety, or welfare or to the environment, under current conditions and for any foreseeable period of time, so long as the following activities and uses occur on the Property:

   (a) Commercial or industrial uses as permitted by the Town of Kingston Zoning Ordinances or otherwise by the Town of Kingston to include walkways and parking;

   (b) Activities conducted within the Property that do not excavate or disturb subsurface soil below six (6) feet, as long as the final restored grade retains two (2) feet of clean soil over the contaminated soil. Final as built plans showing all modifications to the property's grading will be submitted to NHDES and EPA and a copy recorded in the Rockingham County, New Hampshire Registry of Deeds as an amendment to this Notice of Activity and Use Restriction;

   (c) Groundwater remediation activities, including but not limited to on-site pumping and treating of groundwater, undertaken as a means to comply with the groundwater remediation requirements of the CERCLA remedy; and

   (d) Such other activities and uses, which, in the opinion and concurrence by EPA and NHDES, shall present no greater risk or harm to human health, safety, or welfare or to the environment than the permitted activities and uses set forth herein.

2. **Restricted Activities and Uses Set Forth in the AUR.** Activities and uses that, if implemented at the Property, may result in a significant risk of harm to human health, safety, or welfare or to the environment or present a substantial hazard, are prohibited as follows:

   (a) Any activity, including, but not limited to, excavation associated with underground utility or construction work which is likely to disturb PCB (polychlorinated biphenyls) and/or VOC (volatile organic compounds) contaminated soil;

   (b) Use of the Property as a residence, school, nursery, recreational areas (such as parks or athletic fields) or any other use at which a child's presence is likely or intended;

   (c) Any activity including, but not limited to, relocation of PCB and/or VOC contaminated soil unless such activity is first evaluated and approved by EPA and NHDES; and

   (d) Installation of groundwater wells or any removal or exposure to groundwater (except for remediation purposes) unless such activity is first evaluated and approved by EPA and NHDES.

3. **Obligations and Conditions.** Obligations and Conditions to be undertaken and maintained at the Property by the State authority which is managing the Property to maintain a condition of no significant risk as set forth in this Declaration shall include the following:

   (a) A Soil Management Plan prepared by a qualified Environmental Consulting Firm and approved by the NHDES and the EPA prior to commencement of any subsurface activity that may involve impact to PCB and/or VOC contaminated soil that would result in direct contact to humans or present a greater risk to the environment.

   (b) A site specific Health and Safety Plan prepared by a Certified Hygienist or other qualified health and safety professional, in accordance with 29 CFR 1910.120, prior to commencement of any subsurface activity that may involve impact to PCB and/or VOC contaminated soil. The plan must clearly identify the location of the PCB and/or VOC contaminated soils and specifically identify the types of personal protective equipment, monitoring devices, and engineering controls necessary to ensure that workers and others at the Property are not exposed to PCBs and/or VOCs through dermal contact, ingestion, and/or inhalation of particulate dusts.

(c) The seeded top-soil barrier must be maintained to ensure that PCB and/or VOC contaminated soils beneath the barrier remain inaccessible.

(d) PCB and/or VOC contaminated soil may not be relocated or moved unless first evaluated by an Environmental Consulting Firm, which shall render an opinion that such relocation or movement of the soil is in accordance with the Soil Management Plan (if applicable) and is not inconsistent with maintaining a condition that is protective of human health and the environment, and approved by the NHDES and the EPA.

(e) Prior to commencement of any subsurface activity that may involve extraction or release of contaminated groundwater that could result in direct contact to humans or present a greater risk to the environment, a human health and ecological risk assessment must be conducted by a qualified Environmental Consulting Firm and approved by the NHDES and EPA.

(f) If CERCLA actionable risks are identified, a site specific Groundwater Management Plan must be prepared by a qualified Environmental Consulting Firm and approved by the NHDES and the EPA. In addition, a site specific Health and Safety Plan prepared by a Certified Hygienist or other qualified health and safety professional, in accordance with 29 CFR 1910.120, must be approved by the NHDES and the EPA prior to commencement of any subsurface activity that may involve release or exposure to contaminated groundwater. The plan must clearly identify the types of personal protective equipment, monitoring devices, and engineering controls necessary to ensure that workers and others at the Property are not exposed to contaminated groundwater through dermal contact, ingestion, and/or inhalation.

4. **Emergency Procedures.** In the event of any emergency or condition that may result in significant risk or harm to human health from exposure to site contaminants, the State authority which is managing the Property shall:

(a) Promptly notify NHDES and EPA of such emergency or condition.

(b) Limit disturbance of PCB and VOC contaminated media to the minimum reasonably necessary to adequately respond to such emergency or condition.

(c) Implement appropriate precautions to reduce exposures to PCB and VOC contaminated media by workers at the Property and neighbors to the Property.

(d) Engage the services of an Environmental Consulting Firm to supervise the preparation and implementation of a written plan, for review and approval by NHDES and EPA, for restoring the Property to a condition consistent with the AUR.

(e) Take precautions to limit disturbance of PCB and VOC contaminated media to the minimum necessary to respond to the emergency or condition.

5. **Proposed Changes in Activities and Uses.** The restricted activities and uses set forth above may be amended or modified upon mutual agreement by the NHDES and EPA. Any proposed changes in activities and uses at the Property that may result in a greater risk of exposure to PCBs and VOCs than currently exists at the Property shall be evaluated by the NHDES and EPA as to whether the proposed changes will present an unacceptable level of risk to human health and the environment. Approval by the NHDES and EPA shall be required before such proposed activity or use is commenced.

6. **Duration of Activity and Use Restrictions.** The activity and use restrictions set forth herein shall run with the land, and, pursuant to RSA 147-A:14 and A:14-A (Supp. 2003), and for the benefit of public health, safety, welfare, and environment of the State, the restrictions shall become binding upon successive owners of the Property or portions of the Property and shall remain in effect until the PCB and VOC soil contamination at the Property meets the applicable state and federal standards for any restricted activity or use.

7. **Termination of Activity and Use Restrictions.** The activity and use restrictions set forth herein may be terminated upon mutual agreement by the NHDES and EPA and upon a showing that these restrictions are no longer necessary to maintain the protection of human health and the environment.

8. **Recordation.** This Declaration of Activity and Use Restriction, any modifications or amendments, and any terminations are effective upon recordation of notice in the chain of title for the Property at the Rockingham County, New Hampshire Registry of Deeds. All recordation costs shall be the responsibility of the Property Owner. Owner shall provide certified copies of all AUR recorded instruments to NHDES and EPA within 60 days of recordation.

9. **Incorporation Into Deeds, Mortgages, Leases, and Instruments of Transfer.** This Declaration of Activity and Use Restriction shall be incorporated either in full or by reference into the chain of title of all deeds, easements, mortgages, leases, licenses, occupancy agreements or any other instrument of transfer, whereby an interest in and/or a right to use the property or a portion thereof is conveyed. The notice of this instrument shall be substantially in the following form:

NOTICE: THE INTEREST CONVEYED HEREBY IS SUBJECT TO AN ACTIVITY AND USE RESTRICTION, DATED _____, 2006, RECORDED IN THE PUBLIC LAND RECORDS DATED _____, 2006, AND RECORDED IN BOOK _____, PAGES _____ OF THE ROCKINGHAM COUNTY LAND RECORDS.

10. **Notices.** Any notice, demand, request, consent, approval, or communication that any party desires or is required to give to the other shall be in writing and shall either be served personally or sent by first class mail, postage prepaid, addressed as follows:

To Property Owner and
To New Hampshire Department of Environmental Services:

Ottati & Goss Superfund Site State Project Coordinator
New Hampshire Department of Environmental Services
P.O. Box 95, 29 Hazen Drive
Concord, New Hampshire 03302-0095
(603) 271-3503

To the United States Environmental Protection Agency:

Ottati & Goss Superfund Site Remedial Project Manager
United States Environmental Protection Agency, Region 1
One Congress Street, Suite 1100, MC HBO
Boston, MA 02114-2023
(617) 918-1335

Property Owner, the State of New Hampshire, hereby authorizes and consents to the filing and recordation of this Notice, which shall become effective upon approval of NHDES and EPA and recordation of this instrument at the Rockingham County New Hampshire Registry of Deeds in the chain of Title for the Property.

WITNESSETH the execution hereof under seal this 26th day of October, 2006.

By: STATE OF NEW HAMPSHIRE
DEPARTMENT OF ENVIRONMENTAL SERVICES

Michael J. Walls
Assistant Commissioner

THE STATE OF NEW HAMPSHIRE
Merrimack, SS.

On the 26 day of October 2006, before me appeared Michael J. Walls, known to me (or satisfactorily proven) to be the person whose name appears above, and he/she subscribed his/her name to the foregoing document.

Notary Public/Justice of the Peace
My commission expires:

GAIL C. FRASER, Notary Public
My Commission Expires April 20, 2010

EXHIBIT A

A certain tract or parcel of land situate on the westerly side of Route 125 in the Town of Kingston, County of Rockingham, New Hampshire, being Tax Map R13, Lot 14 owned by Great Lakes Container Corporation:

Beginning at a granite bound along the northwesterly right-of-way limit of New Hampshire Route 125, marking the southeasterly corner of the parcel and the northeasterly corner of land now or formerly of John Peter Sebetes;

Thence N 58° 12' 59" W, along land of said Sebetes, a distance of 458.93 feet to a galvanized iron pipe marking the northeasterly corner of land now or formerly of the Concord Realty Trust;

thence N 58° 00' 49" W, along land of said Concord Realty Trust and crossing a small brook, a distance of 409.34 feet to a point;

thence continuing along land of said Concord Realty Trust N 57° 26' 59" W, a distance of 85.40 feet to the southwesterly corner of the parcel marked by granite bound;

thence turning and running N 35° 57' 01" E, along land now or formerly of BBS Realty Trust, a distance of 267.40 feet to the northwesterly corner of the parcel marked by a galvanized iron pipe;

thence turning and running S 58° 12' 59" E along land of said BBS Realty Trust, a distance of 953.92 feet to a granite bound along the northwesterly right-of-way limit of Route 125, being the northeasterly corner of the parcel;

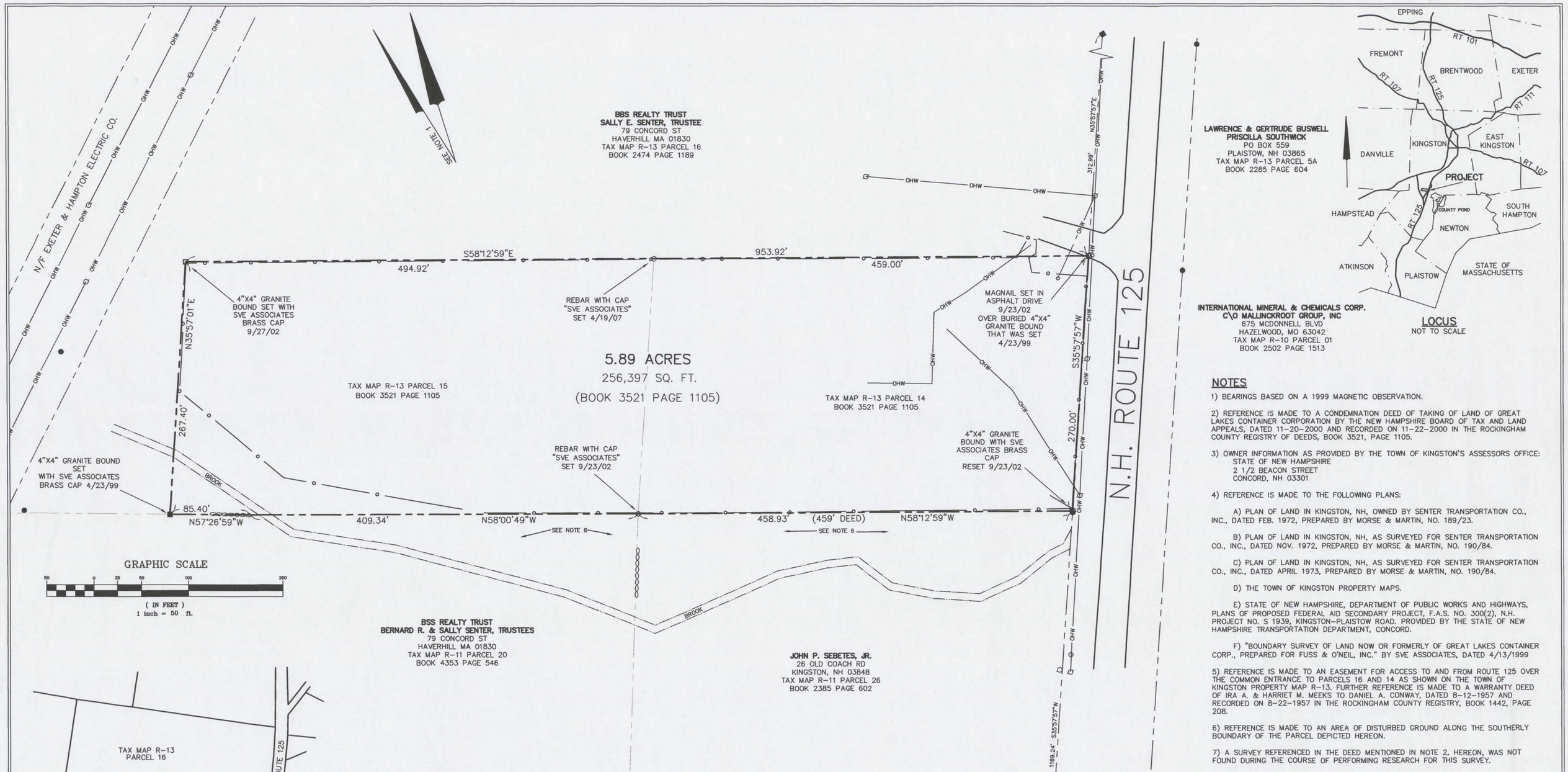
thence turning and running S 35° 57' 57" W along the northwesterly right-of-way of Route 125, a distance of 270.00 feet to the point of beginning.

containing 5.89 acres or 256,397 square feet, more or less.

Meaning and intending to describe the premises conveyed to the condemnee by deed of International Minerals and Chemicals Corporation dated August 25, 1976, and recorded in the Rockingham County Registry of Deeds at Book 2267, Page 1090 on October 5, 1976.

EXHIBIT B

(Plan of Property)



NOTES

1) BEARINGS BASED ON A 1999 MAGNETIC OBSERVATION.

2) REFERENCE IS MADE TO A CONDEMNATION DEED OF TAKING OF LAND OF GREAT LAKES CONTAINER CORPORATION BY THE NEW HAMPSHIRE BOARD OF TAX AND LAND APPEALS, DATED 11-20-2000 AND RECORDED ON 11-22-2000 IN THE ROCKINGHAM COUNTY REGISTRY OF DEEDS, BOOK 3521, PAGE 1105.

3) OWNER INFORMATION AS PROVIDED BY THE TOWN OF KINGSTON'S ASSESSORS OFFICE:
STATE OF NEW HAMPSHIRE
2 1/2 BEACON STREET
CONCORD, NH 03301

4) REFERENCE IS MADE TO THE FOLLOWING PLANS:

A) PLAN OF LAND IN KINGSTON, NH, OWNED BY SENTER TRANSPORTATION CO., INC., DATED FEB. 1972, PREPARED BY MORSE & MARTIN, NO. 189/23.

B) PLAN OF LAND IN KINGSTON, NH, AS SURVEYED FOR SENTER TRANSPORTATION CO., INC., DATED NOV. 1972, PREPARED BY MORSE & MARTIN, NO. 190/84.

C) PLAN OF LAND IN KINGSTON, NH, AS SURVEYED FOR SENTER TRANSPORTATION CO., INC., DATED APRIL 1973, PREPARED BY MORSE & MARTIN, NO. 190/84.

D) THE TOWN OF KINGSTON PROPERTY MAPS.

E) STATE OF NEW HAMPSHIRE, DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS, PLANS OF PROPOSED FEDERAL AID SECONDARY PROJECT, F.A.S. NO. 300(2), N.H. PROJECT NO. S 1939, KINGSTON-PLAISTOW ROAD. PROVIDED BY THE STATE OF NEW HAMPSHIRE TRANSPORTATION DEPARTMENT, CONCORD.

F) "BOUNDARY SURVEY OF LAND NOW OR FORMERLY OF GREAT LAKES CONTAINER CORP., PREPARED FOR FUSS & O'NEIL, INC." BY SVE ASSOCIATES, DATED 4/13/1999

5) REFERENCE IS MADE TO AN EASEMENT FOR ACCESS TO AND FROM ROUTE 125 OVER THE COMMON ENTRANCE TO PARCELS 16 AND 14 AS SHOWN ON THE TOWN OF KINGSTON PROPERTY MAP R-13. FURTHER REFERENCE IS MADE TO A WARRANTY DEED OF IRA A. & HARRIET M. MEEKS TO DANIEL A. CONWAY, DATED 8-12-1957 AND RECORDED ON 8-22-1957 IN THE ROCKINGHAM COUNTY REGISTRY, BOOK 1442, PAGE 208.

6) REFERENCE IS MADE TO AN AREA OF DISTURBED GROUND ALONG THE SOUTHERLY BOUNDARY OF THE PARCEL DEPICTED HEREON.

7) A SURVEY REFERENCED IN THE DEED MENTIONED IN NOTE 2, HEREON, WAS NOT FOUND DURING THE COURSE OF PERFORMING RESEARCH FOR THIS SURVEY.

8) SVE ASSOCIATES PERFORMED A FIELD CHECK AND REVISED PLAN REFERENCE "F" APRIL 2007.

SURVEYOR'S CERTIFICATION

THIS SURVEY AND PLAT WERE PRODUCED BY ME OR THOSE UNDER MY DIRECT SUPERVISION FROM A THEODOLITE AND ELECTRONIC DISTANCE METER TRAVERSE WITH A CLOSURE BETTER THAN 1:15,000 AND IS BASED ON INFORMATION RECORDED AT THE ROCKINGHAM COUNTY REGISTRY OF DEEDS AS REFERENCED HEREON, INFORMATION PROVIDED BY THE CLIENT AND PHYSICAL EVIDENCE FOUND. THIS IS AN URBAN SURVEY AND IS SUBSTANTIALLY CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF. ALL DIMENSIONS ARE SUBJECT TO THE ERROR OF CLOSURE PREVIOUSLY STATED.

THIS SURVEY PLAT AND ALL INFORMATION HEREON IS THE SOLE BENEFIT OF NHDES AND USEPA AND MAY NOT BE USED OR RELIED UPON BY ANY OTHER THIRD PARTY EXCEPT WITH THE WRITTEN PERMISSION OF SVE ASSOCIATES. THIS PLAT IS INVALID WITHOUT ORIGINAL SIGNATURE AND SEAL.

PURSUANT TO RSA 676:18,III AND RSA 672:14
I CERTIFY THAT THIS SURVEY PLAT IS NOT A SUBDIVISION PURSUANT TO THIS TITLE AND THAT THE LINES OF STREETS AND WAYS SHOWN ARE THOSE OF PUBLIC OR PRIVATE STREETS OR WAYS ALREADY ESTABLISHED AND THAT NO NEW WAYS ARE SHOWN.

STATE OF NEW HAMPSHIRE — No. 877 RUSSELL J. HUNTLEY — LICENSED LAND SURVEYOR — SIGNATURE

RUSSELL J. HUNTLEY, L.L.S. #877 06/29/07

LEGEND

	UTILITY POLE
	REBAR WITH CAP SET
	GRANITE BOUND SET
	IRON PIN FOUND
	HIGHWAY BOUND FOUND
	STONE WALL
	BROOK
	CHAINLINK FENCE
	RIGHT-OF-WAY
OHW	OVERHEAD WIRES
	PROPERTY LINE

NO.	DATE	REVISION	BY
1	10/07/02	MONUMENTATION	DAE

REVISION OF BOUNDARY SURVEY PLAN
OF LAND NOW OR FORMERLY OF
STATE OF NEW HAMPSHIRE
PREPARED FOR
NHDES & USEPA
TOWN OF KINGSTON — COUNTY OF ROCKINGHAM — STATE OF NEW HAMPSHIRE

SVE Associates © 2007
Engineering Surveying Landscape Architecture Planning
47 Marlboro St., Keene, NH 03431 Phone (603) 355-1532 Fax (603) 355-2969
website: www.sveassoc.com

DATE PLAN: 4/25/07
DATE SURVEY: 3/25/1999
DRAWN BY: JAP
CHECKED BY: RJH
SCALE: 1"=50'
PROJ. NO. K1726
CAD FILE NO. K1726 01

ARTICLE 209:
GROUNDWATER MANAGEMENT ZONE
(Adopted March 13, 2012)

209.1 AUTHORITY AND PURPOSE

Pursuant to RSA 674:21, Innovative Land Use Controls, the Town of Kingston (the Town) hereby adopts a Groundwater Management Zone, in consultation with the United States Environmental Protection Agency (US EPA) and New Hampshire Department of Environmental Services (NH DES).

Objectives of the Groundwater Management Zone are:

A. To prevent use of groundwater drawn from within a designated federal Superfund site, as defined under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) , 42 U.S.C. § 9601 *et seq.,* until the cleanup goals required under CERCLA decision documents for the Ottati & Goss Superfund Site are achieved.

B. To protect the public health and general welfare of the citizens of Kingston.

209.2 ZONE BOUNDARIES

The Groundwater Management Zone is superimposed over the existing underlying zoning districts and is comprised of three specific lots, those being Tax Map R10, Lot 1; Tax Map R13, Lot 14; and that portion of Tax Map R13, Lot 16 which is located south of North Brook, so called. The specific Zone is shown on a Plan entitled, "Ottati & Goss Superfund Site, Kingston, New Hampshire – Proposed Boundary for O & G Groundwater Management Zone," (Attachment A).

When the actual boundary of the Groundwater Management Zone is in dispute by any owner or abutter affected by said boundary, the Town will engage, at the owner or abutter's expense, a professional geologist or hydro geologist to determine more accurately the precise boundary of the Zone. The Town shall consult with the US EPA and NH DES, before any modification of the Groundwater Management Zone is made.

209.3 PROHIBITED USES

Additional to the prohibited uses of the underlying zoning district in which the Groundwater Management Zone is located, all use of groundwater for any purpose whatsoever in this district is not allowed without prior approval from the Town, US EPA and the NH DES. No wells of any nature whatsoever shall be dug, installed, or otherwise created within the district without prior approval from the Town, US EPA and the NH DES. No groundwater shall be drawn by any means whatsoever or for any use whatsoever from within the Zone without prior approval from the Town, US EPA and the NH DES .

No disturbance of wetlands within the Groundwater Management Zone shall be permitted without prior approval from the Town, US EPA and the NH DES.

These restrictions do not apply to US EPA and NH DES activities authorized under CERCLA.

209.4 ADMINISTRATION

The provisions of the Groundwater Management District shall be administered:

A. By the Planning Board for subdivision, site plan review and/or conditional use approval, and

B. By the Zoning Board of Adjustment for applications for appeal, and

C. By the Health Officer for applications to drill wells, and

D. By the Building Inspector for applications to construct, and

E. By the Conservation Commission for applications to disturb wetlands.

Any variances given to the provisions of the Groundwater Management District shall be forwarded to the US EPA and NH DES.

209.5 ENFORCEMENT

The Board of Selectmen shall be responsible for enforcement of the provisions of the Groundwater Management District.

209.6 EFFECTIVE DATE

This Article shall become effective upon passage.

The Groundwater Management District shall remain in effect until the cleanup goals required under CERCLA decision documents for the Ottati & Goss Superfund Site are achieved. The Town shall consult with the US EPA and NH DES before modifying or terminating the Groundwater Management District.

ATTACHMENT 3

SITE INSPECTION CHECKLIST

Five-Year Review Site Inspection Checklist

I. SITE INFORMATION	
Site name: Ottati & Goss/Kingston Steel Drum	**Date of inspection:** August 28, 2013
Location and Region: EPA Region 1, New England	**EPA ID:** NHD990717647
Agency, office, or company leading the five-year review: EPA	**Weather/temperature:** Sunny, humid, approx 75F

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- X Access controls
- X Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- X Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls
- X Other_ In-situ chemical oxidation was performed 2008-2010. Monitoring of groundwater continues to assess effectiveness of the treatments.

_____

_____

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** _____N/A_____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached

_____

_____

2. **O&M staff** _____N/A_____ _____ _____
   Name Title Date
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached

_____

_____

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency __New Hampshire Dept of Environmental Services_____
Contact ___Andrew Hoffman_____ Project Manager _8/28/13_ 603-271-6778_____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached _Drew attended site inspection with EPA (Bill Lovely) and AECOM (Barbara Weir)_____

Agency _____
Contact _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached
_____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached
_____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; ☐ Report attached
_____
_____

4. **Other interviews** (optional) ☐ Report attached.

See Interviews Section of five year review report for interviews with local authorities. EPA Project Manager Bill Lovely, NHDES Project Manager Andrew Hoffman, and AECOM (Barbara Weir) Interviewed Town officials on December 12, 2013. Barbara Weir interviewed a site abutter (Country Shores Campground owner) by telephone on December 12, 2013.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - ☐ O&M manual ☐ Readily available ☐ Up to date X N/A
   - ☐ As-built drawings ☐ Readily available ☐ Up to date X N/A
   - ☐ Maintenance logs ☐ Readily available ☐ Up to date X N/A

   Remarks_____

2. **Site-Specific Health and Safety Plan** X Readily available X Up to date ☐ N/A
   - ☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date X N/A

   Remarks__copy of HASP resides in site trailer._____

3. **O&M and OSHA Training Records** ☐ Readily available ☐ Up to date X N/A

   Remarks_____

4. **Permits and Service Agreements**
   - ☐ Air discharge permit ☐ Readily available ☐ Up to date X N/A
   - ☐ Effluent discharge ☐ Readily available ☐ Up to date X N/A
   - ☐ Waste disposal, POTW ☐ Readily available ☐ Up to date X N/A
   - ☐ Other permits_____ ☐ Readily available ☐ Up to date X N/A

   Remarks_____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date X N/A

   Remarks_____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date X N/A

   Remarks_____

7. **Groundwater Monitoring Records** ☐ Readily available ☐ Up to date X N/A

   Remarks_____

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date X N/A

   Remarks_____

9. **Discharge Compliance Records**
   - ☐ Air ☐ Readily available ☐ Up to date X N/A
   - ☐ Water (effluent) ☐ Readily available ☐ Up to date X N/A

   Remarks_____

10. **Daily Access/Security Logs** ☐ Readily available ☐ Up to date X N/A

    Remarks_____

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☐ Contractor for State
☐ PRP in-house ☐ Contractor for PRP
☐ Federal Facility in-house ☐ Contractor for Federal Facility
X Other___EPA Region 1, New England IAGs and Contracts_____

2. **O&M Cost Records**

☐ Readily available ☐ Up to date X N/A

☐ Funding mechanism/agreement in place
Original O&M cost estimate_____ ☐ Breakdown attached

Total annual cost by year for review period if available

From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost
From_____ To_____ _____ ☐ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Describe costs and reasons:
____None_____
_____
_____
_____
_____
_____
_____

V. ACCESS AND INSTITUTIONAL CONTROLS X Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☐ Gates secured ☐ N/A

Remarks___Fence is in good condition._____
_____

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A

Remarks_ Locks on gates present and operable. Sign present and in adequate condition._____
_____

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes X No ☐ N/A
Site conditions imply ICs not being fully enforced ☐ Yes X No ☐ N/A

Type of monitoring (*e.g.*, self-reporting , drive by) _During field events, AECOM observes site conditions __Local police do drive bys on occasion._____
Frequency _3x per year in 2012; twice in 2013, more frequently prior to 2012_____
Responsible party/agency
_EPA_____
Contact _Bill Lovely_____ _Project Manager__ _8/28/2013 617-918-1240__
Name Title Date Phone no.

Reporting is up-to-date ☐ Yes ☐ No X N/A
Reports are verified by the lead agency ☐ Yes ☐ No X N/A

Specific requirements in deed or decision documents have been met X Yes ☐ No ☐ N/A
Violations have been reported ☐ Yes X No ☐ N/A
Other problems or suggestions: ☐ Report attached
_____
_____
_____
_____

2. **Adequacy** X ICs are adequate ☐ ICs are inadequate ☐ N/A
Remarks_____
_____
_____
_____

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map X No vandalism evident
Remarks_____
_____

2. **Land use changes on site** X N/A
Remarks_____
_____

3. **Land use changes off site** X N/A
Remarks_____
_____

VI. GENERAL SITE CONDITIONS

A. Roads X Applicable ☐ N/A

1. **Roads damaged** ☐ Location shown on site map X Roads adequate ☐ N/A
Remarks_____
_____
_____

B. Other Site Conditions

Remarks _Overall condition is good. Mowing needed only when field events are scheduled. Field trailer remains on site for future use.

_____
_____
_____
_____
_____
_____

VII. LANDFILL COVERS ☐ Applicable X N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
Areal extent_____ Depth_____
Remarks_____
_____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
Lengths_____ Widths_____ Depths_____
Remarks_____
_____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
Areal extent_____ Depth_____
Remarks_____
_____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
Areal extent_____ Depth_____
Remarks_____
_____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
☐ Trees/Shrubs (indicate size and locations on a diagram)
Remarks_____
_____

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A
Remarks_____
_____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident
Areal extent_____ Height_____
Remarks_____
_____

8. **Wet Areas/Water Damage** ☐ Wet areas/water damage not evident
☐ Wet areas ☐ Location shown on site map Areal extent_____
☐ Ponding ☐ Location shown on site map Areal extent_____
☐ Seeps ☐ Location shown on site map Areal extent_____
☐ Soft subgrade ☐ Location shown on site map Areal extent_____
Remarks_____
_____

9.	**Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability Areal extent_____ Remarks_____ _____
B. Benches	☐ Applicable ☐ N/A (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)
1.	**Flows Bypass Bench** ☐ Location shown on site map ☐ N/A or okay Remarks_____ _____
2.	**Bench Breached** ☐ Location shown on site map ☐ N/A or okay Remarks_____ _____
3.	**Bench Overtopped** ☐ Location shown on site map ☐ N/A or okay Remarks_____ _____
C. Letdown Channels	☐ Applicable ☐ N/A (Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)
1.	**Settlement** ☐ Location shown on site map ☐ No evidence of settlement Areal extent_____ Depth_____ Remarks_____ _____
2.	**Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation Material type_____ Areal extent_____ Remarks_____ _____
3.	**Erosion** ☐ Location shown on site map ☐ No evidence of erosion Areal extent_____ Depth_____ Remarks_____ _____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
Areal extent_____ Depth_____
Remarks_____
_____

5. **Obstructions** Type_____ ☐ No obstructions
☐ Location shown on site map Areal extent_____
Size_____
Remarks_____
_____

6. **Excessive Vegetative Growth** Type_____
☐ No evidence of excessive Growth
☐ Vegetation in channels does not obstruct flow
☐ Location shown on site map Areal extent_____
Remarks_____
_____

D. Cover Penetrations ☐ Applicable ☐ N/A

1. **Gas Vents** ☐ Active ☐ Passive
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance
☐ N/A
Remarks_____
_____

2. **Gas Monitoring Probes**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks_____
_____

3. **Monitoring Wells** (within surface area of landfill)
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks_____
_____

4. **Leachate Extraction Wells**
☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A
Remarks_____
_____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A
Remarks_____
_____

E. Gas Collection and Treatment	☐ Applicable ☐ N/A
1.	**Gas Treatment Facilities** ☐ Flaring ☐ Thermal destruction ☐ Collection for reuse ☐ Good condition ☐ Needs Maintenance Remarks_____
2.	**Gas Collection Wells, Manifolds and Piping** ☐ Good condition ☐ Needs Maintenance Remarks_____
3.	**Gas Monitoring Facilities** (*e.g .*, Gas monitoring of adjacent homes or buildings) ☐ Good condition ☐ Needs Maintenance ☐ N/A Remarks_____
F. Cover Drainage Layer	☐ Applicable ☐ N/A
1.	**Outlet Pipes Inspected** ☐ Functioning ☐ N/A Remarks_____
2.	**Outlet Rock Inspected** ☐ Functioning ☐ N/A Remarks_____
G. Detention/Sedimentation Ponds	☐ Applicable ☐ N/A
1.	**Siltation** Areal extent_____ Depth_____ ☐ N/A ☐ Siltation not evident Remarks_____
2.	**Erosion** Areal extent_____Depth_____ ☐ Erosion not evident Remarks_____
3.	**Outlet Works** ☐ Functioning ☐ N/A Remarks_____
4.	**Dam** ☐ Functioning ☐ N/A Remarks_____

H. Retaining Walls	☐ Applicable ☐ N/A
1.	**Deformations** ☐ Location shown on site map ☐ Deformation not evident Horizontal displacement_____ Vertical displacement_____ Rotational displacement_____ Remarks_____
2.	**Degradation** ☐ Location shown on site map ☐ Degradation not evident Remarks_____
I. Perimeter Ditches/Off-Site Discharge	☐ Applicable ☐ N/A
1.	**Siltation** ☐ Location shown on site map ☐ Siltation not evident Areal extent_____ Depth_____ Remarks_____
2.	**Vegetative Growth** ☐ Location shown on site map ☐ N/A ☐ Vegetation does not impede flow Areal extent_____ Type_____ Remarks_____
3.	**Erosion** ☐ Location shown on site map ☐ Erosion not evident Areal extent_____ Depth_____ Remarks_____
4.	**Discharge Structure** ☐ Functioning ☐ N/A Remarks_____
VIII. VERTICAL BARRIER WALLS	☐ Applicable X N/A
1.	**Settlement** ☐ Location shown on site map ☐ Settlement not evident Areal extent_____ Depth_____ Remarks_____
2.	**Performance Monitoring** Type of monitoring _____ ☐ Performance not monitored Frequency_____ ☐ Evidence of breaching Head differential_____ Remarks_____

IX. GROUNDWATER/SURFACE WATER REMEDIES	☐ Applicable X N/A
A. Groundwater Extraction Wells, Pumps, and Pipelines	☐ Applicable ☐ N/A
1. **Pumps, Wellhead Plumbing , and Electrical** ☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A Remarks_____	
2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances** ☐ Good condition ☐ Needs Maintenance Remarks_____	
3. **Spare Parts and Equipment** ☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided Remarks_____	
B. Surface Water Collection Structures, Pumps, and Pipelines	☐ Applicable ☐ N/A
1. **Collection Structures, Pumps, and Electrical** ☐ Good condition ☐ Needs Maintenance Remarks_____	
2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances** ☐ Good condition ☐ Needs Maintenance Remarks_____	
3. **Spare Parts and Equipment** ☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided Remarks_____	

C. Treatment System ☐ Applicable ☐ N/A

1. **Treatment Train** (Check components that apply)
   ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation
   ☐ Air stripping ☐ Carbon adsorbers
   ☐ Filters_____
   ☐ Additive (*e. g .*, chelation agent, flocculent)_____
   ☐ Others_____
   ☐ Good condition ☐ Needs Maintenance
   ☐ Sampling ports properly marked and functional
   ☐ Sampling /maintenance log displayed and up to date
   ☐ Equipment properly identified
   ☐ Quantity of groundwater treated annually_____
   ☐ Quantity of surface water treated annually_____
   Remarks_____
   _____

2. **Electrical Enclosures and Panels** (properly rated and functional)
   ☐ N/A ☐ Good condition ☐ Needs Maintenance
   Remarks_____
   _____
   _____

3. **Tanks, Vaults, Storage Vessels**
   ☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance
   Remarks_____
   _____
   _____

4. **Discharge Structure and Appurtenances**
   ☐ N/A ☐ Good condition ☐ Needs Maintenance
   Remarks_____
   _____

5. **Treatment Building(s)**
   ☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair
   ☐ Chemicals and equipment properly stored
   Remarks_____
   _____

6. **Monitoring Wells** (pump and treatment remedy)
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ All required wells located ☐ Needs Maintenance ☐ N/A
   Remarks_____
   _____
   _____

D. Monitoring Data

1. Monitoring Data
   ☐ Is routinely submitted on time ☐ Is of acceptable quality

2. Monitoring data suggests:
   ☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
   - ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   - ☐ All required wells located ☐ Needs Maintenance ☐ N/A

   Remarks_____

   _____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

Remedy objectives are: 1) prevent potential for human exposure to soil and groundwater that currently exceed cleanup levels (met by ICs); 2) remediate and restore wetlands; 3) remediate groundwater using a combination of ISCO to substantially reduce concentrations of organic contaminants of concern (completed) followed by monitored natural attenuation for residual groundwater contamination exceeding cleanup levels. Remedy is effective based on field observations. Fencing intact, no violations of IC noted. Wells remain in place for use in MNA monitoring. Wetland (OU4) restoration has been effective and is being maintained by NHDES. Wetland was not inspected on August 28, 2013 but is inspected by others at regular intervals. See text of five year review for discussion.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

No issues noted during site inspection on August 28. Wetland inspection performed separately by others – see text of five year review for discussion.

_____
_____
_____
_____
_____

C.	**Early Indicators of Potential Remedy Problems**
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs,that suggest that the protectiveness of the remedy may be compromised in the future. **None**
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. **Groundwater monitoring program was reduced somewhat in 2012 (fewer wells) and again in 2013 (limited to groundwater management zone wells only), as annual ISCO performance monitoring was no longer deemed necessary. Annual monitoring was performed from 2008 to 2012 to monitor the ISCO remedy (which was completed in 2010). Reduced frequency of monitoring was determined to be sufficient as the groundwater remedy is entering the MNA phase.**

ATTACHMENT 4

SITE PHOTOGRAPHS

August 28, 2013: Site View Looking West from Route 125

December 12, 2013: View of Site Entrance and Trailer, Looking Southwest

December 12, 2013: View of Area B (foreground) and Area A (background) from Route 125

December 12, 2013: View of Area A Looking West from Route 125 – Wells Visible

View from Route 125 During ISCO Injections, Fall 2008

Monitoring of South Brook During ISCO Injections, Fall 2008

View from Route 125 During ISCO Injections, Fall 2009

View of Oxidant Staging Area During ISCO Injections, Fall 2010

ATTACHMENT 5

INTERVIEW RECORD FORMS

INTERVIEW DOCUMENTATION FORM (page 1 of 2)

The following is a list of individuals interviewed for this five-year review. See the attached contact record(s) for a detailed summary of the interviews.

Name	Title/Position	Organization	Date
_Peter Broderick____	__Selectman_____	_Town of Kingston	____12/12/2013____
_Larry Middlemiss__	Deputy Health Officer_____	_Town of Kingston__	_12/12/2013_
Richard D. St. Hilaire	_Road Agent/EMD__	_Town of Kingston_	___12/12/2013_____
_Don Briggs_____	Chief of Police/EMD_	__Town of Kingston_	___12/12/2013_____
_Robert Steward___	_Building Inspector_	_Town of Kingston__	___12/12/2013_____
_Bill Seaman_____	_Fire Chief/EMD___	Town of Kingston_	___12/12/2013_____

INTERVIEW DOCUMENTATION FORM (page 2 of 2)

The following is a list of individuals interviewed for this five-year review. See the attached contact record(s) for a detailed summary of the interviews.

Name	Title/Position	Organization	Date
_Scott Newnan____	__Fire Department__	_Town of Kingston	____12/12/2013____
Ellen Faulconer	Planning Board_____	_Town of Kingston__	_12/12/2013_
__Larry Buswell Sr.	_Owner__	_Country Shores Campground__	___12/12/2013_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

INTERVIEW RECORD

Site Name: Ottati & Goss/Kingston Steel Drum Superfund Site	**EPA ID No.: NHD990717647**	
Subject: Five Year Review Interviews	**Time: 9 AM**	**Date: 12/12/2013**
Type: □ Telephone X Visit □ Other **Location of Visit: Kingston, NH Town Hall**	□ Incoming □ Outgoing	

Contact Made By:

Name: Barbara Weir; Bill Lovely; Drew Hoffman (joint interview)	**Title: Task order manager, Remedial Project Manager, Project Manager**	**Organization: AECOM, EPA, NHDES**

Individual Contacted:

Name: Town Officials – interviewed together – see preceding documentation form	**Title: see preceding documentation form**	**Organization: Town of Kingston, NH**
Telephone No: 603-642-3342	**Street Address: 163 Main Street** **City, State, Zip: Kingston, NH**	

Summary Of Conversation

Town Officials were interviewed after their weekly department head meeting held every Thursday, as co-ordinated through Selectman Peter Broderick. The Interview Documentation Form lists those in attendance.

Remedy Status: We were asked to provide a brief overview of the remedial actions completed (all operable units) and to summarize why the groundwater remedy was changed from pump and treat to ISCO, to refresh everyone's memory. Participants had questions about how the ISCO remedy was working – this was explained using diagrams showing the total VOC concentration plumes in 2007 (before ISCO) compared to 2012 (after all ISCO had been finished). People asked whether the cleanup was completely done, and Bill explained that while ISCO is done, the plumes are not at cleanup levels yet but that they would be monitored and the plan was to let them attenuate naturally the rest of the way – letting Mother Nature take over. He explained that this is very common and mentioned examples of other sites. There was some discussion of the fact that there is residual contamination stuck on the soil under Route 125 that could not be removed (no way to get at it). Contamination will slowly bleed out from it for a long time, but it will naturally attenuate.

PCBs and Fish Advisory: There were questions about PCBs, and some discussion about the fish advisory for Country Pond (which the health officers were very familiar with). Bill and Drew explained that PCBs are not really in the groundwater but that they stick to the soil. Drew explained that the fish tissue sampling done in 2010 (fish from Country Pond and another local pond) both showed detections of PCBs, but that 1) levels were similar for the two ponds, 2) these levels are ubiquitous because there are so many sources of PCBs (they are found everywhere now), and 3) levels are an order of magnitude lower than when samples were collected in the 1980's. However, because the understanding of toxicity levels for PCB congeners has changed (now thought to be more toxic), even though concentrations are lower than in the past, the State determined that a fish advisory was needed. Mr. Broderick noted that they understand the PCBs in the fish in Country Pond are not because of the site necessarily, because they are found everywhere. Drew showed a map of states that have advisories - the whole Eastern seaboard has them. Mercury is the other contaminant that seems to be ubiquitous in fish. It was also noted that there was no subsistence fishing at Country Pond – most catch and release or if eaten it is very infrequent.

INTERVIEW RECORD

Site Name: Ottati & Goss/Kingston Steel Drum Superfund Site	**EPA ID No.: NHD990717647**	
Subject: Five Year Review Interviews	**Time: 9 AM**	**Date: 12/12/2013**
Type: □ Telephone X Visit □ Other **Location of Visit: Kingston, NH Town Hall**	□ Incoming □ Outgoing	

Contact Made By:

Name: Barbara Weir; Bill Lovely; Drew Hoffman (joint interview)	**Title: Task order manager, Remedial Project Manager, Project Manager**	**Organization: AECOM, EPA, NHDES**

Individual Contacted:

Name: Town Officials – interviewed together – see preceding documentation form	**Title: see preceding documentation form**	**Organization: Town of Kingston, NH**
Telephone No: 603-642-3342	**Street Address: 163 Main Street** **City, State, Zip: Kingston, NH**	

Summary Of Conversation

Communication and Community Concerns: We discussed whether communication about the site was adequate – did people feel well enough informed? There was some disagreement on this topic within the group, with some officials saying that EPA did a good job but people did not turn out (referencing the last public meeting), while others thought more could be done to reach out. It was suggested that EPA could come to another meeting and have it on the Town cable access channel.

As far as concerns that officials had (either themselves or from others) – there is not a great deal of concern about the site now. There was a fish kill in Country Pond back in spring 2008 (after ISCO was pilot tested at the site that winter) and people were concerned it might have been due to the ISCO. A definite cause for it was never identified. Drew said this also raised concern on his part and EPA's, not necessarily that the pilot test caused the fish kill (this is highly unlikely) – but that it made clear that a monitoring program would be needed when injecting at full scale to ensure that the oxidant chemicals did not enter the nearby brooks and spread to the pond. That was done – the brooks were monitored continuously during all 3 years of injections (2008, 2009, and 2010) and there were no signs of oxidants or by-products getting into the brooks.

Site Reuse: People are interested in whether the site can be put to productive use now. Bill explained that reuse is OK as long as institutional controls are maintained and some uses (like day care) would not be acceptable. It was discussed that the State owns the part of the site within the fence where the ISCO was done. Drew explained that reuse is not practical now because of all the wells on site that need to be monitored, and also there would need to be a source of potable water brought to the site. He explained that the State takes over full responsibility for the site from EPA in 2020. The State would support reuse and that is the time when it would be most likely to be feasible – cleanup would be far enough along and the wells in the middle of the site no longer needed, etc. EPA also supports reuse and it is also possible to de-list sites from the NPL, Bill noted. He has one site now that is going through this process. Several of the Town officials noted that the Town might want to lease the land from the State at some future date, but would not want to buy it due to liability concerns. Mr. Broderick noted that even after the cleanup is done, there can be a stigma associated with a property and some people would never be comfortable with reuse.

INTERVIEW RECORD

Site Name: Ottati & Goss/Kingston Steel Drum Superfund Site	**EPA ID No.: NHD990717647**	
Subject: Five Year Review Interviews	**Time: 9 AM**	**Date: 12/12/2013**
Type: □Telephone X Visit □ Other **Location of Visit: Kingston, NH Town Hall**	□ Incoming □ Outgoing	

Contact Made By:

Name: Barbara Weir; Bill Lovely; Drew Hoffman (joint interview)	**Title: Task order manager, Remedial Project Manager, Project Manager**	**Organization: AECOM, EPA, NHDES**

Individual Contacted:

Name: Town Officials – interviewed together – see preceding documentation form	**Title: see preceding documentation form**	**Organization: Town of Kingston, NH**
Telephone No: 603-642-3342	**Street Address: 163 Main Street** **City, State, Zip: Kingston, NH**	

Summary Of Conversation

Final Notes: Chief Briggs noted that a lot of progress has been made at the site over the years and everyone has been very good to work with and mindful of safety concerns. He appreciates EPA and DES co-operation, in particular with his requests regarding traffic safety such as no left turns into the site from Route 125 northbound.

INTERVIEW RECORD

Site Name: Ottati & Goss/Kingston Steel Drum Superfund Site	**EPA ID No.: NHD990717647**	
Subject: Five Year Review Interviews	**Time: 11:30 AM**	**Date: 12/12/2013**
Type: X Telephone □ Visit □ Other **Location of Visit:**	□ Incoming X Outgoing	

Contact Made By:

Name: Barbara Weir	**Title: Task order manager**	**Organization: AECOM**

Individual Contacted:

Name: Larry Buswell Sr.	**Title: Owner**	**Organization: Country Shores Campground, Kingston, NH**
Telephone No: 603-642-6745	**Street Address:** **City, State, Zip: Kingston, NH**	

Summary Of Conversation

I asked Mr. Buswell if he was aware of any concerns regarding the site or its operation and administration, such as questions raised by people who camp at Country Shores. He said that no one who comes to the campground has raised any questions or concerns to him.

I asked if he felt adequately informed about the site's activities and progress. He said yes, for the most part, and that he felt he knew whom he could contact if he had questions.

I asked if he had any comments, suggestions, or recommendations regarding the site's management or operation. He said no, he did not have any suggestions regarding what could be done differently.

I asked if he posted the fish advisory and if so, were there any questions about it. He said it had been up for a while but was not currently posted. He noted that people do not eat the fish anyway – they catch and release them.

He asked for an overview of what was happening at the site now and what would be happening in the future. I explained that the ISCO injections were finished in 2010, that they worked well to reduce contaminant concentrations, and that the site is now in a monitoring phase. I explained that the next monitoring would likely not occur until 2015, because the remedy is now in a natural attenuation (let Nature take its course) phase. We were monitoring often during the ISCO work because changes were happening quickly then, but changes will be more gradual now and into the future so monitoring does not need to be as frequent. I said that we likely would not be contacting him to sample the wells on his property until 2015.

ATTACHMENT 6

Risk Evaluation in Connection with the 2014 Five Year Review. Memo from William Lovely, RPM, OSRR to Ottati & Goss Site File, March 24, 2014

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

From: William Lovely, RPM, OSRR

To: Ottati & Goss Site File

Re: Risk Evaluation in Connection with the 2014 Five-Year Review

Date: March 24, 2014

Purpose

The last Five-Year review for the Ottati & Goss Superfund Site (the "Site") was completed in March 2009. Although the review concluded that the remedial actions at all Operable Units (OU) are currently protective of human health and the environment, the review recommended a further evaluation of a small area of PCB impacted soils that abut OU 4 and where concentrations exceed a risk-based residential cleanup level of 3 ppm. The purpose of this evaluation was to determine whether a revised cleanup level for PCBs and possibly additional CERCLA actions are necessary to help ensure the protectiveness of the remedy in the long-term. This memo is written in response to that recommendation and it documents how the evaluation was used to help inform the 2014 Five-Year review.

Background/ History

The Site is located in Kingston, NH and is comprised of 3 distinct sections: (1) a 5.8 acre parcel referred to the Great Lakes Container Corporation and Kingston Steel Drum (GLCC/KSD), (2) a 29 acre area owned by BBS Realty Trust of which a one acre portion was historically used during Site operations, and (3) a 23-acre marsh pond located east of the GLCC/KSD section, located between Route 125 and Country Pond.

From 1957 through 1973 drum reconditioning operations at the Site contaminated soil, groundwater and sediments with a number of contaminants including volatile organic compounds (e.g., benzene and trichloroethylene), inorganic metals (e.g., arsenic and nickel), and polychlorinated biphenyls (PCBs). To address this contamination, EPA issued a Record of Decision (ROD) in 1987 which included the cleanup of the groundwater to drinking water quality using pump and treat technology, building demolition, and the cleanup of soil and sediment to levels protective of human health and the environment under anticipated future site uses. Using a PCB soil cleanup level of 20 ppm, which at the time of the 1987 ROD was considered protective of future residential uses, EPA initiated the soil cleanup in 1989 (OU1) and completed it in 2002 (OU4) after

modifying the cleanup approach from on-site treatment of contaminated soils to off-site disposal, changing the cleanup level in sediments from 1 ppm to 10 ppm, and placing institutional controls on the GLCC/KSD property to prevent residential use. Details regarding these changes are documented in two Explanation of Significant Differences (ESD), dated September 1999 and February 2002, respectively.

Prior to initiating the OU4 soil cleanup in 2001, EPA recalculated the risks associated with the 20 ppm cleanup level as part of the 1999 Five-Year review and determined that a 3 ppm risk-based cleanup level would be needed to be protective under future residential use scenarios based on new information about the toxicity of PCBs. Details of this recalculation are described in an EPA memo dated July 28, 1997, which is attached with this memo. Although the 1997 revised risk calculation was applicable to the entire Site, the placement of institutional controls on the GLCC/KSD portion of the Site and previous work on the BBS Realty Trust property limited the applicability of the revised risk calculation to a 7,200 sq. ft. portion of the BBS Realty Trust property along the GLCC/KSD (OU4) boundary where future use of the property was not restricted. More importantly, because there has been no development on the BBS Realty Trust property since this issue was first raised in the 1999 Five-Year Review, each of the subsequent Five-Year reviews (2004, and 2009) continued to frame the issue as one that called into question the long-term protectiveness of the remedy, particularly in light of the fact that remedial activities at the Site including the implementation of the groundwater portion of the remedy and long-term monitoring of the Site were on-going. Nonetheless, this memo responds to previous Five-Year review recommendations to further evaluate the soil data within this small portion of the BBS Realty Trust property to determine if a revised PCB cleanup level in soil needs to be established in a future CERCLA decision document.

Data Review

Figure 7 (copy attached) from the 2009 Five Year review shows the location and dimensions of the 7,200 sq. ft. area on the BBS Realty Trust property where PCB contaminated soil remains in excess of the 3 ppm risk-based residential cleanup. These exceedences were found in confirmation samples that were collected following the soil excavations that were performed as part of the 2002 OU4 soil removal. The exceedences were limited to soils at a depth of 8-12 feet below the land surface along the GLCC/KSD and BBS Realty Trust property boundary. Based on a review of the confirmation sampling results (copy attached) and additional details about the excavation that are described in the *Final Remedial Action Report, Ottati & Goss/ Kingston Steel Drum Superfund Site, Soil & Sediment Remediation, Operable Unit No. 4, March 2003*, the following can be concluded with respect to residual PCB concentrations on the BBS Realty Trust portion of the Site:

- The dimensions of the excavation on the BBS Realty Trust property where a few confirmation samples exceeded 3 ppm are approximately 120 feet long and 60 feet wide, which equals a total of 7,200 sq. ft. According to the 2003 Remedial Action Report (page 3-15, Section 3.14.5, Final Excavation Limits) excavations in this area

extend to a minimum depth of 8 feet. Therefore, combining this depth with the 7,200 sq. ft. areal limits of the excavation results in a total volume of 2,133 cu.yds.

- A total of 13 confirmation samples were collected from the bottom of the excavation described above. The arithmetic average and 95% UCL for this data are: 4.5 ppm and 6.8 ppm, respectively (see attached spreadsheet).

- Clean fill was brought in to backfill the open excavation to grade; PCB concentrations within this fill material were conservatively estimated to be 0.1 ppm. Consequently, if one were to calculate the volume-weighted average PCB concentration within the limits of the excavation using a value of 6.8 ppm for the 8-10 ft. soil depth interval (i.e., the 95 % UCL) and 0.1 ppm for the 0-8 ft. soil depth interval, the result would be 1.4 ppm, which is below the 3 ppm risk level stated in the 2009 Five-Year review. Details regarding this calculation are also included in the spreadsheet discussed in the bullet above.

Conclusion

The 2009 Five-Year review recommended an additional evaluation of the residual PCB soil contamination on a 7,200 sq. ft. area on BBS Realty Trust portion of the site that abuts OU4. Based on this evaluation, which assumes that a house foundation could be constructed within this area to a depth of 10 ft., the volume-weighted average PCB concentration was calculated at 1.4 ppm, which is below the 3 ppm risk-level stated in the review. Moreover, when one considers that a future residence could be built anywhere within the 29-acre BBS Realty Trust property (not just the 7,200 sq. ft. area discussed in this memo), the shallow water table within this area (less than 4 ft. below land surface), and the 20-ft minimum set-back requirement that the Town of Kingston requires along property boundaries, the exposure point concentration that EPA would use in a risk assessment would most likely be lower than and closer to the current risk-based soil cleanup level of 1.0 ppm for PCBs. Consequently, EPA concludes that the low level PCB concentrations that remain at depth do not pose an unacceptable CERCLA risk under a future residential use scenario, and therefore no further evaluation is necessary for the purpose of assessing the protectiveness of the remedy in the long-term as it relates to PCBs in soil.

cc. Rick Sugatt, Risk Assessor, OSRR
Mike Jasinski, Chief, NH/RI Superfund Section

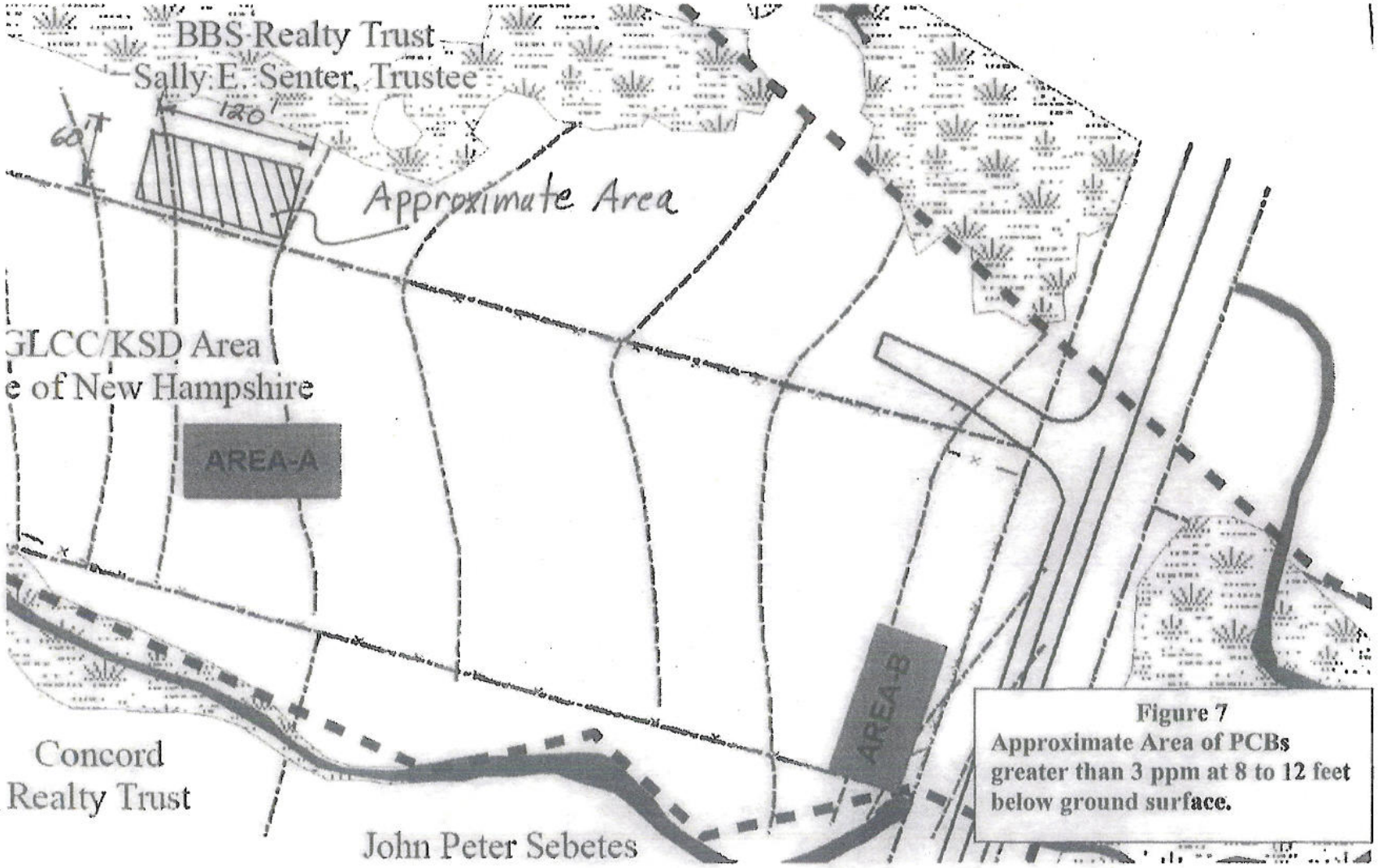


Figure 7
Approximate Area of PCBs greater than 3 ppm at 8 to 12 feet below ground surface.

REV	DESCRIPTION	DATE	APPROVED
1	DRAFT-FINAL COMMENTS	03-03-03	TN

NOTE: FLOOR SAMPLES IN THIS AREA EXCEEDED SITE CLEAN-UP LIMITS. EXCAVATION DEPTH WAS 8'-10' BGS; GROUNDWATER ELEVATION WAS AT ~3'-4' BGS.

N/F BBS REALTY TRUST
℄ N/F STATE OF NEW HAMPSHIRE
(FORMERLY OLCC)

(FORMERLY OLCC)
℄ N/F STATE OF NEW HAMPSHIRE

MATCH LINE
REF. SHEET NO. 6

NOTES:
1) REFER TO SHEET NO. 5 FOR MATCHLINE LOCATIONS

2) REFER TO SHEET NO.'S 4 AND 5 FOR EXCAVATION DEPTHS.

3) QC AND FD SAMPLES WERE SPLIT FROM APPROXIMATELY 10% OF SAMPLE LOCATIONS AS UNIQUE SAMPLES AND ANALYZED. THE HIGHEST CONCENTRATION(S), FOR EACH ANALYSIS, OF ALL SPLIT SAMPLES (NORMAL, QC, AND FD) IS ROUTINELY REPORTED.

4) SAMPLE RESULTS ARE IN UNITS OF mg/kg (PPM) AND ARE BASED ON DRY UNIT WEIGHT.

5) ND = NOT DETECTED AT SELECTED ANALYTICAL CONCENTRATION. THE ND CONCENTRATION CAN BE SAMPLE SPECIFIC AND WILL BE DIFFERENT BETWEEN ANALYTICAL METHODS USED AND THE MATRIX BEING ANALYZED. SEE REPORT FOR SAMPLE SPECIFIC DETECTION LIMITS.

0' 20' 40' 60'

LEGEND

	PROPERTY LINE
	SAMPLE GRID BOUNDARY
	LIMITS OF SAMPLE AREA
(CS)(W22) - (1)(001) - (FL)(A) = SAMPLE I.D.	
(CS) = CONFIRMATION SAMPLE	
(W22) = EXCAVATION AREA I.D.	
(1) = SAMPLE MATRIX (SOIL)	
(001) = SAMPLE GRID NUMBER	
(FL) = FLOOR SAMPLE	
(A) = FIRST RESAMPLE	
PCB 7.21	PCB CONCENTRATION (PPM)
VOC 0.32	VOC CONCENTRATION (PPM)

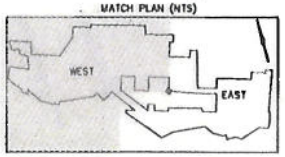
COMPOSITE SAMPLE METHOD

X X
X
X X

GRID AREA ~825 SF

X = FLOOR COMPOSITE SAMPLE LOCATION

MATCH PLAN (NTS)



ENVIRONMENTAL CHEMICAL CORPORATION
30 D'ARCOLD DRIVE
MARLBOROUGH, MA 01752

DRAWN BY: J. Michels	DRAWING C-8, WEST / UPLAND FLOOR SAMPLE RESULTS - WEST
CHECK BY: T. Michels	OTTAR & COSS / KINGSTON STEEL DRUM SUPERFUND SITE
APPROVED BY: B. LaMont	120 ROUTE 125 KINGSTON, NH 03848
DATE: 11/17/02	PROJECT CODE: 5530 CONTRACT CODE: DACA-27-99-D-0018
SCALE: 1" = 20'	FILE NAME: 8JJ FLOOR E&D.DWG SHEET: 8 OF 22 REV: 1

Ottati Goss Post-Removal PCB Soil Concentrations

Sample Location	Total PCB Concentration (ppm)
CSW33-1008-FL	0.22
CSW33-1005-FL	0.74
CSW04-1001-FL	6.9
CSW04-1002-FL	5.28
CSW04-1003-FL	7.9
CSW04-1004-FL	2.7
CSW05-1001-FL	15.1
CSW05-1002-FL	5.7
CSW05-1003-FL	0.47
CSW05-1004-FL	5.7
CSW06-1001-FL	0.48
CSW06-1002-FL	0.37
CSW06-1004-FL	7.15
Mean	4.516153846
Standard Deviation	4.163409362
95% CI	2.263213522
95 % UCL	6.779367369
Assumptions/ Calculation:	
Area of Removal (sq ft)	7200
Depth of Removal (ft)	8
Depth interval of residual PCB contamination (ft)	2
Volume of Removal (cu yd)	2133.333333
Volume of soil at the 8-10 ft depth interval (cu yd)	533.3333333
Volume weighted Avg. (ppm/cu yd)	
Avg. PCB concentration 0-8 ft. = 0.1 ppm	213.3333333
Avg. PCB concentration 8-10ft. = 6.8 ppm	3626.666667
Overall average PCB concentration	1.44

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1
JFK Federal Building, Boston, MA 02203-2211

DATE: July 28, 1997

SUBJ: Recalculation of risks associated with soil cleanup levels for the Ottati and Goss Superfund Site

FROM: Ann-Marie Burke, Toxicologist
Technical Support Section

TO: Dick Goehlert, RPM
NH, RI Superfund Section

The following is a recalculation of the potential health risks associated with the cleanup level for PCBs in soils at the Ottati and Goss Superfund Site. This recalculation of risks incorporates new toxicity information, (based on EPA's reassessment of the carcinogenicity of PCB mixtures reported in "PCBs: Cancer Dose-Response Assessment and Application to Environmental Mixtures, EPA/600/P-96/001F, September, 1996") and new information about how to estimate dermal exposures to contaminated soils (contained in "Risk Assessment Guidance for Superfund, Volume 1 : Human Health Evaluation Manual, Supplemental Guidance, Dermal Risk Assessment Interim Guidance, DRAFT, June 19, 1997." If you have any questions about this calculation, do not hesitate to call me at (617)223-5528.

Estimated excess cancer risk associated with oral and dermal exposure to residential soils

If the Ottati and Goss Site is used for residential purposes in the future, the cleanup level, calculated below would need to be attained in surface (0-1ft) soils and subsurface soils (0-10ft). The following calculation for a cleanup level assumes two potential exposure pathways from soil; accidental ingestion of soil and dermal absorption of soils. The inhalation pathway is not expected to contribute significantly to the total risk from contaminated soils to a residential receptor since the major route of exposure would be via volatilization and PCBs are not expected to volatilize to any great extent due to a low vapor pressure.

The equation for a cleanup level for the oral and dermal routes of exposures is presented below:

$$C_s\ (mg/kg) = \frac{TR \times At_c}{F\left[\frac{CPF \times RAF_o \times IF_{adj}}{10^6\ mg/kg} + \frac{(SFS_{adj} \times CPF \times RAF_d)}{10^6 mg/kg}\right]}$$

3403

Where:
C_s = PCB concentration in soil = soil cleanup level
TR = target excess lifetime cancer risk - 1E-06
AT_c = averaging time, carcinogen (70yrs x 365dys/yr) - 25550 days
CPF = cancer potency factor for PCBs $(2mg/kg\text{-}dy)^{-1}$ - IRIS, 10/1/96
F = exposure frequency (150 dys/yr) - Region 1 default for residential scenario
If_{adj} = age-adjusted soil ingestion factor (114 mg-yr/kg-dy) equal to:

$$\frac{Ir_{soil/child} \times D_c}{Bw_c} + \frac{Ir_{soil/adult} \times D_a}{Bw_a} = \frac{(200 \times 6) + (100 \times 24)}{15 \qquad 70} = 114 mg\text{-}yr/kg\text{-}dy$$

SFS_{adj} = skin contact factor for soil, age adjusted, 291 (mg-yr/kg-dy) (see EPA's 6/19/97 Dermal Risk Assessment Interim Guidance for derivation)
RAF_o = oral relative absorption factor = amount absorbed from the oral route from the site/amt absorbed from tox study = 100/100 =1 (based on recent review of the literature)
RAF_{dermal} = dermal relative absorption factor = amount absorbed via the dermal route from the site/amt absorbed from tox study = (From(Wester et al, 1993)14/100 = 0.14)

Substituting the above values into the equation:

$$C(mg/kg) = \frac{(10^{-6})(25550)}{150\ [\frac{(114)(2)}{10^6}(1) + \frac{(291 \times 0.14 \times 2)}{10^6}}$$

$$= \frac{(10^{-6})(25550)}{150(\frac{228}{10^6} + \frac{81.48}{10^6})}$$

$$= \frac{(10^{-6})(25550)}{46422/10^6}$$

$$= \frac{0.02555}{0.04642} = 0.55$$

So 0.55ppm for surface soil is associated with a lifetime cancer risk equal to 1×10^{-6}. Thus the proposed cleanup level for surface soils at the Ottati and Goss site (20ppm) would be associated with a 3.6×10^{-5} excess cancer risk. The persistence of PCBs and its bioconcentration factor indicate that food consumption could be a significant contributor to exposure to PCBs in soil. If consumption of homegrown vegetables is expected as a future use in this area, a site-specific conceptual model should be included in a calculation of a PCB soil cleanup level.

Estimated noncancer hazard associated with oral and dermal exposure to residential soils

$$C_s\ (mg/kg) = \frac{THQ \times BW_c \times At_{nc}}{FxD\ [(\frac{1}{RfD_o} \times \frac{IR_c}{10^6 mg/kg}) + (\frac{1}{RfD_o} \times \frac{SA_c \times AF \times RAF_d}{10^6 mg/kg})}$$

Where the RfD for Aroclor 1254 is 2×10^{-5} (mg/kg-dy) (IRIS, 10/94). Also the sensitive receptor for this calculation is a child of 0-6 yrs, thus duration = 6 yrs, AT = 2190 days, IR = 200mg/kg, SA = $2900cm^2$ and AF = $0.2mg/cm^2$

Substituting the above values into the equation

$$= \frac{(1)(15)(2190)}{(150)(6)\left[\left(\frac{1}{2\times10^{-5}} \times \frac{200}{10^6}\right) + \left(\frac{1}{2\times10^{-5}} \times \frac{2900 \times 0.2 \times .14}{10^6}\right)\right]}$$

$$= \frac{32850}{900\left[\frac{200}{20} + \frac{81.2}{20}\right]}$$

$$= \frac{32850}{900\left(\frac{281.2}{20}\right)}$$

= 32850/12654 = 2.6

So 2.6ppm of PCBs in surface soil is associated with a hazard quotient of 1. Thus the proposed cleanup level for surface soils at the Ottati and Goss site (20ppm) would be associated with a HQ equal to 7.7.

Estimated excess cancer risk associated with oral and dermal exposure to industrial soils

If the Ottati and Goss Site is used in the future for industrial purposes, an adult worker could be exposed to contaminated soils via accidential ingestion, dermal absorption and inhalation of particulate matter containing PCBs. The cleanup level derivation for an industrial worker who may conduct some maintenance activities is presented below. This cleanup level would need to be attained in surface (0-1ft) soils and subsurface soils (0-10ft).

$$C_s\ (mg/kg) = \frac{TR \times BW_c \times At_c}{F \times D\left[\frac{CPF \times RAF_o \times IR_a}{10^6\ mg/kg} + \frac{(SA \times AF \times CPF \times RAF_d)}{10^6 mg/kg} + \frac{(IR_s \times CPF_i)}{VF_s}\right]}$$

Where:

C_s = PCB concentration in soil = soil cleanup level
TR = target excess lifetime cancer risk - 1E-06
BW = adult body weight - 70kg
AT = averaging time, carcinogen (70yrs x 365dys/yr) - 25550 days
CPF = oral and inhalation cancer potency factor for PCBs $(2mg/kg\text{-}dy)^{-1}$ - IRIS, 10/1/96
F = exposure frequency (150 dys/yr) - Region 1 default for time spent by industrial worker outside
D = exposure duration for worker = 25yrs
IR_a = soil ingestion rate, industrial worker (480mg/dy for 1/4 of time and 50mg/dy for 3/4 of time)

= 160mg/dy
RAF_o = oral relative absorption factor = amount absorbed from the oral route from the site/amt absorbed from tox study = 100/100 =1 (based on recent review of the literature)
RAF_{dermal} = dermal relative absorption factor = amount absorbed via the dermal route from the site/amt absorbed from tox study = (From(Wester et al, 1993)14/100 = 0.14)
SA = adult surface area exposed to soil - 5700 cm^2
AF = soil adherence factor, adult surface area adjusted- 0.03 mg/cm^2- day (groundskeeper)
Ir_a = adult inhalation rate - $20m^3/dy$
Vf_s - particulate emission factor, defalut - $1.3E9m^3/kg$

Substituting the above values into the equation:

$$C = \frac{(10^{-6})(70)(25550)}{(150)(25)\left[\frac{160x2}{10^6} + \frac{5700x0.03x.14x2}{10^6} + \frac{20\ x2}{1.3x10^9}\right]}$$

$$= \frac{1.7885}{3750\left[\frac{320}{10^6} + \frac{47.88}{10^6} + \frac{0.03}{10^6}\right]}$$

= 1.3ppm

So 1.3ppm for surface soil is associated with a lifetime cancer risk equal to $1x10^{-6}$. Thus the proposed cleanup level for surface soils at the Ottati and Goss site (20ppm) would be associated with a $1.5x10^{-5}$ excess cancer risk.

Estimated noncancer hazard associated with oral and dermal exposure to industrial soils

$$C_s\ (mg/kg) = \frac{THQ\ x\ BW_a\ x\ At_{nc}}{FxD\left[\left(\frac{1}{RfD_o} x \frac{IR_a}{10^6 mg/kg}\right) + \left(\frac{1}{RfD_o} x \frac{SA_a\ x\ AF\ x\ RAF_d}{10^6 mg/kg}\right) + \left(\frac{1}{RfD_i} x \frac{Ir_a}{VF_s}\right)\right]}$$

$$= \frac{(1)\ (70)\ (9125)}{(150)(25)\left[\left(\frac{1}{2x10^{-5}} x \frac{160}{10^6}\right) + \left(\frac{1}{2x10^{-5}} x \frac{5700\ x\ 0.03\ x\ .14}{10^6}\right)\right.}$$

$$= \frac{638750}{3750\left[\frac{160}{20} + \frac{23.9}{20}\right]}$$

$$= \frac{638750}{34481.3} = 18.5$$

So 18.5ppm of PCBs in surface soil is associated with a hazard quotient of 1. Thus the proposed cleanup level for surface soils at the Ottati and Goss site (20ppm) would be associated with a HQ equal to 1.1.

Summary

Excess cancer risks associated with residential property containing 20ppm total PCBs in the soil would be $3.6x10^{-5}$ and the hazard quotient would be 7.7. A PCB homologue analysis of site soils

should be conducted to ensure that none of the more toxic dioxin-like PCB congeners are present. Consult an EPA risk assessor and QA chemist about this. In addition, if vegetables are expected to be grown for consumption on this property, a site-specific food chain model should be applied to derive a cleanup level which is protective of this pathway. Otherwise the above estimated excess cancer risk could be an underestimate. If the site were used for industrial purposes in the future, the excess cancer risk associated with a cleanup level of 20ppm of total PCBs would be equivalent to 1.5×10^{-5} and the HQ would be 1.1. Again, a PCB homologue analysis of site soils should be conducted to ensure that none of the more toxic dioxin-like PCB congeners are present.