

FIVE-YEAR REVIEW REPORT FOR
NORWOOD PCBs SUPERFUND SITE
Norwood, Massachusetts

Superfund Records Center
SITE: Norwood PCBs
BREAK: 8.3
OTHER: 569692



Prepared by

U.S. Environmental
Protection Agency
Region 1
Boston, Massachusetts

A handwritten signature in black ink, appearing to read "James T. Owens III", is written over a horizontal dashed line.

James T. Owens III
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USEPA, Region 1

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Date



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LIST OF ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirement
bgs	Below Ground Surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COCs	Contaminants of Concern
COPCs	Contaminants of Potential Concern
CUGs	Cleanup Goals
EMP	Environmental Monitoring Plan
ESD	Explanation of Significant Difference
FYR	Five-Year Review
Gpm	Gallons per minute
GWTP	Groundwater Treatment Plant
ICs	Institutional Controls
MassDEP	Massachusetts Department of Environmental Protections
MCLs	Maximum Contaminant Levels
Mg/kg	Milligram per kilogram
NCP	National Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
PAH	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PCE	Perchloroethylene
PRP	Potentially Responsible Party
Ppb	Parts per billion
Ppm	Parts Per million
PRP	Potentially Responsible Party
RAO	Remedial Action Objectives
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
RBAL	Risk Based Action Level
SVOC	Semi volatile Organic Compounds
TCE	Trichloroethylene
ug/kg	Micrograms per Kilogram
ug/L	Microgram per Liter
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds

EXECUTIVE SUMMARY

The United States Environmental Protection Agency, Region 1 (USEPA) has conducted a Five-Year Review of the Remedial Actions (RAs) implemented at the Norwood PCBs Superfund Site (Site) in Norwood, Massachusetts, in compliance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. §§ 9601, *et seq.* USEPA conducted this review between May 2014 and August 2014. This is the fourth Five-Year Review for the Site. The triggering action for the first Five-Year Review was the date of the start of the first RA in 1989. Subsequent reviews are conducted at least every five years. The purpose of the Five-Year Review is to evaluate whether response actions and original performance standards remain protective of human health and the environment.

The Norwood PCBs site encompasses approximately 26 acres in an industrial/commercial area adjacent to a residential area in Norwood, Massachusetts (Figure 1). It extends north to Meadow Brook, east to U.S. Route 1 and the Dean Street Access Road, south to Dean Street, and west to Pellana Road, and includes a portion of the town-owned Meadow Brook. The Site currently consists of multiple parcels of land as a result of various subdivisions which have occurred since the site was listed on the National Priorities List (NPL) in 1983 (Figure 2).

Although there is only one Operable Unit (OU), remedial activities have been conducted in three "phases" with one phase (Phase 3) consisting of an "A" and "B": Phase 1 – groundwater treatment; Phase 2 – building demolition; Phase 3A – cap and cover; and Phase 3B – Meadow Brook restoration. On January 11, 1996, construction of the groundwater treatment facility (Phase 1) was completed. On February 6, 1997, the building demolition (Phase 2) was completed. On August 11, 1998, the Cap and Cover (Phase 3A) was completed. On August 11, 1999, Meadow Brook restoration (Phase 3B) was completed. The groundwater treatment facility operated from January 1996 until June 2000 at which time it was shut down; quarterly groundwater monitoring continued until October 2002. The clean-up goals published in the 1989 Record of Decision (ROD) and 1996 Amended ROD have not been met; however, new clean-up goals were documented in a 2005 Explanation of Significant Differences (ESD) which have been met. Routine monitoring has been performed and continued to confirm that clean-up goals are being met. In 1997, the owner of the area under the Phase 3A Cap and Cover entered into an agreement entitled "Agreement and Covenant Not to Sue: Joseph Laham and 921, Inc., Norwood Superfund Site," (also referred to as the Prospective Purchaser Agreement (PPA)), that, among other requirements, required the owner to establish and comply with institutional controls on its property.

In March 2008, institutional controls (ICs) in the form of a Grant of Environmental Restriction and Easement (GERE) were recorded for the area under the Phase 3A Cap and Cover. Subsequent to their recording, USEPA and the Massachusetts Department of Environmental Protection (MassDEP) approved a Redevelopment Work Plan (RWP) thus allowing a commercial redeveloper to complete their construction of 56,000 square feet of commercial/retail space. In May 2011, a new owner (i.e., Monkey Sports, Inc.) purchased one of the parcels which comprise the Site, and agreed to become a Settling Respondent under the PPA and assume the

landowner obligations for that parcel under the PPA, including Section VIII (Access/Institutional Controls).

In the adjacent Town of Norwood-owned Meadow Brook parcel within the Site, land use restrictions required under a Consent Decree with the Town (Book No. 25628, Page No. 534) have been recorded at the Norfolk County Registry of Deeds. Moreover, copies of Town Master Plans (sewer and water) have been annotated to alert any future public works project of the existence of property use restrictions within the Meadow Brook parcel due to Site contamination.

The Site was delisted April 1, 2011, but because contamination remains in place above CERCLA action levels, CERCLA requires that five-year reviews continue to be conducted.

Short-term protectiveness has been achieved through the construction of a final cap; the adoption of all institutional controls; the construction of retail building inclusive of a vapor mitigation barrier, and routine Operation and Maintenance (O&M). Protectiveness issues identified in the previous Five-Year Review have been completed. These include updating the O&M Plan and Environmental Monitoring Plan (EMP), and completing punch list items associated with property redevelopment. Periodic inspection of the Site and abutting Meadow Brook have been, and will continue to be, conducted to insure compliance with the recorded ICs.

As part of the current five-year review, a new condition potentially affecting long-term protectiveness was identified. Specifically, gaps around raised concrete parking lot "islands" (a redevelopment feature) are allowing water to infiltrate between layers of asphalt and likely causing premature deterioration of the parking lot surface (i.e., the cap). A second concern was identified with regard to nearby private/irrigation wells that could (potentially) draw site contaminants away from the site. Three private wells were identified on a Norwood Board of Health inventory of private wells, and there is insufficient information available to confirm their exact location, status, and use.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Norwood PCBs		
EPA ID: MAD980670566		
Region: 1	State: MA	City/County: Norwood/Norfolk County
SITE STATUS		
NPL Status: Final		
Multiple OUs? No	Has the site achieved construction completion? Yes	
Has site been put into reuse? Yes	Construction completion date: September 1999	
REVIEW STATUS		
Lead agency: EPA		
Author name: Dan Keefe and Taylor Smith		
Author affiliation: USEPA		
Review period: 12/29/2009 – 12/28/2014		
Date of site inspection: 6/25/2014		
Type of review: Statutory		
Review number: 4		
Triggering action date: 12/28/2009		
Due date (five years after triggering action date): 12/28/2014		

Five-Year Review Summary Form (continued)

Issues/Recommendations

OU(s) without Issues/Recommendations Identified in previous Five-Year Review:
 None

Issues and Recommendations Identified in the Five-Year Review:

OU(s): 1	Issue Category: Operations and Maintenance			
	Issue: Storm water is entering cracks adjacent to stamped concrete parking lot islands (a redevelopment feature) resulting in water being trapped between layers of asphalt. This appears to be contributing to premature surface deterioration of the asphalt cover in some down gradient areas due to freeze/thaw cycles typical of New England winters.			
	Recommendation: Seal joints between surface coat of asphalt and stamped concrete parking lot islands.			
Affect Current Protectiveness	Affect Future Protectiveness	Party Responsible	Oversight Party	Milestone Date
No	Yes	Owner	EPA	12/1/2015
OU(s): 1	Issue Category: Operations and Maintenance			
	Issue: Three private wells (presumably used for irrigation only, based on Norwood Board of Health regulations) were recently identified. There is insufficient information currently available from the Town of Norwood to confirm their exact location, status, and use; however preliminary information suggest that these are either irrigation wells or monitoring wells installed long ago as part of prior (Norwood PCBs) groundwater assessments.			
	Recommendation: Conduct a field inventory of private wells. If necessary, conduct a hydrologic evaluation assessing the ability of these wells to influence the existing groundwater plume (i.e., draw contamination from the site).			
Affect Current Protectiveness	Affect Future Protectiveness	Party Responsible	Oversight Party	Milestone Date
No	Yes	EPA	EPA	12/1/2015

Protectiveness Statement(s)

Operable Unit:
1

Protectiveness Determination:
Short-term Protective

Protectiveness Statement:

The remedy at Norwood PCBs Superfund Site currently protects human health and the environment because groundwater clean-up goals continue to be met and institutional controls have been recorded. However in order for the remedy to be protective in the long-term, the following actions need to be taken: cracks adjacent to stamped concrete parking lot islands (which sit on the underlying remedial cover) need to be filled. Water which enters these crack is causing premature deterioration of the surface coat of asphalt. In addition a hydrological assessment of nearby private wells and their influence on site groundwater may need to be completed.

Sitewide Protectiveness Statement

Protectiveness Determination:
Short-term Protective

Protectiveness Statement:

The remedy at Norwood PCBs Superfund Site currently protects human health and the environment because groundwater clean-up goals continue to be met and institutional controls have been recorded. However in order for the remedy to be protective in the long-term, the following actions need to be taken: cracks adjacent to stamped concrete parking lot islands (which sit on the underlying remedial cover) need to be filled. Water which enters these crack is causing premature deterioration of the surface coat of asphalt. In addition a hydrological assessment of nearby private wells and their influence on site groundwater may need to be completed.

I. INTRODUCTION

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

The USEPA prepares FYRs pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121, 42 United States Code (USC) § 9621, and the National Contingency Plan (NCP), 40 Code of Federal Regulations (CFR) Part 300. CERCLA 121 states:

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

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

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

USEPA conducted a FYR on the remedy implemented at the Norwood PCBs Superfund Site in Norwood, Massachusetts. USEPA is the lead agency for developing and implementing the remedy for the Site. MassDEP, as the support agency representing the Commonwealth of Massachusetts, has reviewed all supporting documentation and provided input to USEPA during the FYR process.

This is the fourth FYR for the Norwood PCBs Superfund Site. The triggering action for this statutory review was 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 a single Operable Unit (OU).

II. PROGRESS SINCE THE LAST REVIEW

Table 1: Protectiveness Determinations/Statements from the 2009 FYR

OU #	Protectiveness Determination	Protectiveness Statement
1	Protective	The remedy at Norwood PCBs Site remains protective of human health and the environment because groundwater clean-up goals are being met and institutional controls are in place. To ensure protectiveness in the future, the O&M Manual and the Environmental Monitoring Plan need to be updated, punch list items associated with redevelopment need to be completed, and all institutional controls (including a revised Prospective Purchaser Agreement with the landowner) need to be in place.

Table 2: Status of Recommendations from the 2009 FYR

O U #	Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Party	Current Status	Completion Date (if applicable)
1	O&M and EMP plans out of date	Amend, post-redevelopment, the O&M manual and EMP.	Developer	USEPA	Completed	1/6/2011
1	Punch list items associated with redevelopment incomplete	Complete miscellaneous items as described in the approved Work Plan for Redevelopment.	Developer	USEPA	Completed	3/31/2011

Recommendation 1

- The final (amended) O&M plan was received on January 6, 2011 incorporating comments from USEPA and MassDEP. The final (amended) EMP, dated April 2010, was also prepared describing modification to the annual monitoring program post-redevelopment.

Recommendation 2

- Punch list items associated with redevelopment were completed. The final Redevelopment Completion Report was prepared and submitted (dated March 2011)

Remedy Implementation Activities

The only remedial activities performed during the most-recent FYR review period were modifications to Institutional Controls (ICs). Specifically these include: 1) an amendment to the Grant allowing for larger volume of soil to be excavated under the provisions of a "Pre-Approved Work Plan" and 2) a partial release of the restriction that formerly prohibited day-care, education or recreational activities. The partial release pertained to within the footprint of the buildings (i.e., Building A and Building B) only. The release and amendment were recorded with the Norfolk County Registry of Deeds on May 20, 2011.

Although not remedy related, per se, a catch basin required reconstruction within a restricted area. The provisions of the Grant for conducting restricted activities were followed and a work plan submitted in June 2012. A completion report was submitted on behalf of the property owner in December 2012 in conformance with the requirements of the Grant.

System Operation/Operation and Maintenance Activities

GZA, the consultant for the Settling Parties to a 1996 Consent Decree with former owners and operators of the facility, has conducted annual inspections and environmental monitoring consistent with amended O&M and EMP. Groundwater is sampled twice annually, and surface water and sediments samples are collected every other year. In addition, GZA has conducted maintenance operations such as filling cracks as needed. Items noted in disrepair that are attributable to the site owner (and due to property redevelopment) are noted in the annual inspection reports for repair by the owner.

III. FIVE-YEAR REVIEW PROCESS

Administrative Components

The Settling Parties were notified of the initiation of the five-year review on May 27th, 2014 via email. The 2014 Norwood PCBs Superfund Site Five-Year Review was led by Dan Keefe of the USEPA, Remedial Project Manager for the Site. Other USEPA personnel include Richard Sugatt (Risk Assessor) and Taylor Smith (USEPA summer intern). Dave Buckley (MassDEP) assisted in the review as the representative for the support agency.

The review consisted of the following components:

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

Community Notification and Involvement

A Press Release was issued on February 2014, stating that there was a five-year review planned for the Norwood PCBs site and inviting the public to submit comments. The results of the review and the report will be made available at the Site information repository located at Morrill Memorial Library, Walpole Street, Norwood, MA 02062, at the USEPA Region 1 Superfund Records Center at 5 Post Office Square, Boston, MA 02109.

Document Review

This five-year review consisted of a review of relevant documents including O&M records and annual monitoring reports. Applicable groundwater clean-up and surface water quality standards, as identified in the February 2005 ESD, were also reviewed.

The project team reviewed documents and site files to become knowledgeable with the history and clean-up activities conducted at the site. Specific documents reviewed included:

1. September 29, 1989 Record of Decision
2. May 17, 1996 Amended Record of Decision
3. April 2000 Final Supplemental Risk Assessment (Foster Wheeler)
4. June 2000 Operation and Maintenance Manual for Meadow Brook (USACE)
5. May 11, 2001 MADEP Groundwater Use and Value Determination
6. January 2002 Meadow Brook Restoration Remedial Action Report (USACE)
7. May 2002 Final Amendment to the Supplemental Risk Assessment (Foster Wheeler)
8. March 2003 Final Technical Memorandum – Development of Risk-Based Action Levels (Foster Wheeler)
9. July 2004 Draft Phase II Ecological and Human Health Risk Summary Report (Tetra Tech FW)
10. February 2005 Explanation of Significant Differences
11. March 2008 Revised Work Plan for Redevelopment (GZA)
12. March 2008 Grant of Environmental Restriction and Easement
13. January 2009 Annual Monitoring Report (GZA)

14. December 2009 Third Five Year Review Report
15. January 2010 Annual Monitoring Report (GZA)
16. April 2010 Operation and Maintenance Plan (GZA)
17. April 2010 Amended Environmental Monitoring Work Plan (GZA)
18. May 2010 Sub-slab Soil Vapor Sampling, Analysis, and Evaluation Report (GZA)
19. September 2010 Completion Report of Redevelopment Activities (GZA)
20. October 2010 First Amendment to GERE
21. January 2011 Annual Monitoring Report (GZA)
22. March 2011 Notice of Deletion from NPL
23. May 2011 Partial Release of GERE
24. August 2011 Generic Work Plan (GZA)
25. January 2012 Annual Monitoring Report (GZA)
26. January 2013 Annual Monitoring Report (GZA)
27. January 2014 Annual Monitoring Report (GZA)

Data Review

Groundwater is monitored twice annually and the results compared to Risk-Based Action Levels (RBALs) that were calculated in 2002 for the protection of ecological receptors (see Table 3 below). For all contaminants, excluding PCBs, the RBALs were later accepted as groundwater clean-up goals in the 2005 ESD. The RBAL for PCBs was not adopted as a groundwater clean-up goal due to a previous determination in the ROD that groundwater restoration [of PCBs] was "technically impracticable". In addition to the data presented in Table 3, monitoring well-specific trends of certain VOCs are shown in Appendix B. Based on a review of these data, it was observed in some wells that the concentration of many VOCs varied by season (i.e., spring versus fall). Notwithstanding the variability, the overall concentration of all VOCs appears to be stable or decreasing over time. With regard to PCBs in groundwater, the concentration also appear to be stable or decreasing. Although not a cleanup goal (for PCBs), PCBs were measured below a calculated ecological risk-based level in 8 of the last 10 sampling events. This represents a decrease as compared to the preceding 4 years (2005 through 2008) during which time PCBs were detected above the level in all 8 sampling events.

Table 3
Maximum observed Groundwater Analytical Results (2009- 2013)

Contaminants of Potential Concern	Clean-up Goal (CUG)	2009 Groundwater Data		2010 Groundwater Data		2011 Groundwater Data		2012 Groundwater Data		2013 Groundwater Data	
		May 2009	November & December 2009	May 2010	November 2010	May 2011	November 2011	May 2012	November 2012	May 2013	November 2013
Volatile Organic Compounds (VOCs)	(µg/l)	(µg/l)	(µg/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)	(ug/l)
1,2,4-Trichlorobenzene	34,000	780	64	255	429	84	370	521	33	79.4	83.1
1,4-Dichlorobenzene	4,600	72	22	101	47	12	210	38	28	43.8	72.4
Total 1,2-Dichloroethenes	3,660,000	56.0	73	256.1	131	35.0	64	75.0	30	36.7	47.6
Tetrachloroethene	37,000	13	13	18	11	13	10	11	8	11.0	6.5
Trichloroethene	108,000	550	210	733	657	190	150	188	104	140.0	100.0
Vinyl Chloride	310,000	39	10	46	1	10	46	11	1	9.4	10.7
Polychlorinated Biphenyls (PCBs)	Ecological Risk-Based Level										
Total PCBs	4.3	4.3	13	3.8	2.7	0.59	1.3	8.48	2.0	2.03	0.8
Wells exceeding PCB Ecological risk-based level	4.3	NONE	MW-1A, ME-10	NONE	NONE	NONE	NONE	ME-17	NONE	NONE	NONE

- 1) Risk-Based Action Levels (RBALs) were calculated and accepted as the final Groundwater Clean-up Goals (2005 ESD) for VOCs only.
- 2) All groundwater concentrations are in µg/l (ppb).
- 3) Concentrations in bold indicate exceedance of a calculated PCB ecological risk-based level. No clean up goal was developed for PCBs, based on a ROD determination that restoration of PCBs in groundwater was "technically impracticable."

Surface water and sediment samples were collected twice during the five-year period (2010 and 2012). Samples were collected from three locations along Meadow Brook and analyzed for PCBs. While there is no surface water clean-up goal specified in any of the decision documents, the National Recommended Water Quality Criteria (NRWQC) for the protection of aquatic life is 0.014 ug/l, was established as a monitoring standard in the ESD. No PCBs were detected in any of the surface water samples. PCBs were detected in two of the three sediment samples (maximum concentration of 299 ppb in duplicate sample SED-3). These results are consistent with historical data (from results reported in earlier Five Year reviews) and are below the ROD's 1 ppm sediment clean-up goal used in the Meadow Brook remediation.

Table 4
Surface water and Sediment Analytical Results (2010, 2012*)

Sampling Event	Polychlorinated Biphenyl Concentration							
	Surface Water Samples				Sediment Samples			
	SW-1	SW-2	SW-3	Duplicate	Sed-1	Sed-2	Sed-3	Duplicate
	µg/l	µg/l	µg/l	µg/l	µg/kg	µg/kg	µg/kg	µg/kg
November 2010	ND	ND	ND	ND (SW-2)	120	ND	ND	ND (Sed-2)
November 2012	ND	ND	ND	ND (SW-3)	179	ND	193	299 (Sed-3)

* Surface water and sediment samples were collected in November 2014; however, the results not available for this FYR.

µg/l Micrograms per liter (ppb)
 µg/kg Micrograms per kilogram (ppb)
 ND Non-detected.

Site Inspection

The FYR site inspection was conducted on June 25, 2014. In attendance were Dan Keefe, Richard Sugatt and Taylor Smith, USEPA; Dave Buckley, MassDEP; Russ Parkman with GZA; and Dave Nilson on behalf of Monkey Sports, Inc. The purpose of the inspection was to assess the protectiveness of various remedy components. A secondary inspection was performed on November 4, 2014 by USEPA and MassDEP to verify certain deficiencies (noted in the June 2014 inspection) had been corrected.

During the June inspection, the team noted several potential issues including an eroded embankment along the detention basin (and adjacent to the remedial cap). The team also noted cracks adjacent to many of stamped concrete parking lot islands. These cracks allow storm water to infiltrate below the surface coat of asphalt and migrate east, towards the newly-constructed buildings, between layers of asphalt. Further, the inspection team noted portions of asphalt down gradient from the stamped concrete island that appear to be degraded as evidence by loose asphalt and/or pot holes. This degradation is attributable to the "freeze-thaw cycle" typical of New England winters and is exacerbated by the trapped water between layers of asphalt.

During this inspection, Meadow Brook was also observed. The embankment on both sides of the brook was heavily vegetated. While this provides significant and beneficial shade to stream organisms, it is also detrimental to maintaining stream flow capacity. On September 23, 2014, USEPA alerted the Town of Norwood, via letter, of the recommended operation and maintenance to preserve the flood control benefits of the completed Meadow Brook Restoration.

Upon re-inspection in November 2014, USEPA and MassDEP noted that the erosion along the detention basin had been repaired. In addition, the deteriorated pavement (i.e. pot holes) had also been repaired. The owner still had not corrected the root cause of the pavement deterioration, namely the cracks adjacent to stamped concrete islands. Thus, premature failure of the surface coat of asphalt is likely. Mitigation methods are actively being evaluated by the property owner. Photographs from both inspections (July and November 2014) are in Appendix C.

Interviews

During the FYR process, interviews were conducted with various stakeholders including Joe Laham (owner/abutter), Tom Arnold (MonkeySports - owner), Dave Nilson (Leading Edge Construction Services/Property Manager on behalf of MonkeySports), and Dave Buckley (MassDEP). The purpose of the interviews was to document any perceived problems or successes with the remedy that has been implemented to date. Interviews were conducted by mail or telephone. Completed interviews are included in Appendix D.

IV. TECHNICAL ASSESSMENT

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

Yes.

Remedial Action Performance

- The remedy, as constructed, is protective of current site use (commercial/retail redevelopment).
- The cap is inspected and maintained to prevent direct contact with contaminated soil. Cracks greater than 1/4th of an inch in diameter have been repaired excluding the recent cracks adjacent to stamped concrete parking lot islands (this is the sole issue affecting long-term protectiveness identified in this review).
- Surface water drainage features have been repaired, as needed, and appear to be functioning as designed.

System Operations/O&M

- The PCB and VOC concentrations from monitoring wells have been steady or decreasing. VOCs in groundwater continue to meet the clean-up goals detailed in the 2005 ESD (See Table 3 above and graphs in Appendix D). There is no evidence of groundwater contaminant migration from the Site.
- Annual Inspections and the routine sampling of groundwater, surface water and sediment provide sufficient early indicators of changes in site conditions which might potentially affect protectiveness.
- Also, to further increase the protectiveness of the remedy, it is recommended that GZA (on behalf of the Settling Parties) annually review Town of Norwood well-installation permit applications¹ to determine if any wells have been installed within a 500-foot radius of the Site. GZA has indicated they will revise their annual Site Inspection Checklist to include an inquiry of the Norwood Board of Health thereby reducing the potential (and unintentional) movement of contaminated groundwater plume to areas outside the boundaries of the Norwood PCBs site.

Opportunities for Optimization

- None. The remedy consist of routine monitoring, ICs, and a protective cap, none of which is amenable to optimization.

Early Indicators of Potential Issues

- A gap around the majority of stamped concrete parking lot islands is allowing water to accumulate between layers of asphalt. This is creating "frost heaves" during the winter season. This is compromising the durability of the upper layer of asphalt and is the sole issue identified in this FYR.
- Review of Town of Norwood records identified three private wells that have been constructed within 500 feet of the Site boundary (500 feet being used as a conservative distance for possible zone of influence of any groundwater withdrawal). Addition information provided by the BOH confirm that one well (north of the site) is used for irrigation only and the others are likely monitoring wells associated with prior work performed at the Norwood PCBs site. A field inventory of these wells will be conducted to confirm their location, status, and use. If

¹ The Town of Norwood regulates the installation of potable and non-potable wells under the Board of Health's *Rules and Regulations for the Construction of Wells*.

necessary, a hydrologic evaluation will be conducted to assess the ability of these wells to influence the existing groundwater plume (i.e., draw contamination from the site).

Implementation of Institutional Controls and Other Measures

- Institutional controls are in place via the previous recording of a Grant of Environmental Restriction and Easement (the "Grant") for the cap and cover parcel.
- The Grant has been modified to allow a larger volume of soil to be excavated (in certain areas) under a "Pre-approved Work Plan".
- A partial release was granted relative to "recreational activities" within the footprint of each on-site building.
- With regard to Town-owned Meadow Brook parcel, a *Notice of Right of Access and Declaration of Covenants and Restriction* was recorded at the Norfolk County Registry of Deeds, and various maps (used within the Town) were annotated to alert any future municipal offices (e.g., Water and Sewer, DPW, etc...) of certain land use restrictions.

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

No, but the remedy remains protective (see below).

Changes in Standards and TBCs

Few changes to the ARARs have occurred since the ESD was signed. Most location- and action-specific ARARs currently apply to on-going monitoring and O&M activities rather than construction activities (the latter have not occurred to any extent during the most recent review period). Two location-specific ARARs regarding federal protection of wetlands and protection of floodplains no longer exist as promulgated standards (but they reference Executive Orders for the protection of wetlands and floodplains that are still pertinent to the CERCLA remedy); these do not affect the protectiveness of the remedy. The Commonwealth of Massachusetts was asked to identify State ARARs promulgated since the last FYR which may have a bearing on protectiveness. According to the MassDEP, as of this report, they were not aware of any new or revised State ARARS potentially affecting the protectiveness of the Remedy.

Changes in Exposure Pathways

There have been no changes in current or expected land use, or human health or ecological receptors, or exposure pathways that could affect the protectiveness of the remedy, except for the potential for increased human exposure to PCBs due to previously mentioned physical degradation of the asphalt cap. This issue is identified as an action item in this five year review. There are no newly identified contaminants, toxic contaminant byproducts or contaminant sources and

exposure pathways. Although vapor intrusion was previously identified as an exposure pathway, this pathway was shown to have acceptable risk in a 2010 risk assessment. However, as detailed in the next section, the toxicity factors for one VOC have changed since the 2010 risk assessment leading to a potential increase in risk.

Changes in Toxicity and Other Contaminant Characteristics

As discussed below, the toxicity factors for contaminants of concern at the site have not changed in a way that could affect the protectiveness of the remedy. The human health toxicity factors for TCE have changed since the last five year review, resulting in higher toxicity. This change does not affect the protectiveness for drinking water exposures because the groundwater was reclassified as non-potable, institutional controls have been implemented to prevent groundwater use, and the groundwater cleanup goals for VOCs were changed to be protective of aquatic and terrestrial organisms in contact with, or consuming water from Meadow Brook that receives Site groundwater. These cleanup goals, were derived for six VOCs in the 2005 ESD based on ecological benchmarks and empirical groundwater-to-surface water dilution factors in Meadow Brook. The cleanup goals are still protective because there have been no significant changes in the ecological benchmarks used to derive them. The cleanup goals have not been exceeded in groundwater samples collected through 2013. Continued monitoring will be conducted.

Vapor intrusion was not recognized as an exposure pathway of concern in either the ROD, Amended ROD, or ESD. However, in light of the (then) planned redevelopment in 2008, vapor intrusion was identified as a future potential human exposure pathway. Accordingly, a requirement for a vapor mitigation system was added to the Grant of Environmental Restriction and Easement (GERE) and is applicable to any new structures built on the Site. Accordingly, the buildings were constructed with a spray-applied, synthetic, non-permeable vapor barrier (Liquid Boot™). Beneath this barrier is a gravel vent layer that is allowed to passively vent via perforated PVCs pipe which exits the building above the roof. This system was installed in both buildings and they continue to passively operate (i.e. without assistance of blowers or fans). A risk assessment was conducted in 2010 using modeled indoor air concentrations as estimated by the maximum measured concentrations of VOCs in soil gas between the slab and liner below the slab, as attenuated into indoor air by a conservative attenuation factor of 0.1. Although seven VOCs were detected in soil gas, the risk assessment concluded that the only groundwater contaminants of potential concern were trichloroethene (TCE) and vinyl chloride (VC), and the risk of the predicted concentrations of these two VOCs was lower than USEPA's maximum risk limits. Since the inhalation toxicity factors for TCE have changed, the risk calculation was revised using the theoretical exposure concentrations from the 2010 risk assessment and the updated toxicity factors. This evaluation (see Appendix E) indicated that the hazard quotient (HQ) for the maximum estimated indoor air concentration of TCE increased from 0.3 to 1.5. The excess lifetime cancer risk (ELCR) increased from 2E-06 to 5E-06, but remained within USEPA's acceptable risk range of 1E-06 to 1E-04. The slight exceedance of USEPA's maximum non-cancer risk limit (HQ = 1) is based on the maximum concentration in soil vapor and a highly conservative attenuation factor, and does not take into account that the passive mitigation system is now operating. Therefore, it is likely that any site-related indoor air concentrations of TCE are lower than the estimated maximum, probably

resulting in HQ values lower than $HQ = 1$, even if the ventilation system were to become non-operational due to the attenuation of vapors across the impermeable barrier alone. In summary, the vapor intrusion pathway has been evaluated and determined not to be an exposure pathway of concern.

Changes in Risk Assessment Methods

As discussed below, it is concluded that changes in risk assessment methodology since the last five year review have not changed in a way that could affect protectiveness of the remedy.

In the development of the soil cleanup levels for PAHs, all PAHs were considered to be equal in toxicity to the most toxic PAH, benzo(a)pyrene. The cleanup levels, expressed as total carcinogenic PAH (cPAH) were 6 ppm cPAH for workers and 2 ppm cPAH for nearby residents. After the development of these cleanup levels, USEPA approved a relative potency method for evaluating risks to cPAHs whereby each individual cPAH is evaluated using the toxicity value for benzo(a)pyrene in combination with a comparative relative potency factor. Among the other cPAHs, only dibenzo(a, h)anthracene is considered equal in toxicity to benzo(a)pyrene. All other cPAHs are considered less toxic. Since the cleanup levels were developed using the benzo(a)pyrene toxicity factor for all cPAHs without the relative potency factors, the cleanup levels are more protective than they would be if they were re-calculated today.

In the development of the soil cleanup levels for PCBs, only the cancer risks of PCBs were evaluated. The non-cancer risks were not included in the analysis. The cleanup levels for total PCBs were 1 ppm for residents and 10 ppm for workers. As shown below, these cleanup levels are protective for both cancer and non-cancer risk. Using Aroclor 1254, which is representative of the aged PCBs at the Site and is the only Aroclor to have both cancer toxicity factor and non-cancer toxicity factors, the current (May, 2014) USEPA Regional Screening Level (RSL) for residential soil is 1.1 mg/kg for a Hazard Quotient ($HQ = 1$) and 0.24 mg/kg for cancer risk of $1E-06$. The RSL for $1E-05$ cancer risk would be ten times higher, or 2.4 mg/kg. The residential cleanup goal of 1 mg/kg is protective because it represents a non-cancer risk of $HQ = 1$ and a cancer risk of about $4E-06$ (i.e. $1/0.24 \times 1E-06$). The RSL for industrial soil is 15 mg/kg for an $HQ = 1$ and 1 mg/kg for a cancer risk of $1E-06$. Therefore, the worker cleanup goal of 10 ppm is protective because it represents an HQ of 0.7 (i.e. $10/15$) and a cancer risk of about $1E-05$ (i.e. $10/1 \times 1E-06$). Therefore, it is concluded that the soil cleanup levels are protective for both cancer and non-cancer risks.

A change in methodology not mentioned in the previous 2009 five year review is the 2005 Cancer Guidelines and Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens. This guidance recommends the use of age-specific adjustment factors to account for an increased sensitivity during early life to the effects of carcinogens that act by a mutagenic mode of action. Such chemicals include carcinogenic PAHs, but not PCBs. Usage of this guidance is not expected to change the protectiveness of the remedy because the Site was already remediated to the likely overprotective cPAH cleanup levels. Further, the resulting cPAH-contaminated soil was placed with PCB-contaminated material under an asphalt cap. Future exposure is prevented by institutional controls which restrict intrusive activities and O&M requirements to maintain a

protective cover.

Standard default exposure factors have been updated in the 2014 OSWER Directive on the Update of Standard Default Exposure Factors. Use of these new factors would generally result in lower risks; therefore this new guidance does not affect the protectiveness of the remedy.

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

No.

Technical Assessment Summary

Review of Site documents and monitoring data indicate that the remedy components are functioning as intended by the ROD (1989), ROD Amendment (1996), and ESD (2005). Institutional controls are in place on all Site properties owned by Laham/921 Inc., Monkey Sports, Inc., and the town-owned Meadow Brook property. Intrusive activities (catch basin repair) have been successfully completed following the procedures specified by the Grant of Environmental Restriction and Easement. Annual GW monitoring reports reveal stable or decreasing trends of VOCs and PCBs. All VOCs detected remain below groundwater clean-up goals. There is no evidence of migration of contamination from the Site, although a recent inquiry as to the existence of any private (irrigation) wells revealed up to three wells within a 500-foot radius of the Site (see Figure 3). EPA will review the exact location of these wells and determine if there is any hydraulic connection between these wells and the site. Routine annual inspections are performed by GZA on behalf of the Settling Parties (which will also include a review of any new private well construction records within the 500-foot radius of the Site). Routine maintenance is performed by either GZA or the property owner pending the nature of the maintenance activities (i.e., remedy or redevelopment related). Gaps in pavement immediately adjacent to numerous stamped-concrete parking lot islands is the sole issue potentially affecting the long-term protectiveness of the remedy. The islands were constructed (in association with property redevelopment) prior to the top coat of asphalt being applied. Since their construction, the "seam" between the parking lot and the concrete islands has widened, thus allowing storm water to enter and accumulate between layers of asphalt. Expansion of this water, typical of the freeze-thaw cycles in New England, has led to the creation of numerous pot holes (all of which have been filled at the time of the November 2014 inspection); however, the root cause has not been mitigated.

V. ISSUES/RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Table 5: Issues and Recommendations/Follow-up Actions

OU #	Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Y/N)	
						Current	Future
1	Water is penetrating through the upper-most layer of asphalt causing premature deterioration of the asphalt cap	Borders of concrete parking lot islands need to be sealed to pavement	Owner	USEPA	12/1/2015	No	Yes
1	Up to three private (irrigation) wells may exist within 500 feet from the site boundary based on Norwood Board of Health records.	Verify location and status of each well within 500 feet of the site. Determine hydraulic connection between the well and site groundwater.	EPA	USEPA	12/1/2015	No	Yes

Although not an issue potentially affecting protectiveness, the Town of Norwood has not conducted any of the recommended maintenance activities within the adjacent portion of Meadow Brook. As part of the Meadow Brook Restoration, the limits of the brook were excavated to the flood control specifications provided by the Town of Norwood. In 2001, the U.S. Army Corps of Engineers provided the Town of Norwood with an O&M Manual to preserve the flood control benefits of this project. A letter and another copy of the O&M Manual were sent the Town of Norwood on September 23, 2014 reminding them of the recommended O&M.

Also, as previously noted, it is recommended that GZA (on behalf of the Settling Parties) annually review Town of Norwood's records for any new well installations on properties adjacent to the site. GZA has indicated they will revise their annual Site Inspection Checklist to include an inquiry of the Norwood Board of Health thereby reducing the potential (and unintentional) movement of contaminated groundwater plume to areas outside the boundaries of the Norwood PCBs site.

VI. PROTECTIVENESS STATEMENT

Protectiveness Statement(s)		
<i>Operable Unit:</i> OU1	<i>Protectiveness Determination:</i> Short-term Protective	<i>Addendum Due Date (if applicable):</i> N/A
<p><i>Protectiveness Statement:</i> The remedy at Norwood PCBs Superfund Site currently protects human health and the environment because groundwater clean-up goals continue to be met and institutional controls have been recorded. However in order for the remedy to be protective in the long-term, the following actions need to be taken: cracks adjacent to stamped concrete parking islands (which sit on the underlying remedial cover) need to be filled. Water which enters these crack is causing premature deterioration of the surface coat of asphalt. In addition a hydrological assessment of nearby private wells and their influence on site groundwater may need to be completed. Click here to enter text</p>		

Sitewide Protectiveness Statement	
<i>Protectiveness Determination:</i> Short-term Protective	<i>Addendum Due Date (if applicable):</i> Click here to enter a date.
<p><i>Protectiveness Statement:</i> The remedy at Norwood PCBs Superfund Site currently protects human health and the environment because groundwater clean-up goals continue to be met and institutional controls have been recorded. However in order for the remedy to be protective in the long-term, the following actions need to be taken: cracks adjacent to stamped concrete parking islands (which sit on the underlying remedial cover) need to be filled. Water which enters these crack is causing premature deterioration of the surface coat of asphalt. In addition a hydrological assessment of nearby private wells and their influence on site groundwater may need to be completed. Click here to enter text</p>	

VII. NEXT REVIEW

The next five-year review report for the Norwood PCBs Superfund Site is required five years from the completion date of this review.

APPENDIX A – EXISTING SITE INFORMATION

A. SITE CHRONOLOGY

Table 6: Site Chronology

06/01/83	Initial discovery of contamination
06/24/83	Removal Action begin
08/03/83	Removal Action complete
06/10/86	Site listed on National Priorities List (NPL)
05/21/87	Remedial Investigation/Feasibility Study (RI/FS) complete
09/29/89	Record of Decision (ROD) signed
04/07/94	Remedial Design complete
11/22/94	On-site construction begins of GWTP
1996	Consent Decree with Facility property owners/operators
01/11/96	GWTP construction complete
03/01/96	Long-term Remedial Action phase (LTRA) begins
05/17/96	ROD Amendment Signed
04/97	Settling Party-initiated Cap/Cover activities
09/29/97	Laham/921 Inc. Prospective Purchaser Agreement
10/97	Meadow Brook Restoration begins
08/11/98	Final inspection of Cap/Cover
08/11/99	Final inspection of Meadow Brook Restoration
09/99	Construction Completion achieved
12/30/99	First 5-Year Review complete
04/00	Final Supplemental Risk Assessment submitted
06/00	Groundwater treatment system temporarily shut down
05/11/01	Groundwater Use and Value determination prepared by MADEP
05/28/02	Final Amendment to the Risk Assessment submitted
12/15/04	Operation and Maintenance Plan approved
12/30/04	Second Five-Year Review complete
02/05	ESD issued revising Groundwater Clean-Up Levels
2007	Wastewater Treatment Plant Decommissioned
03/08	Redevelopment Work Plan Approved
03/08	Grant of Environmental Restrictions recorded
05/08	Redevelopment Begins
02/2009	Consent Decree with the Town of Norwood
03/09	ICs (Notice) recorded for Town-owned Meadow Brook parcel

04/10	Revised O&M Plan submitted
05/10	Sub-slab Soil Vapor Sampling, Analysis, and Evaluation Report submitted
09/10	Redevelopment of Shoppes At Elmway Farms completed
10/10	GERE Amended
05/11	Monkey Sports becomes a Settling Respondent under the PPA
06/11	Site deleted from the NPL
05/11	Part of Laham property sold to MonkeySports, Inc.
05/11	Partial release and Grant amendment recorded
08/11	Amended generic work plan for Monkeysports submitted

B. BACKGROUND

Physical Characteristics

The Site encompasses approximately 26 acres in an industrial/commercial area adjacent to a residential area in Norwood, Massachusetts. It extends north to Meadow Brook, east to U.S. Route 1 and the Dean Street Access Road, south to Dean Street, and west to Pellana Road, and includes the portion of Meadow Brook located between the Laham property and the Dean Street culvert. The Site consists of several parcels of land including the Laham property, residential properties to the north of the Laham property, several properties on Kerry Place (excluding Lot 12, number 50), and adjacent parking areas and fields. The Laham property was subdivided with a portion being sold to Monkey Sports, Inc. (a sports equipment retailer) in 2012.

Both soil and groundwater have been impacted by previous Site uses. The primary soil contaminant is PCBs, while groundwater has been impacted by VOCs, SVOCs (particularly 1,2,4-Trichlorobenzene) and PCBs. Based on the requirements set forth in the Remedial Action Work Plan (RAWP dated October 2006 and as supplemented in February/March 2008) for the Soil/Brook Remediation, existing materials within the area and stockpiled or excavated materials with PCB concentrations greater than the site-specific cleanup goal of 70 parts per million (ppm) were placed within the limits of the asphalt Cap. Stockpiled or excavated materials with PCB concentrations less than 70 ppm were placed within the limits of the Cover areas (soils with concentrations above 40 ppm were only placed at depths greater than 1 foot below finish grade). The Cap consists of 6 inches of asphalt over 6 inches of dense-graded crushed stone, over a woven geotextile fabric marker layer. The Cover consists of 12 inches of dense-graded crushed stone, pavement or building slab/foundation overlying a woven geotextile fabric marking layer. According to the Twenty-Eighth Groundwater Monitoring Report prepared by Watermark and Tetra Tech, targeted volatile compounds consist primarily of chlorinated compounds (trichloroethylene, dichloroethene, etc.). PCBs have also been detected in groundwater.

Hydrology

The soil conditions of the site generally consist of up to 11 feet of fill and subsoil over 6 to 10 feet of dense to very dense granular deposits over 5 to 10 feet of very stiff clayey silt over bedrock. Groundwater elevations ranged from 39.5 feet to 48.28 feet corresponding to approximately 9 to 18 feet below existing ground surface

Land and Resource Use

- A portion of the 8.6 "Laham property" was subdivided and sold in 2012, thus creating additional site/property owners.
- Groundwater is not currently nor anticipated to be a future drinking water supply as memorialized in a 2001 Groundwater Use and Value Determination prepared by the MassDEP.

History of Contamination

Table 7: Contaminants Detected On-site

Contaminant	Media	Contaminant Group
1,1,1-Trichloroethane	Groundwater, Sediment, Soil	VOC
1,2,4-Trichlorobenzene	Groundwater, Sediment, Soil	SVOC
1,2-Dichlorobenzene	Groundwater, Sediment, Soil	VOC
1,2-Dichloroethane	Groundwater, Sediment, Soil	VOC
1,2-Trans-dichloroethylene	Groundwater, Sediment, Soil	VOC
1,3-Dichlorobenzene	Groundwater, Sediment, Soil	VOC
1,4-Dichlorobenzene	Groundwater, Sediment, Soil	Base Neutral Acids
Aroclor 1016	Groundwater, Sediment, Soil	PCBs
Aroclor 1254	Groundwater, Sediment, Soil	PCBs
Aroclor 1260	Groundwater, Sediment, Soil	PCBs
Base neutral acids	Groundwater, Sediment, Soil	Base Neutral Acids
Benzoic acid	Groundwater, Sediment, Soil	Base Neutral Acids
Chlorobenzene	Groundwater, Sediment, Soil	VOC
Chloroform	Groundwater, Sediment, Soil	VOC
PAH	Groundwater, Sediment, Soil	PAH
PCBs	Groundwater, Sediment, Soil	PCBs
Pentachloroethane	Groundwater, Sediment, Soil	VOC
Phenol	Groundwater, Sediment, Soil	Base Neutral Acids
Silver	Groundwater, Sediment, Soil	Metals
Vinyl chloride	Groundwater, Sediment, Soil	VOC
Zinc	Groundwater, Sediment, Soil	Metals

- Contamination at the Site originated from disposal practices of the parties who owned the property or operated businesses on the Site. The former manufacturing building was constructed in 1942 by Bendix Aviation Corporation, which produced navigational control systems and conducted other electronic research for the U.S. Navy. In October 1947, the land was purchased by Tobe Deutschman Corporation, which manufactured electrical equipment at the Site, including capacitors and transformers. The property was purchased in October 1956 by Cornell-Dubilier Electronics, Inc., which also manufactured electrical equipment at the facility. In January 1960, the property was briefly owned by Maryvale Corporation, and was then purchased by the Friedland brothers. The Friedland brothers leased the property to Federal Pacific Electric Company, which held the lease on the property until October 1979. During the period from 1960 to 1979, Federal Pacific Electric (FPE) Company operated a business at the Site, and sublet portions of the facility to Cornell-Dubilier Electronics (CDE), Inc. and to Arrow Hart Corporation, which also manufactured electrical equipment at the facility. In 1979, the Site was subdivided. The northeastern portion of the Site, approximately 9 acres, was purchased by Grant Gear Realty Trust, which leased the facility to Grant Gear Works, Inc., to produce gears for industry. The Commonwealth of Massachusetts originally investigated the site in response to a telephone call from an area resident.

Initial Response

The following time-critical Removal Actions were performed at the Site

1. Removal Action completed in the summer of 1983 by USEPA - 518 tons of contaminated soil was removed from locations within the Kerry Place and Grant Gear properties.
2. Removal Action completed January 1986 by MADEP - an IRM was implemented to limit access to areas of highest surface soil contamination by installing a cap over a 1.5-acre portion of the Grant Gear Property and fencing the capped areas.

Basis for Taking Action

- PCBs were found to be present in high concentration, as well as a number of VOCs and SVOCs.
- Residents, nearby workers, and areas that Meadow Brook runs through were potentially impacted.

C. REMEDIAL ACTIONS

Remedial Action Objectives and Remedy Selection

The RAO in the 1989 ROD are summarized as follows:

- prevent contact with contaminated soil, surface water and sediment;
- mitigate release of contaminated material from the Grant Gear Drainage system [to Meadow Brook];
- eliminate the risk of direct contact of workers to contaminated surfaces within the Grant Gear building;
- reduce risk from the future consumption of groundwater; and
- reduce the risk to human health from the inhalation of organic vapors.

The 1989 ROD specified solvent extraction to treated PCB-contaminated soil. This was later modified by a ROD amendment (1996) due to significantly higher treatment cost. The amended remedy has the following major components: demolition of the Grant Gear building; consolidation of contaminated soil and sediment from Meadow Brook onto a portion of the Grant Gear property; removal of "hot spot" contamination below the water table; covering of the most-heavily contaminated areas of the Grant Gear property with an asphalt cap and covering of other areas with clean fill material; periodic monitoring to assess performance and protectiveness of the remedy; inspections and maintenance of the cap and cover; and continued on-site groundwater extraction and treatment. The last modification of the remedy were changes to groundwater clean-up goals and were memorialized in a 2005 ESD.

Remedy Implementation

The Norwood PCB remedy, although a single Operable Unit, was implemented in phases, namely: Phase 1 – groundwater treatment; Phase 2 – building demolition; Phase 3A – cap and cover; and Phase 3B – Meadow Brook restoration. On January 11, 1996, construction of the groundwater treatment facility (Phase 1) was completed. On February 6, 1997, the building demolition (Phase 2) was completed. On August 11, 1998, the Cap and Cover (Phase 3A) was completed. On August 11, 1999, Meadow Brook restoration (Phase 3B) was completed. The groundwater treatment facility operated from January 1996 until June 2000 at which time it was shut down; quarterly groundwater monitoring continued until October 2002. The clean-up goals published in the 1989 Record of Decision (ROD) and 1996 Amended ROD have not been met; however, new clean-up goals were documented in a 2005 Explanation of Significant Differences (ESD) which have been met. Routine monitoring has been performed and continued to confirm that clean-up goals are being met. In March 2008, institutional controls in the form of a Grant of Environmental Restriction and Easement (GERE) were recorded. All remedial activities have been implemented and the site was deleted from the NPL on June 2, 2011.

System Operation/Operation and Maintenance

The (former) groundwater treatment system has been dismantled (2007) and the property redeveloped into 26,000 square feet of commercial/retail space. Therefore, there is no element of the remedy requiring "operation". Maintenance activities are completed by either GZA (under contract to

the responsible parties) or by the property owner based on whether the required action is associated with a remedy feature or a redevelopment feature. The O&M manual and the EMP were both updated to reflect the redeveloped features of the property. Inspections occur twice annually (spring and fall) with groundwater and surface water sampling occurring in the fall. O&M activities have (generally) consisted of limiting the use of salt and sand in the winter, annual sweeping of sand in the spring, inspection and filling of asphalt cracks, stabilizing minor areas of surface erosion and maintaining the storm water drainage swale.

APPENDIX B - FIGURES



I:\11860518605-00-STP\Figures\18605-00_SiteLocus_F01.mxd



SOURCE : SCANNED USGS TOPOGRAPHIC QUADRANGLES
 SCANNED BY THE MASSACHUSETTS EXECUTIVE OFFICE OF
 ENVIRONMENTAL AFFAIRS, MASSGIS. DISTRIBUTED JUNE, 2001.



PROJ. MGR.: RBP
 DESIGNED BY: DR
 REVIEWED BY: AJR
 OPERATOR: EMD
 DATE: 12-14-2005

LOCUS PLAN
 NORWOOD PCB SUPERFUND SITE
 NORWOOD, MASSACHUSETTS

JOB NO.
 01.0018605.00
 FIGURE NO.
1



bing

0 250 500 Feet



- Norwood PCB Site Boundary
- 500 foot Buffer Zone
- Approximate Location of Private Wells

Private Well Locations Near Norwood PCB

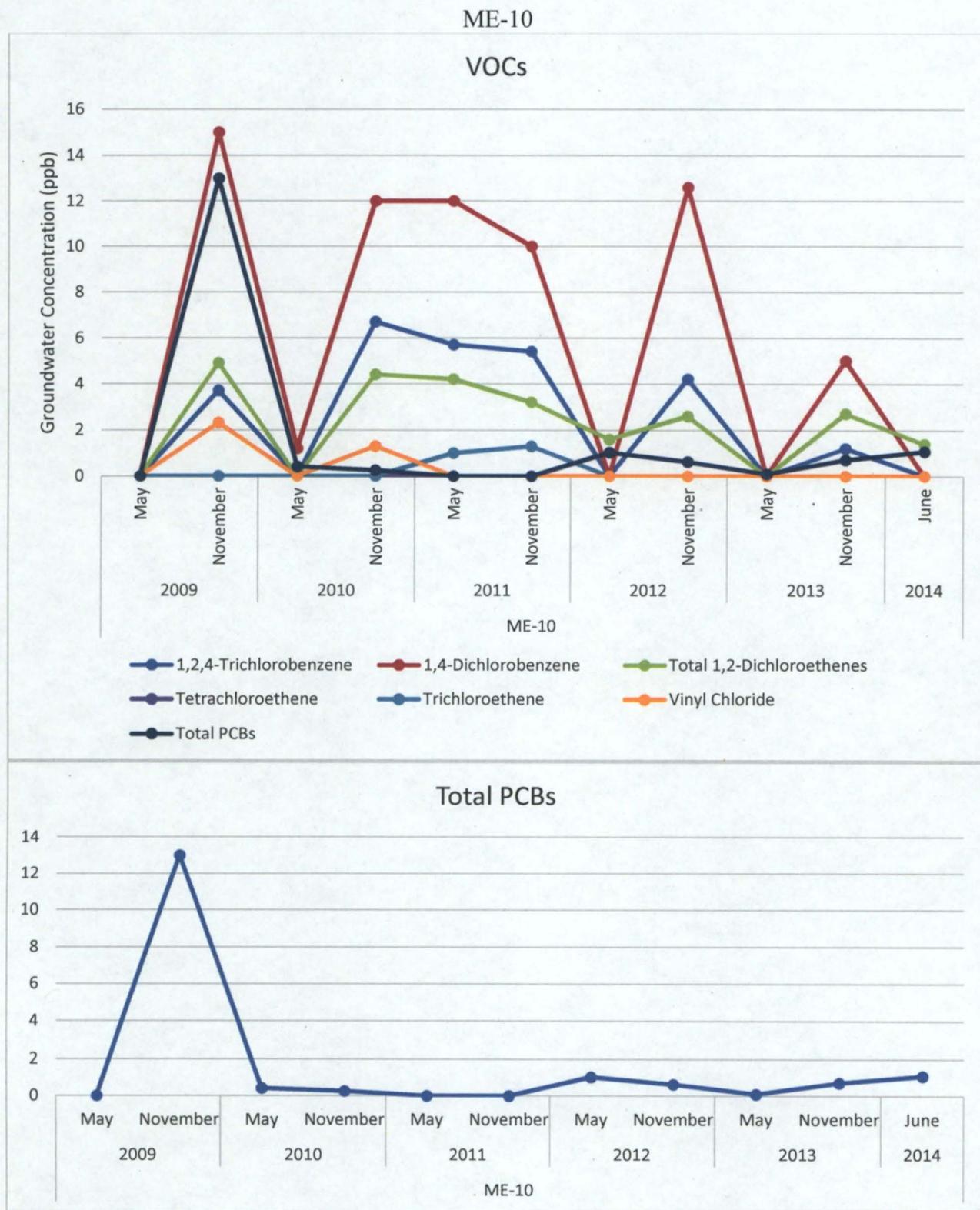
Figure 3

This map was created by the US EPA Region 1 GIS Center on Dec. 9, 2014. Map Tracker ID: 10257. Sources: EPA, Bing.



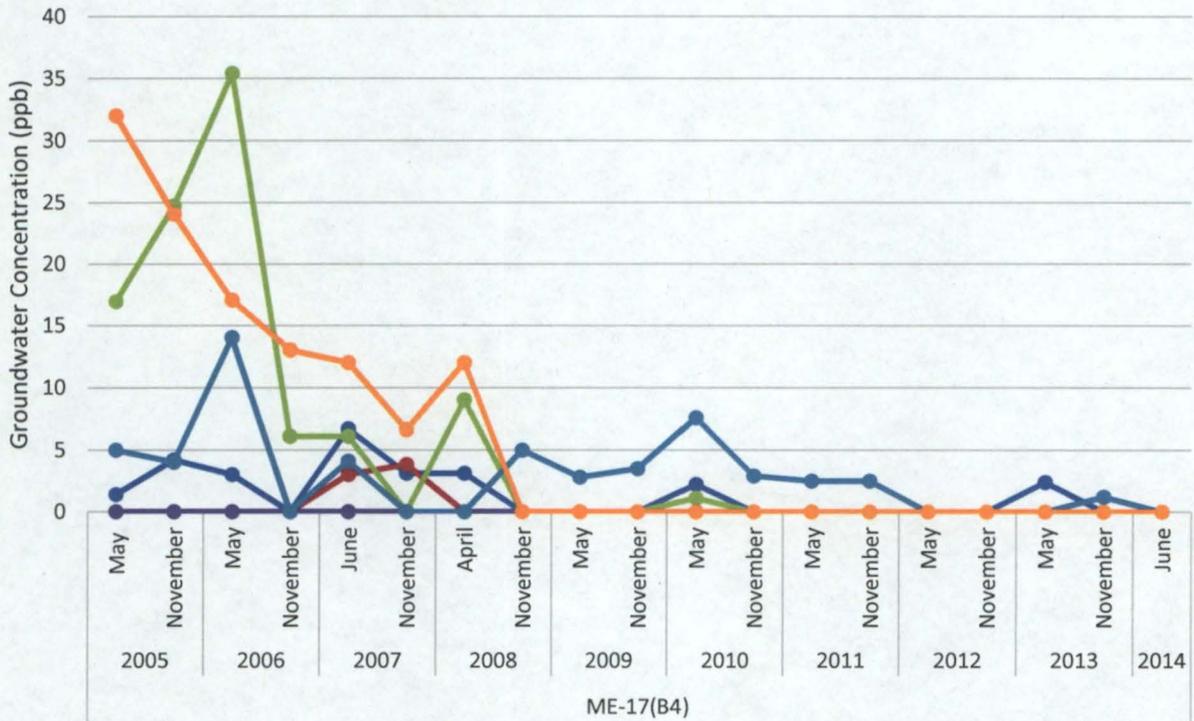
APPENDIX C – GRAPHS/TABLES

Individual Well Data

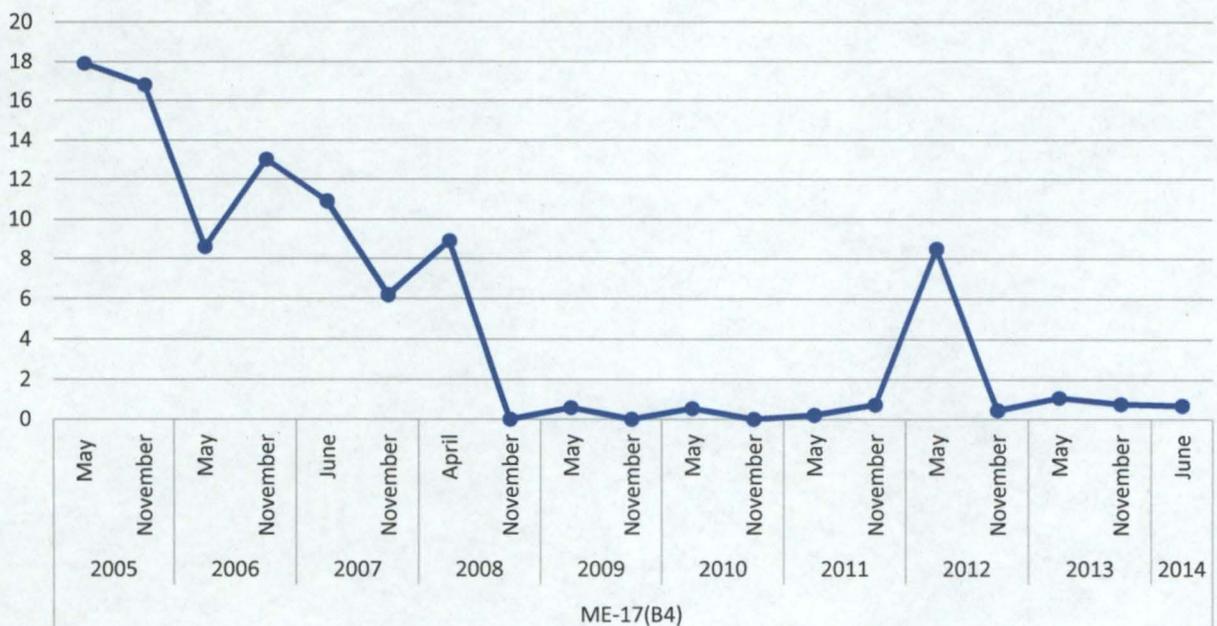


ME-17(B4)

VOCs

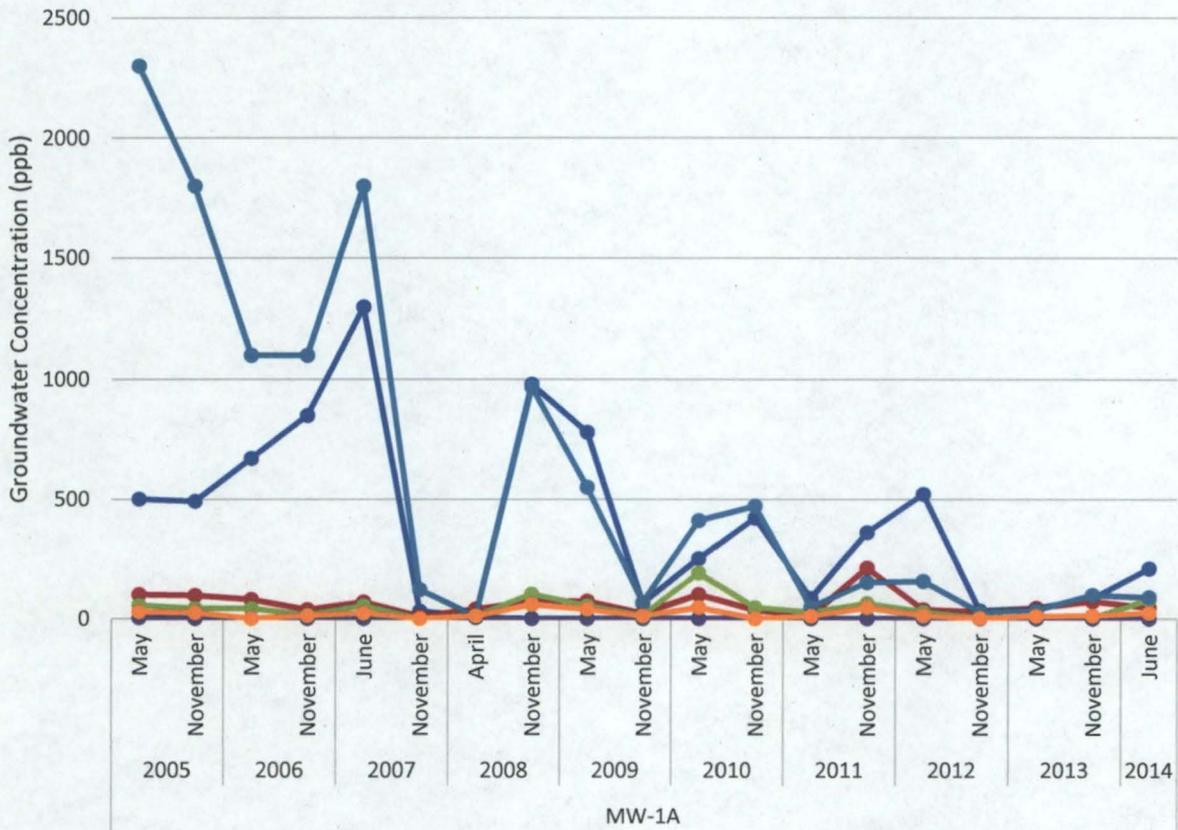


Total PCBs



MW-1A

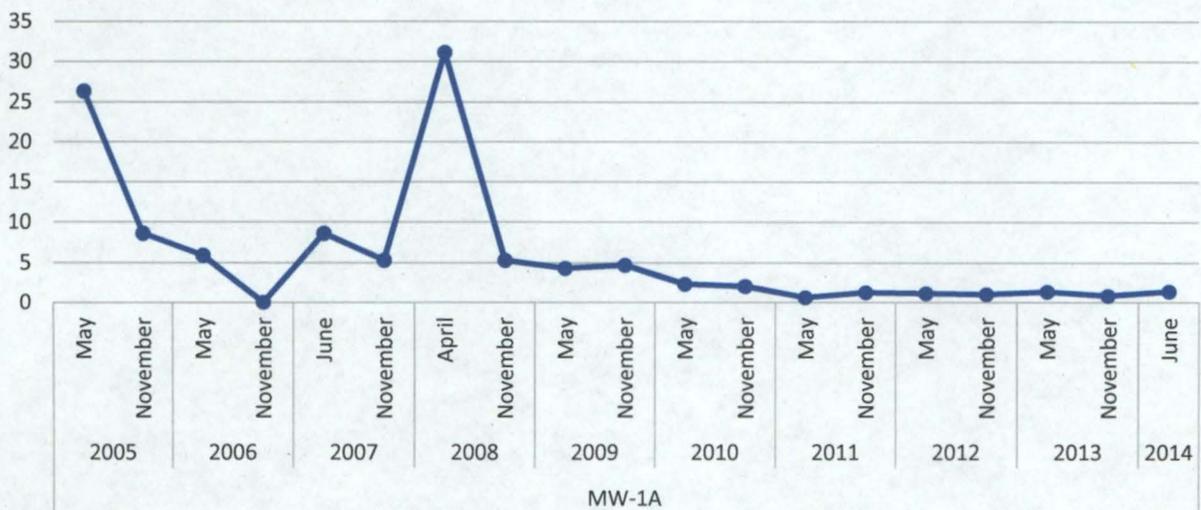
VOCs



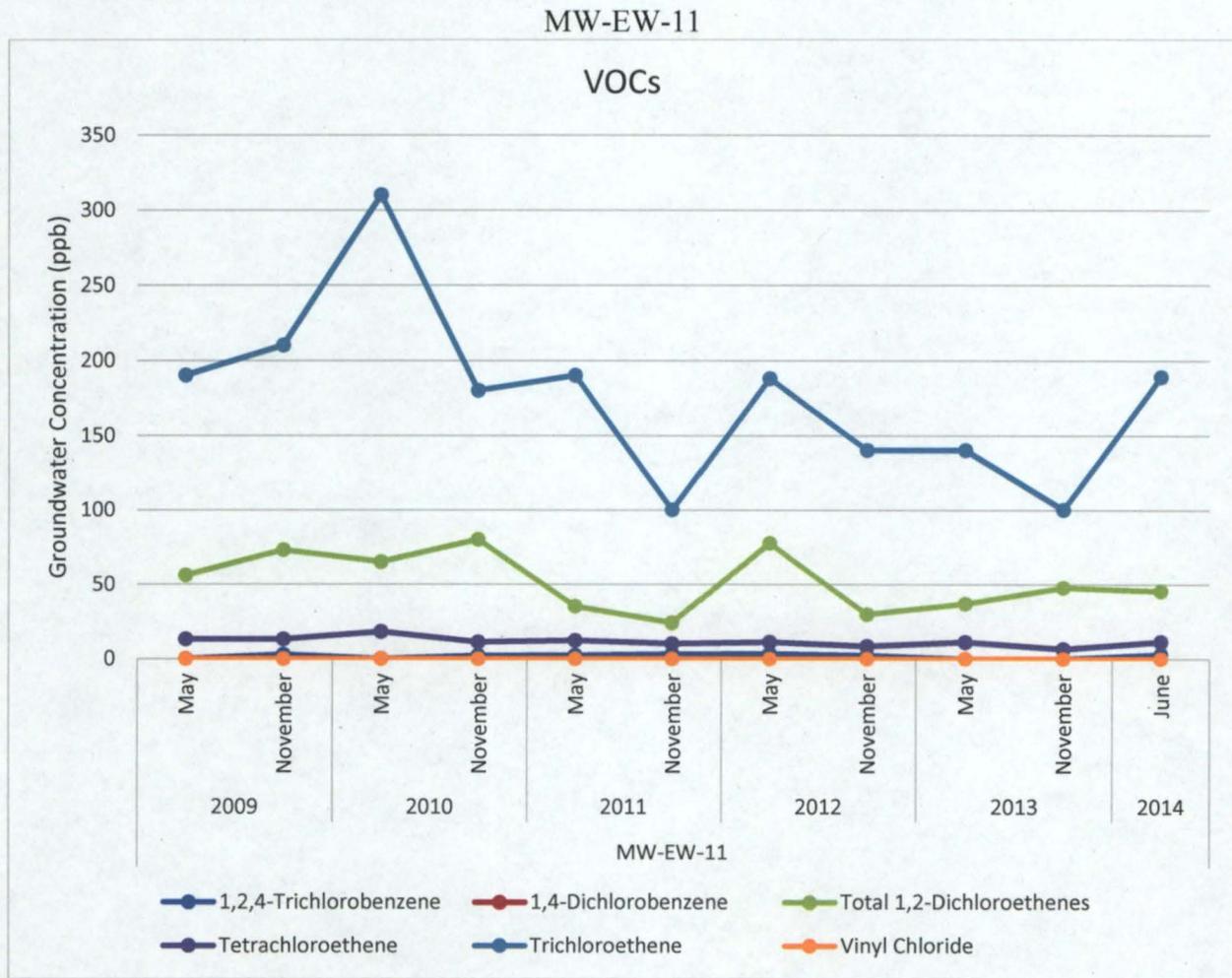
MW-1A

- 1,2,4-Trichlorobenzene ● 1,4-Dichlorobenzene ● Total 1,2-Dichloroethenes
- Tetrachloroethene ● Trichloroethene ● Vinyl Chloride

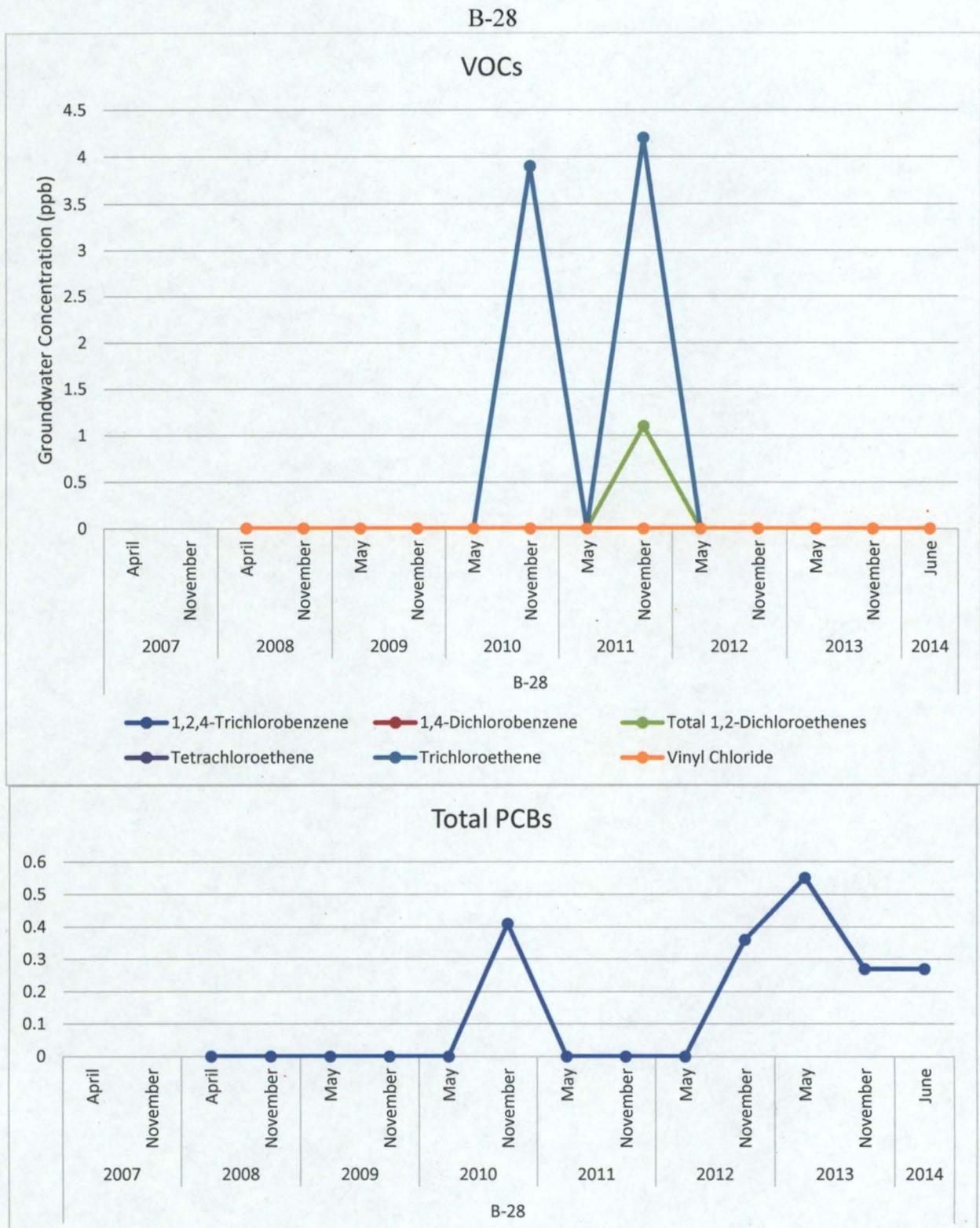
Total PCBs



MW-1A



(No PCB Data – None Detected)



Appendix D - Photographs



Pictures 1-3: Inside sports equipment retail store (Building A).



Pictures 4-6: Inside sports equipment retail store (Building A).



Pictures 7-8: Piping (white PVC) associated with passive vapor mitigation systems.



Pictures 9-10: Mural visible on exterior (rear) of retail store.



Pictures 11-13: Passive vapor mitigation exhaust fans.



Pictures 14-15: Catch basin re-constructed in 2012



Pictures 16 -17: Retail building B (vacant). White protective plastic placed in advance of new tenants.



Pictures 18-19: Unfinished (rear) portion of Building B (note: black vapor barrier still visible).



Pictures 20-22: Storm water detention basin adjacent to Meadow Brook



Pictures 23-24: Minor surface erosion occurring due to overland/sheet flow in north corner of site.



Picture 25: Meadow Brook



Pictures 26-28: Meadow Brook



Pictures 29-31: Cracks and evidence of water seeping through cracks in parking lot pavement.



Pictures 32-33: Gap between surface coat of asphalt and stamped concrete parking lot island.



Pictures 34-35: Corrected deficiencies (Nov 2014): Patched parking lot and rip-rap to prevent surface erosion.



Picture 36: Site and parking lot



Picture 37: Site and parking lot

APPENDIX E – INTERVIEWS



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 1
5 Post Office Square
Boston, MA 02109-3912**

Norwood PCB's Site Interviews 2014

Name: *David Buckley*

Title: *Project Manager*

Organization: *MADEP*

What is your relationship to the Norwood PCBs Site?

State Project Manager for the site

Are there any issues regarding the site that you would like to bring to EPA's attention?

Overall site is well maintained. 2 issues identified during the site visit were:

-The surrogate cap (parking area) continues to exhibit subsurface drainage issues which may be causing damage to it.

-Meadow Brook vegetation maintenance through this may not be site O&M issues

Do you believe that the completed Remedial Actions remain protective of human health and the environment?

Yes the remedial actions taken continue to protect human health and the environment.

Do you foresee any issues becoming a problem affecting the protectiveness of the remedy in the future?

The drainage issue should be addressed so it does not impact the remedy.

Do you have any other questions, comments or concerns?

No



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

Norwood PCB's Site Interviews 2014

Name: Tom Arnold Title: Manager Organization: MonkeySports Capital MA, LLC

What is your relationship to the Norwood PCBs Site?

Owner

Are there any issues regarding the site that you would like to bring to EPA's attention?

None

Do you believe that the completed Remedial Actions remain protective of human health and the environment?

Yes

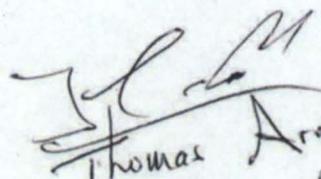
Do you foresee any issues becoming a problem affecting the protectiveness of the remedy in the future?

No

Do you have any other questions, comments or concerns?

No

Thank you


Thomas Arnold
5/29/14



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

Norwood PCB's Site Interviews 2014

Name: JOE LAHAM

Title:

Organization:

What is your relationship to the Norwood PCBs Site?

Owner/Developer

Are there any issues regarding the site that you would like to bring to EPA's attention?

We need to remove the stigma of a Brownfield

Do you believe that the completed Remedial Actions remain protective of human health and the environment?

I would prefer a different process had been employed, this was very costly and difficult.

Do you foresee any issues becoming a problem affecting the protectiveness of the remedy in the future?

NONE!

Do you have any other questions, comments or concerns?

No .. I would extend my appreciation to all of those you assisted in the redevelopment Of this site, if not for the Government agencies this would not have occurred.



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

Norwood PCB's Site Interviews 2014

Name: Dave Nilson Title: Property Manager Organization: Leading Edge Construction Services on behalf of Monkey Sports – Property Owner

What is your relationship to the Norwood PCBs Site? I manage the property for Monkey Sports Inc.

Are there any issues regarding the site that you would like to bring to EPA's attention?

There are several areas where the top coats of the paving surface have been compromised by water seeping up from below the paving course. I would assume that this will be an ongoing maintenance situation, but I wanted to bring it to your attention.

Do you believe that the completed Remedial Actions remain protective of human health and the environment? Yes I do.

Do you foresee any issues becoming a problem affecting the protectiveness of the remedy in the future? The item that I have mentioned here in question # 2.

Do you have any other questions, comments or concerns?

Not at this time.

Appendix F – Vapor Intrusion Risk Summary

MEMORANDUM

To: Daniel Keefe
From: Richard Sugatt *RS*
Date: November 24, 2014
Subject: Risk update for 2010 vapor intrusion risk assessment Norwood PCBs Superfund Site

The potential risk of vapor intrusion into buildings on the Norwood PCBs Superfund Site was evaluated in a May 17, 2010 report entitled "Sub-slab Soil Vapor Sampling, Analysis, and Evaluation Report The Shoppes at Elmway Farms Project Norwood, Massachusetts". The risk assessment in this report is being updated because the inhalation toxicity values for trichloroethene (TCE) have changed such that risk would be higher than calculated in the 2010 risk assessment.

The 2010 vapor intrusion evaluation modelled indoor air concentrations by measuring soil gas concentrations in the sub-slab space between the subsurface liner over contaminated soil and the slab itself and then using a conservative attenuation factor of 0.1 to estimate the concentration in indoor air. Although seven VOCs were detected in soil gas, the evaluation concluded that the only Site-related groundwater contaminants of potential concern were TCE and vinyl chloride (VC). The risk assessment of the estimated maximum concentrations in indoor air indicated that the risk was lower than EPA's maximum risk limits for CERCLA sites (Hazard Quotient (HQ) \leq 1; Elevated Lifetime Cancer Risk (ELCR) \leq 1E-04).

Since the toxicity values for TCE have changed, the risk calculation in the 2010 risk assessment was revised using the same theoretical exposure concentrations from the 2010 risk assessment and the updated toxicity factors. The results of the revised risk assessment are presented in Table 1. The non-cancer risk due to TCE increased from an HQ of 0.3 to 1.5. The revised HQ is higher than EPA's risk limit of HQ=1. The cancer risk increased from an ELCR of 2.2E-06 to 4.5E-06. The revised ELCR is lower than EPA's maximum ELCR of 1E-04. The cancer and non-cancer risk of VC did not change because toxicity factors have not changed.

Although the revised HQ for TCE is higher than 1 (HQs should be rounded to the nearest whole number), it is based on the maximum concentration in soil vapor and a highly conservative (health protective) attenuation factor. Therefore, it is likely that any Site-related indoor air concentrations of TCE are lower than the maximum estimated concentration, probably resulting in HQ values lower than HQ =1. This conclusion is supported by the fact that passive sub-slab ventilation systems were installed as part of site redevelopment and are operating.

Table 1. Updated (2014) Vapor Intrusion Risks-Norwood PCBs

Non-Cancer Risk

Chemical	2010				2014			
	EPC (ug/m ³)	ADE (mg/m ³)	RfC (mg/m ³)	HQ	EPC (ug/m ³)	ADE (mg/m ³)	RfC (mg/m ³)	HQ
TCE	1.3E+01	3.0E-03	1.0E-02	3.0E-01	1.3E+01	3.0E-03	2.0E-03	1.5E+00
VC	2.5E+00	5.7E-04	1.0E-01	5.7E-03	2.5E+00	5.7E-04	1.0E-01	5.7E-03
				3E-01				2E+00

Cancer Risk

Chemical	2010				2014			
	EPC (ug/m ³)	LADE (ug/m ³)	UR (ug/m ³) ⁻¹	ELCR	EPC (ug/m ³)	LADE (ug/m ³)	UR (ug/m ³) ⁻¹	ELCR
TCE	1.3E+01	1.1E+00	2.0E-06	2.2E-06	1.3E+01	1.1E+00	4.1E-06	4.5E-06
VC	2.5E+00	2.0E-01	8.8E-06	1.8E-06	2.5E+00	2.0E-01	8.8E-06	1.8E-06
				4E-06				6E-06

2010 data and toxicity factors from Appendix B of May 17, 2010 "Sub-slab Soil Vapor Sampling, Analysis, and Evaluation Report The Shoppes at Elmway Farms Project Norwood, Massachusetts"

2014 toxicity factors from May 2014 EPA Regional Screening Level tables

EPC = Exposure Point Concentration

ADE = Average Daily Exposure

RfC = inhalation Reference Concentration

HQ = Hazard Quotient

LADE = Lifetime Average Daily Exposure

UR = inhalation Unit Risk

ELCR = Excess Lifetime Cancer Risk

TCE = Trichloroethene

VC = Vinyl chloride

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