THIRD FIVE-YEAR REVIEW REPORT FOR SACO MUNICIPAL LANDFILL SUPERFUND SITE SACO, MAINE

Prepared by

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09/08/15

Date

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APPENDICES

AC ACRONYMS AND ABBREVIATIONS

%	Percent
ARAR	Applicable or Relevant and Appropriate Requirement
AWQC	Ambient Water Quality Criteria
CCC	Criteria Continuous Concentration
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIC	Community Involvement Coordinator
cis-1,2-DCE	cis-1,2-Dichloroethylene
CMC	Criteria Maximum Concentration
COCs	Contaminants of Concern
COPC	Contaminants of Potential Concern
CSFs	Cancer Slope Factors
EPA	United States Environmental Protection Agency
EPCs	Exposure Point Concentrations
ERA	Environmental Risk Assessment
FS	Feasibility Study
FYR	Five-Year Review
HHRA	Human Health Risk Assessment
HQ	Hazard quotient
ICs	Institutional Controls
ICLs	Interim Cleanup Levels
IRIS	Integrated Risk Information System
Maine DEP	Maine Department of Environmental Protection
MCL	Maximum Contaminant Levels
MCLG	Maximum Contaminant Level Goals
MEGs	Maximum Exposure Guidelines
Mg/kg	Milligrams per kilogram
MNA	Monitored Natural Attenuation
NCP	National Contingency Plan
NPL	National Priorities List
NRWQC	National Recommended Water Quality Criteria
NTCRA	Non-Time Critical Removal Action

PCE	Tetrachloroethylene
PQL	Practical Quantitation limit
PRP	Potentially Responsible Party
RAO	Remedial Action Objectives
RBA	Relative bioavailability
RfCs	Reference Concentrations
RfDs	Reference Dose
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
RSL	Regional Screening Level
Site	Saco Municipal Landfill Superfund Site
SWQC	Surface Water Quality Criteria
TBC	To Be Considered
TCE	Trichloroethylene
UCL	Upper control limit
µg/L	Micrograms per liter
URFs	Unit Risk Factors
USGS	United States Geological Survey
VISLs	Vapor Intrusion Screening Levels
VOCs	Volatile organic compounds

ES EXECUTIVE SUMMARY

This is the third Five-Year Review (FYR) for the Saco Municipal Landfill Superfund Site (the Site) located in Saco, York County, Maine. The purpose of this FYR is to review information to determine if the remedy is and will continue to be protective of human health and the environment. The triggering action for this statutory FYR was the signing of the previous FYR on September 9, 2010.

The Site is located on Foss Road, in York County, Maine. The Site consists of two parcels of land (approximately 90 acres combined) owned by the City of Saco (Figure 1). The Site includes four separate landfill areas (Landfill Areas 1, 2, 3, and 4) that comprise approximately 30 acres (Figure 2). The City of Saco owned and operated the four-landfill areas from 1963 until 1988 and is the Potentially Responsible Party (PRP) at the Site. Numerous investigations have been performed at the Site. Early environmental investigations identified groundwater and surface water quality problems that were believed to be associated with outbreak of landfill leachate. Because the results of early investigations identified suspected contamination in nearby shallow wells, the municipal water supply was extended to residents along Buxton Road (Route 112) in 1975. In 1990, the United States Environmental Protection Agency (EPA) placed the Site on the National Priorities List (NPL).

In 1995, the City of Saco entered into an Administrative Order with EPA to conduct a Remedial Investigation and Feasibility Study (RI/FS). The results for the Remedial Investigation (RI) Report determined that leachate from Landfill Areas 3 and 4 was causing reducing conditions that mobilized the naturally occurring arsenic and manganese into the groundwater beneath the Site, resulting in the discharge of contaminants to a wetland seep area and into surface water and sediments of Sandy Brook.

In 1996, EPA signed an Action Memorandum to initiate a Non-Time Critical Removal Action (NTCRA) at the Site to address the source of contamination to groundwater below the Site. The NTCRA was completed in 1999. The objective of the NTCRA was to consolidate contaminated soils, sediments and wastes within Landfill Areas 3 and 4; excavate several pockets of solid waste (approximately 5,000 cubic yards) located outside the landfill footprint and consolidate the materials into Landfill Areas 3 and 4; design and construct a multi-layer barrier landfill cap over Landfill Areas 3 and 4; develop land use restrictions to restrict future use of the Site; and create

a new on-site wetlands area southeast of Landfill Area 4 to compensate for the wetlands impacted by the cap construction.

Concurrent with the NTCRA, a supplemental RI was performed at the Site between 1997 and 1998 and included United States Geologic Survey (USGS) geologic and hydrologic surveys. The data were used to further characterize the nature and extent of contamination at the Site in support of the FS, which became final in July 2000. EPA subsequently signed the Record of Decision (ROD) for the Site in September 2000 (USEPA, 2000). The ROD specified the selected remedy which includes long-term maintenance of the cap constructed during the NTCRA; monitored natural attenuation of groundwater; long-term surface water and sediment monitoring and evaluation; and institutional controls to address the primary Site risks.

This is the third FYR for the Saco Municipal Landfill Superfund Site. The triggering action for this statutory review is the signing of the second FYR on September 9, 2010. The FYR is required because hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure.

This FYR concludes that the remedy is functioning as intended and is protective of human health and the environment in the short-term. There are no current exposures of Site-related waste to humans or the environment at concentrations that would represent a health concern. The landfill cover system prevents exposure to waste material and contamination within the landfill. The institutional controls (ICs) and the municipal water line that was installed have eliminated groundwater use in areas impacted by the Site. The ICs prevent any land use that would result in exposures to Site-related contaminants. The maximum contaminant level (MCL) for arsenic has changed since the signing of the ROD from 50 microgram per liter (µg/L) to 10 µg/L. EPA will adjust the cleanup level for arsenic prior to certifying that cleanup levels have been achieved. Routine inspections and maintenance will continue to be performed at the landfill to ensure the cover system remains protective. Long-term groundwater, surface water, and sediment sampling will continue to be performed to evaluate the overall progress of the remedy towards achieving cleanup goals.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Saco Municipal Landfill Superfund Site		
EPA ID: MED980504393		
Region: 1	**State:** ME	**City/County:** Saco/York
SITE STATUS		
NPL Status: Final		
Multiple OUs? No	**Has the site achieved construction completion?** Yes	
REVIEW STATUS		
Lead agency: EPA		
Author name (Federal or State Project Manager): Leslie McVickar		
Author affiliation: U.S. Environmental Protection Agency		
Review period: 4/9/2015 - 7/10/2015		
Date of site inspection: 5/28/2015		
Type of review: Statutory		
Review number: 3		
Triggering action date: 9/9/2010		
Due date *(five years after triggering action date)*: 9/9/2015		

Five-Year Review Summary Form (continued)

Issues/Recommendations

Issues and Recommendations Identified in the Five-Year Review:

OU(s): *Site-wide*	**Issue Category: No Issue**			
	Issue: ROD does not reflect current MCL for arsenic.			
	Recommendation: Revise the groundwater cleanup level for arsenic in a future decision document to the current MCL of 10 µg/L; the concentration to be used to evaluate the long-term cleanup of groundwater.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	EPA	EPA	Ongoing

Protectiveness Statement(s)

Operable Unit:	*Protectiveness Determination:*	*Addendum Due Date (if applicable):*
Site-wide	Short-term Protective	Not applicable

Protectiveness Statement:

The remedy is considered protective of human health and the environment in the short-term. There are no current exposures of Site-related waste to humans or the environment at concentrations that would represent a health concern. The landfill cover system prevents exposure to waste material and contamination within the landfill. The ICs and the municipal water line that was installed have eliminated groundwater use in areas impacted by the Site. The ICs prevent any land use that would result in exposures to Site-related contaminants. The MCL for arsenic has changed since the signing of the ROD from 50 µg/L to 10 µg/L. EPA will adjust the cleanup level for arsenic prior to certifying that cleanup levels have been achieved. Routine inspections and maintenance will continue to be performed at the landfill to ensure the cover system remains protective. Long-term groundwater, surface water, and sediment sampling will continue to be performed to evaluate the overall progress of the remedy towards achieving cleanup goals and long-term protectiveness.

I INTRODUCTION

The purpose of a Five-Year Review (FYR) is to evaluate the implementation and performance of a remedy in order to determine if the remedy will continue to be protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in FYR reports. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The U.S. Environmental Protection Agency (EPA) prepares FYRs pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121 and the National Contingency Plan (NCP). CERCLA 121 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."*

EPA interpreted this requirement further in the NCP; 40 Code of Federal Regulations (CFR) Section 300.430(f)(4)(ii), which 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 actions no less often than every five years after the initiation of the selected remedial action."*

EPA conducted a FYR on the remedy implemented at the Saco Municipal Landfill Superfund Site (the Site) in Saco, York County, Maine. EPA is the lead agency for developing and implementing the remedy for the Site. The Maine Department of Environmental Protection (Maine DEP), as the

support agency representing the State of Maine, has reviewed all supporting documentation and provided input to EPA during the FYR process.

This is the third FYR for the Site. The triggering action for this statutory review is the signing of the second FYR on September 9, 2010. The FYR is required because hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure.

II PROGRESS SINCE THE LAST REVIEW

The second FYR was signed on September 9, 2010. In 2010, the remedy was considered protective in the short-term and long-term. Tables 1 and 2 below provide the protectiveness statement and recommendations from the 2010 FYR.

Table 1
Protectiveness Determinations/Statements from the 2010 FYR

OU #	Protectiveness Determination	Protectiveness Statement
Site-wide	Protective	All immediate threats at the Site have been addressed, and the remedy is expected to be protective of human health and the environment in the short term because of the institutional controls, alternative water supply, and the eventual restoration of the groundwater to cleanup levels. The remedy is considered protective of human health and the environment in the short-term because: • There is no current exposure of Site-related waste to humans or the environment at levels that would represent a health concern. • The landfill cover system prevents exposure to the waste material and contaminants within the landfill. • The public water line has eliminated groundwater use within the area impacted by the landfill. • The land use restriction prevents any use of the land that would result in an exposure to hazardous substances, pollutants, or contaminants. To ensure short-term protectiveness, there will be continued performance of operation, maintenance, and monitoring activities. Due to a change in the acceptable level for arsenic in groundwater, a reduction in the cleanup level for arsenic will be necessary prior to the certification that the groundwater has been fully restored and long-term protectiveness has been achieved.

Table 2
Status of Recommendations from the 2010 FYR

OU #	Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Party	Original Milestone Date	Current Status	Completion Date (if applicable)
Site-wide	The need to revise the groundwater cleanup level for arsenic to reflect a current MCL to evaluate the long-term cleanup of the groundwater.	Revise the groundwater cleanup level for arsenic in the future to evaluate the long-term cleanup of the groundwater.	PRP	EPA/State	NA	Ongoing	NA

STATUS OF RECOMMENDATIONS FROM THE 2010 FYR

Recommendation 1

To address the recommendation to revise the cleanup level for arsenic in the future, long-term monitoring of groundwater continued. Data collected was evaluated to ensure current protectiveness as well as to support the future evaluation of the long-term cleanup of groundwater. All data collected at the Site is reviewed and summarized in annual long-term monitoring reports prepared by the City of Saco, who is the Site PRP.

Remedy Implementation Activities and Institutional Controls

There have been no Remedy Implementation Activities performed at the Site since the second FYR was completed in 2010. A summary of historical Site investigations and Remedy Implementation Activities are included in Appendix A.

ICs for the Site were completed prior to the ROD. Land and groundwater use has been restricted by the "Grant of Environmental Restrictions and Right of Access" (Environmental Restrictions) agreed to by the City, the EPA, and the Maine DEP. These Environmental Restrictions are considered necessary to ensure long-term protection of public health. The Environmental Restrictions include:

- No use that disturbs the integrity of any layers of the cap, or any other structures for maintaining the effectiveness of the Removal Action, whether in place now or put in place in the future;

- No groundwater use, including, but not limited to, use as a drinking water supply. No groundwater wells shall be installed within the Groundwater Restriction Parcel except for purposes of groundwater monitoring pursuant to a plan approved by the City, EPA and Maine DEP;

- No use of the waters of Sandy Brook within the Groundwater Restriction Parcel; and

- No residential development and no activity or use at the Site which adversely impacts the NTCRA, whether now or in the future, including, without limitation: (1) systems and areas to collect and/or contain groundwater, surface water runoff, or leachate; (2) systems or containment areas to excavate, dewater, store, treat, and/or dispose of soils and sediments; and (3) systems and studies to provide long-term environmental monitoring of groundwater, surface waters, and sediments and to ensure the long-term effectiveness of the Removal Action and its protectiveness of human health and the environment.

The City of Saco ensures that the ICs remain in effect.

System Operation and Maintenance Activities

The operation, maintenance, and monitoring activities are performed by the PRP. Monitoring and maintenance reports are submitted to EPA and Maine DEP for review. In addition, EPA's oversight contractor performs routine Site inspections and oversees PRP activities, as necessary.

The operation and maintenance activities focus on maintaining the vegetative cover of the landfill cap, monitoring the physical condition of drainage structures and gas vents, monitoring for nuisance rodents and invasive plant species, and repair of erosion. Monitoring activities include collection and analysis of environmental samples to monitor contaminant of concern (COC) concentration trends in surface water, sediments, and groundwater.

III FIVE-YEAR REVIEW PROCESS

Administrative Components

The public was notified of the initiation of the Five-Year Review on January 5, 2015. The Saco Municipal Landfill Superfund Site Five-Year Review was led by Ms. Leslie McVickar of the EPA, Remedial Project Manager (RPM) for the Site and Sarah White, the Community Involvement Coordinator (CIC). Iver McLeod, of the Maine DEP, assisted in the review as the representative for the support agency.

The review, which began on April 9, 2015, consisted of the following components:

- Community Involvement;
- Document Review;
- Data Review;
- Site Inspection; and
- Five-Year Review Report Development and Review.

Community Notification and Involvement

Activities to involve the community in the FYR process were initiated in January 2015. Per Region 1 policy, a region-wide press release announcing all upcoming five-year reviews in New England was issued on January 5, 2015 and is attached in Appendix B. The results of the review and report will be made available online and at the following repositories:

Saco City Hall, 300 Main Street, Saco, ME 04072

EPA Records and Information Center, 1st Floor
5 Post Office Square, Suite 100 (HSC)
Boston, MA 02109-3912
(617) 918-1440

Document Review

This FYR consisted of a review of relevant documents, which included the following:

- September 2000 ROD
- Consent Decree
- O&M records
- Long-Term Monitoring Reports and Data
- Soil and Groundwater Cleanup Standards and
- Previous FYR Reports

Data Review

Long-term groundwater monitoring has been performed at the Site since June 2001. The long-term monitoring well network includes 24 groundwater monitoring wells and nine surface water and sediment locations. Samples are collected semi-annually (typically May/June and October/November) and the results are discussed in annual long-term monitoring reports prepared by the PRP's consultant, Woodward & Curran. As part of the third FYR, EPA reviewed the 2014 Annual Long-Term Monitoring and Third Five-Year Review Report prepared by Woodard & Curran, dated March 31, 2015 (Woodard & Curran, 2015). As part of the report, Woodard & Curran evaluated data trends for Site COCs (arsenic, manganese, and benzene) and iron for each long-term monitoring location (groundwater and surface water/sediment) using data collected from June 2001 through November 2014. A summary of the results is provided in the sections below. Data summary tables presented in the 2014 Annual Long-Term Monitoring and Third Five-Year Review Report are included in Appendix C.

Groundwater Elevations and Groundwater Sampling Data

A review of groundwater elevation data provided in the 2014 Annual Long-Term Monitoring and Third Five Year Review Report indicates that overburden groundwater flow from Landfill Areas 1 and 2 is generally west/southwest towards Sandy Brook. There are no bedrock monitoring wells in Landfill Areas 1 and 2 from which to measure groundwater elevations. Overburden and bedrock groundwater flow from Landfill Areas 3 and 4 is generally to the east/southeast towards Sandy Brook.

Concentrations of arsenic and manganese exceed interim cleanup levels (ICLs) in the majority of wells across the Site. Concentrations of benzene have not been detected above ICLs in any monitoring well in the last five years. A summary of increasing and decreasing trends in groundwater from 2001 through 2014 is presented in the table below.

Table 3
Summary of Increasing and Decreasing Trends in Groundwater (2001 – 2014)

Analyte	Sample Location ID	Landfill Area Monitored	Geologic Unit
Increasing Trends			
Arsenic	MW-93-1	Upgradient/Background	Overburden
	MW-95-4RD	Landfill Areas 3 and 4	Bedrock
	MW-97-13R	Landfill Areas 3 and 4	Bedrock
	MW-96-9R	Landfill Areas 3 and 4	Bedrock
Manganese	MW-93-7	Upgradient/Background	Overburden
Decreasing Trends			
Benzene	MW-13	Landfill Areas 1 and 2	Overburden
	MW-95-3R	Landfill Areas 3 and 4	Bedrock
	MW-95-4R	Landfill Areas 3 and 4	Bedrock
	MW-95-4RD	Landfill Areas 3 and 4	Bedrock
	MW-97-13R	Landfill Areas 3 and 4	Bedrock
Arsenic	MW-95-3R	Landfill Areas 3 and 4	Bedrock
	MW-95-6S	Landfill Areas 3 and 4	Overburden
	MW-97-14S-1	Landfill Areas 3 and 4	Overburden
	MW-97-19S	Landfill Areas 3 and 4	Overburden
	MW-93-5	Landfill Areas 3 and 4	Overburden
Iron	MW-13	Landfill Areas 1 and 2	Overburden
	MW-95-1R	Landfill Areas 3 and 4	Bedrock
	MW-95-1S	Landfill Areas 3 and 4	Overburden
	MW-95-3R	Landfill Areas 3 and 4	Bedrock
	MW-95-4SA	Landfill Areas 3 and 4	Overburden
	MW-95-4SB	Landfill Areas 3 and 4	Overburden
	MW-95-6S	Landfill Areas 3 and 4	Overburden
	MW-97-19S	Landfill Areas 3 and 4	Overburden
	MW-97-14S-1	Landfill Areas 3 and 4	Overburden
	MW-93-5	Landfill Areas 3 and 4	Overburden
	MW-95-7R	Landfill Areas 3 and 4	Bedrock
Manganese	MW-93-1	Upgradient/Background	Overburden
	MW-13	Landfill Areas 1 and 2	Overburden
	MW-95-9S	Landfill Areas 1 and 2	Overburden
	MW-95-1R	Landfill Areas 3 and 4	Bedrock
	MW-95-1S	Landfill Areas 3 and 4	Overburden

Analyte	Sample Location ID	Landfill Area Monitored	Geologic Unit
	MW-95-3R	Landfill Areas 3 and 4	Bedrock
	MW-95-4SA	Landfill Areas 3 and 4	Overburden
	MW-95-4SB	Landfill Areas 3 and 4	Overburden
	MW-95-6S	Landfill Areas 3 and 4	Overburden
	MW-97-13R	Landfill Areas 3 and 4	Bedrock
	MW-97-14S-1	Landfill Areas 3 and 4	Overburden
	MW-97-19S	Landfill Areas 3 and 4	Overburden
	MW-93-5	Landfill Areas 3 and 4	Overburden
	MW-95-7R	Landfill Areas 3 and 4	Bedrock
	MW-96-9R	Landfill Areas 3 and 4	Bedrock

Note: Data in this table is based on Table 4-12 as presented in Woodard & Curran, 2015.

The results of the data trend analysis concluded that concentrations of iron and manganese exhibit statistically significant decreasing trends with time in approximately half of the Site monitoring wells. Decreasing arsenic trends were observed in five monitoring wells (four overburden and 1 bedrock) in Landfill Areas 3 and 4. The decreasing trends suggest that natural attenuation is occurring in some parts of the Site. Long-term monitoring should continue so that data trends can be evaluated against the estimated cleanup time period stated in the 2000 ROD (60-100 years).

Monitoring well MW-93-1 is located hydraulically upgradient of Landfill Areas 1 and 2 (Figure 2) and represents background conditions at the Site. Arsenic concentrations at this location have historically exceeded the ICL and have shown a slightly increasing trend since 2001. However, all concentrations are below the ICL of 50 µg/L but above the current MCL of 10 µg/L.

Surface Water

There were no significant data trends observed for arsenic, iron, or manganese concentrations at the nine surface water sampling locations. The highest concentrations of COCs tend to be observed at sampling locations SW-52, SW-13, SW-37, and SW-34, which are located slightly upstream, adjacent to, and just downstream of the primary seep area, respectively. The concentrations will likely decrease over time as COCs in groundwater discharging to Sandy Brook continue to attenuate.

Sediment

Decreasing trends of arsenic and iron concentrations were noted at sediment sample locations SD-21 and SD-31. A decreasing trend in manganese concentrations was noted at sediment sample location SD-7. There were no other apparent data trends observed at any sediment sampling location. The 2000 Environmental Risk Assessment (ERA) determined that concentrations of arsenic greater than 106 milligrams per kilogram (mg/kg) could impact benthic organisms by causing a moderate reduction in growth and reproduction. In the last five years, two arsenic detections have exceeded 106 mg/kg. Both detections were at sample location SD-34 with a maximum concentration of 287 mg/kg detected in the sample collected in June 2011. The ROD states that EPA will re-evaluate the potential environmental impacts of site contamination if individual sample locations reveal arsenic levels above 200 mg/kg in isolated locations or a more extensive area if arsenic levels are above 100 mg/kg. Arsenic concentrations above 100 mg/kg appear to be limited to the area around location SD-34 with limited detections above 100 mg/kg. One arsenic detection (SD-34 in June 2011) has exceeded 200 mg/kg in the last five years. Based on the limited number of detections exceeding 100 mg/kg and 200 mg/kg, re-evaluation of Site-related impacts to sediment are not warranted at this time. COC concentrations in sediment will continue to be monitored during semi-annual sampling events.

SITE INSPECTION

The inspection of the Site was conducted on May 28, 2015. Representatives in attendance during the Site inspection were EPA (EPA's oversight contractor Nobis Engineering, Inc.) and the PRP's consultant Woodard & Curran. A copy of the landfill inspection report is included in Appendix D. The inspection included the following activities:

- Walking the perimeter and top of the landfill cap to look for evidence of erosion, cap disturbance, settlement, and growth of vegetation;
- Inspecting the on and off-cap storm water control structures for damage, settlement, sedimentation, vegetation, and blockage; and
- Inspecting the above ground portions of structures that penetrate the cap (i.e., gas vents) for damage.

The results of the Site inspection are presented below according to the various components of the landfill cover system.

Landfill Surface

The vegetative cover over the landfill surface was generally in good condition. EPA observed two areas of thin cover. One area was located in the southwest area of the cap near Bench I. The other area was a small bare spot located along the north side of the riprap channel located along the southwestern toe of the landfill slope.

During historical inspections, animal burrows were in two locations on the cap—at the base of GV-15 and above the culvert outlet at the southern end of the sedimentation basin. Currently, the burrow at the base of GV-15 appears to be filled in/abandoned and the burrow above the culvert has been repaired. There were no new burrows identified during the FYR Site inspection.

A small piece of filter fabric material was observed protruding from the ground in an area located north of the perimeter drain on the north slope of the landfill. It is unclear at this time what caused the fabric to become exposed.

Benches

The benches were observed to be in generally good condition with no major signs of erosion, undermining, bypass, breaching, or ponded water. EPA observed a 5-foot long area of light erosion of the soil at the upper edge of the riprap and geo-fabric lining of bench channel "E", along the bend at the bottom of the channel which is immediately south of the perimeter access road. Minor sediment deposits were observed in the channel and downstream of this location at the outlet of the culvert under the perimeter access road. The channel is still operational and does not require immediate repairs; however, this area should be monitored and repaired if further erosion is observed.

Letdown Channels (down-drains)

The gabion-lined letdown channels on the east end and northwest slope of the landfill were in good condition with no signs of settlement, material degradation, erosion, undercutting, or obstructions. The sump between the eastern down-drain and the sedimentation basin appeared to be in good condition with no obstructions.

Cover Penetrations

Cover penetrations throughout the landfill cover system include 20 passive gas vent structures, numbered GV-1 through GV-20. The vents were generally found to be in good condition, but some damage was observed.

The majority of the vent riser pipes were leaning down slope at various degrees of tilt. A review of inspection photos from the previous five years suggests that the amount of tilt has not changed significantly, and it appears that the gas vents are not actively moving.

GV-11 and GV-15 exhibited the furthest extent of tilt. The tilt did not appear to be impacting the effectiveness of the vents, and no crimping or other structural deformity was observed. A review of photos from previous inspections identified no apparent change to the tilt of the gas vents.

EPA observed gashes in the outer geomembrane boot at the base of GV-11, GV-15, GV-8, GV-9, and GV-5 that may have been caused by mowing equipment. The damaged portions of the geomembrane boots are not physically connected to the landfill cap geomembrane. The vents will continue to be monitored for damage to the inner vent section that connects to the cap geomembrane.

Monitoring Wells

There have been no reports of issues with the security or integrity of the monitoring wells adjacent to the landfill cap. Monitoring wells appeared to be contained in protective standpipes with locked caps.

Cover Drainage Layer

The outlet pipes and riprap outlet zone of the drainage layer at the perimeter of the cover system appeared to be in good condition. No apparent damage to the outlet pipes or displacement of the riprap was observed. Rodent guards were present and in good condition on all of the outlet pipes.

Sedimentation Basin

The sedimentation basin and outlet structures appeared to be in good condition and well maintained. There were no signs of settlement, material degradation, erosion, undercutting, or obstructions, and water was observed flowing freely from the outlet structures. An area of Japanese Knotweed (an invasive species) at the eastern end of the basin was observed during previous inspections. During the FYR inspection, EPA noted the Japanese knotweed had been cut down. While the current stand of Knotweed is not located on the cap, it should continue to be controlled to prevent spread to other areas of the Site and the landfill cap.

Retaining Walls

No significant bulging or tilting was observed in the gabion baskets forming the retaining structure at the bottom of the down-drain on the east end of the landfill.

Perimeter Ditches and Off-Site Discharge

The perimeter ditches were in good condition at the time of the inspection. All of the drainage culverts also appeared to be in good condition.

During the FYR inspection, EPA observed a new stand of Japanese Knotweed growing near a small riprap lined drainage area located approximately 75 feet from the southwestern corner of the landfill. This stand of Knotweed is not located on the cap; it should be controlled to prevent spread to other areas of the Site and the landfill cap.

Perimeter Roads

EPA observed light rutting at the terminus of the perimeter road to the south of the Area 4 landfill; this rutting was unchanged from previous inspections. EPA observed light rutting at the end of the northern perimeter road near the granite stockpiles. Should this condition worsen, repairs may be necessary. Otherwise, the perimeter roads were in good condition with no signs of erosion, ruts, or potholes.

PAST INSPECTIONS

Semi-annual inspections of the Saco Municipal Landfill have been conducted by the PRP, EPA (EPA's oversight contractor Nobis Engineering, Inc.), and Maine DEP since 2005. There have been no major issues regarding the operation and maintenance of the landfill remedial system. Operations, maintenance, and monitoring have adequately established the landfill cap integrity.

INTERVIEWS

During the FYR process, interviews were conducted with parties impacted by the Site, including the City of Saco (current landowners), PRP consultant (Woodard & Curran) and the Maine DEP, who are all involved in Site activities or aware of the Site. The purpose of the interviews was to document any perceived problems or successes with the remedy that has been implemented to date. Interviews were conducted from June 5 through July 2, 2015. Interviews are included in Appendix E. The following people were interviewed as part of the FYR:

- Mr. Iver McLeod, Remedial Project Manager, Maine DEP
- Mr. Thomas Eschner, PG, Sr. Project Manager, Woodard & Curran
- Mr. Patrick Fox, Public Works Director, City of Saco, Maine

There were no issues identified during the interviews performed during this FYR.

IV TECHNICAL ASSESSMENT

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

Remedial Action Performance

Yes. The remedy is performing as intended, as indicated by the following:

- The landfill cap remains in good condition and continues to isolate and prevent direct contact with the solid waste contained within the landfill.

- The groundwater contaminant plume has not expanded beyond the area defined by the ROD.
- Groundwater, surface water, and sediment concentrations remain within the range of concentrations identified in the ROD.

System Operations/Operation and Maintenance

Operation and maintenance of the cap continues to be effective. Issues identified during the routine Site inspections by Nobis Engineering, Inc. on behalf of the EPA are regularly addressed or continue to be monitored as recommended. The monitoring well network appears to be adequate to define the current extent of the groundwater plume and monitor the progress of the cleanup.

Opportunities for Optimization

This FYR did not identify any changes in operating procedures that would further optimize the cleanup actions.

Early Indicators of Potential Issues

The physical components of the remedy are in good condition and appear to be functioning as intended. A review of historical groundwater indicates that some natural attenuation of COCs is occurring in certain portions of the Site. Long-term monitoring should continue so that data trends can be evaluated against the estimated cleanup time period stated in the 2000 ROD (60-100 years).

Implementation of Institutional Controls and Other Measures

A restrictive covenant has been placed on the property to prevent the use of the contaminated groundwater. The main access is fenced. No activities were observed that would have violated the ICs.

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

No, some of the exposure assumptions, toxicity data, and methods of evaluating risk used at the time of the 1998 Human Health Risk Assessment (HHRA) and the 2000 ROD remedy selection are no longer valid. However, the landfill cap, sediment removal, and ICs have eliminated the human health and ecological exposure pathways addressed by the 2000 ROD; therefore, these changes do not impact the short term protectiveness of the remedy. The cleanup levels and RAOs used at the time of the remedy selection are still valid and EPA will adjust the cleanup level for arsenic prior to certifying that the remedial objectives have been achieved.

CHANGES IN STANDARDS AND TO BE CONSIDERED (TBCS)

As part of the third FYR, the Applicable, Relevant, and Appropriate Requirements (ARARs) and To Be Considered (TBCs) were reviewed for changes that might affect the protectiveness of the remedy.

Source contamination was addressed under the NTCRA source control remedy completed in 1999. ARARs related to the construction of the components of the source control remedy (soil and sediment removal and construction of the landfill cap) were met prior to the September 2000 ROD and remain unchanged. The ROD presented ARARs related to the groundwater response action selected to control the migration of the contamination in groundwater. Table D-1 in the ROD contained the chemical-specific ARARs and TBCs. The ROD lists federal maximum contaminant levels (MCLs), non-zero maximum contaminant level goals (MCLGs), Maine maximum exposure guidelines (MEGs), and Maine Surface Water Quality Criteria (SWQC) as chemical specific ARARs, and arsenic, manganese, and benzene as the only COCs. The following discussions address these chemical-specific ARARs and other applicable TBCs.

Federal Maximum Contaminant Levels (MCLs)

As noted in the 2005 and 2010 Five Year Reviews, the MCL for arsenic has changed since the signing of the ROD from 50 µg/L to 10 µg/L. There have been no further changes to the MCLs for COCs since the 2010 Five Year Review. Since there is no current exposure to the Site impacted groundwater, the short-term protectiveness of the cleanup has not changed. EPA will adjust the cleanup level for arsenic prior to certifying that cleanup levels have been achieved.

Federal Maximum Contaminant Level Goals (MCLGs)

There have been no changes to the MCLGs for COCs since the 2010 Five Year Review.

Maine Maximum Exposure Guidelines (MEGs)

The Maine MEGs were updated in 2012 and include a revision to the MEG for manganese from the value of 200 µg/L cited in the ROD to a less stringent 2012 MEG of 500 µg/L. Since the ROD cleanup level is more stringent than the current MEG, this change does not impact either short-term or long-term protectiveness of the remedy.

Environmental Protection Agency Reference Doses (RfDs) and Cancer Slope Factors (CSFs)

EPA toxicity values including RfDs and CSFs are routinely re-evaluated and updated. Reference concentrations (RfCs) and inhalation unit risk factors (URFs) are also available for evaluation of risks via the inhalation pathway. Currently, the primary source of toxicity values is the EPA Integrated Risk Information System (IRIS) database (USEPA, 2015b). These toxicity values are used in the calculations of risk in the HHRA and the development of site-specific and more generic risk-based screening values or clean-up goals. Changes have occurred to toxicity values used for the HHRA (e.g., trichloroethene (TCE), tetrachloroethene (PCE), etc.). See changes in toxicity discussion below. Because the source control remedy relies on a cap to prevent exposures of contaminants by direct contact with soils and there is no current exposure to the Site impacted groundwater, these changes do not impact the short-term protectiveness of the remedy. Because the remedy relies on MCLs and MEGs as cleanup goals, these changes do not impact the long-term protectiveness of the remedy.

EPA Regional Screening Levels (RSLs)

The RSLs were not listed previously as ARARs or TBCs. The EPA risk-based RSLs are used to identify contaminants of potential concern (COPCs) to be evaluated quantitatively in the HHRA. The RSLs are developed based on a target cancer risk level of 1E-06 or a non-cancer hazard quotient level of 1. They can be found at this EPA website;

http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/. They are updated twice per year to address any changes in toxicity values or other contributing factors. This most recently occurred in June 2015 (USEPA, 2015a). Because the source control remedy relies on a cap to prevent exposures of contaminants by direct contact with soils and there is no current exposure to the Site impacted groundwater, these changes do not impact the short-term protectiveness of the remedy. Because the remedy relies on MCLs and MEGs as cleanup goals, these changes do not impact the long-term protectiveness of the remedy.

EPA Vapor Intrusion Screening Levels (VISLs)

The risk-based VISLs were not listed previously as ARARs or TBCs. EPA introduced the VISLs in 2012 as a tool to evaluate the vapor intrusion pathway. The VISLs can be found at this EPA website http://www.epa.gov/oswer/vaporintrusion/guidance.html#Item6 and are updated periodically to address any changes in toxicity values or other contributing factors; most recently in June 2015 (USEPA, 2015). Because there are no occupied buildings overlying the area of contamination and land-use restrictions are in place to prevent future building construction over the area of contamination, the vapor intrusion pathway is incomplete and the update to VISLs do not impact the short-term or long-term protectiveness of the remedy. However, the groundwater cleanup levels (MCLs and MEGs) are not designed to be protective of the vapor intrusion pathway. Because the groundwater VISLs are based on cancer risk of $1E^{-6}$ and hazard quotient (HQ) of 1 and are more stringent than the MCLs and MEGs for some contaminants, the cleanup goals may not be sufficiently protective should occupied buildings be built over the contaminated groundwater or if the edge of the plume migrated beneath occupied buildings. Any future planned redevelopment activities at the Site should consider the potential for vapor intrusion in the redevelopment plans and further evaluation of this potential future pathway would be necessary to ensure protectiveness.

Federal Ambient Water Quality Criteria (AWQC)

AWQC protect aquatic life and human health. The human health criteria based on the consumption of surface water as drinking water and consumption of fish are not applicable to the Site because these exposure pathways are incomplete. The AWQC (now known as National Recommended Water Quality Criteria (NRWQC)) (USEPA, 2005) that are applicable to the Site include fresh water Criteria Maximum Concentrations (CMC) and fresh water Criteria Continuous

Concentrations (CCC) for the protection of aquatic life. Although the NRWQC table has been updated, there have been no changes to the AWQC for any of the COCs since the ROD.

Maine Surface Water Quality Standards

Maine surface water quality standards include the SWQC, which are similar to the federal AWQC for protection of aquatic life and human health, and include a non-degradation requirement. These standards were last updated in July 2012 (Maine DEP Chapter 584: Surface Water Quality Criteria for Toxic Pollutants). As stated above, consumption of surface water as drinking water and consumption of fish are not applicable to the Site. The criteria for the protection of aquatic life for the identified COCs remain unchanged since the signing of the ROD. The ROD established a site-specific non-degradation based standard for arsenic in surface water of 3 µg/L based on the practical quantitation limit (PQL), pending development of a site-specific background concentration.

CHANGES IN EXPOSURE PATHWAYS

The 1998 HHRA evaluated potential exposures to contaminants in groundwater, soil, surface water, and sediment. The evaluated exposure pathways included:

- Hypothetical future residential use of groundwater as drinking water (ingestion, dermal contact, and inhalation of volatiles); and
- Trespasser/recreational user incidental ingestion and dermal contact with soil, sediment, and surface water.

The groundwater study area was evaluated at two different exposure points, downgradient of Landfill Areas 1 and 2 and wells southeast of Landfill Areas 3 and 4. The HHRA identified cancer risks and non-cancer health hazards at levels exceeding EPA and state risk management criteria based on future residential exposures to groundwater in both areas.

No significant risks from soil, sediment, and surface water pathways were identified.

The 2010 Five Year Review evaluated potential exposures of waders in the brook downgradient of the landfill to contaminated soil/sediment and surface water and concluded that there is no unacceptable risk.

No individuals are currently exposed to contaminated groundwater. With the installation of the alternate water supply and completion of the landfill cap, these exposure pathways are now incomplete. Although the exposure pathways used at the time of the remedy selection remain the only primary pathways of past, current, or future concern regarding the Site, a conservative human health risk calculation for potential exposure to waders in the brook downgradient from the landfill was developed and included in the 2010 Five Year Review. The results indicated that there is no unacceptable risk to human health from direct contact with contaminated soil/sediment in Sandy Brook. There is no basis to develop or consider additional exposure pathways or risk evaluations.

Although volatile contaminants were included in the groundwater COPCs in the HHRA, the HHRA did not evaluate a vapor intrusion pathway. However, because there are no buildings overlying the contaminant plume, this pathway is not a concern at this Site under current conditions. Should any future redevelopment activities be planned for the Site, the vapor intrusion pathway would need to be considered in the redevelopment plans and further evaluation of this potential future pathway would be necessary to ensure protectiveness.

The 2000 ERA focused on potential ecological effects associated with discharge of Site groundwater to Sandy Brook and exposures of benthic macroinvertebrates, fish, and reptiles to sediment. Benthic macroinvertebrates were considered the most sensitive receptors. Following sediment removal actions, the ERA identified a minimal ecological risk to benthic organisms that was limited to a small area of the brook downstream of the remediated seep, which would not have resulted in additional damage to habitat.

No additional exposure pathways for human or environmental receptors have been identified.

Since the baseline HHRA and the 2010 Five Year Review, EPA has issued new guidance regarding human health exposure assumptions used in the evaluations of human health risk.

- 2014 OSWER Directive on the Update of Standard Default Exposure Factors

  In 2014, EPA finalized the Directive to Update Standard Default Exposure Factors and frequently asked questions associated with these updates.

http://www.epa.gov/oswer/riskassessment/superfund_hh_exposure.htm (items # 22 and #23 of this web link). Many of these exposure factors differ from those used in the risk assessment supporting the 2000 ROD. These changes in general would result in a slight decrease of the risk estimates for most chemicals. (Reference: USEPA. 2014a. Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER Directive 9200.1-120. February 6, 2014.)

Although this new Directive would result in lower risks for most chemicals, it does not affect the protectiveness of the Site remedy since the remedy relies on a landfill cap to prevent exposures to contaminants in soil and MCLs and MEGs are cleanup levels for groundwater.

CHANGES IN TOXICITY AND OTHER CONTAMINANT CHARACTERISTICS

There are some changes to toxicity values for groundwater COPCs evaluated in the 1998 HHRA since the 2010 Five Year Review.

Tables F1 through F4 in Appendix F provide lists of current toxicity values for groundwater COPCs from the HHRA and any contaminants detected during the most recent groundwater, surface water, and sediment monitoring (2014) versus those in effect at the time of the 2010 Five Year Review. Those chemicals with changes in toxicity values are highlighted. Of particular note are changes to TCE, PCE, methylene chloride, and cis-1,2-dichloroethene (cis-1,2-DCE). The compounds listed below include contaminants identified as groundwater COPCs in the HHRA. In addition, although 1,4-dioxane was not listed as a COPC in the 1998 HHRA, it is included in the discussions below because of its status as an emerging contaminant at sites with chlorinated volatile organic compounds (VOCs).

New IRIS toxicity values since 2010:

- **2010 cis-1,2-DCE non-cancer toxicity values**
  In January 2010, EPA revised the non-cancer toxicity value for cis-1,2-DCE and determined that there are currently no available cancer values and no inhalation values. It is now not possible to quantify cancer risk and inhalation risk from exposure to cis-1,2-DCE.

- **2011 Methylene Chloride cancer and non-cancer toxicity values**
  On November 18, 2011, EPA finalized the toxicity assessment for methylene chloride. The new values indicate that methylene chloride is more toxic from non-cancer health effects but less toxic from cancer health effects. These toxicity changes would result in an increased non-cancer hazard and a decreased cancer risk from exposure to methylene chloride.

- **2011 TCE cancer and non-cancer toxicity values**
  On September 28, 2011, EPA finalized the December 2009 revised toxicity values for TCE. The new values indicate that TCE is more toxic from both cancer and non-cancer health effects. These toxicity changes would result in increased non-cancer hazard and cancer risk from exposure to TCE.

- **2012 PCE cancer and non-cancer toxicity values**
  On February 10, 2012, EPA finalized the cancer and non-cancer toxicity values for PCE. These new values indicate that PCE is now more toxic from cancer health effects but less toxic from non-cancer hazard effects. These toxicity changes would result in an increased cancer risk and a decreased non-cancer hazard from exposure to PCE.

- **2010 1,4-dioxane non-cancer toxicity value and 2013 cancer toxicity values**
  In 2010 and 2013, EPA finalized the toxicity assessment for 1,4-dioxane. The new values indicate that 1,4-dioxane is more toxic from both cancer and non-cancer health effects. These toxicity changes would result in increased non-cancer hazard and cancer risk from exposure to 1,4-dioxane.

Because the remedy relies on a cap to prevent exposures of contaminants by direct contact with soils and there is no current exposure to the Site impacted groundwater, these changes do not impact the short-term protectiveness of the remedy. Because the remedy relies on MCLs and MEGs as cleanup goals, these changes do not impact the long-term protectiveness of the remedy.

CHANGES IN RISK ASSESSMENT METHODS

Since 2010, EPA has introduced the following new risk assessment method applicable to the Site evaluations:

- *2012 OSWER Directive on Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil*

  Based on a compilation and review of data on relative bioavailability of arsenic in soil in 2012, arsenic was found to be less bioavailable via soil ingestion relative to other analytes. A default value of relative bioavailability (RBA) of 60% is now applied during soil/sediment ingestion calculations of risk/cleanup levels. This default RBA value reduces arsenic contribution to risk and/or increases arsenic cleanup levels. (Reference: USEPA. 2012. Compilation and Review of Data on Relative Bioavailability of Arsenic in Soil and Recommendations for Default Value for Relative Bioavailability of Arsenic in Soil Documents. OSWER Directive 9200.1-113. December 31, 2012.) Because soil exposure pathways evaluated in the HHRA are no longer complete, changes in the method for evaluating arsenic in soil do not impact the protectiveness of the remedy.

- *2014 OSWER Directive Determining Groundwater Exposure Point Concentrations, Supplemental Guidance*

  In 2014, EPA finalized a Directive to determine groundwater exposure point concentrations (EPCs) http://www.epa.gov/oswer/riskassessment/pdf/superfund-hh-exposure/OSWER-Directive-9283-1-42-GWEPC-2014.pdf. This Directive provides recommendations to develop groundwater EPCs. The recommendations to calculate the 95 percent (%) upper control limit (UCL) of the arithmetic mean concentration for each contaminant from wells within the core/center of the plume, using the statistical software ProUCL could result in lower groundwater EPCs than the maximum concentrations routinely used for EPCs as past practice in risk assessment, leading to changes in groundwater risk screening and evaluation. In general, this approach could result in slightly lower risk or lower screening levels. (Reference: USEPA. 2014b. Determining Groundwater Exposure Point Concentrations. OSWER Directive 9283.1-42. February 2014.) Although the new guidance could result in lower risk results from groundwater exposure, groundwater is not currently used as drinking water at the Site and a restrictive covenant has been placed on the property to prevent future use of the contaminated

groundwater. In addition, since no one is currently using the groundwater as potable water and the long-term remedy relies on MCLs and MEGs as cleanup goals, this change does not impact the remedy.

Expected Progress toward Meeting RAOs

The RAOs for the ROD are as follows:

- Prevent the ingestion of groundwater containing contaminants that exceed Federal or State MCLs, non-zero MCLGs, and MEGs, or in their absence, an excess cancer risk of 1×10^{-6} or a HQ of 1.

- Restore groundwater to meet Federal or State MCLs, MCLGs, MEGs, or in their absence, an excess cancer risk of 1×10^{-6} or a HQ of 1.

- Perform long-term monitoring of surface water, sediments, and groundwater to verify that the cleanup programs at the Site are protective to human health and the environment.

The cap continues to prevent direct contact with wastes and limits infiltration. ICs prevent future contact with groundwater as drinking water. Surface water and sediment monitoring supports the conclusion that the ecological receptors are protected. Therefore, the remedy remains protective of human health and the environment in the short-term.

Long-term monitoring of groundwater, surface water, and sediment has continued during the period covered by this review (2010 to 2015). Results of semi-annual groundwater sampling indicate that benzene concentrations have fallen below cleanup goals. Groundwater arsenic and manganese concentrations continue to exceed cleanup goals and do not yet meet the long-term goal of groundwater restoration. Iron and manganese concentrations in groundwater appear to be decreasing in approximately one-half the wells; however, arsenic concentrations only show a decreasing trend in five monitoring wells. Decreasing trends of arsenic and iron concentrations were noted at sediment sample locations SD-21 and SD-31. A decreasing trend in manganese concentrations was noted at sediment sample location SD-7. There were no other apparent data trends observed at any sediment sampling location. There were no significant data trends

observed for arsenic, iron, or manganese concentrations at the nine surface water sampling locations.

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

No. Based on information gathered during this FYR, no new information has come to light, which would call into question the protectiveness of the remedy. No new human or ecological receptors have been identified at this time. No evidence of significant damage due to natural disasters or lack of maintenance was noted during the site inspection. The cleanup level for arsenic will need to be lowered to the level of the new MCL prior to completion of the cleanup action; however, the groundwater is many years away from achieving compliance with cleanup levels. The new arsenic MCL may impact the time period required for cleanup, but it does not affect the protectiveness of the remedy since there is no current use of the groundwater.

Technical Assessment Summary

The remedy is performing as intended. The landfill cap remains in good condition and continues to isolate and prevent direct contact with the solid waste contained within the landfill. The groundwater contaminant plume has not expanded beyond the area defined by the ROD. Based on a review of groundwater data included in the 2014 Annual Long-Term Monitoring and Third Five Year Review Report, decreasing arsenic trends were only observed in five monitoring wells. Long-term monitoring should continue so that data trends can be evaluated against the estimated cleanup time period stated in the 2000 ROD (60-100 years).

There were no changes in ARARs or TBCs identified during the FYR that would affect the protectiveness of the remedy. The cleanup level for arsenic will need to be lowered to the level of the new MCL prior to completion of the cleanup action; however, the groundwater is many years away from achieving compliance with cleanup levels.

V ISSUES/RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Table 4
Issues and Recommendations/Follow-up Actions

OU #	Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Y/N)	
						Current	Future
Site-wide	ROD does not reflect the current MCL for arsenic.	Revise the groundwater cleanup level for arsenic in a future decision document to the current MCL of 10 µg/L; the concentration to be used to evaluate the long-term cleanup of groundwater.	EPA	EPA	Ongoing	No	Yes

EPA and Maine DEP will continue to perform periodic inspections to identify areas where maintenance may be necessary.

During 2014 sampling activities, a beaver dam was observed downstream of surface water/sediment sampling location SW/SD-34. The dam is reducing flow through Sandy Brook and causing slow flowing flood-like conditions. Samples collected under these flood-like conditions may not accurately represent groundwater impacts to surface water and sediment in these areas. However, beaver activity is unlikely to be a long-term condition. Prior to future surface water and sampling events, any potential impacts of beaver dams on the LTMP should be evaluated.

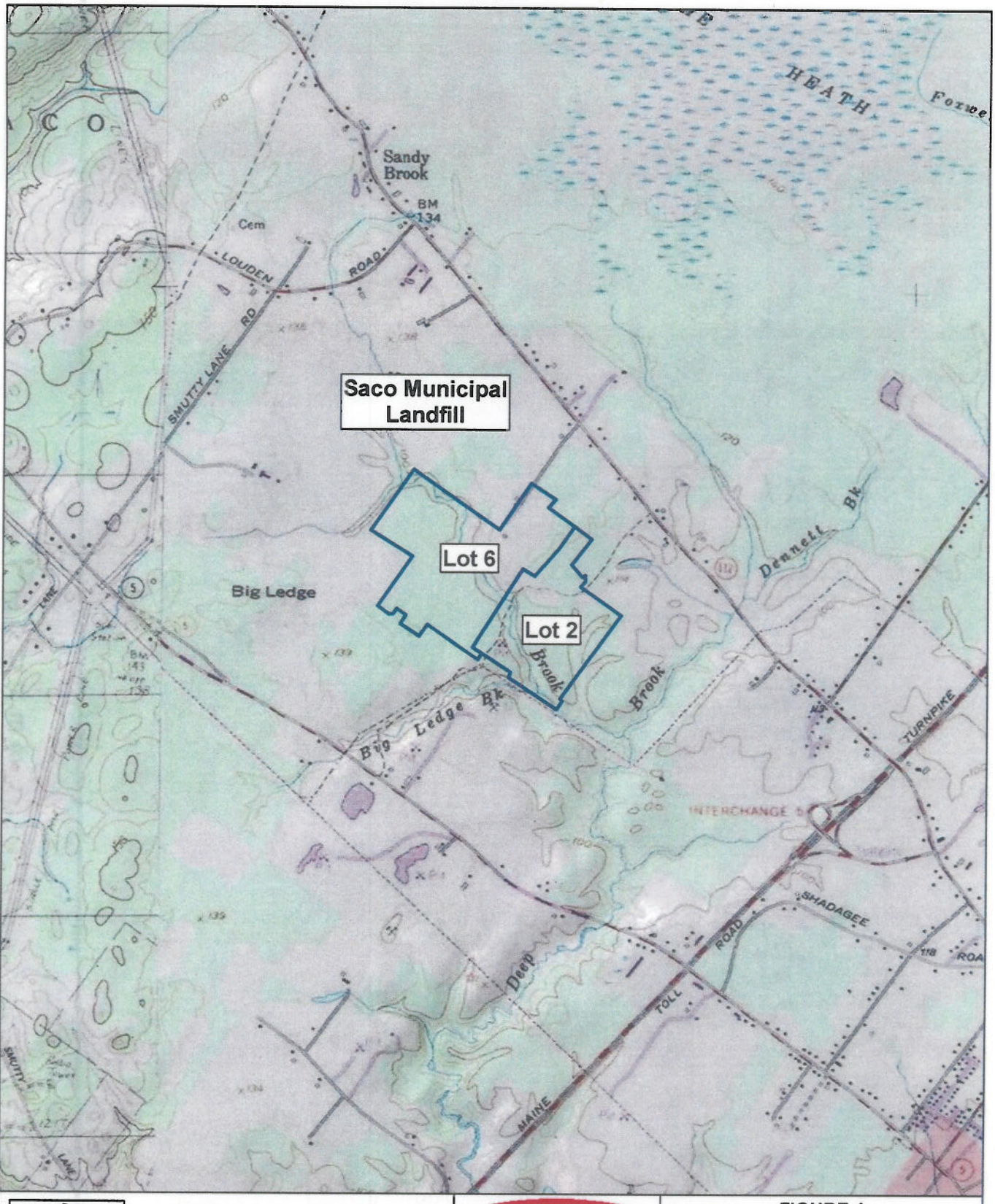
VI PROTECTIVENESS STATEMENT

Protectiveness Statement(s)		
Operable Unit:	*Protectiveness Determination:*	*Addendum Due Date (if applicable):*
Site-wide	Short-term Protective	Not Applicable
The remedy is considered protective of human health and the environment in the short-term. There are no current exposures of Site-related waste to humans or the environment at concentrations that would represent a health concern. The landfill cover system prevents exposure to waste material and contamination within the landfill. The ICs and the municipal water line that was installed have eliminated groundwater use in areas impacted by the Site. The ICs prevent any land use that would result in exposures to Site-related contaminants. The MCL for arsenic has changed since the signing of the ROD from 50 µg/L to 10 µg/L. EPA will adjust the cleanup level for arsenic prior to certifying that cleanup levels have been achieved. Routine inspections and maintenance will continue to be performed at the landfill to ensure the cover system remains protective. Long-term groundwater, surface water, and sediment sampling will continue to be performed to evaluate the overall progress of the remedy towards achieving cleanup goals and long-term protectiveness.		

VII NEXT REVIEW

The next five-year review report for the Saco Municipal Landfill Superfund Site will be completed in September 2020, five years after the signature date of this review.

FIGURES



Map Location

USGS Topographic Map
Old Orchard Beach, ME
Revised 1970

0 500 1,000 2,000
Feet
1 inch = 2,000 feet

N

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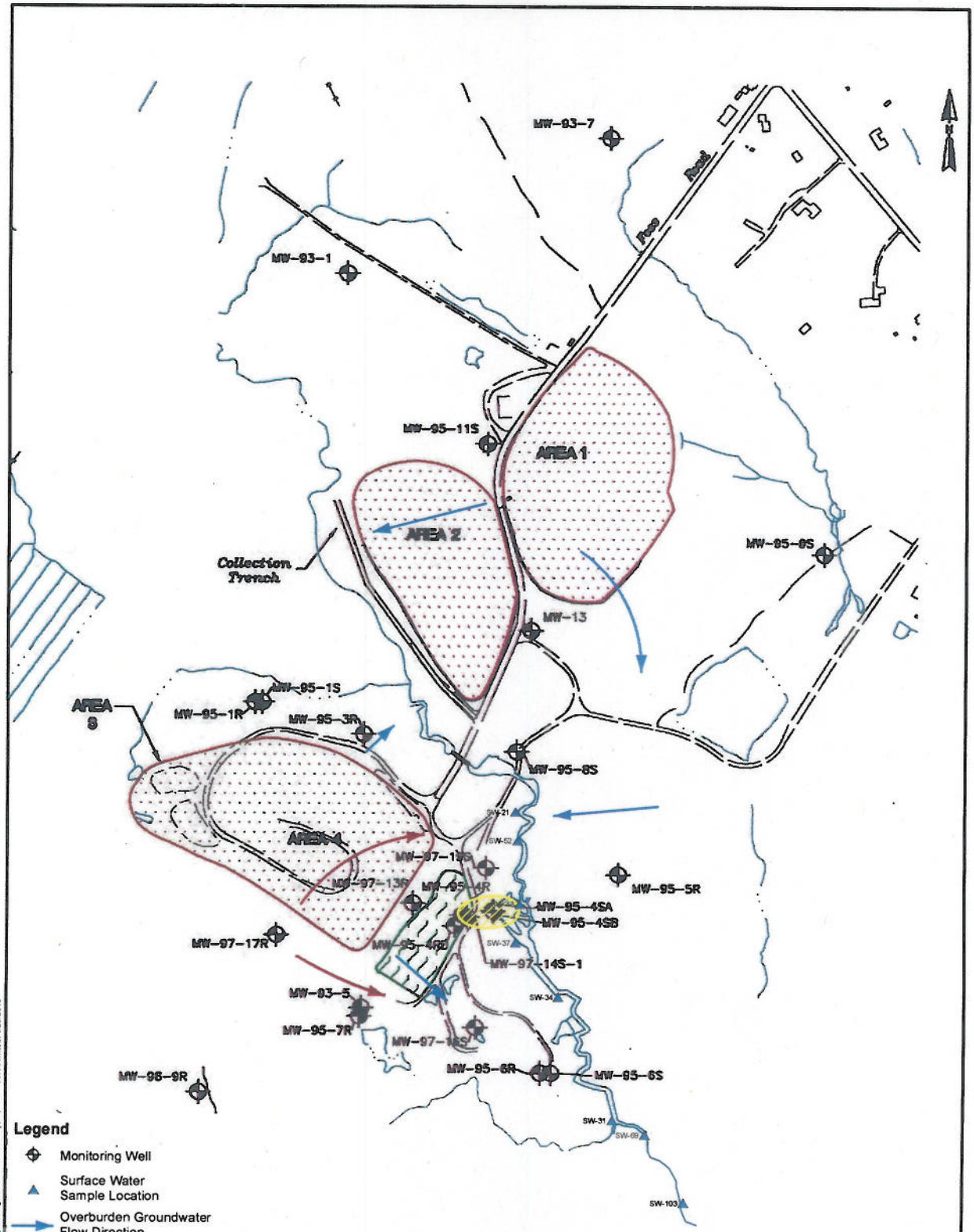
FIGURE 1

LOCUS MAP
SACO MUNICIPAL LANDFILL
SACO, MAINE

PREPARED BY: JH	CHECKED BY: AR
PROJECT NO. 80097.06	DATE: JUNE 2015

Path: R:\80000 Task Orders\80097 Five Year Review\Saco\Technical Data\GIS\Figures\Figure 1 Saco FYR Locus.mxd Date Printed: 6/29/2015



Notes:

1. This site plan was developed from the following: a plan by Woodard & Curran titled 'Figure 2-1 Groundwater Monitoring Locations' dated February 2009, a plan by Woodard & Curran titled 'Figure 3-1, Groundwater Contour Map Shallow Overburden, June 2014', dated March 2015, and a plan by Woodard & Curran titled 'Figure 3-2, Groundwater contour Map Bedrock, June 2014' dated March 2015.

2. Location of site features depicted hereon is approximate and given for illustrative purposes only.

N

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FIGURE 2

GROUNDWATER MONITORING PLAN
SACO MUNICIPAL LANDFILL
FIVE YEAR REVIEW
SACO, MAINE

PREPARED BY: JH	CHECKED BY: AR
PROJECT NO. 80097.06	DATE: JUNE 2015

Path: R:\80000 Task Orders\80097 Five Year Review\Saco\Technical Data\GIS\Figures\Figure 2 Saco FYR Site plan.mxd Date Printed: 6/29/2015

APPENDIX A

APPENDIX A – EXISTING SITE INFORMATION

A. SITE CHRONOLOGY

A summary of key events and milestone dates throughout the history of the Site is presented in the table below.

Site Chronology

Date	Event
1963 - 1989	Saco Municipal Landfill operates as a municipal solid waste and industrial waste landfill.
1975	Municipal water supply line installed to serve adjacent residents.
1976	Landfill Area 1 closed and a clay cap was installed. The clay cap was repaired in 1985.
1985	Landfill Area 2 closed with clay cap and a leachate recirculation system was installed.
1989	Landfill Area 3 and Landfill Area 4 stop receiving waste.
1990	Saco Municipal Landfill placed on the National Priorities List.
1995	Administrative Order on Consent signed for performance of Remedial Investigation and Feasibility Study.
1996	EPA signs Action Memorandum to initiate a Non-Time-Critical Removal Action (NTCRA) to construct the cap over Landfill Areas 3 and 4.
1997-1999	Construction of landfill cap for Landfill Area 3 and Landfill Area 4.
2000	EPA signs Record of Decision for Saco Municipal Landfill selecting monitored natural attenuation as the long-term remedial action
2000	EPA determines that the Saco Municipal Landfill construction is complete.
2000-2005	Annual monitoring and maintenance activities continue.
2005	EPA performs first Five Year Review.
2010	EPA performs second Five Year Review.

B. BACKGROUND

The Site is located on Foss Road, in York County, Maine. The Site consists of two parcels of land (approximately 90 acres combined) owned by the City of Saco (Figure 1). The Site includes four separate landfill areas (Landfill Areas 1, 2, 3, and 4) that comprise approximately 30 acres. The City of Saco owned and operated the four-landfill areas from 1963 until 1988. In 1990, the United States Environmental Protection Agency (EPA) placed the Site on the National Priorities List (NPL). A brief history and description of the landfill areas at the Site are provided below.

Landfill Area 1

Landfill Area 1 encompasses approximately 10 acres and was the first municipal landfill at the Site. It operated as an open dump beginning in the early 1960s. Material reportedly disposed in this landfill included, among other things, municipal waste and sludge from the Factory Island Treatment Facility. Landfill Area 1 was closed in 1974, re-graded, and covered with a clay cap in 1976. An additional 18 inches of compacted clay with six inches of seeded topsoil was placed on the landfill in 1985.

Landfill Area 2

Landfill Area 2 encompasses approximately 6 acres. This landfill area began operation in 1974 accepting industrial waste, brush, and construction demolition debris. In 1981, the Maine Department of Environmental Protection (DEP) issued an Administrative Consent Agreement and Enforcement Order to the City of Saco for closure of Landfill Area 2. Closure of Landfill Area 2 was completed in 1985, and included an 18 to 20 inch clay cover with four inches of top soil, and a clay slurry wall along the northern edge of the landfill, including a leachate collecting and recirculation system. Problems with the leachate recirculation system were encountered within the first year of operation. In the winter of 1986, the leachate system failed resulting in leachate reaching Sandy Brook.

Landfill Area 3

Landfill Area 3, is approximately 1 acre in size and is located adjacent to the northwestern edge of Landfill Area 4. Landfill Area 3 was developed around 1985 as an industrial waste area for several local industries. Material was temporarily stored in this area until it could be incinerated at the Maine Energy Recovery Company in Biddeford, Maine. Removal and off-site disposal of a majority of this material was competed in December 1992. This landfill was the subject of an early cleanup action implemented as a NTCRA. This area is currently capped with a low permeability cover system.

Landfill Area 4

Landfill Area 4 encompasses approximately 13 acres. This landfill area operated between 1974 and 1989, accepting primarily municipal waste. Sludge from the tannery wastewater treatment

system was reportedly disposed of in this area. This landfill was the subject of an early cleanup action implemented as a NTCRA and is currently capped with a low permeability cover system.

The sections that follow discuss the Site's physical characteristics, hydrology, land resource use, contamination history, initial response, and the basis for taking action.

Physical and Environmental Setting Characteristics

The Saco River is located approximately 2.3 miles southwest of the Site. Sandy Brook, a small perennial tributary to the Saco River, flows through the Site. Landfill Areas 1 and 2 are located on the east side of Sandy Brook and Landfill Areas 3 and 4 are located on the west side of the brook. The Site is bounded by wooded areas in all directions. Landfill Areas 1 and 2 have been converted to athletic fields. Newly constructed athletic fields are located approximately 700 feet to the northeast of Landfill Areas 3 and 4. The nearest residential homes are located approximately 0.3-mile north and east of Landfill Area 4.

Hydrology

Overburden groundwater flow from Landfill Areas 1 and 2 is generally to the west/southwest towards Sandy Brook. There are no bedrock monitoring wells located in Landfill Areas 1 and 2 to measure bedrock groundwater elevations. Overburden and bedrock groundwater flow from Landfill Areas 3 and 4 is generally to the east/southeast towards Sandy Brook. A significant groundwater seep is located in an area just east of the retention basin located at the base of Landfill Area 4 (Figure 2). This area is routinely referred to as the primary seep area. The primary seep area discharges to the surface waters of Sandy Brook.

Land and Resource Use

In the spring of 1998, the City of Saco established a Recreation Advisory Committee made up of 11 residents to prepare recommendations for the reuse of the property. The Committee's *Recreation and Reuse Plan*, produced in December 1998, describes a comprehensive vision that incorporates active and passive recreational uses and nature conservation areas. EPA and the Maine DEP continue to work with the city to ensure that the intended uses are safe and compatible with the cleanup remedy. The reuse plans include ball fields and a network of trails to provide passive recreation opportunities including hikers, snowshoers, cross-country skiers, horseback

riders, trail runners, and other non-motorized activities. The City of Saco also plans to link these trails through a right-of-way to the Middle School and nearby woodlands located a short distance to the southeast. This will provide greater pedestrian access and allow for the creation of a cross-country running course for the school.

Contamination and Site Investigation History

Numerous investigations have been performed at the Site. Early investigations were initiated in 1973 by the City of Saco and primarily focused on landfill practices and operations to minimize the generation of landfill leachate, and improve the operational efficiency of the landfill. The focus of the investigations began to shift to environmental concerns in the late 1970s and early 1980s. Early environmental investigations identified groundwater and surface water quality problems that were believed to be associated with outbreak of landfill leachate. Because the results of early investigations identified suspected contamination in nearby shallow wells, the municipal water supply was extended to residents along Buxton Road (Route 112) in 1975.

In 1980, EPA and Maine DEP performed a Preliminary Site Assessment and Site Inspection to investigate reports of illegal dumping of hazardous wastes at the Site. The results of the investigation determined that landfill leachate was impacting groundwater and surface water at the Site. In 1981, the Maine DEP issued an Administrative Consent Agreement and Enforcement Order that initiated closure and closure related studies at the Site. The Site was officially placed on the NPL on February 21, 1990.

In 1995, the City of Saco entered into an Administrative Order with EPA to conduct a Remedial Investigation and Feasibility Study (RI/FS). To comply with the order, the City of Saco developed a Phase 1A field program and performed additional environmental investigations to address data gaps identified during historical investigations. The results of the Phase 1A field program were documented in the Final Phase 1A Remedial Investigation (RI) Report, prepared by Woodward & Curran, dated October 1998. The results for the Phase 1A RI Report determined that leachate from Landfill Areas 3 and 4 was causing reducing conditions that mobilized the naturally occurring arsenic and manganese into the groundwater beneath the Site, resulting in the discharge of contaminants to a wetland seep area and into surface water and sediments of Sandy Brook. The Phase 1A RI Report also included a Human Health Risk Assessment (HHRA). The HHRA

concluded that EPA target risk levels were exceeded for hypothetical residential drinking water scenarios for groundwater impacted by Landfill Areas 3 and 4.

In 1996, EPA signed an Action Memorandum to initiate a NTCRA at the Site to address the source of contamination to groundwater below the Site. From 1997 through 2000 an ERA was conducted at the Site. The results of the ERA identified an ecological risk to benthic organisms limited to a small portion of Sandy Brook downstream of the remediated seep. However, the risk was determined to be minimal and would be addressed through the remedial alternatives for groundwater.

Between 1997 and 1998, as part of the Feasibility Study (FS), a supplemental RI was performed at the Site and included United States Geologic Survey (USGS) geologic and hydrologic surveys. The data were used to further characterize the nature and extent of contamination at the Site. The Final FS Report was completed in July 2000.

The NTCRA was completed in 1999. The objective of the NTCRA was to consolidate contaminated soils, sediments and wastes within Landfill Areas 3 and 4; excavate several pockets of solid waste (approximately 5,000 cubic yards) located outside the landfill footprint and consolidate the materials into Landfill Areas 3 and 4; design and construct a multi-layer barrier landfill cap over Landfill Areas 3 and 4; develop land use restrictions to restrict future use of the Site; and create a new on-site wetlands area southeast of Landfill Area 4 to compensate for the wetlands impacted by the cap construction.

In 2000, EPA signed the Record of Decision (ROD) for the Site. The ROD specified the selected remedy which includes long-term maintenance of the cap constructed during the NTCRA; monitored natural attenuation of groundwater; long-term surface water and sediment monitoring and evaluation; and ICs to address the primary site risks.

Initial Response

In 1975, the municipal water supply was extended to residents along Buxton Road (Route 112). In 1985, the City of Saco completed the closure of Landfill Areas 1 and 2 under the oversight of the State of Maine.

Basis for Taking Action

The HHRA identified a potential threat to future residents based on the use of Site groundwater as drinking water. Additionally, the ERA identified an ecological risk to benthic organisms, limited to a small portion of Sandy Brook downstream of the remediated seep. However, the risk was determined to be minimal and would be addressed through the remedial alternatives for groundwater.

C. REMEDIAL ACTIONS

The following sections discuss the remedy selection, implementation, and ongoing system operations and maintenance.

Remedy Selection

Two CERCLA remedial actions have been implemented at the Site. The first cleanup action was a NTCRA. The NTCRA included construction of a multi-layer landfill cap; installation of a passive gas venting system; and ICs to protect the cap. The second cleanup action is described in the September 2000 ROD. The second remedial action specified monitored natural attenuation (MNA) of COCs in groundwater; continued operation and maintenance of the NTCRA multi-layer cap, and ICs to control future activities at the Site. The 2000 ROD established the following remedial action objectives (RAOs) for the Site:

- Prevent the ingestion of groundwater containing contaminants that exceed Federal or State maximum contaminant levels (MCLs), non-zero maximum contaminant level goals (MCLGs), maximum enforcement guidelines (MEGs), or in their absence, an excess cancer risk of $1x10^{-6}$ (one in a million) or a hazard quotient of 1;

- Restore groundwater to meet Federal or State MCLs, MCLGs, MEGs, or in their absence, an excess cancer risk of $1x10^{-6}$ (one in a million) or a hazard quotient of 1; and

- Perform long-term monitoring of surface water, sediments, and groundwater to verify that the cleanup programs at the Site are protective to human health and the environment.

The primary expected outcome of the selected remedy is that groundwater will meet cleanup levels specified in the ROD at and beyond the point of compliance within approximately 60 to 100 years.

Remedy Implementation

The physical construction cleanup activities at the Site were implemented as part of the NTCRA. The NTCRA consisted of the following:

- Excavation of soils/sediments from several groundwater seeps that contained elevated levels of arsenic and placement of these materials beneath the cap for Landfill Areas 3 and 4;

- Excavation of several pockets of solid waste (approximately 5,000 cubic yards) outside the footprint of the existing landfills and consolidation of this solid waste into Landfill Areas 3 and 4;

- Design and construction of a multi-barrier landfill cap over Landfill Areas 3 and 4;

- Development of land use restrictions that will restrict future use of the Site; and

- Creation of a new on-site wetlands area southeast of Landfill Area 4 to compensate for the wetlands impacted by the cap construction.

NTCRA construction activities began in June 1997 and were completed in 1998.

EPA signed a Preliminary Closeout Report (PCOR) for the entire Site (NTCRA and Remedial Action) in September 2000 upon completion of the cap. The PCOR confirmed that no additional monitoring wells or other construction activities were necessary at the Site. ICs for the Site were completed prior to the ROD. Land and groundwater use has been restricted by the "Grant of Environmental Restrictions and Right of Access" agreed to by the City, the EPA, and the Maine DEP. These restrictions are considered necessary to ensure long-term protection of public health and are summarized below.

- No use that disturbs the integrity of any layers of the cap, or any other structures for maintaining the effectiveness of the Removal Action, whether in place now or put in place in the future;

- No groundwater use, including, but not limited to, use as a drinking water supply. No groundwater wells shall be installed within the Groundwater Restriction Parcel except for purposes of groundwater monitoring pursuant to a plan approved by the City, EPA and Maine DEP;

- No use of the waters of Sandy Brook within the Groundwater Restriction Parcel;

- No residential development and no activity or use at the Site which adversely impacts the NTCRA, whether now or in the future, including, without limitation: (1) systems and areas to collect and/or contain groundwater, surface water runoff, or leachate; (2) systems or containment areas to excavate, dewater, store, treat, and/or dispose of soils and sediments; and (3) systems and studies to provide long-term environmental monitoring of groundwater, surface waters, and sediment, and to ensure the long-term effectiveness of the Removal Action and its protectiveness of human health and the environment.

The City of Saco ensures that the ICs remain in effect.

System Operation/Operation and Maintenance

The operation, maintenance, and monitoring activities are being implemented by the PRP. Monitoring and maintenance reports are submitted to EPA and Maine DEP for review. In addition, EPA has an oversight contractor to perform Site inspections and oversee the PRP activities.

The operation, maintenance, and monitoring activities focus on maintenance of the vegetative cover of the cap and repair of any erosion and collection and analysis of samples to monitor COC concentration trends in groundwater.

APPENDIX B

Newsroom

News Releases from Region 1

EPA Will Review 24 Hazardous Site Cleanups during 2015

Release Date: 01/05/2015
Contact Information: Emily Bender, 617-918-1037

EPA will review site clean ups and remedies at 20 Superfund Sites and oversee reviews at 4 Federal Facilities across New England this year by doing scheduled Five-Year Reviews at each site.

EPA conducts evaluations every five years on previously-completed clean up and remediation work performed at Superfund sites and Federal Facilities listed on the "National Priorities List" (aka Superfund sites) to determine whether the implemented remedies at the sites continue to be protective of human health and the environment. Further, five year review evaluations identify any deficiencies to the previous work and, if called for, recommend action(s) necessary to address them.

The Superfund Sites where EPA will begin Five Year Reviews in FY' 2015 (October 1, 2014 through September 30, 2015) are below. Please note, the Web link provided after each site provides detailed information on the site status and past assessment and cleanup activity. The web link also provides contact information for the EPA Project Manager and Community Involvement Coordinator at each site. Community members and local officials are invited to contact EPA with any comments or current concerns about a Superfund Site or about the conclusions of the previous Five Year Review.

The Superfund Sites at which EPA is performing Five Year Reviews over the following several months include the following sites.

Connecticut

Durham Meadows, Durham
http://www.epa.gov/region1/superfund/sites/durham

Old Southington Landfill, Southington
http://www.epa.gov/region1/superfund/sites/oldsouthington

Raymark Industries, Stratford
http://www.epa.gov/region1/superfund/sites/raymark

Solvents Recovery Services of New England, Southington
http://www.epa.gov/region1/superfund/sites/srs

Maine

Brunswick Naval Air Station (Federal Facility), Brunswick
http://www.epa.gov/region1/superfund/sites/brunswick

Callahan Mining Corp., Brooksville
http://www.epa.gov/region1/superfund/sites/callahan

Eastland Woolen Mill, Corinna
http://www.epa.gov/region1/superfund/sites/eastland

Loring Air Force Base (Federal Facility), Limestone
http://www.epa.gov/region1/superfund/sites/loring

Pinette's Salvage Yard, Washburn
http://www.epa.gov/region1/superfund/sites/pinette

Saco Municipal Landfill, Saco
http://www.epa.gov/region1/superfund/sites/sacolandfill

Massachusetts

Atlas Tack Corp., Fairhaven
http://www.epa.gov/region1/superfund/sites/atlas

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View selected historical press releases from 1970 to 1998 in the EPA History website.

Recent additions

03/31/2015 Three Massachusetts Students Selected for EPA Fellowships to Support Next Generation of Environmental Scientists
03/31/2015 UNH Student Selected for EPA Fellowships to Support Next Generation of Environmental Scientists
03/31/2015 Univ. of New Haven Student Selected for EPA Fellowships to Support Next Generation of Environmental Scientists
03/27/2015 EPA Awards Funding for Brownfield Cleanup Planning in Lawrence and New Bedford, Mass. and Portland, Maine
03/27/2015 EPA Action Ensures that Runoff Doesn't Harm Nearby Streams at North Reading, Mass. Construction Site

Cannon Engineering Corp., Bridgewater
http://www.epa.gov/region1/superfund/sites/cannon

Charles-George Reclamation Trust Landfill, Tyngsborough
http://www.epa.gov/region1/superfund/sites/charlesgeorge

Fort Devens (Federal Facility), Ayer, Harvard, Lancaster & Shirley
http://www.epa.gov/region1/superfund/sites/devens

Groveland Wells No. 1 & 2 Site, Groveland
http://www.epa.gov/region1/superfund/sites/groveland

Materials Technology Laboratory (US ARMY, Federal Facility), Watertown
http://www.epa.gov/region1/superfund/sites/amtl

New Bedford Harbor, New Bedford
www.epa.gov/nbh

PSC Resources, Palmer
http://www.epa.gov/region1/superfund/sites/psc

New Hampshire

Somersworth Sanitary Landfill, Somersworth
http://www.epa.gov/region1/superfund/sites/somersworth

South Municipal Water Supply Well (Five Year Review Addendum), Peterborough
http://www.epa.gov/region1/superfund/sites/southmuni

Troy Mills Landfill, Troy
http://www.epa.gov/region1/superfund/sites/troymills

Rhode Island

Stamina Mills Inc., North Smithfield
http://www.epa.gov/region1/superfund/sites/stamina

West Kingston Town Dump/URI Disposal Area, South Kingstown
http://www.epa.gov/region1/superfund/sites/wkingston

Vermont

Burgess Brothers Landfill, Woodford and Bennington
http://www.epa.gov/region1/superfund/sites/burgess

Last updated on 4/1/2015

APPENDIX C

Appendix A-1:
Groundwater Analytical Results (Detected Analytes 2009-2013)

Saco Municipal Landfill
Saco, Maine

		Background Wells																				
		MW-93-1	MW-93-1	MW-93-1	MW-93-1	MW-93-1	MW-93-1	MW-93-1	MW-93-1	MW-93-1	MW-93-1	MW-93-7	MW-93-7	MW-93-7	MW-93-7	MW-93-7	MW-93-7	MW-93-7	MW-93-7	MW-93-7	MW-93-7	MW-93-7
		6/2/2009	11/4/2009	6/10/2010	11/18/2010	6/15/2011	11/2/2011	6/20/2012	11/1/2012	6/12/2013	11/6/2013	6/4/2009	11/6/2009	6/9/2010	11/19/2010	6/16/2011	11/3/2011	6/21/2012	11/2/2012	6/13/2013	11/8/2013
CONSTITUENT	UNITS	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
VOCs (ug/l)																					
Acetone	(ug/l)	<5	<5	-	-	-	-	-	-	-	-	<5	<5	-	-	-	-	-	-	-	-
Benzene	(ug/l)	<1	<1	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
n-Utylbenzene	(ug/l)	<1	<1	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
sec-Utylbenzene	(ug/l)	<1	<1	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
Chlorobenzene	(ug/l)	<1	<1	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
Chloroethane	(ug/l)	<2J	<2	-	-	-	-	-	-	-	-	<2	<2	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	(ug/l)	<1	<1	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
1,1-Dichloroethane	(ug/l)	<1	<1	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
1,2-Dichloroethene	(ug/l)	<2	<2	-	-	-	-	-	-	-	-	<2	<2	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	(ug/l)	<1	<1	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
Isopropylbenzene	(ug/l)	<1	<1	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
4-Isopropyltoluene	(ug/l)	<1	<1	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
Naphthalene	(ug/l)	<1	<1UJ	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
1-Phenylpropane	(ug/l)	<1	<1	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
Tetrahydrofuran	(ug/l)	<10	<10	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
1,2,4-Trichlorobenzene	(ug/l)	<1	<1	-	-	-	-	-	-	-	-	<10	<10	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	(ug/l)	<1	<1	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
1,3,5-Trimethylbenzene	(ug/l)	<1	<1	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
m&p-Xylene	(ug/l)	<2	<2	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
o-Xylene	(ug/l)	<1	<1	-	-	-	-	-	-	-	-	<2	<2	-	-	-	-	-	-	-	-
Total xylenes	(ug/l)	<3	<3	-	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-
Total Inorganic Analytes (ug/l)												<3	<3	-	-	-	-	-	-	-	-
Aluminum	(ug/l)	309	<54.4U	-	-	-	-	-	-	-	-	<137U	<63.8U	-	-	-	-	-	-	-	-
Arsenic	(ug/l)	31	27.1	31.9	30.6	30.5	31	27.2	30.2	27.2	30.5	<8	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0J	<8U
Barium	(ug/l)	5.8J	4.9J	-	-	-	-	-	-	-	-	20	30.6	-	-	-	-	-	-	-	-
Calcium	(ug/l)	19300	21400	-	-	-	-	-	-	-	-	21500	31200	-	-	-	-	-	-	-	-
Iron	(ug/l)	301	<44.4U	46.0J	423	<100U	285	<100U	195	<100U	<100U	277	140	92.4J	220	162	<173U	<161U	171	129	232
Lead	(ug/l)	2J	<1.8U	-	-	-	-	-	-	-	-	<5	<5.0	-	-	-	-	-	-	-	-
Magnesium	(ug/l)	5420	4870	-	-	-	-	-	-	-	-	6180	7480	-	-	-	-	-	-	-	-
Manganese	(ug/l)	58.1	58.2	61.5J	67.5	56.2	63.6	55.3	57	55.3	54.1	119	159	93.4J	81.2	228	109	107	91	95.9	120
Potassium	(ug/l)	3760	3510	-	-	-	-	-	-	-	-	4440	5830	-	-	-	-	-	-	-	-
Sodium	(ug/l)	28800	29400	-	-	-	-	-	-	-	-	78100	103000	-	-	-	-	-	-	-	-
Dissolved Inorganic Analytes (ug/l)																					
Arsenic	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Water Quality Analyses																					
Hardness carbonate (as CaCO3)	(ug/l)	70400	73600	74300	76600	71600	71600	73100	71300	77200	74600	79100	109000	68300	96000	107000	49400	54200	58400	60900	59800
Residue, filterable	(mg/l)	160	140	120	160	160	170	170	150	160	150	360	370	310	440	470	390	380	370	400	360

Notes:
ug/l = micrograms per liter
mg/l= milligrams per liter
< = not detected above given reporting limit
- = not analyzed or not available
J = estimated value
U = revised to non-detect during validation

Appendix A-1:
Groundwater Analytical Results (Detected Analytes 2009-2013)

Saco Municipal Landfill
Saco, Maine

		Landfill Areas 1 & 2																				
		MW-13	MW-13	MW-13	MW-13	MW-13	MW-13	MW-13	MW-13	MW-13	MW-13	MW-95-8S	MW-95-8S	MW-95-8S	MW-95-8S	MW-95-8S	MW-95-8S	MW-95-9S	MW-95-9S	MW-95-9S-DUP	MW-95-9S	MW-95-9S DUP
		6/2/2009	11/5/2009	6/9/2010	11/18/2010	6/16/2011	11/2/2011	6/21/2012	11/1/2012	6/13/2013	11/6/2013	6/3/2009	11/5/2009	6/9/2010	6/15/2011	6/20/2012	6/12/2013	6/3/2009	11/5/2009	11/5/2009	6/9/2010	6/9/2010
CONSTITUENT	UNITS	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate 1	Primary	Duplicate 1
VOCs (ug/l)																						
Acetone	(ug/l)	8	<5U	<5J	-	-	-	-	-	-	-	<5	<5	-	-	-	-	<5	<5	-	-	-
Benzene	(ug/l)	0.9J	1	1	-	-	-	-	-	-	-	<1	<1	-	-	-	-	<1	<1	-	-	-
n-Utylbenzene	(ug/l)	<1	0.2J	0.3J	-	-	-	-	-	-	-	<1	<1	-	-	-	-	<1	<1	-	-	-
sec-Utylbenzene	(ug/l)	<1	<1	<1	-	-	-	-	-	-	-	<1	<1	-	-	-	-	<1	<1	-	-	-
Chlorobenzene	(ug/l)	<1	<1	<1	-	-	-	-	-	-	-	<1	<1	-	-	-	-	<1	<1	-	-	-
Chloroethane	(ug/l)	4	4	4	-	-	-	-	-	-	-	<2J	<2	-	-	-	-	<2J	<2	-	-	-
1,2-Dichlorobenzene	(ug/l)	<1	<1	<1	-	-	-	-	-	-	-	<1	<1	-	-	-	-	<1	<1	<10	<9	<9
1,1-Dichloroethane	(ug/l)	27	27	36	-	-	-	-	-	-	-	<1	<1	-	-	-	-	<1	<1	-	-	-
1,2-Dichloroethene	(ug/l)	<2	<2	<2	-	-	-	-	-	-	-	<2	<2	-	-	-	-	<2	<2	-	-	-
1,4-Dichlorobenzene	(ug/l)	<1	<1	<1	-	-	-	-	-	-	-	<1	<1	-	-	-	-	<1	<1	<10	<9	<9
Isopropylbenzene	(ug/l)	<1	0.4J	0.6J	-	-	-	-	-	-	-	<1	<1	-	-	-	-	<1	<1	-	-	-
4-Isopropyltoluene	(ug/l)	0.3J	0.4J	0.6J	-	-	-	-	-	-	-	<1	<1	-	-	-	-	<1	<1	-	-	-
Naphthalene	(ug/l)	2 ?	3	7	-	-	-	-	-	-	-	<1	<1	-	-	-	-	<1	<1	<10	<9	<9
1-Phenylpropane	(ug/l)	0.6J	0.7J	1.0J	-	-	-	-	-	-	-	<1	<1	-	-	-	-	<1	<1	-	-	-
Tetrahydrofuran	(ug/l)	<10	3J	<10J	-	-	-	-	-	-	-	<10	<10	-	-	-	-	<10	<10	-	-	-
1,2,4-Trichlorobenzene	(ug/l)	<1	<1	1	-	-	-	-	-	-	-	<1	<1	-	-	-	-	<1	<1	<10	<9	<9
1,2,4-Trimethylbenzene	(ug/l)	6	7	11	-	-	-	-	-	-	-	<1	<1	-	-	-	-	<1	<1	-	-	-
1,3,5-Trimethylbenzene	(ug/l)	1	2	3	-	-	-	-	-	-	-	<1	<1	-	-	-	-	<1	<1	-	-	-
m&p-Xylene	(ug/l)	1J	1J	2J	-	-	-	-	-	-	-	<2	<2	-	-	-	-	<2	<2	-	-	-
o-Xylene	(ug/l)	1J	1	2	-	-	-	-	-	-	-	<1	<1	-	-	-	-	<1	<1	-	-	-
Total xylenes	(ug/l)	2J	2J	4	-	-	-	-	-	-	-	<3	<3	-	-	-	-	<3	<3	-	-	-
Total Inorganic Analytes (ug/l)																						
Aluminum	(ug/l)	136J	<23.4U	-	-	-	-	-	-	-	-	813	1280	-	-	-	-	670	<86.6UJ	-	-	-
Arsenic	(ug/l)	34.9	46.3	41.6	40.4	42.9	43.9	44.5	44.6	35.5	54.8	<8	4.5J	<8.0	3.3J	9.6	<8UJ	<8	<8.0	-	<8.0	-
Barium	(ug/l)	18.8	24.5	-	-	-	-	-	-	-	-	4J	9.1	-	-	-	-	3.7J	4.7J	-	-	-
Calcium	(ug/l)	53800	65000	-	-	-	-	-	-	-	-	7790	9080	-	-	-	-	3360	9640	-	-	-
Iron	(ug/l)	67500	69100	72600	55900	68000	57900	64500	54400	59900	65100	848	1540	1770	1830	6400	2280	763	205	-	1140	-
Lead	(ug/l)	2.5J	<3.4U	-	-	-	-	-	-	-	-	2J	<6.4U	-	-	-	-	1.6J	<3.8U	-	-	-
Magnesium	(ug/l)	21500	21800	-	-	-	-	-	-	-	-	7550	7360	-	-	-	-	2170	5350	-	-	-
Manganese	(ug/l)	2950	2610	3360J	2850	3100	2780	2990	2410	2720	2470	23.3	58.7	113	67.7	137	67.3	407	421	-	478	-
Potassium	(ug/l)	7300	8480	-	-	-	-	-	-	-	-	2250J	2280	-	-	-	-	1680J	2040	-	-	-
Sodium	(ug/l)	64800	72100	-	-	-	-	-	-	-	-	12000	12400	-	-	-	-	6930J	14600	-	-	-
Dissolved Inorganic Analytes (ug/l)																						
Arsenic	(ug/l)	-	-	-	-	-	-	-	-	-	-	<8	<8.0	<8.0	<8.0	<8.0	-	-	-	-	-	-
Banum	(ug/l)	-	-	-	-	-	-	-	-	-	-	0.93J	3.4J	-	-	-	-	-	-	-	-	-
Calcium	(ug/l)	-	-	-	-	-	-	-	-	-	-	7410	8820	-	-	-	-	-	-	-	-	-
Iron	(ug/l)	-	-	-	-	-	-	-	-	-	-	<29.9U	<114U	<100J	<100U	<127U	-	-	-	-	-	-
Magnesium	(ug/l)	-	-	-	-	-	-	-	-	-	-	7030	7110	-	-	-	-	-	-	-	-	-
Manganese	(ug/l)	-	-	-	-	-	-	-	-	-	-	<2.2U	<8.1U	8	4.3J	17	-	-	-	-	-	-
Potassium	(ug/l)	-	-	-	-	-	-	-	-	-	-	<1980UJ	1930	-	-	-	-	-	-	-	-	-
Sodium	(ug/l)	-	-	-	-	-	-	-	-	-	-	11500J	12500	-	-	-	-	-	-	-	-	-
Water Quality Analyses																						
Hardness carbonate (as CaCO3)	(ug/l)	223000	252000	251000	223000	257000	225000	251000	225000	248000	260000	50500	53000	64800	53800	51800	55200	17300	46100	-	19500	-
Residue, filterable	(mg/l)	430	480	440	430	530	470	550	480	500	510	110	44	110	110	120	94	48	91	-	25	-

Notes:
ug/l = micrograms per liter
mg/l= milligrams per liter
< = not detected above given reporting limit
- = not analyzed or not available
J = estimated value
U = revised to non-detect during validation

Appendix A-1:
Groundwater Analytical Results (Detected Analytes 2009-2013)

Saco Municipal Landfill
Saco, Maine

		Landfill Areas 1 & 2 (continued)									Landfill Areas 3 & 4														
		MW-95-9S	MW-95-9S	MW-95-9S	MW-95-9S	MW-95-9S	MW-95-9S	MW-95-9S	MW-95-11S	MW-93-5	MW-93-5	MW-93-5	MW-93-5	MW-93-5	MW-93-5	MW-93-5	MW-93-5	MW-93-5	MW-93-5	MW-95-1R	MW-95-1R DUP	MW-95-1R	MW-95-1R	MW-95-1R	MW-95-1R DUP
		11/18/2010	6/15/2011	11/2/2011	6/20/2012	11/1/2012	6/12/2013	11/6/2013	11/6/2009	6/4/2009	11/4/2009	6/9/2010	11/18/2010	6/15/2011	11/2/2011	6/20/2012	11/1/2012	6/12/2013	11/6/2013	6/3/2009	6/3/2009	11/4/2009	6/9/2010	11/18/2010	11/18/2010
CONSTITUENT	UNITS	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate 1	Primary	Primary	Primary	Duplicate 1
VOCs (ug/l)																									
Acetone	(ug/l)	-	-	-	-	-	-	-	<5	<5	<5	-	-	-	-	-	-	-	-	<5	<5	<5	-	-	-
Benzene	(ug/l)	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1	-	-	-
n-Utylbenzene	(ug/l)	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1	-	-	-
sec-Utylbenzene	(ug/l)	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1	-	-	-
Chlorobenzene	(ug/l)	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1	-	-	-
Chloroethane	(ug/l)	-	-	-	-	-	-	-	<2	<2J	<2	-	-	-	-	-	-	-	-	<2J	<2J	<2	-	-	-
1,2-Dichlorobenzene	(ug/l)	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1	-	-	-
1,1-Dichloroethane	(ug/l)	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1	-	-	-
1,2-Dichloroethene	(ug/l)	-	-	-	-	-	-	-	<2	<2	<2	-	-	-	-	-	-	-	-	<2	<2	<2	-	-	-
1,4-Dichlorobenzene	(ug/l)	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1	-	-	-
Isopropylbenzene	(ug/l)	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1	-	-	-
4-Isopropyltoluene	(ug/l)	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1	-	-	-
Naphthalene	(ug/l)	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1	-	-	-
1-Phenylpropane	(ug/l)	-	-	-	-	-	-	-	<1	<1	<1UJ	-	-	-	-	-	-	-	-	<1	<1	<1	-	-	-
Tetrahydrofuran	(ug/l)	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1	-	-	-
1,2,4-Trichlorobenzene	(ug/l)	-	-	-	-	-	-	-	<10	<10	<10	-	-	-	-	-	-	-	-	<10	<10	<10	-	-	-
1,2,4-Trimethylbenzene	(ug/l)	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1	-	-	-
1,3,5-Trimethylbenzene	(ug/l)	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1	-	-	-
m&p-Xylene	(ug/l)	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1	-	-	-
o-Xylene	(ug/l)	-	-	-	-	-	-	-	<2	<2	<2	-	-	-	-	-	-	-	-	<2	<2	<2	-	-	-
Total xylenes	(ug/l)	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1	-	-	-
Total Inorganic Analytes (ug/l)									<3	<3	<3	-	-	-	-	-	-	-	-	<3	<3	<3	-	-	-
Aluminum	(ug/l)	-	-	-	-	-	-	-	240J	<83.5U	<25.4U	-	-	-	-	-	-	-	-	<95.1U	<82.8U	<25.8U	-	-	-
Arsenic	(ug/l)	<8.0	1.5J	<2.6U	<8.0	<8.0	<8.0J	<8U	<8.0	52.2	27.1	43	14.4	30	38.5	26.9	19.7	23	22.4	114	117	148	133	128	135
Barium	(ug/l)	-	-	-	-	-	-	-	<1.5U	8J	11.4	-	-	-	-	-	-	-	-	18.7	18.2	28	-	-	-
Calcium	(ug/l)	-	-	-	-	-	-	-	6100	11900	13400	-	-	-	-	-	-	-	-	24500	24900	36200	-	-	-
Iron	(ug/l)	1780	195	687	236	229	220	284	253	15300	19300	12800	9990	9770	17000	9210	10300	9910	14300	15000	15400	20800	18200	17300	18200
Lead	(ug/l)	-	-	-	-	-	-	-	<5.0	7.4	<2.5U	-	-	-	-	-	-	-	-	2.5J	2.4J	<4.4U	-	-	-
Magnesium	(ug/l)	-	-	-	-	-	-	-	2380	2630	2430	-	-	-	-	-	-	-	-	2320	2340	2700	-	-	-
Manganese	(ug/l)	364	152	277	222	177	124	254	<4.5U	1280	2160	1340J	1320	856	1080	803	890	740	1840	7580	7750	10700	9200J	9390	9730
Potassium	(ug/l)	-	-	-	-	-	-	-	1400	1960J	1900	-	-	-	-	-	-	-	-	1510J	1590J	1300	-	-	-
Sodium	(ug/l)	-	-	-	-	-	-	-	12200	4150J	4250	-	-	-	-	-	-	-	-	1970J	1990J	2480	-	-	-
Dissolved Inorganic Analytes (ug/l)																									
Arsenic	(ug/l)	<8.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron	(ug/l)	18.8J	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	(ug/l)	40.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Water Quality Analyses																									
Hardness carbonate (as CaCO3)	(ug/l)	18600	14800	26600	16300	14900	13400	24600	25000	40500	43500	34900	36800	36400	37400	33900	36000	38300	39200	70800	71800	102000	85200	103000	105000
Residue, filterable	(mg/l)	40	42	83	47	49	46	57	52	94	43	51	75	76	86	78	77	75	80	94	-	100	110	120	-

Notes:
ug/l = micrograms per liter
mg/l= milligrams per liter
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Appendix A-1:
Groundwater Analytical Results (Detected Analytes 2009-2013)

Saco Municipal Landfill
Saco, Maine

		Landfill Areas 3 & 4 (continued)																							
		MW-95-1R	MW-95-1R	MW-95-1R	MW-95-1R DUP	MW-95-1R	MW-95-1R	MW-95-1R	MW-95-1S	MW-95-1S	MW-95-1S	MW-95-1S DUP	MW-95-1S	MW-95-1S	MW-95-1S	MW-95-1S	MW-95-1S	MW-95-1S	MW-95-1S	MW-95-3R	MW-95-3R	MW-95-3R-DUP	MW-95-3R	MW-95-3R DUP
		6/16/2011	11/2/2011	6/20/2012	6/20/2012	11/1/2012	6/13/2013	11/6/2013	6/3/2009	11/4/2009	6/9/2010	6/9/2010	11/18/2010	6/16/2011	11/2/2011	6/20/2012	11/1/2012	6/13/2013	11/6/2013	6/3/2009	11/5/2009	11/5/2009	6/9/2010	6/9/2010
CONSTITUENT	UNITS	Primary	Primary	Primary	Duplicate 1	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate 1	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate 1	Primary	Duplicate 1
VOCs (ug/l)																								
Acetone	(ug/l)	-	-	-	-	-	-	-	<5	<5	-	-	-	-	-	-	-	-	-	<5	<5	<5	3J	4J
Benzene	(ug/l)	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	-	2	2	2	2	2
n-Utylbenzene	(ug/l)	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	-	<1	<1	0.3J	<1	<1
sec-Utylbenzene	(ug/l)	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	-	<1	<1	0.2J	<1	<1
Chlorobenzene	(ug/l)	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	-	2	2	2	2	2
Chloroethane	(ug/l)	-	-	-	-	-	-	-	<2J	<2	-	-	-	-	-	-	-	-	-	4J	2	2J	2J	2J
1,2-Dichlorobenzene	(ug/l)	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	-	1 ?	1	1	1	1
1,1-Dichloroethane	(ug/l)	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	-	4	3	3	3	4
1,2-Dichloroethene	(ug/l)	-	-	-	-	-	-	-	<2	<2	-	-	-	-	-	-	-	-	-	0.4J	0.2J	0.3J	0.2J	0.3J
1,4-Dichlorobenzene	(ug/l)	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	-	0.9J	<1	1	0.7J	0.8J
Isopropylbenzene	(ug/l)	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	-	0.6J	0.5J	0.5J	0.5J	0.5J
4-Isopropyltoluene	(ug/l)	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	-	<1	<1	<1	<1	<1
Naphthalene	(ug/l)	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	-	<1	<1	<1	<1	4
1-Phenylpropane	(ug/l)	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	-	<1	<1	<1	<1	<1
Tetrahydrofuran	(ug/l)	-	-	-	-	-	-	-	<10	<10	-	-	-	-	-	-	-	-	-	<10	3J	4J	4J	5J
1,2,4-Trichlorobenzene	(ug/l)	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	-	<1	<1	0.4J	<1	<1
1,2,4-Trimethylbenzene	(ug/l)	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	-	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	(ug/l)	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	-	<1	<1	<1	<1	<1
m&p-Xylene	(ug/l)	-	-	-	-	-	-	-	<2	<2	-	-	-	-	-	-	-	-	-	<2	<2	<2	<2	<2
o-Xylene	(ug/l)	-	-	-	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	-	<1	<1	<1	<1	<1
Total xylenes	(ug/l)	-	-	-	-	-	-	-	<3	<3	-	-	-	-	-	-	-	-	-	<3	<3	<3	<3	<3
Total Inorganic Analytes (ug/l)																								
Aluminum	(ug/l)	-	-	-	-	-	-	-	<71.4U	<28.3U	-	-	-	-	-	-	-	-	-	<246U	<36.8U	<40.5U	-	-
Arsenic	(ug/l)	121	126	150	133	147	127	161	754	1030	716	720	510	830	937	1040	993	713	890	609	564	578	535	552
Barium	(ug/l)	-	-	-	-	-	-	-	10.3J	12.4	-	-	-	-	-	-	-	-	-	125	121	118	-	-
Calcium	(ug/l)	-	-	-	-	-	-	-	19200	16300	-	-	-	-	-	-	-	-	-	99200	104000	104000	-	-
Iron	(ug/l)	15500	16800	15000	13800	22000	17100	29000	47100	40700	42800	43300	37300	58400	54200	57100	48500	60600	54700	63300	62200	62100	60700	62700
Lead	(ug/l)	-	-	-	-	-	-	-	<5	<2.7U	-	-	-	-	-	-	-	-	-	3.1J	<5.0	<5.0	-	-
Magnesium	(ug/l)	-	-	-	-	-	-	-	4530	2990	-	-	-	-	-	-	-	-	-	19600	19100	18500	-	-
Manganese	(ug/l)	7770	8860	6770	6380	9460	6860	10900	2920	2390	2930J	2980J	2110	3410	3140	3400	2670	3540	3040	2030	1650	1800	2130J	2250J
Potassium	(ug/l)	-	-	-	-	-	-	-	7700J	7720	-	-	-	-	-	-	-	-	-	13300J	12800	12300	-	-
Sodium	(ug/l)	-	-	-	-	-	-	-	3260J	3120	-	-	-	-	-	-	-	-	-	31800J	39200	36600	-	-
Dissolved Inorganic Analytes (ug/l)																								
Arsenic	(ug/l)	-	-	-	-	-	-	-	-	706	-	-	-	712	677	907	629	-	-	-	-	-	-	-
Barium	(ug/l)	-	-	-	-	-	-	-	-	11.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	(ug/l)	-	-	-	-	-	-	-	-	16600	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron	(ug/l)	-	-	-	-	-	-	-	-	33600	-	-	-	55900	47700	55200	39500	-	-	-	-	-	-	-
Magnesium	(ug/l)	-	-	-	-	-	-	-	-	3100	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	(ug/l)	-	-	-	-	-	-	-	-	2440	-	-	-	3390	3120	3480	2570	-	-	-	-	-	-	-
Potassium	(ug/l)	-	-	-	-	-	-	-	-	7810	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	(ug/l)	-	-	-	-	-	-	-	-	3210	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Water Quality Analyses																								
Hardness carbonate (as CaCO3)	(ug/l)	82500	94900	77900	74000	113000	90800	131000	66600	53000	60900	62100	51800	75500	66400	78000	61900	85000	69500	328000	340000	337000	292000	302000
Residue, filterable	(mg/l)	120	140	110	-	160	110	180	160	<10	78	-	130	160	150	120	96	160	170	500	340	-	400	-

Notes:
ug/l = micrograms per liter
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J = estimated value
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Appendix A-1:
Groundwater Analytical Results (Detected Analytes 2009-2013)

Saco Municipal Landfill
Saco, Maine

		Landfill Areas 3 & 4 (continued)																				
		MW-95-3R	MW-95-3R	MW-95-3R DUP	MW-95-3R	MW-95-3R	MW-95-3R	MW-95-3R	MW-95-3R	MW-95-4R	MW-95-4R	MW-95-4R	MW-95-4R	MW-95-4R DUP	MW-95-4R	MW-95-4R	MW-95-4R DUP	MW-95-4R	MW-95-4R DUP	MW-95-4R	MW-95-4R	MW-95-4R DUP
		11/18/2010	6/16/2011	6/16/2011	11/2/2011	6/21/2012	11/1/2012	6/13/2013	11/6/2013	6/4/2009	11/5/2009	6/10/2010	11/19/2010	11/19/2010	6/16/2011	11/3/2011	11/3/2011	6/21/2012	6/21/2012	11/2/2012	6/13/2013	6/13/2013
CONSTITUENT	UNITS	Primary	Primary	Duplicate 1	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate 1	Primary	Primary	Duplicate 1	Primary	Duplicate 1	Primary	Primary	Duplicate 1
VOCs (ug/l)																						
Acetone	(ug/l)	-	-	-	-	-	-	-	-	<5	<5U	3J	<5	<5	<5	<5U	<5U	<5.0	<5.0	<5.0	<5	-
Benzene	(ug/l)	-	-	-	-	-	-	-	-	4J	4	3	<1	0.4J	2	<1	<1	2.5J	2.6J	0.81J	<1	-
n-Utylbenzene	(ug/l)	-	-	-	-	-	-	-	-	0.4J	0.4J	<1	<1	<1	<1U	<1	<1	1.1J	1.1J	<1.0	<1	-
sec-Utylbenzene	(ug/l)	-	-	-	-	-	-	-	-	<1	0.2J	<1	<1	<1	<1	<1	<1	1.2J	1.2J	<1.0	<1	-
Chlorobenzene	(ug/l)	-	-	-	-	-	-	-	-	4J	4	3	<1	<1	4B	<1	<1	3.8J	3.6J	1.2	<1	-
Chloroethane	(ug/l)	-	-	-	-	-	-	-	-	<2J	2	<2	<2	<2	1J	<2	<2	<2.0	<2.0	<2.0	<2J	-
1,2-Dichlorobenzene	(ug/l)	-	-	-	-	-	-	-	-	3J ?	2	2	<1	<1	<2U	<1	<1	1.5J	1.6J	0.35J	0.21J	-
1,1-Dichloroethane	(ug/l)	-	-	-	-	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1.0	<1.0	<1.0	<1	-
1,2-Dichloroethene	(ug/l)	-	-	-	-	-	-	-	-	0.3J	0.2J	0.2J	<2	<2	<2U	<2	<2	<2.0	<2.0	<2.0	<2J	-
1,4-Dichlorobenzene	(ug/l)	-	-	-	-	-	-	-	-	3J ?	2	2	<1	<1	<2U	<1	<1	1.8J	1.9J	0.53J	<1	-
Isopropylbenzene	(ug/l)	-	-	-	-	-	-	-	-	2	1	1	<1	<1	1	<1	<1	0.85J	0.78J	<1.0	<1	-
4-Isopropyltoluene	(ug/l)	-	-	-	-	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1.0	<1.0	<1.0	<1	-
Naphthalene	(ug/l)	-	-	-	-	-	-	-	-	3J ?	1	<1	<1	<1	5	<1	<1	0.41J	0.56J	<1.0	<1J	-
1-Phenylpropane	(ug/l)	-	-	-	-	-	-	-	-	0.7J	0.7J	0.4J	<1	<1	0.5J	<1	<1	1.7J	1.7J	<1.0	<1	-
Tetrahydrofuran	(ug/l)	-	-	-	-	-	-	-	-	<10	4J	3J	<10	<10	4J	<10J	<10J	<10.	<10.	<10.	20	-
1,2,4-Trichlorobenzene	(ug/l)	-	-	-	-	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1.0	<1.0	<1.0	<1	-
1,2,4-Trimethylbenzene	(ug/l)	-	-	-	-	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1.0	<1.0	<1.0	<1	-
1,3,5-Trimethylbenzene	(ug/l)	-	-	-	-	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1.0	<1.0	<1.0	<1	-
m&p-Xylene	(ug/l)	-	-	-	-	-	-	-	-	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	<2.0	<2.0	<2	-
o-Xylene	(ug/l)	-	-	-	-	-	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1.0	<1.0	<1.0	<1	-
Total xylenes	(ug/l)	-	-	-	-	-	-	-	-	<3	<3	<3	<3	<3	<3	<3	<3	<3.0	<3.0	<3.0	<3	-
Total Inorganic Analytes (ug/l)																						
Aluminum	(ug/l)	-	-	-	-	-	-	-	-	<144U	<34.9U	-	-	-	-	-	-	-	-	-	-	-
Arsenic	(ug/l)	603	494	499	579	567	558	512	500	433	535	490	180	176	412	186	188	384	398	273	128	130
Barium	(ug/l)	-	-	-	-	-	-	-	-	125	142	-	-	-	-	-	-	-	-	-	-	-
Calcium	(ug/l)	-	-	-	-	-	-	-	-	52800	65200	-	-	-	-	-	-	-	-	-	-	-
Iron	(ug/l)	62700	48100	50800	59600	51200	52400	44600	46400	22800	25000	26500	6640	6770	21800	6060	6030	17600	17600	9100	5370	5640
Lead	(ug/l)	-	-	-	-	-	-	-	-	2.6J	<5.0	-	-	-	-	-	-	-	-	-	-	-
Magnesium	(ug/l)	-	-	-	-	-	-	-	-	19800	22200	-	-	-	-	-	-	-	-	-	-	-
Manganese	(ug/l)	2070	1350	1480	1800	1580	1680	1140	1310	1410	1480	1800J	617	617	1410	771	765	1230	1230	874	1010	1020
Potassium	(ug/l)	-	-	-	-	-	-	-	-	26800J	29900	-	-	-	-	-	-	-	-	-	-	-
Sodium	(ug/l)	-	-	-	-	-	-	-	-	76300J	90300	-	-	-	-	-	-	-	-	-	-	-
Dissolved Inorganic Analytes (ug/l)																						
Arsenic	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Water Quality Analyses																						
Hardness carbonate (as CaCO3)	(ug/l)	350000	266000	277000	330000	308000	298000	302000	274000	213000	254000	228000	151000	148000	237000	180000	178000	228000	231000	221000	237000	241000
Residue, filterable	(mg/l)	480	450	-	480	460	420	450	440	480	540	390	250	-	460	310	-	460	-	380	370	-

Notes:
ug/l = micrograms per liter
mg/l= milligrams per liter
< = not detected above given reporting limit
- = not analyzed or not available
J = estimated value
U = revised to non-detect during validation

Appendix A-1:
Groundwater Analytical Results (Detected Analytes 2009-2013)

Saco Municipal Landfill
Saco, Maine

		Landfill Areas 3 & 4 (continued)																	
		MW-95-4R	MW-95-4R DUP	MW-95-4RD	MW-95-4RD DUP	MW-95-4RD	MW-95-4RD	MW-95-4RD	MW-95-4RD	MW-95-4RD DUP	MW-95-4RD	MW-95-4RD	MW-95-4RD	MW-95-4RD DUP	MW-95-4RD	MW-95-4RD DUP	MW-95-4RD	MW-95-4SA	MW-95-4SA
		11/8/2013	11/8/2013	6/4/2009	6/4/2009	11/5/2009	6/10/2010	11/19/2010	6/16/2011	6/16/2011	11/3/2011	6/21/2012	11/2/2012	11/2/2012	6/13/2013	6/13/2013	11/8/2013	6/4/2009	11/5/2009
CONSTITUENT	UNITS	Primary	Duplicate 1	Primary	Duplicate 1	Primary	Primary	Primary	Primary	Duplicate 1	Primary	Primary	Primary	Duplicate 1	Primary	Duplicate 1	Primary	Primary	Primary
VOCs (ug/l)																			
Acetone	(ug/l)	<5	<5	<5U	<5U	<5U	4J	<5	<5	<5	<5U	<5.0	<5.0	<5.0	3.1J	3J	<5	<5	<5
Benzene	(ug/l)	3.6	3.6	3	4	4	3	2	3	3	1	3.2J	3	2.9	1.6	1.2	3.4	<1	<1
n-Utylbenzene	(ug/l)	<1	<1	0.3J	0.3J	0.3J	<1	<1	<1U	<1U	<1	1.2J	<1.0	<1.0	<1	<1	<1	<1	<1
sec-Utylbenzene	(ug/l)	<1	<1	<1	<1	0.2J	<1	<1	0.2J	0.2J	<1	<1.0	<1.0	<1.0	<1	<1	<1	<1	<1
Chlorobenzene	(ug/l)	5.6	5.3	5	5	5	4	3	4B	4B	2	4.9J	5.4	5.2	2.9	2.7	5.1	<1	<1
Chloroethane	(ug/l)	<2J	<2J	<2J	<2J	2	0.6J	<2	<2UJ	1J	<2	<2.0	<2.0	<2.0	<2	<2J	<2J	<2J	<2
1,2-Dichlorobenzene	(ug/l)	2J	2J	2	2	2	2	2	<2U	<2U	0.9J	2.2J	2	2	1.3	1	2.2J	<1	0.2J
1,1-Dichloroethane	(ug/l)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1.0	<1.0	<1.0	<1	<1	<1	<1	<1
1,2-Dichloroethene	(ug/l)	<2	<2	0.3J	0.3J	0.2J	<2	<2	<2U	<2U	<2	<2.0	<2.0	<2.0	<2	<2J	<2	<2	<2
1,4-Dichlorobenzene	(ug/l)	2.2	2.3	3	3	3	2	<1	<2U	<3U	<1	2.5J	2.4	2.4	1.6	<1	2.3	<1	<1
Isopropylbenzene	(ug/l)	0.8J	0.8J	1	1	1	1	0.8J	1	1	0.3J	1.2J	<1.0	<1.0	1.3	0.58J	0.81J	<1	<1
4-Isopropyltoluene	(ug/l)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1.0	<1.0	<1.0	<1	<1	<1	<1	<1
Naphthalene	(ug/l)	0.38J	0.34J	3	3	1	<1	0.4J	5	5	<1	0.65J	2.2	2.2	<1	<1J	<1	<1	<1
1-Phenylpropane	(ug/l)	0.4J	0.44J	0.5J	0.6J	0.7J	0.3J	0.5J	0.6J	0.7J	1.0J	1.8J	0.35J	0.37J	1.5	0.26J	0.34J	<1	<1
Tetrahydrofuran	(ug/l)	3.3J	3.5J	<10	<10	4J	2J	<10	3J	4J	<10J	<10.	<10.	<10.	2.9J	<10	2.8J	<10	2J
1,2,4-Trichlorobenzene	(ug/l)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1.0	<1.0	<1.0	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	(ug/l)	<1	<1	0.3J	0.3J	<1	<1	<1	<1	<1	<1	<1.0	<1.0	<1.0	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	(ug/l)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1.0	<1.0	<1.0	<1	<1	<1	<1	<1
m&p-Xylene	(ug/l)	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	<2.0	<2.0	<2	<2	<2	<2	<2
o-Xylene	(ug/l)	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1.0	<1.0	<1.0	<1	<1	<1	<1	<1
Total xylenes	(ug/l)	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3.0	<3.0	<3.0	<3	<3	<3	<3	<3
Total Inorganic Analytes (ug/l)																			
Aluminum	(ug/l)	-	-	<176U	<169U	<32.1U	-	-	-	-	-	-	-	-	-	-	-	<104U	<300
Arsenic	(ug/l)	466	456	579	566	622	622	498	502	520	381	507	553	550	357	352	501	111	166
Barium	(ug/l)	-	-	140	135	160	-	-	-	-	-	-	-	-	-	-	-	58	77
Calcium	(ug/l)	-	-	64000	62200	79400	-	-	-	-	-	-	-	-	-	-	-	32500	47600
Iron	(ug/l)	23700	23200	26800	26100	29200	26600	18100	23500	24900	12700	22400	24000	23500	13100	13100	23100	9930	14700
Lead	(ug/l)	-	-	2.9J	2.3J	<5.0	-	-	-	-	-	-	-	-	-	-	-	2J	<2.5U
Magnesium	(ug/l)	-	-	21900	21200	23500	-	-	-	-	-	-	-	-	-	-	-	9990	11600
Manganese	(ug/l)	1270	1230	1620	1580	1780	1740J	1130	1480	1570	881	1340	1340	1310	831	832	1280	2170	2880
Potassium	(ug/l)	-	-	27200J	26300J	28200	-	-	-	-	-	-	-	-	-	-	-	6660J	7290
Sodium	(ug/l)	-	-	89600J	86300J	97200	-	-	-	-	-	-	-	-	-	-	-	20500J	19200
Dissolved Inorganic Analytes (ug/l)																			
Arsenic	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Water Quality Analyses																			
Hardness carbonate (as CaCO3)	(ug/l)	259000	255000	250000	242000	295000	261000	233000	243000	255000	170000	246000	258000	253000	187000	190000	257000	122000	166000
Residue, filterable	(mg/l)	480	-	510	570	620	460	450	500	-	380	550	520	-	380	-	520	210	260

Notes:
ug/l = micrograms per liter
mg/l= milligrams per liter
< = not detected above given reporting limit
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J = estimated value
U = revised to non-detect during validation

Appendix A-1:
Groundwater Analytical Results (Detected Analytes 2009-2013)

Saco Municipal Landfill
Saco, Maine

		Landfill Areas 3 & 4 (continued)																						
		MW-95-4SA	MW-95-4SA	MW-95-4SA	MW-95-4SA	MW-95-4SA	MW-95-4SA	MW-95-4SA	MW-95-4SA	MW-95-4SB	MW-95-4SB DUP	MW-95-4SB	MW-95-4SB	MW-95-4SB	MW-95-4SB	MW-95-4SB	MW-95-4SB	MW-95-4SB	MW-95-4SB	MW-95-4SB	MW-95-5R	MW-95-6R	MW-95-6S	MW-95-6S
		6/10/2010	11/19/2010	6/15/2011	11/3/2011	6/21/2012	11/2/2012	6/12/2013	11/8/2013	6/4/2009	6/4/2009	11/5/2009	6/10/2010	11/19/2010	6/15/2011	11/3/2011	6/21/2012	11/2/2012	6/12/2013	11/8/2013	6/3/2009	6/2/2009	6/2/2009	11/4/2009
CONSTITUENT	UNITS	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate 1	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
VOCs (ug/l)																								
Acetone	(ug/l)	-	-	-	-	-	-	-	-	<5	<5	<5U	-	-	-	-	-	-	-	-	<5	<5	<5	<5
Benzene	(ug/l)	-	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1	<1
n-Utylbenzene	(ug/l)	-	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1	<1
sec-Utylbenzene	(ug/l)	-	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1	<1
Chlorobenzene	(ug/l)	-	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1	<1
Chloroethane	(ug/l)	-	-	-	-	-	-	-	-	<2J	<2J	<2	-	-	-	-	-	-	-	-	<2J	<2	<2	<2
1,2-Dichlorobenzene	(ug/l)	-	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1	<1
1,1-Dichloroethane	(ug/l)	-	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1	<1
1,2-Dichloroethene	(ug/l)	-	-	-	-	-	-	-	-	<2	<2	<2	-	-	-	-	-	-	-	-	<2	<2	<2	<2
1,4-Dichlorobenzene	(ug/l)	-	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1	<1
Isopropylbenzene	(ug/l)	-	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1	<1
4-Isopropyltoluene	(ug/l)	-	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1	<1
Naphthalene	(ug/l)	-	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1	<1
1-Phenylpropane	(ug/l)	-	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1	<1UJ
Tetrahydrofuran	(ug/l)	-	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1	<1
1,2,4-Trichlorobenzene	(ug/l)	-	-	-	-	-	-	-	-	<10	<10	3J	-	-	-	-	-	-	-	-	<10	<10	<10	<10
1,2,4-Trimethylbenzene	(ug/l)	-	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1	<1
1,3,5-Trimethylbenzene	(ug/l)	-	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1	<1
m&p-Xylene	(ug/l)	-	-	-	-	-	-	-	-	<2	<2	<2	-	-	-	-	-	-	-	-	<2	<2	<2	<2
o-Xylene	(ug/l)	-	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1	<1
Total xylenes	(ug/l)	-	-	-	-	-	-	-	-	<3	<3	<3	-	-	-	-	-	-	-	-	<3	<3	<3	<3
Total Inorganic Analytes (ug/l)																								
Aluminum	(ug/l)	-	-	-	-	-	-	-	-	<127U	<131U	<23.4U	-	-	-	-	-	-	-	-	<358U	95.3J	92.7J	<26.0U
Arsenic	(ug/l)	138	191	122	190	140	151	169	203	74	74.2	79.9	98.8	88.2	78.2	90.6	87.7	99.9	76.4	94.6	17.8	3.8B	<8	<3.1U
Barium	(ug/l)	-	-	-	-	-	-	-	-	41.9	43.2	55.5	-	-	-	-	-	-	-	-	22.7	8.9J	9.5J	11.6
Calcium	(ug/l)	-	-	-	-	-	-	-	-	48900	51100	69700	-	-	-	-	-	-	-	-	10500	43000	29100	32200
Iron	(ug/l)	15200	35700	13000	21700	8800	8150	10800	12300	6400	6600	6600	7580	7330	6580	6500	5440	6840	6550	7710	<394U	8.4J	726	1600
Lead	(ug/l)	-	-	-	-	-	-	-	-	1.7J	<5	<1.6U	-	-	-	-	-	-	-	-	<5	<5	<5	<5.0
Magnesium	(ug/l)	-	-	-	-	-	-	-	-	13500	14000	15600	-	-	-	-	-	-	-	-	8590	10400	8390	7820
Manganese	(ug/l)	3370J	7600	2580	4300	1540	1440	1760	1780	2960	3170	3680	3170J	3840	2840	3180	1960	2780	2440	3090	36.4	<5	239	145
Potassium	(ug/l)	-	-	-	-	-	-	-	-	10200J	10600J	12100	-	-	-	-	-	-	-	-	6240J	3810	3020	2810
Sodium	(ug/l)	-	-	-	-	-	-	-	-	30200J	31200J	42800	-	-	-	-	-	-	-	-	144000J	14200	8130	8680
Dissolved Inorganic Analytes (ug/l)																								
Arsenic	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Water Quality Analyses																								
Hardness carbonate (as CaCO3)	(ug/l)	143000	296000	131000	249000	123000	116000	153000	163000	178000	185000	238000	201000	270000	207000	236000	157000	232000	211000	266000	61500	150000	107000	112000
Residue, filterable	(mg/l)	190	430	240	460	230	200	240	260	270	310	360	260	400	330	410	250	360	310	380	450	210	130	130

Notes:
ug/l = micrograms per liter
mg/l= milligrams per liter
< = not detected above given reporting limit
- = not analyzed or not available
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Appendix A-1:
Groundwater Analytical Results (Detected Analytes 2009-2013)

Saco Municipal Landfill
Saco, Maine

		Landfill Areas 3 & 4 (continued)																						
		MW-95-6S	MW-95-6S	MW-95-6S	MW-95-6S	MW-95-7R	MW-95-7R	MW-95-7R	MW-95-7R	MW-95-7R	MW-95-7R	MW-96-9R	MW-96-9R	MW-96-9R	MW-96-9R	MW-96-9R	MW-96-9R	MW-96-9R	MW-96-9R	MW-97-13R	MW-97-13R	MW-97-13R
		6/10/2010	6/15/2011	6/20/2012	6/12/2013	6/4/2009	11/4/2009	6/9/2010	6/15/2011	6/20/2012	6/12/2013	6/2/2009	11/4/2009	6/9/2010	11/18/2010	6/15/2011	11/2/2011	6/20/2012	11/1/2012	6/12/2013	11/6/2013	6/4/2009	11/5/2009	6/10/2010
CONSTITUENT	UNITS	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
VOCs (ug/l)																								
Acetone	(ug/l)	-	-	-	-	<5	<5	-	-	-	-	<5	<5	-	-	-	-	-	-	-	-	<5	<5	3J
Benzene	(ug/l)	-	-	-	-	<1	<1	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	0.8J	0.4J	0.9J
n-Utylbenzene	(ug/l)	-	-	-	-	<1	<1	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1
sec-Utylbenzene	(ug/l)	-	-	-	-	<1	<1	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1
Chlorobenzene	(ug/l)	-	-	-	-	<1	<1	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1
Chloroethane	(ug/l)	-	-	-	-	<2J	<2	-	-	-	-	<2	<2	-	-	-	-	-	-	-	-	<2	<2UJ	<2
1,2-Dichlorobenzene	(ug/l)	-	-	-	-	<1	<1	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1
1,1-Dichloroethane	(ug/l)	-	-	-	-	<1	<1	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1
1,2-Dichloroethene	(ug/l)	-	-	-	-	<2	<2	-	-	-	-	<2	<2	-	-	-	-	-	-	-	-	<2	<2	<2
1,4-Dichlorobenzene	(ug/l)	-	-	-	-	<1	<1	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1
Isopropylbenzene	(ug/l)	-	-	-	-	<1	<1	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1
4-Isopropyltoluene	(ug/l)	-	-	-	-	<1	<1	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1
Naphthalene	(ug/l)	-	-	-	-	<1	<1UJ	-	-	-	-	<1	<1UJ	-	-	-	-	-	-	-	-	<1	<1	<1
1-Phenylpropane	(ug/l)	-	-	-	-	<1	<1	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1
Tetrahydrofuran	(ug/l)	-	-	-	-	<10	<10	-	-	-	-	<10	<10	-	-	-	-	-	-	-	-	<10	<10	<10
1,2,4-Trichlorobenzene	(ug/l)	-	-	-	-	<1	<1	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1
1,2,4-Trimethylbenzene	(ug/l)	-	-	-	-	<1	<1	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1
1,3,5-Trimethylbenzene	(ug/l)	-	-	-	-	<1	<1	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1
m&p-Xylene	(ug/l)	-	-	-	-	<2	<2	-	-	-	-	<2	<2	-	-	-	-	-	-	-	-	<2	<2	<2
o-Xylene	(ug/l)	-	-	-	-	<1	<1	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1
Total xylenes	(ug/l)	-	-	-	-	<3	<3	-	-	-	-	<3	<3	-	-	-	-	-	-	-	-	<3	<3	<3
Total Inorganic Analytes (ug/l)																								
Aluminum	(ug/l)	-	-	-	-	<66.8U	<23.6U	-	-	-	-	91.2J	<42.7U	-	-	-	-	-	-	-	-	<95.9U	<24.0U	-
Arsenic	(ug/l)	5.2J	1.7J	1.8J	<8U	<8	<3.0U	3.6J	4.0J	4.8J	<8.0J	164	159	148	157	187	186	190	175	176	192	151	206	357
Barium	(ug/l)	-	-	-	-	1.8J	2.9J	-	-	-	-	13.6	14.8	-	-	-	-	-	-	-	-	11.2	10.6	-
Calcium	(ug/l)	-	-	-	-	11500	12900	-	-	-	-	20700	23200	-	-	-	-	-	-	-	-	19900	16400	-
Iron	(ug/l)	2190	370	473	902	110	<78.0U	142	<100U	220	232	304	341	240	227	251	253	243	228	236	287	130000	122000	163000
Lead	(ug/l)	-	-	-	-	<5	<5.0	-	-	-	-	<5	<5.0	-	-	-	-	-	-	-	-	1.8J	<5.0	-
Magnesium	(ug/l)	-	-	-	-	2280	2060	-	-	-	-	9780	9480	-	-	-	-	-	-	-	-	4640	3150	-
Manganese	(ug/l)	274J	75.1	92.4	173	16.1	11.6	15.6J	23.7	43.4	27	450	474	486J	451	409	422	403	391	385	372	2640	2330	3390J
Potassium	(ug/l)	-	-	-	-	1350J	619J	-	-	-	-	2230	1950	-	-	-	-	-	-	-	-	5460J	5470	-
Sodium	(ug/l)	-	-	-	-	4460J	4220	-	-	-	-	28000	29200	-	-	-	-	-	-	-	-	2770J	2450	-
Dissolved Inorganic Analytes (ug/l)																								
Arsenic	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	125	-	-
Barium	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11.5	-	-
Calcium	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19800	-	-
Iron	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	126000	-	-
Magnesium	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4630	-	-
Manganese	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2600	-	-
Potassium	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5260J	-	-
Sodium	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2740J	-	-
Water Quality Analyses																								
Hardness carbonate (as CaCO3)	(ug/l)	123000	114000	133000	142000	38100	40700	38200	43000	43800	50800	92000	96900	91000	96900	94700	92600	95300	92600	97400	93400	68700	53800	78500
Residue, filterable	(mg/l)	140	140	160	150	71	47	20	68	68	68	160	130	120	180	170	180	150	170	160	150	300	350	260

Notes:
ug/l = micrograms per liter
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Appendix A-1:
Groundwater Analytical Results (Detected Analytes 2009-2013)

Saco Municipal Landfill
Saco, Maine

		Landfill Areas 3 & 4 (continued)																				
		MW-97-13R	MW-97-13R	MW-97-13R	MW-97-13R	MW-97-13R	MW-97-13R	MW-97-13R	MW-97-1451	MW-97-14S-1	MW-97-14S-1-DUP	MW-97-14S-1	MW-97-14S-1	MW-97-14S-1	MW-97-14S-1	MW-97-14S-1	MW-97-14S-1	MW-97-14S-1	MW-97-14S-1	MW-97-16S	MW-97-17R	MW-97-19S
		11/18/2010	6/16/2011	11/3/2011	6/21/2012	11/2/2012	6/13/2013	11/8/2013	6/4/2009	11/4/2009	11/4/2009	6/10/2010	11/19/2010	6/16/2011	11/3/2011	6/21/2012	11/1/2012	6/13/2013	11/8/2013	6/2/2009	6/4/2009	6/2/2009
CONSTITUENT	UNITS	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate 1	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
VOCs (ug/l)																						
Acetone	(ug/l)	-	-	-	-	-	-	-	<5	<5	<5	-	-	-	-	-	-	-	-	<5	<5	<5
Benzene	(ug/l)	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1
n-Utylbenzene	(ug/l)	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1
sec-Utylbenzene	(ug/l)	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1
Chlorobenzene	(ug/l)	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1
Chloroethane	(ug/l)	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	0.5J
1,2-Dichlorobenzene	(ug/l)	-	-	-	-	-	-	-	<2	<2	<2	-	-	-	-	-	-	-	-	<2	<2	0.5J
1,1-Dichloroethane	(ug/l)	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1
1,2-Dichloroethene	(ug/l)	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1
1,4-Dichlorobenzene	(ug/l)	-	-	-	-	-	-	-	<2	<2	<2	-	-	-	-	-	-	-	-	<2	<2	<2
Isopropylbenzene	(ug/l)	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1
4-Isopropyltoluene	(ug/l)	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1
Naphthalene	(ug/l)	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1
1-Phenylpropane	(ug/l)	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1
Tetrahydrofuran	(ug/l)	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1
1,2,4-Trichlorobenzene	(ug/l)	-	-	-	-	-	-	-	<10	3J	3J	-	-	-	-	-	-	-	-	<10	<10	6J
1,2,4-Trimethylbenzene	(ug/l)	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1
1,3,5-Trimethylbenzene	(ug/l)	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1
m&p-Xylene	(ug/l)	-	-	-	-	-	-	-	<2	<2	<2	-	-	-	-	-	-	-	-	<2	<2	<2
o-Xylene	(ug/l)	-	-	-	-	-	-	-	<1	<1	<1	-	-	-	-	-	-	-	-	<1	<1	<1
Total xylenes	(ug/l)	-	-	-	-	-	-	-	<3	<3	<3	-	-	-	-	-	-	-	-	<3	<3	<3
Total Inorganic Analytes (ug/l)																						
Aluminum	(ug/l)	-	-	-	-	-	-	-	<153U	<37.0U	<23.8U	-	-	-	-	-	-	-	-	63.4J	<204U	437
Arsenic	(ug/l)	240	45.7	347	300	178J	226	222	109	167	174	144	106	109	144	98.2	175	76.6	186	<8	5.4J	31
Barium	(ug/l)	-	-	-	-	-	-	-	50.2	67.1	66	-	-	-	-	-	-	-	-	1.5J	14.9	112
Calcium	(ug/l)	-	-	-	-	-	-	-	55000	66200	66300	-	-	-	-	-	-	-	-	18600	70000	70800
Iron	(ug/l)	154000	36600	136000	141000	125000	140000	125000	6310	7290	7280	11000	4040	8860	6310	6330	9520	6990	10300	16.7J	2700	2390
Lead	(ug/l)	-	-	-	-	-	-	-	<5	<5.0	<5.0	-	-	-	-	-	-	-	-	<5	3.5J	1.6J
Magnesium	(ug/l)	-	-	-	-	-	-	-	14500	14200	14100	-	-	-	-	-	-	-	-	3970	11100	21300
Manganese	(ug/l)	3430	856	2770	2810	2630	2500	2710	928	1020	1020	1470J	699	1100	829	846	1040	894	887	19.6	107	2480
Potassium	(ug/l)	-	-	-	-	-	-	-	11000	15800	15800	-	-	-	-	-	-	-	-	1700	<885UJ	14900
Sodium	(ug/l)	-	-	-	-	-	-	-	37100	44200	43700	-	-	-	-	-	-	-	-	4660	7350J	55400
Dissolved Inorganic Analytes (ug/l)																						
Arsenic	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iron	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Magnesium	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Manganese	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sodium	(ug/l)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Water Quality Analyses																						
Hardness carbonate (as CaCO3)	(ug/l)	115000	25700	65700	63200	85800	76800	79500	197000	224000	224000	336000	155000	298000	222000	260000	300000	320000	287000	62900	220000	264000
Residue, filterable	(mg/l)	320	220	230	190	270	190	250	320	330	-	430	270	410	380	400	480	460	430	73	280	430

Notes:
ug/l = micrograms per liter
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Appendix A-1:
Groundwater Analytical Results (Detected Analytes 2009-2013)

Saco Municipal Landfill
Saco, Maine

		Landfill Areas 3 & 4 (continued)									
		MW-97-19S	MW-97-19S	MW-97-19S	MW-97-19S	MW-97-19S	MW-97-19S DUP	MW-97-19S	MW-97-19S	MW-97-19S	MW-97-19S
		11/4/2009	6/10/2010	11/19/2010	6/16/2011	11/3/2011	11/3/2011	6/21/2012	11/1/2012	6/13/2013	11/8/2013
CONSTITUENT	UNITS	Primary	Primary	Primary	Primary	Primary	Duplicate 1	Primary	Primary	Primary	Primary
VOCs (ug/l)											
Acetone	(ug/l)	<5	-	-	-	-	-	-	-	-	-
Benzene	(ug/l)	<1	-	-	-	-	-	-	-	-	-
n-Utylbenzene	(ug/l)	<1	-	-	-	-	-	-	-	-	-
sec-Utylbenzene	(ug/l)	<1	-	-	-	-	-	-	-	-	-
Chlorobenzene	(ug/l)	<1	-	-	-	-	-	-	-	-	-
Chloroethane	(ug/l)	0.7J	-	-	-	-	-	-	-	-	-
1,2-Dichlorobenzene	(ug/l)	0.3J	-	-	-	-	-	-	-	-	-
1,1-Dichloroethane	(ug/l)	<1	-	-	-	-	-	-	-	-	-
1,2-Dichloroethene	(ug/l)	<2	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	(ug/l)	<1	-	-	-	-	-	-	-	-	-
Isopropylbenzene	(ug/l)	<1	-	-	-	-	-	-	-	-	-
4-Isopropyltoluene	(ug/l)	<1	-	-	-	-	-	-	-	-	-
Naphthalene	(ug/l)	<1	-	-	-	-	-	-	-	-	-
1-Phenylpropane	(ug/l)	<1	-	-	-	-	-	-	-	-	-
Tetrahydrofuran	(ug/l)	4J	-	-	-	-	-	-	-	-	-
1,2,4-Trichlorobenzene	(ug/l)	<1	-	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	(ug/l)	<1	-	-	-	-	-	-	-	-	-
1,3,5-Trimethylbenzene	(ug/l)	<1	-	-	-	-	-	-	-	-	-
m&p-Xylene	(ug/l)	<2	-	-	-	-	-	-	-	-	-
o-Xylene	(ug/l)	<1	-	-	-	-	-	-	-	-	-
Total xylenes	(ug/l)	<3	-	-	-	-	-	-	-	-	-
Total Inorganic Analytes (ug/l)											
Aluminum	(ug/l)	<106U	-	-	-	-	-	-	-	-	-
Arsenic	(ug/l)	30	10.6	18	19	35	35.6	13	29	16.9	23.2
Barium	(ug/l)	122	-	-	-	-	-	-	-	-	-
Calcium	(ug/l)	87900	-	-	-	-	-	-	-	-	-
Iron	(ug/l)	2050	1030	1610	1380	2650	2680	995	2340	1560	2100
Lead	(ug/l)	<2.2U	-	-	-	-	-	-	-	-	-
Magnesium	(ug/l)	22200	-	-	-	-	-	-	-	-	-
Manganese	(ug/l)	2560	3490J	2900	2470	3020	3000	2340	2460	2400	2400
Potassium	(ug/l)	16800	-	-	-	-	-	-	-	-	-
Sodium	(ug/l)	62500	-	-	-	-	-	-	-	-	-
Dissolved Inorganic Analytes (ug/l)											
Arsenic	(ug/l)	-	-	-	-	-	-	-	-	-	-
Barium	(ug/l)	-	-	-	-	-	-	-	-	-	-
Calcium	(ug/l)	-	-	-	-	-	-	-	-	-	-
Iron	(ug/l)	-	-	-	-	-	-	-	-	-	-
Magnesium	(ug/l)	-	-	-	-	-	-	-	-	-	-
Manganese	(ug/l)	-	-	-	-	-	-	-	-	-	-
Potassium	(ug/l)	-	-	-	-	-	-	-	-	-	-
Sodium	(ug/l)	-	-	-	-	-	-	-	-	-	-
Water Quality Analyses											
Hardness carbonate (as CaCO3)	(ug/l)	311000	279000	320000	230000	294000	293000	268000	296000	276000	289000
Residue, filterable	(mg/l)	490	400	470	360	<10.	-	400	500	400	450

Notes:
ug/l = micrograms per liter
mg/l= milligrams per liter
< = not detected above given reporting limit
- = not analyzed or not available
J = estimated value
U = revised to non-detect during validation

Appendix A-2: Surface Water Analytical Results (Detected Analytes 2009-2013)

Saco Municipal Landfill
Saco, Maine

		SW-7	SW-7	SW-7	SW-7	SW-7	SW-7	SW-13	SW-13	SW-13	SW-13	SW-13	SW-13
		6/5/2009	11/6/2009	6/11/2010	6/17/2011	6/22/2012	6/14/2013	6/5/2009	11/6/2009	6/11/2010	6/17/2011	6/22/2012	6/14/2013
CONSTITUENT	UNITS	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
Inorganic Analytes (ug/l) (total)													
Aluminum	(ug/l)	246J	<95.5U	-	-	-	-	232J	<120U	-	-	-	-
Arsenic	(ug/l)	<8UJ	<8.0	<8.0	<8.0	<8.0	<1	19.4	15.8	17	20.1	15.4	7
Barium	(ug/l)	10.4	10.4	-	-	-	-	28.5	20.9	-	-	-	-
Calcium	(ug/l)	4160	4440	-	-	-	-	18900	16700	-	-	-	-
Iron	(ug/l)	424	254	1710	630	444	1400	1840	1470	1740	1700	1780	960
Magnesium	(ug/l)	1700	1790	-	-	-	-	3970	3260	-	-	-	-
Manganese	(ug/l)	171	62.8	432	254	131	320	667	415	504	579	448	210
Potassium	(ug/l)	<3380UJ	3800	-	-	-	-	<3230UJ	3180	-	-	-	-
Sodium	(ug/l)	6850	7330	-	-	-	-	28000	22000	-	-	-	-
General Chemistry													
Hardness, carbonate (as CaCO3)	(ug/l)	17400	18500	17900	18100	17300	20000	63600	55200	58500	68500	54600	39000

Notes:
< = not detected at reporting limit
- = not analyzed
J = estimated value
U = revised to non-detect during validation
ug/l = micrograms per liter

Appendix A-2: Surface Water Analytical Results (Detected Analytes 2009-2013)

Saco Municipal Landfill
Saco, Maine

		SW-21	SW-21	SW-21	SW-21	SW-21	SW-21	SW-31	SW-31	SW-31	SW-31	SW-31	SW-31
		6/5/2009	11/6/2009	6/11/2010	6/17/2011	6/22/2012	6/14/2013	6/5/2009	11/6/2009	6/11/2010	6/17/2011	6/22/2012	6/14/2013
CONSTITUENT	UNITS	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
Inorganic Analytes (ug/l) (total)													
Aluminum	(ug/l)	272	<140U	-	-	-	-	<191U	<91.4U	-	-	-	-
Arsenic	(ug/l)	<8UJ	<8.0	<8.0	2.7J	<8.0	1	12.2J	10.8	12.2	13.1	12.2	7
Barium	(ug/l)	11.5	9.4	-	-	-	-	21.5	17.3	-	-	-	-
Calcium	(ug/l)	10100	10200	-	-	-	-	21300	19000	-	-	-	-
Iron	(ug/l)	662	605	918	686	1150	710	1070	854	1240	1010	1190	970
Magnesium	(ug/l)	1920	1940	-	-	-	-	4560	4040	-	-	-	-
Manganese	(ug/l)	96.9	31.1	98.7	76.6	91.7	67	548	332	434	414	356	210
Potassium	(ug/l)	2030J	2590	-	-	-	-	<3370UJ	3100	-	-	-	-
Sodium	(ug/l)	21900	17100	-	-	-	-	27400	22900	-	-	-	-
General Chemistry													
Hardness, carbonate (as CaCO3)	(ug/l)	33000	33600	36700	37400	33400	31000	72000	64200	65900	75700	67600	43000

Notes:
< = not detected at reporting limit
- = not analyzed
J = estimated value
U = revised to non-detect during validation
ug/l = micrograms per liter

Appendix A-2: Surface Water Analytical Results (Detected Analytes 2009-2013)

Saco Municipal Landfill
Saco, Maine

		SW-34	SW-34	SW-34	SW-34	SW-34	SW-34	SW-37	SW-37	SW-37	SW-37	SW-37	SW-37
		6/5/2009	11/6/2009	6/11/2010	6/17/2011	6/22/2012	6/14/2013	6/5/2009	6/5/2009	11/6/2009	11/6/2009	6/11/2010	6/17/2011
CONSTITUENT	UNITS	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Duplicate 1	Primary	Duplicate 1	Primary	Primary
Inorganic Analytes (ug/l) (total)													
Aluminum	(ug/l)	<198U	<122U	-	-	-	-	221J	225J	<115U	<110U	-	-
Arsenic	(ug/l)	17.1	13.7	15.2	16.4	12.2	9	18.1	18.8	14.5	15.4	13.1	20.1
Barium	(ug/l)	26.3	20.3	-	-	-	-	27.4	27.6	22.2	21.4	-	-
Calcium	(ug/l)	19700	17200	-	-	-	-	18900	19000	16500	17000	-	-
Iron	(ug/l)	1430	1230	1470	1330	1460	1400	1610	1620	1380	1400	1680	1640
Magnesium	(ug/l)	4060	3490	-	-	-	-	3870	3850	3570	3450	-	-
Manganese	(ug/l)	646	412	482	571	450	270	652	648	440	436	528	593
Potassium	(ug/l)	<3280UJ	3170	-	-	-	-	<3120UJ	<3270UJ	3250	3250	-	-
Sodium	(ug/l)	27500	22600	-	-	-	-	26900	26800	23600	22600	-	-
General Chemistry													
Hardness, carbonate (as CaCO3)	(ug/l)	65900	57300	60000	72700	58200	41000	63100	63400	55900	56800	60000	69100

Notes:
< = not detected at reporting limit
- = not analyzed
J = estimated value
U = revised to non-detect during validation
ug/l = micrograms per liter

Appendix A-2: Surface Water Analytical Results (Detected Analytes 2009-2013)

Saco Municipal Landfill
Saco, Maine

		SW-37	SW-37	SW-37	SW-37	SW-37	SW-52	SW-52	SW-52	SW-52	SW-52	SW-52	SW-52
		6/17/2011	6/22/2012	6/22/2012	6/14/2013	6/14/2013	6/5/2009	11/6/2009	6/11/2010	6/11/2010	6/17/2011	6/22/2012	6/14/2013
CONSTITUENT	UNITS	Duplicate 1	Primary	Duplicate 1	Primary	Duplicate 1	Primary	Primary	Primary	Duplicate 1	Primary	Primary	Primary
Inorganic Analytes (ug/l) (total)													
Aluminum	(ug/l)	-	-	-	-	-	254J	<142U	-	-	-	-	-
Arsenic	(ug/l)	20	15.9	15.6	7	7	25.4	14	15	15.6	36.3	19.7	6
Barium	(ug/l)	-	-	-	-	-	27.9	19.7	-	-	-	-	-
Calcium	(ug/l)	-	-	-	-	-	17400	15800	-	-	-	-	-
Iron	(ug/l)	1590	1710	1670	970	960	2810	1550	1780	1750	4080	2720	960
Magnesium	(ug/l)	-	-	-	-	-	3470	3020	-	-	-	-	-
Manganese	(ug/l)	593	492	490	220	220	562	337	440	437	540	428	180
Potassium	(ug/l)	-	-	-	-	-	<3000UJ	3080	-	-	-	-	-
Sodium	(ug/l)	-	-	-	-	-	27100	22100	-	-	-	-	-
General Chemistry													
Hardness, carbonate (as CaCO3)	(ug/l)	68600	58300	58400	40000	39000	57800	51800	55200	54700	65300	54300	37000

Notes:
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U = revised to non-detect during validation
ug/l = micrograms per liter

Appendix A-2: Surface Water Analytical Results (Detected Analytes 2009-2013)

Saco Municipal Landfill
Saco, Maine

		SW-69	SW-69	SW-69	SW-69	SW-69	SW-69	SW-103	SW-103	SW-103	SW-103	SW-103	SW-103
		6/5/2009	11/6/2009	6/11/2010	6/17/2011	6/22/2012	6/14/2013	6/5/2009	11/6/2009	6/11/2010	6/17/2011	6/22/2012	6/14/2013
CONSTITUENT	UNITS	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
Inorganic Analytes (ug/l) (total)													
Aluminum	(ug/l)	<160U	<82.2U	-	-	-	-	<140U	<60.4U	-	-	-	-
Arsenic	(ug/l)	9J	7.2J	10.1	11	9.5	5	7.8J	7.1J	8.0J	9.6	9.8	5
Barium	(ug/l)	16.2	13.7	-	-	-	-	15.8	13.5	-	-	-	-
Calcium	(ug/l)	21800	19200	-	-	-	-	22100	19600	-	-	-	-
Iron	(ug/l)	774	589	1160	854	946	700	727	519	810	701	831	690
Magnesium	(ug/l)	4600	3900	-	-	-	-	4640	4070	-	-	-	-
Manganese	(ug/l)	402	237	377	331	270	130	367	207	264	247	226	120
Potassium	(ug/l)	<3060UJ	2790	-	-	-	-	<3120UJ	2830	-	-	-	-
Sodium	(ug/l)	23200	19200	-	-	-	-	23100	19900	-	-	-	-
General Chemistry													
Hardness, carbonate (as CaCO3)	(ug/l)	73400	64000	62900	83300	71600	44000	74400	65800	63700	79800	73600	45000

Notes:
< = not detected at reporting limit
- = not analyzed
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U = revised to non-detect during validation
ug/l = micrograms per liter

Appendix A-3: Sediment Analytical Results (Detected Analytes 2009 - 2013)

Saco Municipal Landfill
Saco, Maine

		SD-7	SD-7	SD-7	SD-7	SD-7	SD-13	SD-13	SD-13	SD-13	SD-13	SD-21	SD-21	SD-21	SD-21	SD-21
		6/5/2009	6/11/2010	6/17/2011	6/22/2012	6/14/2013	6/5/2009	6/11/2010	6/17/2011	6/22/2012	6/14/2013	6/5/2009	6/11/2010	6/17/2011	6/22/2012	6/14/2013
CONSTITUENT	UNITS	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
Inorganic Analytes (mg/kg)																
Aluminum	(mg/kg)	6070	-	-	-	-	5840	-	-	-	-	7470	-	-	-	-
Arsenic	(mg/kg)	2.1	4.7	2.8	3.8J	2.1	41	39.1	23.6	15.4J	28.7	5.3	7.7	9.8	6.3J	4
Barium	(mg/kg)	29.5	-	-	-	-	34.6	-	-	-	-	41.9	-	-	-	-
Beryllium	(mg/kg)	0.7	-	-	-	-	0.38J	-	-	-	-	0.51	-	-	-	-
Calcium	(mg/kg)	727J	-	-	-	-	1060J	-	-	-	-	1910J	-	-	-	-
Chromium	(mg/kg)	6.8	-	-	-	-	15.1	-	-	-	-	22.4	-	-	-	-
Cobalt	(mg/kg)	2.3J	-	-	-	-	3.1	-	-	-	-	4.1	-	-	-	-
Copper	(mg/kg)	4.7	-	-	-	-	6.5	-	-	-	-	8	-	-	-	-
Iron	(mg/kg)	6440	9920	9040	7810	5780	12600	16200	6800	10100	9460	13400	5930	10400	9060	10500
Lead	(mg/kg)	7.2	-	-	-	-	6.2	-	-	-	-	5.8	-	-	-	-
Magnesium	(mg/kg)	1210J	-	-	-	-	2600J	-	-	-	-	4800J	-	-	-	-
Manganese	(mg/kg)	399	818	432	624	988	187	223	187	333	214	238	172	203	177	238
Nickel	(mg/kg)	4.2	-	-	-	-	13.3	-	-	-	-	15.6	-	-	-	-
Potassium	(mg/kg)	1160J	-	-	-	-	1010J	-	-	-	-	1830J	-	-	-	-
Sodium	(mg/kg)	72.5J	-	-	-	-	<89.6U	-	-	-	-	134	-	-	-	-
Vanadium	(mg/kg)	9.8	-	-	-	-	12.2	-	-	-	-	20.9	-	-	-	-
Zinc	(mg/kg)	23.8	-	-	-	-	30.2	-	-	-	-	33.3	-	-	-	-
General Chemistry																
Solids - Total Residue	(%)	65	45	60	61	61	76	76	78	68	80	83	66	59	84	82

Notes:
< = not detected at reporting limit
- = not analyzed
J = estimated value
U= revised to non-detect during validation
mg/kg = milligrams per kilogram

Appendix A-3: Sediment Analytical Results (Detected Analytes 2009 - 2013)

Saco Municipal Landfill
Saco, Maine

		SD-31	SD-31	SD-31	SD-31	SD-31	SD-34	SD-34	SD-34	SD-34	SD-34
		6/5/2009	6/11/2010	6/17/2011	6/22/2012	6/14/2013	6/5/2009	6/11/2010	6/17/2011	6/22/2012	6/14/2013
CONSTITUENT	UNITS	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
Inorganic Analytes (mg/kg)											
Aluminum	(mg/kg)	3950	-	-	-	-	5640	-	-	-	-
Arsenic	(mg/kg)	32.5	45.6	39.2	43.5J	40.1	56.3	52.5	287	56.3J	138
Barium	(mg/kg)	42.6	-	-	-	-	44.1	-	-	-	-
Beryllium	(mg/kg)	0.29J	-	-	-	-	0.43	-	-	-	-
Calcium	(mg/kg)	1040J	-	-	-	-	1090J	-	-	-	-
Chromium	(mg/kg)	7	-	-	-	-	12.4	-	-	-	-
Cobalt	(mg/kg)	2.8J	-	-	-	-	3.2	-	-	-	-
Copper	(mg/kg)	3	-	-	-	-	4.9	-	-	-	-
Iron	(mg/kg)	7350	8610	7320	13700	7990	13600	11100	43200	10600	16600
Lead	(mg/kg)	4	-	-	-	-	5.8	-	-	-	-
Magnesium	(mg/kg)	1440J	-	-	-	-	2390J	-	-	-	-
Manganese	(mg/kg)	1020	1070	775	896	1100	438	496	2190	520	490
Nickel	(mg/kg)	6.2	-	-	-	-	10	-	-	-	-
Potassium	(mg/kg)	565J	-	-	-	-	1000J	-	-	-	-
Sodium	(mg/kg)	<86.9U	-	-	-	-	<157U	-	-	-	-
Vanadium	(mg/kg)	7.1	-	-	-	-	11.8	-	-	-	-
Zinc	(mg/kg)	25.8	-	-	-	-	36.8	-	-	-	-
General Chemistry											
Solids - Total Residue	(%)	74	65	67	59	61	75	77	39	70	63

Notes:
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U= revised to non-detect during validation
mg/kg = milligrams per kilogram

Appendix A-3: Sediment Analytical Results (Detected Analytes 2009 - 2013)

Saco Municipal Landfill
Saco, Maine

		SD-37	SD-37 DUP	SD-37	SD-37	SD-37 DUP	SD-37	SD-37 DUP	SD-37	SD-37 DUP	SD-52	SD-52	SD-52 DUP	SD-52	SD-52	SD-52
		6/5/2009	6/5/2009	6/11/2010	6/17/2011	6/17/2011	6/22/2012	6/22/2012	6/14/2013	6/14/2013	6/5/2009	6/11/2010	6/11/2010	6/17/2011	6/22/2012	6/14/2013
CONSTITUENT	UNITS	Primary	Duplicate 1	Primary	Primary	Duplicate 1	Primary	Duplicate 1	Primary	Duplicate 1	Primary	Primary	Duplicate 1	Primary	Primary	Primary
Inorganic Analytes (mg/kg)																
Aluminum	(mg/kg)	4550	4270	-	-	-	-	-	-	-	7020	-	-	-	-	-
Arsenic	(mg/kg)	39.3	33.8	18.6	29.2	28.9	23.7J	50.7J	27.6J	60.9J	34.3	24.2	23.8	71.1	21.8J	33.3
Barium	(mg/kg)	40.9	30.8	-	-	-	-	-	-	-	38.9	-	-	-	-	-
Beryllium	(mg/kg)	0.4J	0.45J	-	-	-	-	-	-	-	0.59	-	-	-	-	-
Calcium	(mg/kg)	1110J	811J	-	-	-	-	-	-	-	1420J	-	-	-	-	-
Chromium	(mg/kg)	9.9	7.7	-	-	-	-	-	-	-	10.6	-	-	-	-	-
Cobalt	(mg/kg)	2.3	2.1	-	-	-	-	-	-	-	2.6J	-	-	-	-	-
Copper	(mg/kg)	4.6	3.4	-	-	-	-	-	-	-	5.3	-	-	-	-	-
Iron	(mg/kg)	9990	7670	7620	6960	7290	8770	8920	10600	15700	11200	7490	7720	13000	7650	14800
Lead	(mg/kg)	6.1	5	-	-	-	-	-	-	-	9.3	-	-	-	-	-
Magnesium	(mg/kg)	1500J	1340J	-	-	-	-	-	-	-	1770J	-	-	-	-	-
Manganese	(mg/kg)	545	388	158	120	113	398	243	280J	481J	313	198	210	229	535	401
Nickel	(mg/kg)	7.2	5.8	-	-	-	-	-	-	-	6.6	-	-	-	-	-
Potassium	(mg/kg)	804J	938	-	-	-	-	-	-	-	1050J	-	-	-	-	-
Sodium	(mg/kg)	<100U	<70.3U	-	-	-	-	-	-	-	<153U	-	-	-	-	-
Vanadium	(mg/kg)	10.3	7.6	-	-	-	-	-	-	-	12	-	-	-	-	-
Zinc	(mg/kg)	30.3	31.2	-	-	-	-	-	-	-	39.4	-	-	-	-	-
General Chemistry																
Solids - Total Residue	(%)	71	69	65	73	72	78	74	56	52	62	60	52	55	51	39

Notes:
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- = not analyzed
J = estimated value
U= revised to non-detect during validation
mg/kg = milligrams per kilogram

Appendix A-3: Sediment Analytical Results (Detected Analytes 2009 - 2013)

Saco Municipal Landfill
Saco, Maine

		SD-69	SD-69	SD-69	SD-69	SD-69	SD-103	SD-103	SD-103	SD-103	SD-103
		6/5/2009	6/11/2010	6/17/2011	6/22/2012	6/14/2013	6/5/2009	6/11/2010	6/17/2011	6/22/2012	6/14/2013
CONSTITUENT	UNITS	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
Inorganic Analytes (mg/kg)											
Aluminum	(mg/kg)	2590	-	-	-	-	3750	-	-	-	-
Arsenic	(mg/kg)	7.3	3.5	7.5	22.5J	8.8	13.2	13.9	13.5	12.5J	14.3
Barium	(mg/kg)	12.4	-	-	-	-	21.7	-	-	-	-
Beryllium	(mg/kg)	0.21J	-	-	-	-	0.28J	-	-	-	-
Calcium	(mg/kg)	606J	-	-	-	-	638J	-	-	-	-
Chromium	(mg/kg)	5.1	-	-	-	-	6.5	-	-	-	-
Cobalt	(mg/kg)	1.3	-	-	-	-	2.1J	-	-	-	-
Copper	(mg/kg)	<2.5U	-	-	-	-	3.1	-	-	-	-
Iron	(mg/kg)	3570	3800	5070	13600	5090	5240	8160	6150	6690	6260
Lead	(mg/kg)	2	-	-	-	-	3.5	-	-	-	-
Magnesium	(mg/kg)	1020J	-	-	-	-	1280J	-	-	-	-
Manganese	(mg/kg)	185	57.7	116	570	138	462	503	344	303	367
Nickel	(mg/kg)	4.8	-	-	-	-	5.6	-	-	-	-
Potassium	(mg/kg)	423J	-	-	-	-	526J	-	-	-	-
Sodium	(mg/kg)	<44.6U	-	-	-	-	<68U	-	-	-	-
Vanadium	(mg/kg)	5	-	-	-	-	7.4	-	-	-	-
Zinc	(mg/kg)	13.5	-	-	-	-	18.3	-	-	-	-
General Chemistry											
Solids - Total Residue	(%)	77	68	81	80	68	75	76	80	80	78

Notes:
< = not detected at reporting limit
- = not analyzed
J = estimated value
U= revised to non-detect during validation
mg/kg = milligrams per kilogram

Table 3-1: Groundwater Analytical Results - 2014
Upgradient/Background Wells - Detected Analytes
Saco Municipal Landfill
Saco, Maine

	ICL	MEG	MCL	MW-93-1 6/11/2014	MW-93-1 11/5/2014	MW-93-7 6/11/2014	MW-93-7 11/5/2014
Volatile Organic Compounds (ug/l) - no detections							
Semi-Volatile Organic Compounds (ug/l) - no detections							
Total Inorganic Analytes (ug/l)							
Arsenic	50	10	10	[29.2]	[28.0]	<8	<8 UJ
Barium	-	1000	2000	6.83	5.13	15.6	15.8
Cadmium	-	1	5	<5	<5	0.18 J	<5 UJ
Calcium	-	-	-	20900	19600	12600	13800
Chromium	-	20	100	<10	0.55 J	0.38 J	0.90 J
Cobalt	-	10	-	<10	<10	<10	0.27 J
Copper	-	500	1300	1.0 J	<25 UJ	1.0 J	<25
Iron	-	5000	-	268	<100 UJ	161	158
Magnesium	-	-	-	5130	4680	3350	3090 J
Manganese	200	500	-	60.9	45.4	86.9	111
Nickel	-	20	-	<10	0.76 J	1.3 J	0.79 J
Potassium	-	-	-	3490	3100 J	4420	4100 J
Sodium	-	20000	-	**[31100] J**	**[28400]**	**[94300] J**	**[83800]**
Vanadium	-	200	-	0.64 J	<10	<10	<10
Zinc	-	2000	-	4.6 J	<20 UJ	16.4 J	<20 UJ
Water Quality Parameters (ug/l)							
Hardness (as CaCO3)	-	-	-	73400	68200	45300	47200
Total dissolved solids (TDS)	-	-	-	150000	150000	350000	310000

Notes:
ug/l = micrograms per liter
< = not detected above given laboratory reporting limit
- = not analyzed or not available
J = estimated value
U = revised to non-detect during validation
MEG = Maine Maximum Exposure Guideline (Oct. 2012)
MCL=USEPA Maximum Contaminant Level (2009)
ICL=Interim Cleanup Level (site-specific)
[Bold] = exceeds ICL, MEG and/or MCL

Table 3-2: Groundwater Analytical Results - 2014
Landfill Areas 1 & 2 - Detected Analytes
Saco Municipal Landfill
Saco, Maine

	ICL	MEG	MCL	MW-13 6/12/2014	MW-13 11/6/2014	MW-95-8S 6/11/2014	MW-95-8S 11/5/2014	MW-95-9S 6/11/2014	MW-95-9S 11/5/2014	MW-95-11S 6/11/2014
Volatile Organic Compounds (ug/l)										
1,1-Dichloroethane	-	60	-	25	27	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	-	-	-	5.8	8.4	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	-	-	-	0.68 J	2.2	<1	<1	<1	<1	<1
1-Phenylpropane	-	-	-	<1	0.69 J	<1	<1	<1	<1	<1
4-Isopropyltoluene	-	70	-	<1	0.42 J	<1	<1	<1	<1	<1
Benzene	5	4	5	0.76 J	1	<1	<1	<1	<1	<1
Chloroethane	-	7	-	2.9	2.8	<2	<2	<2	<2	<2
Isopropylbenzene	-	-	-	<1	0.29 J	<1	<1	<1	<1	<1
m&p-Xylene	-	-	10000	0.74 J	0.92 J	<2	<2	<2	<2	<2
Naphthalene	-	10	-	1.4	1.8	<1	<1	<1 J	<1	<1
n-Butylbenzene	-	-	-	<1	0.27 J	<1	<1	<1	<1	<1
o-Xylene	-	-	10000	1.8	0.96 J	<1	<1	<1	<1	<1
Toluene	-	600	1000	0.61 J	0.49 J	<1	<1	<1	<1	<1
Total xylenes	-	-	10000	2.6 J	1.9 J	<3	<3	<3	<3	<3
Semi-Volatile Organic Compounds (ug/l) - no detections										
Total Inorganic Analytes (ug/l)										
Aluminum	-	7000	-	<300 UJ	<300 UJ	980	4620	362	416	<300 UJ
Arsenic	50	10	10	[40.6]	[46.9]	<8	<8 UJ	<8	<8 UJ	<8 UJ
Barium	-	1000	2000	21.1	21.6	6.94	17.2	<5 UJ	<5 UJ	<5 UJ
Calcium	-	-	-	58000	58300	8480	9790	3310	5840	10200
Chromium	-	20	100	<10	<10	1.0 J	3.72 J	<10	<10	<10
Cobalt	-	10	-	2.88 J	<10 UJ	0.60 J	0.55 J	0.27 J	0.26 J	<10
Copper	-	500	1300	<25	<25	2.8 J	<25 UJ	1.4 J	<25 UJ	<25
Iron	-	5000	-	[57500]	[52800]	1070	4290	290	240	485
Lead	-	10	15	<5 UJ	<5	<5	2.3 J	<5	<5 J	<5
Magnesium	-	-	-	22800 J	20200	7410	8720 J	1670	2860 J	3880
Manganese	200	500	-	[2970]	[2260]	50.9	64	120	[267]	4.5 J
Nickel	-	20	-	1.3 J	<10	2.0 J	6.19 J	<10	2.0 J	<10
Potassium	-	-	-	6650	7560	1820	2610 J	1000	1220	1810
Silver	-	40	-	0.39 J	<10	<10	<10	<10	<10	<10
Sodium	-	20000	-	[58800]	[57700]	12200J	13100	6250 J	10100	12200J

Table 3-2: Groundwater Analytical Results - 2014
Landfill Areas 1 & 2 - Detected Analytes
Saco Municipal Landfill
Saco, Maine

	ICL	MEG	MCL	MW-13	MW-13	MW-95-8S	MW-95-8S	MW-95-9S	MW-95-9S	MW-95-11S
				6/12/2014	11/6/2014	6/11/2014	11/5/2014	6/11/2014	11/5/2014	6/11/2014
Vanadium	-	200	-	1.2 J	1.4 J	1.8 J	4.75 J	0.39 J	0.60 J	0.30 J
Zinc	-	2000	-	<20 UJ	<20 UJ	7.1 J	<20 UJ	7.1 J	<20 UJ	9.61 J
Dissolved Inorganic Analytes (ug/l)										
Aluminum	-	7000	-	-	-	<300 UJ	2120	-	-	-
Barium	-	1000	2000	-	-	<5 UJ	10.2	-	-	-
Calcium	-	-	-	-	-	8170	9430	-	-	-
Chromium	-	20	100	-	-	<10	2.1 J	-	-	-
Cobalt	-	10	-	-	-	<10	0.26 J	-	-	-
Iron	-	5000	-	-	-	<100 UJ	2050	-	-	-
Lead	-	10	15	-	-	<5	1.4 J	-	-	-
Magnesium	-	-	-	-	-	7000	8000 J	-	-	-
Manganese	200	500	-	-	-	3.3 J	29.4	-	-	-
Nickel	-	20	-	-	-	0.33 J	4.01 J	-	-	-
Potassium	-	-	-	-	-	1480	2090 J	-	-	-
Sodium	-	20000	-	-	-	11900J	12900	-	-	-
Vanadium	-	200	-	-	-	0.44 J	2.36 J	-	-	-
Zinc	-	2000	-	-	-	2.3 J	<20 UJ	-	-	-
Water Quality Parameters (ug/l)										
Hardness carbonate (as CaCO3)	-	-	-	239000	229000	51700	60400	15100	26400	41300
Total dissolved solids (TDS)	-	-	-	570000	510000	100000	140000	44000	71000	110000

Notes:
ug/l = micrograms per liter
< = not detected above given laboratory reporting limit
- = not analyzed or not available
J = estimated value
U = revised to non-detect during validation
MEG = Maine Maximum Exposure Guideline (Oct. 2012)
MCL=USEPA Maximum Contaminant Level (2009)
ICL=Interim Cleanup Level (site-specific)
[Bold] = exceeds ICL, MEG, and/or MCL

Table 3-3: Groundwater Analytical Results - 2014
Landfill Areas 3 & 4 - Detected Analytes
Saco Municipal Landfill
Saco, Maine

	ICL	MEG	MCL	Northern Boundary Wells					
				MW-95-1R	MW-95-1R	MW-95-1S	MW-95-1S	MW-95-3R	MW-95-3R
				6/11/2014	11/5/2014	6/11/2014	11/5/2014	6/11/2014	11/5/2014
				Primary	Primary	Primary	Primary	Primary	Primary
Volatile Organic Compounds (ug/l)									
1,1-Dichloroethane	-	60	-	<1	<1	<1	<1	1.8	1.9
1,2-Dichlorobenzene	-	200	600	<1	<1	<1	<1	0.67 J	0.83 J
1,2-Dichloroethane	-	4	5	<1	<1	<1	<1	<1	0.40 J
1,4-Dichlorobenzene	-	70	75	<1	<1	<1	<1	<1	0.64 J
Acetone	-	6000	-	<5	<5	<5	<5	<5	<5
Benzene	5	4	5	<1	<1	<1	<1	0.94 J	1.3
Chlorobenzene	-	100	100	<1	<1	<1	<1	1.4	1.4
Chloroethane	-	7	-	<2	<2	<2	<2	1.4 J	<2
Dichlorodifluoromethane	-	1000	-	<2	<2	<2	<2	<2	<2
Isopropylbenzene	-	-	-	<1	<1	<1	<1	<1	0.23 J
Semi-Volatile Organic Compounds (ug/l) - no detections									
Total Inorganic Analytes (ug/l)									
Arsenic	50	10	10	[130]	[132]	[643]	[740]	[472]	[468]
Barium	-	1000	2000	26.7	33	13.5	16.1	86.4	78.2
Calcium	-	-	-	31200	40400	21100	21100	82900	83500
Chromium	-	20	100	<10	<10	<10	<10	2.5 J	3.2
Cobalt	-	10	-	[11.6]	[15.3]	[20.9]	[19.6]	7.81 J	[11.2]
Copper	-	500	1300	0.72 J	<25	<25	<25	<25	<25
Iron	-	5000	-	[19800]	[22800]	[54700]	[49600]	[42500]	[44000]
Lead	-	10	15	<5	<5 J	<5	<5 J	<5	<5.0
Magnesium	-	-	-	2360	2860 J	4350	3950 J	14300	13600
Manganese	200	500	-	[7150]	[8320]	[3250]	[2990]	[1160]	[1480]
Nickel	-	20	-	7.69 J	11.6	<10	<10	8.14 J	11.8
Potassium	-	-	-	1160	1120	7050	7390 J	9220	8240
Silver	-	40	-	0.38 J	<10	<10	<10	0.34 J	<10
Sodium	-	20000	-	2280 J	2870	3530 J	3800	[39000] J	[36500]
Vanadium	-	200	-	0.81 J	0.85 J	0.53 J	0.41 J	0.38 J	<10U
Zinc	-	2000	-	12.3 J	<20 UJ	16.9 J	<20 UJ	8.45 J	<20U
Water Quality Parameters (ug/l)									
Hardness (as CaCO3)	-	-	-	87600	113000	70500	68900	266000	264000
Total dissolved solids (TDS)	-	-	-	140000	160000	160000	150000	450000	440000

Notes:
ug/l = micrograms per liter
< = not detected above given laboratory reporting limit
- = not analyzed or not available
J = estimated value
U = revised to non-detect during validation
MEG = Maine Maximum Exposure Guideline (Oct. 2012)
MCL=USEPA Maximum Contaminant Level (2009)
ICL=Interim Cleanup Level (site-specific)
[Bold] = exceeds ICL, MEG and/or MCL

Table 3-3: Groundwater Analytical Results - 2014
Landfill Areas 3 & 4 - Detected Analytes
Saco Municipal Landfill
Saco, Maine

	ICL	MEG	MCL	Eastern Boundary Wells										
				MW-95-4R	MW-95-4R	MW-95-4R	MW-95-4RD	MW-95-4RD	MW-95-4RD	MW-95-4SA	MW-95-4SA	MW-95-4SB	MW-95-4SB	MW-95-4SB
				6/12/2014	6/12/2014	11/6/2014	6/12/2014	11/6/2014	11/6/2014	6/13/2014	11/6/2014	6/13/2014	11/6/2014	11/6/2014
				Primary	Duplicate 1	Primary	Primary	Primary	Duplicate 1	Primary	Primary	Primary	Primary	Duplicate 1
Volatile Organic Compounds (ug/l)														
1,1-Dichloroethane	-	60	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	-	200	600	1.6	1.5	0.70 J	1.7	1.5	1.4	<1	0.43 J	<1	<1	<1
1,2-Dichloroethane	-	4	5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	-	70	75	2.1	2	0.90 J	2.3	1.8	1.8	<1	0.68 J	<1	<1	<1
Acetone	-	6000	-	<5	<5	<5	<5	<5	<5	<5	4.7 J	<5	<5	<5
Benzene	5	4	5	2.3	2.2	1.1	2.5	2.2	2.1	<1	0.34 J	<1	<1	<1
Chlorobenzene	-	100	100	4.3	4.2	2.3	4.6	4.5	4.4	0.30 J	1.3	<1	<1	<1
Chloroethane	-	7	-	<2	<2	<2	<2	<2	0.78 J	<2	<2	<2	<2	<2
Dichlorodifluoromethane	-	1000	-	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Isopropylbenzene	-	-	-	0.42 J	0.41 J	0.27 J	0.46 J	0.56 J	0.54 J	<1	<1	<1	<1	<1
Semi-Volatile Organic Compounds (ug/l) - no detections														
Total Inorganic Analytes (ug/l)														
Arsenic	50	10	10	[399]	[396]	[345]	[625]	[469]	[491]	[158]	[208]	[75.4]	[72.4]	[74.3]
Barium	-	1000	2000	116	116	63	140	98.5	103	57.5	124	30.7	38.4	39.4
Calcium	-	-	-	59200	59200	59100	63300	53900	56800	31600	68200	37000	52100	53500
Chromium	-	20	100	2.2 J	2.1 J	1.8 J	2.0 J	2.3 J	2.2 J	<10	1.4 J	<10	1.3 J	1.0 J
Cobalt	-	10	-	0.94 J	0.76 J	<10	0.58 J	<10 UJ	<10 UJ	2.78 J	<10 UJ	1.9 J	<10 UJ	<10 UJ
Copper	-	500	1300	<25 UJ	<25 UJ	<25 UJ	<25 UJ	<25	<25	<25 UJ	<25	<25 UJ	<25 UJ	<25 UJ
Iron	-	5000	-	[20900]	[21100]	[11200]	[23000]	[15100]	[15800]	[7040]	[14400]	4390	4130	4300
Lead	-	10	15	<5 UJ	<5 UJ	<5	<5	<5	<5	<5 UJ	<5	<5	<5	<5
Magnesium	-	-	-	20700 J	20800 J	16000	22200	16700	18600	8590 J	17300	8580 J	11800	11900
Manganese	200	500	-	[1210]	[1200]	[988]	[1240]	[896]	[930]	[1210]	[2280]	[1740]	[1980]	[2020]
Nickel	-	20	-	15.4 J	14.4 J	<10 UJ	14.6 J	14.6	15.1	2.3 J	<10 UJ	1.8 J	<10 UJ	<10 UJ
Potassium	-	-	-	23000	23200	17700	24300	22600	23500	6580	10900	7880	10200	10400
Silver	-	40	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Sodium	-	20000	-	[62600]	[62400]	[48600]	[69300]	[60500]	[62800]	[24200]	[36900]	[30000]	[30400]	[31200]
Vanadium	-	200	-	1.0 J	0.97 J	0.47 J	1.3 J	0.92 J	0.57 J	0.38 J	1.1 J	0.52 J	0.59 J	0.52 J
Zinc	-	2000	-	20	<20 UJ	<20 UJ	<20 UJ	<20 UJ	<20 UJ	<20 UJ	<20 UJ	<20 UJ	<20 UJ	<20 UJ
Water Quality Parameters (ug/l)														
Hardness (as CaCO3)	-	-	-	233000	233000	214000	249000	203000	218000	114000	242000	128000	178000	183000
Total dissolved solids (TDS)	-	-	-	520000	-	380000	550000	440000	-	240000	380000	240000	280000	-

Notes:
ug/l = micrograms per liter
< = not detected above given laboratory reporting limit
- = not analyzed or not available
J = estimated value
U = revised to non-detect during validation
MEG = Maine Maximum Exposure Guideline (Oct. 2012)
MCL=USEPA Maximum Contaminant Level (2009)
ICL=Interim Cleanup Level (site-specific)
[Bold] = exceeds ICL, MEG and/or MCL

Table 3-3: Groundwater Analytical Results - 2014
Landfill Areas 3 & 4 - Detected Analytes
Saco Municipal Landfill
Saco, Maine

	ICL	MEG	MCL	Eastern Boundary Wells (cont'd)					
				MW-95-5R	MW-95-6R	MW-95-6S	MW-95-6S	MW-97-13R	MW-97-13R
				6/12/2014	6/13/2014	6/13/2014	11/5/2014	6/12/2014	11/6/2014
				Primary	Primary	Primary	Primary	Primary	Primary
Volatile Organic Compounds (ug/l)									
1,1-Dichloroethane	-	60	-	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	-	200	600	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	-	4	5	<1	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	-	70	75	<1	<1	<1	<1	<1	<1
Acetone	-	6000	-	<5	<5	<5	<5	2.6 J	<5
Benzene	5	4	5	<1	<1	<1	<1	0.68 J	0.66 J
Chlorobenzene	-	100	100	<1	<1	<1	<1	<1	<1
Chloroethane	-	7	-	<2	<2	<2	<2	<2	<2
Dichlorodifluoromethane	-	1000	-	0.50 J	<2	<2	<2	0.30 J	0.32 J
Isopropylbenzene	-	-	-	<1	<1	<1	<1	<1	<1
Semi-Volatile Organic Compounds (ug/l) - no detections									
Total Inorganic Analytes (ug/l)									
Arsenic	50	10	10	[19.4]	<8 UJ	<8	<8 UJ	[163]	[432]
Barium	-	1000	2000	33.9	7.96	10.3	12.2	14.5	14.7
Calcium	-	-	-	16400	39300	31000	36600	25500	23900
Chromium	-	20	100	<10	<10	<10	0.80 J	<10	<10
Cobalt	-	10	-	<10	<10	<10	0.27 J	<10	<10 UJ
Copper	-	500	1300	<25 UJ	<25 UJ	<25 UJ	<25 UJ	<25	<25
Iron	-	5000	-	361	<100	370	1980	[173000]	[144000]
Lead	-	10	15	<5	<5	<5	<5 J	<5	1.2 J
Magnesium	-	-	-	12200 J	8560 J	8570 J	7890 J	4970 J	4210
Manganese	200	500	-	46	<5	147	[208]	[2740]	[2580]
Nickel	-	20	-	4.60 J	<10	<10	0.30 J	<10	<10
Potassium	-	-	-	5950	2930	2710	2300 J	5790	6590
Silver	-	40	-	<10	<10	<10	<10	<10	2.1 J
Sodium	-	20000	-	[157000]	10500	5970	5840	2400	2480
Vanadium	-	200	-	0.36 J	0.27 J	<10	<10	<10	1.1 J
Zinc	-	2000	-	<20 UJ	<20 UJ	<20 UJ	<20 UJ	<20 UJ	<20 UJ
Water Quality Parameters (ug/l)									
Hardness (as CaCO3)	-	-	-	91300	133000	113000	124000	84100	77100
Total dissolved solids (TDS)	-	-	-	540000	220000	160000	150000	310000	280000

Notes:
ug/l = micrograms per liter
< = not detected above given laboratory reporting limit
- = not analyzed or not available
J = estimated value
U = revised to non-detect during validation
MEG = Maine Maximum Exposure Guideline (Oct. 2012)
MCL=USEPA Maximum Contaminant Level (2009)
ICL=Interim Cleanup Level (site-specific)
[Bold] = exceeds ICL, MEG and/or MCL

Table 3-3: Groundwater Analytical Results - 2014
Landfill Areas 3 & 4 - Detected Analytes
Saco Municipal Landfill
Saco, Maine

	ICL	MEG	MCL	Eastern Boundary Wells (cont'd)					
				MW-97-14S-1	MW-97-14S-1	MW-97-16S	MW-97-19S	MW-97-19S	MW-97-19S
				6/12/2014	11/6/2014	6/12/2014	6/12/2014	6/12/2014	11/6/2014
				Primary	Primary	Primary	Primary	Duplicate 1	Primary
Volatile Organic Compounds (ug/l)									
1,1-Dichloroethane	-	60	-	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	-	200	600	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	-	4	5	<1	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	-	70	75	<1	<1	<1	<1	<1	0.32 J
Acetone	-	6000	-	<5	<5	<5	<5	<5	<5
Benzene	5	4	5	<1	<1	<1	<1	<1	<1
Chlorobenzene	-	100	100	<1	<1	<1	<1	<1	<1
Chloroethane	-	7	-	<2	<2	<2	<2	<2	<2 J
Dichlorodifluoromethane	-	1000	-	<2	<2	<2	<2	<2	<2
Isopropylbenzene	-	-	-	<1	<1	<1	<1	<1	<1
Semi-Volatile Organic Compounds (ug/l) - no detections									
Total Inorganic Analytes (ug/l)									
Arsenic	50	10	10	[68.9]	[120]	<8	9.9 J	[10] J	[24.5]
Barium	-	1000	2000	32.9	59.6	3.54 J	83	79.5	87.4
Calcium	-	-	-	45900	80200	19200	71200	68800	73600
Chromium	-	20	100	<10	0.96 J	<10	0.42 J	0.68 J	1.3 J
Cobalt	-	10	-	0.38 J	<10 UJ	<10	2.0 J	1.8 J	<10 UJ
Copper	-	500	1300	<25 UJ	<25 UJ	<25 UJ	<25 UJ	<25 UJ	<25 UJ
Iron	-	5000	-	3910	[6150]	<100 UJ	1100	1130	1480
Lead	-	10	15	<5	<5	<5	<5	<5 UJ	<5
Magnesium	-	-	-	10800 J	17700	3690 J	17600 J	18700 J	16200
Manganese	200	500	-	[590]	[791]	6.9	[2440]	[2370]	[2120]
Nickel	-	20	-	0.61 J	<10 UJ	3.41 J	3.24 J-	3.29 J	<10 UJ
Potassium	-	-	-	9000	13400	1480	10200	9880	11800
Silver	-	40	-	<10	<10	<10	<10	<10	<10
Sodium	-	20000	-	[24200]	[33900]	3250	[45200]	[43200]	[48700]
Vanadium	-	200	-	<10	0.56 J	<10	0.82 J	0.82 J	0.58 J
Zinc	-	2000	-	<20 UJ	<20 UJ	<20 UJ	<20 UJ	<20 UJ	<20 UJ
Water Quality Parameters (ug/l)									
Hardness (as CaCO3)	-	-	-	159000	273000	63300	250000	241000	250000
Total dissolved solids (TDS)	-	-	-	250000	400000	110000	410000	-	430000

Notes:
ug/l = micrograms per liter
< = not detected above given laboratory reporting limit
- = not analyzed or not available
J = estimated value
U = revised to non-detect during validation
MEG = Maine Maximum Exposure Guideline (Oct. 2012)
MCL=USEPA Maximum Contaminant Level (2009)
ICL=Interim Cleanup Level (site-specific)
[Bold] = exceeds ICL, MEG and/or MCL

Table 3-3: Groundwater Analytical Results - 2014
Landfill Areas 3 & 4 - Detected Analytes
Saco Municipal Landfill
Saco, Maine

	ICL	MEG	MCL	Southern Boundary Wells							
				MW-93-5	MW-93-5	MW-95-7R	MW-95-7R	MW-95-7R	MW-96-9R	MW-96-9R	MW-97-17R
				6/13/2014	11/5/2014	6/13/2014	6/13/2014	11/5/2014	6/11/2014	11/5/2014	6/12/2014
				Primary	Primary	Primary	Duplicate 1	Primary	Primary	Primary	Primary
Volatile Organic Compounds (ug/l)											
1,1-Dichloroethane	-	60	-	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	-	200	600	<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	-	4	5	<1	<1	<1	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	-	70	75	<1	<1	<1	<1	<1	<1	<1	<1
Acetone	-	6000	-	<5	<5	<5	<5	<5	<5	<5	<5
Benzene	5	4	5	<1	<1	<1	<1	<1	<1	<1	<1
Chlorobenzene	-	100	100	<1	<1	<1	<1	<1	<1	<1	<1
Chloroethane	-	7	-	<2	<2	<2	<2	<2	<2	<2	<2
Dichlorodifluoromethane	-	1000	-	<2	<2	<2	<2	<2	<2	<2	<2
Isopropylbenzene	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1
Semi-Volatile Organic Compounds (ug/l) - no detections											
Total Inorganic Analytes (ug/l)											
Arsenic	50	10	10	[28.1]	[19.7]	<8 UJ	<8 UJ	<8 UJ	[173]	[182]	8.2 J
Barium	-	1000	2000	6.98	6.97	3.24 J	3.82 J	<5 UJ	13	12.5	16.4
Calcium	-	-	-	10100	10300	13200	13000	17700	20300	20600	77300
Chromium	-	20	100	<10	<10	<10	<10	0.69 J	<10	0.50 J	<10
Cobalt	-	10	-	[10.3]	8.70 J	<10	<10	0.60 J	<10	<10	<10
Copper	-	500	1300	<25	<25	<25	<25 UJ	<25 UJ	<25	<25 UJ	<25 UJ
Iron	-	5000	-	[9700]	[7320]	<100 UJ	<100 UJ	1210	227	244	2920
Lead	-	10	15	<5 UJ	1.2 J	<5 UJ	<5	<5 J	<5	<5 J	<5 UJ
Magnesium	-	-	-	2190 J	2050 J	2200 J	2110 J	2820 J	8710	8710 J	12200 J
Manganese	200	500	-	[822]	[688]	23.2	23.3	[302]	[350]	[336]	198
Nickel	-	20	-	0.99 J	<10 UJ	<10	<10	1.4 J	<10	<10	<10
Potassium	-	-	-	1870	1720	<1000 UJ	<1000 UJ	<1000 UJ	1730	1530	1110
Silver	-	40	-	<10	<10	<10	<10	<10	<10	<10	<10
Sodium	-	20000	-	4350	4530	3840	3850	4050	[28600] J	[26000]	7630
Vanadium	-	200	-	<10	<10	<10	0.26 J	<10	<10	<10	<10
Zinc	-	2000	-	<20 UJ	<20 UJ	<20 UJ	<20 UJ	<20 UJ	19.2 J	<20 UJ	31.1
Water Quality Parameters (ug/l)											
Hardness (as CaCO3)	-	-	-	34200	34100	42200	41200	55900	86500	87400	244000
Total dissolved solids (TDS)	-	-	-	83000	71000	79000	-	72000	170000	160000	290000

Notes:
ug/l = micrograms per liter
< = not detected above given laboratory reporting limit
- = not analyzed or not available
J = estimated value
U = revised to non-detect during validation
MEG = Maine Maximum Exposure Guideline (Oct. 2012)
MCL=USEPA Maximum Contaminant Level (2009)
ICL=Interim Cleanup Level (site-specific)
[Bold] = exceeds ICL, MEG and/or MCL

Table 3-4: Surface Water Analytical Results - 2014
Detected Analytes
Saco Municipal Landfill
Saco, Maine

	SSPS	SW-7 6/18/2014 Primary	SW-7 11/4/2014 Primary	SW-13 6/18/2014 Primary	SW-13 11/4/2014 Primary	SW-21 6/18/2014 Primary	SW-21 11/4/2014 Primary	SW-31 6/18/2014 Primary	SW-31 11/4/2014 Primary	SW-34 6/18/2014 Primary	SW-34 11/4/2014 Primary	SW-37 6/18/2014 Primary
Total Inorganic Analytes (ug/l)												
Aluminum	-	260 J	377	241 J	<300 UJ	388 J	<300 UJ	345 J	315	572	<300 UJ	224 J
Arsenic	3	<1	<1	**[10.8]**	**[13.6]**	2.3	0.86 J	**[15.8]**	**[6.8]**	**[18.5]**	**[4.82]**	**[14.8]**
Barium	-	9.69	12.9	22.8	17.5	12.5	9.46	19	11.6	26.9	10.7	22
Beryllium	-	<5	0.20 J	<5	<5	<5	<5	<5	<5	<5	<5 UJ	<5
Calcium	-	4630	5340	16400	14500	9740	9280	19400	12900	17400	19200	18500
Chromium	-	<10	<10 UJ	<10	<10 UJ	<10	<10 UJ	<10	<10 UJ	0.44 J	<10 UJ	<10
Cobalt	-	0.30 J	<10	<10	0.31 J	0.25 J	<10	0.36 J	<10	0.34 J	<10	0.43 J
Copper	-	<25	<25	<25	<25	0.74 J	<25	<25	<25	<25	<25 UJ	0.68 J
Iron	-	461 J	497	1600 J	1380	835 J	584	1520 J	928	2000	794	1470 J
Lead	-	<5	<5	<5	<5	1.4 J	<5	<5	<5	1.3 J	<5	<5
Magnesium	-	1720	2330	3230	3050	1920	1780	4130	2740	3450	4010 J	3580
Manganese	-	137	143	452	361	100	32	512	148	676	198	622
Nickel	-	<10	0.88 J	<10	1.2 J	<10	0.45 J	<10	0.69 J	0.51 J	<10 UJ	<10
Potassium	-	3420	5460	2820	2860	2160	2070	3050	2420	2970	2300	2850
Silver	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	0.37 J
Sodium	-	7210	11200	28400	16400	24600	13100	30200	16600	27200	14800	25300
Vanadium	-	0.48 J	<10 UJ	0.95 J	<10 UJ	0.84 J	<10 UJ	0.85 J	<10 UJ	1.2 J	0.44 J	0.89 J
Zinc	-	<20 U	<20 UJ	<20 U	<20 UJ	<20 U	<20 UJ	<20 U	<20 UJ	<20	2.8 J	<20 U
Water Quality Parameters (ug/l)												
Hardness carbonate (as CaCO3)	-	18600	22900	54200	48800	32200	30500	65400	43400	57600	64400	60900

Notes:
ug/l = micrograms per liter
< = not detected above given laboratory reporting limit
- = not available
SSPS = site-specific performance standard
[Bold] = exceeds SSPS
< = not detected above given reporting limit
U = revised to non-detect during validation

Table 3-4: Surface Water Analytical Results - 2014
Detected Analytes
Saco Municipal Landfill
Saco, Maine

	SSPS	SW-37 6/18/2014 Duplicate 1	SW-37 11/4/2014 Primary	SW-52 6/18/2014 Primary	SW-52 11/4/2014 Primary	SW-52 11/4/2014 Duplicate 1	SW-69 6/18/2014 Primary	SW-69 11/4/2014 Primary	SW-103 6/18/2014 Primary	SW-103 11/4/2014 Primary
Total Inorganic Analytes (ug/l)										
Aluminum	-	865 J	<300 UJ	320 J	<300 UJ	<300 UJ	233 J	<300 UJ	251 J	<300 UJ
Arsenic	3	**[18.6]**	**[7.3]**	**[16.9]**	**[6.26]**	**[6.49]**	**[11.8]**	**[4.97]**	**[11.1]**	**[4.72]**
Barium	-	27.3	12.7	23.1	13.1	13	14.9	9.68	14.9	9.82
Beryllium	-	<5	<5	<5	<5	<5	<5	<5	<5	<5
Calcium	-	17900	12000	16100	11500	11500	19400	13300	21100	13600
Chromium	-	0.90 J	<10 UJ	<10	<10 UJ	<10 UJ	<10	<10 UJ	<10	<10 UJ
Cobalt	-	0.51 J	<10	0.41 J	<10	<10	<10	<10	<10	<10
Copper	-	<25	<25	<25	0.70 J	<25	<25	<25	0.91 J	<25
Iron	-	2390 J	1010	1800 J	1020	1010	1070 J	687	1060 J	688
Lead	-	1.6 J	<5	<5	<5	<5	<5	<5	<5	<5
Magnesium	-	3580	2400	3160	2210	2250	4220	2650	4430	2670
Manganese	-	641	207	421	145	143	345	104	328	99.2
Nickel	-	0.74 J	0.81 J	<10	1.1 J	0.97 J	<10	0.91 J	<10	0.47 J
Potassium	-	3020	2300	2800	2270	2280	2660	2040	2850	2130
Silver	-	<10	<10	<10	<10	<10	<10	<10	0.33 J	<10
Sodium	-	26800	14500	28500	15200	15100	24300	14900	25500	15000
Vanadium	-	1.6 J	<10 UJ	0.80 J	<10 UJ	<10 UJ	0.77 J	<10 UJ	0.63 J	<10 UJ
Zinc	-	<20 U	<20 UJ	<20 U	<20 UJ	<20 UJ	<20 UJ	<20 UJ	<20 U	<20 UJ
Water Quality Parameters (ug/l)										
Hardness carbonate (as CaCO3)	-	59400	39800	53200	37800	38000	65800	44200	70900	44800

Notes:
ug/l = micrograms per liter
< = not detected above given laboratory reporting limit
- = not available
SSPS = site-specific performance standard
[Bold] = exceeds SSPS
< = not detected above given reporting limit
U = revised to non-detect during validation

Table 3-5: Sediment Analytical Results - 2014
Detected Analytes
Saco Municipal Landfill
Saco, Maine

	Ecological Benchmark	SD-7	SD-13	SD-21	SD-31	SD-34	SD-37	SD-37	SD-52	SD-69	SD-103
		6/18/2014	6/18/2014	6/18/2014	6/18/2014	6/18/2014	6/18/2014	6/18/2014	6/18/2014	6/18/2014	6/18/2014
		Primary	Primary	Primary	Primary	Primary	Primary	Duplicate 1	Primary	Primary	Primary
Total Inorganic Analytes (mg/kg)											
Aluminum	-	5260	6780	9060	2160	17700	4520	4400	5560	3580	4220
Antimony	-	<0.64 UJ	0.083 J	0.12 J	<0.66 J	<1.3 J	<0.62	<0.62 J	<0.81 J	0.11 J	<0.61 J
Arsenic	106	2.58	28.9	8.11	19.4	101	20.9	19.1	14.4	9.22	8.66
Barium	-	32.7	34.8	41.3	22.2	119	25.3	26.8	30.6	16.2	17.3
Beryllium	-	0.603	0.342 J	0.625	0.136 J	1.34	0.285 J	0.272 J	0.410 J	0.202 J	0.227 J
Cadmium	-	0.052 J	<0.46	0.054 J	0.018 J	0.356 J	0.022 J	0.031 J	0.033 J	0.0086 J	0.011 J
Calcium	-	685	1470	1680	586	4940	788	806	1100	785	1020
Chromium	-	7.09	20.8	26.6	3.97	27.7	8.59	12.2	9.71	8.24	8
Cobalt	-	3.49	4.38	3.72	1.47	8.23	2.37	2.16	2.33	1.88	2.25
Copper	-	3.3	5.5	7.23	0.99 J	11.6	3.95	2.74	3.58	2.16	1.74 J
Iron	-	6130	10400	8330	3740	27400	6970	6470	6950	4940	5900
Lead	-	6.95 J	5.03 J	12.9 J	2.28 J	22.6 J	4.35 J	11.7 J	6.74 J	2.54 J	3.08 J
Magnesium	-	1060	3400	2460	696	4080	1810	1700	1470	1480	1920
Manganese	-	262	158	153	361	1860	175	211	154	207	306
Mercury	-	0.013 J	0.0072 J	0.018 J	0.0077 J	0.049 J	0.0085 J	0.0079 J	0.0090 J	0.0065 J	0.0047 J
Nickel	-	4.01	21.7	9.52	2.94	15.4	7.67	6.98	5.58	6.28	6.67
Potassium	-	993	1050	1670	279	2610	718	792	929	530	556
Silver	-	0.026 J	0.18 J	0.12 J	0.022 J	0.470 J	0.17 J	0.16 J	0.099 J	0.11 J	0.20 J
Sodium	-	88.5	184	206	55.8 J	288	88.2	82.3	133	78.4	77.4
Vanadium	-	8.9	15.5	15.9	3.57	29.6	10.8	8.37	9.45	7.36	9.54
Zinc	-	23.4	29.6	45.8	12.6	115	24.2	23	30.7	16.1	17.4
Solids (%)											
Solids - Total Residue	-	62	84	65	74	43	79	79	65	80	82

Notes:
mg/kg = milligrams per kilogram
< = not detected above given laboratory reporting limit
- = not available
[Bold] = exceeds Ecological Benchmark from Record of Decision
J = estimated value
U = revised to non-detect during validation

APPENDIX D

Nobis
Engineering a Sustainable Future

EPA Region 1 RAC 2 Contract No. EP-S1-06-03

June 3, 2015
Nobis Project No. 80020

Via Electronic Submittal

U.S. Environmental Protection Agency, Region 1
Attention: Ms. Leslie McVickar, Task Order Project Officer
5 Post Office Square, Suite 100
Boston, Massachusetts 02109-3919

Subject: Transmittal of the Spring 2015 Annual Inspection Report
Saco Municipal Landfill Superfund Site (Areas 3 & 4), Saco, Maine
Groundwater Monitoring Oversight
Task Order Number 0020-AN-GM-01B9

Dear Ms. McVickar:

Attached with this correspondence is the spring 2015 Annual Inspection Report for the landfill inspection conducted on May 28, 2015 at the Saco Municipal Landfill Superfund Site (Areas 3 & 4).

Should you have any questions or comments, please contact me at (978) 703-6051, or by email at gmischel@nobiseng.com.

Sincerely,

NOBIS ENGINEERING, INC.

Gregory A. Mischel, P.E.
Project Manager

Attachments

c: File 80020/MA

Nobis Engineering, Inc.
585 Middlesex Street
Lowell, MA 01851

SPRING 2015 ANNUAL INSPECTION
SACO MUNICIPAL LANDFILL SUPERFUND SITE (AREAS 3 AND 4)
SACO, MAINE

1.0 INTRODUCTION

This report documents and presents observations made by Nobis Engineering, Inc. (Nobis) during the annual inspection of the Saco Municipal Landfill Superfund Site, Areas 3 and 4 in Saco, Maine (the Site), conducted on May 28, 2015 under the RAC 2 Contract EP-S1-06-03, Task Order 0020-AN-GM-01B9. This landfill consists of four distinct Landfill Areas, numbered 1 through 4, which are surrounded by wooded areas. Landfill Areas 1 and 2 have been converted to recreational ball fields, and only Areas 3 and 4 are included in this Site Inspection Report. A representative from the Potentially Responsible Party's (PRP) consultant (Woodard and Curran, Inc.) was on-site, and accompanied Nobis during the inspection.

The inspection included the following activities:

- Walking the perimeter and top of the landfill cap to look for evidence of erosion, cap disturbance, settlement, and poor growth of vegetation;
- Inspecting the on and off-cap storm water control structures for damage, settlement, sedimentation, vegetation, and blockage; and
- Inspecting the above ground portions of structures that penetrate the cap (i.e., gas vents) for damage.

This report is based on visual observations made during the Site inspection. The evaluation of subsurface conditions was not within the scope of this inspection. A Site-specific Landfill Inspection Checklist (provided as Attachment 1) was used to document the inspection. Refer to Figure 1 (Site Plan) for the location of items noted during the Site inspection. Photographs documenting observations made during the inspection are provided as Attachment 2.

2.0 SUMMARY OF INSPECTION

The results of the spring 2015 Site inspection are presented below according to the various components of the landfill cover system. Comparisons to items documented during the spring

2014 Site inspection are included where appropriate. For reference, the spring 2014 Inspection Plan is included in Attachment 3.

Landfill Surface

The vegetative cover over the landfill surface was generally in good condition. Nobis observed two areas of thin cover. One area was located in the southwest area of the cap near Bench I. Bare spots were observed in this area during the spring 2014 inspection. The vegetation has improved since spring 2014 but is still sparser than elsewhere on the landfill. The other area was a small bare spot located along the north side of the rip-rap channel located along the southwestern toe of the landfill slope. This area may require re-seeding.

During the spring 2014 inspection, Nobis observed animal burrows in two locations on the cap: at the base of GV-15 and above the culvert outlet at the southern end of the sedimentation basin. Currently, the burrow at the base of GV-15 appears to be filled in/abandoned and the burrow above the culvert has been repaired since the spring 2014 Inspection. There were no new burrows identified during the spring 2015 Inspection.

A small piece of filter fabric material was observed protruding from the ground in an area located north of the perimeter drain on the north slope of the landfill. It is unclear at this time what caused the fabric to become exposed.

Benches

The benches were observed to be in generally good condition with no major signs of erosion, undermining, bypass, breaching, or ponded water. Nobis observed a 5-foot long area of light erosion of the soil at the upper edge of the rip-rap and geofabric lining of bench channel "E", along the bend at the bottom of the channel immediately south of the perimeter access road. Minor sediment deposits were observed in the channel and downstream of this location at the outlet of the culvert under the perimeter access road. The channel is still operational and does not require immediate repairs; however, this area should be monitored and repaired if further erosion is observed.

Letdown Channels (Downdrains)

The gabion-lined letdown channels on the east end and northwest slope of the landfill were in good condition with no signs of settlement, material degradation, erosion, undercutting, or obstructions. The sump between the eastern downdrain and the sedimentation basin appeared to be in good condition with no obstructions.

Cover Penetrations

Cover penetrations throughout the landfill cover system include 20 passive gas vent structures, numbered GV-1 through GV-20. The vents were generally found to be in good condition, but some damage was observed.

The majority of the vent riser pipes were leaning down slope at various degrees of tilt. A review of inspection photos from the previous five years suggests that the amount of tilt has not changed significantly, and it appears that the gas vents are not actively moving.

GV-11 and GV-15 exhibited the furthest extent of tilt. The tilt did not appear to be impacting the effectiveness of the vents, and no crimping or other structural deformity was observed. Nobis compared photos from the spring 2014 inspection and the spring 2015 inspection and there was no apparent change to the tilt of the gas vents. However, the vents should be monitored for signs of further tilt and should be repaired if the tilt reduces the effectiveness of the vents.

Nobis observed gashes in the outer geomembrane boot at the base of GV-11, GV-15, GV-8, GV-9, and GV-5 that may have been caused by mowing equipment. The damaged portions of the geomembrane boots are not physically connected to the landfill cap geomembrane, but the vents should be monitored for damage to the inner vent section that connects to the cap geomembrane.

Monitoring Wells

The PRP consultant, Woodard and Curran, Inc. did not report any issues with the security or integrity of the monitoring wells adjacent to the landfill cap. Wells appeared to be contained in protective standpipes with locked caps.

Cover Drainage Layer

The outlet pipes and riprap outlet zone of the drainage layer at the perimeter of the cover system appeared to be in good condition. No apparent damage to the outlet pipes or displacement of the riprap was observed. Rodent guards were present and in good condition on all of the outlet pipes observed by Nobis.

Sedimentation Basin

The sedimentation basin and outlet structures appeared to be in good condition and well maintained. There were no signs of settlement, material degradation, erosion, undercutting, or obstructions, and water was observed flowing freely from the outlet structures. An area of Japanese Knotweed at the eastern end of the basin was observed during the spring 2013 and spring 2012 inspections. During the spring 2015 inspection, Nobis noted that the Japanese knotweed had been cut down. While the current stand of Knotweed is not located on the cap, it should continue to be controlled to prevent spread to other areas of the Site and the landfill cap.

Retaining Walls

No significant bulging or tilting was observed in the gabion baskets forming the retaining structure at the bottom of the downdrain on the east end of the landfill.

Perimeter Ditches and Off-Site Discharge

The perimeter ditches were in good condition at the time of the inspection. All of the drainage culverts also appeared to be in good condition.

During the spring 2015 inspection, Nobis observed a new stand of Japanese Knotweed growing near a small rip-rap lined drainage area located approximately 75 feet from the southwestern corner of the landfill. This stand of Knotweed is not located on the cap; it should be controlled to prevent spread to other areas of the Site and the landfill cap.

Perimeter Roads

Nobis observed light rutting at the terminus of the perimeter road to the south of the Area 4 landfill; this rutting was unchanged from the spring 2014 inspection. Nobis observed light rutting at the

end of the northern perimeter road near the granite stockpiles. Otherwise, the perimeter roads were in good condition with no signs of erosion, ruts, or potholes.

3.0 CONCLUSION AND RECCOMENDATIONS

Based on the spring 2015 inspection performed on May 28, 2015, Nobis offers the following conclusions and recommendations:

- Items requiring repair from the spring 2014 inspection including animal burrows and the eroded waterbar appear to have been repaired.

- The area of thin vegetation along Bench I has improved since the spring 2014 inspection. During the spring 2015 inspection, a small bare spot was identified along the north side of the rip-rap channel located along the southwestern toe of the landfill slope. Both areas should be continued to be monitored for erosion and re-seeded as necessary.

- The growth of Japanese Knotweed at the north end of the sedimentation basin identified during previous investigations has been cut down. One new area of Japanese Knotweed was identified near the southwest corner of the landfill. Nobis recommends routine maintenance in these areas to control growth and limit the spread of Knotweed.

- The 2014 inspection identified minor erosion at the edge of the bench "E" rip-rap channel and minor sediment buildup in the drainage channel and downstream at the Culvert 2 outfall. The conditions at these locations during the 2015 inspection were observed to be comparable to the 2014 inspection, indicating that conditions have not degraded.

- The geomembrane boot around the base of several landfill vents appears to have been damaged by mowing equipment. Nobis recommends using a 1-foot "buffer zone" when using mowing equipment around the landfill gas vents. Any additional grass cutting around the landfill gas vents can be performed using hand trimmers.

- A small piece of fabric material was observed protruding from the ground in an area located north of the perimeter drain on the north slope of the landfill. It is unclear at this

time what caused the fabric to become exposed. The extent of subsurface damage (if any) should be investigated and any necessary repairs should be performed.

Overall, the landfill appeared to be in good condition and well maintained. These items identified for repair and long-term monitoring do not present an immediate danger to the integrity of the cap, but should be repaired if monitoring shows further degradation. Items observed by Nobis are summarized in Table 1.

TABLE

1 Landfill Inspection Summary Table

FIGURE

1 Site Plan

ATTACHMENTS

1 Annual Landfill Inspection Checklist
2 Site Inspection Photographs
3 Spring 2014 Inspection Site Plan

TABLE

Table 1
Landfill Inspection Summary Table
Saco Municipal Landfill Superfund Site (Areas 3 and 4)
Saco, Maine

Item Description	Date of First Observation	Status as of Spring 2015 Inspection	Recommendation
Area of thin vegetation in the southwest area of the cap near Bench I.	Spring 2011	Improved	Continue to monitor and re-seed if needed.
Small bare spot with some weed growth along the north side of the rip-rap channel located along the southwestern toe of the landfill slope.	Spring 2015	New	Continue to monitor and re-seed if needed.
Japanese Knotweed growth near the inlet pipe in the eastern end of the Sedimentation Basin	Spring 2011	Cut down	Continue to control growth and monitor for spread of Knotweed.
Japanese Knotweed growth near rip-rap lined drainage sump located near the southwestern corner of the landfill.	Spring 2015	New	Control growth and continue to monitor for spread of Knotweed.
Six inch wide animal burrow immediately above the outlet of Culvert #4 at the southern end of the sediment retention basin.	Spring 2012	Repaired	Hole filled. No evidence of additional burrows.
Six inch wide animal burrow near GV-15	Spring 2014	Repaired	Hole filled. No evidence of additional burrows.
Tire ruts at end of access road	Spring 2013	Present	Repair ruts.
Tire ruts at end of access road near granite stockpiles	Spring 2015	New	Repair ruts.
Minor erosion along the side of the rip-rap lined Bench "E" channel near the bottom of the channel, immediately above Culvert 2.	Spring 2014	Present	Continue to monitor. Repair rip-rap channel if further erosion or slumping is observed.
Minor sedimentation in rip-rap .ined Bench "E" channel below erosion area and minro sedimentation at the outfall of Culvert 2.	Spring 2014	Present	Continue to monitor. Remove excess sediment as necessary.
Filter fabric material protruding from the ground.	Spring 2015	Present	Make necessary repairs.
Eroded waterbar at southern point of access road	Spring 2014	Repaired	Waterbar repaired.
Damage to geomembrane boots around GV-11, GV-15, GV-8, GV-9, and GV-5.	Spring 2014 and Spring 2015	Present	Consider maintaining 1-foot "buffer zone" around gas vent pipes when mowing with heavy equipment. Use hand trimmers when trimming around gas vent pipes.

FIGURE

LEGEND

○ GV-1 GAS VENT

0 100' 200'

GRAPHIC SCALE

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FIGURE 1

SITE PLAN
SACO MUNICIPAL LANDFILL
SUPERFUND SITE (AREAS 3 & 4)
SACO, MAINE
SITE INSPECTION

DRAWN BY:	AR	APPROVED BY:	GM
PROJECT:	80020.03		JUNE 2015

R:\80000 Task Orders\80020 Saco Landfill\Technical Data (IU)\CAD\dwg\80020 - Saco Site Plan_Spring 2015 Inspection.dwg

ATTACHMENT 1

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EPA RAC Contract # EP-S1-06-03

LANDFILL INSPECTION CHECKLIST

Task Order:	0020-AN-GM-01B9	**Weather:**	Sunny
Site Name:	Saco Municipal Landfill	**Temperature:**	75-80° F
Town:	Saco	**Site Map:**	Attach Map
State:	Maine	**Date of**	
PRP Representatives:	Tom Eschner (Woodard & Curran)	**Inspection:**	5/28/2015
Inspection Team:	Adam Roy (Nobis)		

ITEM	REMARKS
LANDFILL SURFACE	
1. SETTLEMENT (LOW SPOTS) Yes ☐ No ☒ Location (indicate on site map): Areal Extent: Depth:	
2. CRACKS Yes ☐ No ☒ Location (indicate on site map): Length: Width: Depth:	
3. EROSION Yes ☐ No ☒ Location (indicate on site map): Areal Extent: Depth:	
4. HOLES Yes ☐ No ☒ Location (indicate on site map): Areal Extent: Depth: Suspected Cause (rodent or other):	The burrow appears to have been repaired since the 2014 inspection.
5. VEGETATIVE COVER Yes ☒ No ☐ Grass: Yes Condition: Good Trees/Shrubs: Yes ☐ No ☒ Location (indicate on site map): S side of channel "I" Size: ~30'x5' Location: N side of rip-rap channel at toe of southwestern slope Size: ~3'x15"	Area of thin vegetation along the south side of rip-rap channel "I". Grass is not fully established in this location, but is in better condition than the 2014 inspection and there is no evidence of erosion. Small bare spot with some weed growth along the north side of the rip-rap channel located along the southwestern toe of the landfill slope. There is no evidence of erosion.
6. ARMORED COVER Yes ☒ No ☐ Material Type: rip-rap Condition: good	

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ITEM	REMARKS
7. BULGES Yes ☐ No ☒ Location (indicate on site map): Areal Extent: Height: Suspected Cause (gas pressure or other):	
8. WET AREAS Yes ☐ No ☒ Ponding: Location (indicate on site map): Areal Extent: Seeps: Yes ☐ No ☒ Location (indicate on site map): Areal Extent: Estimated Flow Rate: Soft Subgrade: Yes ☐ No ☒ Location (indicate on site map): Areal Extent:	
9. SLOPE INSTABILITY Yes ☐ No ☒ Slides: Location (indicate on site map): Areal Extent: Probable Slide Interface: Suspected Cause: Exposed Cover Components:	

BENCHES

1. FLOW BYPASS BENCHES Yes ☐ No ☒ Location (indicate on site map): Description of Problem:	Bench A ☐ B ☐ C ☐ D ☐ E ☒ F ☐ G ☐ H ☐ I ☐	Area of light erosion at bend in channel "E" immediately upstream of culvert under perimeter road. There is light erosion along the east side of the channel and a small area has settled from soils scoured away from under the fabric lining. There is light sedimentation in the channel and downstream at the culvert outlet. The channel is still operational and does not require immediate repairs. All other locations are in good condition.
2. BENCH BREACHED Yes ☒ No ☐ Location (indicate on site map): near perimeter road Description of Problem: light erosion		
3. SETTLEMENT Yes ☐ No ☒ Location (indicate on site map): near perimeter road Areal Extent: Depth:		

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EPA RAC Contract # EP-S1-06-03

ITEM		REMARKS
LETDOWN CHANNELS		
1. SETTLEMENT Location (indicate on site map): Areal Extent: Depth:	Yes ☐ No ☒	
2. MATERIAL DEGRADATION Material Type: Location (indicate on site map): Areal Extent: Degree of Degradation:	Yes ☐ No ☒	
3. EROSION Location (indicate on site map): Areal Extent: Depth:	Yes ☐ No ☒	
4. UNDERCUTTING Location (indicate on site map): Areal Extent: Depth:	Yes ☐ No ☒	
5. OBSTRUCTIONS Type: Location (indicate on site map): Areal Extent: Size:	Yes ☐ No ☒	
6. VEGETATIVE GROWTH Type: Location (indicate on site map): Areal Extent:	Yes ☐ No ☒	
COVER PENETRATIONS		
1. GAS VENTS Located: Functioning: Condition: Fair	Active Passive Yes ☒ No ☐ Yes ☒ No ☐	Numbering on vents is faded; need to be re-painted. Vents are leaning at various degrees of tilt, with GV-11 and GV-15 the most out-of-plumb. Minor damage to the geomembrane boot covering the gas vent pipes was observed at GV-11, GV-15, GV-8, GV-9, and GV-5. The animal burrow observed at the base of GV-15 in 2014 appears to have been filled in/abandoned. All vents are still functioning and the observed leaning and damage has not impacted the function of the vents.
2. GAS MONITORING PROBES Located: Functioning: Condition:	Yes ☐ No ☒ Yes ☐ No ☐ Yes ☐ No ☐	

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ITEM		REMARKS
3. MONITORING WELLS Located: Functioning: Condition:	Yes ☐ No ☒ Yes ☐ No ☐ Yes ☐ No ☐	Monitoring wells are located outside the landfill cap. The monitoring wells observed during inspection appeared to be covered and locked.
COVER DRAINAGE LAYER		
1. OUTLET PIPES Functioning: Condition: Good	Yes ☒ No ☐ Yes ☒ No ☐	
2. OUTLET ROCK Functioning: Condition:	Yes ☒ No ☐ Yes ☒ No ☐	
3. RODENT GUARDS Present:	Yes ☒ No ☐ Yes ☒ No ☐	
DETENTION/SEDIMENTATION PONDS		
1. SILTATION Areal Extent:	Yes ☐ No ☒ Depth:	
2. EROSION Areal Extent:	Yes ☐ No ☒ Depth:	
3. OUTLET WORKS Functioning: Condition: Good	Yes ☒ No ☐ Yes ☒ No ☐	
4. DAM Functioning: Condition: Good	Yes ☒ No ☐ Yes ☒ No ☐	
RETAINING WALLS (Bottom of Downdrain)		
1. DEFORMATIONS Location (indicate on site map): Horizontal Displacement: Vertical Displacement: Rotational Displacement:	Yes ☐ No ☒	
2. DEGRADATION Location (indicate on site map): Description of Damage:	Yes ☐ No ☒	
GROUNDWATER SYSTEMS		
1. OFF-CAP MONITORING WELLS Damage:	Yes ☐ No ☒	

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ITEM		REMARKS	
PERIMETER DITCHES/OFF-SITE DISCHARGE			
1. SILTATION Yes ☒ No ☐ Location (indicate on site map): Culvert 2 Areal Extent: ~4'x8' Depth: <6"	Culvert 1 ☐ Culvert 2 ☒ Culvert 3 ☐ Culvert 4 ☐ Manhole 1 ☐ Manhole 2 ☐	Minor sedimentation at Culvert 2 from erosion of Bench "E". See notes in "Benches" for details.	
2. VEGETATION GROWTH Yes ☒ No ☐ Location (indicate on site map): Areal Extent: ~10'x10' Type: Japanese Knotweed		New stand of Japanese Knotweed growing near a small rip-rap lined drainage area located approximately 75 feet from the southwestern corner of the landfill.	
3. EROSION Yes ☐ No ☒ Location (indicate on site map): Areal Extent: Depth:			
4. DISCHARGE STRUCTURE Yes ☒ No ☐ Functioning: Yes ☒ No ☐ Condition: Good			
FENCING			
1. FENCING DAMAGE Yes ☐ No ☒ Location (indicate on site map): Description of Damage:			
PERIMETER ROADS			
1. ROADS DAMAGED Yes ☒ No ☐ Location (indicate on site map): South road Description of Damage: minor rutting and erosion		Minor rutting at end of north road near granite stockpile. Minor erosion at southernmost point of road from damaged waterbar noted during 2014 inspection appears to be repaired.	
SITE ACCESS			
1. ACCESS RESTRICTION Yes ☒ No ☐			
GENERAL			
1. VANDALISM Yes ☐ No ☒ Location (indicate on site map): Description of Damage:			
2. CHANGED SITE CONDITION Yes ☐ No ☒			

INTERVIEWS (conduct interviews if the following are present during inspection)

1. INTERVIEW WORKERS ON SITE NO
   Problems:
   Suggestions:
   Attach Report

ITEM	REMARKS
2. INTERVIEW SITE NEIGHBORS NO Problems: Suggestions: *Attach Report*	
3. INTERVIEW LOCAL OFFICIALS NO Problems: Suggestions: *Attach Report*	
REVIEW DOCUMENTS	
1. GROUNDWATER MONITORING RECORDS Abnormalities:	Not reviewed during inspection.
2. LANDFILL CLOSURE PROGRESS REPORT Report Date: Abnormalities:	Not reviewed during inspection.
3. OPERATION AND MAINTENANCE PLAN Is there a plan in place? Yes ☐ No ☐ Is it being followed? Yes ☐ No ☐ Is it adequate? Yes ☐ No ☐	Not reviewed during inspection.

ATTACHMENT 2

Attachment 2
Site Inspection Photographs
Saco Municipal Landfill Superfund Site
Saco, Maine

Date: 5/28/2015
Description: View of the landfill facing south.

Date: 5/28/2015
Description: Sediment buildup in channel E.

Date: 5/28/2015

Description: Sediment buildup at the outfall of Culvert 2.

Date: 5/28/2015

Description: Piece of filter fabric exposed on the northern side of the perimeter drainage channel along the north slope of the landfill.

Date: 5/28/2015

Description: Minor ruts observed at the end of the northern access road near the granite stockpiles.

Date: 5/28/2015

Description: View of the landfill facing southeast.

Date: 5/28/2015
Description: Bare spot observed along the southwest toe of the landfill.

Date: 5/28/2015
Description: Thin vegetation along Bench I.

Date:5/28/2015
Description: Repaired animal burrow above the culvert in the sedimentation basin.

Date: 5/28/2015
Description: Former animal burrow at the base of GV-15.

Date: 5/28/2015
Description: New stand of Japanese Knotweed located 75 feet from SW corner of LF.

Date: 5/28/2015
Description: Japanese Knotweed cut down at the sedimentation basin.

Date: 5/28/2015
Description: Angle of pipe at GV-11.

Date: 5/28/2015
Description: Damage to geomembrane boot at GV-2.

Date: 5/28/2015
Description: Damage to geomembrane boot at GV-15.

Date: 5/28/2015
Description: Damage to geomembrane boot at GV-5.

Date: 5/28/2015
Description: View of the gabion wall facing southwest.

Date: 5/28/2015
Description: View of the letdown channel facing northwest.

ATTACHMENT 3

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FIGURE 1

SITE PLAN
SACO MUNICIPAL LANDFILL
SUPERFUND SITE (AREAS 3 & 4)
SACO, MAINE
SITE INSPECTION

DRAWN BY:	DC	APPROVED BY:	GM
PROJECT:	80020.03		JUNE 2014

APPENDIX E

INTERVIEW RECORD			
Site Name: Saco Municipal Landfill Superfund Site		**EPA ID No.:** MED980504393	
Subject: Third Five-Year Review (2015)		**Time:**	**Date:** 6/5/2015
Type: ☐ Telephone ☐ Visit ☒ Other **Location of Visit:**		☐ Incoming ☐ Outgoing	
Contact Made By:			
Name: Adam Roy	**Title:** Project Scientist	**Organization:** Nobis Engineering, Inc.	
Individual Contacted:			
Name: Iver McLeod	**Title:** Remedial Project Manager	**Organization:** Maine Department of Environmental Protection	
Telephone No: 207-287-2651 **Fax No:** **E-Mail Address:** Iver.J.McLeod@maine.gov		**Street Address:** 28 Tyson Drive **City, State, Zip:** Augusta, Maine 04333	

Summary Of Conversation

Q1: What is your overall impression of the project and site?
A1: Overall, things are running smoothly – environmental monitoring is performed at the appropriate intervals and landfill inspections are thorough.

Q2: Are you aware of any issues the five-year review should focus on?
A2: Trends in contaminant concentrations

Q3: Do you believe the current remedy still protective?
A3: For the most part.

Q4: Do you feel that information related to the site is readily available?
A4: Do you mean available to the public or available to myself? I don't know where the admin record is kept so can't comment on availability to the public. Information related to the site is readily available to me.

Q5: Are you aware of any changes in the state ARARs, groundwater quality standards, etc., since 2010?
A5: No

Q6: Are you aware of any changes in the Site or surrounding property in the last 5 years, or whether any changes are planned?
A6: No

Q7: Do you have any comments, suggestions, or recommendations regarding the project?
A7: Just keep monitoring and inspections on schedule.

INTERVIEW RECORD			
Site Name: Saco Municipal Landfill Superfund Site		**EPA ID No.:** MED980504393	
Subject: Third Five-Year Review (2015)		**Time:**	**Date:** 6/5/2015
Type: ☐ Telephone ☐ Visit ☒ Other **Location of Visit:**		☐ Incoming ☐ Outgoing	
Contact Made By:			
Name: Adam Roy	**Title:** Project Scientist	**Organization:** Nobis Engineering, Inc.	
Individual Contacted:			
Name: Thomas Eschner	**Title:** Senior Project Manager	**Organization:** Woodard & Curran	
Telephone No: 207-774-2112 **Fax No:** 207-774-6635 **E-Mail Address:** teschner@woodardcurran.com		**Street Address:** 41 Hutchins Drive **City, State, Zip:** Portland, Maine 04102	

Summary Of Conversation

Q1: What is your overall impression of the project and site?
A1: *The Site is well maintained and access is controlled. The City of Saco corrects maintenance issues as it becomes aware of them. Monitoring and reporting are conducted in conformance with the work plan schedule.*

Q2: Are you aware of any issues the five-year review should focus on?
A2: *I am not aware of any issues other than the overall objective of confirming that the remedy remains protective.*

Q3: Do you believe the current remedy still protective?
A3: *Yes. The landfill cap prevents exposure and reduces or eliminates infiltration of precipitation. To my knowledge there have been no changes from the conditions that led to the conclusion in EPA's 2010 human health risk assessment of Sandy Brook surface water and sediment that there was no current unacceptable risk to human health from exposure to site contaminants. The institutional controls that prevent or limit groundwater extraction remain in effect.*

Q4: Do you feel that information related to the site is readily available?
A4: *The City Engineer and City Manager both are familiar with and aware of past and present activities at the landfill. If asked they would provide information or refer residents to appropriate information sources. The public repository remains in Dyer Library.*

Q5: Are you aware of any changes in the state ARARs, groundwater quality standards, etc., since 2010?
A5: *No. This is not a change since the previous five-year review in 2010, but the interim clean-up level for arsenic in the ROD is 50 µg/L, based on the MCL at the time, whereas the current MCL for arsenic is 10 µg/L.*

Q6: Are you aware of any changes in the Site or surrounding property in the last 5 years, or whether any changes are planned?
A6: *Within the past couple of years, one or more beavers has taken up residence in Sandy Brook*

downstream from the landfill and upstream from the property boundary.

My understanding is that a subdividable parcel near the southeastern side of the landfill has changed hands in the past two years, but no plans for development have come before the City. The area is on public water and sewer.

Q7: Do you have any comments, suggestions, or recommendations regarding the project?
A7: *No.*

INTERVIEW RECORD			
Site Name: Saco Municipal Landfill Superfund Site		**EPA ID No.:** MED980504393	
Subject: Third Five-Year Review (2015)		**Time:**	**Date:** 6/30/2015
Type: ☐ Telephone ☐ Visit ☐ Other **Location of Visit:**		☐ Incoming ☐ Outgoing	
Contact Made By:			
Name: Adam Roy	**Title:** Project Scientist	**Organization:** Nobis Engineering, Inc.	
Individual Contacted:			
Name: Patrick Fox	**Title:** Public Works Director	**Organization:** City of Saco, Maine	
Telephone No: 207-284-6641 **Fax No:** **E-Mail Address:** pfox@sacomaine.org		**Street Address:** 351 North Street **City, State, Zip:** Saco, Maine 04072	

Summary Of Conversation

Q1: What is your overall impression of the project and site?
A1: Overall impressions of the project are good. The feedback loop with EPA inspections helps the City to keep up with repair and maintenance issues of the landfill cap.

Q2: Are you aware of any issues the five-year review should focus on?
A2: No, not at this time.

Q3: Do you believe the current remedy still protective?
A3: Yes.

Q4: Do you feel that information related to the site is readily available?
A4: Yes, the information about the Site is readily available. A few personnel familiar with the Site have left the City. However, new City personnel are being brought up to speed on the project.

Q5: Are you aware of any changes in the state ARARs, groundwater quality standards, etc., since 2010?
A5: No.

Q6: Are you aware of any changes in the Site or surrounding property in the last 5 years, or whether any changes are planned?
A6: No, the City controls of most of the land surrounding the landfill. Public Works may take a parcel nearby but it would not impact current use of the Site.

Q7: Do you have any comments, suggestions, or recommendations regarding the project?
A7: Not at this time.

APPENDIX F

Table F1
Comparison of Current and May 2010 Cancer Toxicity Values - Oral Cancer Slope Factors
Saco Municipal Landfill Superfund Site
Saco, Maine

Chemical	CAS No.	January 2015		May 2010	
		CSF	Source	CSF	Source
Arsenic, Inorganic	7440-38-2	1.5E+00	IRIS	1.5E+00	IRIS
Benzene	71-43-2	5.5E-02	IRIS	5.5E-02	IRIS
Chloroform	67-66-3	3.1E-02	CalEPA	3.1E-02	CalEPA
Chromium (VI)	18540-29-9	5.0E-01	J	5.0E-01	J
DDD	72-54-8	2.4E-01	IRIS	2.4E-01	IRIS
DDE, p, p	72-55-9	3.4E-01	IRIS	3.4E-01	IRIS
Dichlorobenzene, 1,4-	106-46-7	5.4E-03	CalEPA	5.4E-03	CalEPA
Dichloroethane, 1,1-	75-34-3	5.7E-03	CalEPA	5.7E-03	CalEPA
Dichlorothane, 1,2-	107-06-2	9.1E-02	IRIS	9.1E-02	IRIS
Dieldren	60-57-1	1.6E+01	IRIS	1.6E+01	IRIS
Ethylbenzene	100-41-4	1.1E-02	CalEPA	1.1E-02	CalEPA
Methylene Chloride	75-09-2	2.0E-03	IRIS	7.5E-03	IRIS
Bis(2-ethylhexyl)phthalate	117-81-7	1.4E-02	IRIS	1.4E-02	IRIS
Aroclor 1260	11096-82-5	2.0E+00	S	2.0E+00	S
Benzo[a]pyrene	50-32-8	7.3E+00	IRIS	7.3E+00	IRIS
Trichlorobenzene, 1,2,4-	120-82-1	2.9E-02	PPRTV	2.9E-02	PPRTV
Trichloroethylene	79-01-6	4.6E-02	IRIS	5.9E-03	CalEPA

Notes:
Highlighted cells indicate a constituent with year-to-year varying entries.
A = ASTDR
CalEPA = California Environmental Protection Agency
E or N = Environmental Criteria and Assessment Office (formerly National Center for Environmental Assessment)
H = HEAST
IRIS = Integrated Risk Information System
J = New Jersey
N/A = Not applicable
O = Other
PPRTV = Provisional Peer Reviewed Toxicity Values
R = Route Extrapolation
S = See RSL User's Guide

Table F2
Comparison of Current and May 2010 Cancer Toxicity Values - Inhalation Unit Risk Factors
Saco Municipal Landfill Superfund Site
Saco, Maine

Chemical	CAS No.	January 2015		May 2010	
		IUR	Source	IUR	Source
Arsenic, Inorganic	7440-38-2	4.3E-03	IRIS	4.3E-03	IRIS
Benzene	71-43-2	7.8E-06	IRIS	7.8E-06	IRIS
Beryllium and compounds	7440-41-7	2.4E-03	IRIS	2.4E-03	IRIS
Cadmium (Diet)	7440-43-9	1.8E-03	IRIS	1.8E-03	IRIS
Cadmium (Water)	7440-43-9	1.8E-03	IRIS	1.8E-03	IRIS
Chloroform	67-66-3	2.3E-05	IRIS	2.3E-05	IRIS
Chromium (VI)	18540-29-9	8.4E-02	S	8.4E-02	S
Cobalt	7440-48-4	9.0E-03	PPRTV	9.0E-03	PPRTV
DDD	72-54-8	6.9E-05	CalEPA	6.9E-05	CalEPA
DDE, p, p	72-55-9	9.7E-05	CalEPA	9.7E-05	CalEPA
Dichlorobenzene, 1,4-	106-46-7	1.1E-05	CalEPA	1.1E-05	CalEPA
Dichloroethane, 1,1-	75-34-3	1.6E-06	CalEPA	1.6E-06	CalEPA
Dichlorothane, 1,2-	107-06-2	2.6E-05	IRIS	2.6E-05	IRIS
Dieldren	60-57-1	4.6E-03	IRIS	4.6E-03	IRIS
TCDD, 2,3,7,8-	1746-01-6	3.8E-01	CalEPA	3.8E-01	CalEPA
Ethylbenzene	100-41-4	2.5E-06	CalEPA	2.5E-06	CalEPA
Methylene Chloride	75-09-2	1.0E-08	IRIS	7.7E-06	CalEPA
Nickel Soluble Salts	7440-02-0	2.6E-04	CalEPA	2.6E-04	CalEPA
Bis(2-ethylhexyl)phthalate	117-81-7	2.4E-06	CalEPA	2.4E-06	CalEPA
Aroclor 1260	11096-82-5	5.7E-04	S	5.7E-04	S
Naphthalene	91-20-3	3.4E-05	CalEPA	3.4E-05	CalEPA
Trichloroethylene	79-01-6	4.1E-06	IRIS	2.0E-06	CalEPA
Vanadium and Compounds	7440-62-2	8.3E-03	PPRTV	8.3E-03	PPRTV

Notes:
Highlighted cells indicate a constituent with year-to-year varying entries.
A = ASTDR
CalEPA = California Environmental Protection Agency
E or N = Environmental Criteria and Assessment Office (formerly National Center for Environmental Assessment)
H = HEAST
IRIS = Integrated Risk Information System
J = New Jersey
N/A = Not applicable
O = Other
PPRTV = Provisional Peer Reviewed Toxicity Values
R = Route Extrapolation
S = See RSL User's Guide

Table F3
Comparison of Current and May 2010 Cancer Toxicity Values - Oral Reference Doses
Saco Municipal Landfill Superfund Site
Saco, Maine

Chemical	CAS No.	January 2015		May 2010	
		RfD	Source	RfD	Source
Acetone	67-64-1	9.0E-01	IRIS	9.0E-01	IRIS
Aluminum	7429-90-5	1.0E+00	PPRTV	1.0E+00	PPRTV
Antimony (metallic)	7440-36-0	4.0E-04	IRIS	4.0E-04	IRIS
Arsenic, Inorganic	7440-38-2	3.0E-04	IRIS	3.0E-04	IRIS
Barium	7440-39-3	2.0E-01	IRIS	2.0E-01	IRIS
Benzene	71-43-2	4.0E-03	IRIS	4.0E-03	IRIS
Beryllium and compounds	7440-41-7	2.0E-03	IRIS	2.0E-03	IRIS
Butylbenzene, n-	104-51-8	5.0E-02	PPRTV	No value	N/A
Cadmium (Diet)	7440-43-9	1.0E-03	IRIS	1.0E-03	IRIS
Cadmium (Water)	7440-43-9	5.0E-04	IRIS	5.0E-04	IRIS
Chlorobenzene	108-90-7	2.0E-02	IRIS	2.0E-02	IRIS
Chloroform	67-66-3	1.0E-02	IRIS	1.0E-02	IRIS
Chromium(III), Insoluble Salts	16065-83-1	1.5E+00	IRIS	1.5E+00	IRIS
Chromium(VI)	18540-29-9	3.0E-03	IRIS	3.0E-03	IRIS
Cobalt	7440-48-4	3.0E-04	PPRTV	3.0E-04	PPRTV
Copper	7440-50-8	4.0E-02	H	4.0E-02	H
Dichlorobenzene, 1,2-	106-37-6	9.0E-02	IRIS	9.0E-02	IRIS
Dichlorobenzene, 1,4-	106-46-7	7.0E-02	A	7.0E-02	A
Dichlorodifluoromethane	75-71-8	2.0E-01	IRIS	2.0E-01	IRIS
Dichloroethane, 1,1-	75-34-3	2.0E-01	PPRTV	2.0E-01	PPRTV
Dichloroethane, 1,2-	107-06-2	6.0E-03	X	2.0E-02	PPRTV
Dichloroethylene, 1,1-	75-35-4	5.0E-02	IRIS	5.0E-02	IRIS
Dichloroethylene, 1,2-cis-	156-59-2	2.0E-03	IRIS	1.0E-02	PPRTV
Dichloroethylene, 1,2-trans-	156-60-5	2.0E-02	IRIS	2.0E-02	IRIS
Dieldrin	60-57-1	5.0E-05	IRIS	5.0E-05	IRIS
Dimethylphenol, 2,4-	105-67-9	2.0E-02	IRIS	2.0E-02	IRIS
Ethylbenzene	100-41-4	1.0E-01	IRIS	1.0E-01	IRIS
Tetrahydrofuran	109-99-9	9.0E-01	IRIS	No value	N/A
Iron	7439-89-6	7.0E-01	PPRTV	7.0E-01	PPRTV
Manganese (Diet)	7439-96-4	1.4E-01	IRIS	1.4E-01	IRIS
Manganese (Non-diet)	7439-96-5	2.4E-02	S	2.4E-02	S
~Mercuric Chloride (and other Mercury salts)	7487-94-7	3.0E-04	IRIS	3.0E-04	IRIS
Methyl Ethyl Ketone (2-Butanone)	78-93-3	6.0E-01	IRIS	6.0E-01	IRIS
Methylene Chloride	75-09-2	6.0E-03	IRIS	6.0E-02	IRIS
Nickel Soluble Salts	7440-02-0	2.0E-02	IRIS	2.0E-02	IRIS
~Bis(2-ethylhexyl)phthalate	117-81-7	2.0E-02	IRIS	2.0E-02	IRIS
~Dibutyl Phthalate	84-74-2	1.0E-01	IRIS	1.0E-01	IRIS
~Diethyl Phthalate	84-66-2	8.0E-01	IRIS	8.0E-01	IRIS
~Fluoranthene	206-44-0	4.0E-02	IRIS	4.0E-02	IRIS
~Methylnaphthalene, 2-	91-57-6	4.0E-03	IRIS	4.0E-03	IRIS
~Naphthalene	91-20-3	2.0E-02	IRIS	2.0E-02	IRIS
~Pyrene	129-00-0	3.0E-02	IRIS	3.0E-02	IRIS
Selenium	7782-49-2	5.0E-03	IRIS	5.0E-03	IRIS
Silver	7440-22-4	5.0E-03	IRIS	5.0E-03	IRIS
Thallium (Soluble Salts)	7440-28-0	1.0E-05	X	No Value	N/A
Toluene	108-88-3	8.0E-02	IRIS	8.0E-02	IRIS
Trichlorobenzene, 1,2,3-	87-61-6	8.0E-04	X	8.0E-04	X
Trichlorobenzene, 1,2,4-	120-82-1	1.0E-02	IRIS	1.0E-02	IRIS
Trichloroethylene	79-01-6	5.0E-04	IRIS	No Value	N/A
Trimethylbenzene, 1,3,5-	108-67-8	1.0E-02	X	1.0E-02	X
Vanadium and Compounds	7440-62-2	5.0E-03	S	5.0E-03	S
Xylene, o-	95-47-6	2.0E-01	S	2.0E-01	S
Xylenes	1330-20-7	2.0E-01	IRIS	2.0E-01	IRIS
Zinc and Compounds	7440-66-6	3.0E-01	IRIS	3.0E-01	IRIS

Notes:
Highlighted cells indicate a constituent with year-to-year varying entries.
A = ASTDR
CalEPA = California Environmental Protection Agency
E or N = Environmental Criteria and Assessment Office (formerly National Center for Environmental Assessment)
H = HEAST
IRIS = Integrated Risk Information System
J = New Jersey
N/A = Not applicable
O = Other
PPRTV = Provisional Peer Reviewed Toxicity Values
R = Route Extrapolation
S = See RSL User's Guide
X = Appendix PPRTV Screen

Table F4
Comparison of Current and May 2010 Cancer Toxicity Values - Inhalation Reference Concentrations
Saco Municipal Landfill Superfund Site
Saco, Maine

Chemical	CAS No.	January 2015		May 2010	
		RfC	Source	RfC	Source
Acetone	67-64-1	3.1E+01	A	3.1E+01	A
Aluminum	7429-90-5	5.0E-03	PPRTV	5.0E-03	PPRTV
Arsenic, Inorganic	7440-38-2	1.5E-05	CalEPA	1.5E-05	CalEPA
Barium	7440-39-3	5.0E-04	H	5.0E-04	H
Benzene	71-43-2	3.0E-02	IRIS	3.0E-02	IRIS
Beryllium and compounds	7440-41-7	2.0E-05	IRIS	2.0E-05	IRIS
Cadmium (Diet)	7440-43-9	1.0E-05	A	1.0E-05	A
Cadmium (Water)	7440-43-9	1.0E-05	A	1.0E-05	A
Chlorobenzene	108-90-7	5.0E-02	PPRTV	5.0E-02	PPRTV
Chloroform	67-66-3	9.8E-02	A	9.8E-02	A
Chloromethane	74-87-3	9.0E-02	IRIS	9.0E-02	IRIS
Chromium(VI)	18540-29-9	1.0E-04	IRIS	1.0E-04	IRIS
Cobalt	7440-48-4	6.0E-06	PPRTV	6.0E-06	PPRTV
Dichlorobenzene, 1,2-	95-50-1	2.0E-01	H	2.0E-01	H
Dichlorobenzene, 1,4-	106-46-7	8.0E-01	IRIS	8.0E-01	IRIS
Dichlorodifluoromethane	75-71-8	1.0E-01	X	2.0E-01	H
Dichloroethane, 1,2-	107-06-2	7.0E-03	PPRTV	2.4E+00	A
Dichloroethylene, 1,1-	75-35-4	2.0E-01	IRIS	2.0E-01	IRIS
Dichloroethylene, 1,2-trans-	156-60-5	No Value	N/A	6.0E-02	PPRTV
Ethyl Chloride (Chloroethane)	75-00-3	1.0E+01	IRIS	1.0E+01	IRIS
Ethylbenzene	100-41-4	1.0E+00	IRIS	1.0E+00	IRIS
Tetrahydrofuran	109-99-9	2.0E+00	IRIS	No value	N/A
Manganese (Diet)	7439-96-4	5.0E-05	IRIS	5.0E-05	IRIS
Manganese (Non-diet)	7439-96-5	5.0E-05	IRIS	5.0E-05	IRIS
~Mercuric Chloride (and other Mercury salts)	7487-94-7	3.0E-04	S	3.0E-05	CalEPA
~Mercury (elemental)	7439-97-6	3.0E-04	IRIS	3.0E-04	IRIS
Methyl Ethyl Ketone (2-Butanone)	78-93-3	5.0E+00	IRIS	5.0E+00	IRIS
Methylene Chloride	75-09-2	6.0E-01	IRIS	1.0E+00	A
Nickel Soluble Salts	7440-02-0	9.0E-05	A	9.0E-05	A
~Naphthalene	91-20-3	3.0E-03	IRIS	3.0E-03	IRIS
Selenium	7782-49-2	2.0E-02	CalEPA	2.0E-02	CalEPA
Toluene	108-88-3	5.0E+00	IRIS	5.0E+00	IRIS
Trichlorobenzene, 1,2,4-	120-82-1	2.0E-03	PPRTV	2.0E-03	PPRTV
Trichloroethylene	127-18-4	2.0E-03	IRIS	No Value	N/A
Trimethylbenzene, 1,2,4-	95-63-6	7.0E-03	PPRTV	7.0E-03	PPRTV
Vanadium and Compounds	7440-62-2	1.0E-04	A	No Value	N/A
Xylene, o-	95-47-6	1.0E-01	S	7.0E-01	CalEPA
Xylenes	1330-20-7	1.0E-01	IRIS	1.0E-01	IRIS

Notes:

Highlighted cells indicate a constituent with year-to-year varying entries.

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APPENDIX G

Appendix G

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