

**Fourth Five-Year Review Report
for
Queen City Farms
WAD980511745**

**Maple Valley
King County, Washington**

September 2013

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**Fourth Five-Year Review Report
for
Queen City Farms
Southern Half of Section 28 – Maple Valley Quad
Maple Valley
King County, Washington**

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List of Acronyms

AOC	Administrative Order on Consent
ARAR	Applicable or Relevant and Appropriate Requirement
BDA	Buried Drum Area
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CLARC	Cleanup Levels and Risk Calculation
COC	Contaminant of Concern
DCE	Dichloroethene
EPA	United States Environmental Protection Agency
FYR	Five-Year Review
IC	Institutional Control
IRM	Interim Remedial Measure
LNAPL	Light Non-Aqueous Phase Liquid
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
µg/L	Micrograms per Liter
mg/kg	Milligrams per Kilogram
MTCA	Washington State Model Toxics Control Act
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethene
PRP	Potentially Responsible Party
PVC	Polyvinyl Chloride
RAO	Remedial Action Objective
ROD	Record of Decision
TCE	Trichloroethene
VC	Vinyl Chloride
VOC	Volatile Organic Compound

Executive Summary

Introduction

The 324-acre Queen City Farms Superfund site is near Maple Valley, Washington. Waste disposal and chemical processing at the Site caused two areas of contamination:

1. The area with the former waste ponds and the buried drums was the most contaminated part of the Site and is referred to as operable unit 1. The main soil contaminants in these areas of the Site included metals, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls, pentachlorophenol, and solvents such as tetrachloroethene and toluene. The main groundwater contaminants are volatile organic compounds (VOCs). The current implementation of the contingent groundwater remedy will focus on the primary VOC concern, trichloroethene.
2. The former processing area near the eastern boundary of the site had less contamination and was addressed through a separate remedial action. That area is referred to as the former 4-Tek facility or operable unit 2. Soil in the area was contaminated with VOCs that also impacted area groundwater.

The Site's responsible parties (PRPs) removed contaminated soil and sludge from the Site and constructed a barrier wall and protective cap to contain groundwater and soil beneath the former pond area. The PRPs continue to monitor the groundwater plume to ensure that people do not become exposed to the contamination.

The triggering action for this fourth five-year review was the signing of the previous Five-Year Review Report on September 29, 2008.

Remedial Action Objectives

The Site's 1992 Record of Decision established the following remedial action objectives:

Soil

- Prevent exposure to contaminated surface and subsurface soil.
- Prevent soil at the containment area from causing further groundwater contamination.
- Reduce the concentrations of contaminants in soils at the containment area.

Groundwater

- Prevent exposure to contaminated groundwater.
- Prevent migration of the contaminant plume.
- Restore groundwater for future beneficial use.

Technical Assessment

The soil component of the remedy is functioning as intended. Natural attenuation of the groundwater plume has not been as successful as expected, so implementation of the contingent remedy of active groundwater extraction and treatment is necessary. All necessary institutional controls have been implemented so Site-related groundwater contamination is not affecting groundwater users near the Site. The potential for vapor intrusion has not been assessed. Currently, there are no enclosed buildings near the Site's VOC plumes; however, future development may occur near the plumes resulting in potential exposures. Off-road vehicles are causing erosion near the edge of the cap on the final containment cell.

Conclusion

The Site's remedy currently protects human health and the environment because contaminated surface soils have been removed, contaminated subsurface soils are capped, people are not exposed to the Site's groundwater contamination, and covenants are in place to restrict land and groundwater use. However, in order for the remedy to be protective in the long term, the following actions need to be taken to ensure protectiveness:

- Install the contingent groundwater extraction and treatment system.
- Assess the potential for vapor intrusion.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Queen City Farms		
EPA ID: WAD980511745		
Region: 10	State: WA	City/County: Maple Valley/King
SITE STATUS		
NPL Status: Final		
Multiple OUs? Yes	Has the site achieved construction completion? September 9, 1997 Yes	
REVIEW STATUS		
Lead agency: EPA If "Other Federal Agency" selected above, enter Agency name: Click here to enter text.		
Author name: Hagai Nassau and Treat Suomi (Reviewed by EPA)		
Author affiliation: Skeo Solutions		
Review period: September 30, 2008 – September 29, 2013		
Date of site inspection: May 21, 2013		
Type of review: Statutory		
Review number: 4		
Triggering action date: September 29, 2008		
Due date (five years after triggering action date): September 29, 2013		

Five-Year Review Summary Form (continued)

Issues/Recommendations

OU(s) without Issues/Recommendations Identified in the Five-Year Review:
none

Issues and Recommendations Identified in the Five-Year Review:

OU(s): 1	Issue Category: Remedy Performance			
	Issue: Reasonable progress towards attainment of remedial action objectives has not been achieved through implementation of MNA remedy: Aquifer 2 plume has migrated and 10 year TCE cleanup goals have not been met.			
	Recommendation: Implement the contingent groundwater extraction and treatment system.			
Affect Current Protectiveness	Affect Future Protectiveness	Implementing Party	Oversight Party	Milestone Date
No	Yes	PRP	EPA	9/30/2015

OU(s): 1, 2	Issue Category: Remedy Performance			
	Issue: The potential for vapor intrusion has not been assessed. Currently, there are no enclosed buildings near the Site's VOC plumes; however, future development may occur near the plumes.			
	Recommendation: Assess the potential for vapor intrusion.			
Affect Current Protectiveness	Affect Future Protectiveness	Implementing Party	Oversight Party	Milestone Date
No	Yes	PRP	EPA	9/30/2014

Five-Year Review Summary Form (continued)

Protectiveness Statements

<i>Operable Unit:</i> 1	<i>Protectiveness Determination:</i> Short-term Protective	<i>Addendum Due Date (if applicable):</i> Not Applicable
<i>Protectiveness Statement:</i> The remedy at OU1 currently protects human health and the environment because contaminated surface soils have been removed, contaminated subsurface soils are capped, exposure pathways to the groundwater contamination are being controlled, and covenants are in place to restrict land and groundwater use. However, in order for the remedy to be protective in the long term, the following actions need to be taken to ensure protectiveness: Implement the contingent groundwater extraction and treatment action; Assess the potential for vapor intrusion.		

<i>Operable Unit:</i> 2	<i>Protectiveness Determination:</i> Short-term Protective	<i>Addendum Due Date (if applicable):</i> Not Applicable
<i>Protectiveness Statement:</i> The remedy at OU2 currently protects human health and the environment because contaminated soils and debris were removed, exposure pathways to the groundwater contamination are being controlled, and groundwater monitoring is being conducted to ensure that the groundwater contamination does not migrate into Aquifer 2. However, in order for the remedy to be protective in the long term, the potential for vapor intrusion needs to be assessed.		

Sitewide Protectiveness Statement

<i>Protectiveness Determination:</i> Short-term Protective	<i>Addendum Due Date (if applicable):</i> Not Applicable
<i>Protectiveness Statement:</i> The Site's remedy currently protects human health and the environment because contaminated surface soils have been removed, contaminated subsurface soils are capped, exposure pathways to the Site's groundwater contamination are being controlled, and covenants are in place to restrict land and groundwater use. However, in order for the remedy to be protective in the long term, the following actions need to be taken to ensure protectiveness: Implement the contingent groundwater extraction and treatment action; Assess the potential for vapor intrusion.	

Fourth Five-Year Review Report for Queen City Farms Superfund Site

1.0 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 is, and will continue to be, protective of human health and the environment. FYR reports document FYR methods, findings and conclusions. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The United States Environmental Protection Agency (EPA) prepares FYRs pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Section 121 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA Section 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 5 years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The 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 action no less often than every five years after initiation of the selected remedial action.

Skeo Solutions, an EPA contractor, conducted the FYR and prepared this report regarding the remedy implemented at the Queen City Farms Superfund site (the Site) in Maple Valley, King County, Washington. The EPA conducted this FYR between December 2012 and September 2013. The EPA is the lead agency for overseeing the implementation of the remedy by the potentially responsible party (PRP). The Washington State Department of Ecology, as the support agency representing the State of Washington, has reviewed all supporting documentation and provided input to the EPA during the FYR process.

This is the fourth FYR for the Site. The triggering action for this statutory review is the previous FYR. The FYR is required due to the fact that hazardous substances, pollutants or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure. The Site

consists of two operable units (OUs), both of which are addressed in this FYR. The waste disposal area is OU1. The former 4-Tek Industries chemical processing facility is OU2.

2.0 Site Chronology

Table 1 lists the dates of important events for the Site.

Table 1: Chronology of Site Events

Event	Date
Site began accepting industrial wastes	1957
EPA discovered the Site	November 23, 1979
EPA conducted the preliminary assessment/site investigation	June 27, 1983
EPA issued an Administrative Order on Consent (AOC) for the shallow groundwater investigation	August 17, 1983
EPA placed the Site on the National Priorities List	September 21, 1984
EPA signed the Site's first Record of Decision (ROD)	October 24, 1985
EPA issued an AOC for interim remedial measure (IRM)	October 28, 1985
IRM conducted	October 28, 1985 to October 31, 1986
EPA conducted a remedial investigation/feasibility study for OU1	September 30, 1985 to May 6, 1988
EPA issued an AOC for a remedial investigation/feasibility study for the waste ponds	May 6, 1988
PRP conducted a remedial investigation/feasibility study for OU1	May 6, 1988 to December 31, 1992
EPA issued an AOC for the waste pond remedial investigation/feasibility study	June 21, 1988
PRP conducted a remedial investigation	June 21, 1988 to January 31, 1991
PRPs conducted a removal action	August 16, 1988 to October 5, 1988
EPA issued a Unilateral Administrative Order for removal actions at OU2 (former 4-Tek facility)	May 8, 1989
PRP conducted a removal action at OU2 (former 4-Tek facility)	April 15, 1990 to March 28, 1994
EPA issued an AOC restricting areas of the Site available for mining	May 7, 1990
Emergency removal of site wastes at OU2 (former 4-Tek facility)	May 1990
EPA issued an AOC for groundwater monitoring by King County	May 1, 1992
EPA signed the Site's second ROD, for both OUs	December 31, 1992
EPA issued an Administrative Order for remedial design and remedial action	March 28, 1994
EPA issued a consent decree to Boeing to implement elements of the 1992 ROD	September 9, 1994
PRP conducted remedial design for OU1 (Queen City Farms property)	September 20, 1994 to April 26, 1996
PRP conducted remedial design for OU2 (former 4-Tek facility)	September 22, 1994 to August 28, 1995
PRP conducted remedial action at OU1	July 27, 1995 to September 26, 2001
PRP constructed a vertical barrier wall at OU1	July 1995 to 1996
Emergency removal of site wastes at OU1 (Buried Drum Area)	September 1995
EPA issued Preliminary Close-Out Report	September 9, 1997
EPA signed first FYR	September 28, 1998
EPA issued Final Construction Complete Report	September 26, 2001
EPA signed second FYR	September 29, 2003
EPA signed third FYR	September 29, 2008
PRP conducted supplemental remedial investigation at OU1	August 26, 2009 to February 8, 2013

Event	Date
PRP Boeing and the EPA agreed to undertake contingent action in the southwest portion of the Aquifer 2 trichloroethene plume near the S-well cluster.	December 17, 2012
Boeing submitted Final Monitored Natural Attenuation Data Report	February 26, 2013
Boeing submitted Final Evaluation of Remediation Technologies	April 4, 2013
Boeing submitted revised Aquifer 2 Contingent Action Conceptual Design Report for contingent Aquifer 2 extraction and treatment action	June 21, 2013

3.0 Background

3.1 Physical Characteristics

The 324-acre Site is located in a rolling upland area adjacent to Cedar Grove Road, about 2.5 miles north of Maple Valley and 5.5 miles south of Issaquah in King County, Washington (see Figure 1). The Site's elevation ranges from 350 to 535 feet above mean sea level; the Site is not within a 500-year floodplain. Native surface soils at the Site largely consist of Alderwood gravelly sandy loam and Everett gravelly sandy loam. As of the 2010 census, 604 people lived within 1 mile of the Site and 11,670 people lived within 3 miles of the Site. Access to the Site's containment area (see Figure 2) is restricted with a padlocked fence.

The Site has two lakes: Queen City Lake and the Main Gravel Pit Lake (see Figure 2). The Main Gravel Pit Lake was formed as a result of former mining operations at the Site. The water level in the lake changes dramatically with rainfall and season. The Main Gravel Pit Lake is a source of direct recharge to groundwater.

The water balance for the area is positive, as precipitation exceeds evapotranspiration by at least 20 inches per year. During the rainy season (late fall through spring), the slope between the Main Gravel Pit Lake and the containment area has several surface springs and seeps. Most of the water from these springs enters the Main Gravel Pit Lake, but some springs discharge to Cedar River Tributary 316A. This intermittent stream originates west of the Cedar Hills Regional Landfill, which is directly north of the Site. The stream flows in a southerly direction on the east side of the compost facility and the former 4-Tek Industries chemical processing facility (see Figure 2), and eventually discharges into the Cedar River.

The Site is located in the Puget Sound Lowland, a north-south oriented trough between the Cascade Range to the east and the Olympic Mountains to the west. The regional geology comprises a series of glacial and interglacial deposits often overlain with post-glacial sands, silts, peat and/or gravels. King County has designated Critical Aquifer Recharge Areas where groundwater is highly susceptible to contamination.¹ Parts of the Site are designated as Critical Aquifer Recharge Areas, in part because the property acts as a groundwater recharge zone.

The Site has five water-bearing zones. They are, from top to bottom:

- *Near Surface Water-Bearing Zone*: This zone is found north of the containment area and Queen City Lake. It is directly recharged by precipitation and discharges to Queen City Lake.
- *Aquifer 1*: This is a perched sand-and-gravel aquifer that is highly permeable and flows toward the south. It is only found in the northeast quadrant of the Site, near the

¹ King County Critical Aquifer Recharge Areas, June 9, 2008. Available online at <http://your.kingcounty.gov/ddes/cao/PDFs/mapKC-CARA-15051AttachB.pdf>. Last accessed on May 17, 2013.

containment area, and does not extend to the 4-Tek area. It is separated from Aquifer 2 by a leaky aquitard.

- *Aquifer 2*: An unconfined aquifer that extends throughout the Site. It is separated into upper and lower zones that have differing characteristics. When the upper part is referred to separately, it is called Aquifer 2a. Aquifer 2 serves as a drinking water source for several residences in the area. The direction of groundwater flow in Aquifer 2 is highly influenced by the Main Gravel Pit Lake. North of the Main Gravel Pit Lake, upper Aquifer 2 groundwater flows to the north-northwest; south of the Main Gravel Pit Lake, upper Aquifer 2 groundwater flows to the south-southeast. In contrast, groundwater in lower Aquifer 2 flows radially outward in all directions except east from Main Gravel Pit Lake. At some monitoring locations, groundwater in the upper and lower part of Aquifer 2 flows in different directions.
- *Aquifer 3*: A confined aquifer that extends throughout the Site. Groundwater in Aquifer 3 flows toward the south/southeast throughout the area affected by the contaminant plume. Contaminated water from Aquifer 2 flows through a leaky aquitard into Aquifer 3. When the upper part is referred to separately, it is called Aquifer 3a.
- *Deep Water-Bearing Zone*: This confined aquifer is located underneath Aquifer 3 and extends throughout the region. This zone was not part of the remedial investigation and is largely uncharacterized. As a result of the natural attenuation that occurs in Aquifer 3, this zone is not believed to have been impacted by any contaminants from the Site.

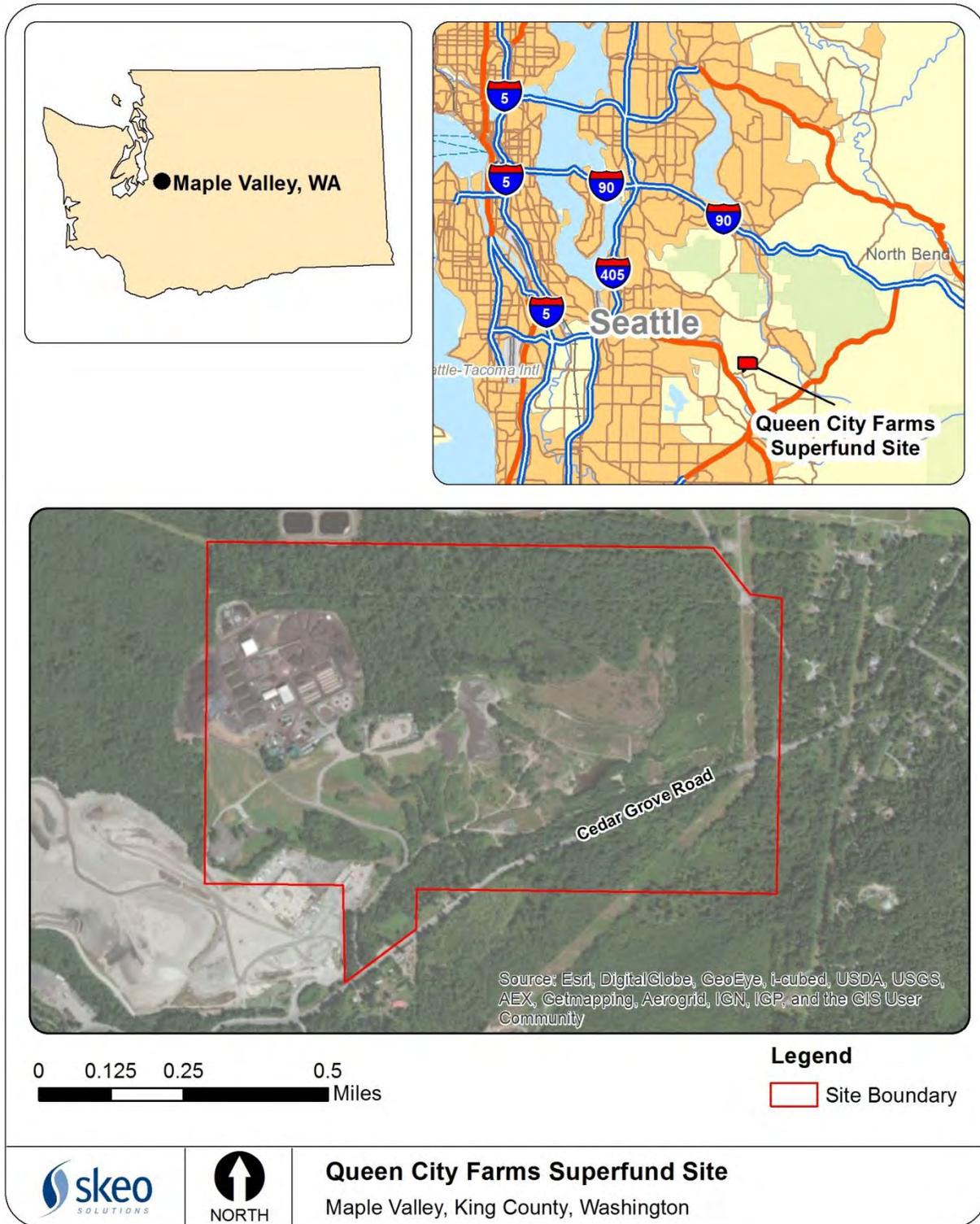
3.2 Land and Resource Use

A regional composting facility occupies 26 acres in the northwest section of the Site. The gravel mining and sorting operation in the southwest section of the Site ended in 1992 as the available gravel deposits were depleted. The former gravel mine area is now being graded as part of land reclamation. The Site has some wetlands and wildlife habitat areas. Previous site uses included a pig farm, an airport, a chemical mixing operation and waste disposal ponds. The site property is owned by Queen City Farms, Inc. The owner is interested in pursuing additional uses of the property. Figure 3 shows the property parcels at the Site.

The 960-acre Cedar Hills Regional Landfill operated by King County borders the Site to the north. Undeveloped land that is owned by Reeve Resources LLC and is zoned for timber borders the Site to the west. Stoneway Sand and Gravel's mining operation borders the Site to the southwest. Homes border the Site's southern and eastern borders. Cedar Grove Road runs through the southeastern portion of the Site.

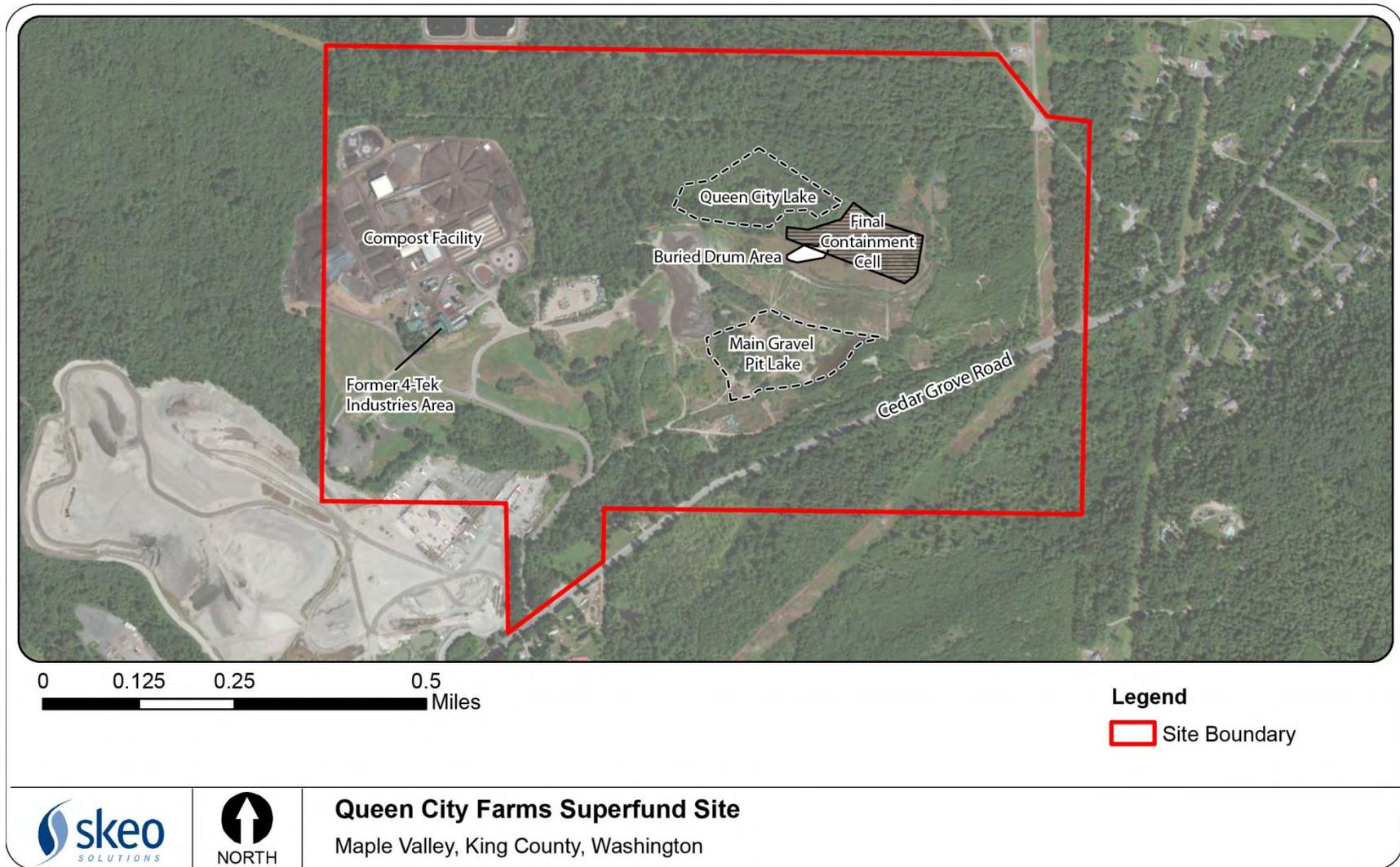
Groundwater from Aquifer 2, Aquifer 3 and the Deep Water-Bearing Zone is used as a source of drinking water by many public water system wells and private wells within a half-mile of the site property.

Figure 1: Site Location Map



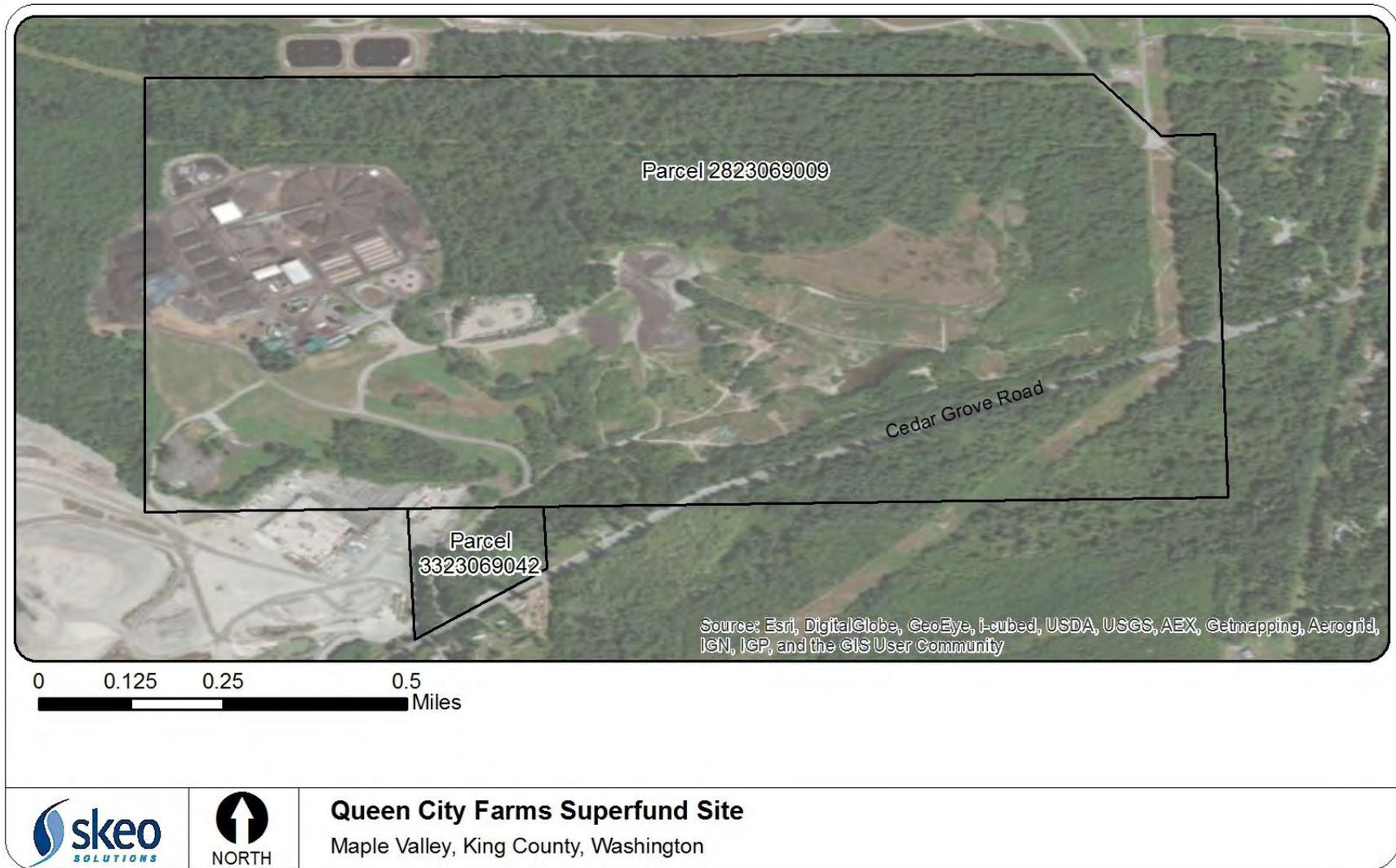
Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding the EPA's response actions at the Site.

Figure 2: Detailed Site Map



Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding the EPA's response actions at the Site.

Figure 3: Parcel Map



Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding the EPA's response actions at the Site.

3.3 History of Contamination

The Site's contamination was caused by waste disposal and chemical processing at the Site. The waste disposal area is referred to as OU1. The former 4-Tek chemical processing facility is referred to as OU2. The Site has two PRPs: Queen City Farms, Inc. and The Boeing Company (Boeing).

Industrial waste liquids, including paint and petroleum products, organic solvents, and oils, were transported to Queen City Farms in tanker trucks and drums and then discharged directly into three unlined 1-acre ponds in the northeastern portion of the Site (Ponds 1, 2 and 3), which were located where the containment cell is now (see Figure 2). Occasionally, the drums themselves were placed in the ponds. These ponds were periodically burned to reduce the volume and lower the risk of accidental fires posed by floating flammable products in these ponds. Disposal occurred from about 1955 through the late 1960s.

Ponds 4, 5 and 6 were unlined ponds located immediately southwest of Queen City Lake. They are now usually dry. The ponds are believed to have been used predominantly for disposal of whey and animal waste produced by the past hog farming operation on site. Soil samples from these ponds detected both heavy metals and organic compounds at concentrations that decreased with depth. Some soil and sediment samples also detected polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), cyanide and pesticides. No groundwater contamination associated with Ponds 4, 5 and 6 was detected.

The Site included several areas of buried drums. In March 1988, gravel mining operations encountered additional buried drums in an area 300 to 400 feet south of Queen City Lake. Samples from the drums and the soils around the drums revealed a range of contaminants, including heavy metals, PAHs, PCBs, pentachlorophenol and solvents such as tetrachloroethene (PCE) and toluene.

4-Tek Industries leased a building on the western portion of the Site for solvent recycling and reformulation. The plant operated for several years and closed in 1986. Surface water runoff from chemical storage and mixing areas drained to a sump with a discharge pipe. Soil samples taken near the 4-Tek drainage contained detectable levels of volatile organic compounds (VOCs) that were probably due to spillage. Sample results from the intermittent stream near the 4-Tek area did not detect any contamination.

Wells at the Cedar Hills Regional Landfill were studied to determine if the landfill was contributing any contamination to the Site. The sampling results determined that this was not happening. In a May 1992 consent order with the EPA, King County (owner of the Cedar Hills Regional Landfill) agreed to undertake a long-term surface water and groundwater monitoring program.

3.4 Initial Response

There were no cleanup activities at the Site before the initial 1985 ROD.

3.5 Basis for Taking Action

Sludge and soil samples from the waste ponds area contained significant concentrations of heavy metals, VOCs, semivolatile organics, PAHs and PCBs. Soil samples from the 4-Tek area contained VOCs, including PCE, trichloroethene (TCE), toluene and dichloromethane.

Activities at the Site have contaminated the Site's groundwater with PCE, TCE and cis-1,2-dichloroethene (DCE).

The Site's risk assessment found that dermal exposure to the Site's soil could result in an unacceptable risk of cancer. Exposure to the Site's groundwater could result in unacceptable cancer and non-cancer risks. The Site's groundwater contamination also exceeded health-based standards, such as the EPA's maximum contaminant levels (MCLs).

The EPA listed the Site on the Superfund program's National Priorities List (NPL) in 1984.

4.0 Remedial Actions

In accordance with CERCLA and the NCP, the overriding goals for any remedial action are protection of human health and the environment and compliance with applicable or relevant and appropriate requirements (ARARs). The Site's 1992 Record of Decision (ROD) considered a number of remedial alternatives for the Site, and final selection was made based on an evaluation of each alternative against nine evaluation criteria that are specified in Section 300.430(e)(9)(iii) of the NCP. The nine criteria are:

1. Overall Protection of Human Health and the Environment
2. Compliance with ARARs
3. Long-Term Effectiveness and Permanence
4. Reduction of Toxicity, Mobility or Volume through Treatment
5. Short-Term Effectiveness
6. Implementability
7. Cost
8. State Acceptance
9. Community Acceptance

The Site's 1985 ROD was issued before these nine criteria were established; the initial remedial measures selected in the 1985 ROD were based on the cost effectiveness of the evaluated alternatives.

4.1 Remedy Selection

The EPA signed the Site's first ROD on October 24, 1985. The 1985 ROD selected an interim remedial measure (IRM) to close the waste ponds (Ponds 1, 2 and 3). The primary objective of the IRM was "to eliminate future groundwater contamination from Ponds 1, 2 and 3 and the immediate vicinity." The selected remedy included:

- Removing sludge and water from the ponds, with disposal of solids at an off-site landfill.
- Excavating contaminated soil from around the ponds and placing them into the pond depressions.
- Placing an impermeable cover over the contaminated area.
- Installing a trench to prevent runoff and shallow groundwater from entering the remedial action area.
- Installing monitoring wells to ensure that the system is preventing water from contacting the waste.

The EPA signed the Site's second ROD on December 31, 1992. The 1992 ROD addresses both of the Site's OUs. The 1992 ROD established the following remedial action objectives (RAOs):

Soil

- Prevent exposure to contaminated surface and subsurface soil.

- Prevent IRM and buried drum area (BDA) soils from causing further groundwater contamination.
- Reduce the concentrations of contaminants in IRM and BDA soils.

Groundwater

- Prevent exposure to contaminated groundwater.
- Prevent migration of the contaminant plume.
- Restore groundwater for future beneficial use.

The remedy selected in the 1992 ROD includes isolating the Aquifer 1 source area, followed by natural attenuation of the underlying Aquifer 2. The purpose of the selected remedy was to address the short-term and long-term threats to groundwater and soils posed by TCE and other contaminants at the Site. The selected remedy included:

IRM Area

- Constructing a containment area using a vertical barrier wall around the IRM to isolate the contaminated soils.
- Dewatering, treatment and off-site discharge of the water within the IRM.
- Removing light non-aqueous phase liquid from within, and adjacent to, the IRM, with off-site incineration.
- If needed, venting IRM soils.
- If needed, extracting and treating Aquifer 1 groundwater outside the IRM, with discharge to surface water.
- If needed, extracting and treating contaminated Aquifer 2 groundwater, with discharge to surface water.

Buried Drum Area (BDA)

- Excavating about 10,000 cubic yards of soil and debris.
- Disposing of debris and soil with high levels of contamination at an off-site landfill.
- Placing soil with low levels of contamination below an extension of the existing IRM cap.
- Constructing a surface water diversion system to prevent infiltration of water into the IRM/BDA cap.

4-Tek Area

- Sampling groundwater twice per year for five years.
- If needed, extracting and treating groundwater on site, with discharge to an on-site surface water body.

Sitewide Actions

- Implementing deed restrictions and institutional controls on land and groundwater use.
- Long-term monitoring of groundwater and surface water.

Off-site Areas

- Long-term monitoring of private drinking water wells.
- Providing an alternative water supply, if needed.
- Long-term monitoring of surface water and groundwater in the southern portion of the Cedar Hills Regional Landfill.

The 1992 ROD did not call for cleanup of Ponds 4, 5 and 6 because the contaminant concentrations did not exceed the cleanup levels established in the ROD. Table 2 presents the maximum contaminant concentrations for BDA soils that were to be left in place. These soil cleanup levels were based on unrestricted land use and were established under the Washington State Model Toxics Control Act (MTCA) Method B, WAC 173-340-740

Table 2: Cleanup Levels for BDA Soils

Soil Contaminant of Concern (COC)	1992 ROD Cleanup Level (milligrams per kilogram (mg/kg))
Arsenic	20 ^a
Cadmium	40
Chromium	400
Lead	250
PCBs (total)	1.0 ^b
PAHs (carcinogenic)	1.0 ^b
Note: a. Background value. b. Practical quantitation limit.	

Table 3 presents the cleanup levels for Aquifer 1 groundwater outside the containment area. These cleanup levels also apply to the shallow groundwater zone at the 4-Tek area. Although Aquifer 1 meets the definition of an underground source of drinking water (40 CFR 144.3), it was not being used as a source of drinking water at the time of the ROD and does not meet the definition of an aquifer used by the Washington State Department of Ecology. Therefore, the 1992 ROD established cleanup levels for Aquifer 1 that will be protective of Aquifer 2 as a drinking water source and represent either the more stringent of levels established under the MTCA Method B or the MCLs and non-zero maximum contaminant level goals (MCLGs). In addition, the 1992 ROD requires institutional controls to restrict the use of on-site untreated groundwater from Aquifers 1 and 2 until cleanup goals are achieved.

Table 3: Cleanup Levels for Aquifer 1 Groundwater

Ground Water COC	1992 ROD Cleanup Level (micrograms per liter (µg/L))
Chromium	80
PCBs (total)	0.01
PAHs (carcinogenic)	0.01
PCE	1
TCE	5
cis-1,2-DCE	70
trans-1,2-DCE	100
Vinyl chloride	0.02

Table 4 presents the cleanup levels for Aquifer 2 groundwater. Aquifer 2 is used off site as a drinking water source. The cleanup levels were determined using the more stringent of either the level established under the Washington State MTCA Method B or the EPA's MCLs and non-zero MCLGs.

Table 4: Cleanup Levels for Aquifer 2 Groundwater

Groundwater COC	1992 ROD Cleanup Level (µg/L)
PCE	1
TCE	5
cis-1,2-DCE	70
trans-1,2-DCE	100
Vinyl chloride	0.02

The 1992 ROD stated that the cumulative risk from all groundwater contaminants (including substances not listed in Tables 3 and 4) must not exceed a cancer risk of 1×10^{-5} or a non-cancer hazard index of 1.0, as required by Washington State's MTCA.

In order to achieve the cleanup objectives established for Aquifer 2 groundwater, the 1992 ROD included the following contingent remedial action:

Three years after construction of the IRM vertical barrier system, an historical and statistical analysis of Aquifer 2 contaminant concentrations will be conducted. If this analysis indicates that contaminant concentrations in Aquifer 2 are not likely to decline to cleanup levels within 10 years after construction of the vertical barrier system, ground-water extraction shall be implemented. The determination as to whether Aquifer 2 cleanup levels are achievable within the required time frame will be made by EPA, in consultation with [the Washington State Department of] Ecology. (p. 94)

Although noting a downward vertical hydraulic gradient that potentially could result in contamination from Aquifer 2 moving to Aquifer 3, the 1992 ROD did not establish cleanup levels or remedial measures for Aquifer 3. Very little characterization of this aquifer occurred during the remedial investigation and, in 1992, the limited data available did not indicate any site-related contamination of Aquifer 3. Data collected during supplemental investigations and subsequent monitoring of wells installed during those investigations have shown TCE and DCE to be present in Aquifer 3.

Institutional controls were required to maintain the integrity of the remedy. Long-term monitoring and institutional controls were required to prevent exposure to on-site contaminated media.

4.2 Remedy Implementation

1985 ROD - Interim Remedial Measure (IRM)

The EPA and the site property owner signed a consent order for the IRM in October 1985. The property owner conducted the IRM in 1986.

Water and sludge in and around Ponds 1, 2 and 3 were excavated until native soil was encountered, and then another foot of native soil under the sludge was also removed. Deeper contaminated soils were left in place. About 23,750 tons of solid waste were stabilized with limestone flour and/or kiln dust and disposed of at a Class I hazardous waste disposal facility in Arlington, Oregon. About 2,000 tons of contaminated water were sent off site for treatment and disposal.

A diversion system was constructed along the northern side of the former ponds to prevent surface water and near-surface water from migrating through the contaminated soils that remained under what used to be Ponds 1, 2 and 3.

The former ponds were capped to prevent precipitation from migrating through the contaminated soils. The former ponds were first filled to grade with clean soil, most of which came from elsewhere on the Site. The cap consists of a silt base, a 30-mil (0.76 millimeter) PVC (polyvinyl chloride) geomembrane, 2 feet of sand, 2 feet of cobbles, 6 inches of silty sand and gravel, 6 inches of sand and gravel, and drainage channels to dewater the soils above the geomembrane. The topmost layer was seeded for erosion control.

Three wells were installed in an area believed to be upgradient of the IRM area. Five wells were installed in an area believed to be downgradient of the IRM area.

The IRM also included removal of some of the Site's buried drums.

Containment Area

A May 1988 consent order required the Site's two PRPs, Queen City Farms, Inc. and Boeing, to undertake a remedial investigation/feasibility study. Pursuant to the 1992 ROD, a consent decree was signed with The Boeing Company in September 1994 to implement the ROD.

In 1988, the PRPs conducted a removal action at the buried drum area (BDA), southwest of the IRM area. BDA material that was suitable for removal was removed and disposed of off-site. Thirty-two over-pack drums and three roll-off truck boxes were used to transport the recovered drums and heavily contaminated soils to an off-site disposal facility. The remaining slightly contaminated soil was stockpiled to be disposed of after completion of the remedial investigation/feasibility study. In 1995, the stockpiled soil (estimated at 7,500 cubic yards) from the BDA and other lightly contaminated soils (estimated at 4,500 cubic yards) from elsewhere around the Site were consolidated at the BDA.

Data from the monitoring well network indicated that the IRM surface water and groundwater diversion system and multilayer cap had not achieved the goal of isolating the contaminated soils from the groundwater. In response, the 1992 ROD called for a vertical barrier wall to be constructed around the IRM and BDA areas. The wall was constructed in 1995-96, is 3 to 4 feet thick and its depth ranges from 38 to 73 feet below ground surface.

In 1996, the cap over the IRM was expanded to include the BDA. After the construction of the barrier wall and the expansion of the containment cap, the combined BDA/IRM areas became known as the final containment cell.

The 1992 ROD also called for removal of light non-aqueous phase liquid (LNAPL) within the containment area and pumping out any water inside the containment area. Extracted groundwater was to be treated on site and then discharged to nearby bodies of surface water. This proved to be impossible after the slurry wall was constructed. The slurry wall intersected a former streambed or other underground channel, which allowed the bentonite slurry to infiltrate Aquifer 1. Subsequent studies determined that it was no longer feasible to dewater the IRM or remove the LNAPL, as these materials were immobilized within the bentonite slurry that saturated most of Aquifer 1 within the containment area.

The air above the containment area was sampled in 1999 to determine if the containment area should be vented. The study concluded that venting the IRM soils was not necessary because the concentrations of VOCs in the samples collected did not exceed background levels.

4-Tek Industries Area

In May 1990, a consent order was signed requiring PRP Queen City Farms, Inc. to undertake removal activities for the contamination associated with 4-Tek Industries. The 8-inch drain pipe, sump and surrounding soils were excavated in 1990. Subsequent

testing revealed that groundwater contamination remained. In 1991, three monitoring wells were installed in the uppermost saturated zone to monitor the groundwater contamination in this area over time.

In March 1994, the EPA issued a unilateral administrative order requiring Queen City Farms, Inc. to develop and implement a field investigation and monitoring work plans for the contamination associated with 4-Tek Industries. In 1994, three additional monitoring wells were installed, this time in Aquifer 2 to determine whether contamination in the uppermost saturated zone had migrated downward and contaminated Aquifer 2. No PCBs or VOCs were detected in Aquifer 2. All of the tested metals were below the EPA's primary MCLs.

Sitewide

All institutional controls, as called for in the 1992 ROD, are in place. Section 6.3 describes the Site's institutional controls.

The EPA issued the Site's Preliminary Close-Out Report on September 9, 1997.

4.3 Operation and Maintenance (O&M)

Groundwater monitoring is conducted twice per year (with the exception of the 4-Tek area) to ensure that the containment area continues to function and to monitor the rate of natural attenuation. Monitoring is conducted in accordance with the 1995 site groundwater and surface water monitoring plan, the 2010 Field Sampling Plan and the 2010 Quality Assurance Project Plan.

As part of the twice per year sampling, Boeing regularly samples the two nearest downgradient residential wells, which serve four residences southwest of the Site. One of these wells draws from Aquifer 2. There are monitoring wells between these drinking water wells and the plume, so contamination would be detected before it reaches the drinking water wells. Contamination from the Site has not exceeded the EPA's MCLs at the residences. Should either of the residential wells become contaminated, alternate water will be provided as called for in the 1994 consent decree. Table 5 presents the annual O&M costs for OU1 over the past five years. The 1992 ROD's O&M cost estimate (\$120,000 per year) was an underestimate.² See, Table 5.

A consent order with King County requires the County to provide EPA with surface and groundwater data collected for the next 30 years from the adjacent Cedar Hills Regional Landfill.

The 4-Tek monitoring wells were originally sampled twice a year, with a plan for groundwater extraction and treatment if VOC contamination is detected above cleanup levels in Aquifer 2. Based on a history of decreasing concentration of contaminants in the uppermost saturated zone, and a lack of contamination in Aquifer 2, the EPA reduced

² The 1992 ROD estimated a 30-year O&M cost of \$1.85 million using a 5 percent discount rate, which corresponds to about \$120,000 per year.

the sampling frequency in 2003 to once every five years. See Section 6.4 for a summary of the latest sampling results.

Table 5: Annual O&M Costs (excluding 4-Tek area)

Year	Total Cost
2008	\$111,000
2009	\$284,000
2010	\$227,000
2011	\$329,000
2012	\$204,000
<i>Note:</i> These O&M costs do not include costs for the 4-Tek area. O&M costs for the 4-Tek area were not available.	

5.0 Progress Since the Last Five-Year Review

The protectiveness statement from the 2008 FYR for the Site stated:

A protectiveness determination of the remedy at Queen City Farms cannot be made at this time until further information is obtained. Further information will be obtained when the following evaluations are completed: containment of groundwater plumes, sufficiency of the monitoring well network and the proposed action to restore groundwater at and outside the conditional point of compliance to productive use. It is expected that these actions will take approximately two years to complete, at which time a protectiveness determination will be made.

The 2008 FYR included five issues and eight recommendations. This report summarizes each recommendation and its current status below (Table 6).

The 2008 FYR identified three major issues: migration of the groundwater plume in the SW corner of the site; non-attainment of 10-year clean-up goals in Aquifer 2; and a lack of information on geochemical properties of Aquifer 2 and 3. To address data gaps, Boeing installed additional wells in Aquifer 3 and 3a. In addition, in October 2012, Boeing conducted a field investigation of the groundwater geochemical properties of Aquifers 2a, 3, 3a and 3. Boeing submitted the results in the Final Monitored Natural Attenuation Data Report to the EPA on February 26, 2013. The report concluded that “Aquifers 2a and 2 are predominantly aerobic environments in which reductive dechlorination is not likely to be a strong mechanism for attenuation of TCE. In contrast, observations in Aquifers 3a and 3 indicate favorable conditions for reductive dechlorination of TCE to cis-1,2-DCE and, locally, evidence of reductive dechlorination of cis-1,2-DCE to VC [vinyl chloride]” (p. 5-1).

In order to address plume migration and non-attainment of 10-year groundwater restoration goals, in December 2012, Boeing and the EPA agreed to undertake a contingent remedial action in the southwest portion of the Aquifer 2 TCE plume near the S-well cluster. Boeing evaluated several remediation technologies and identified extraction and treatment as the most appropriate technology. Boeing submitted the Aquifer 2 Contingent Action Conceptual Design Report to the EPA on June 21, 2013 and is currently developing the engineering design.

Table 6: Progress on Recommendations from the 2008 FYR

Recommendation	Party Responsible	Milestone Date	Action Taken and Outcome	Date of Action
Demonstrate plume containment or take action to contain the groundwater plume.	Boeing	December 2010	Complete. Boeing and the EPA agreed to undertake contingent remedial action in the southwest portion of the Aquifer 2 TCE plume near the S-well cluster.	12/17/2012
Demonstrate sufficiency of the monitoring network or add additional wells to make it adequate.	Boeing	June 2010	Complete. Boeing installed additional monitoring wells.	7/29/2011
Implement either the contingent pump and treat action or an equally effective alternate method.	Boeing	December 2010	Ongoing. Boeing and the EPA agreed to undertake contingent action in the southwest portion of the Aquifer 2 TCE plume near the S-well cluster. Design ongoing.	Ongoing
Evaluate monitoring Aquifer 3 groundwater for geochemical and conventional groundwater parameters.	Boeing	December 2009	Complete. Boeing investigated the groundwater geochemical properties of Aquifers 2a, 2, 3a and 3.	2/23/2013
MW-1: Restore proper access to this well.	Queen City Farms, Inc.	March 2009	Complete. Vegetation was cut back.	11/20/2008
MW-3: Properly close and abandon this well.	Queen City Farms, Inc.	March 2009	Complete. Queen City Farms, Inc. decommissioned MW-3 in November 2008.	11/20/2008
MW-4: Locate well and check for abandonment.	Queen City Farms, Inc.	March 2009	Complete. Queen City Farms, Inc. decommissioned MW-4 in November 2008.	11/20/2008
MW-5: Repair well cap so it can be locked.	Queen City Farms, Inc.	March 2009	Complete. Well cap was repaired	11/20/2008

6.0 Five-Year Review Process

6.1 Administrative Components

EPA Region 10 initiated this FYR in December 2012 and scheduled its completion for September 2013. EPA Remedial Project Manager, Jannine Jennings, led the EPA site review team, which also included EPA hydrogeologist, Marcia Knadle, EPA community involvement coordinator, Wendy Williams, and contractor support provided to the EPA by Skeo Solutions. In May 2013, the EPA met with members of the review team to discuss the Site and items of interest as they related to the protectiveness of the remedy currently in place. The review schedule established consisted of the following activities:

- Community notification.
- Document review.
- Data collection and review.
- Site inspection.
- Local interviews.
- FYR report development and review.

6.2 Community Involvement

On January 8, 2013, the EPA published a public notice in the *Voice of the Valley* newspaper announcing the commencement of the FYR process for the Site, providing contact information for Jannine Jennings and inviting community participation. The press notice is available in Appendix B. No one contacted the EPA as a result of the advertisement.

The EPA will make this final FYR Report available to the public. The EPA will place copies of the document in the designated site repository: EPA Region 10, 1200 Sixth Avenue, Suite 900, Seattle, Washington 98101. Upon completion of the FYR, the EPA will place the final FYR Report in the Site's document repository.

6.3 Document Review

This FYR included a review of relevant, site-related documents, including the RODs, remedial action reports and recent monitoring data. A complete list of the documents reviewed can be found in Appendix A.

ARARs Review

CERCLA Section 121(d)(1) requires that Superfund remedial actions attain “a degree of cleanup of hazardous substance, pollutants, and contaminants released into the environment and of control of further release at a minimum which assures protection of human health and the environment.” The remedial action must achieve a level of cleanup that at least attains those requirements that are legally applicable or relevant and appropriate. Applicable requirements are those cleanup standards, standards of control,

and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, remedial action, location or other circumstance found at a CERCLA site. Relevant and appropriate requirements are those standards that, while not “applicable,” address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Only those state standards that are more stringent than federal requirements may be applicable or relevant and appropriate. To-be-considered criteria are non-promulgated advisories and guidance that are not legally binding, but should be considered in determining the necessary remedial action. For example, to-be-considered criteria may be particularly useful in determining health-based levels where no ARARs exist or in developing the appropriate method for conducting a remedial action.

Chemical-specific ARARs are health- or risk-based numerical values or methodologies which, when applied to site-specific conditions, result in the establishment of numerical values. These values establish an acceptable amount or concentration of a chemical that may remain in, or be discharged to, the ambient environment. Examples of chemical-specific ARARs include maximum contaminant levels (MCLs) under the federal Safe Drinking Water Act and ambient water quality criteria enumerated under the federal Clean Water Act.

Action-specific ARARs are technology- or activity-based requirements or limits on actions taken with respect to a particular hazardous substance. These requirements are triggered by a particular remedial activity, such as discharge of contaminated groundwater or in-situ remediation.

Location-specific ARARs are restrictions on hazardous substances or the conduct of the response activities solely based on their location in a special geographic area. Examples include restrictions on activities in wetlands, sensitive habitats and historic places.

Remedial actions are required to comply with the ARARs identified in the ROD. When reviewing the ARARs during this FYR, only those ARARs that address the protectiveness of the remedy were reviewed.

Groundwater ARARs

According to the 1992 ROD, cleanup goals for groundwater were based on the more stringent of either Washington state’s MTCA Method B Groundwater Cleanup Standards based on a human health carcinogenic risk level of 1×10^{-6} and a noncancer threshold of 1.0 or the EPA’s MCLs and non-zero MCLGs. In addition, according to MTCA Method B, if the MCL is within the 1×10^{-5} site-wide cancer risk threshold, then MTCA Method B defaults to the MCL unless there are multiple carcinogens encountered together in an exposure medium. For example, the 1×10^{-6} Method B level for TCE is 0.54 $\mu\text{g/L}$ while the value based on a noncancer threshold of 1.0 is 4 $\mu\text{g/L}$. Since the MCL of 5 $\mu\text{g/L}$ is below the 1×10^{-5} site-wide cancer risk threshold, the cleanup goal defaults to the noncancer-based Method B value of 4 $\mu\text{g/L}$ to ensure protectiveness for noncancer effects.

Table 7 compares the groundwater cleanup levels from the 1992 ROD against the current MCLs/MCLGs and the current Method B groundwater levels. The derivation of the current MTCA Method B levels based on a human health carcinogenic risk level of 1×10^{-6} and a noncancer threshold of 1.0 were determined using the Cleanup Levels and Risk Calculation (CLARC) tool, a searchable database developed and maintained by the Washington State Department of Ecology (Ecology) accessed at the website: (<https://fortress.wa.gov/ecy/clarc/Reporting/ChemicalQuery.aspx>). The Method B groundwater levels from the CLARC database is presented in Appendix F.

The 1992 ROD cleanup levels for TCE and cis-1,2-DCE are the same as the current MCLs. However, the current Method B groundwater levels for these two contaminants of concern (COCs) are now more stringent than the 1992 ROD cleanup levels. Also, the current Method B groundwater level for chromium (VI) is slightly more stringent than the 1992 ROD's groundwater cleanup level for total chromium. The historical annual monitoring reports prepared in 2008 and 2009 indicate that the valence of chromium has not been differentiated. However, the only time chromium appears to be detected in groundwater is during the winter where spikes of chromium are observed in the perched aquifer, Aquifer 1, and not in the underlying Aquifer 2. This phenomenon suggests that chromium is entering the perched aquifer as a result of recharge from the Queen City Lake during the winter months and not from historical sources. Turbid conditions are often present in the lake during the winter months, which is most likely the source of naturally occurring chromium in Aquifer 1 since chromium is not observed in Aquifer 2. Thus the mechanism for chromium transport into the perched aquifer supports the conclusion that the chromium is unlikely to be present in the hexavalent form. Further, hexavalent would not be expected since iron bearing metals present in the aquifers support abiotic degradation. Based on current site conditions, the 1992 ROD's groundwater cleanup level for total chromium continues to be protective.

Table 7: ARAR Review for Groundwater COCs

Contaminant of Concern	1992 ROD Cleanup Level (µg/L)	Current MCL (µg/L) ^a	Current Method B Cleanup Level (µg/L) ^b	Is the Current ARAR More Stringent than the 1992 ROD Cleanup Level?
Chromium	80 ^c	100	Chromium (III): 24,000 Chromium (VI): 48	No - based on Chromium (III) Yes – based on Chromium (VI)
PCBs (total)	0.01 ^c	0.5	0.044	No
PAHs (carcinogenic)	0.01 ^c	0.2	0.012	No
PCE	1 ^c	5	21	No
TCE	5 ^d	5	4	Yes
cis-1,2-DCE	70 ^d	70	16	Yes
trans-1,2-DCE	100 ^d	100	160	No
Vinyl chloride	0.02 ^c	2	0.029	No

Notes:

- The current MCLs were obtained at <http://water.epa.gov/drink/contaminants/index.cfm> (accessed 5/21/2013). The current non-zero MCLGs were not more stringent than the current MCLs.
- The more stringent of the cancer and noncancer-based Method B cleanup levels is presented based on Equations 720-1 and 720-2, available at <http://apps.leg.wa.gov/WAC/default.aspx?cite=173-340> (accessed 7/3/2013). See Appendix F for more information.
- The 1992 ROD cleanup level was calculated based on risk, using MTCA Method B.
- The 1992 ROD cleanup level was the EPA’s MCL or non-zero MCLG.

Soil ARARs

The 1992 ROD established cleanup levels for six soil COCs based on MTCA Method B guidelines except for four of the COCs where the cleanup levels were taken from the table of Method A soil cleanup standards for unrestricted land use in Washington State’s MTCA. The EPA calculated the other two soil cleanup levels using the risk-based MTCA Method B formula. MTCA Method A values are now available for all six soil COCs. Therefore, Table 8 compares the soil cleanup levels from the 1992 ROD against the current MTCA Method A soil cleanup standards.

The Method B soil cleanup standards for PCBs and PAHs have become more stringent since the cleanup levels were established in the 1992 ROD. Also, the current Method B cleanup level for chromium (VI) is more stringent than the 1992 ROD cleanup level for total chromium. However, the 1992 ROD cleanup levels remain protective because soils contaminated by PCBs and PAHs are contained under a cap, and therefore, there is no risk of exposure. The current Method B soil values are included in Appendix F.

Table 8: ARAR Review for Soil COCs

Contaminant of Concern	1992 ROD Cleanup Level (mg/kg)	Current Method B Standard (mg/kg) ^a	Is the Current ARAR More Stringent than the 1992 ROD Cleanup Level?
Arsenic	20 ^b	20 ^d	No
Cadmium	40	NA	NA
Chromium	400	Chromium (III): 12,000 ^d Chromium (VI): 240 ^d	No - based on Chromium (III) Yes – based on Chromium (VI)
Lead	250 ^c	250	No
PCBs (total)	1.0 ^c	0.5	Yes
PAHs (carcinogenic)	1.0 ^c	0.14	Yes

Notes:

- a. The current Method B standards were obtained from the CLARC data base selecting Method B standard values for unrestricted use unless otherwise noted (<https://fortress.wa.gov/ecy/clarc/Reporting/ParameterQuery.aspx>)(accessed 9/3/2013).
 - b. The 1992 ROD cleanup level came from the MTCA’s table of Method A cleanup levels, and is the background level for arsenic.
 - c. The 1992 ROD cleanup level was the Method A health--based value in absence of a Method B value.
 - d. Since previous cleanup level was based on background a Method B soil cleanup level is not provided since cleanup .
 - e. Value is the practical quantitation limit.
- NA = Method A or Method B direct contact value not available, however, EPA has published a residential value of 70 mg/kg based on a HI of 1.0, which is less stringent than the cleanup level.

Institutional Controls Review

All required institutional controls are in place. Table 9 summarizes the status of institutional controls at the Site. Figure 6 is a map showing the areas of the Site with land use restrictions.

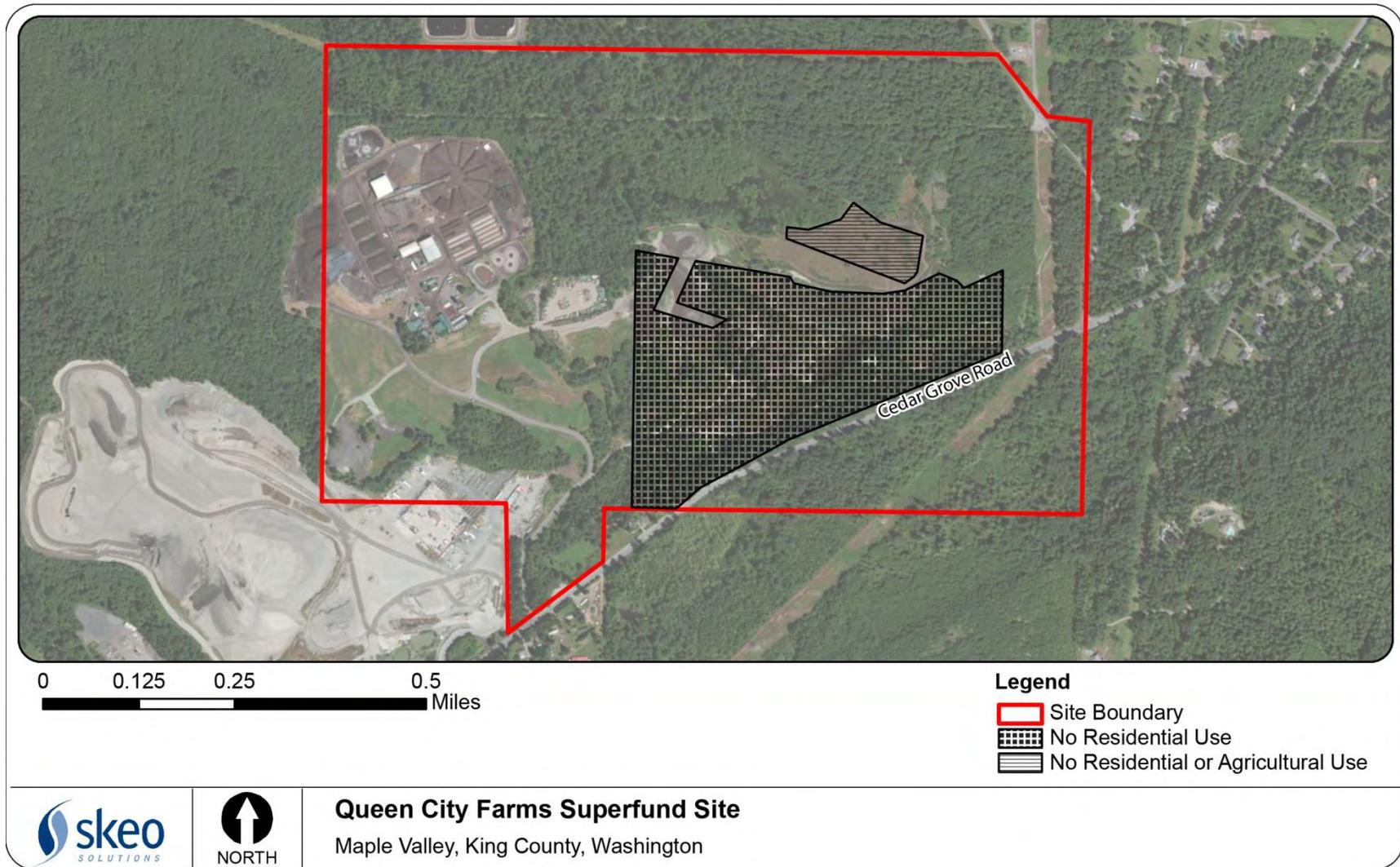
Under Section VIII of Administrative Order No. 1094-03-09-106, Queen City Farms, Inc. was required to put in place “restrictive covenants which will run with the land.” The 1992 ROD called for institutional controls to:

- Notify potential purchasers that the land was used to manage hazardous waste.
- Restrict groundwater use until cleanup goals are achieved.
- Protect groundwater monitoring facilities.
- Restrict land use in the IRM area.

Table 9: Institutional Control (IC) Summary Table

Medium	ICs Needed?	ICs Called for in the Decision Documents?	Impacted Parcel	IC Objective from 1992 ROD	Instrument in Place	Notes
Operable Unit 1 (Queen City Farms property)						
Ground Water	Yes	Yes	2823069009	Restrict use of on-site untreated groundwater from Aquifers 1 and 2 until cleanup goals are achieved.	2002 covenant prohibits extracting water on the property until cleanup goals are achieved.	Although the plume extends across the site property's northern boundary, onto the Cedar Hills Regional Landfill, ICs are not needed for the landfill property given the current and future land use of the landfill and the landfill's required groundwater monitoring.
Soil	Yes	Yes	2823069009	Restrict land use in IRM area.	2002 Memorandum of Agreement prohibits residential and agricultural use of certain areas (see Figure 6).	none
Operable Unit 2 (Former 4-Tek Industries area)						
Ground Water	Yes	Yes	2823069009	Restrict use of on-site untreated groundwater from Aquifers 1 and 2 until cleanup goals are achieved.	2002 Memorandum of Agreement prohibits extracting water on the property until cleanup goals are achieved.	none
Soil	No	No	none	none	none	none

Figure 6: Land Use Restrictions Map



Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding the EPA's response actions at the Site.

Restrictive covenants have been implemented on the Site, primarily to prevent unauthorized extraction of groundwater and to prevent disturbance of any of the equipment used to implement or maintain the remedy. The “Memorandum of Agreement and Declaration of Covenants Running with the Land” was recorded April 17, 2002, as Recording No. 20020417001877 of Official Records. After a November 2007 title search revealed an error, the PRPs corrected the error using documents recorded with King County on September 10, 2008, under Recording Nos. 20080910000133 and 20080910000134. The Memorandum of Agreement and the correction documents are available as part of the Site administrative record.

The Memorandum of Agreement includes covenants that prohibit:

- Activities that would damage the final containment cell.
- Extraction of groundwater.
- Residential land use in a defined “area of contamination” of about 70 acres.
- Residential and agricultural land use in the IRM area, the “expanded IRM area” and the buried drum area

Currently, the Site’s environmental covenants do not require assessment of vapor intrusion prior to future development.

6.4 Data Review

Annual and semiannual groundwater monitoring at the site has been performed since 1997. In preparing the Site's monitoring plan, the data for all COCs was evaluated a subset determined to be appropriate for inclusion in the long-term monitoring plan. Based on evaluations of the collected data, modifications to the sampling network, sampling frequency and sampled analytes have been revised. In 2011 Boeing conducted an optimization analysis of the monitoring network. As a result of this analysis, EPA approved additional changes to the sampling plan. Boeing currently monitors OU1 groundwater twice per year for VOCs. Queen City Farms, Inc. monitors OU2 (4-Tek area) groundwater once every five years for VOCs and total manganese. This FYR reviewed the most recent available monitoring reports for OU1 (2012 Annual Groundwater Monitoring Data Report, Landau Associates, April 1, 2013) and OU2 (4-Tek Industries Groundwater Monitoring Results, April 2013 Sampling Event, Landau Associates, June 17, 2013).

OU1 Groundwater

Most Aquifer 1 monitoring wells were properly abandoned after contamination was no longer detected in Aquifer 1. One Aquifer 1 monitoring well (E-1) continues to be sampled annually for VOCs; VOCs have not been detected in that well over the past 10 years. E-1 is frequently dry and unable to be sampled. The spring sampling events are the most likely to have water levels between 23 and 28 feet. During this review, it was noted that there are several substances for which cleanup levels exist for Aquifer 1 that are not currently being monitored. It is recommended that EPA review the Aquifer 1 data and evaluate whether additional substances should be analyzed.

The magnitude of the Aquifer 2 TCE plume has generally declined since 1997 (see Figure 7). However, the current remedy has not prevented migration of the TCE plume and the 10-year restoration goal for TCE in Aquifer 2 has not been met (Figure 9).

During the Site's initial investigations, no site-related contamination was detected in Aquifer 3, so no cleanup levels were set for Aquifer 3 in the ROD. However, TCE is now present in Aquifer 3a at levels above the Aquifer 2 cleanup level (Figure 9). The source of this contamination is the Aquifer 2 plume TCE. However, according to Boeing's February 26, 2013 Final Monitored Natural Attenuation Data Report, Aquifers 3a and 3 have favorable conditions for reductive dechlorination of VOCs (and thus natural attenuation). Also, beginning in 2001, expansion of the southwestern edge of the Aquifer 2 TCE plume has been documented. Therefore, Boeing and the EPA have agreed to undertake a contingent groundwater extraction and treatment action in the southwest portion of the Aquifer 2 TCE plume near the S-well cluster. An Engineering Design Report for the action is currently being developed by Boeing. In addition, both Aquifer 2 and Aquifer 3 will continue to be monitored and assessed for trends in contaminant concentrations.

As shown in Figure 8, the Aquifer 2 TCE plume extends across the site's northern boundary, onto the Cedar Hills Regional Landfill. Although the plume extends south of Cedar Grove Road, it remains within the site's southern boundary.

OU2 (4-Tek Area) Groundwater

VOC concentrations in the Aquifer 1 wells (MW-1 and MW-2) have declined greatly since the source removal was conducted in 1991 (see Figures 5 and 10). In the April 2013 sampling event, PCE at MW-2 was below the performance standard, the concentrations of VOCs continue to decline in MW-1 and MW-2. However, PCE was detected in MW-1 at 29 µg/L (above its cleanup level of 1 µg/L). Vinyl chloride was not detected in any of the wells except MW-2 at 1.3 µg/L (above its cleanup level of 0.02 µg/L). During the 2008 sampling event, vinyl chloride was not detected in MW 2. The concentrations of PCE and vinyl chloride may indicate degradation of VOCs. VOCs have not been detected in the Aquifer 2 wells (MW-5 and MW-6). High levels of manganese were detected in the shallow groundwater and in Aquifer 2. EPA will continue to track these concentrations during upcoming sampling events.

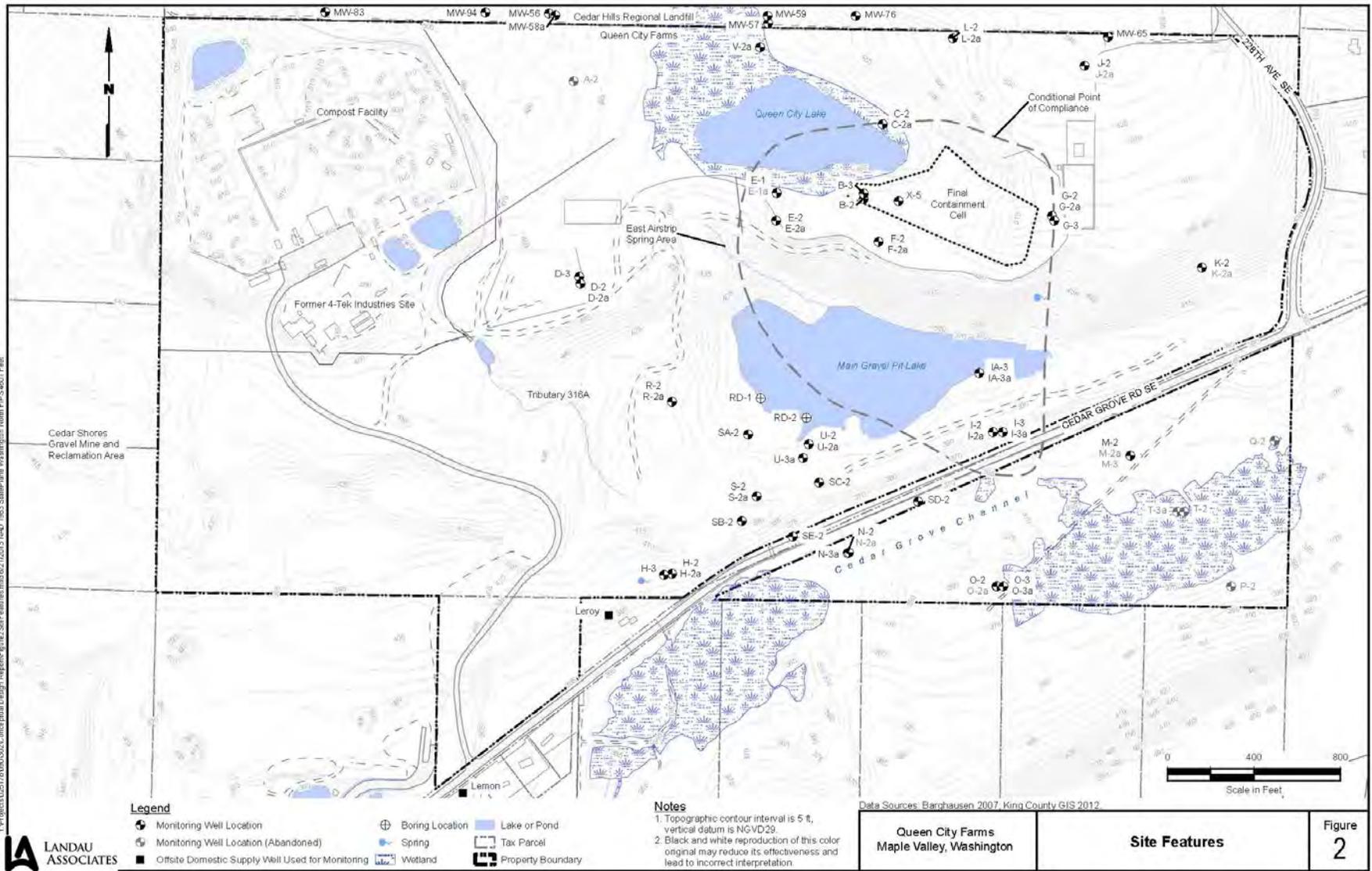
The VOC plume at the 4-Tek area is very shallow (about 15 feet deep) and is near buildings (see Figure 5). However, these buildings are open on one side, so vapor intrusion is not currently a concern. In order to ensure protectiveness in the long term, a vapor intrusion assessment should be conducted.

Private Potable Wells

Twice per year, Boeing samples the two private residential drinking water wells that were determined to be at greatest risk. These wells are south of the Site, along Cedar Grove Road. In 1991, TCE was detected in one of the residential wells at a concentration of 0.3 µg/L, which is well below the EPA's MCL of 5 µg/L. Site-related contaminants have not been detected in either of the two private wells in the past 15 years.

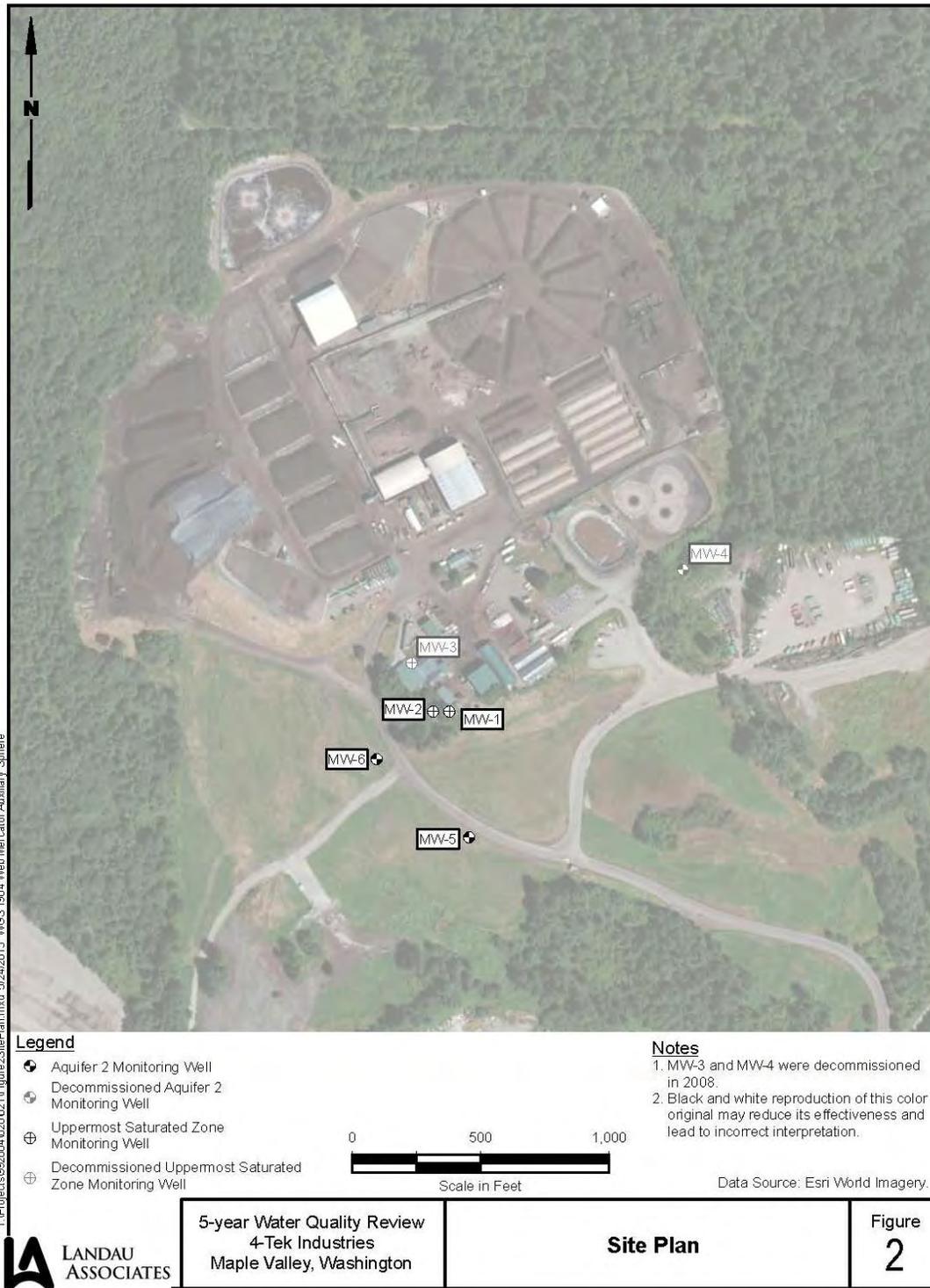
Additional properties, south of the Site, have been developed since the last evaluation of area water supply wells was conducted in 1989. Since VOCs are still present in site groundwater near the southern boundary, Boeing evaluated and sampled additional off-site water supply wells from 2011 to 2013. The 2011-2013 evaluation found that the Site's groundwater contamination is not affecting residents near the Site's southern boundary.

Figure 4: OU1 Monitoring Well Map



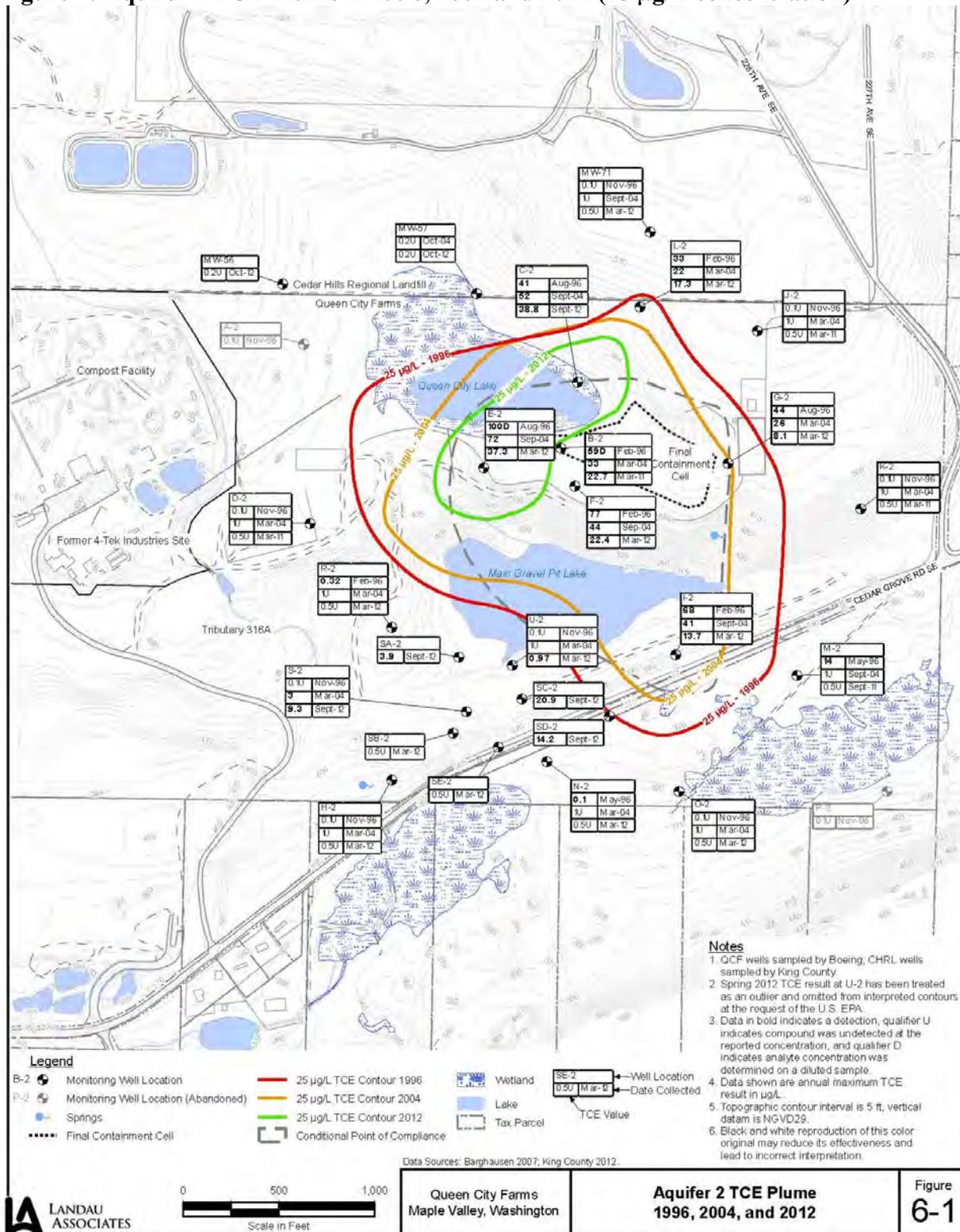
Source: Aquifer 2 Contingent Action Conceptual Design Report, Landau Associates, June 21, 2013

Figure 5: OU2 (4-Tek Area) Monitoring Well Map



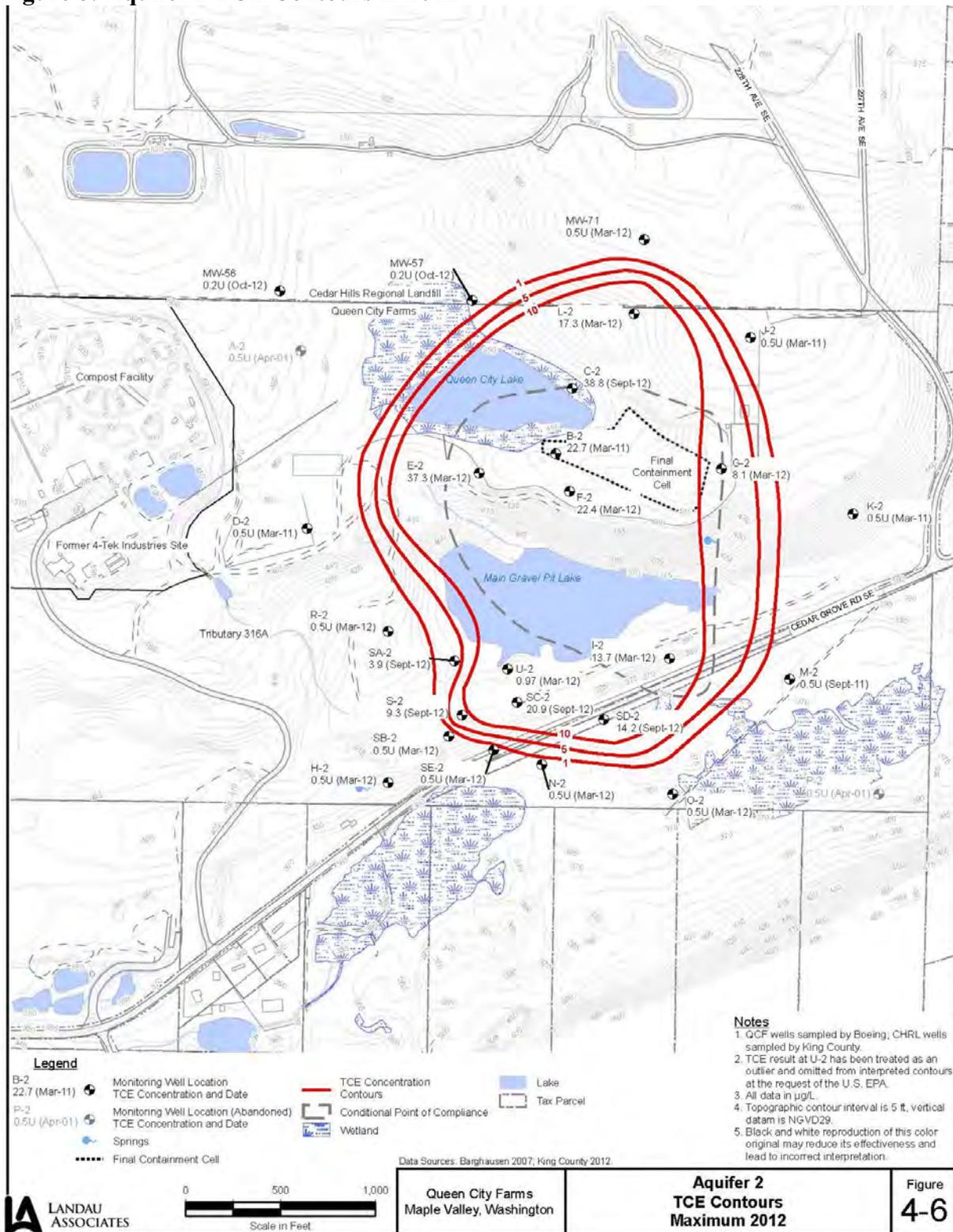
Source: 4-Tek Industries Groundwater Monitoring Results, April 2013 Sampling Event, Landau Associates, June 17, 2013

Figure 7: Aquifer 2 TCE Plume in 1996, 2004 and 2012 (25 µg/L concentration)



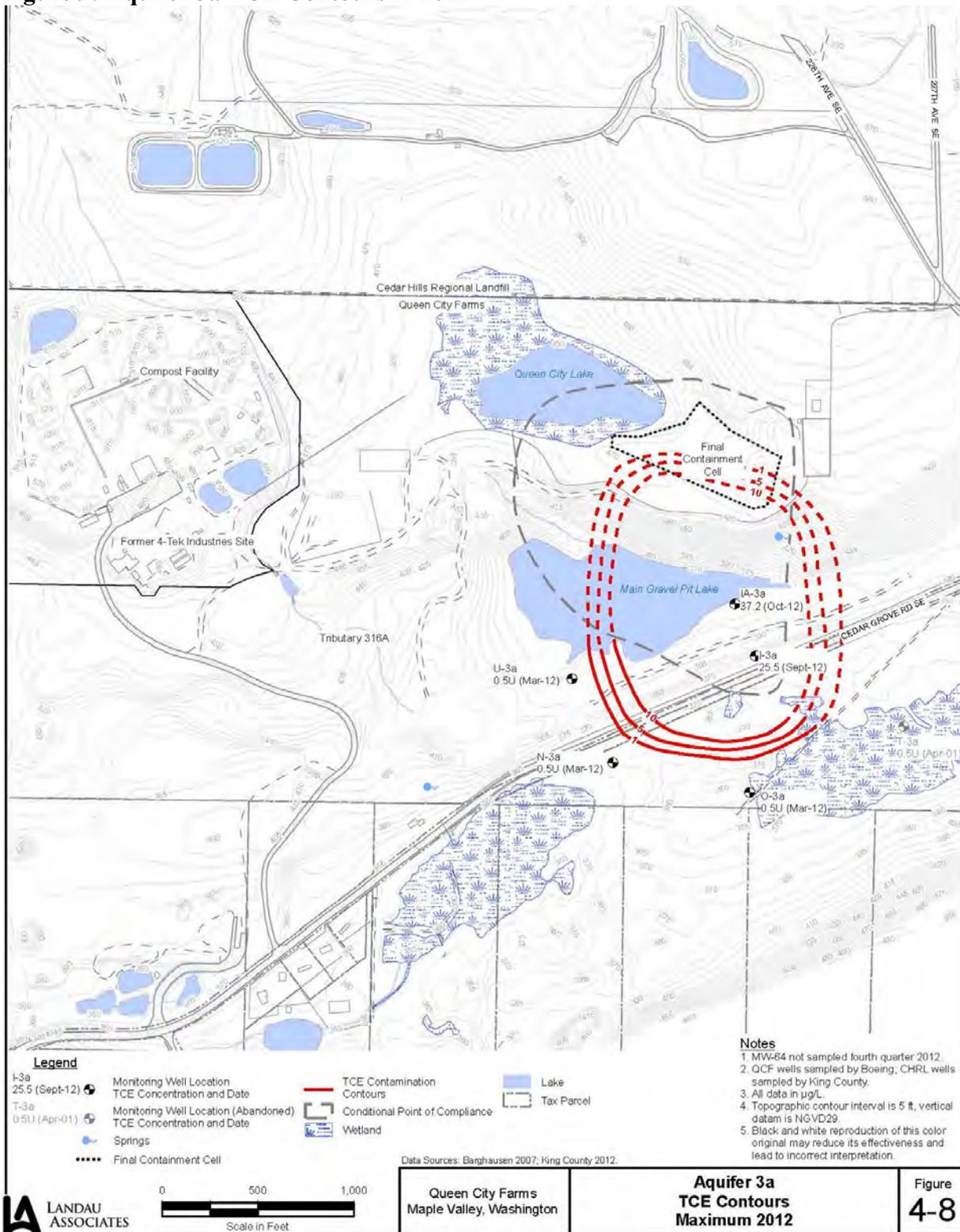
Source: 2012 Annual Groundwater Monitoring Data Report, Landau Associates, April 1, 2013

Figure 8: Aquifer 2 TCE Contours in 2012



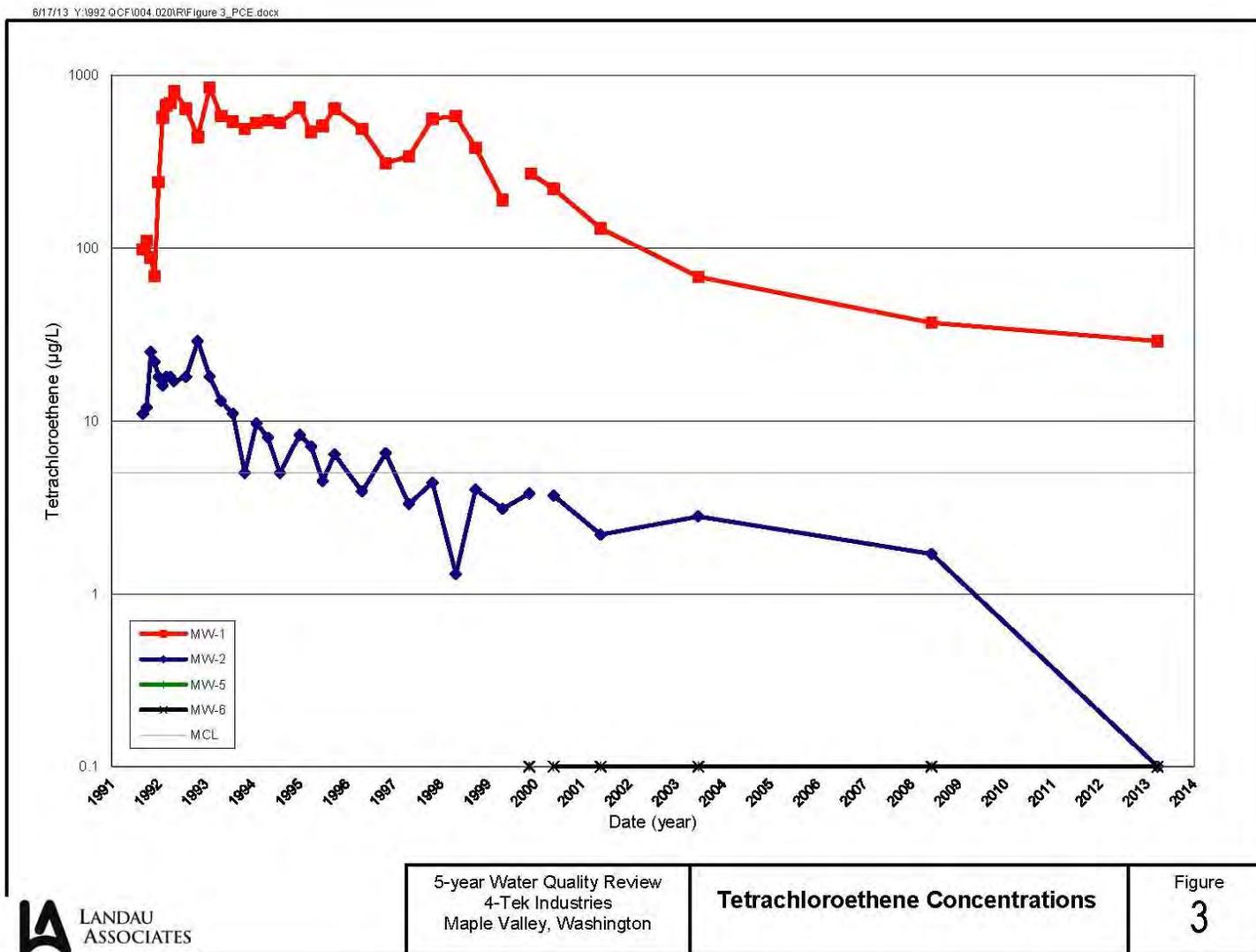
Source: 2012 Annual Groundwater Monitoring Data Report, Landau Associates, April 1, 2013

Figure 9: Aquifer 3a TCE Contours in 2012



Source: 2012 Annual Groundwater Monitoring Data Report, Landau Associates, April 1, 2013

Figure 10: PCE Concentrations at the 4-Tek Area



Source: 4-Tek Industries Groundwater Monitoring Results, April 2013 Sampling Event, Landau Associates, June 17, 2013

6.5 Site Inspection

On May 21, 2013, Jannine Jennings and Marcia Knadle (EPA), Gene Freeman (Washington State Department of Ecology), Eric Weber and Lauren Knickrehm (PRP contractor Landau Associates), Joe Flaherty (Boeing) and Treat Suomi (Skeo Solutions) conducted the FYR site inspection. The site inspection participants met at the Site's northern entrance gate, near the Cedar Hills Regional Landfill, and discussed the items needed to complete the FYR. Participants discussed the Site's history and the status of the contingency remedy that has been triggered and planned the walking tour of the Site. Participants also discussed the current status of institutional controls at the Site.

Participants inspected the final containment cell area, the cap, the perimeter drainage system (including culverts) and the monitoring wells in the upper (northern) portion of the Site. The culvert that acts as an outflow from Queen City Lake was overgrown with blackberries but the culvert appeared clear of debris. Several electrical or control type boxes were seen in the capped area; Landau Associates is going to follow up to determine what they are and whether they need to be removed. They were likely associated with the early efforts to extract and treat groundwater in the final containment cell.

A depression area was observed and determined to be the former location of extraction well X-1. Although the capped area was mostly vegetated and well maintained, there were some bare areas on the capped final containment cell. Landau Associates is checking to confirm whether these areas are early signs of possible erosion on the capped area.

Participants continued to the lower part of the Site where the composting business was observed as well as additional groundwater monitoring wells. The team looked at newly installed wells and the proposed location of the extraction wells and water treatment plant. While walking to the Main Gravel Pit Lake, EPA observed and documented eroded areas on the southeastern edge of the upper (northern) portion of the Site. It appears that off-road vehicles are used outside the fence, near the edge of the final containment cell and that they are causing erosion on the hillside.

Site inspection participants then inspected the 4-Tek area monitoring wells. See Appendix D of this FYR Report for the completed site inspection checklist.

Contractor staff took photographs of site features, ongoing industrial operations at the compost facility, groundwater monitoring wells and other remedial features. See Appendix E for photographs taken during the FYR site inspection.

Also on May 21, 2013, Jannine Jennings and Marcia Knadle (EPA) and Treat Suomi (Skeo Solutions) visited the information repository for the Site at the Maple Valley Public Library, located at 21844 Southeast 248th Street, Maple Valley, Washington 98038. A librarian indicated that the library no longer has copies of site information. Due to the Site's proximity to the Region 10's office and the general lack of public interest regarding the Site, a decision has been made to relocate the Site information repository to

the Region 10 office at 1200 Sixth Ave, Seattle, approximately 20 miles northwest of the Site.

6.6 Interviews

The FYR process included interviews with parties affected by the Site, including the current landowners and regulatory agencies that were involved in site activities or were aware of the Site. The purpose of the interviews was to document the perceived status of the Site and any perceived problems or successes with the phases of the remedy implemented to date. Key interviews are summarized below. Appendix C provides the complete interviews.

Eugene Freeman: Eugene Freeman is a hydrogeologist with the Washington State Department of Ecology. His overall impression of the remediation work is positive, and he believes the remedial activities effectively eliminated the majority of the contaminant source. Mr. Freeman expressed confidence in the sentinel well monitoring program which detects plume migration of the remaining contamination and in the institutional controls at the Site. Mr. Freeman expressed confidence in the overall management of remedial activities and monitoring at the Site. However, he did note that contaminant concentrations in groundwater under the northern portion of the Site remain high and wondered if additional extraction in this area may be helpful in reducing contaminant levels. He has not received any complaints regarding the Site.

Steve Banchemo: Steve Banchemo represents Queen City Farms, Inc., one of the PRPs for the Site. Mr. Banchemo believes the remedy is generally working as intended. He has not received any complaints or serious inquiries about the Site. He is aware of periodic off-site sampling in two wells, and reported that both wells tested clean. Mr. Banchemo also feels adequately informed about remedial activities on the Site. He did not have any further suggestions or recommendations.

Eric Weber: Eric Weber represents Landau Associates, the O&M contractor for both OU1 and OU2. The two Site PRPs separately hire Landau Associates to assist as the O&M contractor for the two separate OUs. Mr. Weber completed two interviews, one for each of the PRPs.

OU1 (Boeing)

Mr. Weber believes remediation of OU1 is performing extremely well. Though plume remediation has occurred at a slower rate than anticipated, Mr. Weber's belief is that overall control of the source contamination is successful given the site's complex hydrogeological setting. He reported that trichloroethene and cis-1,2-dichloroethene concentrations in Aquifer 2 are steadily declining, according to monitoring reports. O&M will address any reported anomalies in concentration trends with focused characterization and targeted cleanup actions. Mr. Weber mentioned a few updates regarding O&M activities, primarily the installation of additional monitoring wells. Additionally, the O&M contractor made improvements to a half dozen wells around Aquifer 2 after Boeing submitted a well optimization analysis in March 2011.

OU2 (Queen City Farms)

His interview specifically pertained to the remedy on the 4-Tek portion of the Site. Mr. Weber stated that the remedy is appropriate and successful. He specified that groundwater concentrations of VOCs are declining consistently, and monitoring data show the historical contamination is not affecting regional groundwater aquifers. He mentioned that the initial release from the facility was relatively small and has been controlled so impacts are localized and the remedy does not impact reuse of a portion of the Site as a composting facility. Currently, groundwater monitoring occurs every five years. Mr. Weber recommends that monitoring continue at that frequency.

Joseph Flaherty: Joseph Flaherty represents The Boeing Company, one of the PRPs for the site. He believes containment of the source contamination and monitored natural attenuation of the groundwater plume performs as designed. Mr. Flaherty reported that COC levels in the groundwater plume are steadily decreasing and remain confined to the property boundaries of the site, despite remediation occurring at a slower rate than the Consent Decree originally envisioned. He mentioned that construction of the final containment cell contributes to the steady decline of COC levels. Overall, he is satisfied with the remedial activities and the performance of the O&M teams.

7.0 Technical Assessment

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

No. The most highly contaminated soils and debris were removed from the Site. A cap was constructed to cover remaining contaminants in the containment area. These measures removed the contaminated surface soils and prevent exposure to the subsurface soil. The cap and vertical barrier wall are successfully keeping the contaminants within the final containment cell from acting as a source of contamination to groundwater. The groundwater plume extends across the Site property's northern boundary, onto the Cedar Hills Regional Landfill. The plume remains within the Site property's southern boundary.

However, the current remedy has not prevented migration of the TCE plume and the 10-year restoration goal for TCE in Aquifer 2 has not been met. Therefore, PRP Boeing and the EPA have agreed to undertake the contingent groundwater extraction and treatment action outlined in the ROD in the southwest portion of the Aquifer 2 TCE plume near the S-well cluster. An Engineering Design Report for the action is currently being developed by Boeing. Also, TCE is now present in Aquifer 3a at levels above the Aquifer 2 cleanup level and Aquifer 2 is the source of Aquifer 3 contamination. However, according to Boeing's February 26, 2013 Final Monitored Natural Attenuation Data Report, Aquifers 3a and 3 have favorable conditions for reductive dechlorination of VOCs (and thus natural attenuation).

Site-related groundwater contamination is not affecting groundwater users near the Site. None of the nearby public water systems have been impacted by the Site, based on previous site investigations and a 2013 search of the Washington state Department of Health's Sentry database.³ Twice per year, Boeing samples the two private residential drinking water wells that were determined to be at greatest risk. In 1991, TCE was detected in one of the residential wells at a concentration of 0.3 µg/L, which is well below the EPA's MCL of 5 µg/L. VOCs have not been detected in either of the two private wells in the past 15 years. During 2011-2013, Boeing evaluated and sampled additional off-site water supply wells because properties south of the Site have been developed since the previous evaluation in 1989 and because VOCs are still present in groundwater on the site property near its southern boundary. The 2011-2013 evaluation found that the Site's groundwater contamination is not affecting residents near the Site's southern boundary.

Sampling at OU2 (4-Tek Area) indicates that contaminant levels are declining and there is no observed migration of VOCs to Aquifer 2. Sampling will continue to be monitored to ensure the remedy continues to function as intended.

The Site's PRPs (Queen City Farms and Boeing) have recorded restrictive covenants that prohibit activities that would damage the final containment cell, extraction of groundwater, and residential and agricultural land uses on specified areas of the Site.

³ The Sentry database (available at <https://fortress.wa.gov/doh/eh/portal/odw/si/Intro.aspx>) was searched on July 4, 2013, for wells in township 23, range 06E, sections 27, 28 and 33.

Although the plume extends across the site property's northern boundary, onto the Cedar Hills Regional Landfill, a separate monitoring and clean-up plan are in place at that site and all monitoring data is provided to EPA pursuant to a consent order with the EPA.

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

Yes. Washington State's Method B soil cleanup standards (for unrestricted use) for PCBs and PAHs have become more stringent since the cleanup levels were established in the 1992 ROD while a Method B value is no longer available for cadmium. Based on a comparison with the EPA's current screening level for residential soil (70 mg/kg based on non-carcinogenic properties), the cadmium soil cleanup level selected in the ROD (40 mg/kg) is still protective. The PCB, PAH and chromium (VI) soil cleanup levels selected in the 1992 ROD also remain protective since the impacted soils remain contained by a cover and are not available for exposure.

Washington State's Method B groundwater cleanup levels for TCE and cis-1,2-DCE have become more stringent since the cleanup levels were established in the 1992 ROD. This does not affect current protectiveness because people are not exposed to the contaminated groundwater and restrictive covenants prevent future exposure. However, to ensure long-term protectiveness, it may be helpful to consider more recent toxicity information for TCE and cis-1,2-DCE during implementation of the groundwater extraction and treatment action.

The Site's other soil and groundwater cleanup levels are still valid, based on a comparison to current ARARs.

The 1992 ROD stated that the cumulative risk from all groundwater contaminants (including substances without cleanup concentrations established in the ROD) must not exceed a cancer risk of 1×10^{-5} or a non-cancer hazard index of 1.0, as required by Washington State's MTCA. The EPA will ensure that this cleanup level is met before ending the Site's groundwater cleanup.

The 1992 ROD did not call for cleanup of Ponds 4, 5 and 6 because the contaminant concentrations did not exceed the cleanup levels. This decision is still protective, based on a comparison of sampling data from the 1992 ROD against current soil ARARs.

The VOC plume at the 4-Tek area is very shallow (about 15 feet deep) and is near buildings (see Figure 5). However, these buildings are open on one side, so vapor intrusion is not currently a concern. To ensure long term protectiveness, a vapor intrusion assessment should be conducted.

Overall, the RAOs and the exposure assumptions are still valid. The 1992 ROD established soil cleanup standards based on unrestricted use. As discussed above, the PAH soil cleanup level is now protective for industrial use, but not residential use. This is

not a concern because the Site's restrictive covenants prohibit residential use at the soil cleanup area.

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

No. The May 2013 FYR site inspection found that off-road vehicles are causing erosion outside the fence, near the edge of the cap on the final containment cell.

1,4-dioxane, a contaminant that is often present when other VOCs are present, has not been detected at the Site. It was last monitored for in August 2005 in several wells (C-2, E-2, H-2a, I-2, and I-3a). There were no detections.

7.4 Technical Assessment Summary

The soil component of the remedy is functioning as intended. However, natural attenuation of the groundwater plume in Aquifer 2 has not been as successful as expected, so site PRP Boeing will implement the contingent remedy of active groundwater extraction and treatment. All necessary institutional controls have been implemented so Site-related groundwater contamination is not affecting groundwater users near the Site. The potential for vapor intrusion has not been assessed. Currently, there are no enclosed buildings near the Site's VOC plumes; however, future development may occur near the plumes. Off-road vehicles are causing erosion near the edge of the cap on the final containment cell.

8.0 Issues

Table 10 summarizes the current site issues.

Table 10: Current Site Issues

Issue	Affects Current Protectiveness?	Affects Future Protectiveness?
The current MNA remedy will not achieve remedial action objectives in a reasonable timeframe	No	Yes
The potential for vapor intrusion has not been assessed. Currently, there are no enclosed buildings near the Site's VOC plumes; however, future development may occur near the plumes.	No	Yes

9.0 Recommendations and Follow-up Actions

Table 11 provides recommendations to address the current site issues.

Table 11: Recommendations to Address Current Site Issues

Issue	Recommendation / Follow-Up Action	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness?	
					Current	Future
Reasonable progress towards attainment of remedial action objectives has not been achieved through implementation of MNA remedy: Aquifer 2 plume has migrated and 10 year TCE cleanup goals have not been met.	Implement the contingent remedy for Aquifer 2.	Boeing	EPA	9/30/2015	No	Yes
The potential for vapor intrusion has not been assessed. Currently, there are no enclosed buildings near the Site's VOC plumes; however, future development may occur near the plumes.	Assess the potential for vapor intrusion.	Boeing, Queen City Farms, Inc.	EPA	9/30/2014	No	Yes

The following items do not affect the Site's protectiveness, but warrant additional follow-up:

- Off-road vehicles are causing erosion near the edge of the cap on the final containment cell. The PRP should address trespassing to prevent damage to the cap.
- The list of substances monitored in Aquifer 1, OU1, should be evaluated to determine if all substances of concern are being sampled.

10.0 Protectiveness Statements

Operable Unit 1 (containment area and associated groundwater plume)

The remedy at OU1 currently protects human health and the environment because contaminated surface soils have been removed, contaminated subsurface soils are capped, exposure pathways to the groundwater contamination are being controlled, and covenants are in place to restrict land and groundwater use. However, in order for the remedy to be protective in the long term, the following actions need to be taken to ensure protectiveness:

- Implement the contingent groundwater extraction and treatment action.
- Assess the potential for vapor intrusion.

Operable Unit 2 (former 4-Tek Industries area)

The remedy at OU2 currently protects human health and the environment because contaminated soils and debris were removed, exposure pathways to the groundwater contamination are being controlled, and groundwater monitoring is being conducted to ensure that the groundwater contamination does not migrate into Aquifer 2. However, in order for the remedy to be protective in the long term, the potential for vapor intrusion needs to be assessed.

Sitewide

The Site's remedy currently protects human health and the environment because contaminated surface soils have been removed, contaminated subsurface soils are capped, exposure pathways to the Site's groundwater contamination are being controlled, and covenants are in place to restrict land and groundwater use. However, in order for the remedy to be protective in the long term, the following actions need to be taken to ensure protectiveness:

- Implement the contingent groundwater extraction and treatment action.
- Assess the potential for vapor intrusion.

11.0 Next Review

The next FYR will be due within five years of the signature/approval date of this FYR.

Appendix A: List of Documents Reviewed

2008 Annual Monitoring Data Report for Queen City Farms, King County, Washington. Prepared by EcoChem, Inc. and the Boeing Company. October 2009.

2009 Annual Monitoring Data Report for Queen City Farms, King County, Washington. Prepared by EcoChem, Inc. and the Boeing Company. October 2010.

2011 Annual Monitoring Data Report for Queen City Farms, King County, Washington. Prepared by Landau Associates, Inc. December 21, 2012.

2012 Annual Monitoring Data Report for Queen City Farms, King County, Washington. Prepared by Landau Associates, Inc. April 1, 2013.

4-Tek Industries Groundwater Monitoring Results from June 2008 Sampling Event, Landau Associates, Aug. 2008.

Aquifer 2 Contingent Action Conceptual Design Report for Queen City Farms Superfund Site. Prepared by Landau Associates. June 21, 2013.

Baseline Risk Assessment Addendum for Queen City Farms Remedial Investigation. Prepared by Landau Associates, Inc. July 31, 1992.

Cedar Hills Regional Landfill Quarterly Environmental Monitoring Report; King County, December 2012.

Cedar Hills Regional Landfill Quarterly Environmental Monitoring Report; King County. Prepared by Engineering Services Section Solid Waste Division. April 2, 2012.

Cedar Hills Regional Landfill Area 5 Top Deck Monitoring Report; King County, May 2013

Cedar Hills Regional Landfill Quarterly Environmental Monitoring Report. First Quarter 2013. Prepared by King County Department of Natural Resources and Parks. March 2013.

Final Evaluation of Remediation Technologies for Queen City Farms. Prepared by Landau Associates. April 4, 2013.

Final Monitored Natural Attenuation Data Report for Queen City Farms. Prepared by Landau Associates. February 26, 2013.

Long Term Groundwater Monitoring Plan for Queen City Farms Superfund Site. Prepared by EcoChem, Inc. October 22, 2010.

Offsite Well Evaluation Report for Queen City Farms. Prepared by Landau Associates. February 5, 2013.

Record of Decision. Prepared by EPA Region 10. June 29, 1993.

Record of Decision. Prepared by EPA Region 10. October 24, 1985.

Third Five-Year Report for the Queen City Farms Superfund Site. Prepared by EPA Region 10. September 29, 2008.

Appendix B: Press Notice



We Want Your Input on the Queen City Farms Superfund Site Cleanup in Maple Valley, WA

The U.S. Environmental Protection Agency (EPA) is preparing a Five-Year Review of the Queen City Farms Superfund Site on Cedar Grove Road in Maple Valley, Washington. The EPA reviews cleanups at Superfund sites every five years to make sure the cleanup continues to protect people and the environment.

The 324-acre site includes two areas of contamination:

- The former waste pond and buried drum area was the most contaminated area at the site. The EPA monitors groundwater contamination in this area twice a year.
- The former processing area had less contamination. Groundwater at this area is monitored every five years.

During the initial cleanup, EPA removed contaminated soil and sludge from the site and constructed a barrier wall and protective cap to contain groundwater and soil beneath the former pond area. This fourth Five-Year Review, which will be completed later this year, will assess whether the soil and groundwater cleanup at the Queen City Farms site continues to protect people and the environment.

You Can Get Involved!

EPA welcomes your participation during our review. If you have information that may help us, contact Jannine Jennings, EPA Remedial Project Manager, at jennings.jannine@epa.gov or 800-424-4372, ext. 2724 or 206-553-2724 before February 15, 2013.

For more information about the cleanup at Queen City Farms see:

<http://go.usa.gov/gH9Q>

TDD/TDY users may call the Federal Relay Service at 1-800-877-8339 and give the operator Jannine Jennings' phone number.

Appendix C: Interview Forms

Queen City Farms Superfund Site

Five-Year Review Interview Form

Site Name: Queen City Farms

EPA ID No.: WAD980511745

Subject Name: Steve Banchemo

Affiliation: Emerald Services, Inc.

Subject Contact Information: steveb@emeraldnc.com

Time: 3:45 p.m.

Date: 06/13/13

Interview Location: Office

Interview Format (circle one): In Person Phone Mail Other: **Email**

Interview Category: **Site Owner and PRP**

1. What is your overall impression of the remedial activities at the Site?

The current remedy, monitored natural attenuation, is generally working as intended.

2. What have been the effects of the Site on the surrounding community, if any?

None to my knowledge, with the possible exception of periodic off-site sampling at two domestic wells. Both of these wells are clean.

3. What is your assessment of the current performance of the remedy in place at the Site?

The current remedy, monitored natural attenuation, is generally working as intended.

4. Are you aware of any complaints or inquiries regarding environmental issues or the remedial action from residents since implementation of the cleanup?

No.

5. Do you feel well-informed regarding the Site's activities and remedial progress? If not, how might the EPA convey site-related information in the future?

I am generally comfortable with the remedial progress. I feel that there is adequate information for me to become more informed if I need to.

6. Do you have any comments, suggestions or recommendations regarding the management or operation of the Site's remedy?

No.

Site Name: Queen City Farms **EPA ID No.:** WAD980511745
Subject Name: Chris Bellovary **Affiliation:** EPA Region 10
Subject Contact Information: 206-553-2723; bellovary.chris@epa.gov
Time: 7:45 a.m. **Date:** 06/18/2013
Interview Location: EPA Region 10 Seattle Office

Interview Format (circle one): In Person Phone Mail **Other: Email**

Interview Category: **EPA Remedial Project Manager**

1. What is your overall impression of the project, including cleanup, maintenance and reuse activities (as appropriate)?

When I took over management of the Site, I had concerns about whether the remedy was properly protective, and if we had fully characterized the Site. As a result, I started working with the PRP to gather more information with which to determine whether additional actions would be necessary. The PRP was initially highly resistant to the idea, but as we started gathering more data, began to understand that better characterization, adjustments to the remedy decision, and additional work would need to occur.

At the time I left the project, it was unclear whether the ROD would need a ROD Amendment or an Explanation of Significant Differences. At that time, a ROD Amendment appeared to be more likely, but we were still gathering data and looking at our options, so it was still too early to have a fully informed decision.

Part of the Site is being actively used by Cedar Grove Composting, and discussed an expansion of that operation to the east with the landowner, over which I felt would be an acceptable plan. My only real concerns with reuse activities were: (a) how changes in surface use would affect groundwater movement; and (b) since we were still in the process of determining how best to adjust the remedy to be properly protective, we would want to avoid reuse plans that would conflict with viable strategies for adjusting the remedy.

2. What have been the effects of the Site on the surrounding community, if any?

In the past decade, the surrounding community has seen little impact from the Site. Drinking water from two houses southwest of the Site is monitored twice a year, but contaminants have not been detected in either well. FYRs were conducted in 2003 and 2008, which generated some inquiries from people who recently moved to the area and had not previously been aware of the Site, but little interest.

3. Are you aware of any complaints or inquiries regarding site-related environmental issues or remedial activities since the implementation of the cleanup?

In November 2009, I had a few conversations with a nearby resident, who did not previously know about the Site. Her concern was over a natural spring on her property, as she and her horse had lived there for 20 years, and her horse had recently become sick and died. We had several conversations, but her property is upgradient from the Site in terms of groundwater

flow, east of where Aquifer 2 pinches off, located at a higher elevation than the Site, with clean perimeter wells between the contamination and her house. CHRL monitors the community water system that services her house, and I reviewed that data as well.

The only other questions from the public that I can recall came from real estate agents who were selling houses in the area, who wanted to know more about the Site.

4. What is your assessment of the current performance of the remedy in place at the Site?

Although there are no open exposure routes to contaminants at this time, additional action will be necessary to ensure the Site remains protective of human health and the environment.

5. Are you comfortable with the status of the institutional controls at the Site? If not, what are the associated outstanding issues?

Yes.

6. Are you aware of any community concerns regarding the Site or the operation and management of its remedy? If so, please provide details.

No.

7. Do you have any comments, suggestions or recommendations regarding the management or operation of the Site's remedy?

I have not been keeping up with the reports or data from the Site over the past eight months, but I understand that a remedy is being fashioned for the southwestern expansion of the plume, and additional wells are being placed to characterize and monitor the contamination in Aquifer 3/3a, which were my main areas of concern when I left the Site.

Site Name: Queen City Farms **EPA ID No.:** WAD980511745
Subject Name: Eugene Freeman **Affiliation:** Washington Department of Ecology

Subject Contact Information: Eufr461@ecy.wa.gov
Time: 2:00 p.m. **Date:** 06/11/2013
Interview Location: Bellevue, WA

Interview Format (circle one): In Person Phone Mail **Other: Email**

Interview Category: State Agency

1. What is your overall impression of the project, including cleanup, maintenance and reuse activities (as appropriate)?

The initial cleanup to date appears to have effectively eliminated the majority of the contaminant source and contained the remaining contamination. Migration in groundwater and lower than expected product degradation has allowed contamination to reach site boundaries at concentrations above the cleanup levels. The monitoring program and sentinel wells have provided adequate coverage to detect plume migration. The plan to install a series of extraction wells to address plume migration appears to be an adequate response.

2. What is your assessment of the current performance of the remedy in place at the Site?

The remedy has worked well to remove the major contamination and monitor the performance at the Site.

3. Are you aware of any complaints or inquiries regarding site-related environmental issues or remedial activities from residents in the past five years?

No, I am not aware of any complaints at the Site.

4. Has your office conducted any site-related activities or communications in the past five years? If so, please describe the purpose and results of these activities.

No, to my knowledge the Washington state Department of Ecology has not conducted any site-related activities or communications.

5. Are you aware of any changes to state laws that might affect the protectiveness of the Site's remedy?

No, I am not aware of any changes to state law that would affect the protectiveness at the Site.

6. Are you comfortable with the status of the institutional controls at the Site? If not, what are the associated outstanding issues?

Yes, I am comfortable with the current institutional controls at the Site.

7. Are you aware of any changes in projected land use(s) at the Site?

I am not aware of any changes in land use at the Site.

8. Do you have any comments, suggestions or recommendations regarding the management or operation of the Site's remedy?

No, the management and operation of the remedy seems appropriate and remains effective. Although, contaminant concentrations to the north, where the buried drum area was located, remain high. Would an effort to remediate closer to the higher concentration area be effective in reducing contamination before it can migrate further downgradient.

Site Name: Queen City Farms EPA ID No.: WAD980511745
Subject Name: Jannine Jennings Affiliation: EPA
Subject Contact Information: Jennings.Jannine@epa.gov
Time: 8:00 a.m. Date: 06/12/13
Interview Location: Seattle Office
Interview Format (circle one): In Person Phone Mail Other: **Email**

Interview Category: **EPA Remedial Project Manager**

1. What is your overall impression of the project, including cleanup, maintenance and reuse activities (as appropriate)?

The Site has been well managed and the PRPs have taken responsibility to address the problems. Over the last five years, several studies have been conducted to better understand the contamination at the Site such that a targeted contingent pump-and-treat system can be employed. Boeing is currently designing treatment targeting plume migration. A large quadrant of the Site is being used for a composting facility. This reuse does not appear to interfere with the ongoing groundwater plume or its remediation.

2. What have been the effects of the Site on the surrounding community, if any?

No visible evidence of effects stemming from contamination. The presence of the large composting facility on site likely has both positive and negative effects on the community typical of that type of operation. I am not familiar with the extent to which the large open space has affected the community.

3. Are you aware of any complaints or inquiries regarding site-related environmental issues or remedial activities since the implementation of the cleanup?

No. I have not received any inquiries. There was no response to the public notice of the FYR.

4. What is your assessment of the current performance of the remedy in place at the Site?

The remedy is working. The surface soils appear to have been remediated and the containment cell serving its intended purpose. Groundwater cleanup may not be as quick as originally suggested. Some migration of the plume center to the southwest has occurred but overall groundwater concentrations are decreasing throughout the Site. Some of the contamination appears to have been pushed into Aquifer 3 – an area that could be of concern if it does not readily break down through natural processes.

5. Are you comfortable with the status of the institutional controls at the Site? If not, what are the associated outstanding issues?

Yes.

6. Are you aware of any community concerns regarding the Site or the operation and management of its remedy? If so, please provide details.

No.

7. Do you have any comments, suggestions or recommendations regarding the management or operation of the Site's remedy?

Need to continue to pursue targeted treatment of southwest portion of plume, watch the TCE levels in Aquifer 3, and watch TCE levels on north side of the Site to determine if natural attenuation continues to bring groundwater down to cleanup levels.

The Site currently provides some great wetland and wildlife habitat. Much of the Site could be reused for other purposes without interfering with ongoing remedial action. The site property owner has some interests in future use – this should be encouraged.

Site Name: Queen City Farms EPA ID No.: WAD980511745
Subject Name: Eric Weber Affiliation: Landau Associates
Subject Contact Information: eweber@landauinc.com
Time: 3:30 p.m. Date: 06/13/13
Interview Location: Office
Interview Format (circle one): In Person Phone Mail Other: **Email**

Interview Category: O&M Contractor (Queen City Farms)

All answers below refer to the remedy at the 4-Tek portion of the Site, as opposed to the larger site remedy.

1. What is your overall impression of the project, including cleanup, maintenance and reuse activities (as appropriate)?

I think the remedy is appropriate. There was a reported small release at the Site. Source control has been completed and there is localized groundwater contamination in the shallow water bearing zone that is being addressed by natural attenuation. Since the release was small and localized, the remedy does not impact reuse of a portion of the Site as a composting facility.

2. What is your assessment of the current performance of the remedy in place at the Site?

Groundwater concentrations are declining consistent with source control and natural attenuation.

3. What are the findings from the monitoring data? What are the key trends in contaminant levels that are being documented over time at the Site?

Key findings are:

- The historical release is not affecting the regional groundwater aquifer.
- Maximum concentrations have declined on a consistent basis at the two wells that had VOC detections. VOCs are now only above performance standards at MW-2, which is located near the source removal area.

4. Is there a continuous on-site O&M presence? If so, please describe staff responsibilities and activities. Alternatively, please describe staff responsibilities and the frequency of site inspections and activities if there is not a continuous on-site O&M presence.

No, there is not a continuous on-site O&M presence. Groundwater sampling only occurs every five years so the only O&M necessary is to keep the wells clear. This was done adequately over the last five years.

5. Have there been any significant changes in site O&M requirements, maintenance schedules or sampling routines since startup or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.

Sampling frequency has been modified a few times. Since 2008, sampling frequency has been changed from every year to every five years. Two wells have been abandoned. These changes were approved by the EPA.

6. Have there been unexpected O&M difficulties or costs at the Site since startup or in the last five years? If so, please provide details.

No.

7. Have there been opportunities to optimize O&M activities or sampling efforts? Please describe changes and any resulting or desired cost savings or improved efficiencies.

Yes. Please see the answer to question # 5.

8. Do you have any comments, suggestions or recommendations regarding O&M activities and schedules at the Site?

In our five-year monitoring report that will be issued to the EPA on June 18, we recommended continuing five-year monitoring.

Queen City Farm Superfund Site**Five-Year Review Interview Form**Site Name: Queen City Farms

EPA ID No.: WAD980511745

Subject Name: Eric WeberAffiliation: Landau Associates for The Boeing CompanySubject Contact Information: 253-926-2493. eweber@landauinc.comTime: Not applicableDate: 07/24/13Interview Location: Via emailInterview Format (circle one): In Person Phone eMail Other:Interview Category: O&M Contractor (Boeing)

1. What is your overall impression of the project, including cleanup, maintenance and reuse activities (as appropriate)?

Overall, I think the project has been successful.

2. What is your assessment of the current performance of the remedy in place at the Site?

The remedy is performing well. Source control and remediation has gone extremely well. Plume remediation is going slower than originally predicted however in hindsight, the initial predications were overly optimistic and plume concentration declines are in line with current expectations. There are a few anomalies in plume concentration trends, however these anomalies are likely the result of a complex hydrogeologic setting and are being addressed by focused characterization and contingent cleanup actions.

3. What are the findings from the monitoring data? What are the key trends in contaminant levels that are being documented over time at the Site?

The key trends in monitoring data are the steady decline in trichloroethene and cis-1,2-dichloroethene concentrations in Aquifer 2. The broad area of decline is indicative of successful source control and remediation and effective natural attenuation processes within the plume.

4. Is there a continuous on-site O&M presence? If so, please describe staff responsibilities and activities. Alternatively, please describe staff responsibilities and the frequency of site inspections and activities if there is not a continuous on-site O&M presence.

O&M activities are shared between Boeing and Landau personnel. The primary activities are: annual inspection and repair of the security fence, annual inspection of the Final Containment Cell cap and drain system, biannual brush clearing, and semiannual groundwater level and quality monitoring.

5. Have there been any significant changes in site O&M requirements, maintenance schedules or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.

There haven't been any significant changes with the exception of installation of additional monitoring wells to address specific data gaps such as in the "S" and "I" well areas.

6. Have there been unexpected O&M difficulties or costs at the Site since start-up or in the last five years? If so, please provide details.

No.

7. Have there been opportunities to optimize O&M activities or sampling efforts? Please describe changes and any resulting or desired cost savings or improved efficiencies.

Yes. Boeing submitted an optimization analysis of Aquifer 2 monitoring data in March 2011. Based on this analysis, EPA approved optimization of the monitoring network that affected about a half dozen wells.

8. Do you have any comments, suggestions or recommendations regarding O&M activities and schedules at the Site.

No.

Queen City Farm Superfund Site

Five-Year Review Interview Form

Site Name: Queen City Farms

EPA ID No.: WAD980511745

Subject Name: Joseph Flaherty

Affiliation: The Boeing Company

Subject Contact Information: Email and phone

Time: Not applicable

Date: 06/18/2013

Interview Location: Via email

Interview Format (circle one): In Person Phone Mail Other:

Interview Category: Potentially Responsible Parties (PRPs)

1. What is your overall impression of the remedial activities at the Site?

Overall, I am satisfied with the remedial activities at the Queen City Farms Superfund Site. I think we have a really excellent team in place, both from a regulatory and a PRP standpoint.

2. What have been the effects of this Site on the surrounding community, if any?

The contaminants of concern (COCs) have remained within the property boundaries of the Site, so I do not believe there have been any effects on the surrounding community.

3. What is your assessment of the current performance of the remedy in place at the Site?

I am pleased with the current performance of the remedy at the Site. Since the construction of the Final Containment Cell, we have seen a steady decline in COC levels at a majority of the groundwater monitoring well locations throughout the Site.

4. Are you aware of any complaints or inquiries regarding environmental issues or the remedial action from residents since implementation of the cleanup?

No, I am not aware of any complaints or inquiries regarding environmental issues or the remedial action from residents since implementation of the cleanup.

5. Do you feel well-informed regarding the Site’s activities and remedial progress? If not, how might EPA convey site-related information in the future?

Yes, I feel well-informed regarding the Site’s activities and remedial.

6. Do you have any comments, suggestions or recommendations regarding the management or operation of the Site’s remedy?

I believe the remedy in place at the Site, containment of the source and monitored natural attenuation of the groundwater plume, is working as designed. COC levels in the groundwater plume are steadily decreasing and remain confined to the property boundaries of the site. Good progress towards pulling the plume to within the bounds of the Conditional Point of Compliance has been made. Though this has been progressing at a slower rate than was envisioned at the

time the Consent Decree was written, I think the remedy we have in place is working and will continue to perform as designed for years to come.

Appendix D: Site Inspection Checklist

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST																	
I. SITE INFORMATION																	
Site name: Queen City Farms	Date of inspection: May 21, 2013																
Location and Region: Maple Valley, Washington EPA Region 10	EPA ID: WAD980511745																
Agency, office, or company leading the five-year review: EPA Region 10	Weather/temperature: Overcast and intermittent rain/54°F																
Remedy Includes: (Check all that apply) <table style="width: 100%; border: none;"> <tr> <td><input checked="" type="checkbox"/> Landfill cover/containment</td> <td><input checked="" type="checkbox"/> Monitored natural attenuation</td> </tr> <tr> <td><input type="checkbox"/> Access controls</td> <td><input checked="" type="checkbox"/> Groundwater containment</td> </tr> <tr> <td><input checked="" type="checkbox"/> Institutional controls</td> <td><input checked="" type="checkbox"/> Vertical barrier walls</td> </tr> <tr> <td><input type="checkbox"/> Groundwater pump and treatment</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Surface water collection and treatment</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Other _____</td> <td></td> </tr> </table>		<input checked="" type="checkbox"/> Landfill cover/containment	<input checked="" type="checkbox"/> Monitored natural attenuation	<input type="checkbox"/> Access controls	<input checked="" type="checkbox"/> Groundwater containment	<input checked="" type="checkbox"/> Institutional controls	<input checked="" type="checkbox"/> Vertical barrier walls	<input type="checkbox"/> Groundwater pump and treatment		<input type="checkbox"/> Surface water collection and treatment		<input type="checkbox"/> Other _____					
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<input type="checkbox"/> Groundwater pump and treatment																	
<input type="checkbox"/> Surface water collection and treatment																	
<input type="checkbox"/> Other _____																	
Attachments: <input checked="" type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached																	
II. INTERVIEWS (Check all that apply)																	
1. O&M site manager <table style="width: 100%; border: none;"> <tr> <td style="width: 30%;"></td> <td style="width: 30%; text-align: center;">_____</td> <td style="width: 30%; text-align: center;">_____</td> <td style="width: 10%; text-align: center;"><u>mm/dd/yyyy</u></td> </tr> <tr> <td></td> <td style="text-align: center;">Name</td> <td style="text-align: center;">Title</td> <td style="text-align: center;">Date</td> </tr> <tr> <td>Interviewed <input type="checkbox"/> at site</td> <td><input type="checkbox"/> at office</td> <td><input type="checkbox"/> by phone</td> <td>Phone no. _____</td> </tr> <tr> <td colspan="4">Problems, suggestions; <input type="checkbox"/> Report attached _____</td> </tr> </table>			_____	_____	<u>mm/dd/yyyy</u>		Name	Title	Date	Interviewed <input type="checkbox"/> at site	<input type="checkbox"/> at office	<input type="checkbox"/> by phone	Phone no. _____	Problems, suggestions; <input type="checkbox"/> Report attached _____			
	_____	_____	<u>mm/dd/yyyy</u>														
	Name	Title	Date														
Interviewed <input type="checkbox"/> at site	<input type="checkbox"/> at office	<input type="checkbox"/> by phone	Phone no. _____														
Problems, suggestions; <input type="checkbox"/> Report attached _____																	
2. O&M staff <table style="width: 100%; border: none;"> <tr> <td style="width: 30%;"></td> <td style="width: 30%; text-align: center;">_____</td> <td style="width: 30%; text-align: center;">_____</td> <td style="width: 10%; text-align: center;"><u>mm/dd/yyyy</u></td> </tr> <tr> <td></td> <td style="text-align: center;">Name</td> <td style="text-align: center;">Title</td> <td style="text-align: center;">Date</td> </tr> <tr> <td>Interviewed <input type="checkbox"/> at site</td> <td><input type="checkbox"/> at office</td> <td><input type="checkbox"/> by phone</td> <td>Phone no. _____</td> </tr> <tr> <td colspan="4">Problems, suggestions; <input type="checkbox"/> Report attached _____</td> </tr> </table>			_____	_____	<u>mm/dd/yyyy</u>		Name	Title	Date	Interviewed <input type="checkbox"/> at site	<input type="checkbox"/> at office	<input type="checkbox"/> by phone	Phone no. _____	Problems, suggestions; <input type="checkbox"/> Report attached _____			
	_____	_____	<u>mm/dd/yyyy</u>														
	Name	Title	Date														
Interviewed <input type="checkbox"/> at site	<input type="checkbox"/> at office	<input type="checkbox"/> by phone	Phone no. _____														
Problems, suggestions; <input type="checkbox"/> Report attached _____																	
3. Site Consultant <table style="width: 100%; border: none;"> <tr> <td style="width: 30%;"></td> <td style="width: 30%; text-align: center;"><u>Eric Weber</u></td> <td style="width: 30%; text-align: center;"><u>Principal Hydrogeologist</u></td> <td style="width: 10%; text-align: center;"><u>05/21/2013</u></td> </tr> <tr> <td></td> <td style="text-align: center;">Name</td> <td style="text-align: center;">Title</td> <td style="text-align: center;">Date</td> </tr> <tr> <td>Interviewed <input type="checkbox"/> at site</td> <td><input type="checkbox"/> at office</td> <td><input type="checkbox"/> by phone</td> <td>Email. <u>eweber@landauinc.com</u></td> </tr> <tr> <td colspan="4">Problems, suggestions; <input type="checkbox"/> Report attached _____</td> </tr> </table>			<u>Eric Weber</u>	<u>Principal Hydrogeologist</u>	<u>05/21/2013</u>		Name	Title	Date	Interviewed <input type="checkbox"/> at site	<input type="checkbox"/> at office	<input type="checkbox"/> by phone	Email. <u>eweber@landauinc.com</u>	Problems, suggestions; <input type="checkbox"/> Report attached _____			
	<u>Eric Weber</u>	<u>Principal Hydrogeologist</u>	<u>05/21/2013</u>														
	Name	Title	Date														
Interviewed <input type="checkbox"/> at site	<input type="checkbox"/> at office	<input type="checkbox"/> by phone	Email. <u>eweber@landauinc.com</u>														
Problems, suggestions; <input type="checkbox"/> Report attached _____																	

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

Agency Washington Department of Ecology
 Contact Eugene Freeman Title _____ Date 6/11/2013 Phone No. _____
 Name _____ Title _____ Date _____ Phone No. _____
 Problems; suggestions; Report attached

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

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

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

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

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

Steve Banchemo, Emerald Services, Inc. (representing PRP Queen City Farms, Inc.)

Jannine Jennings, EPA remedial project manager

Chris Bellovary, former EPA remedial project manager

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

1. **O&M Documents**

<input checked="" type="checkbox"/> O&M manual	<input checked="" type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
<input type="checkbox"/> As-built drawings	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
<input checked="" type="checkbox"/> Maintenance logs	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A

Remarks: _____

2. **Site-Specific Health and Safety Plan** Readily available Up to date N/A

Contingency plan/emergency response plan Readily available Up to date N/A

Remarks: _____

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

Remarks: _____

4.	Permits and Service Agreements	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
	<input type="checkbox"/> Air discharge permit			
	<input type="checkbox"/> Effluent discharge	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
	<input type="checkbox"/> Waste disposal, POTW	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
	<input type="checkbox"/> Other permits _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
	Remarks: _____			
5.	Gas Generation Records	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
	Remarks: _____			
6.	Settlement Monument Records	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
	Remarks: _____			
7.	Groundwater Monitoring Records	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
	Remarks: _____			
8.	Leachate Extraction Records	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
	Remarks: _____			
9.	Discharge Compliance Records			
	<input type="checkbox"/> Air	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
	<input type="checkbox"/> Water (effluent)	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
	Remarks: _____			
10.	Daily Access/Security Logs	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
	Remarks: <u>Access to the containment area of the Site is restricted with a padlocked fence, and the keys are kept by the responsible parties. Access is limited to maintenance, monitoring, and inspections.</u>			
IV. O&M COSTS				
1.	O&M Organization			
	<input type="checkbox"/> State in-house	<input type="checkbox"/> Contractor for State		
	<input checked="" type="checkbox"/> PRP in-house	<input checked="" type="checkbox"/> Contractor for PRP		
	<input type="checkbox"/> Federal Facility in-house	<input type="checkbox"/> Contractor for Federal Facility		
	<input type="checkbox"/> _____			

2. **O&M Cost Records**

Readily available Up to date

Funding mechanism/agreement in place Unavailable

Original O&M cost estimate \$120,000/year Breakdown attached

Total annual cost by year for review period if available

From 1/1/2008	To 12/31/2008	<u>\$111,000</u>	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From 1/1/2009	To 12/31/2009	<u>\$284,000</u>	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From 1/1/2010	To 12/31/2010	<u>\$227,000</u>	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From 1/1/2011	To 12/31/2011	<u>\$329,000</u>	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	
From 1/1/2012	To 12/31/2012	<u>\$204,000</u>	<input type="checkbox"/> Breakdown attached
Date	Date	Total cost	

3. **Unanticipated or Unusually High O&M Costs During Review Period**
Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS Applicable N/A

A. Fencing

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

B. Other Access Restrictions

1. **Signs and other security measures** Location shown on site map N/A
Remarks: Warning signs are located on the roadside gate to the fence as well as along the fence line. It appears that the warning signs are being maintained.

C. Institutional Controls (ICs)			
1. Implementation and enforcement			
Site conditions imply ICs not properly implemented	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A
Site conditions imply ICs not being fully enforced	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A
Type of monitoring (e.g., self-reporting, drive by) <u>Self-Reporting</u>			
Frequency <u>Main Containment Area: 2/year; 4-Tek Industries Area: 1/5years</u>			
Responsible party/agency <u>Main Contaminant Area: The Boeing Company; 4-Tek Industries Area: Queen City Farms, Inc.</u>			
Contact	_____	<u>mm/dd/yyyy</u>	_____
Name	Title	Date	Phone no.
Reporting is up-to-date	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Reports are verified by the lead agency	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Specific requirements in deed or decision documents have been met	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
Violations have been reported	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A
Other problems or suggestions: <input type="checkbox"/> Report attached			
2. Adequacy	<input checked="" type="checkbox"/> ICs are adequate	<input type="checkbox"/> ICs are inadequate	<input type="checkbox"/> N/A
Remarks:			
D. General			
1. Vandalism/trespassing	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No vandalism evident	
Remarks: <u>Multiple indications of trespassing were identified outside the fenced-in containment area.</u>			
2. Land use changes on site	<input checked="" type="checkbox"/> N/A		
Remarks:			
3. Land use changes off site	<input checked="" type="checkbox"/> N/A		
Remarks: _____			
VI. GENERAL SITE CONDITIONS			
A. Roads	<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A	
1. Roads damaged	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Roads adequate	<input type="checkbox"/> N/A
Remarks:			
B. Other Site Conditions			
Remarks: While walking to the main gravel pit lake area, observations of eroded areas on the edge of the northern (upper) portion of the Site were observed and documented. It appears that off-road dirt bikes and possibly ATVs are used in the area and that they are causing erosion on the hillside.			

VII. LANDFILL COVERS			<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
A. Landfill Surface				
1.	Settlement (Low spots) Arial extent _____ Remarks: _____	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Settlement not evident Depth _____	
2.	Cracks Lengths _____ Remarks: _____	<input type="checkbox"/> Location shown on site map Widths _____	<input checked="" type="checkbox"/> Cracking not evident Depths _____	
3.	Erosion Arial extent _____ Remarks: _____	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Erosion not evident Depth _____	
4.	Holes Arial extent _____ Remarks: _____	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Holes not evident Depth _____	
5.	Vegetative Cover <input checked="" type="checkbox"/> No signs of stress Remarks: _____	<input checked="" type="checkbox"/> Grass <input type="checkbox"/> Trees/Shrubs (indicate size and locations on a diagram)	<input checked="" type="checkbox"/> Cover properly established	
6.	Alternative Cover (armored rock, concrete, etc.) Remarks: _____		<input checked="" type="checkbox"/> N/A	
7.	Bulges Arial extent _____ Remarks: _____	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Bulges not evident Height _____	
8.	Wet Areas/Water Damage <input type="checkbox"/> Wet areas <input type="checkbox"/> Ponding <input type="checkbox"/> Seeps <input type="checkbox"/> Soft subgrade Remarks: _____	<input checked="" type="checkbox"/> Wet areas/water damage not evident <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Location shown on site map	Arial extent _____ Arial extent _____ Arial extent _____ Arial extent _____	
9.	Slope Instability <input checked="" type="checkbox"/> No evidence of slope instability Arial extent _____ Remarks: _____	<input type="checkbox"/> Slides	<input type="checkbox"/> Location shown on site map	
B. Benches				
<input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)				

1.	Flows Bypass Bench	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
Remarks: _____			
2.	Bench Breached	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
Remarks: _____			
3.	Bench Overtopped	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
Remarks: _____			
C. Letdown Channels			
		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)			
1.	Settlement (Low spots)	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of settlement
Aerial extent _____		Depth _____	
Remarks: _____			
2.	Material Degradation	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of degradation
Material type _____		Aerial extent _____	
Remarks: _____			
3.	Erosion	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of erosion
Aerial extent _____		Depth _____	
Remarks: _____			
4.	Undercutting	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of undercutting
Aerial extent _____		Depth _____	
Remarks: _____			
5.	Obstructions	Type _____	<input type="checkbox"/> No obstructions
<input type="checkbox"/> Location shown on site map		Aerial extent _____	
Size _____			
Remarks: _____			
6.	Excessive Vegetative Growth	Type _____	
<input type="checkbox"/> No evidence of excessive growth			
<input type="checkbox"/> Vegetation in channels does not obstruct flow			
<input type="checkbox"/> Location shown on site map		Aerial extent _____	
Remarks: _____			

D. Cover Penetrations		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	Gas Vents	<input type="checkbox"/> Active	<input type="checkbox"/> Passive
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs Maintenance	<input checked="" type="checkbox"/> N/A
Remarks: _____			
2.	Gas Monitoring Probes	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs Maintenance	<input checked="" type="checkbox"/> N/A
Remarks: _____			
3.	Monitoring Wells (within surface area of landfill)		
	<input checked="" type="checkbox"/> Properly secured/locked	<input checked="" type="checkbox"/> Functioning	<input checked="" type="checkbox"/> Routinely sampled
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> N/A
Remarks: _____			
4.	Extraction Wells Leachate	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs Maintenance	<input checked="" type="checkbox"/> N/A
Remarks: _____			
5.	Settlement Monuments	<input type="checkbox"/> Located	<input type="checkbox"/> Routinely surveyed
Remarks: _____			
E. Gas Collection and Treatment		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Gas Treatment Facilities		
	<input type="checkbox"/> Flaring	<input type="checkbox"/> Thermal destruction	<input type="checkbox"/> Collection for reuse
	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance	
Remarks: _____			
2.	Gas Collection Wells, Manifolds and Piping		
	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance	
Remarks: _____			
3.	Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings)		
	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> N/A
Remarks: _____			
F. Cover Drainage Layer		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	Outlet Pipes Inspected	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A
Remarks: <u>The culvert that acts as an outflow from Queen City Lake was overgrown with blackberries. The culvert appeared clear of debris. A depression area was observed but determined to be the former location of extraction well X-1.</u>			

2.	Outlet Rock Inspected	<input type="checkbox"/> Functioning	<input checked="" type="checkbox"/> N/A
Remarks: _____			
G. Detention/Sedimentation Ponds			
		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Siltation	Area extent _____	Depth _____ <input type="checkbox"/> N/A
<input type="checkbox"/> Siltation not evident			
Remarks: _____			
2.	Erosion	Area extent _____	Depth _____
<input type="checkbox"/> Erosion not evident			
Remarks: _____			
3.	Outlet Works	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A
Remarks: _____			
4.	Dam	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A
Remarks: _____			
H. Retaining Walls			
		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Deformations	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Deformation not evident
Horizontal displacement _____		Vertical displacement _____	
Rotational displacement _____			
Remarks: _____			
2.	Degradation	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Degradation not evident
Remarks: _____			
I. Perimeter Ditches/Off-Site Discharge			
		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	Siltation	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Siltation not evident
Area extent _____		Depth _____	
Remarks: _____			
2.	Vegetative Growth	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A
<input checked="" type="checkbox"/> Vegetation does not impede flow			
Area extent _____		Type _____	
Remarks: _____			
3.	Erosion	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Erosion not evident
Area extent _____		Depth _____	
Remarks: _____			
4.	Discharge Structure	<input type="checkbox"/> Functioning	<input checked="" type="checkbox"/> N/A
Remarks: _____			

VIII. VERTICAL BARRIER WALLS		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	Settlement	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Settlement not evident
	Area extent _____		Depth _____
	Remarks: _____		
2.	Performance Monitoring	Type of monitoring <u>groundwater monitoring</u>	
	<input type="checkbox"/> Performance not monitored		
	Frequency <u>twice per year</u>		<input type="checkbox"/> Evidence of breaching
	Head differential _____		
	Remarks: _____		
IX. GROUNDWATER/SURFACE WATER REMEDIES		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
A. Groundwater Extraction Wells, Pumps, and Pipelines		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Pumps, Wellhead Plumbing, and Electrical		
	<input type="checkbox"/> Good condition	<input type="checkbox"/> All required wells properly operating	<input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A
	Remarks: _____		
2.	Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances		
	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance	
	Remarks: _____		
3.	Spare Parts and Equipment		
	<input type="checkbox"/> Readily available	<input type="checkbox"/> Good condition	<input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided
	Remarks: _____		
B. Surface Water Collection Structures, Pumps, and Pipelines		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Collection Structures, Pumps, and Electrical		
	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance	
	Remarks: _____		
2.	Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances		
	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs Maintenance	
	Remarks: _____		
3.	Spare Parts and Equipment		
	<input type="checkbox"/> Readily available	<input type="checkbox"/> Good condition	<input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided
	Remarks: _____		

C. Treatment System	<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
<p>1. Treatment Train (Check components that apply)</p> <p><input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation</p> <p><input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers</p> <p><input type="checkbox"/> Filters _____</p> <p><input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____</p> <p><input type="checkbox"/> Others _____</p> <p><input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance</p> <p><input type="checkbox"/> Sampling ports properly marked and functional</p> <p><input type="checkbox"/> Sampling/maintenance log displayed and up to date</p> <p><input type="checkbox"/> Equipment properly identified</p> <p><input type="checkbox"/> Quantity of groundwater treated annually _____</p> <p><input type="checkbox"/> Quantity of surface water treated annually _____</p> <p>Remarks: _____</p>		
<p>2. Electrical Enclosures and Panels (properly rated and functional)</p> <p><input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance</p> <p>Remarks: _____</p>		
<p>3. Tanks, Vaults, Storage Vessels</p> <p><input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance</p> <p>Remarks: _____</p>		
<p>4. Discharge Structure and Appurtenances</p> <p><input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance</p> <p>Remarks: _____</p>		
<p>5. Treatment Building(s)</p> <p><input type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair</p> <p><input type="checkbox"/> Chemicals and equipment properly stored</p> <p>Remarks: _____</p>		
<p>6. Monitoring Wells (pump and treatment remedy)</p> <p><input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition</p> <p><input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A</p> <p>Remarks: _____</p>		
D. Monitoring Data		
<p>1. Monitoring Data</p> <p><input checked="" type="checkbox"/> Is routinely submitted on time <input checked="" type="checkbox"/> Is of acceptable quality</p>		

<p>2. Monitoring data suggests:</p> <p><input type="checkbox"/> Groundwater plume is effectively contained <input checked="" type="checkbox"/> Contaminant concentrations are declining</p>
<p>E. Monitored Natural Attenuation</p> <p>1. Monitoring Wells (natural attenuation remedy)</p> <p><input checked="" type="checkbox"/> Properly secured/locked <input checked="" type="checkbox"/> Functioning <input checked="" type="checkbox"/> Routinely sampled <input checked="" type="checkbox"/> Good condition</p> <p><input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A</p> <p>Remarks:</p>
<p style="text-align: center;">X. OTHER REMEDIES</p> <p>If there are remedies applied at the site and not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.</p>
<p style="text-align: center;">XI. OVERALL OBSERVATIONS</p>
<p>A. Implementation of the Remedy</p> <p>Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).</p> <p>The most highly contaminated soils and debris were removed from the Site. A cap was constructed to cover remaining contaminants in the containment area. These measures removed the contaminated surface soils and prevent exposure to the subsurface soil. The cap and vertical barrier wall are successfully keeping the contaminants within the final containment cell from contaminating groundwater. The groundwater plume extends across the site property's northern boundary, onto the Cedar Hills Regional Landfill. The plume remains within the site property's southern boundary.</p> <p>Some of the Site's RAOs have not been achieved: the groundwater contaminant plume has migrated, and the 10-year TCE cleanup target has not been achieved. Therefore, site PRP Boeing and the EPA have agreed to undertake the contingent groundwater action in the southwest portion of the Aquifer 2 TCE plume near the S-well cluster.</p> <p>The Site's PRPs (Queen City Farms and Boeing) have recorded a restrictive covenant that prohibits activities that would damage the final containment cell, extraction of groundwater, and residential and agricultural land uses on specified areas of the Site. Although the plume extends across the site property's northern boundary, onto the Cedar Hills Regional Landfill, additional groundwater use restrictions are not needed for the landfill property, given its current and future use and the groundwater monitoring that King County is required to perform at the landfill pursuant to a consent order with the EPA.</p>
<p>B. Adequacy of O&M</p> <p>Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.</p> <p>The 10-year TCE cleanup target was not achieved. Also, the southwestern edge of the Aquifer 2 TCE plume expanded from 2001 to 2011. Therefore, Boeing will implement the contingent groundwater remedy to address the Aquifer 2 TCE contamination.</p>

C. Early Indicators of Potential Remedy Problems
Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future. Boeing will implement the contingent groundwater remedy.
D. Opportunities for Optimization
Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. Continue to pursue targeted treatment of southwest portion of plume.

Site Inspection Team:

Jannine Jennings, EPA Region 10 Remedial Project Manager
 Marcia Knadle, EPA Region 10 Hydrogeologist
 Eugene Freeman, Senior Hydrogeologist, Washington Department of Ecology
 Eric F. Weber, Principal Hydrogeologist, Landau Associates
 Lauren Knickrehm, Project Engineer, Landau Associates
 Joe Flaherty, Remediation Group, The Boeing Company
 Treat Suomi, Senior Associate, Skeo Solutions

Appendix E: Photographs from Site Inspection Visit



Tanks used for purge water during sampling



Locked gate at final containment cell.



Final containment cell with compost facility in the background



Access to perimeter drain system



G-2, G-2A and G-3 well cluster



Culvert/perimeter drain system



Culvert under road across containment cell



Looking west toward buried drum area



From southern fence line at the containment area, looking south



Open culvert for drainage at capped area



Cobbles at surface of cap



Cedar Grove composting facility



Spring near well H cluster



Monitoring well SA-2



Erosion south of containment cell caused by off-road vehicles



Looking across Main Gravel Pit Lake the containment cell is located at the top of the hill.



Main Gravel Pit Lake



Monitoring well SC-2

Appendix F: Calculation of Current Method B Groundwater and Soil Levels

Current Method B ground water levels were calculated using the standard Method B values and formula located at the Cleanup Levels and Risk Calculations (CLARC) website (<https://fortress.wa.gov/ecy/clarc/Reporting/ParameterQuery.aspx>). Except for trichloroethylene where the cancer toxicity values associated with evaluating mutagenic mode of action were used and for vinyl chloride which takes into account early life stage exposures.

CLARC Summary	Chemical:	benzo[a]pyrene	chromium (total)	chromium(III)	chromium(VI)	dichloroethylene;1,2-,cis	dichloroethylene;1,2-,trans	polychlorinated biphenyls	tetrachloroethylene	trichloroethylene	vinyl chloride
	CAS #:	50-32-8	7440-47-3	16065-83-1	18540-29-9	156-59-2	156-60-5	1336-36-3	127-18-4	79-01-6	75-01-4
Ground Water, Method B, Carcinogen, Standard Formula Value (µg/L)		1.2E-02	Not Researched	Not Researched	Not Researched	Not Researched	Not Researched	4.4E-02	2.1E+01	5.4E-01 (a)	0.029(b)
Ground Water, Method B, Non-carcinogen, Standard Formula Value (µg/L)		Not Researched	Not Researched	2.4E+04	4.8E+01	1.6E+01	1.6E+02	Not Researched	4.8E+01	4E+00	2.4E+01

Notes: a. Based on mutagenic mode of action

b. Based on early life stage exposures.

Not researched = means research has not been conducted and no value exists in the database for this parameter.

CLARC Summary	arsenic, inorganic	benzo[a]pyrene	cadmium in soil	chromium (total)	chromium(III)	chromium(VI)	lead	polychlorinated biphenyls
	7440-38-2	50-32-8	7440-43-9a	7440-47-3	16065-83-1	18540-29-9	7439-92-1	1336-36-3
Soil, Method B, Carcinogen, Standard Formula Value, Direct Contact (ingestion only), unrestricted land use (mg/kg)	6.7E-01	1.4E-01	Not Researched	Not Researched	Not Researched	Not Researched	Not Researched	5E-01
Soil, Method B, Non-carcinogen, Standard Formula Value, Direct Contact (ingestion only), unrestricted land use (mg/kg)	2.4E+01	Not Researched	Researched-No Data	Not Researched	1.2E+05	2.4E+02	Not Researched	Not Researched

Notes: Not researched = means research has not been conducted and no value exists in the database for this parameter.

Researched – No Data = means research has been conducted and no value exists in the database for this parameter.