



**CITY OF NEW BEDFORD
MASSACHUSETTS**

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MAYOR

June 17, 2005

Ms. Kimberly Tisa
EPA New England, Region 1
1 Congress Street
Suite 1100 (CPT)
Boston, MA 02114-2023

Re: McCoy Field Site – Site Wetlands
225 Hathaway Boulevard
New Bedford, MA 02740

Dear Ms. Tisa:

The enclosed Risk-Based Cleanup Request has been prepared under 40 CFR 761.61(c) for polychlorinated biphenyl (PCB) remediation waste within the portion of the McCoy Field Site (the Site) hereinafter referred to as the "Site Wetlands".

The City's goal is to significantly reduce the risk associated with hazardous material that has migrated from the School Site to the Site Wetlands by excavating contaminated sediment and restoring the natural wetland community. Although the Method 3 Risk Assessment concludes that there is "No Significant Risk of harm to human health, public welfare, safety, and the environment," cleanup activities to achieve a 1 ppm cleanup goal are proposed.

Questions regarding this matter should be addressed to Alan D. Hanscom, LSP-of-Record, at (781) 255-1982, or to me at (508) 979-1487.

Very truly yours,

City of New Bedford

Scott Alfonse
Director of Environmental Stewardship

Cc: Larry Oliveira, School Department
Jacqueline Coucci, City of New Bedford
William DoCarmo, City Project Manager
Gerard Martin, MADEP
Evan Warner, Mount Vernon Group Architects
Alan D. Hanscom, LSP, BETA Group, Inc.

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U.S. EPA, Region 1, ...

Wetlands Risk-Based Cleanup Request

**Wetlands Site at McCoy Field
New Bedford, Massachusetts
RTN 4-15685**

June 17, 2005

Prepared for:

City of New Bedford
New Bedford, Massachusetts

Prepared by:



BETA Group, Inc.

Engineers • Scientists • Planners

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- 2 Laboratory Analytical Results – RCRA 8 Metals and Total Organic Carbon
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ATTACHMENTS

- A Method 3 Risk Characterization Report – June 2005
- B Notice of Intent - May 27, 2005
- C Laboratory Analytical Reports (CD-ROM)
- D QA/QC Plan for Cleanup Verification
- E BRP WW10 Major Project Certification
- F Environmental Notification Form
- G Section 404 Permit

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- 1 Locus Map
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1.0 EXECUTIVE SUMMARY

1.1 Purpose of Submission

This document constitutes a Risk-Based Cleanup Request under 40 CFR 761.61(c) for polychlorinated biphenyl (PCB) remediation waste within the portion of the McCoy Field Site (the “Site”) hereinafter referred to as the “Site Wetlands.” Refer to the Locus Map (Figure 1) for the Site location. The Site Wetlands have been delineated, as shown on Figure 2. The “School Site”, which encompasses landscaped areas, paved areas, and areas within the building footprint, has been addressed in a separate Risk-Based Cleanup Request for the School Site, last revised May 18, 2005.

The self-implementing cleanup level for *Bulk Polychlorinated biphenyl (PCB) remediation waste in high occupancy areas* under §761.61(a)(4)(i)(A) is ≤ 1 part per million (ppm) without further conditions, such as capping. However, use of self-implementing procedures to clean up sediments in freshwater ecosystems is prohibited under §761.61(a)(1)(i)(B). Therefore, even though the cleanup level proposed for sediment in the Site Wetlands is ≤ 1 ppm PCBs, this Risk-Based Cleanup Request must be submitted to demonstrate that the proposed cleanup level will pose “No Significant Risk” of injury to health or the environment.

1.2 Site Background

The property formerly known as McCoy Field (the Site), previously a recreational area occupied by three soccer fields, is the construction site for the New Keith Middle School. The Site is bounded by Hathaway Boulevard to the east, Durfee Street to the north, Summit Street to the west, and Nemasket Street to the south (Figure 2). Much of the material underlying the former soccer fields is relocated fill material from the current New Bedford High School location (east of the Site, across Hathaway Boulevard), where historic dumping and burning activities were reportedly performed prior to construction of the high school in the early 1970s. In or around 1994, the PCB-contaminated debris was spread across the Site and graded for the purposes of athletic field construction. The waste was covered with a sand/gravel leveling course and topsoil prior to construction of the soccer fields. The maximum depth of waste at the Site is 14 feet. As a result, the following distinct horizons are present at the Site:

- Topsoil;
- Sand/gravel layer;
- Fill material;
- Native organic silt; and,
- Native glacial till.

Embankments mark the edge of the fill placement along the northern and western boundaries of the filled area. These embankments lead down to deciduous wood swamp wetland areas, the “Site Wetlands”, where fill material was not historically placed. Over time, constituents from the fill material migrated from the embankment areas to the Site Wetlands from wind erosion and storm water runoff. This Risk-Based Cleanup Request is being submitted to address cleanup of PCB remediation waste that has migrated to the Site Wetlands.

1.3 Wetlands Cleanup Plan

In recent consultation with United States Environmental Protection Agency (US EPA) and Massachusetts Department of Environmental Protection (DEP) representatives, it was determined that cleanup of sediments with residual concentrations of PCBs greater than 1 ppm is the appropriate remedy. The remediation effort will include the removal of up to six inches of impacted sediments at locations within the Site Wetlands. Excavated sediment will be transferred directly into trucks for disposal in a state-approved non-hazardous waste landfill as *PCB remediation waste* at <50 ppm. Removal of the contaminated material will be conducted under the supervision of a licensed site professional (LSP) as required by the Massachusetts Contingency Plan (MCP), 310 CMR 40.0000.

Limited clearing of vegetation is proposed in order to access the surficial sediments to be removed. All disturbed areas will be restored, including replacement of the impacted sediments, replacement of vegetation with selected plant species, and seeding with wetlands seed mix.

1.4 Risk Characterization

The conclusion of a site-specific Method 3 Risk Characterization based on current site conditions is that, despite slight exceedances of the baseline hazard index (HI) of 1.0 for some environmental receptors, the Site is concluded to poses ***No Significant Risk of harm to human health, the environment, public welfare, and safety***. No institutional controls or engineered barriers were assumed in the risk characterization.

2.0 SITE BACKGROUND

2.1 Site History and Setting

BETA Group, Inc. (BETA) has been retained by the City of New Bedford School Department to provide LSP services related to the development of the New Keith Middle School at the location of the current McCoy Field (the "Site"). McCoy Field consists of approximately seven acres of land on the west side of Hathaway Boulevard, opposite New Bedford High School.

For the purposes of conducting cleanup, the Site has been divided into two sections, the "School Site" and the "Site Wetlands". PCB-contaminated debris from a former City burn dump was placed at the School Site in the late 1960s/early 1970s during construction of the New Bedford High School. In or around 1994, PCB-contaminated debris was spread across the School Site and graded for the purposes of athletic field construction.

Embankments mark the edge of the fill placement along the northern and western boundaries of the filled area. These embankments lead down to deciduous wood swamp wetland areas, the "Site Wetlands", where fill material was not historically placed. Over time, constituents from the fill material on the School Site migrated to the Site Wetlands from wind erosion and storm water runoff.

Pre-construction investigations of the School Site revealed the presence of Reportable Concentrations (RCs) of several contaminants in soil, including lead, barium, PCBs, and other semivolatile organic compounds (SVOCs). Initial subsurface investigations conducted in April 2000 by Miller Engineering & Testing, Inc. (Miller) identified four distinct horizons in soil in the playing field: surface soil, a gravel layer, fill (ash and construction and debris wastes), and native soil.

PCB analytical results from samples collected in March 2004 identified PCB concentrations at ≥ 50 ppm at the School Site. Based on these results and past Site activities, PCB-contaminated materials meet the definition of a *PCB remediation waste*, as defined under federal PCB regulations at 40 CFR 761.3. *PCB remediation waste* is regulated under the Toxic Substances Control Act (TSCA) and the PCB regulations at 40 CFR Part 761.

In accordance with a Consent Agreement and Final Order (CAFO) between EPA and the City of New Bedford (the City), the City has conducted sampling and removed the PCB-impacted soil located in the proposed utility corridors and in the vicinity of the proposed building pile caps and grade beams at the School Site. The CAFO also required development of a Work Plan that details the work. Revision 2 of the EPA Work Plan was appended to the CAFO executed by the EPA on May 21, 2004.

Since the original CAFO addressed only soil located in the utility corridors and in the vicinity of the proposed building pile caps and grade beams, the CAFO was amended on October 25, 2004 to encompass sampling and removal to be addressed under Revision 3 of the EPA Work Plan. This revision, submitted on November 5, 2004, expanded the scope of work to include sampling and removal of PCB-impacted soil for installation of the elevator shaft, acid neutralization tanks, above ground storage tank (AST) foundation, light stanchions, detention basins, drain lines, water line, and landscaped areas, as well as

for the remediation of the Site Wetlands and the neighboring properties in the vicinity of Durfee Street and Nemasket Street.

BETA has consulted with EPA and DEP concerning the submittal of this Risk-Based Cleanup Request for the Site Wetlands separate from the request already submitted for the cleanup of the School Site.

2.2 Nature of Contamination

2.2.1 Wetlands Sediment/Soil

Vanasse Hangen Brustlin, Inc. (VHB) collected sediment samples at the Site Wetlands in August 2000 and October 2002. PCBs were detected in the majority of these samples, with an average total PCB concentration of 0.52 ppm and a maximum concentration of 3.49 ppm. On August 11, 2000, sample G1 was collected within the Site Wetlands at the toe of the embankment in a heavily vegetated area in which ash fill was visible. The sample contained 18.4 ppm PCBs, constituting an Imminent Hazard as defined in the MCP at 310 CMR 40.0321(2). Access to the area in the vicinity of 18.4 ppm PCBs detection was restricted by School personnel on August 18, 2000, through installation of snow fencing and exclusion tape. Snow fence was used along the vegetation line, and exclusion tape was used in the woods/swamp where density of the vegetation prevented placement of snow fencing. The exclusion tape was later replaced with snow fencing after brush and vegetation was cleared out of the way.

In order to characterize wetlands sediment for ecological risk assessment, BETA collected 124 samples from the wetlands located to the west and north of McCoy Field in December 2004, January 2005, and April 2005. The laboratory analytical results of the sampling conducted by BETA are included in Tables 1 through 5. A compact disk (CD) containing electronic copies of the laboratory reports is included as Attachment C.

Since the Site Wetlands generally dry out in late summer, the material is evaluated as both soil and sediment. When evaluated as soil, the following constituents were detected at concentrations above the applicable Method 1 S-1 Soil Standards set forth in 310 CMR 40.0000:

Constituent	Locations of Exceedances	Range of Detected Concentrations (mg/kg)	Method 1 S-1 Soil Standard ¹ (mg/kg)	U.S. EPA Residential Cleanup Level (mg/kg)
PCBs (as Aroclor 1254)	IW-2, WC.5-4.5, WC.5-27.5, WD-5, WD.5-2.5, WD.5-17.57, WD-6, WD-11, WD-12, WD-14, WD-15, WD-19, WD-23, WD-24, WD-25, WD-26, WD-27, WH-5 (above, plus) WC.5-22.5, WC.5-24.5, WD.5-3.5, WD-10, WD-17, WD-21, WE-3, WG-4.5, WL.5-5	0.014 – 11.8	2	1
Benzo(a)anthracene	IW-1, IW-2, WB-4, WC.5-14.5, WD.5-17.57	0.1 – 2.3	0.7	--
Benzo(b)fluoranthene	IW-1, IW-2, WC.5-14.5, WC.5-17.28, WD.5-17.57	0.12 – 2.9	0.7	--
Benzo(a)pyrene	IW-1, IW-2, WC.5-14.5, WD.5-17.57	0.11 – 2.3	0.7	--
Indeno(1,2,3-cd)pyrene	IW-2, WC.5-14.5	0.55 – 1.1	0.7	--
Lead	IW-2, WB-7, WC.5-14.5, WD.5-17.57, WD-7, WD-12, WD-23, WD-25, WE-3, WF-8	1.7 – 810	300	--

Notes:

1. Applicable to both S-1/GW-2 and S-1/GW-3 categories.
2. mg/kg – milligrams per kilogram (parts per million)

The following table lists constituents that were detected at concentrations above one or more of the following screening sediment benchmarks:

- Freshwater Sediment Screening Benchmarks (MADEP 2002b);
- If the above was not available, Effect Range-Low (ERL) Values (NOAA 1999); and,
- If neither of the above were available, values calculated from chronic surface water benchmark concentrations using the equilibrium partitioning approach and the 5th percentile organic carbon content of Site soil/sediment.

Constituent	No. Locations With Exceedances/Total Samples Analyzed	Range of Detected Concentrations	Chronic Sediment Screening Benchmark
		(mg/kg)	(mg/kg)
PCBs (as Aroclor 1254)	92 / 124	0.014 – 11.8	0.0598 ¹
Anthracene	4 / 122	0.25 – 0.74	0.0572 ¹
Benzo(a)anthracene	13 / 122	0.1 – 2.3	0.108 ¹
Benzo(b)fluoranthene	5 / 122	0.12 – 2.9	1.116 ²
Benzo(k)fluoranthene	2 / 122	0.13 – 1.4	0.617 ²
Benzo(g,h,i)perylene	4 / 122	0.49 – 1.1	0.226 ²
Benzo(a)pyrene	9 / 122	0.11 – 2.3	0.15 ¹
Chrysene	11 / 122	0.11 – 1.2	0.166 ¹
Fluoranthene	9 / 122	0.11 – 3.6	0.423 ¹
Fluorene	2 / 122	0.089 – 0.14	0.0774 ¹
Phenanthrene	8 / 122	0.095 – 2.6	0.204 ¹
Pyrene	19 / 122	0.12 – 5.6	0.195 ¹
Cadmium	48 / 123	0.2 – 5.75	0.99 ¹
Chromium (total)	7 / 123	3.07 – 79	43.4 ¹

Constituent	No. Locations With Exceedances/Total Samples Analyzed	Range of Detected Concentrations	Chronic Sediment Screening Benchmark
Lead	70 / 123	1.7 – 810	35.8 ¹
Mercury	28 / 123	0.015 – 2.06	0.18 ¹

1. MADEP (2002b).
2. Calculated value.

Wetlands surface sediment sample WD25, collected during the December 2004 sampling event, contained PCBs at a concentration exceeding 10 ppm. On January 18, 2005, the MADEP was notified of this Imminent Hazard (IH) condition. On January 19, 2005, BETA personnel took four additional samples located approximately six feet away from WD25 to determine the extent of PCB concentrations in excess of 10 ppm. The area surrounding sample WD25 was fenced off with high visibility orange plastic fencing to restrict access to the suspect area. Analytical results of the subsequent sampling indicated that the aerial extent of PCB concentrations greater than 10 ppm was limited to the original sample location WD25. In order to increase the frequency of sample locations and delineate the extent of sediment containing >1 ppm PCBs, additional samples were collected in April 2005.

2.2.2 Wetlands Surface Water

Surface water has not been sampled in the Site Wetlands. The Method 3 Risk Characterization Report, included as Attachment A, predicts sediment interstitial water concentrations from soil/sediment using the equilibrium partitioning approach.

2.2.3 Wetlands Groundwater

Groundwater has not been sampled in the Site Wetlands. Limited groundwater sampling conducted in the upland area indicated that concentrations of constituents of concern were very limited; all detected concentrations were below all applicable Method 1 Groundwater Standards. Groundwater for the Site will be monitored in accordance with the Long-Term Monitoring Plan, a draft of which was submitted with the Risk-Based Cleanup Request for the School Site (May 2005).

2.2.4 Adjacent Upland Soil

Site investigations in upland areas of the School Site identified the presence of constituents in soil and fill material at concentrations above applicable MCP Method 1 S-1 Soil Standards. While these conditions do not represent conditions in the Site Wetlands, they describe the upgradient source of contaminants that may have migrated to the Site Wetlands. The following constituents were detected at concentrations above Method 1 S-1 Soil Standards:

- PCBs (as Aroclor 1254)
- Benzidine
- Benzo(a)anthracene
- Benzo(b)fluoranthene
- Benzo(k)fluoranthene
- Benzo(a)pyrene
- Chrysene
- Dibenzo(a,h)anthracene
- Indeno(1,2,3-cd)pyrene
- Total petroleum hydrocarbons (TPH)
- Arsenic
- Barium
- Lead

2.3 Wetlands Sampling Procedures

2.3.1 Sampling Equipment and Methodology

Samples were collected from wetlands sediment using disposable polyvinyl chloride (PVC) liners in conjunction with a hollow shaft sampler, extension rods, and a slam bar hammer. In order to maximize sample recovery, the sampler was driven down two feet into the sediment. Samples were collected from 0 to 6 inches. As necessary to obtain enough sample volume for laboratory analyses, the sleeve was re-advanced as close as possible to the original location. A dedicated disposable liner was used for each sample location. The hollow shaft sampler was decontaminated between sample locations.

2.3.2 Sample Locations

Samples were initially collected on approximately a 40-foot grid. In some cases where initial samples contained >1 ppm PCBs, the grid was tightened to a 20-foot grid and additional samples were collected. Refer to Figure 2 for the layout of the sampling grid and sample locations.

2.3.3 Analytical Parameters

Samples collected for ecological risk characterization were routinely analyzed for PCBs, RCRA 8 Metals, polynuclear aromatic hydrocarbons (PAHs), pesticides, and herbicides. Whenever a metal was detected in excess of 20 times its respective toxicity characteristic level, Toxicity Characteristic Leaching Procedure (TCLP) analysis was conducted. The following reporting limits were used, to the extent possible, by the laboratory:

- PCB = 10 parts per billion (ppb) per Aroclor
- Mercury = 10 ppb
- RCRA 8 Metals (except Mercury) combined = 100 ppb
- Pesticides/herbicides = 10 ppb

2.4 Wetlands Data Quality Assessment

Prior to excavation of contaminated sediment, a data quality assessment will be completed on the characterization sample results. Since the cleanup goal is defined with respect to PCBs, the assessment is focused on PCB analytical results.

2.4.1 Technical Holding Times

The laboratory holding times for both the sample prior to extraction and the extract prior to analysis will be evaluated for compliance with EPA's recommended holding times (14 days and 40 days, respectively).

2.4.2 Surrogate Recoveries

The surrogate recoveries will be compared to the acceptable range (40 to 140%).

2.4.3 Matrix Spike/Matrix Spike Duplicates

Matrix spikes and matrix spike duplicates will be evaluated with respect to the corresponding samples and the relative percent difference will be compared to the acceptable range (50%).

2.4.4 Method Blanks

The analytical results of the method blanks will be reviewed for the detection of target analytes.

Note: Post-excavation confirmatory sampling is to be performed and the horizontal and vertical limits of the excavated areas, including data quality assessment and validation, as discussed in Section 3.4.

3.0 WETLANDS CLEANUP PLAN

3.1 Schedule

3.1.1 Notice of Intent

A Notice of Intent (NOI) was filed with the New Bedford Conservation Commission (the Commission) on May 27, 2005 for Plot 69 Lot 125 and Plot 75 Lot 167. The NOI encompasses removal of contaminated soils and sediments from the wetland area located adjacent to the McCoy Field/Keith Middle School construction project. Refer to Attachment B for a copy of the NOI. A Public Hearing was held on June 14, 2005.

3.1.2 Order of Conditions

In anticipation of meeting the remediation and restoration schedule, we have requested that the Conservation Commission provide an Order of Conditions for this project by mid-July 2005.

3.1.3 Other Permit Requirements

A BRP WW10 Major Project Certification (Water Quality Certification) and Environmental Notification Form (ENF) have been filed with the DEP, with copies to the Army Corp of Engineers (ACOE). Refer to Attachments E and F, respectively. A Section 404 Permit has been filed with the ACOE (Attachment G). Due to the nature of the work and limited opportunity to remediate the wetlands during the dry weather time of the year, we anticipate final approval within six to eight weeks.

3.1.4 Wetlands Cleanup

Wetlands remediation is proposed to take place in September 2005, pending acquisition of the required permits in a timely manner.

3.1.5 Wetlands Restoration

All planting will occur at the beginning or end of the growing season. Fall plantings should be done before the first frost. However, shrubs and trees may be planted up to October 26th, weather permitting. Special conditions and contingency plans are outlined in the Wetlands Restoration Design included in Attachment B.

3.1.6 Conservation Commission Inspections

As discussed with the Conservation Commission, no Site work will be performed prior to a Site inspection and approval of the siltation controls by the Conservation Agent. Subsequently, BETA will coordinate Commission inspections of the Site Wetlands at the project milestones outlined in the NOI (Attachment B).

3.2 Remedial Approach

The remediation project includes the removal of up to six inches of impacted sediments at selected locations within the Site Wetlands (Figure 2). Limited clearing of vegetation is proposed in order to access the area in which the sediments are to be removed. All disturbed areas will be restored, including replacement of the impacted sediments, and seeding with wetlands seed mix.

3.2.1 Wetlands Sediment Removal

In recent consultation with US EPA and DEP representatives, it was determined that cleanup of sediments with residual concentrations of PCBs greater than 1 ppm is the appropriate remedy. Reference is made to the Executive Summary of the Method 3 Risk Characterization Report, included as Attachment A. Removal of the contaminated material will be conducted under the supervision of an LSP as required by the Massachusetts Contingency Plan, 310 CMR 40.0000.

We propose to implement the removal of up to six inches of PCB-impacted sediments at selected locations within the area illustrated on the attached site plan (Figure 2). Access to the area is proposed to include the following:

- Clearing of vegetation, as required, to access areas containing contaminated sediment;
- Physical removal of leaf litter, surface vegetation and surface sediment/soil to the limits direct by BETA's on-site representative;
- Excavation and removal of contaminated sediment, soil and vegetation, including live loading, transportation, and disposal at appropriately licensed disposal facilities; and
- Restoration of disturbed areas, including replacement of the removed sediment/soil with clean sandy soil and seeding with wetlands mix, similar to that used for the current slope stabilization project at McCoy Field.

The remediation contractor will use a combination of a Bobcat (or equivalent) loader, hand tools, and vacuum excavation to remove up to six inches of leaf litter, sediment, and soil from the proposed area of excavation. Trees larger than 4-inches in diameter will not be removed. Hand tools and vacuum excavation will be used to remove all soil within a five-foot radius of trees with a minimum 4-inch trunk diameter.

The temporary disturbance will be conducted at a time when the area is sufficiently dry or frozen to reduce impacts caused by the compaction of equipment. Once the contaminated areas have been excavated, the area will be restored and re-vegetated as described in Section 3.6. Prior to restoration, confirmation sampling will be conducted as detailed in Section 3.5.

3.2.2 Clearing

Remediation activities will result in some areas being cleared of existing vegetation and excavated. If large trees need to be cut to allow equipment access,

the stumps will remain to minimize soil disturbance. Leaving the stumps will also increase the likelihood that the trees will sprout new growth. Any debris, including slash and felled trees will be stockpiled on an upland area adjacent to the site work.

Individual large diameter trees that are Facultative or wetter will be evaluated and marked to remain in the wetland restoration area to take advantage of their shading effect. Selection of canopy trees will be performed by a qualified professional retained by BETA to oversee the wetland restoration activities. This will also create a pit and mound topography creating microenvironments.

3.2.3 Erosion Control

Embankments (edges of fill material) have been stabilized at a slope of 2:1 to 3:1. Any contaminated material remaining on the embankments was covered with a geotextile separation fabric, warning barrier, and three feet of clean soil.

Prior to the initiation of any Site activities, BETA will direct the placement of a row of staked hay bales in staggered formation along the limits of work (LOW) line. All work and all disturbances will occur within the LOW. In the event that flooding rains occur or excess water exists in the work area, dewatering of isolated work areas will be implemented as discussed in Section 3.2.5.

During the project, the remediation contractor will be implementing the provisions of the Storm Water Pollution Prevention Plan (SWPPP) dated September 2004. The SWPPP addresses proper procedures for such items as removing silt from trucks and adjacent roadways, preventing fuel spills, and managing stormwater flow. Additionally, the remediation contractor will be required to place jute erosion mats (and/or straw mulch on level areas) over open excavation areas to minimize erosion by stormwater runoff.

3.2.4 Temporary Access Ways

The remediation contractor will install temporary access ways, where necessary, to allow vehicle access to the areas of proposed excavation. These driveways will be constructed by the placement of non-woven geotextile fabric on the existing cleared ground surface followed by the placement of crushed stone. The access ways will be substantially removed upon the completion of excavation and these areas will be restored in accordance with the Wetland Restoration and Planting Plan included in Attachment B.

3.2.5 Dewatering

Depending on Site conditions, limited dewatering may be necessary to remove standing surface water prior to excavation. If such dewatering is necessary, the Contractor will install shallow groundwater extraction sumps (typically on the order of 4 feet deep) within the limits of work, to remove surface water and provide a limited lowering of the local water table during excavation. The extracted surface and groundwater will be pumped to an on-Site fractionation tank to provide settling of fines followed by discharge into a settling basin to be

constructed on-Site. This treatment and discharge will be performed under a National Pollutant Discharge Elimination System (NPDES) exclusion letter or an NPDES Construction General Permit (CGP), as appropriate, to be obtained by BETA from EPA.

3.3 Disposal Technology

Site investigations in upland areas of the School Site identified the presence of PCBs at concentrations ≥ 50 ppm. Based on these results and past Site activities, PCB-contaminated materials at the School Site meet the definition of a *PCB remediation waste* which is regulated under the TSCA and the PCB regulations at 40 CFR Part 761. Sediment in the Site Wetlands that was impacted from migration of PCBs from the School Site is also *PCB remediation waste*.

The PCB regulations require disposal of *PCB remediation waste* at ≥ 50 ppm in a TSCA-permitted disposal facility or a RCRA hazardous waste landfill; however, the highest concentration of PCBs detected in the Site Wetlands is 11.8 ppm. Therefore, sediment excavated from the Site Wetlands will be disposed in a state-approved non-hazardous waste landfill as *PCB remediation waste* at < 50 ppm.

Excavated sediment will be transferred directly into trucks for removal from the Site and appropriate disposal. All material requiring off-site disposal shall be properly disposed off-site at appropriately permitted landfill or disposal facilities in good standing and holding current, valid permits and licenses in accordance with all federal, state, and local laws, regulations, ordinances, and procedures. Actual disposal facility locations will be identified to EPA prior to shipment of any wastes from the Site.

3.4 Cleanup Verification

3.4.1 Confirmation Sampling Plan

Subsequent to excavation of up to six inches of sediment in the designated remediation area, confirmation samples for vertical delineation of the remediation area will be collected in the same location as the characterization samples. Refer to Figure 2. Confirmation samples of the aerial extent of the remediation area will be collected along the perimeter of the excavation at approximately every 20 feet. The confirmation samples will be collected from the remaining top six inches (6 to 12 inches from the pre-remediation surface). Confirmation samples will be analyzed for PCBs only using EPA Method 8082. Sampling will be performed, to the extent possible, in accordance with the *Region I, EPA New England, Sediment Sampling Guidance* (Draft September 1998), so as to minimize water content to ensure usability ($> 30\%$ solids) in a Tier I-type evaluation. Refer to the QA/QC Plan for Cleanup Verification (Appendix D).

3.4.2 Confirmation Sample Laboratory Analysis

As outlined in the QA/QC Plan for Cleanup Verification, the samples should be analyzed for percent solids prior to PCB analysis to ensure that $> 30\%$ solids are

present. All samples with percent solids $\leq 30\%$ will need to be pretreated (either air drying or freeze drying). Solvent extraction of the sample should only proceed once the percent solids $> 30\%$. Refer to the QA/QC Plan for Cleanup Verification (Appendix D).

3.4.3 Data Validation

The EPA Work Plan (November 2004) outlines the data validation and laboratory and field quality control requirements for samples collected at the Site. All data will undergo a Tier I-type evaluation whereby a completeness check is made. A modified Tier II-type review will be performed on all of the data using QC indicators. Refer to the QA/QC Plan for Cleanup Verification for specific requirements outlined for the Tier I- and Tier II-type evaluations to be implemented for Site Wetlands confirmation samples (Appendix D).

3.5 Wetlands Restoration

The surrounding bordering vegetated wetland (BVW) is well vegetated with a diverse community consisting of red maple trees and saplings, highbush blueberry shrubs, viburnum shrubs and emergent herbaceous plants. The remediation activities will result in approximately 0.87 acres of temporary alteration to the surrounding BVW. Once the area has been excavated and confirmation samples indicate that the remediation goal has been met, re-vegetation efforts can commence.

3.5.1 Planting Plan

The goal of the restoration effort will be to restore the natural plant community so that the impacts of the remediation are minimized. In accordance with 310 CMR 10.55, at least 75% of the surface area of the restoration area must be re-established with indigenous wetland plant species within two growing seasons. The planting plan is depicted in Figures 3.1 and 3.2. For additional details on the planting plan, consult the Wetland Restoration Design prepared by NAA and appended to the Notice of Intent (Attachment B).

The proposed final elevations are the same as current elevations. Any soil amendments needed to create a soil profile to support the planted wetland vegetation will be placed to bring the ground surface to finished elevation. The amended soils used for the replication area will consist of a mixture of 8-10% organic and the remainder of mineral materials. Once the project is complete, it is expected that there will be no loss or impairment of the resource area.

3.5.2 Inspections and Monitoring

BETA will coordinate a Commission inspection of the Site at the following project milestones:

- When erosion controls are installed, prior to any other work;
- After sediment has been excavated (Commission will inspect the soils to be replaced in the restored wetland at this time);

- After soils have been replaced (Commission will inspect plant material to be placed in restoration area at this time); and
- After final plantings are complete.

Any trees that do not remain alive for a minimum of one year from the completion of wetlands restoration will be replaced.

3.6 Contingency Plan

3.6.1 Unanticipated Conditions

Any “suspect” material (characteristically different material) will be segregated and temporarily stored on and covered with 20-mil polyethylene sheeting outside the wetland area until samples are collected, analyzed for suspected contamination. Upon review and evaluation of the results, appropriate disposal options will be assessed and implemented as soon as practicable. Temporary storage of wastes/materials to be segregated for separate characterization will not exceed 100 cubic yards (cy).

3.6.2 Unanticipated Wider Distribution

Since sediment in the Site Wetlands was impacted from material that migrated from the adjacent upland area, the impacted sediment is not expected to occur below the top six inches. Therefore, characterization samples were collected from the surface to six inches. In order to demonstrate that removal of the top six inches of sediment, as indicated in Figure 2, successfully removes the extent of material containing PCBs at concentrations exceeding 1 ppm, confirmation samples will be collected from 6 to 12 inches below pre-excavation grade. If any confirmation samples contain PCBs at concentrations exceeding 1 ppm, the remediation plan will be modified to include removal of the impacted sediment. Then additional confirmation samples will be collected from the top six inches of remaining sediment. This iterative process of excavating and collecting confirmation samples will be carried out until confirmation samples demonstrate that the remediation goal has been achieved.

3.6.3 Other Obstacles

At this time, no “other obstacles” are anticipated; however, the City will be monitoring all construction activities and will be prepared to address unforeseen circumstances that may arise.

4.0 HAZARD IDENTIFICATION

4.1 Constituents of Concern

Constituents of concern (COCs) for the human health risk characterization include the following:

- | | |
|--------------------------|--------------------------|
| ➤ PCBs (as Aroclor 1254) | ➤ Fluorene |
| ➤ Acenaphthene | ➤ Indeno(1,2,3-cd)pyrene |
| ➤ Anthracene | ➤ Phenanthrene |
| ➤ Benzo(a)anthracene | ➤ Pyrene |
| ➤ Benzo(b)fluoranthene | ➤ Barium |
| ➤ Benzo(k)fluoranthene | ➤ Cadmium |
| ➤ Benzo(g,h,i)perylene | ➤ Chromium |
| ➤ Benzo(a)pyrene | ➤ Lead |
| ➤ Chrysene | ➤ Mercury |
| ➤ Fluoranthene | ➤ Selenium |

These COCs are all of the constituents detected in soil/sediment from the wetland area except for the following for the reasons provided:

Arsenic. Arsenic was not detected above either its Method 1 soil standard or its chronic sediment screening benchmark. All detected concentrations were at or below arsenic's natural soil background level (MADEP 2002d).

Silver. Silver was not detected above either its Method 1 Soil Standard or its chronic sediment screening benchmark. All detected concentrations were at or below silver's natural soil background level (MADEP 2002d).

Note that detected concentrations of acenaphthene, anthracene, benzo(a)-anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, benzo(a)pyrene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, phenanthrene, and pyrene, all of which are polycyclic aromatic hydrocarbons (PAHs), are all at or below background levels in natural soil. These constituents are retained because they are also assessed in sediment and there is no generally recognized background level for these COCs in sediment.

4.2 Environmental Fate and Transport Characteristics

Leaching

Leaching potential can be described by a constituent's water solubility and tendency to adsorb to organic carbon in soil. The water solubility of the organic COCs is low to moderate, and the tendency of the COCs to adsorb to organic carbon in soil is high. This indicates that significant desorption of organic COCs from soil or sediment to groundwater or surface water is not likely.

Metals vary in their water solubility depending on the form that exists in the soil or sediment; which is not known. However, most metals generally have a low water solubility and are strongly bound to soil and, with the exception of mercury, are considered non-volatile. Mercury can be volatile; however, this is typically seen at higher than ambient temperatures.

Volatilization

Volatilization potential can be described both by a constituent's vapor pressure and Henry's Law Constant (the ratio of vapor pressure to water solubility, describing the tendency to volatilize from water). The higher the vapor pressure and Henry's law constant, the higher the volatilization potential. The organic COCs generally have a low volatility. This indicates that significant volatilization of the organic COCs to air is unlikely.

Erosion

Due to the engineered barriers at the School Site (soil cap, asphalt cap, building), which will be maintained in accordance with the AUL, no fill material will be present at the ground surface of the School Site. Therefore, surface runoff from the School Site onto the Site Wetlands will not be a migration pathway.

Similarly, the engineered barriers will preclude the potential for entrainment of contaminated soil in the air. During construction activities in which contaminated material is exposed to the air, dust monitoring activities are conducted in accordance with the Soil Management and Dust Monitoring Section of the EPA Work Plan as well as Work Plan Attachment O (Proposed Waste and Regulated Soil Removal Plan).

Furthermore, the Storm Water Pollution Prevention Plan incorporates storm water management, stabilization practices, erosion and sediment control, and spill prevention. Hay bales and silt fences are in place along the toe of the entire embankment.

Persistence

PCBs, PAHs, and metals are generally considered to be persistent in the environment. Degradation of these constituents will occur slowly over time, or not at all (metals).

Bioaccumulation

PCBs, PAHs, and metals are generally considered to have the potential to bioaccumulate in animal or plant tissue.

Toxicity Values

Seven of the COCs are known or probable human carcinogens and assessed as such: PCBs, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, chrysene, and indeno(1,2,3-cd)pyrene. The remainder is assessed as non-carcinogens. Chronic and sub-chronic toxicity values used to quantify the potential carcinogenic and non-carcinogenic human health risks of the COCs are presented on Table 7 and were obtained from the following sources:

- Integrated Risk Information System (IRIS) (U.S. EPA 2005);
- Proposed Revised Method 1 Numerical Standards and supporting documentation (MADEP 2004); and,
- Revisions to Dose-Response Values Used in Human Health Risk Assessment (MADEP 2004a).

Toxicity values used to assess non-carcinogenic health impacts are reference doses (RfD) for ingestion and dermal exposures and reference concentrations (RfC) for inhalation exposures. Toxicity values used to assess excess lifetime cancer risks are cancer slope factors (SF) for ingestion and dermal exposures and inhalation unit risk values (UR) for

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inhalation exposures. Inter-route extrapolations were made (e.g., deriving inhalation toxicity values from oral values), where necessary, to quantify exposures. Brief toxicity profiles for the COCs are presented in Attachment A.

5.0 HUMAN HEALTH RISK CHARACTERIZATION

The Method 3 Risk Characterization, conducted in accordance with 310 CMR 40.0000, for Wetland Areas is based upon the results of sediment sampling conducted in the wetland area from December 2004 through April 2005. The results of samples collected from 2000 to 2002 are not considered due to the age of the data, high reporting limits, and the potential for wetlands sediment to have migrated over time. The objective of the human health risk characterization is to assess if pre-remediation Site conditions pose a potential health risk to exposed humans. AULs and engineered barriers are neither proposed for the Site Wetlands nor assumed in the risk characterization. The conclusion of the Method 3 Risk Characterization is that the Site Wetlands pose No Significant Risk of harm to human health. A summary of the human health risk characterization follows. Refer to Attachment A for a more detailed discussion.

5.1 Exposure Assessment

Human receptors potentially present at the future Keith Middle School include pedestrians, recreators, and trespassers, who may be exposed to COCs during recreational activities, dog-walking, and similar activities. Pedestrians, recreators, and trespassers are assessed in four age groups: children (between the ages of 1 to 8), youth (between the ages of 8 to 15), adults (over age 15), and a combined age group (ages 1 to 30).

The following receptor groups are not quantitatively assessed for the reasons provided:

- Residents: The Site is not currently used for residential purposes, nor is such use anticipated in the near future. Given the presence of the wetland, there is little likelihood that any residential structures will be built. Therefore, residential use of the wetlands is not assessed.
- Commercial Workers: The Site is not currently used for occupational purposes, nor is such use anticipated in the future. Given the presence of the wetland, there is little likelihood that any occupational structures will be built. Therefore, occupational use of the wetlands is not assessed.
- Construction Workers: Worker exposure and any protective measures will be addressed in the remediation contractor's Site-Specific Health & Safety Plan. Based upon the worker exposure assessment performed on the immediately adjacent site containing the same contaminants of concern, dust suppression measures (water spraying) will likely be required to reduce dusts to acceptable levels for potential inhalation by workers and/or to prevent off-site migration.

5.2 Potentially Complete Exposure Pathways

Potential exposure pathways that are quantitatively assessed are:

- Soil/sediment ingestion
- Soil/sediment dermal contact
- Inhalation of entrained soil/sediment particles
- Surface water ingestion
- Surface water dermal contact

All soil/sediment samples are assessed as soil since the wetland area typically dries up in summer, humans are more likely to have contact with soil than submerged sediment, and are more likely to access the Site during the warmer months when the wetlands have dried up. Since groundwater has been sampled at the Site and concentrations of COCs were either non-detect or below the applicable Method 1 Standards; exposure to groundwater is not assessed. Furthermore, since the COCs have a low volatility potential, exposure through volatilization pathways is also not assessed.

5.3 Exposure Factors

Exposure factors used to quantify human exposures were obtained from DEP (2004; 2002a; 1995), U.S. EPA (2004; 1997; 1996), or other, generally recognized guidance. In the absence of specific guidance, assumptions were made regarding the degree of exposure. Relative absorption factors (RAFs) are used to modify absorption through dermal intake and all constituents are conservatively assumed to be 100% absorbed through the oral exposure route. Estimation of the dermal intake of constituents from surface water is estimated using approaches described in U.S. EPA (2004).

5.4 Exposure Point Concentrations

This section evaluates the presence of hot spots and describes the derivation of exposure point concentrations (EPCs) for COCs in soil and groundwater.

5.4.1 Evaluation of Hot Spots

No hot spots, as defined in 310 CMR 40.0006, are contained within the data set.

5.4.2 Soil/Sediment Exposure Point Concentrations

The MCP allows use of the arithmetic mean as an EPC under certain conditions:

- Longer-term exposures are assessed;
- Constituents assessed are not lethal or associated with severe health effects from short-term exposures;
- Data available to characterize the Site are sufficient;
- The data do not exhibit a high degree of variability; and,
- The arithmetic mean is unlikely to underestimate the true mean.

Responses to these conditions are presented below:

- Chronic exposures are assessed for all receptors.
- None of the COCs is believed associated with acute health effects at the environmental concentrations detected; all detected concentrations are below upper concentration limits.
- The amount of data available for the Site is judged sufficient and the scope of analyses is appropriate for the type of release that occurred.
- While a certain amount of variability exists in the data, it is judged to represent spatial distribution of the contamination. All COCs meet the criteria in 310 CMR 40.0926(b) for demonstrating low variability, using the Method 1 S-1 Soil Standard as the applicable standard.

- Since environmental data are often log-normally distributed, the arithmetic mean concentration is likely to overestimate the true central tendency of the data.

5.4.3 Soil/Sediment Exposure Point Concentrations

COCs EPCs present in soil/sediment were calculated using arithmetic mean concentrations for all COCs. Non-detect constituents were included in the arithmetic mean at a concentration equal to one-half the quantitation limit.

The maximum detected concentration of PCBs at WD-25 (11.8 mg/kg) was further characterized by supplemental sampling at four locations immediately surrounding the original sample location (WD-25A, -25B, -25C, and -25D). Lower PCB concentrations were detected in these samples (0.419 mg/kg to 0.987 mg/kg). To avoid over-representing this location, the average of the five sample results was used to represent WD-25.

Sample location WE-6 was sampled on two occasions. The highest detected COC concentrations or the lowest quantitation limits (if not detected) were used to represent this location.

5.4.4 Sediment Interstitial Water and Surface Water Exposure Point Concentrations

Interstitial water EPCs were calculated from soil/sediment EPCs using the equilibrium partitioning approach. Overlying surface water EPCs were calculated from the predicted sediment interstitial water concentration. The predicted water concentrations for each COC are presented in Attachment A.

5.4.5 Air Exposure Point Concentrations

EPCs for soil particles in air were derived using the approach recommended by DEP (1995) to represent soil particle concentrations in air under “open field” conditions.

5.5 Quantitation of Exposure

COC exposure was quantified by combining exposure factors with EPCs to derive an average daily exposure (ADE) or dose (ADD). Risk characterization equations presented in MADEP (1995) were used to quantify exposures and are presented in the risk characterization spreadsheets as an appendix to Attachment A.

5.6 Risk Characterization

5.6.1 Methodology

Potential cancer risks and non-carcinogenic health hazards were quantified by combining estimated COC intakes with the COC’s appropriate toxicity value for the exposure under consideration.

The risk characterization procedure for carcinogenic chemicals derives an excess lifetime cancer risk, which is the excess lifetime risk (i.e., over background risk levels) of incurring cancer from exposure to carcinogens. Cancer risks for each COC, pathway, and age group are summed to derive a total excess lifetime cancer risk, which is compared with the maximum acceptable cancer risk adopted by MADEP: a risk of one-in-one-hundred-thousand, denoted as 1×10^{-5} . A total excess lifetime cancer risk at or below 1×10^{-5} represents no significant risk to human health.

The risk characterization procedure for non-carcinogenic chemicals derives a Hazard Quotient (HQ), which is the ratio of the estimated exposure or intake to an exposure or intake judged to pose no health hazard. HQs are derived separately for each age group. HQs for each COC and pathway are summed to derive a total Hazard Index (HI), which is compared with the maximum acceptable HI adopted by MADEP: 1.0. An HI at or below 1.0 represents "No Significant Risk" to human health.

5.6.2 Risk Characterization Results

Risk characterization calculations are summarized below.

RECREATIONAL/PEDESTRIAN/TRESPASSER RISK CHARACTERIZATION SUMMARY							
Exposure Pathway	Child		Youth		Adult		Combined
	Hazard Index	Cancer Risk	Hazard Index	Cancer Risk	Hazard Index	Cancer Risk	Cancer Risk
Soil/sediment ingestion	0.2	5×10^{-7}	0.05	1×10^{-7}	0.03	2×10^{-7}	8×10^{-7}
Soil/sediment dermal contact	0.08	3×10^{-7}	0.02	8×10^{-8}	0.01	9×10^{-8}	5×10^{-7}
Inhalation of entrained soil particles	0.0006	4×10^{-10}	0.0006	4×10^{-10}	0.0006	1×10^{-9}	2×10^{-9}
Surface water ingestion	0.0005	4×10^{-10}	0.0002	2×10^{-10}	0.0001	3×10^{-10}	9×10^{-10}
Surface water dermal contact	0.0001	1×10^{-8}	0.00009	1×10^{-8}	0.00006	2×10^{-8}	5×10^{-8}
Total (all pathways)	0.3	9×10^{-7}	0.07	2×10^{-7}	0.04	3×10^{-7}	1×10^{-6}
Maximum Acceptable Level	1.0	1×10^{-5}	1.0	1×10^{-5}	1.0	1×10^{-5}	1×10^{-5}

Total HIs for adults, youth, and children are below the maximum acceptable HI (1.0). Total excess lifetime cancer risks for individual and combined age groups are below the maximum acceptable cancer risk. Therefore, the Site poses "No Significant Risk" of harm to human health to pedestrians, recreators, or trespassers.

6.0 ENVIRONMENTAL RISK CHARACTERIZATION

The objective of the environmental risk characterization is to assess if Site conditions in the wetland area pose a potential health risk to exposed environmental receptors. These potential health risks are assessed by performing a risk characterization consistent with DEP and U.S. EPA guidance for environmental risk characterizations.

6.1 Exposure Assessment

A number of threatened or endangered species or species of special concern have been identified in the New Bedford area. These species include terrestrial, avian, reptilian, and amphibian species. Although not specifically identified on the Site Wetlands, some of these species have the potential to be located on the Site Wetlands based on the species' preferred habitat.

Environmental receptors for which exposure and toxicological information is readily available have been selected to serve as surrogates for similar environmental species that may be present on Site Wetlands but for which exposure and toxicological information is not readily available. These receptors are summarized below:

- Earthworms (terrestrial invertebrates)
- Crustaceans (benthic aquatic invertebrates)
- Green frog (amphibians)
- American robin (omnivorous avian species)
- Red-tailed hawk (carnivorous avian species)
- Short-tailed shrew (insectivorous mammals)
- Raccoon (omnivorous mammals)

This set of surrogate receptors spans several trophic levels; including those in intimate contact with potentially impacted media (terrestrial and aquatic invertebrates and the green frog in its embryonic or juvenile form), organisms that feed on these organisms (shrew, raccoon, and robin) and organisms that feed on these primary feeders (raccoon and hawk). These organisms are also consistent with the limited environmental habitat offered by the Site Wetlands because of its urban setting, future planned use, limited size, and isolated character.

Because the wetlands are dry for a portion of the year, the wetlands are not believed to support a fish population. Therefore, species that feed primarily on fish (such as mink or heron) or inhabit primarily aquatic environments (sea otter, muskrat) are not assessed. Similarly, species that tend to inhabit habitats different from the Site (e.g. prairie voles), or have a similar or "less at risk" dietary habit (e.g., are primarily vegetarian) as the selected receptors (e.g., rabbits) are not assessed.

6.2 Potentially Complete Exposure Pathways

In general, invertebrates and amphibian species are directly exposed to impacted media, whereas higher trophic level species are exposed primarily through direct ingestion of

media and the diet. Exposure factors, such as food, water, and soil ingestion rates, and fraction of potentially affected food in the diet, were applied to quantify exposure of these organisms.

6.3 Sediment Interstitial Water and Surface Water Exposure Point Concentrations

Interstitial water EPCs were calculated from soil/sediment EPCs using the equilibrium partitioning approach. Overlying surface water EPCs were calculated from the predicted sediment interstitial water concentration. The predicted interstitial water COC concentrations were applied as EPCs to assess aquatic invertebrates; predicted overlying surface water COCs were applied as EPCs to assess amphibians, avian and mammalian receptor groups. The predicted water concentrations for each COC are presented in Attachment A.

6.4 Toxicity Assessment

6.4.1 Terrestrial Invertebrates

Since the assessment endpoint for this receptor group is survival, toxicity reference values (TRVs) based on acute toxicity in the form of soil concentrations in milligrams per kilogram (mg/kg), were selected.

6.4.2 Aquatic Invertebrates

Since the assessment endpoint for this receptor group is survival, TRVs based on acute toxicity in the form of water concentrations in micrograms per liter ($\mu\text{g/L}$) were selected. These TRVs are later compared with predicted sediment interstitial water concentrations. This form of the TRV was selected rather than bulk sediment concentrations (such as probable effects levels), because bulk sediment benchmark values do not consider Site-specific factors, such as the organic carbon content of the sediment. In addition, the constituent concentration in sediment interstitial water is typically considered the bioavailable fraction.

6.4.3 Amphibians

Available toxicological data for amphibians were obtained from the Reptile and Amphibian Toxicological Literature database (RATL, version 6), maintained by the Environment Canada's National Wildlife Research Centre.¹ Toxicological information was located for Aroclor 1254, benzo(a)pyrene, fluoranthene, cadmium, chromium, lead, mercury, and selenium. Species tested included various frogs, toads, and salamanders, typically tested in the egg or tadpole stage. The assessment endpoints for these receptors are survival, growth, and reproduction, so preference was given to studies identifying a no-observed-

¹ In presentation of lab data, the database states that results are expressed as " $\mu\text{g/L}$ or ppm unless otherwise specified." Since $\mu\text{g/L}$ and ppm differ by three orders of magnitude, the units were sometimes unclear if the data were not specifically labeled. Data associated with uncertain presentation of units were typically not used.

adverse-effect-level (NOAEL). However, since most information was based on acute effects, the following scheme was applied to approximate a chronic effects-based TRV:

Where LC_{50} is the median lethal concentration and EC_{50} is the median effective concentration (for effects other than lethality). The available toxicity values and resultant TRVs are summarized in Appendix A.

6.4.4 Avian Species

The assessment endpoints for this receptor group are survival, growth, and reproduction. TRVs are based on chronic toxicity and are in the form of an intake in milligrams per kilogram of body weight per day (mg/kgBW-dy). Unlike benthic and aquatic invertebrates and amphibians, two TRVs were selected for use: one TRV representing a more conservative level of protection (TRV-Low) and one representing a more moderate level of protection (TRV-High). Several sources of avian TRVs were identified, including TRVs from U.S. EPA, U.S. Department of Energy, and other sources.

In general, when two or more TRV values were available for a TRV type (i.e., low or high), the more commonly adopted value or a value representing the middle of the distribution was typically (but not always) selected for use. In some cases [as in the U.S. EPA (1999) value for PAHs, discussed in the footnote to Table 18, Appendix A], the study design was judged to be inappropriate for use in the risk characterization and was not applied. If a TRV-High value was not available for a COC (all of the PAHs), the TRV-Low value was applied for both risk characterization calculations.

6.4.5 Mammalian Species

The assessment endpoints for this receptor group are survival, growth, and reproduction. TRVs are based on chronic toxicity and are in the form of an intake (mg/kgBW-dy). Two TRVs were selected for use: one TRV representing a more conservative level of protection (TRV-Low) and one representing a more moderate level of protection (TRV-High). Several sources of mammalian TRVs were identified, including TRVs from U.S. EPA, U.S. Department of Energy, and other sources.

In general, when two or more TRV values were available for a TRV type (i.e., low or high), the more commonly adopted value or a value representing the middle of the distribution was typically selected for use.

6.5 Risk Characterization

6.5.1 Terrestrial Invertebrates

Soil EPCs are compared with acute effects-based soil TRVs for the assessment endpoint of survival (chronic TRVs were applied when acute TRVs could not be located).

6.5.2 Aquatic Invertebrates

Since COCs in interstitial water will be more bioavailable than those bound up on sediment particles, predicted interstitial water concentrations are compared with acute effects-based TRVs for the assessment endpoint of survival.

6.5.3 Amphibian Receptors

Since frogs typically lay their eggs on the water surface or attached to floating or submerged vegetation and tadpoles stay within the water column, one-tenth of predicted interstitial water concentrations are used to represent surface water EPCs. Surface water EPCs are compared with chronic effects-based surface water TRVs for the assessment endpoint of survival, growth, and reproduction.

6.5.4 Avian Receptors

Surrogate avian receptors are the American robin and the red-tailed hawk. These birds may have direct contact with COCs contained in surface water and soil/sediment in the wetlands, as well as through their diet.

6.5.5 Mammalian Receptors

Surrogate mammalian receptors are the short-tailed shrew and raccoons. These animals may have direct contact with COCs contained in surface water and soil/sediment in the wetlands, as well as through their diet.

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7.0 WRITTEN CERTIFICATION

Pursuant to §761.61(a)(3)(i)(E), Scott Alfonse, as a representative of the City of New Bedford and the party conducting the cleanup, hereby certifies that all sampling plans, sample collection procedures, sample preparation procedures, extraction procedures, and instrumental chemical analysis procedures used to assess or characterize the PCB contamination at the cleanup site, are on file at:

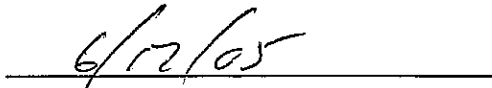
BETA Group, Inc.
315 Norwood Park South
Norwood, MA 02062

and are available for EPA inspection.

City of New Bedford



Director of Environmental Stewardship



Date

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8.0 REFERENCES

U.S. EPA (1998). 40 CFR 761.61. "Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions." *Code of Federal Regulations*.

Table 1

Laboratory Analytical
Results – Polychlorinated
Biphenyls

**Table 1
Laboratory Analytical Results - Polychlorinated Biphenyls
Wetlands**

RCS-1
Turnkey Acceptance Limit
UCL

Sample Identification	Depth	Collection Date	Analysis Date	Total PCBs	PCB-1221			PCB-1232			PCB-1016/1242			PCB-1248			PCB-1254			PCB-1260			PCB-1262			PCB-1268		
				(ug/kg)	(ug/kg)	Q	RL	(ug/kg)	Q	RL	(ug/kg)	Q	RL	(ug/kg)	Q	RL	(ug/kg)	Q	RL	(ug/kg)	Q	RL	(ug/kg)	Q	RL	(ug/kg)	Q	RL
				2,000	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~
IW1-0-6"	0-6"	12/23/04	1/7/05	270	ND	U	20	ND	U	10	ND	U	10	ND	U	10	270	~	10	ND	U	10	ND	U	10	ND	U	10
IW2-0-6"	0-6"	12/23/04	1/11/05	5,710	ND	U	20	ND	U	10	ND	U	10	ND	U	10	5,710	~	10	ND	U	10	ND	U	10	ND	U	10
WA3-0-6"	0-6"	12/21/04	12/23/04	110	ND	U	11	ND	U	5	ND	U	5	ND	U	5	110	~	5	ND	U	5	ND	U	5	ND	U	5
Duplicate 201 (WA3-0-6")	0-6"	12/21/04	12/23/04	230	ND	U	12	ND	U	6	ND	U	6	ND	U	6	230	~	6	ND	U	6	ND	U	6	ND	U	6
WB4-0-6"	0-6"	12/21/04	12/23/04	68	ND	U	21	ND	U	10	ND	U	10	ND	U	10	68	~	10	ND	U	10	ND	U	10	ND	U	10
WB5-0-6"	0-6"	12/21/04	12/23/04	80	ND	U	28	ND	U	14	ND	U	14	ND	U	14	80	~	14	ND	U	14	ND	U	14	ND	U	14
WB6-0-6"	0-6"	12/21/04	12/23/04	113	ND	U	56	ND	U	28	ND	U	28	ND	U	28	113	~	28	ND	U	28	ND	U	28	ND	U	28
WB7-0-6"	0-6"	12/21/04	12/23/04	ND	ND	U	49	ND	U	25	ND	U	25	ND	U	25	ND	U	25	ND	U	25	ND	U	25	ND	U	25
WC-4	0-6"	12/21/04	12/27/04	36	ND	U	45	ND	U	23	ND	U	23	ND	U	23	36	~	23	ND	U	23	ND	U	23	ND	U	23
WC-5	0-6"	12/21/04	12/27/04	74	ND	U	52	ND	U	26	ND	U	26	ND	U	26	74	~	26	ND	U	26	ND	U	26	ND	U	26
WC-6	0-6"	12/21/04	12/27/04	107	ND	U	42	ND	U	21	ND	U	21	ND	U	21	107	~	21	ND	U	21	ND	U	21	ND	U	21
WC7-0-6"	0-6"	12/21/04	12/23/04	640	ND	U	38	ND	U	19	ND	U	19	ND	U	19	640	~	19	ND	U	19	ND	U	19	ND	U	19
WC8-0-6"	0-6"	12/21/04	12/23/04	58	ND	U	56	ND	U	28	ND	U	28	ND	U	28	58	~	28	ND	U	28	ND	U	28	ND	U	28
WC18-0-6"	0-6"	12/23/04	12/30/04	26	ND	U	20	ND	U	10	ND	U	10	ND	U	10	26	~	10	ND	U	10	ND	U	10	ND	U	10
WC19-0-6"	0-6"	12/23/04	1/7/05	110	ND	U	20	ND	U	10	ND	U	10	ND	U	10	110	~	10	ND	U	10	ND	U	10	ND	U	10
WC20-0-6"	0-6"	12/23/04	1/7/05	104	ND	U	20	ND	U	10	ND	U	10	ND	U	10	104	~	10	ND	U	10	ND	U	10	ND	U	10
WC21-0-6"	0-6"	12/23/04	1/7/05	100	ND	U	20	ND	U	10	ND	U	10	ND	U	10	100	~	10	ND	U	10	ND	U	10	ND	U	10
WC22-0-6"	0-6"	12/23/04	12/30/04	68	ND	U	20	ND	U	10	ND	U	10	ND	U	10	68	~	10	ND	U	10	ND	U	10	ND	U	10
WC23-0-6"	0-6"	12/23/04	1/7/05	159	ND	U	20	ND	U	10	ND	U	10	ND	U	10	159	~	10	ND	U	10	ND	U	10	ND	U	10
WC24-0-6"	0-6"	12/23/04	12/30/04	14	ND	U	20	ND	U	10	ND	U	10	ND	U	10	14	~	10	ND	U	10	ND	U	10	ND	U	10
WC25-0-6"	0-6"	12/23/04	12/30/04	71	ND	U	20	ND	U	10	ND	U	10	ND	U	10	71	~	10	ND	U	10	ND	U	10	ND	U	10
WC26-0-6"	0-6"	12/23/04	12/30/04	76	ND	U	20	ND	U	10	ND	U	10	ND	U	10	76	~	10	ND	U	10	ND	U	10	ND	U	10
WC27-0-6"	0-6"	12/23/04	12/30/04	41	ND	U	20	ND	U	10	ND	U	10	ND	U	10	41	~	10	ND	U	10	ND	U	10	ND	U	10
WC.5-4.5	0-6"	4/22/05	4/30/05	4,069	ND	U	173	ND	U	87	ND	U	87	ND	U	87	2,315	~	87	1,754	~	87	ND	U	87	ND	U	87
WC.5-5.5	0-6"	4/22/05	4/30/05	90	ND	U	124	ND	U	62	ND	U	62	ND	U	62	90	~	62	ND	U	62	ND	U	62	ND	U	62
WC.5-6.5	0-6"	4/22/05	4/30/05	ND	ND	U	169	ND	U	85	ND	U	85	ND	U	85	ND	U	85	ND	U	85	ND	U	85	ND	U	85
WC.5-8.5	0-6"	4/22/05	4/30/05	94	ND	U	112	ND	U	56	ND	U	56	ND	U	56	94	~	56	ND	U	56	ND	U	56	ND	U	56
WC.5-9.5	0-6"	4/22/05	4/30/05	135	ND	U	131	ND	U	66	ND	U	66	ND	U	66	135	~	66	ND	U	66	ND	U	66	ND	U	66
WC.5-10.5	0-6"	4/20/05	4/26/05	ND	ND	U	89	ND	U	44	ND	U	44	ND	U	44	ND	U	44	ND	U	44	ND	U	44	ND	U	44
WC.5-11.5	0-6"	4/20/05	4/26/05	36	ND	U	60	ND	U	30	ND	U	30	ND	U	30	36	~	30	ND	U	30	ND	U	30	ND	U	30
WC.5-12.5	0-6"	4/20/05	4/26/05	ND	ND	U	74	ND	U	37	ND	U	37	ND	U	37	ND	U	37	ND	U	37	ND	U	37	ND	U	37
WC.5-13.5	0-6"	4/20/05	4/26/05	232	ND	U	70	ND	U	35	ND	U	35	ND	U	35	232	~	35	ND	U	35	ND	U	35	ND	U	35
Duplicate 222 (WC.5-13.5)	0-6"	4/20/05	4/26/05	105	ND	U	54	ND	U	27	ND	U	27	ND	U	27	105	~	27	ND	U	27	ND	U	27	ND	U	27
WC.5-14.5	0-6"	4/20/05	4/26/05	922	ND	U	41	ND	U	20	ND	U	20	ND	U	20	922	~	20	ND	U	20	ND	U	20	ND	U	20
WC.5-14.5MS	0-6"	4/20/05	4/26/05	500	ND	U	35	ND	U	18	ND	U	18	ND	U	18	500	~	18	ND	U	18	ND	U	18	ND	U	18
WC.5-14.5MSD	0-6"	4/20/05	4/26/05	90	ND	U	38	ND	U	19	ND	U	19	ND	U	19	90	~	19	ND	U	19	ND	U	19	ND	U	19
WC.5-15.5	0-6"	4/20/05	4/26/05	175	ND	U	43	ND	U	22	ND	U	22	ND	U	22	175	~	22	ND	U	22	ND	U	22	ND	U	22
WC.5-16.5	0-6"	4/20/05	4/26/05	ND	ND	U	14	ND	U	7	ND	U	7	ND	U	7	ND	U	7	ND	U	7	ND	U	7	ND	U	7
WC.5-17.14	0-6"	4/20/05	4/26/05	441	ND	U	55	ND	U	28	ND	U	28	ND	U	28	441	~	28	ND	U	28	ND	U	28	ND	U	28
WC.5-17.28	0-6"	4/20/05	4/26/05	546	ND	U	26	ND	U	13	ND	U	13	ND	U	13	546	~	13	ND	U	13	ND	U	13	ND	U	13
WC.5-18.5	0-6"	4/25/05	5/2/05	135	ND	U	34	ND	U	17	ND	U	17	ND	U	17	135	~	17	ND	U	17	ND	U	17	ND	U	17

Table 1
Laboratory Analytical Results - Polychlorinated Biphenyls
Wetlands

Sample Identification	Depth	Collection Date	Analysis Date	RCS-1 Turnkey Acceptance Limit UCL																								
				Total PCBs	PCB-1221			PCB-1232			PCB-1016/1242			PCB-1248			PCB-1254			PCB-1260			PCB-1262			PCB-1268		
				(ug/kg)	(ug/kg)	Q	RL	(ug/kg)	Q	RL	(ug/kg)	Q	RL	(ug/kg)	Q	RL	(ug/kg)	Q	RL	(ug/kg)	Q	RL	(ug/kg)	Q	RL	(ug/kg)	Q	RL
				2,000	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~
WC.5-19.5	0-6"	4/25/05	5/2/05	ND	ND	U	24	ND	U	12	ND	U	12	ND	U	12	ND	U	12	ND	U	12	ND	U	12			
WC.5-20.5	0-6"	4/25/05	5/2/05	ND	ND	U	39	ND	U	19	ND	U	19	ND	U	19	ND	U	19	ND	U	19	ND	U	19			
WC.5-21.5	0-6"	4/25/05	5/2/05	72	ND	U	33	ND	U	17	ND	U	17	ND	U	17	72	~	17	ND	U	17	ND	U	17			
WC.5-22.5	0-6"	4/25/05	5/2/05	1,160	ND	U	42	ND	U	21	ND	U	21	ND	U	21	1,160	~	21	ND	U	21	ND	U	21			
WC.5-23.5	0-6"	4/25/05	5/2/05	379	ND	U	38	ND	U	19	ND	U	19	ND	U	19	379	~	19	ND	U	19	ND	U	19			
WC.5-24.5	0-6"	4/25/05	5/2/05	1,520	ND	U	46	ND	U	23	ND	U	23	ND	U	23	1,520	U	23	ND	U	23	ND	U	23			
Duplicate 223 (WC.5-24.5)	0-6"	4/25/05	5/2/05	67	ND	U	64	ND	U	32	ND	U	32	ND	U	32	67	~	32	ND	U	32	ND	U	32			
WC.5-25.5	0-6"	4/25/05	5/2/05	119	ND	U	35	ND	U	17	ND	U	17	ND	U	17	119	~	17	ND	U	17	ND	U	17			
WC.5-26.5	0-6"	4/25/05	5/2/05	140	ND	U	39	ND	U	19	ND	U	19	ND	U	19	140	~	19	ND	U	19	ND	U	19			
WC.5-27.5	0-6"	4/25/05	5/2/05	2,820	ND	U	24	ND	U	12	ND	U	12	ND	U	12	2,820	U	12	ND	U	12	ND	U	12			
WD-3 (0-6")	0-6"	12/22/04	12/27/04	160	ND	U	20	ND	U	10	ND	U	10	ND	U	10	160	~	10	ND	U	10	ND	U	10			
WD-4 (0-6")	0-6"	12/22/04	12/27/04	240	ND	U	20	ND	U	10	ND	U	10	ND	U	10	240	~	10	ND	U	10	ND	U	10			
WD-4.5	0-6"	4/22/05	4/30/05	330	ND	U	132	ND	U	66	ND	U	66	ND	U	66	330	~	66	ND	U	66	ND	U	66			
WD-5 (0-6")	0-6"	12/22/04	12/27/04	4,730	ND	U	20	ND	U	10	ND	U	10	ND	U	10	4,730	~	10	ND	U	10	ND	U	10			
Duplicate 202 (WD-5-0-6")	0-6"	12/22/04	12/27/04	3,740	ND	U	20	ND	U	10	ND	U	10	ND	U	10	3,740	~	10	ND	U	10	ND	U	10			
WD-6 (0-6")	0-6"	12/22/04	12/27/04	2,250	ND	U	20	ND	U	10	ND	U	10	ND	U	10	2,250	~	10	ND	U	10	ND	U	10			
WD-6.5	0-6"	4/22/05	4/30/05	93	ND	U	142	ND	U	71	ND	U	71	ND	U	71	93	~	71	ND	U	71	ND	U	71			
WD-7	0-6"	12/21/04	12/27/04	571	ND	U	28	ND	U	14	ND	U	14	ND	U	14	571	~	14	ND	U	14	ND	U	14			
WD8-0-6"	0-6"	12/21/04	12/23/04	151	ND	U	42	ND	U	21	ND	U	21	ND	U	21	151	~	21	ND	U	21	ND	U	21			
WD-9 (0-6")	0-6"	12/22/04	12/27/04	560	ND	U	20	ND	U	10	ND	U	10	ND	U	10	560	~	10	ND	U	10	ND	U	10			
WD-10 (0-6")	0-6"	12/22/04	12/27/04	1,020	ND	U	20	ND	U	10	ND	U	10	ND	U	10	1,020	~	10	ND	U	10	ND	U	10			
WD-10.5	0-6"	4/20/05	4/26/05	64	ND	U	65	ND	U	33	ND	U	33	ND	U	33	64	~	33	ND	U	33	ND	U	33			
WD-11 (0-6")	0-6"	12/22/04	12/27/04	5,420	ND	U	20	ND	U	10	ND	U	10	ND	U	10	5,420	~	10	ND	U	10	ND	U	10			
WD-12 (0-6")	0-6"	12/22/04	12/27/04	4,060	ND	U	20	ND	U	10	ND	U	10	ND	U	10	4,060	~	10	ND	U	10	ND	U	10			
WD-13 (0-6")	0-6"	12/22/04	12/27/04	ND	ND	U	20	ND	U	10	ND	U	10	ND	U	10	ND	U	10	ND	U	10	ND	U	10			
WD-14 (0-6")	0-6"	12/22/04	12/27/04	8,910	ND	U	20	ND	U	10	ND	U	10	ND	U	10	8,910	~	10	ND	U	10	ND	U	10			
WD-15 (0-6")	0-6"	12/22/04	12/27/04	3,900	ND	U	20	ND	U	10	ND	U	10	ND	U	10	3,900	~	10	ND	U	10	ND	U	10			
WD-15.5	0-6"	4/20/05	4/26/05	33	ND	U	20	ND	U	10	ND	U	10	ND	U	10	33	~	10	ND	U	10	ND	U	10			
WD-16 (0-6")	0-6"	12/22/04	12/27/04	ND	ND	U	20	ND	U	10	ND	U	10	ND	U	10	ND	U	10	ND	U	10	ND	U	10			
WD-17 (0-6")	0-6"	12/22/04	5/17/06	1,080	ND	U	20	ND	U	10	ND	U	10	ND	U	10	1,080	~	10	ND	U	10	ND	U	10			
WD-17.46	0-6"	4/20/05	4/26/05	282	ND	U	52	ND	U	26	ND	U	26	ND	U	26	282	~	26	ND	U	26	ND	U	26			
WD-17.57	0-6"	4/20/05	4/26/05	35	ND	U	25	ND	U	13	ND	U	13	ND	U	13	35	~	13	ND	U	13	ND	U	13			
WD18-0-6"	0-6"	12/23/04	1/4/05	724	ND	U	20	ND	U	10	ND	U	10	ND	U	10	724	~	10	ND	U	10	ND	U	10			
WD19-0-6"	0-6"	12/23/04	1/4/05	2,090	ND	U	20	ND	U	10	ND	U	10	ND	U	10	2,090	~	10	ND	U	10	ND	U	10			
WD20-0-6"	0-6"	12/23/04	12/30/04	22	ND	U	20	ND	U	10	ND	U	10	ND	U	10	22	~	10	ND	U	10	ND	U	10			
WD21-0-6"	0-6"	12/23/04	1/4/05	1,390	ND	U	20	ND	U	10	ND	U	10	ND	U	10	1,390	~	10	ND	U	10	ND	U	10			
WD21-0-6" MS	0-6"	12/23/04	1/4/05	479	ND	U	20	ND	U	10	ND	U	10	ND	U	10	479	~	10	ND	U	10	ND	U	10			
WD21-0-6" MSD	0-6"	12/23/04	1/4/05	547	ND	U	20	ND	U	10	ND	U	10	ND	U	10	547	~	10	ND	U	10	ND	U	10			
WD22-0-6"	0-6"	12/23/04	1/4/05	96	ND	U	20	ND	U	10	ND	U	10	ND	U	10	96	~	10	ND	U	10	ND	U	10			
WD23-0-6"	0-6"	12/23/04	1/4/05	9,480	ND	U	20	ND	U	10	ND	U	10	ND	U	10	9,480	~	10	ND	U	10	ND	U	10			
WD24-0-6"	0-6"	12/23/04	1/7/05	3,850	ND	U	20	ND	U	10	ND	U	10	ND	U	10	3,850	~	10	ND	U	10	ND	U	10			

Table 1
Laboratory Analytical Results - Polychlorinated Biphenyls
Wetlands

Sample Identification	Depth	Collection Date	Analysis Date	RCS-1 Turnkey Acceptance Limit UCL	Total PCBs	PCB-1221			PCB-1232			PCB-1016/1242			PCB-1248			PCB-1254			PCB-1260			PCB-1262			PCB-1268					
					(ug/kg)	(ug/kg)	Q	RL	(ug/kg)	Q	RL	(ug/kg)	Q	RL	(ug/kg)	Q	RL	(ug/kg)	Q	RL	(ug/kg)	Q	RL	(ug/kg)	Q	RL	(ug/kg)	Q	RL	(ug/kg)	Q	RL
					2,000	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~
					50,000	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~
100,000	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~					
WD25-0-6"	0-6"	12/23/04	1/4/05	11,800	ND	U	20	ND	U	10	ND	U	10	ND	U	10	11,800	~	10	ND	U	10	ND	U	10	ND	U	10				
WD25-A-0-6"	0-6"	1/19/05	1/20/05	419	ND	U	100	ND	U	50	ND	U	50	ND	U	50	419	~	50	ND	U	50	ND	U	50	ND	U	50				
WD25-B-0-6"	0-6"	1/19/05	1/20/05	482	ND	U	96	ND	U	48	ND	U	48	ND	U	48	482	~	48	ND	U	48	ND	U	48	ND	U	48				
WD25-C-0-6"	0-6"	1/19/05	1/20/05	459	ND	U	99	ND	U	50	ND	U	50	ND	U	50	459	~	50	ND	U	50	ND	U	50	ND	U	50				
WD25-D-0-6"	0-6"	1/19/05	1/20/06	987	ND	U	100	ND	U	50	ND	U	50	ND	U	50	987	~	50	ND	U	50	ND	U	50	ND	U	50				
WD26-0-6"	0-6"	12/23/04	1/10/05	2,770	ND	U	20	ND	U	10	ND	U	10	ND	U	10	2,770	~	10	ND	U	10	ND	U	10	ND	U	10				
Duplicate 203 (WD26-0-6")	0-6"	12/23/04	1/4/05	5,510	ND	U	20	ND	U	10	ND	U	10	ND	U	10	5,510	~	10	ND	U	10	ND	U	10	ND	U	10				
WD27-0-6"	0-6"	12/23/04	1/10/05	4,100	ND	U	20	ND	U	10	ND	U	10	ND	U	10	4,100	~	10	ND	U	10	ND	U	10	ND	U	10				
WD.5-2.5	0-6"	4/25/05	5/2/05	4,340	ND	U	27	ND	U	14	ND	U	14	ND	U	14	4,340	~	14	ND	U	14	ND	U	14	ND	U	14				
WD.5-3	0-6"	4/25/05	5/2/05	655	ND	U	32	ND	U	16	ND	U	16	ND	U	16	655	~	16	ND	U	16	ND	U	16	ND	U	16				
WD.5-3.5	0-6"	4/25/05	5/2/05	1,130	ND	U	111	ND	U	56	ND	U	56	ND	U	56	1,130	~	56	ND	U	56	ND	U	56	ND	U	56				
WD.5-3.5MS	0-6"	4/25/05	5/2/05	1,780	ND	U	94	ND	U	47	ND	U	47	ND	U	47	1,780	~	47	ND	U	47	ND	U	47	ND	U	47				
WD.5-3.5MDS	0-6"	4/25/05	5/2/05	3,010	ND	U	150	ND	U	75	ND	U	75	ND	U	75	3,010	~	75	ND	U	75	ND	U	75	ND	U	75				
WD.5-4.5	0-6"	4/22/05	4/30/05	ND	ND	U	165	ND	U	83	ND	U	83	ND	U	83	ND	U	83	ND	U	83	ND	U	83	ND	U	83				
WD.5-5.5	0-6"	4/22/05	4/30/05	ND	ND	U	157	ND	U	78	ND	U	78	ND	U	78	ND	U	78	ND	U	78	ND	U	78	ND	U	78				
WD.5-6.5	0-6"	4/22/05	4/30/05	ND	ND	U	160	ND	U	80	ND	U	80	ND	U	80	ND	U	80	ND	U	80	ND	U	80	ND	U	80				
WD.5-17.14	0-6"	4/20/05	4/26/05	65	ND	U	44	ND	U	22	ND	U	22	ND	U	22	65	~	22	ND	U	22	ND	U	22	ND	U	22				
WD.5-17.28	0-6"	4/20/05	4/26/05	ND	ND	U	26	ND	U	13	ND	U	13	ND	U	13	ND	U	13	ND	U	13	ND	U	13	ND	U	13				
WD.5-17.46	0-6"	4/20/05	4/26/05	118	ND	U	45	ND	U	23	ND	U	23	ND	U	23	118	~	23	ND	U	23	ND	U	23	ND	U	23				
WD.5-17.57	0-6"	4/20/05	4/26/05	9,380	ND	U	34	ND	U	17	ND	U	17	ND	U	17	9,380	~	17	ND	U	17	ND	U	17	ND	U	17				
WE-2.5	0-6"	4/25/05	5/2/05	777	ND	U	31	ND	U	15	ND	U	15	ND	U	15	777	~	15	ND	U	15	ND	U	15	ND	U	15				
WE-3 (0-6")	0-6"	12/22/04	12/27/04	1,950	ND	U	20	ND	U	10	ND	U	10	ND	U	10	1,950	~	10	ND	U	10	ND	U	10	ND	U	10				
WE-3.5	0-6"	4/25/05	5/2/05	ND	ND	U	166	ND	U	83	ND	U	83	ND	U	83	ND	U	83	ND	U	83	ND	U	83	ND	U	83				
WE-4 (0-6")	0-6"	12/22/04	12/27/04	122	ND	U	20	ND	U	10	ND	U	10	ND	U	10	122	~	10	ND	U	10	ND	U	10	ND	U	10				
WE-5 (0-6")	0-6"	12/22/04	12/27/04	320	ND	U	20	ND	U	10	ND	U	10	ND	U	10	320	~	10	ND	U	10	ND	U	10	ND	U	10				
WE-6	0-6"	12/21/04	12/27/04	ND	ND	U	44	ND	U	22	ND	U	22	ND	U	22	ND	U	22	ND	U	22	ND	U	22	ND	U	22				
WE-6 (0-6")	0-6"	12/22/04	12/27/04	ND	ND	U	20	ND	U	10	ND	U	10	ND	U	10	ND	U	10	ND	U	10	ND	U	10	ND	U	10				
WE-7	0-6"	12/21/04	12/27/04	ND	ND	U	36	ND	U	18	ND	U	18	ND	U	18	ND	U	18	ND	U	18	ND	U	18	ND	U	18				
WE8-0-6"	0-6"	12/21/04	12/23/04	44	ND	U	41	ND	U	21	ND	U	21	ND	U	21	44	~	21	ND	U	21	ND	U	21	ND	U	21				
WE.5-2.5	0-6"	4/25/05	5/2/05	601	ND	U	121	ND	U	61	ND	U	61	ND	U	61	601	~	61	ND	U	61	ND	U	61	ND	U	61				
WE.5-3	0-6"	4/25/05	5/2/05	ND	ND	U	221	ND	U	111	ND	U	111	ND	U	111	ND	U	111	ND	U	111	ND	U	111	ND	U	111				
Duplicate 220 (WE.5-3)	0-6"	4/25/05	5/2/05	ND	ND	U	147	ND	U	74	ND	U	74	ND	U	74	ND	U	74	ND	U	74	ND	U	74	ND	U	74				
WE.5-3.5	0-6"	4/25/05	5/2/05	ND	ND	U	151	ND	U	76	ND	U	76	ND	U	76	ND	U	76	ND	U	76	ND	U	76	ND	U	76				
WF-3 (0-6")	0-6"	12/22/04	12/27/04	740	ND	U	20	ND	U	10	ND	U	10	ND	U	10	740	~	10	ND	U	10	ND	U	10	ND	U	10				
WF-4 (0-6")	0-6"	12/22/04	12/27/04	640	ND	U	20	ND	U	10	ND	U	10	ND	U	10	640	~	10	ND	U	10	ND	U	10	ND	U	10				
WF-5 (0-6")	0-6"	12/22/04	12/27/04	ND	ND	U	20	ND	U	10	ND	U	10	ND	U	10	ND	U	10	ND	U	10	ND	U	10	ND	U	10				
WF-6 (0-6")	0-6"	12/22/04	12/27/04	270	ND	U	20	ND	U	10	ND	U	10	ND	U	10	270	~	10	ND	U	10	ND	U	10	ND	U	10				
WF-7	0-6"	12/21/04	12/27/04	104	ND	U	42	ND	U	21	ND	U	21	ND	U	21	104	~	21	ND	U	21	ND	U	21	ND	U	21				
WF8-0-6"	0-6"	12/21/04	12/23/04	325	ND	U	35	ND	U	18	ND	U	18	ND	U	18	325	~	18	ND	U	18	ND	U	18	ND	U	18				
WG-3 (0-6")	0-6"	12/22/04	12/27/04	ND	ND	U	20	ND	U	10	ND	U	10	ND	U	10	ND	U	10	ND	U	10	ND	U	10	ND	U	10				
WG-4 (0-6")	0-6"	12/22/04	12/27/04	280	ND	U	20	ND	U	10	ND	U	10	ND	U	10	280	~	10	ND	U	10	ND	U	10	ND	U	10				

Table 2

Laboratory Analytical
Results – RCRA 8 Metals
and Total Organic Carbon

Table 2
Laboratory Analytical Results - RCRA 8 Metals and Total Organic Carbon
Wetlands

Sample Identification	Depth	Date	RCRA 8 Metals														TCLP	TOC		
			Arsenic		Barium		Cadmium		Chromium		Lead		Mercury		Selenium		Silver		Lead	TOC
			(mg/kg)	RL	(mg/kg)	RL	(mg/kg)	RL	(mg/kg)	RL	(mg/kg)	RL	(mg/kg)	RL	(mg/kg)	RL	(mg/kg)	RL	(mg/L)	(%)
			30	30	1,000	1,000	30	30	1,000	1,000	300	300	20	20	400	400	100	100	~	~
			20	20	50	50	3	3	40	40	600	600	1	1	1	1	5	5	~	5
																		~	100	
																		5.0	~	
																		~	2,000	
IW1-0-6"	0-6"	12/23/04	1.81	0.12	19	0.06	0.81	0.06	7.14	0.06	44	0.06	0.063	0.012	ND	0.12	ND	0.06	~	7.37
IW2-0-6"	0-6"	12/23/04	6.38	0.15	584	0.38	3.77	0.08	57	0.08	560	0.38	0.835	0.150	ND	0.15	0.38	0.08	0.2	11.49
WA3-0-6"	0-6"	12/21/04	1.09	0.14	23	0.07	1.04	0.07	13	0.07	198	0.07	0.037	0.007	ND	0.14	ND	0.07	1.8	2.9
Duplicate 201 (WA3-0-6")	0-6"	12/21/04	1.04	0.13	28	0.06	1.05	0.06	16	0.06	374	0.06	0.057	0.007	ND	0.13	ND	0.06	2.1	3.1
WB4-0-6"	0-6"	12/21/04	0.27	0.22	55	0.11	1.76	0.11	38	0.11	134	0.11	0.094	0.012	ND	0.22	0.11	0.11	0.21	12
WB5-0-6"	0-6"	12/21/04	0.58	0.32	62	0.16	2.05	0.16	42	0.16	127	0.16	0.096	0.016	ND	0.32	ND	0.16	0.17	12.6
WB6-0-6"	0-6"	12/21/04	ND	0.64	99	0.32	1.8	0.32	18	0.32	170	0.32	0.136	0.032	ND	0.64	ND	0.32	<0.1	38
WB7-0-6"	0-6"	12/21/04	1.11	0.62	40	0.31	0.98	0.31	11	0.31	502	0.31	0.235	0.029	0.86	0.62	0.37	0.31	<0.1	57.1
WC-4	0-6"	12/21/04	0.71	0.50	88	0.25	1.56	0.25	17	0.25	178	0.25	0.181	0.025	0.96	0.50	ND	0.25	<0.1	45.2
WC-5	0-6"	12/21/04	ND	0.54	62	0.27	0.98	0.27	11	0.27	50	0.27	0.079	0.031	2.18	0.54	ND	0.27	~	58.6
WC-6	0-6"	12/21/04	ND	0.50	99	0.25	1.58	0.25	3.37	0.25	18	0.25	0.065	0.026	ND	0.50	ND	0.25	~	51
WC7-0-6"	0-6"	12/21/04	ND	0.47	102	0.23	1.31	0.23	12	0.23	184	0.23	0.128	0.023	ND	0.47	ND	0.23	<0.1	37.6
WC8-0-6"	0-6"	12/21/04	ND	0.62	73	0.31	1.11	0.31	9.84	0.31	112	0.31	0.197	0.032	ND	0.62	ND	0.31	<0.1	54.6
WC18-0-6"	0-6"	12/23/04	0.94	0.12	9.27	0.06	0.78	0.06	5.26	0.06	19	0.06	0.029	0.012	ND	0.12	ND	0.06	~	3.45
WC19-0-6"	0-6"	12/23/04	1.37	0.16	23	0.08	0.68	0.08	6.95	0.08	47	0.08	0.062	0.016	ND	0.16	ND	0.08	~	3.97
WC20-0-6"	0-6"	12/23/04	2.38	0.18	23	0.09	0.66	0.09	5.14	0.09	43	0.09	0.06	0.018	ND	0.18	ND	0.09	~	14.75
WC21-0-6"	0-6"	12/23/04	1.17	0.15	12	0.08	0.65	0.08	3.26	0.08	16	0.08	0.058	0.016	ND	0.15	ND	0.08	~	15.1
WC22-0-6"	0-6"	12/23/04	1.23	0.14	13	0.07	0.46	0.07	4.62	0.07	28	0.07	0.067	0.013	ND	0.14	ND	0.07	~	5.92
WC23-0-6"	0-6"	12/23/04	1.91	0.15	16	0.08	0.6	0.08	7.96	0.08	36	0.08	0.096	0.015	0.74	0.15	ND	0.08	~	16.23
WC24-0-6"	0-6"	12/23/04	0.65	0.11	10	0.06	0.26	0.06	3.42	0.06	9.42	0.06	0.025	0.012	ND	0.11	ND	0.06	~	6.15
WC25-0-6"	0-6"	12/23/04	2.25	0.14	49	0.07	0.78	0.07	10	0.07	54	0.07	0.111	0.016	ND	0.14	ND	0.07	~	13.28
WC26-0-6"	0-6"	12/23/04	1.94	0.19	163	0.09	1.64	0.09	25	0.09	119	0.09	0.055	0.018	ND	0.19	ND	0.09	<0.1	4.94
WC27-0-6"	0-6"	12/23/04	1.94	0.12	109	0.06	1.24	0.06	16	0.06	120	0.06	0.033	0.014	0.2	0.12	ND	0.06	<0.1	6.69
WC.5-4.5	0-6"	4/22/05	ND	0.75	44	0.38	0.53	0.38	5.94	0.38	20	0.38	ND	0.081	1.73	0.75	ND	0.38	~	~
WC.5-5.5	0-6"	4/22/05	ND	0.52	52	0.26	0.83	0.26	5.67	0.26	43	0.26	0.11	0.051	1.08	0.52	ND	0.26	~	~
WC.5-6.5	0-6"	4/22/05	ND	0.68	62	0.34	0.75	0.34	5.94	0.34	14	0.34	0.083	0.078	2.12	0.68	ND	0.34	~	~
WC.5-8.5	0-6"	4/22/05	ND	0.60	48	0.30	0.66	0.30	5.89	0.30	27	0.30	0.078	0.062	2.34	0.60	ND	0.30	~	~
WC.5-9.5	0-6"	4/22/05	ND	0.69	78	0.35	0.76	0.35	7.12	0.35	23	0.35	0.075	0.067	2.21	0.69	ND	0.35	~	~
WC.5-10.5	0-6"	4/20/05	ND	0.62	80	0.31	1.18	0.31	6.27	0.31	63	0.31	0.088	0.059	1.86	0.62	ND	0.31	~	~
WC.5-11.5	0-6"	4/20/05	ND	0.38	44	0.19	0.45	0.19	6.01	0.19	15	0.19	0.056	0.038	3.61	0.38	ND	0.19	~	~
WC.5-12.5	0-6"	4/20/05	0.83	0.46	78	0.23	0.78	0.23	16	0.23	26	0.23	0.117	0.050	4.04	0.46	ND	0.23	~	~
WC.5-13.5	0-6"	4/20/05	ND	0.46	86	0.23	1.15	0.23	12	0.23	55	0.23	0.114	0.043	2.89	0.46	ND	0.23	~	~
Duplicate 222 (WC.5-13.5)	0-6"	4/20/05	1.42	0.39	47	0.20	0.71	0.20	36	0.20	19	0.20	0.121	0.038	3.78	0.39	ND	0.20	~	~
WC.5-14.5	0-6"	4/20/05	5.27	0.27	275	0.13	4.73	0.13	26	0.13	524	0.13	0.457	0.027	0.38	0.27	0.40	0.13	~	~
WC.5-14.5MS	0-6"	4/20/05	23	0.25	121	0.12	22	0.12	33	0.12	156	0.12	0.198	0.109	21	0.25	20	0.12	~	~
WC.5-14.5MSD	0-6"	4/20/05	18	0.24	45	0.12	18	0.12	34	0.12	25	0.12	0.092	0.023	17	0.24	16	0.12	~	~
WC.5-15.5	0-6"	4/20/05	0.82	0.32	35	0.16	0.70	0.16	26	0.16	13	0.16	0.039	0.025	ND	0.32	ND	0.16	~	~
WC.5-16.5	0-6"	4/20/05	ND	0.10	5.20	0.05	0.22	0.05	3.90	0.05	1.70	0.05	ND	0.011	ND	0.10	ND	0.05	~	~
WC.5-17.14	0-6"	4/20/05	1.70	0.41	0.28	0.21	0.71	0.21	34	0.21	12	0.21	0.091	0.037	1.08	0.41	ND	0.21	~	~
WC.5-17.28	0-6"	4/20/05	ND	0.40	30	0.20	0.96	0.20	20	0.20	14	0.20	0.238	0.038	ND	0.40	ND	0.20	~	~
WC.5-18.5	0-6"	4/25/05	0.38	0.13	6.59	0.07	0.29	0.07	3.71	0.07	7.41	0.07	0.026	0.014	ND	0.13	ND	0.07	~	~

Table 2
Laboratory Analytical Results - RCRA 8 Metals and Total Organic Carbon
Wetlands

RCS-1 MADEP Background Toxicity Characteristic (20 Times) Rule Regulatory Limit UCL			RCRA 8 Metals														TCLP	TOC		
			Arsenic		Barium		Cadmium		Chromium		Lead		Mercury		Selenium		Silver		Lead	TOC
			(mg/kg)	RL	(mg/kg)	RL	(mg/kg)	RL	(mg/kg)	RL	(mg/kg)	RL	(mg/kg)	RL	(mg/kg)	RL	(mg/kg)	RL	(mg/L)	(%)
			30	30	1,000	1,000	30	30	1,000	1,000	300	300	20	20	400	400	100	100	~	~
			20	20	50	50	3	3	40	40	600	600	1	1	1	1	5	5	~	5
																		5.0	~	
																		~	2,000	
Sample Identification	Depth	Date																		
WC.5-19.5	0-6"	4/25/05	1.03	0.10	9.30	0.05	0.6	0.05	5.97	0.05	4.22	0.05	ND	0.010	ND	0.10	ND	0.05	~	~
WC.5-20.5	0-6"	4/25/05	0.78	0.13	9.31	0.07	0.31	0.07	4.16	0.07	7.10	0.07	0.022	0.014	ND	0.13	ND	0.07	~	~
WC.5-21.5	0-6"	4/25/05	0.96	0.15	23	0.07	0.41	0.07	4.94	0.07	18	0.07	0.101	0.015	0.24	0.15	ND	0.07	~	~
WC.5-22.5	0-6"	4/25/05	1.08	0.15	13	0.08	0.63	0.08	8.38	0.08	34	0.08	0.056	0.061	ND	0.15	ND	0.08	~	~
WC.5-23.5	0-6"	4/25/05	2.60	0.16	20	0.08	0.80	0.08	8.39	0.08	46	0.08	0.078	0.016	0.30	0.16	ND	0.08	~	~
WC.5-24.5	0-6"	4/25/05	1.03	0.18	25	0.09	0.65	0.09	7.90	0.09	57	0.09	0.128	0.021	0.45	0.18	0.11	0.09	~	~
Duplicate 223 (WC.5-24.5)	0-6"	4/25/05	2.12	0.54	69	0.27	1.03	0.27	9.46	0.27	53	0.27	0.113	0.026	2.12	0.54	0.27	0.27	~	~
WC.5-25.5	0-6"	4/25/05	0.96	0.15	11	0.08	0.31	0.08	5.41	0.08	17	0.08	0.046	0.016	0.43	0.15	ND	0.08	~	~
WC.5-26.5	0-6"	4/25/05	0.84	0.17	23	0.08	0.69	0.08	11	0.08	41	0.08	0.073	0.017	0.25	0.17	ND	0.08	~	~
WC.5-27.5	0-6"	4/25/05	1.91	0.13	83	0.06	0.91	0.06	18	0.06	107	0.06	2.06	0.130	ND	0.13	0.11	0.06	0.3	~
WD-3 (0-6")	0-6"	12/22/04	ND	0.19	28	0.09	0.36	0.09	3.71	0.09	23	0.09	0.06	0.019	0.83	0.19	ND	0.09	~	23
WD-4 (0-6")	0-6"	12/22/04	ND	0.45	83	0.22	1.38	0.22	15	0.22	64	0.22	0.123	0.047	ND	0.45	ND	0.22	~	54.4
WD-4.5	0-6"	4/22/05	0.76	0.54	55	0.27	0.6	0.27	9.19	0.27	27	0.27	0.093	0.054	2.50	0.54	ND	0.27	~	~
WD-5 (0-6")	0-6"	12/22/04	1.75	0.20	35	0.10	1.1	0.10	7.2	0.10	61	0.10	0.103	0.019	ND	0.20	ND	0.10	~	11.7
Duplicate 202 (WD5-0-6")	0-6"	12/22/04	1.43	0.15	34	0.08	0.83	0.08	7.55	0.08	61	0.08	0.091	0.017	ND	0.15	ND	0.08	~	9.41
WD-6 (0-6")	0-6"	12/22/04	ND	0.31	82	0.16	1.15	0.16	7.48	0.16	128	0.16	0.177	0.034	ND	0.31	ND	0.16	<0.1	32.2
WD-6.5	0-6"	4/22/05	ND	0.63	68	0.31	1.07	0.31	4.64	0.31	36	0.31	0.077	0.055	1.57	0.63	ND	0.31	~	~
WD-7	0-6"	12/21/04	0.6	0.34	104	0.17	2.62	0.17	26	0.17	477	0.17	0.245	0.016	ND	0.34	ND	0.17	0.1	24
WD8-0-6"	0-6"	12/21/04	ND	0.51	150	0.25	2.44	0.25	16	0.25	162	0.25	0.155	0.026	ND	0.51	ND	0.25	<0.1	39.9
WD-9 (0-6")	0-6"	12/22/04	ND	0.39	77	0.20	0.86	0.20	4.26	0.20	33	0.20	0.117	0.038	0.78	0.39	ND	0.20	~	58.7
WD-10 (0-6")	0-6"	12/22/04	ND	0.36	223	0.18	0.79	0.18	3.07	0.18	25	0.18	0.91	0.036	ND	0.36	ND	0.18	~	33.4
WD-10.5	0-6"	4/20/05	0.67	0.48	25	0.24	0.29	0.24	7.17	0.24	4.16	0.24	0.077	0.048	1.43	0.48	ND	0.24	~	~
WD-11 (0-6")	0-6"	12/22/04	ND	0.42	109	0.21	1.18	0.21	12	0.21	112	0.21	0.201	0.042	ND	0.42	ND	0.21	<0.1	46.9
WD-12 (0-6")	0-6"	12/22/04	ND	0.44	138	0.22	1.9	0.22	15	0.22	386	0.22	0.293	0.047	1.32	0.44	0.31	0.22	<0.1	41.9
WD-13 (0-6")	0-6"	12/22/04	ND	0.41	156	0.21	1.23	0.21	6.37	0.21	59	0.21	0.141	0.041	1.19	0.41	ND	0.21	~	48.9
WD-14 (0-6")	0-6"	12/22/04	5.23	0.54	136	0.27	1.46	0.27	70	0.27	81	0.27	0.339	0.058	3.62	0.54	ND	0.27	~	41
WD-15 (0-6")	0-6"	12/22/04	ND	0.37	147	0.18	1.86	0.18	13	0.18	144	0.18	0.218	0.037	ND	0.37	ND	0.18	<0.1	43.9
WD-15.5	0-6"	4/20/05	0.25	0.12	14	0.06	0.20	0.06	8.80	0.06	4.41	0.06	0.035	0.013	ND	0.12	ND	0.06	~	~
WD-16 (0-6")	0-6"	12/22/04	2.93	0.31	77	0.16	0.81	0.16	40	0.16	47	0.16	0.164	0.035	1.97	0.31	ND	0.16	~	29.2
WD-17 (0-6")	0-6"	12/22/04	0.68	0.32	84	0.16	1.26	0.16	19	0.16	107	0.16	0.145	0.032	ND	0.32	ND	0.16	<0.1	46.9
WD-17.57	0-6"	4/20/05	6.57	0.80	63	0.40	0.48	0.40	70	0.40	22	0.40	0.111	0.017	ND	0.80	ND	0.40	~	~
WD-17.46	0-6"	4/20/05	1.05	0.35	89	0.18	1.05	0.18	13	0.18	97	0.18	0.072	0.037	1.16	0.35	ND	0.18	~	~
WD18-0-6"	0-6"	12/23/04	1.61	0.17	36	0.08	0.79	0.08	8.8	0.08	70	0.08	0.115	0.017	ND	0.17	ND	0.18	~	17.56
WD19-0-6"	0-6"	12/23/04	1.15	0.17	69	0.09	1.03	0.09	16	0.09	93	0.09	0.136	0.074	ND	0.17	0.09	0.09	~	13.7
WD20-0-6"	0-6"	12/23/04	0.17	0.11	11	0.05	0.4	0.05	6.76	0.05	6.14	0.05	0.015	0.013	ND	0.11	ND	0.05	~	2.3
WD21-0-6"	0-6"	12/23/04	1.26	0.25	70	0.13	0.65	0.13	8.12	0.13	93	0.13	0.221	0.026	ND	0.25	ND	0.13	~	17.09
WD21-0-6" MS	0-6"	12/23/04	~		~		~		~		~		~		~		~		~	~
WD21-0-6" MSD	0-6"	12/23/04	~		~		~		~		~		~		~		~		~	~
WD22-0-6"	0-6"	12/23/04	0.74	0.12	26	0.06	0.51	0.06	6.99	0.06	50	0.06	0.072	0.012	ND	0.12	ND	0.06	~	7.48
WD23-0-6"	0-6"	12/23/04	3.85	0.17	278	0.09	3.04	0.09	51	0.09	325	0.09	0.507	0.161	ND	0.17	0.28	0.09	0.2	8.53

Table 2
Laboratory Analytical Results - RCRA 8 Metals and Total Organic Carbon
Wetlands

			RCRA 8 Metals														TCLP	TOC		
			Arsenic		Barium		Cadmium		Chromium		Lead		Mercury		Selenium		Silver		Lead	TOC
			(mg/kg)	RL	(mg/kg)	RL	(mg/kg)	RL	(mg/kg)	RL	(mg/kg)	RL	(mg/kg)	RL	(mg/kg)	RL	(mg/kg)	RL	(mg/L)	(%)
RCS-1 MADEP Background Toxicity Characteristic (20 Times) Rule Regulatory Limit UCL			30	30	1,000	1,000	30	30	1,000	1,000	300	300	20	20	400	400	100	100	~	~
			20	20	50	50	3	3	40	40	600	600	1	1	1	1	5	5	~	5
			100	100	2,000	2,000	20	20	100	100	100	100	4	4	20	20	100	100	~	100
			~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	5.0	~
			300	300	10,000	10,000	800	800	10,000	10,000	6,000	6,000	600	600	10,000	10,000	2,000	2,000	~	2,000
Sample Identification	Depth	Date																		
WD24-0-6"	0-6"	12/23/04	3.18	0.32	344	0.16	2.11	0.16	26	0.16	264	0.16	0.341	0.012	2.46	0.32	ND	0.16	<0.1	30.27
WD25-0-6"	0-6"	12/23/04	6.9	0.25	966	0.63	4.3	0.13	79	0.13	810	0.63	0.648	0.236	ND	0.25	0.5	0.13	0.2	13.14
WD26-0-6"	0-6"	12/23/04	0.98	0.15	13	0.07	0.37	0.07	4.59	0.07	7.34	0.07	0.164	0.057	ND	0.15	ND	0.07	~	9.36

Table 3

Laboratory Analytical
Results – Polynuclear
Aromatic Hydrocarbons

Table 4

Laboratory Analytical
Results – Pesticides

Table 4
Laboratory Analytical Results - Pesticides
Wetlands

			Aldrin		alpha-BHC		beta-BHC		delta-BHC		gamma-BHC		alpha-Chlordane		gamma-Chlordane		Chlordane	
			(ug/kg)	RL	(ug/kg)	RL	(ug/kg)	RL	(ug/kg)	RL	(ug/kg)	RL	(ug/kg)	RL	(ug/kg)	RL	(ug/kg)	RL
			50,000	50,000	500,000	500,000	60,000	60,000	1,000,000	1,000,000	700	700	700	700	100,000	100,000	2,000	2,000
			~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~
			~	~	~	~	10,000,000	10,000,000	~	~	7,000	7,000	10,000,000	10,000,000	5,000,000	5,000,000	2,000,000	2,000,000
Sample Identification	Depth	Date	RCS-1		MADEP Background		UCL											
WA3-0-6"	0-6"	12/21/04	ND	5	ND	5	ND	5	ND	5	ND	5	ND	5	ND	5	ND	100
WC27-0-6"	0-6"	12/23/04	ND	5	ND	5	ND	5	ND	5	ND	5	ND	5	ND	5	ND	100
WC.5-4.5	0-6"	4/22/05	ND	1	ND	1	ND	1	ND	1	ND	1	ND	1	ND	1	ND	20
WC.5-8.5	0-6"	4/22/05	ND	1	ND	1	ND	1	ND	1	ND	1	ND	1	ND	1	ND	20
WC.5-12.5	0-6"	4/20/05	ND	1	ND	1	ND	1	ND	1	ND	1	ND	1	ND	1	ND	20
WC.5-15.5	0-6"	4/20/05	ND	1	ND	1	ND	1	ND	1	ND	1	ND	1	ND	1	ND	20
WC.5-17.14	0-6"	4/20/05	ND	1	ND	1	ND	1	ND	1	ND	1	ND	1	ND	1	ND	20
WC.5-19.5	0-6"	4/25/05	ND	1	ND	1	ND	1	ND	1	ND	1	ND	1	ND	1	ND	20
WC.5-22.5	0-6"	4/25/05	ND	1	ND	1	ND	1	ND	1	ND	1	ND	1	ND	1	ND	20
WC.5-26.5	0-6"	4/25/05	ND	1	ND	1	ND	1	ND	1	ND	1	ND	1	ND	1	ND	20
WD.5-17.46	0-6"	4/20/05	ND	1	ND	1	ND	1	ND	1	ND	1	ND	1	ND	1	ND	20
WE.5-3	0-6"	4/25/05	ND	1	ND	1	ND	1	ND	1	ND	1	ND	1	ND	1	ND	20
Duplicate 220 (WE.5-3)	0-6"	4/25/05	ND	1	ND	1	ND	1	ND	1	ND	1	ND	1	ND	1	ND	20
WF8-0-6"	0-6"	12/21/04	ND	5	ND	5	ND	5	ND	5	ND	5	ND	5	ND	5	ND	100
WG-3(0-6")	0-6"	12/22/04	ND	5	ND	5	ND	5	ND	5	ND	5	ND	5	ND	5	ND	100
WG-4 (0-6")	0-6"	12/22/04	ND	5	ND	5	ND	5	ND	5	ND	5	ND	5	ND	5	ND	100
WH-5 (0-6")	0-6"	12/22/04	ND	5	ND	5	ND	5	ND	5	ND	5	ND	5	ND	5	ND	100
WI.5-4	0-6"	4/22/05	ND	1	ND	1	ND	1	ND	1	ND	1	ND	1	ND	1	ND	20

NOTES:
 ND = not detected above method detection limit
 RCS-1 = Massachusetts Contingency Plan
 Gray shading indicates concentration exceeding

Table 4
Laboratory Analytical Results - Pesticides
Wetlands

			4,4'-DDD		4,4'-DDE		4,4'-DDT		Dieldrin		Endosulfan I		Endosulfan II		Endosulfan sulfate		Endrin		Endrin aldehyde	
			(ug/kg)	RL	(ug/kg)	RL	(ug/kg)	RL	(ug/kg)	RL	(ug/kg)	RL	(ug/kg)	RL	(ug/kg)	RL	(ug/kg)	RL	(ug/kg)	RL
			100,000	100,000	500,000	500,000	700	700	50,000	50,000	50,000	50,000	6,000	6,000	50,000	50,000	100,000	100,000	100,000	100,000
			~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~
			5,000,000	5,000,000	~	~	90,000	90,000	~	~	~	~	500,000	500,000	~	~	~	~	~	~
Sample Identification	Depth	Date	RCS-1		MADEP Background		UCL													
WA3-0-6"	0-6"	12/21/04	ND	10	ND	10	ND	10	ND	10	ND	5	ND	10	ND	10	ND	10	ND	10
WC27-0-6"	0-6"	12/23/04	ND	10	ND	10	ND	10	ND	10	ND	5	ND	10	ND	10	ND	10	ND	10
WC.5-4.5	0-6"	4/22/05	ND	2	ND	2	ND	2	ND	2	ND	1	ND	2	ND	2	ND	2	ND	2
WC.5-8.5	0-6"	4/22/05	ND	2	ND	2	ND	2	ND	2	ND	1	ND	2	ND	2	ND	2	ND	2
WC.5-12.5	0-6"	4/20/05	ND	2	ND	2	ND	2	ND	2	ND	1	ND	2	ND	2	ND	2	ND	2
WC.5-15.5	0-6"	4/20/05	ND	2	ND	2	ND	2	ND	2	ND	1	ND	2	ND	2	ND	2	ND	2
WC.5-17.14	0-6"	4/20/05	ND	2	ND	2	ND	2	ND	2	ND	1	ND	2	ND	2	ND	2	ND	2
WC.5-19.5	0-6"	4/25/05	ND	2	ND	2	ND	2	ND	2	ND	1	ND	2	ND	2	ND	2	ND	2
WC.5-22.5	0-6"	4/25/05	10	2	30	2	31	2	ND	2	ND	1	ND	2	ND	2	ND	2	ND	2
WC.5-26.5	0-6"	4/25/05	36	2	8	2	73	2	ND	2	ND	1	ND	2	ND	2	ND	2	ND	2
WD.5-17.46	0-6"	4/20/05	ND	2	ND	2	ND	2	ND	2	ND	1	ND	2	ND	2	ND	2	ND	2
WE.5-3	0-6"	4/25/05	ND	2	ND	2	ND	2	ND	2	ND	1	ND	2	ND	2	ND	2	ND	2
Duplicate 220 (WE.5-3)	0-6"	4/25/05	64	2	94	2	213	2	ND	2	ND	1	ND	2	ND	2	ND	2	ND	2
WF8-0-6"	0-6"	12/21/04	ND	10	ND	10	ND	10	ND	10	ND	5	ND	10	ND	10	ND	10	ND	10
WG-3(0-6")	0-6"	12/22/04	ND	10	ND	10	ND	10	ND	10	ND	5	ND	10	ND	10	ND	10	ND	10
WG-4 (0-6")	0-6"	12/22/04	ND	10	ND	10	ND	10	ND	10	ND	5	ND	10	ND	10	ND	10	ND	10
WH-5 (0-6")	0-6"	12/22/04	ND	10	ND	10	ND	10	ND	10	ND	5	ND	10	ND	10	ND	10	ND	10
WI.5-4	0-6"	4/22/05	80	2	32	2	217	2	ND	2	ND	1	ND	2	ND	2	ND	2	ND	2

NOTES:
 ND = not detected above method detection limit
 RCS-1 = Massachusetts Contingency Plan
 Gray shading indicates concentration exceeding

Table 4
Laboratory Analytical Results - Pesticides
Wetlands

Sample Identification	Depth	Date	Endrin Ketone		Heptachlor		Heptachlore epoxide		Methoxychlor		Toxaphene	
			(ug/kg)	RL	(ug/kg)	RL	(ug/kg)	RL	(ug/kg)	RL	(ug/kg)	RL
			700	700	1,000,000	1,000,000	500,000	500,000	10,000	10,000	100,000	100,000
			~	~	~	~	~	~	~	~	~	~
RCS-1 MADEP Background UCL			10,000,000	10,000,000	~	~	~	~	900,000	900,000	10,000,000	10,000,000
WA3-0-6"	0-6"	12/21/04	ND	10	ND	5	ND	5	ND	50	ND	5,000
WC27-0-6"	0-6"	12/23/04	ND	10	ND	5	ND	5	ND	50	ND	5,000
WC.5-4.5	0-6"	4/22/05	ND	2	ND	1	ND	1	ND	10	ND	1,000
WC.5-8.5	0-6"	4/22/05	ND	2	ND	1	ND	1	ND	10	ND	1,000
WC.5-12.5	0-6"	4/20/05	ND	2	ND	1	ND	1	ND	10	ND	1,000
WC.5-15.5	0-6"	4/20/05	ND	2	ND	1	ND	1	ND	10	ND	1,000
WC.5-17.14	0-6"	4/20/05	ND	2	ND	1	ND	1	ND	10	ND	1,000
WC.5-19.5	0-6"	4/25/05	ND	2	ND	1	ND	1	ND	10	ND	1,000
WC.5-22.5	0-6"	4/25/05	ND	2	ND	1	ND	1	ND	10	ND	1,000
WC.5-26.5	0-6"	4/25/05	ND	2	ND	1	ND	1	ND	10	ND	1,000
WD.5-17.46	0-6"	4/20/05	ND	2	ND	1	ND	1	ND	10	ND	1,000
WE.5-3	0-6"	4/25/05	ND	2	ND	1	ND	1	ND	10	ND	1,000
Duplicate 220 (WE.5-3)	0-6"	4/25/05	ND	2	ND	1	ND	1	ND	10	ND	1,000
WF8-0-6"	0-6"	12/21/04	ND	10	ND	5	ND	5	ND	50	ND	5,000
WG-3(0-6")	0-6"	12/22/04	ND	10	ND	5	ND	5	ND	50	ND	5,000
WG-4 (0-6")	0-6"	12/22/04	ND	10	ND	5	ND	5	ND	50	ND	5,000
WH-5 (0-6")	0-6"	12/22/04	ND	10	ND	5	ND	5	ND	50	ND	5,000
WI.5-4	0-6"	4/22/05	ND	2	ND	1	ND	1	ND	10	ND	1,000

NOTES:
 ND = not detected above method detection limit
 RCS-1 = Massachusetts Contingency Plan
 Gray shading indicates concentration exceeding

Table 5

Laboratory Analytical
Results – Herbicides

Table 5
Laboratory Analytical Results - Herbicides
Wetlands

			Herbicides													
			2,4-D		2,4,5-TP (Silvex)		Dicamba		Dichloroprop		2,4,5-T		2,4-DB		Dinoseb	
			(ug/kg)	RL	(ug/kg)	RL	(ug/kg)	RL	(ug/kg)	RL	(ug/kg)	RL	(ug/kg)	RL	(ug/kg)	RL
			30	30	1,000	1,000	30	30	1,000	1,000	300	300	20	20	400	400
			20	20	50	50	3	3	40	40	600	600	1	1	1	1
			100	100	2,000	2,000	20	20	100	100	100	100	4	4	20	20
			~	~	~	~	~	~	~	~	~	~	~	~	~	~
			300	300	10,000	10,000	800	800	10,000	10,000	6,000	6,000	600	600	10,000	10,000
Sample Identification	Depth	Date														
WA3-0-6"	0-6"	12/21/04	ND	250	ND	25	ND	25	ND	250	ND	25	ND	250	ND	25
WC27-0-6"	0-6"	12/23/04	ND	250	ND	25	ND	25	ND	250	ND	25	ND	250	ND	25
WC.5-4.5	0-6"	4/22/05	ND	16	ND	1.6	ND	1.6	ND	16	ND	1.6	ND	16	ND	1.6
WC.5-8.5	0-6"	4/22/05	ND	16	ND	1.6	ND	1.6	ND	16	ND	1.6	ND	16	ND	1.6
WC.5-12.5	0-6"	4/20/05	ND	16	ND	1.6	ND	1.6	ND	16	ND	1.6	ND	16	ND	1.6
WC.5-15.5	0-6"	4/20/05	ND	16	ND	1.6	ND	1.6	ND	16	ND	1.6	ND	16	ND	1.6
WC.5-17.14	0-6"	4/20/05	ND	16	ND	1.6	ND	1.6	ND	16	ND	1.6	ND	16	ND	1.6
WC.5-17-46	0-6"	4/20/05	ND	16	ND	1.6	ND	1.6	ND	16	ND	1.6	ND	16	ND	1.6
WC.5-19.5	0-6"	4/25/05	ND	16	ND	1.6	ND	1.6	ND	16	ND	1.6	ND	16	ND	1.6
WC.5-22.5	0-6"	4/25/05	ND	16	ND	1.6	ND	1.6	ND	16	ND	1.6	ND	16	ND	1.6
WC.5-26.5	0-6"	4/25/05	ND	16	ND	1.6	ND	1.6	ND	16	ND	1.6	ND	16	ND	1.6
WE.5-3	0-6"	4/25/05	ND	16	ND	1.6	ND	1.6	ND	16	ND	1.6	ND	16	ND	1.6
Duplicate 220 (WE.5-3)	0-6"	4/25/05	ND	16	ND	1.6	ND	1.6	ND	16	ND	1.6	ND	16	ND	1.6
WF8-0-6"	0-6"	12/21/04	ND	250	ND	25	ND	25	ND	250	ND	25	ND	250	ND	25
WG-3(0-6")	0-6"	12/22/04	ND	250	ND	25	ND	25	ND	250	ND	25	ND	250	ND	25
WG-4 (0-6")	0-6"	12/22/04	ND	250	ND	25	ND	25	ND	250	ND	25	ND	250	ND	25
WH-5 (0-6")	0-6"	12/22/04	ND	250	ND	25	ND	25	ND	250	ND	25	ND	250	ND	25
WI.5-4	0-6"	4/22/05	ND	16	ND	1.6	ND	1.6	ND	16	ND	1.6	ND	16	ND	1.6

NOTES:

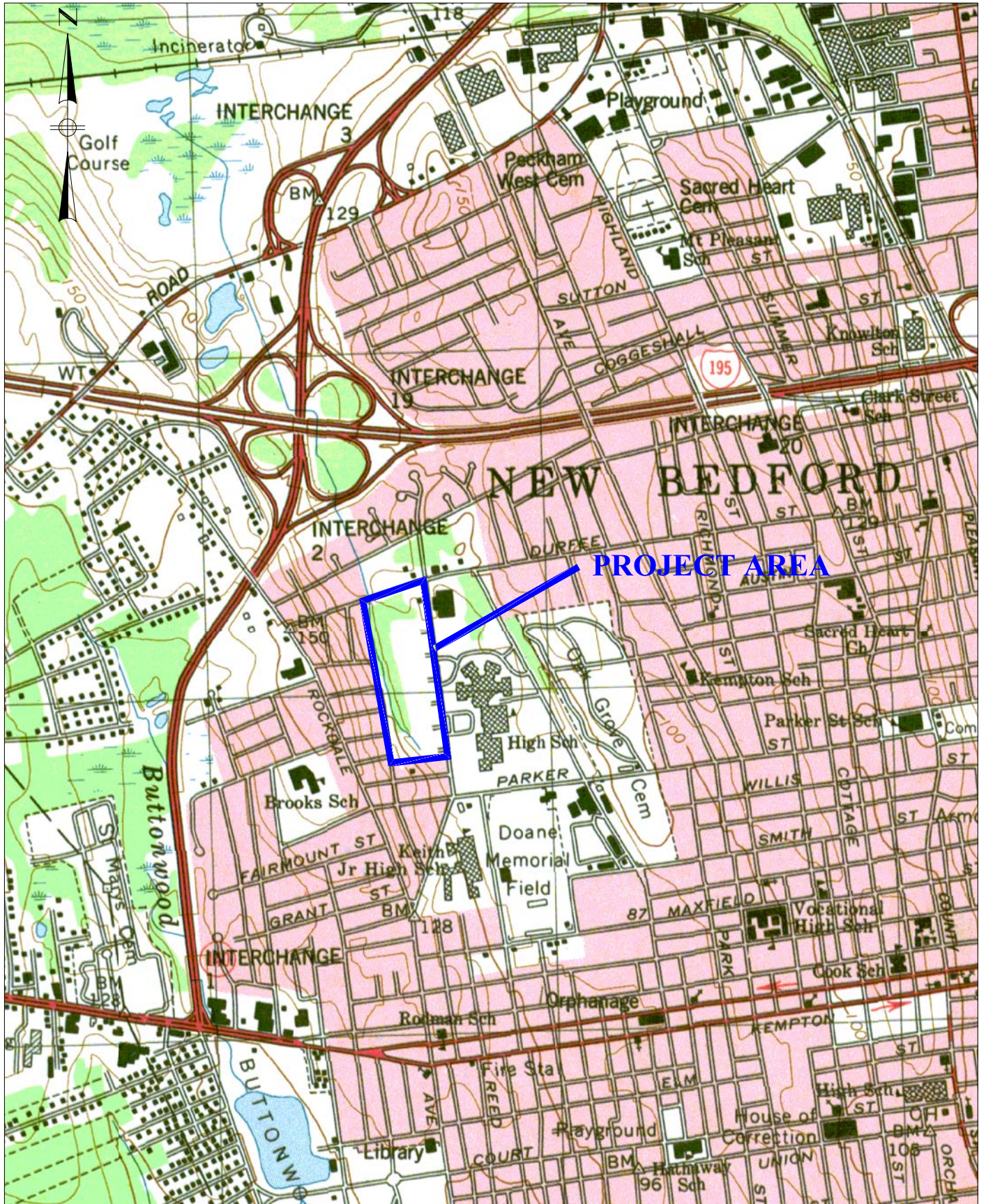
ND = not detected above method detection limit

RCS-1 = Massachusetts Contingency Plan Method 1 Soil Standard for category S-1 soil.

Gray shading indicates concentration exceeding the RCS-1 standard.

Figure 1

Locus Map



BETA Group, Inc.
 Engineers • Scientists • Planners

315 Norwood Park South
 Norwood, MA 02062 781.255.1982
 email: BETA@BETA-inc.com




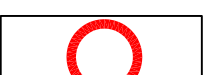

**McCOY FIELD/NEW KEITH
 MIDDLE SCHOOL PROPERTY**
 New Bedford, Massachusetts

Figure No. 1
USGS Locus Map

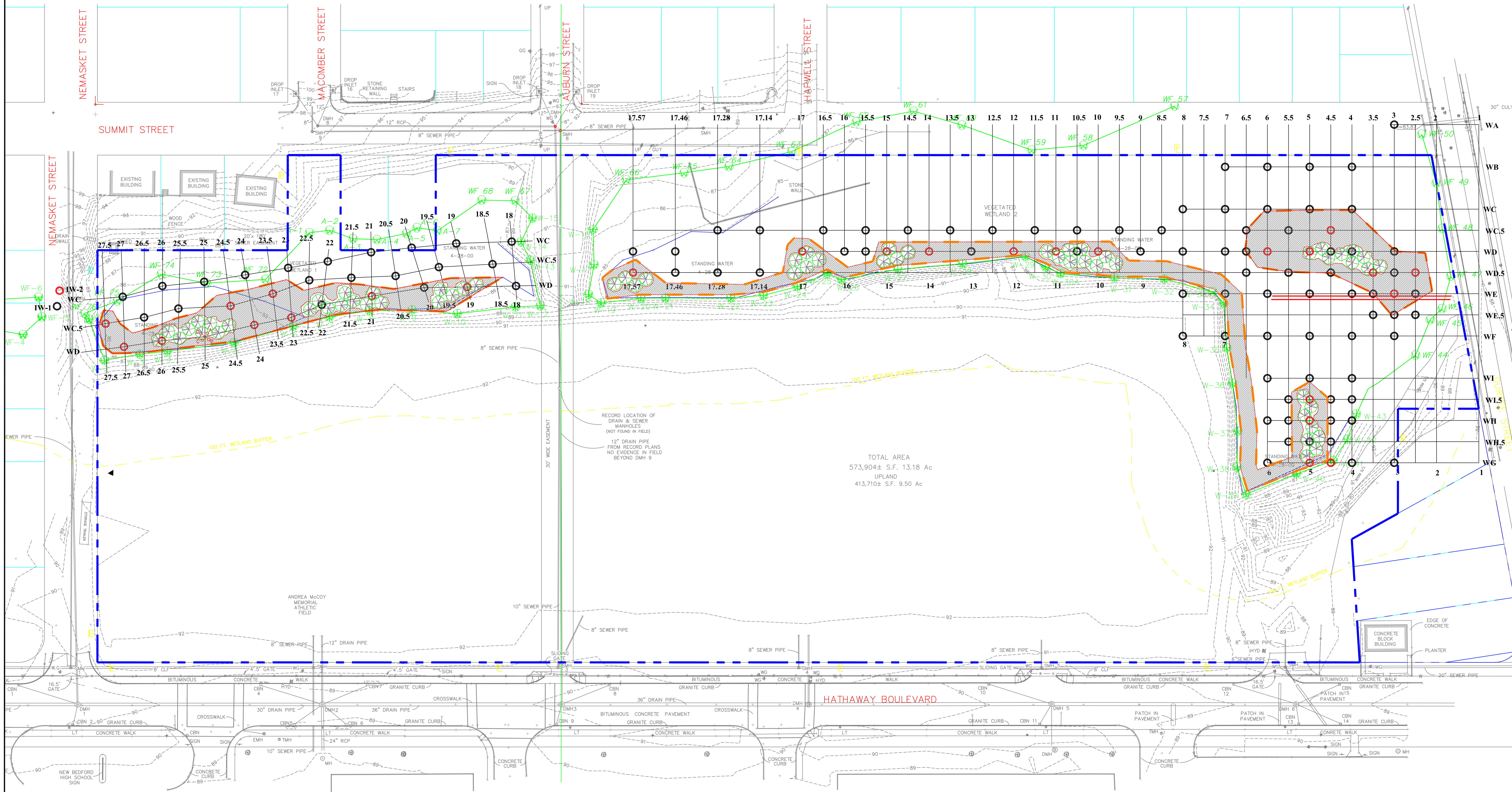
Figure 2

Wetlands Remediation Area
& Sample Locations

LEGEND

-  PROPERTY LINE
-  WETLANDS LINE
-  WETLANDS AREA SAMPLE < 1 PPM PCBs
-  WETLANDS AREA SAMPLE ≥ 1 PPM PCBs
-  BOUNDARY OF INITIAL WETLANDS SEDIMENT REMOVAL (0-6")

NOTE: Alpha-numeric grid corresponds to wetlands area samples. For example, sample WA3-0-6" coincides with grid intersection (WA, 3).



NUMBER	DATE	MADE BY	CHECKED BY	DESCRIPTION
REVISIONS				

DRAWN BY:
DEPT. CHECK:
PROJ. CHECK:

**Permitting Plans
Not for Construction**

BETA Group, Inc.
Engineers • Scientists • Planners

315 Norwood Park South
Norwood, MA 02062
ph: 781.255.1982
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email: BETA@BETA-INC.COM

SCALE:
1"=40'

UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

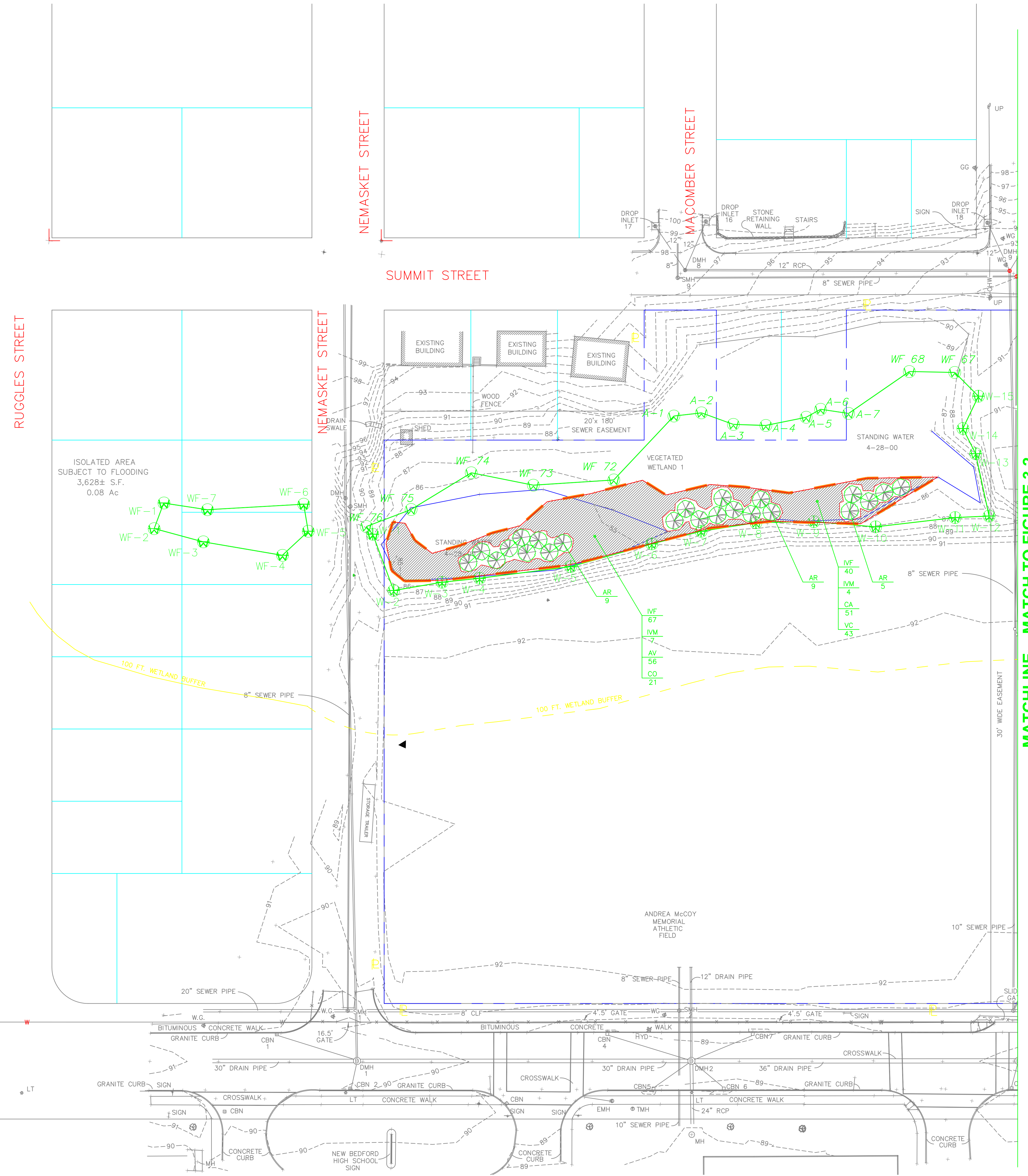
**Risk-Based Cleanup Request
Figure 2
Wetlands Remediation Area
McCoy Field
New Bedford, Massachusetts**

JOB: 02685.00
FILE NO. Figures 2 thru 3REVISED.dwg
PLOT DATE: June 2005
SHEET: **Figure 2**

Figure 3.1

Wetlands Planting Plan –
Vegetated Wetland 1

J:\Projects\2600a\2600a - New Bedford Sampling Plan\AutoCAD Files\Risk-based Cleanup Request\Site Wetlands\Figures 2 thru 3REVISED.dwg Jun 23, 2005 2:17pm



PLANT LIST - THIS SHEET ONLY					
Key	Botanical Name Common Name	Qty.	Size	Notes	Spacing
TREES					
AR	<i>Acer rubrum</i> Red Maple	23	5'-6'	B&B	12' O.C.
SHRUBS					
AV	<i>Rhododendron viscosum</i> Swamp Azalea	56	15"-18"	Cont.	8' O.C.
CA	<i>Clethra alnifolia</i> Sweet Pepperbush	51	15"-18"	Cont.	8' O.C.
CO	<i>Cephalanthus occidentalis</i> Buttombush	21	15"-18"	Cont.	8' O.C.
IVP	<i>Ilex verticillata</i> 'Female' Female Winterberry	107	15"-18"	Cont.	8' O.C.
IVM	<i>Ilex verticillata</i> 'Male' Male Winterberry	11	12"-15"	Cont.	8' O.C.
VC	<i>Viburnum corymbosum</i> Highbush Blueberry	43	15"-18"	Cont.	8' O.C.

SEE THIS SHEET FOR TOTAL PLANT LIST.

TOTAL PLANT LIST					
Key	Botanical Name Common Name	Qty.	Size	Notes	Spacing
TREES					
AR	<i>Acer rubrum</i> Red Maple	63	5'-6'	B&B	12' O.C.
SHRUBS					
AV	<i>Rhododendron viscosum</i> Swamp Azalea	148	15"-18"	Cont.	8' O.C.
CA	<i>Clethra alnifolia</i> Sweet Pepperbush	138	15"-18"	Cont.	8' O.C.
CO	<i>Cephalanthus occidentalis</i> Buttombush	33	15"-18"	Cont.	8' O.C.
IVP	<i>Ilex verticillata</i> 'Female' Female Winterberry	188	15"-18"	Cont.	8' O.C.
IVM	<i>Ilex verticillata</i> 'Male' Male Winterberry	18	12"-15"	Cont.	8' O.C.
VC	<i>Viburnum corymbosum</i> Highbush Blueberry	188	15"-18"	Cont.	8' O.C.

----- Remediation Area

NUMBER	DATE	MADE BY	CHECKED BY	DESCRIPTION
REVISIONS				

DRAWN BY:
DEPT. CHECK:
PROJ. CHECK:

**Permitting Plans
Not for Construction**

BETA Group, Inc.
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LANDSCAPE ARCHITECTURE
85-A Waterman Ave., East Providence, RI 02914 Ph: (401) 438-2071 Fax: (401) 434-7511 E-mail: gl@glab.com

SCALE:
1"=40'

UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

**Risk-Based Cleanup Request
Figure 3.1**

Planting Plan for Vegetated Wetland 1

McCoy Field
New Bedford, Massachusetts

JOB _____ 02685.00

FILE NO. Figures 2 thru 3REVISED.dwg

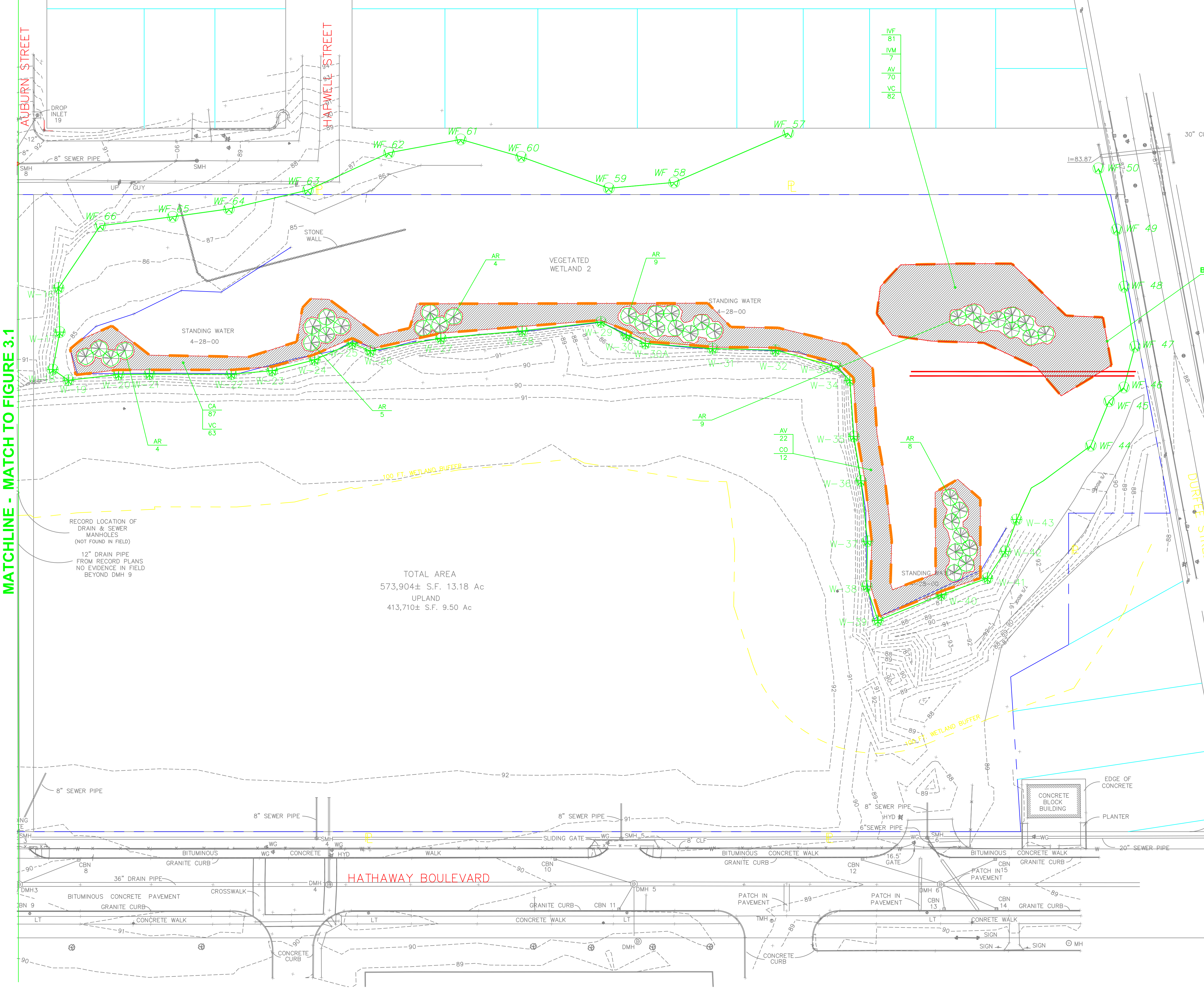
PLOT DATE _____ June 2005

SHEET _____ **Figure 3.1**

Figure 3.2

Wetlands Planting Plan –
Vegetated Wetland 2

MATCHLINE - MATCH TO FIGURE 3.1



PLANT LIST - THIS SHEET ONLY					
Key	Botanical Name Common Name	Qty.	Size	Notes	Spacing
TREES					
AR	<i>Acer rubrum</i> Red Maple	40	5'-6'	B&B	12' O.C.
SHRUBS					
AV	<i>Rhododendron viscosum</i> Swamp Azalea	92	15"-18"	Cont.	8' O.C.
CA	<i>Clethra alnifolia</i> Sweet Pepperbush	87	15"-18"	Cont.	8' O.C.
CO	<i>Cephalanthus occidentalis</i> Butterbush	12	15"-18"	Cont.	8' O.C.
IVP	<i>Ilex verticillata</i> 'Female' Female Winterberry	81	15"-18"	Cont.	8' O.C.
IVM	<i>Ilex verticillata</i> 'Male' Male Winterberry	7	12"-15"	Cont.	8' O.C.
VC	<i>Viburnum corymbosum</i> Highbush Blueberry	145	15"-18"	Cont.	8' O.C.

SEE FIGURE 3.1 FOR TOTAL PLANT LIST.
----- Remediation Area

TOTAL AREA
 573,904± S.F. 13.18 Ac
 UPLAND
 413,710± S.F. 9.50 Ac

J:\Projects\2600a\2685 - New Bedford Sampling Plan\AutoCad Files\Risk-based Cleanup Request\Site Wetlands\Figures 2 thru 3REVISED.dwg Jun 23, 2005 2:16pm

NUMBER	DATE	MADE BY	CHECKED BY	DESCRIPTION
REVISIONS				

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SCALE:
 1"=40'

UNLESS OTHERWISE NOTED OR CHANGED BY REPRODUCTION

**Risk-Based Cleanup Request
 Figure 3.2**

Planting Plan for Vegetated Wetland 2

**McCoy Field
 New Bedford, Massachusetts**

JOB _____ 02685.00
 FILE NO. Figures 2 thru 3REVISED.dwg
 PLOT DATE June 2005
 SHEET **Figure 3.2**



Method 3 Risk Characterization Wetland Areas

**FORMER McCOY FIELD
NEW BEDFORD, MASSACHUSETTS
RTN 4-15685**

PREPARED FOR

Beta Group, Inc.
315 Norwood Park South
Norwood, Massachusetts 02062

PREPARED BY

ESS Group, Inc.
401 Wampanoag Trail, Suite 400
East Providence, Rhode Island 02915

Project No. B345-000

June 2005



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**METHOD 3 RISK CHARACTERIZATION
WETLAND AREAS
Former McCoy Field
New Bedford, Massachusetts
RTN 4-15685**

Prepared For:

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315 Norwood Park South
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ESS Project No. B345-000

June 2005



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EXECUTIVE SUMMARY

A Method 3 Risk Characterization was performed for the former McCoy Field wetland area located on the property bounded by Hathaway Boulevard to the east, Durfee Street to the north, Summit Street to the west, and Ruggles Street to the south, in New Bedford, Massachusetts [Release Tracking Number (RTN) 4-15685] (the Site). The Method 3 Risk Characterization evaluated the potential risk of harm to human health, the environment, public welfare, and safety in accordance with the Massachusetts Contingency Plan (310 CMR 40.0000) (MCP) and *Guidance for Disposal Site Risk Characterization in Support of the Massachusetts Contingency Plan* [Massachusetts Department of Environmental Protection (MADEP), July 1995]. The conclusion of the Method 3 Risk Characterization is that, despite slight exceedances of the baseline hazard index of 1.0 for some environmental receptors, the Site is concluded to pose **No Significant Risk of harm to human health, the environment, public welfare, and safety.** No activity and use limitations (AULs) or use of engineered barriers were assumed in the risk characterization.

McCoy Field is a former recreational field located in a residential section of New Bedford. The property consists of two distinct areas: an upland area that is being developed as the new Keith Middle School, and a vegetated, deciduous wooded swamp wetland area located north and west of the upland area. Only the wetland area is addressed in this risk characterization. The wetland area contains an unnamed stream that originates from another wetland area about 1.5 miles north of the Site and terminates on the Site. The wetland area typically dries up in summer.

McCoy Field was constructed in the 1960s by filling a low area with fill material obtained from the site of the high school during the high school's construction. The high school site was historically operated as a burning dump; fill material from this site consisted of black fine sand and organic silt containing ash, asphalt, concrete, brick, glass, metal, and wood materials. During planning activities for the new middle school, subsurface investigations identified the presence of fill material in the upland area and, in it, chemical constituents above MADEP reportable concentrations. Historic filling of the wetland area did not occur, but some chemical constituents in the fill material may have reached the wetland area through atmospheric dispersion, erosion, or other pathways.

One hundred twenty two (122) to 124 soil/sediment samples were collected from the wetland area in December 2004, January 2005, and April 2005 from a depth interval of 0 to 6 inches. Samples were analyzed for polychlorinated biphenyls (PCBs, as various Aroclor types), polycyclic aromatic hydrocarbons (PAHs), pesticides (which were not detected), and metals. These data were applied to the risk characterization.

The human health risk characterization assessed the potential risk posed by the Site to recreational receptors, pedestrians, and trespassers, all of which were assessed for the same level of exposure. These receptors were assessed for exposure through soil/sediment ingestion, soil/sediment dermal contact, inhalation of entrained soil particles (dust), surface water ingestion, and surface water dermal contact. Constituents of concern (COCs) included PCBs (as Aroclor 1254), thirteen PAHs, and the metals barium, cadmium, total chromium, lead, mercury, and selenium. The numerical results of the human health risk characterization are summarized below:

RECREATIONAL/PEDESTRIAN/TRESPASSER RISK CHARACTERIZATION SUMMARY							
Exposure Pathway	Child		Youth		Adult		Combined Ages
	Hazard Index	Cancer Risk	Hazard Index	Cancer Risk	Hazard Index	Cancer Risk	Cancer Risk
Total (all pathways)	0.3	9×10^{-7}	0.07	2×10^{-7}	0.04	3×10^{-7}	1×10^{-6}
Maximum Acceptable Level	1.0	1×10^{-5}	1.0	1×10^{-5}	1.0	1×10^{-5}	1×10^{-5}

Total HIs and total cancer risks are below maximum acceptable levels for all age groups, indicating that the Site poses no significant risk of harm to human health for these receptor groups.

The environmental risk characterization assessed terrestrial and aquatic invertebrates for survival, and assessed amphibians, two avian species (American robins and red-tailed hawks), and two mammalian species (short-tailed shrew and raccoons) for survival, growth and reproduction. Terrestrial invertebrates were assessed for direct exposure to COCs in soil. Aquatic invertebrates were assessed for direct exposure to COCs in sediment interstitial (pore) water impacted by COCs in soil/sediment. Amphibians were assessed for direct exposure to COCs in surface water impacted by COCs in soil/sediment. Avian and mammalian receptors were assessed for exposure to COCs through soil/sediment ingestion, surface water ingestion, and COCs in their diet. For avian and mammalian receptors, high and low hazard indices (HI-High and HI-Low) were calculated. Numerical results of the environmental risk characterization are summarized below:

Receptor Group	Hazard Index -High	Hazard Index-Low
Terrestrial Invertebrates	0.7	-- 1
Aquatic Invertebrates	0.5	-- 1
Amphibians	1.1	-- 1
American Robin	5	0.4
Red-Tailed Hawk	0.001	0.0001
Short-tailed Shrew	3	1
Raccoon	0.005	0.002
Benchmark Hazard Index	1.0	1.0

1. A "low" scenario was not assessed for this receptor group.

Both high and, when calculated, low total HIs for terrestrial invertebrates, aquatic invertebrates, red-tailed hawk, and raccoons are below the maximum acceptable HI benchmark of 1.0, indicating that the Site poses no significant risk of harm to these receptor groups.

The HI of 1.1 for amphibians slightly exceeds the maximum acceptable HI benchmark of 1.0. However, the risk characterization concludes that this HI is conservative and that a significant risk of harm is not posed to amphibians for the following reasons:

- The HI exceedance is minimal (total HI of 1.1 versus maximum acceptable HI of 1.0);
- The highest chemical-specific HI, for lead, is 0.9, below the maximum acceptable HI of 1.0;
- Lead's toxicity reference value (TRV) of 0.4 µg/L is based on the lowest reported toxicity value identified in the literature, to which an uncertainty factor of 100 was applied;
- Lead's TRV of 0.4 µg/L is below the federal ambient water quality criterion of 0.54 µg/L calculated at the lowest considered water hardness of 25 mg/L;
- Lead's surface water exposure point concentration (EPC) was based on one-tenth of the predicted interstitial water concentration, whereas the overlying water column may be much more diluted from on-flowing surface water; and,
- The predicted interstitial water concentration was based on the 95th upper confidence limit (UCL) of the mean soil/sediment lead concentration of 138 mg/kg, while the mean soil/sediment lead concentration is 98 mg/kg and the median concentration is 46 mg/kg.

The HI-High of 5 and an HI-Low of 0.4 calculated for the American robin were primarily associated with exposure to PCBs. However, the risk characterization concludes that these HIs are conservative and a significant risk of harm is not posed to American robins for the following reasons:

- Robins were assumed to feed nowhere else but at the Site;
- There was no consideration of the periodic inaccessibility of wetland soil due to submergence;

- The soil/sediment EPC for PCBs is a 97.5% UCL mean concentration;
- PCBs were assumed 100% absorbed through the ingestion route;
- Bioaccumulation and bioconcentration factors did not consider the high binding capacity of the soil/sediment (the average total organic carbon content of the soil/sediment is 31.4%);
- The TRV-Low value for PCBs applied to calculate the HI-High is on the low end of the range of values available. Using the highest TRV-Low value, the HI-High would be reduced from 5 to 3; and,
- The difference between the HI of 5 and the maximum acceptable HI of 1 is within the range of uncertainty associated with the assessment.

The HI-High of 3 and an HI-Low of 1 calculated for short-tailed shrew were primarily associated with exposure to PCBs. However, the risk characterization concludes that these HIs are conservative and that a significant risk of harm is not posed to short-tailed shrew for the following reasons:

- Shrew were assumed to feed nowhere else but at the Site;
- There was no consideration of the periodic inaccessibility of wetland soil due to submergence;
- The soil/sediment EPC for PCBs is a 97.5% UCL mean concentration;
- PCBs were assumed 100% absorbed through the ingestion route;
- Bioconcentration factors do not consider the high binding capacity of the soil/sediment;
- The TRV-Low value PCBs applied to calculate the HI-High is in the center of the range of relevant values available. Using the highest TRV-Low value, the HI-High would be reduced from 3 to 1.
- The difference between the HI of 3 and the maximum acceptable HI of 1 is within the range of uncertainty associated with the assessment.

The potential risk of harm to safety and public welfare were assessed according to MADEP guidance. These assessments concluded that the Site poses no significant risk of harm to safety or public welfare.

Prepared by:

Cynthia Fuller, MPH
Health Risk Assessor

1.0 INTRODUCTION

This report presents a Method 3 Risk Characterization for the wetland area of the former McCoy Field property in New Bedford, Massachusetts (the Site) [Release Tracking Number (RTN) 4-15685]. The Method 3 Risk Characterization evaluates the potential risk of harm to human health, the environment, public welfare, and safety in accordance with requirements of the Massachusetts Contingency Plan (MCP) (310 CMR 40.0000) and guidance provided in *Guidance for Disposal Site Risk Characterization in Support of the Massachusetts Contingency Plan* [Massachusetts Department of Environmental Protection (MADEP), July 1995]. In addition, risk assessment guidance developed by the U.S. Environmental Protection Agency (U.S. EPA) was applied.

This risk characterization is based upon the results of soil and sediment sampling conducted in the wetland area in December 2004, January 2005, and April 2005, as presented in this report.

The report is presented in the following sections:

- Site Background (Section 2.0)
- Site Environmental Conditions (Section 3.0)
- Characterization of the Risk of Harm to Human Health (Section 4.0)
- Characterization of the Risk of Harm to the Environment (Section 5.0)
- Characterization of the Risk of Harm to Public Welfare (Section 6.0)
- Characterization of the Risk of Harm to Safety (Section 7.0)
- Summary and Conclusions (Section 8.0)

2.0 SITE BACKGROUND

2.1 Site and Vicinity Location and Use

McCoy Field is a former recreational field previously occupied by three soccer fields. This property is located in a primarily residential area and is bounded by Hathaway Boulevard to the east, Durfee Street to the north, Summit Street to the west, and Ruggles Street to the south (Figure 1). The New Bedford High School is located east of the Site across Hathaway Boulevard and is classified as protected open space.

The former McCoy Field property consists of two distinct areas: an upland area that is undergoing development for the new Keith Middle School, and a deciduous wooded swamp wetland area located north and west of the upland area that will remain undeveloped (Figure 2). This risk characterization addresses the wetland area only, which is referred to as "the Site" in this report.

2.2 Site Physical and Hydrological Setting

The topography of the former McCoy Field property varies. The upland area is and will be elevated above the wetland area by an exposure management barrier (primarily a soil cap, paved areas, and the new school). The downward slope from the upland area to the wetland area has been graded, stabilized, and covered with a soil cap. The wetland area is heavily vegetated and contains an unnamed stream that originates from another wetland area about 1.5 miles north of the Site and terminates at the Site. The wetland area typically dries up in summer. The Site is not located within Zone II of a public water supply, within an interim wellhead protection area, within Zone A of a Class A surface water body, or overlying a high- or medium-yield aquifer (Figure 3).

3.0 SITE ENVIRONMENTAL CONDITIONS

3.1 History of Releases

McCoy Field was constructed in the 1960s by filling a low area with fill material. This fill material was obtained from the site of the high school during the high school's construction. The high school site was historically operated as a burning dump and fill material from this site consisted of black fine sand and organic silt containing ash, asphalt, concrete, brick, glass, metal, and wood materials. In the 1970s, during construction of the McCoy Field playing fields, the fill material was graded with a layer of gravel and capped with imported clean fill.

During planning activities for the new middle school, subsurface investigations identified the presence of fill material in the upland area and, in it, chemical constituents above MADEP reportable concentrations. These findings are discussed further in Section 3.3. While historic filling of the wetland area is believed not to have occurred (an opinion supported by aerial photographs and historic records), the potential exists for fill material to have reached the wetland area through atmospheric dispersion, erosion, or other pathways.

3.2 Categorization of Site Soil and Groundwater

The MCP establishes categories of soil and groundwater for use in characterizing risks posed by a Site. Soil is categorized as S-1, S-2, and/or S-3 on the basis of four factors: potential frequency of contact with soil, intensity of contact with soil, accessibility of soil, and the presence of children. Under the current and planned future undeveloped condition of the Site, soil is categorized as S-1 because children may be present with a high intensity of soil contact when present at the Site.

Groundwater can be categorized as GW-1, GW-2, and/or GW-3, depending on location and use. Category GW-1 is associated with current or potential drinking water source areas. Category GW-2 is associated with groundwater located within 30 feet of an existing occupied building if the average annual depth to groundwater is 15 feet or less. Category GW-3 is associated with groundwater that is a potential source of discharge to surface water. The Site does not overlay any feature triggering a GW-1 category. Site groundwater may be located within 30 feet of a building at the periphery of the Site and is located at a depth of less than 15 feet, so a GW-2 category applies. All groundwater in Massachusetts is categorized as GW-3. Therefore, categories of GW-2 and GW-3 apply to the Site.

Combined soil and groundwater categories applicable to the Site under current and planned future uses are S-1/GW-2 and S-1/GW-3.

3.3 Summary of Current Site Conditions

3.3.1 Adjacent Upland Soil/Fill

Site investigations in the upland area identified constituents in soil and fill material at concentrations above MADEP Method 1 soil standards. Table 1 summarizes analytical results of this sampling; some results represent soil/fill that has been removed from the Site. While these results do not represent conditions in the wetland area, they describe historical upgradient conditions. The following constituents were detected above Method 1 S-1 soil standards:

- PCBs (as Aroclor 1254)
- Benzidine (detected once)
- Benzo(a)anthracene
- Benzo(b)fluoranthene
- Benzo(k)fluoranthene
- Benzo(a)pyrene
- Chrysene
- Dibenzo(a,h)anthracene
- Indeno(1,2,3-cd)pyrene
- Total petroleum hydrocarbons (TPH)
- Arsenic
- Barium
- Lead

3.3.2 Wetland Area Soil/Sediment

Table 2 summarizes analytical results of soil/sediment sampling in the wetland area; sampling locations are shown on Figure 4. These data were reviewed and qualified, as appropriate, according to U.S. EPA's Contract Laboratory Program National Functional Guidelines (U.S. EPA 1999b; 2004c), with respect to surrogate recovery and presence in sampling or laboratory blanks. Since the wetland area dries out in summer, the results are evaluated as both soil and sediment. When evaluated as soil, the following constituents were detected at concentrations above Method 1 S-1 soil standards:

Constituent	Locations of Exceedances	Range of Detected Concentrations (mg/kg)	Method 1 S-1 Soil Standard ¹ (mg/kg)	U.S. EPA Residential Cleanup Level (mg/kg)
PCBs (as Aroclor 1254)	IW-2, WC.5-4.5, WC.5-27.5, WD-5, WD.5-2.5, WD.5-17.57, WD-6, WD-11, WD-12, WD-14, WD-15, WD-19, WD-23, WD-24, WD-25, WD-26, WD-27, WH-5	0.014 – 11.8	2	--
	(above, plus) WC.5-22.5, WC.5-24.5, WD.5-3.5, WD-10, WD-17, WD-21, WE-3, WG-4.5, WI.5-5		--	1
Benzo(a)anthracene	IW-1, IW-2, WB-4, WC.5-14.5, WD.5-17.57	0.1 – 2.3	0.7	--
Benzo(b)fluoranthene	IW-1, IW-2, WC.5-14.5, WC.5-17.28, WD.5-17.57	0.12 – 2.9	0.7	--
Benzo(a)pyrene	IW-1, IW-2, WC.5-14.5, WD.5-17.57	0.11 – 2.3	0.7	--
Indeno(1,2,3-cd)pyrene	IW-2, WC.5-14.5	0.55 – 1.1	0.7	--
Lead	IW-2, WB-7, WC.5-14.5, WD.5-17.57, WD-7, WD-12, WD-23, WD-25, WE-3, WF-8	1.7 – 810	300	--

1. Applicable to both S-1/GW-2 and S-1/GW-3 categories.

When evaluated as sediment and compared with the screening sediment benchmarks shown below, constituents detected above benchmarks are those presented in the following table:

- Freshwater Sediment Screening Benchmarks (MADEP 2002b);
- If the above was not available, Effect Range-Low (ERL) Values (NOAA 1999); and,
- If neither of the above was available, values calculated from chronic surface water benchmark concentrations using the equilibrium partitioning approach and the 5th percentile organic carbon content of Site soil/sediment (Table 3).

Constituent	No. Locations With Exceedances	Range of Detected Concentrations (mg/kg)	Chronic Sediment Screening Benchmark (mg/kg)
PCBs (as Aroclor 1254)	92 / 124	0.014 – 11.8	0.0598 ¹
Anthracene	4 / 122	0.25 – 0.74	0.0572 ¹
Benzo(a)anthracene	13 / 122	0.1 – 2.3	0.108 ¹
Benzo(b)fluoranthene	5 / 122	0.12 – 2.9	1.116 ²
Benzo(k)fluoranthene	2 / 122	0.13 – 1.4	0.617 ²
Benzo(g,h,i)perylene	4 / 122	0.49 – 1.1	0.226 ²
Benzo(a)pyrene	9 / 122	0.11 – 2.3	0.15 ¹
Chrysene	11 / 122	0.11 – 1.2	0.166 ¹
Fluoranthene	9 / 122	0.11 – 3.6	0.423 ¹
Fluorene	2 / 122	0.089 – 0.14	0.0774 ¹
Phenanthrene	8 / 122	0.095 – 2.6	0.204 ¹
Pyrene	19 / 122	0.12 – 5.6	0.195 ¹
Cadmium	48 / 123	0.2 – 5.75	0.99 ¹
Chromium (total)	7 / 123	3.07 – 79	43.4 ¹
Lead	70 / 123	1.7 – 810	35.8 ¹
Mercury	28 / 123	0.015 – 2.06	0.18 ¹

1. MADEP (2002b).
2. Calculated value.

The chronic sediment screening benchmarks are based on the protection of sediment-dwelling organisms and represent a concentration below which adverse effects of sediment dwelling organisms are not expected to occur. Except for calculated values, these benchmarks do not consider site-specific factors, such as the organic carbon content of the sediment (that strongly influences the bioavailability of the constituent). Therefore, exceedance of a screening benchmark does not necessarily indicate that the constituent is causing harm at the Site. The organic carbon content of Site soil/sediments is high (the average total organic carbon content is 31.4%; Table 4), suggesting that most organic constituents would be strongly bound to sediment particles and not readily bioavailable.

3.3.3 Wetland Area Groundwater

Groundwater has not been sampled in the wetland area. Limited groundwater sampling has been conducted in the upland area; detected constituents are presented on Table 5. The presence of constituents in groundwater was very limited, and all detected concentrations were below all applicable Method 1 groundwater standards.

3.3.4 Wetland Area Surface Water

Surface water has not been sampled in the wetland area. In Section 4.2.4.3, sediment interstitial water and overlying surface water concentrations are predicted from soil/sediment concentrations using the equilibrium partitioning approach.

3.4 Potential Site Constituents of Concern

Based on the data for the wetland area presented in Table 2, the following constituents are adopted as constituents of concern (COCs) for the human health and environmental risk characterizations:

- PCBs (as Aroclor 1254)
- Acenaphthene
- Anthracene
- Benzo(a)anthracene
- Benzo(b)fluoranthene
- Benzo(k)fluoranthene
- Benzo(g,h,i)perylene
- Benzo(a)pyrene
- Chrysene
- Fluoranthene
- Fluorene
- Indeno(1,2,3-cd)pyrene
- Phenanthrene
- Pyrene
- Barium
- Cadmium
- Chromium
- Lead
- Mercury
- Selenium

These COCs are all of the constituents detected in soil/sediment from the wetland area except for the following for the reasons provided:

Arsenic. Arsenic was not detected above either its Method 1 soil standard or its chronic sediment screening benchmark. All detected concentrations were at or below arsenic's natural soil background level (MADEP 2002c).

Silver. Silver was not detected above either its Method 1 soil standard or its chronic sediment screening benchmark. All detected concentrations were at or below silver's natural soil background level (MADEP 2002c).

Note that detected concentrations of acenaphthene, anthracene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, benzo(a)pyrene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, phenanthrene, and pyrene, all of which are polycyclic aromatic hydrocarbons (PAHs), are all at or below background levels in natural soil. These constituents are retained because they are also assessed in sediment and there is no generally recognized background level for constituents in sediment.

4.0 HUMAN HEALTH RISK CHARACTERIZATION

The objective of the human health risk characterization is to assess if Site conditions in the wetland area pose a potential health risk to exposed humans.

4.1 Hazard Identification

This section discusses environmental fate and transport potential of the COCs, identifies COC toxicity values applied to the human health risk characterization; and identifies applicable or suitably analogous standards, when available.

4.1.1 Environmental Fate and Transport Characteristics

Chemical properties describing the fate and transport potential of the COCs are summarized in Table 6.

4.1.1.1 Mobility

Mobility describes the movement of a chemical in the environment. Volatilization and leaching are two primary mobility mechanisms.

Volatilization potential can be described both by a constituent's vapor pressure (the constituent's inherent volatility) and Henry's Law Constant (the ratio of vapor pressure to water solubility, describing the tendency to volatilize from water). The higher the vapor pressure and its Henry's Law Constant, the higher the volatilization potential. For comparison, acetone (which is volatile) has a vapor pressure of 0.3 atmospheres and a Henry's Law Constant of 0.0015 cm³/cm³ (U.S. EPA 1994). As Table 6 shows, the organic COCs generally have a low volatility. This indicates that significant volatilization of the organic COCs to air is unlikely.

Leaching potential can be described by a constituent's water solubility and tendency to adsorb to organic carbon in soil (described by its organic carbon/water partition coefficient; K_{OC}). The higher the water solubility and the lower the K_{OC} value, the more likely the constituent is to desorb from soil or sediment particles and transfer to groundwater or surface water. For comparison, acetone (which is mobile) has a water solubility of 1,000,000 mg/L and a K_{OC} value of 0.58 cm³/g. As Table 6 shows, the water solubility of the organic COCs is low to moderate, and the K_{OC} values are high (all above 10⁴). This indicates that significant desorption of organic COCs from soil or sediment to groundwater or surface water is not likely.

Metals vary in their water solubility depending on the form that exists in the soil or sediment; which is not known. However, most metals generally have a low water solubility, are strongly bound to soil and, with the exception of mercury, are considered non-volatile. Mercury can be volatile; however, this is typically seen at higher than ambient temperatures.

4.1.1.2 Persistence

PCBs, PAHs, and metals are generally considered to be persistent in the environment. Degradation of these constituents will occur slowly over time, or not at all (metals).

4.1.1.3 Bioaccumulation

PCBs, PAHs, and metals are generally considered to have the potential to bioaccumulate in animal or plant tissue. This is illustrated by the higher n-octanol/water partition coefficients (K_{ow}) of the COCs; K_{ow} values above 10^3 generally indicate a potential to bioaccumulate.

4.1.2 Toxicity Values

Eight of the COCs are known or probable human carcinogens and are assessed as such: PCBs, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, chrysene, indeno(1,2,3-cd)pyrene, and cadmium (inhalation route only). The remaining COCs are assessed as non-carcinogens. Toxicity values used to quantify the potential carcinogenic and non-carcinogenic human health risks of the COCs are presented on Table 7 and were obtained from the following sources:

- Integrated Risk Information System (IRIS) (U.S. EPA 2005);
- Proposed Revised Method 1 Numerical Standards and supporting documentation (MADEP 2004); and,
- Revisions to Dose-Response Values Used in Human Health Risk Assessment (MADEP 2004a).

Toxicity values used to assess non-carcinogenic health impacts are reference doses (RfD) for oral and dermal exposures and reference concentrations (RfC) for inhalation exposures. Toxicity values used to assess excess lifetime cancer risks are cancer slope factors (SF) for oral and dermal exposures and inhalation unit risk values (UR) for inhalation exposures. Inter-route extrapolations were made (e.g., deriving inhalation toxicity values from oral values), where necessary, to quantify exposures. Toxicity profiles for the COCs are presented in Appendix A.

4.1.3 Applicable or Suitably Analogous Standards

Applicable or suitably analogous standards potentially include the following:

- Drinking Water Standards (310 CMR 22). These regulations establish drinking water standards for GW-1 areas. Groundwater at the Site is not categorized as GW-1, so drinking water standards do not apply.
- Air Quality Standards (310 CMR 6.00). This regulation establishes air quality standards for criteria pollutants (sulfur oxides, particulate matter, carbon monoxide, ozone, nitrogen dioxide, and lead). No COCs of the form found at the Site are addressed in this regulation.
- Surface Water Quality Standards (314 CMR 4.00). This regulation identifies specific standards for general or non-chemical parameters (such as temperature), as well as specifying "freedom" from pollutants in concentrations or combinations that are toxic to humans, aquatic life, or wildlife. The regulation does not provide chemical-specific water quality standards applicable to this risk characterization, but references U.S. EPA ambient water quality criteria. There are no surface water data from the wetland area; however, COC concentrations in sediment interstitial water and surface water in the wetland area are estimated from soil/sediment data and compared with surface water benchmark concentrations in Section 5.0.

4.2 Exposure Assessment

This section identifies human receptor groups potentially exposed to COCs, identifies pathways and routes by which these receptor groups may be exposed, calculates exposure point concentrations for each COC, and quantifies potential exposure.

4.2.1 Potentially Exposed Human Receptors

Human receptor groups quantitatively assessed in the risk characterization include the following:

Pedestrians/Recreators/Trespassers. Pedestrians, recreators, or trespassers may be exposed to COCs during recreational activities, dog-walking, and similar activities conducted on the Site. Pedestrians, recreators, or trespassers are assessed in four ages groups: children (between the ages of 1 to 8), youth (between the ages of 8 to 15), adults (over 15), and a combined age group (ages 1 to 30).

The following receptor groups are not quantitatively assessed for the reasons provided:

Residents. The Site is not currently used for residential purposes, nor is such use anticipated in the near future. Given the presence of the wetlands, there is little likelihood that any residential structures will be built on the Site. Therefore, residential use of the wetlands is not assessed.

Commercial Workers. The Site is not currently used for occupational purposes, nor is such use anticipated in the near future. Given the presence of the wetlands, there is little likelihood that any occupational structures will be built on the Site. Therefore, occupational use of the wetlands is not assessed.

Construction Workers. Since it is not likely that any construction in the wetland area will occur, the potential for construction worker exposure does not exist and is not assessed.

4.2.2 Potentially Complete Exposure Pathways

Potential exposure pathways that are quantitatively assessed are:

- Soil/sediment ingestion
- Soil/sediment dermal contact
- Inhalation of entrained soil/sediment particles
- Surface water ingestion
- Surface water dermal contact

All soil/sediment samples are assessed as soil since the wetland area typically dries up in summer, humans are more likely to have contact with soil than submerged sediment, and are more likely to access the Site during the warmer months when the wetlands have dried up. Since groundwater has not been sampled at the Site and is not likely to be impacted or contacted, exposure to groundwater is not assessed. Furthermore, since the COCs have a low volatility potential, exposure through volatilization pathways is not assessed.

4.2.3 Exposure Factors

Exposure factors used to quantify human exposures are summarized on Table 8. Exposure factors were obtained from MADEP (2004; 2002a; 1995), U.S. EPA (2004; 1997; 1996), or other, generally recognized guidance. In the absence of specific guidance, assumptions were made regarding the degree of exposure. Relative absorption factors (RAFs) used to modify absorption through dermal intake are presented on Table 7; all constituents are conservatively assumed to be 100% absorbed through the oral exposure route. Estimation of the dermal intake of constituents from surface water is estimated using approaches described in U.S. EPA (2004) and presented on Table 9.

4.2.4 Exposure Point Concentrations

This section evaluates the presence of hot spots and describes the derivation of exposure point concentrations (EPCs) for COCs in soil and groundwater.

4.2.4.1 Evaluation of Hot Spots

Soil/sediment analytical data are presented on Table 2. No hot spots, as defined in 310 CMR 40.0006, are contained within the data set.

4.2.4.2 Soil/Sediment Exposure Point Concentrations

COC EPCs in soil/sediment are arithmetic mean concentrations for all COCs, as presented on Table 2. Non-detected constituents are included in the arithmetic mean at a concentration equal to one-half the quantitation limit.

The maximum detected concentration of PCBs at WD-25 (11.8 mg/kg) was further characterized by supplemental sampling at four locations immediately surrounding the original sample location (WD-25A, -25B, -25C, and -25D). Lower PCB concentrations were detected in these samples (0.419 mg/kg to 0.987 mg/kg). To avoid over-representing this location, the average of these five sample results was used to represent WD-25.

Sample location WE-6 was sampled on two occasions. The highest detected COC concentrations or lowest quantitation limits (if not detected) were used to represent this location.

The MCP allows use of the arithmetic mean as an EPC under certain conditions:

- Longer-term exposures are assessed;
- Constituents assessed are not lethal or associated with severe health effects from short-term exposures;
- Data available to characterize the Site are sufficient;
- The data do not exhibit a high degree of variability; and,
- The arithmetic mean is unlikely to underestimate the true mean.

Responses to these conditions are presented below:

- Chronic exposures are assessed for all receptors.
- None of the COCs is believed associated with acute health effects at the environmental concentrations detected; all detected concentrations are below upper concentration limits.
- The amount of data available for the Site is judged sufficient and the scope of analyses is appropriate for the type of release that occurred.
- While a certain amount of variability exists in the data, it is judged to represent spatial distribution of the contamination. All COCs meet the criteria in 310 CMR 40.0926(b) for demonstrating low variability, using the Method 1 S-1 soil standard as the applicable standard.
- Since environmental data are often log-normally distributed, the arithmetic mean concentration is likely to overestimate the true central tendency of the data.

4.2.4.3 Sediment Interstitial Water and Surface Water Exposure Point Concentrations

Interstitial water EPCs were calculated from soil/sediment EPCs using the equilibrium partitioning approach, as follows:

For organic COCs: $C_{SWi} = C_{SED} / (f_{OC} \times K_{OC})$

For inorganic COCs: $C_{SWi} = C_{SED} / K_D$

where:

C_{SWi} = Predicted sediment interstitial water concentration (mg/L)

C_{SED} = Soil/sediment EPC (mg/kg)

f_{OC} = Fraction of organic carbon in soil/sediment (kg/kg)

K_{OC} = Constituent-specific organic carbon/water partition coefficient (L/kg)

K_D = Constituent-specific soil- or sediment/water partition coefficient (L/kg)

The Site average f_{OC} value of 31.4% was applied (Table 4).

Overlying surface water EPCs were calculated from the predicted sediment interstitial water concentration, as follows:

$$C_{SW} = C_{SWi}/10$$

where:

C_{SWi} = Predicted sediment interstitial water concentration (mg/L)

10 = Assumed dilution between interstitial and overlying water (unitless)

These predicted water concentrations are presented on Table 10.

4.2.4.4 Air Exposure Point Concentrations

EPCs for soil particles in air were derived by combining the soil EPCs with an air PM₁₀ concentration (particles with an aerodynamic diameter of 10 microns or less) of 32 µg/m³.

$$C_{air-PM10} = C_{SOIL/SED} \times PM_{10} \times CF$$

Where:

- $C_{air-PM10}$ = Exposure point concentration of soil particles in air (mg/m³)
 $C_{SOIL/SED}$ = Exposure point concentration in soil/sediment (mg/kg)
 PM_{10} = PM₁₀ concentration in ambient air (µg/m³)
 CF = Unit conversion factor (kg/µg)

This approach is recommended by MADEP (1995) to represent soil particle concentrations in air under "open field" conditions.

4.2.5 Quantitation of Exposure

COC exposure was quantified by combining exposure factors with EPCs to derive an average daily exposure (ADE) or dose (ADD). Risk characterization equations presented in MADEP (1995) were used to quantify exposures and are presented in the risk characterization spreadsheets in Appendix B.

4.3 Risk Characterization

4.3.1 Methodology

Potential cancer risks and non-carcinogenic health hazards were quantified by combining estimated COC intakes with the COC's appropriate toxicity value for the exposure under consideration.

The risk characterization procedure for carcinogenic chemicals derives an excess lifetime cancer risk, which is the excess lifetime risk (i.e., over background risk levels) of incurring cancer from exposure to carcinogens. Cancer risks for each COC, pathway, and age group are summed to derive a total excess lifetime cancer risk, which is compared with the maximum acceptable cancer risk adopted by MADEP: a risk of one-in-one-hundred-thousand, denoted as 1x10⁻⁵. A total excess lifetime cancer risk at or below 1x10⁻⁵ represents no significant risk to human health.

The risk characterization procedure for non-carcinogenic chemicals derives a Hazard Quotient (HQ), which is the ratio of the estimated exposure or intake to an exposure or intake judged to pose no health hazard. HQs are derived separately for each age group. HQs for each COC and pathway are summed to derive a total Hazard Index (HI), which is compared with the maximum acceptable HI adopted by MADEP: 1.0. An HI at or below 1.0 represents no significant risk to human health.

4.3.2 Human Health Risk Characterization Results

Risk characterization calculations are presented in Appendix B and summarized below.

RECREATIONAL/PEDESTRIAN/TRESPASSER RISK CHARACTERIZATION SUMMARY							
Exposure Pathway	Child		Youth		Adult		Combined
	Hazard Index	Cancer Risk	Hazard Index	Cancer Risk	Hazard Index	Cancer Risk	Cancer Risk
Soil/sediment ingestion	0.2	5×10^{-7}	0.05	1×10^{-7}	0.03	2×10^{-7}	8×10^{-7}
Soil/sediment dermal contact	0.08	3×10^{-7}	0.02	8×10^{-8}	0.01	9×10^{-8}	5×10^{-7}
Inhalation of entrained soil particles	0.0006	4×10^{-10}	0.0006	4×10^{-10}	0.0006	1×10^{-9}	2×10^{-9}
Surface water ingestion	0.0005	4×10^{-10}	0.0002	2×10^{-10}	0.0001	3×10^{-10}	9×10^{-10}
Surface water dermal contact	0.0001	1×10^{-8}	0.00009	1×10^{-8}	0.00006	2×10^{-8}	5×10^{-8}
Total (all pathways)	0.3	9×10^{-7}	0.07	2×10^{-7}	0.04	3×10^{-7}	1×10^{-6}
Maximum Acceptable Level	1.0	1×10^{-5}	1.0	1×10^{-5}	1.0	1×10^{-5}	1×10^{-5}

Total HIs for adults, youth, and children are below the maximum acceptable HI. Total excess lifetime cancer risks for individual and combined age groups are below the maximum acceptable cancer risk. Therefore, the Site poses no significant risk of harm to human health to pedestrians, recreators, or trespassers.

4.4 Uncertainty Assessment

The human health risk characterization applied available site-specific data, risk characterization approaches recommended by MADEP and U.S. EPA, and reasonable assumptions to assess Site risks. Nonetheless, uncertainties in these factors can contribute to uncertainty in the overall quantitative risk estimates. This section identifies some uncertainties in the quantitative human health risk characterization and discusses the impact of these uncertainties.

4.4.1 Uncertainties Associated with Site Data

One hundred twenty two (122) to 124 soil/sediment samples collected from a depth interval of 0 to 6 inches were applied to the risk characterization, depending on the analyte. These samples were collected from throughout the wetland area. The number, location, and depth of the soil/sediment samples are judged to contribute a low degree of uncertainty to the risk characterization.

Soil samples were analyzed for PCBs (as various Aroclor types), PAHs, pesticides (which were not detected), and RCRA metals. The analytical suite was based on the release type and results from sampling conducted in the upland area and is judged appropriate. A low degree of uncertainty is associated with the scope of analyses.

Overall, the uncertainty associated with Site data is judged low.

4.4.2 Uncertainties Associated with the Toxicity Assessment

Toxicity values were obtained from U.S. EPA or MADEP sources. These toxicity values are typically derived from human studies or from animal studies conducted at high dose levels, from which potential human health effects at low doses are extrapolated and to which conservative uncertainty factors are applied. Therefore, these values provide a conservative estimate of potential human health impacts and are not likely to underestimate health risks. The uncertainty associated with the toxicity values is moderate.

4.4.3 Uncertainties Associated with Exposure Point Concentrations

Soil/sediment EPCs were the arithmetic mean concentration of each COC. When a COC was not detected in a sample, it was presumed present at a concentration equal to one-half of the quantitation limit attained in the analyses. This approach is consistent with MADEP guidance and all COCs meet MADEP's criteria for use of an arithmetic mean concentration as an EPC.

Surface water EPCs were estimated from soil/sediment EPCs by the equilibrium partitioning approach, using the arithmetic average organic carbon content of Site soil/sediment and each constituent's organic carbon/water or soil-sediment/water partition coefficient. This approach estimates interstitial water concentrations; one-tenth of this concentration was used to represent overlying surface water. The uncertainty associated with surface water EPCs is moderate.

Overall, uncertainty associated with exposure point concentrations is low to moderate.

4.4.4 Uncertainties Associated with Exposure Scenarios and Exposure Factors

Three human receptor groups were assessed for exposure to COCs: pedestrians, recreators, and trespassers. Since the degree of exposure of each receptor group was anticipated to be similar, the same exposure factors were used for all three groups. These receptor groups represent current and future potentially exposed receptor groups. The uncertainty associated with the scope of receptors assessed is low.

Humans were assumed to have a high degree of exposure to Site media. Exposure factors obtained from U.S. EPA or MADEP guidance or from best professional judgment will conservatively estimate COC intake and risk. The uncertainty associated with the selection and use of exposure factors is moderate.

Overall, the uncertainty associated with exposure scenarios and factors is low to moderate.

4.4.5 Uncertainties Associated with the Risk Characterization Approach

By combining conservative estimates of exposure and toxicity, results of the risk characterization reflect conservative conditions that may not represent typical exposures. Health risks, particularly to an average exposed individual, may be overestimated.

5.0 ENVIRONMENTAL RISK CHARACTERIZATION

The objective of the environmental risk characterization is to assess if Site conditions in the wetland area pose a potential health risk to exposed environmental receptors. These potential health risks are assessed by performing a risk characterization consistent with MADEP and U.S. EPA guidance for environmental risk characterizations.

5.1 Problem Formulation

5.1.1 Description of Site Environmental Habitat

The area of the former McCoy Field property that is occupied by wetlands consists of land running along the northern and western perimeters of the property; measuring about 400 feet wide along the northern end of the property and 100 feet wide along the southern end of the property. The total estimated acreage of the wetland area is about four acres. The area is heavily vegetated with mature trees and underbrush and is described as a deciduous wooded swamp wetland. Figure 2 shows the appearance of the Site and upland area when previous used as a recreational field.

The Site's wetland area is isolated from other regional natural areas by developed areas. It is bordered by residentially developed land along Durfee Street to the north, Nashua and Summit streets to the west, Ruggles Street to the south, and Hathaway Boulevard (and the future school) to the east. There are several areas near the Site that offer a higher quality environmental habitat than the Site but also serve to attract environmental receptors to the area. These include:

- Apponagansett Swamp, located about 4,000 feet northwest of the Site at its closest point;
- Acushnet Cedar Swamp (a State reservation), located about 2.5 miles northwest of the Site at its closest point; and,
- Buzzards Bay, located about three miles southwest of the Site at its closest point.

The Site is not identified as a core habitat or supporting natural landscape for either plants or animals by the Massachusetts Division of Fisheries and Wildlife's Natural Heritage and Endangered Species Program (NHESP) (www.mass.gov/dfwele/dfw/nhesp/nhesp.htm).

5.1.2 Constituents of Concern

The constituents of concern adopted for the environmental risk characterization are the same as those selected for the human health risk characterization. Fate and transport potential of the COCs was discussed in Section 4.1.1.

5.1.3 Exposure Assessment

5.1.3.1 Potential Receptors

A number of threatened or endangered species or species of special concern have been identified in the New Bedford area (Table 11). These species include terrestrial, avian, reptilian, and amphibian species. Although not specifically identified on the Site, some of these species have the potential to be located on the Site where the species' preferred habitat is consistent with the Site's.

Environmental receptors for which exposure and toxicological information is readily available have been selected to serve as surrogates for similar environmental species that may be present on Site but for which exposure and toxicological information is not readily available. These are identified on Table 12 and summarized below:

- Earthworms (terrestrial invertebrates)
- Crustaceans (benthic aquatic invertebrates)
- Green frog (amphibians)
- American robin (omnivorous avian species)
- Red-tailed hawk (carnivorous avian species)
- Short-tailed shrew (insectivorous mammals)
- Raccoon (omnivorous mammals)

This set of surrogate receptors spans several trophic levels; including those in intimate contact with potentially impacted Site media (terrestrial and aquatic invertebrates and the green frog in its embryonic or juvenile form), organisms that feed on these organisms (shrew, raccoon, and robin) and organisms that feed on these primary feeders (raccoon and hawk). These organisms are also consistent with the limited environmental habitat offered by the Site because of its urban setting, future planned use, limited size, and isolated character.

Because the wetlands are dry for a portion of the year, the wetlands are not believed to support a fish population. Therefore, species that feed primarily on fish (such as mink or heron) or inhabit primarily aquatic environments (sea otter, muskrat) are not assessed. Similarly, species that tend to inhabit habitats different from the Site (e.g. prairie voles), or have a similar or "less at risk" dietary habit (e.g., are primarily vegetarian) as the selected receptors (e.g., rabbits) are not assessed.

Appropriate toxicological values could not be located for reptilian species, such as turtles, so potential risks to reptiles cannot be quantitatively assessed. It is assumed that assessment of the target surrogate species is adequately protective of reptiles.

5.1.3.2 Potentially Complete Exposure Pathways and Factors

Exposure pathways by which the selected surrogate receptors are assessed are summarized on Table 12. In general, invertebrates and amphibian species are directly exposed to impacted media, whereas higher trophic level species are exposed primarily through direct ingestion of media and the diet. Exposure factors applied to quantify exposure of these organisms are summarized on Table 13.

5.1.4 Identification of Assessment Endpoints

The following assessment endpoints have been selected for this Site:

- Survival of aquatic and terrestrial invertebrates. This assessment endpoint is selected because of the potentially limited habitat for both types of receptors as a result of the intermittent submergence and drying up of the wetland area. These receptors are assessed primarily for their role as a food source for other organisms.
- Survival, growth, and reproduction of terrestrial, avian, and amphibian species. This assessment endpoint is selected because the Site may be suitable for full use by these receptors.

5.2 Analysis

5.2.1 Potential Exposure Point Concentrations

5.2.1.1 Soil/Sediment

As in the human health risk characterization, constituent EPCs in soil/sediment for the environmental risk characterization are the arithmetic mean concentration of the COC, unless the constituent does not meet the criteria of 310 CMR 40.0926(b) for applying a mean as an EPC. Using the sediment screening values in Table 2 as the applicable criterion for this purpose, the following constituents do not meet the criteria in 310 CMR 40.0926(b):

- PCBs (as Aroclor 1254)
- Anthracene
- Benzo(a)anthracene
- Benzo(a)pyrene
- Chrysene
- Fluorene
- Phenanthrene
- Pyrene
- Cadmium
- Lead
- Mercury

A 95th percentile upper confidence limit (UCL) on the mean concentration was calculated for these COCs using U.S. EPA's ProUCL (Version 3, 2004), as presented on Table 14 and referenced on Table 2. For PCBs, a 97.5th percentile UCL was recommended by ProUCL. ProUCL printouts are presented in Appendix C.

5.2.1.2 Sediment Interstitial Water and Surface Water

Sediment interstitial water concentrations were estimated from soil/sediment concentrations using the equilibrium partitioning approach. The environmental soil/sediment EPCs were combined with the arithmetic mean soil/sediment total organic carbon content (31.4%) of

the soil/sediment and the organic carbon/water partition coefficient for organic COCs or soil/water partition coefficient for inorganic COCs, as follows:

For organic constituents: $C_{SWi} = C_{sed} / (f_{oc} \times K_{oc})$

For inorganic constituents: $C_{SWi} = C_{sed} / K_D$

For both: $C_{SW} = C_{SWi} / 10$

where:

C_{SWi} = COC EPC in sediment interstitial water (mg/L)

C_{SW} = COC EPC in overlying surface water (mg/L)

C_{sed} = COC EPC in soil/sediment (mg/kg)

f_{oc} = Fraction of organic carbon in soil/sediment (g/g)

K_{oc} = Organic carbon/water partition coefficient (organic COCs)

K_D = Soil/water partition coefficient (inorganic COCs)

Calculations are presented in Table 10. Predicted sediment interstitial water COC concentrations are applied as EPCs to assess aquatic invertebrates; predicted overlying surface water COC concentrations are applied as EPCs to assess amphibians, avian, and mammalian receptor groups.

5.2.1.3 Vegetation

COC concentrations in vegetation were estimated by the following model:

$$C_{vegetation} = C_{soil} \times BCF_r \times 0.12$$

where:

$C_{vegetation}$ = COC EPC in vegetation [mg/kg, wet weight (WW)]

C_{soil} = COC EPC in soil/sediment [mg/kg, dry weight (DW)]

BCF_r = COC-specific plant-soil biotransfer factor [(mg/kgDW)/(mg/kgDW soil)]

0.12 = Dry weight to wet weight conversion factor, assuming an 88% vegetation moisture content (unitless)

BCF_r values for organic COCs were estimated by the following regression equation (U.S. EPA 1999):

$$\log BCF_r = 1.588 - 0.578 \log K_{ow}$$

where K_{ow} is the COC's n-octanol/water partition coefficient (Table 6). For metals, BCF_r values were obtained from U.S. EPA (1999).

5.2.1.4 Prey Species

COC concentrations in soil invertebrates were estimated by the following equation (U.S. EPA 1999):

$$C_{invertebrate} = C_{soil} \times BCF_{ssi}$$

where:

$C_{invertebrate}$ =	COC EPC in soil invertebrate (mg/kg, WW)
C_{soil} =	COC EPC in soil/sediment (mg/kg, DW)
BCF_{ssi} =	COC-specific soil-to-soil-invertebrate bioconcentration factor [(mg/kgWW)/(mg/kgDW soil)]

BCF_{ssi} values for most COCs were obtained from U.S. EPA (1999). For PAHs without a recommended value, the midpoint value for other PAHs (0.05) was applied. For two metals that reportedly do not bioaccumulate (barium and selenium) (U.S. EPA 2005b), the lowest value of all assessed metals with values was applied.

COC concentrations in mammalian prey species, represented by shrew, were estimated by the following equation:

$$C_{shrew} = BA_{mammal} \times [(C_{soil} \times BCF_{ssi} \times BA_{soil/food} \times IR_{food-shrew}) + (C_{soil} \times BA_{soil/food} \times IR_{soil-shrew}) + (C_{sw} \times IR_{sw-shrew})]$$

Where:

C_{shrew} =	COC concentration in shrew (mg/kg, wet weight)
BA_{mammal} =	Mammal biotransfer factor (dy/kg tissue)
C_{soil} =	COC concentration in soil (mg/kg, dry weight)
BCF_{ssi} =	COC soil-to-soil-invertebrate bioconcentration factor (mg/kgWW)/(mg/kgDW soil)]
$BA_{soil/food}$ =	COC bioavailability in soil and food (unitless)
$IR_{food-shrew}$ =	Shrew food ingestion rate (assumed all worms) (kg/dy)
$IR_{soil-shrew}$ =	Shrew soil ingestion rate (kg/dy)
C_{sw} =	COC concentration in surface water (mg/L)
$IR_{sw-shrew}$ =	Shrew surface water ingestion rate (L/dy)

BA_{mammal} values for organic COCs were estimated by the following regression equation (U.S. EPA 1999):

$$\log BA_{mammal} = -7.6 + \log K_{ow}$$

where K_{ow} is the COC's n-octanol/water partition coefficient (Table 6). For metals, BA_{mammal} values were back-calculated from BCF values presented in U.S. EPA (1999), Table D-3,

assuming a shrew soil ingestion rate of 0.0145 kg/kg-dy and a body weight of 0.015 kg. Input values for this model are summarized in Table 13.

5.2.2 Toxicity Assessment

5.2.2.1 Terrestrial Invertebrates

Toxicity reference values (TRVs) for terrestrial invertebrates are presented on Table 15. Since the assessment endpoint for this receptor group is survival, TRVs based on acute toxicity in the form of soil concentrations (in mg/kg) were selected. The TRV located for benzo(a)pyrene was a no-observed-effect-level (NOEL, for growth efficiency) for the common wood louse; this value was also applied to remaining carcinogenic PAHs for which appropriate TRVs were not located: benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, and indeno(1,2,3-cd)pyrene. The TRV for fluorene was similarly applied to other non-carcinogenic PAHs for which appropriate TRVs were not located: acenaphthene, anthracene, benzo(g,h,i)perylene, fluoranthene, phenanthrene, and pyrene. Acute TRVs could not be located for barium and chromium, so chronic TRVs were used.

5.2.2.2 Aquatic Invertebrates

TRVs for aquatic invertebrates are presented on Table 16. Since the assessment endpoint for this receptor group is survival, TRVs based on acute toxicity in the form of water concentrations (in µg/L) were selected. These TRVs are later compared with predicted sediment interstitial water concentrations. This form of the TRV was selected rather than bulk sediment concentrations (such as probable effects levels), because bulk sediment benchmark values do not consider Site-specific factors, such as the organic carbon content of the sediment. In addition, the constituent concentration in sediment interstitial water is typically considered the bioavailable fraction.

The TRV for dibenzo(a,h)anthracene (which was not detected in soil/sediment) was applied to benzo(a)pyrene and indeno(1,2,3-cd)pyrene, for which appropriate TRVs were not located. The TRV for pyrene was similarly applied to phenanthrene. TRVs for cadmium, chromium, lead, and mercury were based on the U.S. EPA acute ambient water quality criteria calculated at a water calcium carbonate hardness of 100 mg/L. The actual hardness of Site surface water is not known.

5.2.2.3 Amphibians

Available toxicological data for amphibians were obtained from the Reptile and Amphibian Toxicological Literature database (RATL, version 6), maintained by the Environment Canada's National Wildlife Research Centre.¹ Toxicological information was located for Aroclor 1254, benzo(a)pyrene, fluoranthene, cadmium, chromium, lead, mercury, and selenium. Species tested included various frogs, toads, and salamanders, typically tested in the egg or tadpole

¹ In presentation of lab data, the database states that results are expressed as "µg/L or ppm unless otherwise specified." Since µg/L and ppm differ by three orders of magnitude, the units were sometimes unclear if the data were not specifically labeled. Data associated with uncertain presentation of units were typically not used.

stage. The assessment endpoints for these receptors are survival, growth, and reproduction, so preference was given to studies identifying a no-observed-adverse-effect-level (NOAEL). However, since most information was based on acute effects, the following scheme was applied to approximate a chronic effects-based TRV:

$$\text{Chronic TRV} = LC_{50}/100$$

$$\text{Chronic TRV} = EC_{50}/100$$

$$\text{Chronic TRV} = \text{NOAEL}/10$$

Where LC_{50} is the median lethal concentration and EC_{50} is the median effective concentration (for effects other than lethality). The available toxicity values and resultant TRVs are summarized on Table 17. The TRV for benzo(a)pyrene was applied to the other carcinogenic PAHs: benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, and indeno(1,2,3-cd)pyrene. The TRV for fluoranthene was applied to the other non-carcinogenic PAHs: acenaphthene, anthracene, benzo(g,h,i)perylene, fluorene, phenanthrene, and pyrene. No value was located for barium; one-tenth of the acute aquatic TRV was applied.

5.2.2.4 Avian Species

TRVs for avian species are presented on Table 18. The assessment endpoints for this receptor group are survival, growth, and reproduction. TRVs are based on chronic toxicity and are in the form of an intake (in mg/kgBW-dy). Unlike benthic and aquatic invertebrates and amphibians, two TRVs were selected for use: one TRV representing a more conservative level of protection (TRV-Low) and one representing a more moderate level of protection (TRV-High). Several sources of avian TRVs were identified, including TRVs from U.S. EPA, U.S. Department of Energy, and other sources.

In general, when two or more TRV values were available for a TRV type (i.e., low or high), the more commonly adopted value or a value representing the middle of the distribution was typically (but not always) selected for use. In some cases [as in the U.S. EPA (1999) value for PAHs, discussed in the footnote to Table 18], the study design was judged to be inappropriate for use in the risk characterization and was not applied. If a TRV-High value was not available for a COC (all of the PAHs), the TRV-Low value was applied for both risk characterization calculations.

5.2.2.5 Mammalian Species

TRVs for mammalian species are presented on Table 19. The assessment endpoints for this receptor group are survival, growth, and reproduction. TRVs are based on chronic toxicity and are in the form of an intake (mg/kgBW-dy). Two TRVs were selected for use: one TRV representing a more conservative level of protection (TRV-Low) and one representing a more moderate level of protection (TRV-High). Several sources of mammalian TRVs were identified, including TRVs from U.S. EPA, U.S. Department of Energy, and other sources.

In general, when two or more TRV values were available for a TRV type (i.e., low or high), the more commonly adopted value or a value representing the middle of the distribution was

typically selected for use. Since mink is not a target receptor for the Site, TRVs for PCBs based on exposure of mink (which has a high sensitivity to PCBs) were not applied. The TRV-Low for anthracene was applied to phenanthrene, and the TRV-Low for fluoranthene was applied to fluorene, based on structure similarity. If a TRV-High value was not available for a COC (most PAHs and chromium), the TRV-Low value was applied for both risk characterization calculations.

5.2.3 Exposure and Risk Characterization Equations

Potential environmental risks for terrestrial and aquatic invertebrates and amphibians were quantified by comparing estimated soil, sediment interstitial water, or surface water EPCs with the appropriate TRV for each COC, then summing the results, as follows:

For terrestrial invertebrates: $HQ = C_{soil} / TRV$

For aquatic invertebrates: $HQ = C_{swi} / TRV$

For amphibian species: $HQ = C_{sw} / TRV$

For all: $Total HI = \sum HQ$

where:

HQ = Hazard quotient; measure of potential adverse health impact from an individual COC (unitless)

C_{soil} = EPC in soil (mg/kg)

C_{swi} = EPC in sediment interstitial water ($\mu\text{g/L}$)

C_{sw} = EPC in surface water ($\mu\text{g/L}$)

TRV = Toxicity reference value for soil (mg/kg) or water ($\mu\text{g/L}$)

HI = Sum of COC-specific HQs

Potential environmental risks for mammalian and avian species were quantified by calculating route-specific intakes for each COC, summing the route-specific intakes across all COCs and all intake routes, and comparing the total intake to the appropriate TRV, in the following manner:

$$Intake_{soil} = C_{soil} \times IR_{soil} \times BA_{soil/food} \times A/FA$$

$$Intake_{food} = \sum(C_{food} \times F_{food}) \times IR_{food} \times BA_{soil/food} \times A/FA$$

$$Intake_{sw} = C_{sw} \times IR_{sw} \times A/FA$$

$$Intake_{Total} = Intake_{soil} + Intake_{Food} + Intake_{sw}$$

$$HI-Low = Intake_{Total} / TRV-High$$

$$HI-High = Intake_{Total} / TRV-Low$$

where:

$Intake_{Soil}$ =	COC intake from consumption of soil/sediment (mg/kg-dy)
$Intake_{Food}$ =	COC intake from consumption of one or more food sources (mg/kg-dy)
$Intake_{SW}$ =	COC intake from consumption of surface water (mg/kg-dy)
IR_{Soil} =	Receptor ingestion rate of soil (mg/kg-dy)
IR_{Food} =	Receptor ingestion rate of one or more food types (mg/kg-dy)
IR_{SW} =	Receptor ingestion rate of surface water (mg/kg-dy)
F_{Food} =	Fraction of total food intake contributed by a specific food type (unitless)
$BA_{soil/food}$ =	The COC bioavailability (unitless)
FA =	Foraging area of receptor (acres)
A =	Available foraging area of Site (acres)
$Intake_{Total}$ =	COC intake from all assessed exposure routes (mg/kg-dy)
HI =	Hazard index; measure of potential adverse health impacts, low or high (unitless)
TRV =	COC-specific toxicity reference value, high or low (mg/kg-dy)

The specific equation for each receptor varies; the equations applied are presented in risk characterization spreadsheets in Appendices D and E for avian and mammalian receptors, respectively.

A total HI of greater than one indicates the potential for adverse health impacts to occur to the environmental receptor. Because an HI is not a probability, an increase of an HI from 0.1 to 1 or one to ten does not represent a ten-fold increase in risk. Each constituent has its own dose/response curve (or rate of adverse impact with increase in exposure), and an HI of one may or may not be distinguishable from an HI of, for example, two. Therefore, any HIs calculated above 1.0 are discussed in light of the likelihood that the HI realistically represents a potential health impact to the environmental receptor. In addition, as with humans, the HI is most meaningful when reflecting a single toxicological endpoint. As a screening, HIs for all COCs and exposure pathways are summed for a given receptor. If an HI above 1.0 is calculated as a result of multiple COCs, the HI can be segregated according to toxicological endpoint.

5.3 Risk Characterization

5.3.1 Terrestrial Invertebrates

Risk characterization calculations for terrestrial invertebrates are presented on Table 20. Soil EPCs are compared with acute effects-based soil TRVs for the assessment endpoint of survival (chronic TRVs were applied when acute TRVs could not be located). None of the COC concentrations in soil exceeds its TRV and the total HI is 0.7, below the maximum acceptable HI of 1.0. This indicates that no significant acute risk is posed to terrestrial invertebrates.

5.3.2 Aquatic Invertebrates

Risk characterization calculations for aquatic invertebrates are presented on Table 21. Since COCs in interstitial water will be more bioavailable than those bound up on sediment particles, predicted interstitial water concentrations are compared with acute effects-based TRVs for the assessment endpoint of survival. None of the COC concentrations in sediment interstitial water exceeds its TRV and the total HI is 0.5, below the maximum acceptable HI of 1.0. This indicates that no significant acute risk is posed to aquatic invertebrates.

5.3.3 Amphibian Receptors

Risk characterization calculations for amphibians are presented on Table 22. Since frogs typically lay their eggs on the water surface or attached to floating or submerged vegetation and tadpoles stay within the water column, one-tenth of predicted interstitial water concentrations are used to represent surface water EPCs. Surface water EPCs are compared with chronic effects-based surface water TRVs for the assessment endpoint of survival, growth, and reproduction.

None of the COC EPCs exceeds its individual TRV; the total HI is 1.1. Based on the conservatism inherent in the risk characterization, as discussed below, the risk characterization concludes that a significant risk is not posed to amphibians:

- The HI exceedance is minimal (total HI of 1.1 versus maximum acceptable HI of 1.0);
- The highest chemical-specific HI, for lead, is 0.9, below the maximum acceptable HI of 1.0;
- Lead's TRV of 0.4 µg/L is based on lowest reported toxicity value identified in the literature divided by an uncertainty factor of 100. Other available toxicity values included a NOAEL of 2,000 µg/L for Jefferson salamander eggs and an LC₅₀ of 1,542 µg/L for adult skipper frogs. This indicates a wide range of responses to lead;
- Lead's TRV of 0.4 µg/L is below the federal ambient water quality criterion of 0.54 µg/L calculated at the lowest considered water hardness of 25 mg/L;
- The surface water EPC was based on one-tenth of the predicted interstitial water concentration, whereas the overlying water column may be much more diluted from on-flowing surface water; and,
- The predicted interstitial water concentration was based on the 95th UCL of the mean soil lead concentration of 138 mg/kg, whereas the mean soil lead concentration is 98 mg/kg and the median concentration is 46 mg/kg.

5.3.4 Avian Receptors

Risk characterization calculations for avian receptors are presented in Appendix D. Surrogate avian receptors are the American robin and the red-tailed hawk. These birds may have direct contact with COCs contained in surface water and soil/sediment in the wetlands, as well as through their diet. Each receptor is discussed separately in the following subsections.

5.3.4.1 American Robin

The American robin is assumed exposed to Site COCs through ingestion of surface water, ingestion of soil/sediment, and through their diet, which is assumed to come entirely from the

Site, with 38% of its diet comprised of soil invertebrates and the remaining 62% comprised of vegetation. Both plants and soil invertebrates are assumed to have bioaccumulated COCs. Exposure and intake calculations are presented on Table D-1 of Appendix D; results are summarized on the following page:

HI Type	HI-High	HI-Low
Total HI	5	0.4
Predominant COC	PCBs	PCBs
COC-specific hazard quotient	5 (92%)	0.2 (64%)
Predominant exposure pathway	Diet	Diet

Using the TRV-Low values, an HI-High of 5 is calculated, with PCBs contributing essentially all of the HI. Using the TRV-High values, an HI-Low of 0.4 is calculated, with PCBs contributing most of the HI.

Despite the numerical results, the risk characterization concludes that a significant risk of harm is not posed to American robins for the following reasons:

- Robins are assumed to feed exclusively at the Site;
- Site soil is assumed to be available throughout a robin's presence in the area to provide food (i.e., there is no consideration of the periodic inaccessibility of wetland soil due to submergence);
- The soil/sediment EPC for PCBs is a 97.5% UCL mean concentration, as recommended by ProUCL;
- PCBs are assumed to be 100% absorbed through the ingestion route;
- Bioaccumulation and bioconcentration factors do not consider the reduction of accumulation that may stem from the high binding capacity of the soil/sediment;
- The TRV-Low value applied for PCBs (0.09 mg/kgBW-dy) is on the low end of the range of values available (0.072, 0.09 and 0.18 mg/kgBW-dy). Using the higher of the TRV-Low value (0.18 mg/kgBW-dy), the HI-High would be reduced from 5 to 3.
- The difference between the HI-High of 5 and the maximum acceptable HI of 1 is within the range of uncertainty associated with the assessment.

5.3.4.2 Red-Tailed Hawk

The red-tailed hawk is assumed exposed to Site COCs through ingestion of surface water, ingestion of soil/sediment, and through their diet, of which 0.2% is obtained from the Site (based on the Site size relative to the hawk's typical foraging area). Exposure and intake calculations are presented on Table D-2 of Appendix D; results are summarized below:

HI Type	HI-High	HI-Low
Total HI	0.001	0.0001
Predominant COCs	PCBs and Lead	Lead and PCBs
COC-specific hazard quotient	PCBs: 0.0005 (55%) Lead: 0.0003 (35%)	Lead: 0.0003 (25%) PCBs: 0.00003 (20%)
Predominant exposure pathway	Soil Ingestion	Soil Ingestion

Using both the TRV-Low and TRV-High values, total HIs below 1 are calculated. This indicates that the Site poses no significant risk to red-tailed hawks.

5.3.5 Mammalian Receptors

Risk characterization calculations for mammalian receptors are presented in Appendix E. Surrogate mammalian receptors are the short-tailed shrew and raccoons. These animals may have direct contact with COCs contained in surface water and soil/sediment in the wetlands, as well as through their diet. Each receptor is discussed separately in the following subsections.

5.3.5.1 Short-Tailed Shrew

The short-tailed shrew is assumed exposed to Site COCs through ingestion of surface water, ingestion of soil/sediment, and through their diet, of which 83% is comprised of soil invertebrates and 17% is comprised of vegetation. Exposure and intake calculations are presented on Table E-1 of Appendix E; results are summarized below:

HI Type	HI-High	HI-Low
Total HI	3	1
Predominant COC	PCBs	PCBs
COC-specific hazard quotient	3 (87%)	0.8 (83%)
Predominant exposure pathway	Diet	Diet

Using the TRV-Low values, an HI-High of 3 is calculated, with PCBs contributing the majority of the HI. Using the TRV-High values, a HI-Low of 1 is calculated, with PCBs again contributing the majority of the HI.

Despite the numerical results, the risk characterization concludes that these HIs are conservative and that a significant risk of harm is not posed to short-tailed shrew:

- Shrew are assumed to feed exclusively at the Site;
- Site soil is available throughout a shrew's presence in the area (i.e., there is no consideration of the periodic inaccessibility of wetland soil due to submergence);
- The EPC for PCBs is a 97.5% UCL mean concentration, as recommended by ProUCL;
- PCBs are assumed 100% absorbed through the ingestion route;
- Bioconcentration factors do not consider the reduction of accumulation that may stem from the high binding capacity of the soil/sediment;
- The TRV-Low value applied for PCBs (0.36 mg/kgBW-dy) is in the center of the range of relevant values available (0.022, 0.36, and 1.14 mg/kgBW-dy). Using the higher of the TRV-Low values, the HI-High would be reduced from 3 to 1;
- The difference between the HI-High of 3 and the maximum acceptable HI of 1 is within the range of uncertainty associated with the assessment.

5.3.5.2 Raccoon

The raccoon is assumed exposed to Site COCs through ingestion of surface water, ingestion of soil/sediment, and through their diet, of which 1% comes from the Site (based on the Site size relative to the raccoon's typical foraging area). Fifty-eight percent of a raccoon's diet

from the Site is assumed comprised of vegetation, 17% comprised of soil invertebrates, and 25% comprised of small mammals. Exposure and intake calculations are presented on Table E-2 of Appendix E; results are summarized below:

HI Type	HI-High	HI-Low
Total HI	0.005	0.002
Predominant COC	PCBs	PCBs
COC-specific hazard quotient	0.004 (73%)	0.001 (68%)
Predominant exposure pathway	Diet	Diet

Using both the TRV-Low and TRV-High values, total HIs below 1 are calculated. This indicates that the Site poses no significant risk to raccoons.

5.4 Uncertainty Assessment

The environmental risk characterization applied available site-specific data, risk characterization approaches recommended by MADEP and U.S. EPA, and reasonable assumptions to assess Site risks. Nonetheless, uncertainties in these factors can contribute to uncertainty in the overall quantitative risk estimates. This section identifies some uncertainties in the quantitative environmental risk characterization that were not discussed in the human health risk characterization uncertainty assessment and discusses the impact of these uncertainties.

5.4.1 Uncertainties Associated with Site Data

Soil/sediment from the wetland area was sampled in December 2004, January 2005, and April 2005 from 0-6 inches throughout the wetland area. These data are anticipated to provide minimal uncertainty to the risk characterization.

5.4.2 Uncertainties Associated with the Toxicity Assessment

Environmental TRVs were obtained from a variety of sources, including U.S. EPA, MADEP, U.S. DOE, NOAA, and independent sources. For many constituents, there is very little toxicological information available, and what is available is often not for the receptor type expected to be present at the Site. In addition, there is no generally accepted consensus on which is the "appropriate" toxicity value of the available values, and values for some COCs can range a few orders of magnitude. Usually, TRVs applied to the risk characterization were within the range of available values, rather than the lowest or highest value. Because of the inherent uncertainty in the available values, the available TRVs contribute a high degree of uncertainty to the risk characterization.

5.4.3 Uncertainties Associated with Exposure Point Concentrations

Soil/sediment EPCs were either the arithmetic mean concentration (for COCs that met MADEP guidance for using a mean as an EPC) or a UCL on the mean concentration (remaining COCs), depending on the COC, as shown in the following table:

Arithmetic Mean

- Acenaphthene
- Benzo(b)fluoranthene
- Benzo(k)fluoranthene
- Benzo(g,h,i)perylene
- Fluoranthene
- Indeno(1,2,3-cd)pyrene
- Barium
- Chromium
- Selenium

95th Percentile UCL (except as noted)

- PCBs (97.5th percentile UCL)
- Anthracene
- Benzo(a)anthracene
- Benzo(a)pyrene
- Chrysene
- Fluorene
- Phenanthrene
- Pyrene
- Cadmium
- Lead
- Mercury

When a COC was not detected in an applied sample, it was presumed present at a concentration equal to one-half of its quantitation limit when calculating the EPC. Use of a UCL as an EPC may overestimate typical exposures.

Sediment interstitial water and surface water EPCs were estimated from soil/sediment EPCs by the equilibrium partitioning approach, using the arithmetic average organic carbon content of Site soil/sediment and each constituent's organic carbon/water partition coefficient. Sediment interstitial water concentrations were used to assess aquatic invertebrates; one-tenth of this concentration was used to represent overlying surface water concentrations and assess amphibian, avian, and mammalian receptor groups. The uncertainty associated with sediment interstitial water and surface water EPCs is moderate.

Concentrations of COCs in vegetation and prey species (earthworms and shrew) were estimated using recommended regression equations and the constituent's n-octanol/water partition coefficient or values used in previous U.S. EPA environmental risk characterizations. These approaches provide a generic measure of bioaccumulation potential that does not consider Site factors (such as the high binding capacity of Site soil/sediment) and, since they are based on regression equations, are rough estimates at best. Since the food pathway was the predominant pathway for most receptors, these approaches provide a moderate to high level of uncertainty to the risk characterization.

Overall, uncertainty associated with exposure point concentrations is moderate to high.

5.4.4 Uncertainties Associated with Exposure Scenarios and Exposure Factors

Seven environmental receptor groups were assessed for exposure to COCs. Terrestrial and aquatic invertebrates were assessed for survival only; amphibians, two avian species, and two mammalian species were assessed for survival, growth and reproduction. These receptors groups represent reasonably expected environmental receptor groups on the Site and possessed sufficient information on exposure and toxicity to be assessed and serve as surrogate species for other receptors that may be present on Site. The uncertainty associated with the scope of receptors assessed is low.

Environmental receptors were assumed to have a high degree of exposure to Site media. For invertebrates, amphibians, American robins, and short-tailed shrew, all exposure was assumed to occur on the Site; exposure of red-tailed hawks and raccoons was apportioned according to the size of the Site relative to the receptor's typical foraging area. Other exposure factors represented average to high exposure. The uncertainty associated with the level of exposure is moderate.

No consideration was given to the inaccessibility of soil to terrestrial receptors or inaccessibility of sediment to aquatic receptors when the wetland is flooded or dried up, respectively. Soil/sediment was assumed to exist in both forms simultaneously to allow assessment of both aquatic and terrestrial receptors. Depending on the amount of time the wetland is submerged, the exposure of terrestrial organisms may be greatly reduced (and vice versa for aquatic receptors). This approach has overestimated exposures of both receptor types and provides a moderate to high degree of uncertainty to the risk characterization.

Overall, the uncertainty associated with exposure scenarios and factors is moderate to high.

5.4.5 Uncertainties Associated with the Risk Characterization Approach

By combining conservative estimates of exposure and toxicity, results of the risk characterization reflect conservative conditions that may not represent typical exposures. Health risks, particularly to an average exposed receptor, are likely overestimated.

6.0 CHARACTERIZATION OF RISK OF HARM TO PUBLIC WELFARE

Characterization of the potential risk of a Site to public welfare considers the extent to which the Site poses a nuisance condition, loss of property value, loss of active or passive property uses, or other monetary or non-monetary costs. The Site is not anticipated to pose a nuisance condition by criteria identified in 310 CMR 40.0994 (4)(a), as discussed following:

- The presence of COCs in soil/sediment is not apparent to the public visually or olfactorily. The COCs are not appreciably volatile and have no overt odors or color.
- Potable water is supplied to the Site and surrounding area by municipal sources, so the Site will have no effect upon the drinking water supply.
- There are no known livestock farms in the area, and given the size and location of the Site, it is unlikely that the Site would convert to a farm in the future.
- There is no available information regarding loss of property value or active or passive property uses resulting from the release. However, none of these losses is expected.

Potential public welfare risks were also evaluated by comparing COC EPCs in Table 2 to upper concentration limits (UCLs) specified in 310 CMR 40.0996. An exceedance of a UCL is considered a condition of significant risk under the MCP. No detected COC concentration or COC EPC in soil/sediment exceeded its UCL. Based on the above evaluation, the Site poses no significant risk of harm to public welfare.

7.0 CHARACTERIZATION OF RISK OF HARM TO SAFETY

Characterization of the risk of harm to safety is performed by evaluating Site conditions relative to conditions that could pose a threat of physical harm or bodily injury. Conditions that could pose a threat of risk to safety include the following:

- Presence of rusted or corroded drums, containers, open pits, or lagoons;
- Threat of fire or explosion or presence of explosive vapors; and,
- Uncontained materials exhibiting characteristics of corrosivity, reactivity, or flammability.

None of these conditions currently exists or is anticipated to exist at the Site in relation to the release in the future. Therefore, the Site is judged to pose no significant risk of harm to safety.

8.0 SUMMARY AND CONCLUSION

A human health and environmental risk characterization was conducted for the former McCoy Field wetland area. The human health risk characterization assessed the risk posed by the Site to recreational receptors, pedestrians, and trespassers, all of which were assessed for the same level of exposure. The numerical results of the human health risk characterization are summarized below:

RECREATIONAL/PEDESTRIAN/TRESPASSER RISK CHARACTERIZATION SUMMARY							
Exposure Pathway	Child		Youth		Adult		Combined
	Hazard Index	Cancer Risk	Hazard Index	Cancer Risk	Hazard Index	Cancer Risk	Cancer Risk
Total (all pathways)	0.3	9×10^{-7}	0.07	2×10^{-7}	0.04	3×10^{-7}	1×10^{-6}
Maximum Acceptable Level	1.0	1×10^{-5}	1.0	1×10^{-5}	1.0	1×10^{-5}	1×10^{-5}

Total HIs and total cancer risks are below maximum acceptable levels for all age groups. This indicates that the Site poses no significant risk of harm to human health for these receptor groups.

The environmental risk characterization assessed terrestrial and aquatic invertebrates for survival, and amphibians, two avian species, and two mammalian species for survival, growth and reproduction. The numerical results of the risk characterization are summarized in the table below:

Receptor Group	Hazard Index – High	Hazard Index – Low
Terrestrial Invertebrates	0.7	-- 1
Aquatic Invertebrates	0.5	-- 1
Amphibians	1.1	-- 1
American Robin	5	0.4
Red-Tailed Hawk	0.001	0.0001
Short-tailed Shrew	3	1
Raccoon	0.005	0.002
Benchmark HI	1.0	1.0

1. A "high" scenario was not assessed for this group.

Total HIs for terrestrial invertebrates, aquatic invertebrates, red-tailed hawk, and raccoons are below the maximum acceptable HI benchmark of 1.0, indicating that the Site poses no significant risk of harm to these receptor groups.

The HI of 1.1 for amphibians slightly exceeds the maximum acceptable HI benchmark of 1.0 as a result of potential exposure to lead. However, the risk characterization concludes that this HI is conservative and that a significant risk of harm is not posed to amphibians for the following reasons:

- The HI exceedance is minimal (total HI of 1.1 versus maximum acceptable HI of 1.0);
- The highest chemical-specific HI, for lead, is 0.9, below the maximum acceptable HI of 1.0;
- Lead's toxicity reference value (TRV) of 0.4 µg/L is based on the lowest reported toxicity value identified in the literature, to which an uncertainty factor of 100 was applied;
- Lead's TRV of 0.4 µg/L is below the federal ambient water quality criterion of 0.54 µg/L calculated at the lowest considered water hardness of 25 mg/L;
- The surface water EPC was based on one-tenth of the predicted interstitial water concentration, whereas the overlying water column may be much more diluted from on-flowing surface water; and,
- The predicted interstitial water concentration was based on the 95th upper confidence limit (UCL) of the mean soil/sediment lead concentration of 138 mg/kg, while the mean soil/sediment lead concentration is 98 mg/kg and the median concentration is 46 mg/kg.

For the American robin, an HI-High of 5 and an HI-Low of 0.4 were calculated. PCBs contributed the majority of the HI. Despite the numerical results, the risk characterization concludes that a significant risk of harm is not posed to American robins for the following reasons:

- Robins were assumed to feed exclusively at the Site;
- There is no consideration of the periodic inaccessibility of wetland soil due to submergence;
- The EPC for PCBs is a 97.5% UCL mean concentration, as recommended by ProUCL;
- PCBs are assumed 100% absorbed through the ingestion route;
- Bioaccumulation and bioconcentration factors do not consider the high binding capacity of soil/sediment;
- The TRV-Low value applied for PCBs is on the low end of the range of values available; use of the highest TRV-Low value reduces the HI-High from 5 to 3.
- The difference between the HI-High of 5 and the maximum acceptable HI of 1 is within the range of uncertainty associated with the assessment.

For short-tailed shrew, an HI-High of 3 and an HI-Low of 1 were calculated. PCBs contributed the majority of the HI. Despite the numerical results, the risk characterization concludes that a significant risk of harm is not posed to short-tailed shrew for the following reasons:

- Shrew were assumed to feed exclusively at the Site;
- There is no consideration of the periodic inaccessibility of wetland soil due to submergence;
- The EPC for PCBs is a 97.5% UCL mean concentration;
- PCBs are assumed 100% absorbed through the ingestion route;
- Bioconcentration factors do not consider the high binding capacity of the soil/sediment;

- The TRV-Low value applied for PCBs is in the center of the range of relevant values available; use of the highest TRV-Low value reduces the HI-High 3 to 1.
- The difference between the HI-High of 3 and the maximum acceptable HI of 1 is within the range of uncertainty associated with the assessment.

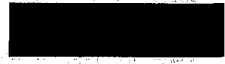
The potential risk of harm to safety and public welfare were conducted according in MADEP guidance. These assessments concluded that the Site poses no significant risk of harm to safety or public welfare.

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Tables



TABLE 1
SUMMARY OF DETECTED CONSTITUENTS IN UPLAND FILL MATERIAL
Former McCoy Field
New Bedford, Massachusetts

Constituent	Number of Detections/ Number of Samples ¹	Arithmetic Mean Detected Concentration ¹ (mg/kg)	Maximum Detected Concentration ¹ (mg/kg)	Method 1 S-1 Soil Standards ²		MCP Upper Concentration Limit ³ (mg/kg)	U.S. EPA Region 9 Preliminary Remediation Goal ⁴ (Residential Soil) (mg/kg)
				S-1/GW-2 (mg/kg)	S-1/GW-3 (mg/kg)		
Volatile Organic Compounds							
n-Butylbenzene ⁵	2/21	0.365	0.63	100	100	5,000	-
sec-Butylbenzene ⁵	1/21	0.093	0.093	100	100	5,000	-
Ethylbenzene	1/21	0.73	0.73	500	500	10,000	-
Isopropylbenzene ⁵	2/21	0.12	0.13	100	100	5,000	-
p-Isopropyltoluene ⁵	2/21	0.14	0.17	100	100	5,000	-
Naphthalene	3/21	2.06	4.3	100	100	10,000	-
n-Propylbenzene ⁵	1/21	0.22	0.22	100	100	5,000	-
Tetrachloroethene	1/21	0.21	0.21	20	20	1,000	-
Toluene	1/21	0.53	0.53	500	500	10,000	-
1,2,4-Trimethylbenzene ⁵	2/21	1.54	2.5	100	100	5,000	-
1,3,5-Trimethylbenzene ⁵	1/21	0.13	0.13	100	100	5,000	-
Xylenes (total)	3/21	0.886	1.71	500	500	10,000	-
Total C9-C10 aromatic hydrocarbons ⁶	--	2.61	3.87	100	100	5,000	-
Semi-Volatile Organic Compounds							
Acenaphthene	107/280	2.4	30	1,000	1,000	10,000	-
Acenaphthylene	64/280	1.7	23	100	100	10,000	-
Anthracene	194/280	3.0	27	1,000	1,000	10,000	-
Benzidine	1/227	16	16	NE	NE	NE	0.0021
Benzo(a)anthracene	242/280	5.1	50	0.7	0.7	100	-
Benzo(a)pyrene	239/280	4.1	37	0.7	0.7	100	-
Benzo(b)fluoranthene	238/280	5.4	48	0.7	0.7	100	-
Benzo(g,h,i)perylene	172/280	2.2	13	1,000	1,000	10,000	-
Benzo(k)fluoranthene	193/280	2.2	17	7	7	400	-
4-Bromophenyl phenyl ether	3/280	0.2	0.32	NE	NE	NE	-
Butyl benzyl phthalate	4/280	1.0	2.7	NE	NE	NE	12,000
4-Chloroaniline	1/280	8.2	8.2	NE	NE	NE	240
4-Chloro-3-methylphenol	2/227	1.2	2.3	NE	NE	NE	-
Chrysene	229/280	4.3	43	7	7	400	-
Dibenzo(a,h)anthracene	57/280	1.3	8.7	0.7	0.7	100	-
Dibenzofuran	58/280	1.8	7.5	NE	NE	NE	150
1,4-Dichlorobenzene	2/280	1.3	2.2	40	40	2,000	-
2,4-Dinitrophenol	1/280	3.3	3.3	40	6	900	-
Diethylphthalate	2/280	0.3	0.46	1,000	0.7	10,000	-
Di-n-butylphthalate	63/280	2.4	25	NE	NE	NE	6,100
2,6-Dinitro-2-methylphenol	1/227	2.8	2.8	NE	NE	NE	-
bis(2-Ethylhexyl)phthalate	8/280	2.7	11	200	200	10,000	-
Fluoranthene	232/280	10.5	110	1,000	1,000	10,000	-
Fluorene	120/280	2.2	28	1,000	1,000	10,000	-
Indeno(1,2,3-cd)pyrene	189/280	2.2	14	0.7	0.7	100	-
2-Methylnaphthalene	55/280	1.9	11	500	500	10,000	-
4-Methylphenol	1/280	0.079	0.079	NE	NE	NE	310
Naphthalene	93/280	4.7	64	100	100	10,000	-
Phenanthrene	230/280	9.5	87	1,000	100	10,000	-
Phenol	4/280	0.6	0.69	500	500	10,000	-
Pyrene	235/280	9.7	120	700	700	10,000	-
Pyridine	1/227	0.11	0.11	NE	NE	NE	61
Polychlorinated Biphenyls							
PCBs (Total)	790/1,057	10.5	94.5	2	2	100	-
Total Petroleum Hydrocarbons							
TPH	24/24	459	7,700	800	800	10,000	-
Metals							
Arsenic	319/341	12.5	300	30	30	300	-
Barium	341/341	559	7,020	1,000	1,000	10,000	-
Cadmium	302/341	3.7	14	30	30	800	-
Chromium (total)	341/341	69.8	853	1,000	1,000	10,000	-
Lead	367/368	622	9,080	300	300	6,000	-
Mercury	304/341	0.65	4.09	20	20	600	-
Selenium	10/341	2.2	4.94	400	400	10,000	-
Silver	126/341	1.12	9.74	100	100	2,000	-

mg/kg = milligrams per kilogram.

NE = Not established.

1. Data for PCBs are from soil/fill remaining on the Site. Data for other constituents include soil/fill subsequently removed from the Site, which is conservatively assumed to represent soil/fill remaining on the Site.

2. 310 CMR 40.0975(5)(a).

3. 310 CMR 40.0996(7).

4. Presented, when available, for constituents without MCP soil standards. U.S. EPA (2005a) (<http://www.epa.gov/region09/waste/sfund/prg/files/04prgtable.pdf>).

5. This constituent has no Method 1 soil standards. Standard presented is that for C9-C10 aromatic hydrocarbons.

6. Sum of detected C9-C10 aromatic hydrocarbon constituents.

TABLE 2
SUMMARY OF WETLAND SOIL/SEDIMENT ANALYTICAL RESULTS
 Former McCoy Field Wetland Area
 New Bedford, Massachusetts

Sample Identification	Sample Depth	Sample Date	Total Organic Carbon (%)	Total PCBs (ug/kg)	Acenaphthene (ug/kg)	Anthracene (ug/kg)	Benzo(a)-anthracene (ug/kg)	Benzo(b)-fluoranthene (ug/kg)	Benzo(k)-fluoranthene (ug/kg)	Benzo(g,h,i)-perylene (ug/kg)
IW-1	0-6"	12/23/04	7.37	270	110	250	920	1,400	450	490
IW-2	0-6"	12/23/04	11.49	5,710 J [11]	140	440	1,400	2,300	560	820
WA-3	0-6"	12/21/04	2.9	110						
WB-4	0-6"	12/21/04	12	68	120 U	120 U	750	120 U	120 U	120 U
WB-5	0-6"	12/21/04	12.6	80	180 U	180 U	180 U	180 U	180 U	180 U
WB-6	0-6"	12/21/04	38	113	330 U	330 U	330 U	330 U	330 U	330 U
WB-7	0-6"	12/21/04	57.1	25 U	310 U	310 U	310 U	310 U	310 U	310 U
WC-4	0-6"	12/21/04	45.2	36	260 U	260 U	260 U	260 U	260 U	260 U
WC-5	0-6"	12/21/04	58.6	74	310 U	310 U	310 U	310 U	310 U	310 U
WC.5-4.5	0-6"	4/22/05	-	4,069	4,100 U	4,100 U	4,100 U	4,100 U	4,100 U	4,100 U
WC.5-5.5	0-6"	4/22/05	-	90	510 U	510 U	510 U	510 U	510 U	510 U
WC.5-6.5	0-6"	4/22/05	-	85 U	840 U	840 U	840 U	840 U	840 U	840 U
WC.5-8.5	0-6"	4/22/05	-	94	650 U	650 U	650 U	650 U	650 U	650 U
WC.5-9.5	0-6"	4/22/05	-	135	600 U	600 U	600 U	600 U	600 U	600 U
WC.5-10.5	0-6"	4/20/05	-	44 U	700 U	700 U	700 U	700 U	700 U	700 U
WC.5-11.5	0-6"	4/20/05	-	36	440 U	440 U	440 U	440 U	440 U	440 U
WC.5-12.5	0-6"	4/20/05	-	37 U	540 U	540 U	540 U	540 U	540 U	540 U
WC.5-13.5	0-6"	4/20/05	-	232	470 U	470 U	470 U	470 U	470 U	470 U
WC.5-14.5	0-6"	4/20/05	-	922	140 U	540	1,400	1,500	740	1,100
WC.5-15.5	0-6"	4/20/05	-	175	340 U	340 U	340 U	340 U	340 U	340 U
WC.5-16.5	0-6"	4/20/05	-	7 U	130 U	130 U	130 U	130 U	130 U	130 U
WC.5-17.14	0-6"	4/20/05	-	441	430 U	430 U	430 U	430 U	430 U	430 U
WC.5-17.28	0-6"	4/20/05	-	546	440 U	440 U	540	770	490	440 U
WC.5-18.5	0-6"	4/25/05	-	135	140 U	140 U	140 U	140 U	140 U	140 U
WC.5-19.5	0-6"	4/25/05	-	12 U	56 U	56 U	56 U	56 U	56 U	56 U
WC.5-20.5	0-6"	4/25/05	-	19 U	160 U	160 U	160 U	160 U	160 U	160 U
WC.5-21.5	0-6"	4/25/05	-	72	95 U	95 U	95 U	95 U	95 U	95 U
WC.5-22.5	0-6"	4/25/05	-	1,160	88 U	88 U	88 U	120	88 U	88 U
WC.5-23.5	0-6"	4/25/05	-	379	190 U	190 U	190 U	190 U	190 U	190 U
WC.5-24.5	0-6"	4/25/05	-	1,520	300 U	300 U	300 U	300 U	300 U	300 U
WC.5-25.5	0-6"	4/25/05	-	119	170 U	170 U	170 U	170 U	170 U	170 U
WC.5-26.5	0-6"	4/25/05	-	140	200 U	200 U	200 U	200 U	200 U	200 U
WC.5-27.5	0-6"	4/25/05	-	2,820	150 U	150 U	180	380	180	150 U
WC-6	0-6"	12/21/04	51	107	260 U	260 U	260 U	260 U	260 U	260 U
WC-7	0-6"	12/21/04	37.6	640	230 UJ	230 UJ	230 UJ	230 UJ	230 UJ	230 UJ
WC-8	0-6"	12/21/04	54.6	58	360 U	360 U	360 U	360 U	360 U	360 U
WC-18	0-6"	12/23/04	3.45	26	79 U	79 U	79 U	79 U	79 U	79 U
WC-19	0-6"	12/23/04	6.97	110	92 U	92 U	100	160	92 U	92 U
WC-20	0-6"	12/23/04	14.75	104	130 U	130 U	130 U	130 U	130 U	130 U
WC-21	0-6"	12/23/04	15.1	100	110 U	110 U	110 U	110 U	110 U	110 U
WC-22	0-6"	12/23/04	5.92	68	84 U	84 U	84 U	84 U	84 U	84 U
WC-23	0-6"	12/23/04	16.23	159	110 U	110 U	110 U	110 U	110 U	110 U
WC-24	0-6"	12/23/04	6.15	14	84 U	84 U	84 U	84 U	84 U	84 U
WC-25	0-6"	12/23/04	13.28	71	110 U	110 U	110 U	110 U	110 U	110 U
WC-26	0-6"	12/23/04	4.94	76	130 UJ	130 UJ	130 UJ	130 UJ	130 UJ	130 UJ
WC-27	0-6"	12/23/04	6.69	41	130 U	130 U	140	130 U	130 U	130 U
WD-3	0-6"	12/22/04	23	160	130 U	130 U	130 U	130 U	130 U	130 U
WD-4	0-6"	12/22/04	54.4	240	340 U	340 U	340 U	340 U	340 U	340 U
WD-4.5	0-6"	4/22/05	-	330	570 U	570 U	570 U	570 U	570 U	570 U
WD-5	0-6"	12/22/04	11.7	4,730	140 U	140 U	140 U	140 U	140 U	140 U
WD.5-2.5	0-6"	4/25/05	-	4,340	160 U	160 U	160 U	160 U	160 U	160 U
WD.5-3	0-6"	4/25/05	-	655	160 U	160 U	160 U	160 U	160 U	160 U
WD.5-3.5	0-6"	4/25/05	-	1,130	610 U	610 U	610 U	610 U	610 U	610 U
WD.5-4.5	0-6"	4/22/05	-	83 U	790 U	790 U	790 U	790 U	790 U	790 U
WD.5-5.5	0-6"	4/22/05	-	78 U	730 U	730 U	730 U	730 U	730 U	730 U
WD.5-6.5	0-6"	4/22/05	-	80 U	570 U	570 U	570 U	570 U	570 U	570 U
WD.5-17.14	0-6"	4/20/05	-	65	300 U	300 U	300 U	300 U	300 U	300 U
WD.5-17.28	0-6"	4/20/05	-	13 U	200 U	200 U	200 U	200 U	200 U	200 U
WD.5-17.46	0-6"	4/20/05	-	118	320 U	320 U	320 U	320 U	320 U	320 U
WD.5-17.57	0-6"	4/20/05	-	9,380	240 U	740	2,300	2,900	1,400	700
WD-6	0-6"	12/22/04	32.2	2,250	220 U	220 U	220 U	220 U	220 U	220 U
WD-6.5	0-6"	4/22/05	-	93	3,500 U	3,500 U	3,500 U	3,500 U	3,500 U	3,500 U
WD-7	0-6"	12/21/04	24	571	170 U	170 U	170 U	170 U	170 U	170 U
WD-8	0-6"	12/21/04	39.9	151	270 U	270 U	270 U	270 U	270 U	270 U
WD-9	0-6"	12/22/04	58.7	560	280 U	280 U	280 U	280 U	280 U	280 U
WD-10	0-6"	12/22/04	33.4	1,020	240 U	240 U	240 U	240 U	240 U	240 U
WD-10.5	0-6"	4/20/05	-	64	50 U	50 U	50 U	50 U	50 U	50 U
WD-11	0-6"	12/22/04	46.9	5,420 J [10]	310 U	310 U	310 U	310 U	310 U	310 U
WD-12	0-6"	12/22/04	41.9	4,060	330 U	330 U	330 U	330 U	330 U	330 U
WD-13	0-6"	12/22/04	48.9	10 U	300 U	300 U	300 U	300 U	300 U	300 U
WD-14	0-6"	12/22/04	41	8,910 J [10]	390 U	390 U	390 U	390 U	390 U	390 U
WD-15	0-6"	12/22/04	43.9	3,900	260 U	260 U	260 U	260 U	260 U	260 U
WD-15.5	0-6"	4/20/05	-	33	50 U	50 U	50 U	50 U	50 U	50 U
WD-16	0-6"	12/22/04	29.2	10 U	230 U	230 U	230 U	230 U	230 U	230 U
WD-17	0-6"	12/22/04	46.9	1,080	220 U	220 U	220 U	220 U	220 U	220 U
WD-17.46	0-6"	4/20/05	-	282	360 U	360 U	360 U	360 U	360 U	360 U
WD-17.57	0-6"	4/20/05	-	35	170 U	170 U	170 U	170 U	170 U	170 U
WD-18	0-6"	12/23/04	17.56	724	110 U	110 U	150	110 U	110 U	110 U
WD-19	0-6"	12/23/04	13.7	2,090	130 U	130 U	180	460	130 U	130 U
WD-20	0-6"	12/23/04	2.3	22	87 U	87 U	87 U	87 U	87 U	87 U
WD-21	0-6"	12/23/04	17.09	1,390 J [10]	170 U	170 U	170 U	170 U	170 U	170 U
WD-22	0-6"	12/23/04	7.48	96	91 UJ	91 UJ	91 UJ	91 UJ	91 UJ	91 UJ
WD-23	0-6"	12/23/04	8.53	9,480 J [10]	120 UJ	120 UJ	360	490 J	200 J	120 UJ
WD-24	0-6"	12/23/04	30.27	3,850 J [10]	82 U	82 U	82 U	82 U	82 U	82 U

**TABLE 2
SUMMARY OF WETLAND SOIL/SEDIMENT ANALYTICAL RESULTS
Former McCoy Field Wetland Area
New Bedford, Massachusetts**

Sample Identification	Sample Depth	Sample Date	Total Organic Carbon (%)	Total PCBs (ug/kg)	Acenaphthene (ug/kg)	Anthracene (ug/kg)	Benzo(a)-anthracene (ug/kg)	Benzo(b)-fluoranthene (ug/kg)	Benzo(k)-fluoranthene (ug/kg)	Benzo(g,h,i)-perylene (ug/kg)
WD-25 ¹	0-6"	12/23/04	13.14	11,800	180 U	180 U	210	310	180 U	180 U
WD-25A ¹	0-6"	1/19/05	-	419	-	-	-	-	-	-
WD-25B ¹	0-6"	1/19/05	-	482	-	-	-	-	-	-
WD-25C ¹	0-6"	1/19/05	-	459	-	-	-	-	-	-
WD-25D ¹	0-6"	1/19/05	-	987	-	-	-	-	-	-
WD-26	0-6"	12/23/04	9.36	2,770	110 U	110 U	110 U	110 U	110 U	110 U
WD-27	0-6"	12/23/04	17.18	4,100 [J,10]	130 U	130 U	130 U	130 U	130 U	130 U
WE-2.5	0-6"	4/25/05	-	777	160 U	160 U	160 U	160 U	160 U	160 U
WE-3	0-6"	12/24/04	62.2	1,950	370 U	370 U	370 U	370 U	370 U	370 U
WE-3.5	0-6"	4/25/05	-	83 U	780 U	780 U	780 U	780 U	780 U	780 U
WE-4	0-6"	12/22/04	73.5	122	500 U	500 U	500 U	500 U	500 U	500 U
WE-5	0-6"	12/22/04	62.5	320	330 U	330 U	330 U	330 U	330 U	330 U
WE-5-2.5	0-6"	4/25/05	-	601	510 U	510 U	510 U	510 U	510 U	510 U
WE-5-3	0-6"	4/25/05	-	111 U	1,100 U	1,100 U	1,100 U	1,100 U	1,100 U	1,100 U
WE-5-3.5	0-6"	4/25/05	-	76 U	930 U	930 U	930 U	930 U	930 U	930 U
WE-6 ¹¹	0-6"	12/21/04	73.4	10 U	270 U	270 U	270 U	270 U	270 U	270 U
WE-7	0-6"	12/21/04	53.7	18 U	220 U	220 U	220 U	220 U	220 U	220 U
WE-8	0-6"	12/21/04	44	44	260 U	260 U	260 U	260 U	260 U	260 U
WF-3	0-6"	12/22/04	39	740	340 U	340 U	340 U	340 U	340 U	340 U
WF-4	0-6"	12/22/04	48.6	640	340 U	340 U	340 U	340 U	340 U	340 U
WF-5	0-6"	12/22/04	33.5	10 U	360 U	360 U	360 U	360 U	360 U	360 U
WF-6	0-6"	12/22/04	46	270	440 U	440 U	440 U	440 U	440 U	440 U
WF-7	0-6"	12/21/04	61.8	104	260 U	260 U	260 U	260 U	260 U	260 U
WF-8	0-6"	12/21/04	28	325	210 U	210 U	510	540	210	210 U
WG-3	0-6"	12/22/04	28.6	10 U	300 U	300 U	300 U	300 U	300 U	300 U
WG-4	0-6"	12/22/04	50.5	280	360 U	360 U	360 U	360 U	360 U	360 U
WG-4.5	0-6"	4/22/05	-	1,162	180 U	180 U	180 U	180 U	180 U	180 U
WG-5	0-6"	12/22/04	37	1,000 UE	140 U	140 U	140 U	140 U	140 U	140 U
WG-6	0-6"	4/22/05	-	12 U	140 U	140 U	140 U	140 U	140 U	140 U
WH-4	0-6"	4/22/05	-	113	240 U	240 U	240 U	240 U	240 U	240 U
WH-4.5	0-6"	4/22/05	-	15 U	130 U	130 U	130 U	130 U	130 U	130 U
WH-5	0-6"	12/22/04	44.4	3,940	220 U	220 U	220 U	220 U	220 U	220 U
WH-5.5	0-6"	4/22/05	-	100	240 U	240 U	240 U	240 U	240 U	240 U
WH-5-4.5	0-6"	4/22/05	-	86	1,800 U	1,800 U	1,800 U	1,800 U	1,800 U	1,800 U
WH-5-5	0-6"	4/22/05	-	77	110 U	110 U	110 U	110 U	110 U	110 U
WH-5-5.5	0-6"	4/22/05	-	56	280 U	280 U	280 U	280 U	280 U	280 U
WH-6	0-6"	4/22/05	-	35 U	--	--	--	--	--	--
WI-4	0-6"	4/22/05	-	240	620 U	620 U	620 U	620 U	620 U	620 U
WI-5	0-6"	4/22/05	-	90	250 U	250 U	250 U	250 U	250 U	250 U
WI-6	0-6"	4/22/05	-	254	430 U	430 U	430 U	430 U	430 U	430 U
WI-5-4	0-6"	4/22/05	-	45	240 U	240 U	240 U	240 U	240 U	240 U
WI-5-4.5	0-6"	4/22/05	-	85	2,300 U	2,300 U	2,300 U	2,300 U	2,300 U	2,300 U
WI-5-5	0-6"	4/22/05	-	1,123	530 U	530 U	530 U	530 U	530 U	530 U
WI-5-5.5	0-6"	4/22/05	-	74	480 U	480 U	480 U	480 U	480 U	480 U
Number of Samples			63	124	122	122	122	122	122	122
Number of Detections			63	100	2	4	14	12	9	4
Arithmetic Mean Concentration ¹			31.4	908	191	203	255	274	218	213
Median Concentration ¹				116	130	130	150	145	135	130
Maximum Detected Concentration			73.5	11,800	140	740	2,300	2,900	1,400	1,100
Upper Concentration Limit ¹			--	100,000	10,000,000	10,000,000	100,000	100,000	400,000	10,000,000
Natural Soil Background Level ²			NE	NE	500	1,000	2,000	2,000	1,000	1,000
Method 1 S-1 Soil Standard ⁴			NE	2,000	1,000,000	1,000,000	700	700	7,000	1,000,000
Percentage Above S-1 Soil Standard			NA	14.5%	0%	0%	4%	4%	0%	0%
Human Health Exposure Point Concentration			NA	908	191	203	255	274	218	213
Chronic Sediment Screening Level ³			NE	59.8	1,993 [6]	57.2	108	1,116 [6]	617 [6]	226 [6]
Percentage Above Sediment Screening Level			NA	74%	0%	3.3%	11%	3%	0.8%	3.3%
Environmental Exposure Point Concentration			NA	2.09 [9]	191	2.21 [9]	401 [9]	274	218	213

µg/kg = micrograms per kilogram.
 mg/kg = milligrams per kilogram.
 U = Undetected at quantitation limit presented.
 J = Estimated concentration below quantitation limit.
 R = Rejected; surrogate recovery < 10%.
 E = Calibration range of instrument exceeded.
 NE = Not established.
 NA = Not applicable.
 1. Non-detections included at one-half quantitation limit.
 2. 310 CMR 40.0996(7).
 3. MADEP (2002c). Background Levels of Polycyclic Aromatic Hydrocarbons and Metals in Soil. May.
 4. 310 CMR 40.0975(a). Lower of S-1/GW-2 or S-1/GW-3 presented. Exceedances are shaded.
 5. MADEP (2002b) Freshwater Sediment Screening Benchmarks for Use Under the Massachusetts Contingency Plan. May (unless otherwise noted). Exceedances in *italics*.
 6. Calculated value; see associated spreadsheet.
 7. Mean concentration at WD-25, -25A, -25B, -25C, and -25D used to avoid over-representing location.
 8. Location sampled on two discrete days; the highest detected value or lowest quantitation limit presented.
 9. Calculated by ProUCL (U.S. EPA 2004a).
 10. Surrogates obscured by contaminants in sample.
 11. Surrogates diluted out.
 12. ER-L value (NOAA, 1999).

TABLE 2
SUMMARY OF WETLAND SOIL/SEDIMENT ANALYTICAL RESULTS
Former McCoy Field Wetland Area
New Bedford, Massachusetts

Sample Identification	Sample Depth	Sample Date	Benzo(a)-pyrene (ug/kg)	Chrysene (ug/kg)	Fluoranthene (ug/kg)	Fluorene (ug/kg)	Indeno(1,2,3-cd)pyrene (ug/kg)	Phenanthrene (ug/kg)	Pyrene (ug/kg)	Arsenic (mg/kg)
IW-1	0-6"	12/23/04	930	880	2,200	89	550	1,400	1,600	1.81
IW-2	0-6"	12/23/04	1,400	1,000	3,000	140	780	1,900	110	6.38
WA-3	0-6"	12/21/04	R	R	R	R	R	R	R	1.09
WB-4	0-6"	12/21/04	120 U	810	2,200	120 U	120 U	1,000	1,500	0.27
WB-5	0-6"	12/21/04	180 U	180 U	470	180 U	180 U	180 U	350	0.58
WB-6	0-6"	12/21/04	330 U	330 U	330 U	330 U	330 U	330 U	330 U	0.64 U
WB-7	0-6"	12/21/04	310 U	310 U	310 U	310 U	310 U	310 U	310 U	1.11
WC-4	0-6"	12/21/04	260 U	260 U	260 U	260 U	260 U	260 U	260	0.71
WC-5	0-6"	12/21/04	310 U	310 U	310 U	310 U	310 U	310 U	310 U	0.54 U
WC.5-4.5	0-6"	4/22/05	4,100 U	4,100 U	4,100 U	4,100 U	4,100 U	4,100 U	4,100 U	0.75 U
WC.5-5.5	0-6"	4/22/05	510 U	510 U	510 U	510 U	510 U	510 U	510 U	0.52 U
WC.5-6.5	0-6"	4/22/05	840 U	840 U	840 U	840 U	840 U	840 U	840 U	0.68 U
WC.5-8.5	0-6"	4/22/05	650 U	650 U	650 U	650 U	650 U	650 U	650 U	0.6 U
WC.5-9.5	0-6"	4/22/05	600 U	600 U	600 U	600 U	600 U	600 U	600 U	0.69 U
WC.5-10.5	0-6"	4/20/05	700 U	700 U	700 U	700 U	700 U	700 U	700 U	0.62 U
WC.5-11.5	0-6"	4/20/05	440 U	440 U	440 U	440 U	440 U	440 U	440 U	0.38 U
WC.5-12.5	0-6"	4/20/05	540 U	540 U	540 U	540 U	540 U	540 U	540 U	0.83
WC.5-13.5	0-6"	4/20/05	470 U	470 U	470 U	470 U	470 U	470 U	470 U	0.46 U
WC.5-14.5	0-6"	4/20/05	1,400	1,200	1,800	140 U	1,100	2,200	4,200	5.27
WC.5-15.5	0-6"	4/20/05	340 U	340 U	340 U	340 U	340 U	340 U	340 U	0.82
WC.5-16.5	0-6"	4/20/05	130 U	130 U	130 U	130 U	130 U	130 U	130 U	0.1 U
WC.5-17.14	0-6"	4/20/05	430 U	430 U	430 U	430 U	430 U	430 U	430 U	1.7
WC.5-17.28	0-6"	4/20/05	680	540	760	440 U	440 U	440 U	1,500	0.4 U
WC.5-18.5	0-6"	4/25/05	140 U	140 U	140 U	140 U	140 U	140 U	140 U	0.38
WC.5-19.5	0-6"	4/25/05	56 U	56 U	56 U	56 U	56 U	56 U	56 U	1.03
WC.5-20.5	0-6"	4/25/05	160 U	160 U	160 U	160 U	160 U	160 U	160 U	0.78
WC.5-21.5	0-6"	4/25/05	95 U	95 U	95 U	95 U	95 U	95 U	95 U	0.96
WC.5-22.5	0-6"	4/25/05	88 U	88 U	110	88 U	88 U	88 U	170	1.08
WC.5-23.5	0-6"	4/25/05	190 U	190 U	190 U	190 U	190 U	190 U	190 U	2.6
WC.5-24.5	0-6"	4/25/05	300 U	300 U	300 U	300 U	300 U	300 U	400	1.03
WC.5-25.5	0-6"	4/25/05	170 U	170 U	170 U	170 U	170 U	170 U	170 U	0.96
WC.5-26.5	0-6"	4/25/05	200 U	200 U	200 U	200 U	200 U	200 U	200 U	0.84
WC.5-27.5	0-6"	4/25/05	250 U	160	310	150 U	150 U	160	420	1.91
WC-6	0-6"	12/21/04	260 U	260 U	260 U	260 U	260 U	260 U	260 U	0.5 U
WC-7	0-6"	12/21/04	230 UJ	230 UJ	230 UJ	230 UJ	230 UJ	230 UJ	230 UJ	0.47 U
WC-8	0-6"	12/21/04	360 U	360 U	360 U	360 U	360 U	360 U	360 U	0.62 U
WC-18	0-6"	12/23/04	79 U	79 U	79 U	79 U	79 U	79 U	79 U	0.94
WC-19	0-6"	12/23/04	110 U	110	180	92 U	92 U	95	170	1.37
WC-20	0-6"	12/23/04	130 U	130 U	130 U	130 U	130 U	130 U	130 U	2.38
WC-21	0-6"	12/23/04	110 U	110 U	110 U	110 U	110 U	110 U	110 U	1.17
WC-22	0-6"	12/23/04	84 U	84 U	120	84 U	84 U	84 U	140	1.23
WC-23	0-6"	12/23/04	110 U	110 U	110	110 U	110 U	110 U	120	1.91
WC-24	0-6"	12/23/04	84 U	84 U	84 U	84 U	84 U	84 U	84 U	0.65
WC-25	0-6"	12/23/04	110 U	110	220	110 U	110 U	130	230	2.25
WC-26	0-6"	12/23/04	130 UJ	130 UJ	130 UJ	130 UJ	130 UJ	130 UJ	130 UJ	1.94
WC-27	0-6"	12/23/04	130 U	140	260	130 U	130 U	140	240	1.94
WD-3	0-6"	12/22/04	130 U	130 U	130 U	130 U	130 U	130 U	130 U	0.19 U
WD-4	0-6"	12/22/04	340 U	340 U	340 U	340 U	340 U	340 U	340 U	0.45 U
WD-4.5	0-6"	4/22/05	570 U	570 U	570 U	570 U	570 U	570 U	570 U	0.76
WD-5	0-6"	12/22/04	140 U	140 U	140 U	140 U	140 U	140 U	140 U	1.75
WD.5-2.5	0-6"	4/25/05	160 U	160 U	170	160 U	160 U	160 U	190	2.35
WD.5-3	0-6"	4/25/05	160 U	160 U	160 U	160 U	160 U	160 U	160 U	2.27
WD.5-3.5	0-6"	4/25/05	610 U	610 U	610 U	610 U	610 U	610 U	610 U	0.9 U
WD.5-4.5	0-6"	4/22/05	790 U	790 U	790 U	790 U	790 U	790 U	790 U	0.74 U
WD.5-5.5	0-6"	4/22/05	730 U	730 U	730 U	730 U	730 U	730 U	730 U	0.67 U
WD.5-6.5	0-6"	4/22/05	570 U	570 U	570 U	570 U	570 U	570 U	570 U	0.7 U
WD.5-17.14	0-6"	4/20/05	300 U	300 U	300 U	300 U	300 U	300 U	330	1.29
WD.5-17.28	0-6"	4/20/05	200 U	200 U	200 U	200 U	200 U	200 U	200 U	0.59
WD.5-17.46	0-6"	4/20/05	320 U	320 U	320 U	320 U	320 U	320 U	320 U	0.44
WD.5-17.57	0-6"	4/20/05	2,300	1,800	3,600	240 U	240 U	2,600	5,600	5.57
WD-6	0-6"	12/22/04	220 U	220 U	220 U	220 U	220 U	220 U	220 U	0.31 U
WD-6.5	0-6"	4/22/05	3,500 U	3,500 U	3,500 U	3,500 U	3,500 U	3,500 U	3,500 U	0.63 U
WD-7	0-6"	12/21/04	170 U	170 U	190	170 U	170 U	170 U	190	0.6
WD-8	0-6"	12/21/04	270 U	270 U	270 U	270 U	270 U	270 U	270 U	0.51 U
WD-9	0-6"	12/22/04	280 U	280 U	280 U	280 U	280 U	280 U	280 U	0.39 U
WD-10	0-6"	12/22/04	240 U	240 U	240 U	240 U	240 U	240 U	240 U	0.36 U
WD-10.5	0-6"	4/20/05	50 U	50 U	50 U	50 U	50 U	50 U	50 U	0.67
WD-11	0-6"	12/22/04	310 U	310 U	310 U	310 U	310 U	310 U	310 U	0.42 U
WD-12	0-6"	12/22/04	330 U	330 U	330 U	330 U	330 U	330 U	330 U	0.44 U
WD-13	0-6"	12/22/04	300 U	300 U	300 U	300 U	300 U	300 U	300 U	0.41 U
WD-14	0-6"	12/22/04	390 U	390 U	390 U	390 U	390 U	390 U	390 U	5.23
WD-15	0-6"	12/22/04	260 U	260 U	260 U	260 U	260 U	260 U	260 U	0.37 U
WD-15.5	0-6"	4/20/05	50 U	50 U	50 U	50 U	50 U	50 U	50 U	0.25
WD-16	0-6"	12/22/04	230 U	230 U	230 U	230 U	230 U	230 U	230 U	2.93
WD-17	0-6"	12/22/04	220 U	220 U	220 U	220 U	220 U	220 U	220 U	0.68
WD-17.46	0-6"	4/20/05	360 U	360 U	360 U	360 U	360 U	360 U	590	6.57
WD-17.57	0-6"	4/20/05	170 U	170 U	170 U	170 U	170 U	170 U	170 U	1.05
WD-18	0-6"	12/23/04	110 U	130	260	110 U	110 U	180	260	1.61
WD-19	0-6"	12/23/04	330	190	310	130 U	130 U	180	430	1.15
WD-20	0-6"	12/23/04	87 U	87 U	87 U	87 U	87 U	87 U	87 U	0.17
WD-21	0-6"	12/23/04	170 U	170 U	260	170 U	170 U	170 U	250	1.26
WD-22	0-6"	12/23/04	91 UJ	91 UJ	91 UJ	91 UJ	91 UJ	91 UJ	91 UJ	0.74
WD-23	0-6"	12/23/04	380 J	300 J	690 J	120 UJ	120 UJ	470 J	760 J	3.85
WD-24	0-6"	12/23/04	82 U	82 U	82 U	82 U	82 U	82 U	82 U	3.18

TABLE 2
SUMMARY OF WETLAND SOIL/SEDIMENT ANALYTICAL RESULTS
Former McCoy Field Wetland Area
New Bedford, Massachusetts

Sample Identification	Sample Depth	Sample Date	Benzo(a)-pyrene (ug/kg)	Chrysene (ug/kg)	Fluoranthene (ug/kg)	Fluorene (ug/kg)	Indeno(1,2,3-cd)pyrene (ug/kg)	Phenanthrene (ug/kg)	Pyrene (ug/kg)	Arsenic (mg/kg)
WD-25 J	0-6"	12/23/04	180 U	180	380	180 U	180 U	220	460	6.9
WD-25A J	0-6"	1/19/05	-	-	-	-	-	-	-	-
WD-25B J	0-6"	1/19/05	-	-	-	-	-	-	-	-
WD-25C J	0-6"	1/19/05	-	-	-	-	-	-	-	-
WD-25D J	0-6"	1/19/05	-	-	-	-	-	-	-	-
WD-26	0-6"	12/23/04	110 U	110 U	140	110 U	110 U	110 U	130	0.98
WD-27	0-6"	12/23/04	130 U	130 U	150	130 U	130 U	130 U	180	1.25
WE-2.5	0-6"	4/25/05	160 U	160 U	160 U	160 U	160 U	160 U	190	1.86
WE-3	0-6"	12/22/04	370 U	370 U	370 U	370 U	370 U	370 U	370 U	0.51 U
WE-3.5	0-6"	4/25/05	780 U	780 U	780 U	780 U	780 U	780 U	780 U	0.63 U
WE-4	0-6"	12/22/04	500 U	500 U	500 U	500 U	500 U	500 U	500 U	0.77 U
WE-5	0-6"	12/22/04	330 U	330 U	330 U	330 U	330 U	330 U	330 U	0.63
WE-5-2.5	0-6"	4/25/05	510 U	510 U	510 U	510 U	510 U	510 U	510 U	0.99 U
WE-5-3	0-6"	4/25/05	1,100 U	1,100 U	1,100 U	1,100 U	1,100 U	1,100 U	1,100 U	1.87 U
WE-5-3.5	0-6"	4/25/05	930 U	930 U	930 U	930 U	930 U	930 U	930 U	0.68 U
WE-6 ⁸	0-6"	12/21/04	270 U	270 U	270 U	270 U	270 U	270 U	270 U	0.51 U
WE-7	0-6"	12/21/04	220 U	220 U	220 U	220 U	220 U	220 U	220 U	0.42 U
WE-8	0-6"	12/21/04	260 U	260 U	260 U	260 U	260 U	260 U	260 U	0.49 U
WF-3	0-6"	12/22/04	340 U	340 U	340 U	340 U	340 U	340 U	340 U	0.51 U
WF-4	0-6"	12/22/04	340 U	340 U	340 U	340 U	340 U	340 U	340 U	0.48 U
WF-5	0-6"	12/22/04	360 U	360 U	360 U	360 U	360 U	360 U	360 U	0.47 U
WF-6	0-6"	12/22/04	440 U	440 U	440 U	440 U	440 U	440 U	440 U	0.88
WF-7	0-6"	12/21/04	260 U	260 U	260 U	260 U	260 U	260 U	260 U	0.48 U
WF-8	0-6"	12/21/04	430	390	1,000	210 U	210 U	700	1,200	4.13
WG-3	0-6"	12/22/04	300 U	300 U	300 U	300 U	300 U	300 U	300 U	0.45 U
WG-4	0-6"	12/22/04	360 U	360 U	360 U	360 U	360 U	360 U	360 U	0.5 U
WG-4.5	0-6"	4/22/05	180 U	180 U	180 U	180 U	180 U	180 U	180 U	0.33
WG-5	0-6"	12/22/04	140 U	140 U	140 U	140 U	140 U	140 U	150	0.4 U
WG-6	0-6"	4/22/05	140 U	140 U	140 U	140 U	140 U	140 U	140 U	0.12 U
WH-4	0-6"	4/22/05	240 U	240 U	240 U	240 U	240 U	240 U	240 U	0.24 U
WH-4.5	0-6"	4/22/05	130 U	130 U	130 U	130 U	130 U	130 U	130 U	0.12 U
WH-5	0-6"	12/22/04	220 U	220 U	220 U	220 U	220 U	220 U	220 U	0.33 U
WH-5.5	0-6"	4/22/05	240 U	240 U	240 U	240 U	240 U	240 U	240 U	0.22 U
WH-5-4.5	0-6"	4/22/05	1,800 U	1,800 U	1,800 U	1,800 U	1,800 U	1,800 U	1,800 U	0.14 U
WH-5-5	0-6"	4/22/05	110 U	110 U	110 U	110 U	110 U	110 U	110 U	0.24 U
WH-5-5.5	0-6"	4/22/05	280 U	280	280 U	280 U	280 U	280 U	280 U	0.16 U
WH-6	0-6"	4/22/05	--	--	--	--	--	--	--	-
WI-4	0-6"	4/22/05	620 U	620 U	620 U	620 U	620 U	620 U	620 U	0.65 U
WI-5	0-6"	4/22/05	250 U	250 U	250 U	250 U	250 U	250 U	250 U	0.79
WI-6	0-6"	4/22/05	430 U	430 U	430 U	430 U	430 U	430 U	430 U	0.36 U
WI-5-4	0-6"	4/22/05	240 U	240 U	240 U	240 U	240 U	240 U	240 U	0.49
WI-5-4.5	0-6"	4/22/05	2,300 U	2,300 U	2,300 U	2,300 U	2,300 U	2,300 U	2,300 U	2.62
WI-5-5	0-6"	4/22/05	530 U	530 U	530 U	530 U	530 U	530 U	530 U	0.47 U
WI-5-5.5	0-6"	4/22/05	480 U	480 U	480 U	480 U	480 U	480 U	480 U	0.8
Number of Samples			122	122	122	122	122	122	122	123
Number of Detections			10	15	24	2	3	14	29	66
Arithmetic Mean Concentration ⁴			249	246	329	191	208	274	351	1.05
Median Concentration ⁴			138	150	163	130	130	150	170	0.49
Maximum Detected Concentration			2,300	1,200	3,600	140	1,100	2,600	5,600	6.9
Upper Concentration Limit ⁴			100,000	400,000	10,000,000	10,000,000	100,000	10,000,000	10,000,000	300
Natural Soil Background Level ⁵			2,000	2,000	4,000	1,000	1,000	3,000	4,000	20
Method 1 S-1 Soil Standard ⁴			700	7,000	1,000,000	1,000,000	700	100,000	700,000	30
Percentage Above S-1 Soil Standard			3%	0%	0%	0%	1.6%	0%	0%	0%
Human Health Exposure Point Concentration			249	246	329	191	208	274	351	NA
Chronic Sediment Screening Level ⁶			150	166	423	77.4	4,077 [6]	204	195	9.79
Percentage Above Sediment Screening Level			7%	9%	7%	2%	0%	7%	15%	0%
Environmental Exposure Point Concentration			395 [9]	377 [9]	329	203 [9]	208	446 [9]	623 [9]	NA

ug/kg = micrograms per kilogram.
mg/kg = milligrams per kilogram.
U = Undetected at quantitation limit presented.
J = Estimated concentration below quantitation limit.
R = Rejected; surrogate recovery < 10%.
E = Calibration range of instrument exceeded.
NE = Not established.
NA = Not applicable.

- Non-detections included at one-half quantitation limit.
- 310 CMR 40.0996(7).
- MADEP (2002c). Background Levels of Polycyclic Aromatic Hydrocarbons and Metals in Soil. May.
- 310 CMR 40.0975(s). Lower of S-1/GW-2 or S-1/GW-3 presented. Exceedances are shaded.
- MADEP (2002b) Freshwater Sediment Screening Benchmarks for Use Under the Massachusetts Contingency Plan. May (unless otherwise noted). Exceedances in *italics*.
- Calculated value; see associated spreadsheet.
- Mean concentration at WD-25, -25A, -25B, -25C, and -25D used to avoid over-representing location.
- Location sampled on two discrete days; the highest detected value or lowest quantitation limit presented.
- Calculated by ProUCL (U.S. EPA 2004a).
- Surrogates obscured by contaminants in sample.
- Surrogates diluted out.
- ER-L value (NOAA, 1999).

**TABLE 2
SUMMARY OF WETLAND SOIL/SEDIMENT ANALYTICAL RESULTS
Former McCoy Field Wetland Area
New Bedford, Massachusetts**

Sample Identification	Sample Depth	Sample Date	Barium (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Lead (mg/kg)	Mercury (mg/kg)	Selenium (mg/kg)	Silver (mg/kg)
IW-1	0-6"	12/23/04	19	0.81	7.14	44	0.063	0.12	0.06
IW-2	0-6"	12/23/04	584	3.77	57	560	0.835	0.15	0.38
WA-3	0-6"	12/21/04	23	1.04	13	198	0.037	0.14	0.07
WB-4	0-6"	12/21/04	55	1.76	38	134	0.094	0.22	0.11
WB-5	0-6"	12/21/04	62	2.05	42	127	0.096	0.32	0.16
WB-6	0-6"	12/21/04	99	1.8	18	170	0.136	0.64	0.32
WB-7	0-6"	12/21/04	40	0.98	11	502	0.235	0.86	0.37
WC-4	0-6"	12/21/04	88	1.56	17	178	0.181	0.96	0.25
WC-5	0-6"	12/21/04	62	0.98	11	50	0.079	2.18	0.27
WC.5-4.5	0-6"	4/22/05	44	0.53	5.94	20	0.081	1.73	0.38
WC.5-5.5	0-6"	4/22/05	52	0.83	5.67	43	0.11	1.08	0.26
WC.5-6.5	0-6"	4/22/05	62	0.75	5.94	14	0.083	2.12	0.34
WC.5-8.5	0-6"	4/22/05	48	0.66	5.89	27	0.078	2.34	0.3
WC.5-9.5	0-6"	4/22/05	78	0.76	7.12	23	0.075	2.21	0.35
WC.5-10.5	0-6"	4/20/05	80	1.18	6.27	63	0.088	1.86	0.31
WC.5-11.5	0-6"	4/20/05	44	0.45	6.01	15	0.056	3.61	0.19
WC.5-12.5	0-6"	4/20/05	78	0.78	16	26	0.117	4.04	0.23
WC.5-13.5	0-6"	4/20/05	86	1.15	12	55	0.114	2.89	0.23
WC.5-14.5	0-6"	4/20/05	275	4.73	26	524	0.457	0.38	0.4
WC.5-15.5	0-6"	4/20/05	35	0.7	26	13	0.039	0.32	0.16
WC.5-16.5	0-6"	4/20/05	5.2	0.22	3.9	1.7	0.011	0.1	0.05
WC.5-17.14	0-6"	4/20/05	0.28	0.71	34	12	0.091	1.08	0.21
WC.5-17.28	0-6"	4/20/05	30	0.96	20	14	0.238	0.4	0.2
WC.5-18.5	0-6"	4/25/05	6.59	0.29	3.71	7.41	0.026	0.13	0.07
WC.5-19.5	0-6"	4/25/05	9.3	0.6	5.97	4.22	0.02	0.1	0.05
WC.5-20.5	0-6"	4/25/05	9.31	0.31	4.16	7.1	0.022	0.13	0.07
WC.5-21.5	0-6"	4/25/05	23	0.41	4.94	18	0.101	0.24	0.07
WC.5-22.5	0-6"	4/25/05	13	0.63	8.38	34	0.056	0.15	0.08
WC.5-23.5	0-6"	4/25/05	20	0.8	8.39	46	0.078	0.3	0.08
WC.5-24.5	0-6"	4/25/05	25	0.65	7.9	57	0.128	0.45	0.11
WC.5-25.5	0-6"	4/25/05	11	0.31	5.41	17	0.046	0.43	0.08
WC.5-26.5	0-6"	4/25/05	23	0.69	11	41	0.073	0.25	0.08
WC.5-27.5	0-6"	4/25/05	83	0.91	18	107	2.06	0.13	0.11
WC-6	0-6"	12/21/04	99	1.58	3.37	18	0.065	0.5	0.25
WC-7	0-6"	12/21/04	102	1.31	12	184	0.128	0.47	0.23
WC-8	0-6"	12/21/04	73	1.11	9.84	112	0.197	0.62	0.31
WC-18	0-6"	12/23/04	9.27	0.78	5.26	19	0.029	0.12	0.06
WC-19	0-6"	12/23/04	23	0.68	6.95	47	0.062	0.16	0.08
WC-20	0-6"	12/23/04	23	0.66	5.16	43	0.06	0.18	0.09
WC-21	0-6"	12/23/04	12	0.65	3.26	16	0.058	0.15	0.08
WC-22	0-6"	12/23/04	13	0.46	4.62	28	0.067	0.14	0.07
WC-23	0-6"	12/23/04	16	0.6	7.96	36	0.096	0.74	0.08
WC-24	0-6"	12/23/04	10	0.26	3.42	9.42	0.025	0.11	0.06
WC-25	0-6"	12/23/04	49	0.78	10	54	0.111	0.14	0.07
WC-26	0-6"	12/23/04	163	1.64	25	119	0.055	0.19	0.09
WC-27	0-6"	12/23/04	109	1.24	16	120	0.033	0.2	0.06
WD-3	0-6"	12/22/04	28	0.36	3.71	23	0.06	0.83	0.09
WD-4	0-6"	12/22/04	83	1.38	15	64	0.123	0.45	0.22
WD-4.5	0-6"	4/22/05	55	0.6	9.19	27	0.093	2.5	0.27
WD-5	0-6"	12/22/04	35	1.1	7.2	61	0.103	0.2	0.1
WD.5-2.5	0-6"	4/25/05	24	1.03	5.44	77	0.046	0.19	0.09
WD.5-3	0-6"	4/25/05	26	0.75	4.64	64	0.043	0.12	0.06
WD.5-3.5	0-6"	4/25/05	38	1.17	6.32	73	0.052	0.9	0.45
WD.5-4.5	0-6"	4/22/05	39	0.37	3.99	11	0.077	1.62	0.37
WD.5-5.5	0-6"	4/22/05	48	0.53	8.14	23	0.087	2.54	0.33
WD.5-6.5	0-6"	4/22/05	37	0.49	10	5.04	0.125	2.8	0.35
WD.5-17.14	0-6"	4/20/05	46	0.43	17	54	0.159	2.7	0.12
WD.5-17.28	0-6"	4/20/05	40	0.42	8.59	11	0.134	1.13	0.09
WD.5-17.46	0-6"	4/20/05	51	0.56	4.79	14	0.278	2.19	0.15
WD.5-17.57	0-6"	4/20/05	363	3.86	52	658	0.411	0.79	0.17
WD-6	0-6"	12/22/04	82	1.15	7.48	128	0.177	0.31	0.16
WD-6.5	0-6"	4/22/05	68	1.07	4.64	36	0.077	1.57	0.31
WD-7	0-6"	12/21/04	104	2.62	26	477	0.245	0.34	0.17
WD-8	0-6"	12/21/04	150	2.44	16	162	0.155	0.51	0.25
WD-9	0-6"	12/22/04	77	0.86	4.26	33	0.117	0.78	0.2
WD-10	0-6"	12/22/04	223	0.79	3.07	25	0.091	0.36	0.18
WD-10.5	0-6"	4/20/05	25	0.29	7.17	4.16	0.077	1.43	0.24
WD-11	0-6"	12/22/04	109	1.18	12	112	0.201	0.42	0.21
WD-12	0-6"	12/22/04	138	1.9	15	386	0.293	1.32	0.31
WD-13	0-6"	12/22/04	156	1.23	6.37	59	0.141	1.19	0.21
WD-14	0-6"	12/22/04	136	1.46	70	81	0.339	3.62	0.27
WD-15	0-6"	12/22/04	147	1.86	13	144	0.218	0.37	0.18
WD-15.5	0-6"	4/20/05	14	0.2	8.8	4.41	0.035	0.12	0.06
WD-16	0-6"	12/22/04	77	0.81	40	47	0.164	1.97	0.16
WD-17	0-6"	12/22/04	84	1.26	19	107	0.145	0.32	0.16
WD-17.46	0-6"	4/20/05	63	0.48	70	22	0.111	0.8	0.4
WD-17.57	0-6"	4/20/05	89	1.05	13	97	0.072	1.16	0.18
WD-18	0-6"	12/23/04	36	0.79	8.8	70	0.115	0.17	0.08
WD-19	0-6"	12/23/04	69	1.03	16	93	0.136	0.17	0.09
WD-20	0-6"	12/23/04	11	0.4	6.76	6.14	0.015	0.11	0.05
WD-21	0-6"	12/23/04	70	0.65	8.12	93	0.221	0.25	0.13
WD-22	0-6"	12/23/04	26	0.51	6.99	50	0.072	0.12	0.06
WD-23	0-6"	12/23/04	278	3.04	51	325	0.507	0.17	0.28
WD-24	0-6"	12/23/04	344	2.11	26	264	0.341	2.46	0.16

TABLE 2
SUMMARY OF WETLAND SOIL/SEDIMENT ANALYTICAL RESULTS
Former McCoy Field Wetland Area
New Bedford, Massachusetts

Sample Identification	Sample Depth	Sample Date	Barium (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Lead (mg/kg)	Mercury (mg/kg)	Selenium (mg/kg)	Silver (mg/kg)
WD-25 ¹	0-6"	12/23/04	966	4.3	79	810	0.648	0.25 U	0.5
WD-25A ¹	0-6"	1/19/05	-	-	-	-	-	-	-
WD-25B ¹	0-6"	1/19/05	-	-	-	-	-	-	-
WD-25C ¹	0-6"	1/19/05	-	-	-	-	-	-	-
WD-25D ¹	0-6"	1/19/05	-	-	-	-	-	-	-
WD-26	0-6"	12/23/04	13	0.37	4.59	7.34	0.164	0.15 U	0.07 U
WD-27	0-6"	12/23/04	21	0.52	4.81	24	0.204	0.18 U	0.09 U
WE-2.5	0-6"	4/25/05	28	1.11	5.58	105	0.085	0.11 U	0.05
WE-3	0-6"	12/22/04	95	1.9	12	431	0.194	0.51 U	0.26 U
WE-3.5	0-6"	4/25/05	50	0.56	4.01	10	0.101	1.63	0.31 U
WE-4	0-6"	12/22/04	107	1	7	53	0.172	1.77	0.38 U
WE-5	0-6"	12/22/04	86	1.16	11	167	0.235	1.94 ¹¹	0.24 U
WE-5-2.5	0-6"	4/25/05	57	1	6.96	105	0.158	0.99 U	0.5 U
WE-5-3	0-6"	4/25/05	51	0.93	4.67	15	0.101	1.87 U	0.93 U
WE-5-3.5	0-6"	4/25/05	65	0.48	6.64	9.65	0.106	3.08	0.34 U
WE-6 ⁸	0-6"	12/21/04	106	1.12	14	25	0.185	4.44	0.26 U
WE-7	0-6"	12/21/04	48	0.54	3.64	15	0.108	1.3	0.21 U
WE-8	0-6"	12/21/04	71	0.78	4.7	29	0.108	0.88	0.24 U
WF-3	0-6"	12/22/04	64	0.72	4.3	42	0.244	2.05	0.26 U
WF-4	0-6"	12/22/04	129	1.62	6.09	251	0.175	0.48 U	0.24 U
WF-5	0-6"	12/22/04	84	0.99	8.31	231	0.294	0.47 U	0.23 U
WF-6	0-6"	12/22/04	210	3.33	13	177	0.188	2.11	0.29 U
WF-7	0-6"	12/21/04	112	1.26	7.34	106	0.135	1.69	0.24 U
WF-8	0-6"	12/21/04	426	5.75	78	633	0.36	0.41 U	0.58
WG-3	0-6"	12/22/04	83	1.04	10	139	0.188	0.45 U	0.23 U
WG-4	0-6"	12/22/04	116	1.21	7.2	92	0.212	1.46	0.25 U
WG-4.5	0-6"	4/22/05	51	0.43	4.7	48	0.064	0.55	0.08 U
WG-5	0-6"	12/22/04	141	1.37	6.6	134	0.141	1.41	0.2 U
WG-6	0-6"	4/22/05	8.73	0.22	4.24	2.48	0.012 U	0.12 U	0.06 U
WH-4	0-6"	4/22/05	17	0.33	4.72	16	0.032	0.24 U	0.12 U
WH-4.5	0-6"	4/22/05	8.91	0.22	3.51	3.41	0.011 U	0.12 U	0.06 U
WH-5	0-6"	12/22/04	94	0.82	6.07	46	0.17	1.38	0.16 U
WH-5.5	0-6"	4/22/05	34	0.35	4.49	13	0.04	0.77	0.11 U
WH-5-4.5	0-6"	4/22/05	17	0.34	4.3	11	0.024	0.14 U	0.07 U
WH-5-5	0-6"	4/22/05	37	0.44	5.4	15	0.047	0.93	0.12 U
WH-5-5.5	0-6"	4/22/05	12	0.25	3.12	12	0.024	0.16 U	0.08 U
WH-6	0-6"	4/22/05	-	-	-	-	-	-	-
WI-4	0-6"	4/22/05	93	1.18	6.09	71	0.128	3.01	0.33
WI-5	0-6"	4/22/05	27	0.51	8.86	6.72	0.031	1.64	0.12 U
WI-6	0-6"	4/22/05	88	0.97	5.26	100	0.114	1.36	0.18 U
WI-5-4	0-6"	4/22/05	14	0.19	3.73	5.44	0.038	0.71	0.11 U
WI-5-4.5	0-6"	4/22/05	54	0.48	11	14	0.13	2.18	0.22 U
WI-5-5	0-6"	4/22/05	63	0.65	11	63	0.12	2.43	0.23 U
WI-5-5.5	0-6"	4/22/05	51	0.56	6.57	13	0.08	2.15	0.2 U
Number of Samples			123	123	123	123	123	123	123
Number of Detections			123	123	123	123	116	62	15
Arithmetic Mean Concentration ⁴			83	1.05	13.0	98	0.15	0.92	0.12
Median Concentration ⁴			54	0.79	7.2	46	0.11	0.38	0.10
Maximum Detected Concentration			966	5.75	79	810	2.06	4.44	0.58
Upper Concentration Limit ⁴			100,000	800	10,000	6,000	600	10,000	2,000
Natural Soil Background Level ³			50	2	30	100	0.3	0.5	0.6
Method 1 S-1 Soil Standard ⁴			1,000	30	1,000	300	20	400	100
Percentage Above S-1 Soil Standard			0%	0%	0%	8%	0%	0%	0%
Human Health Exposure Point Concentration			83	1.05	13	98	0.15	0.92	NA
Chronic Sediment Screening Level ⁵			163,221 [6]	0.99	43.4	35.8	0.18	19.9 [6]	1 [12]
Percentage Above Sediment Screening Level			0%	39%	6%	54%	23%	0%	0%
Environmental Exposure Point Concentration			83	1.17 [9]	13	138 [9]	0.18 [9]	0.92	NA

µg/kg = micrograms per kilogram.
mg/kg = milligrams per kilogram.
U = Undetected at quantitation limit presented.
J = Estimated concentration below quantitation limit.
R = Rejected; surrogate recovery < 10%.
E = Calibration range of instrument exceeded.
NE = Not established.
NA = Not applicable.
1. Non-detections included at one-half quantitation limit.
2. 310 CMR 40.0996(7).
3. MADEP (2002c). Background Levels of Polycyclic Aromatic Hydrocarbons and Metals in Soil. May.
4. 310 CMR 40.0975(8). Lower of S-1/GW-2 or S-1/GW-3 presented. Exceedances are shaded.
5. MADEP (2002b) Freshwater Sediment Screening Benchmarks for Use Under the Massachusetts Contingency Plan. May (unless otherwise noted). Exceedances in *italics*.
6. Calculated value; see associated spreadsheet.
7. Mean concentration at WD-25, -25A, -25B, -25C, and -25D used to avoid over-representing location.
8. Location sampled on two discrete days; the highest detected value or lowest quantitation limit presented.
9. Calculated by ProUCL (U.S. EPA 2004a).
10. Surrogates obscured by contaminants in sample.
11. Surrogates diluted out.
12. ER-L value (NDAA, 1999).

TABLE 3
CALCULATION OF CHRONIC SEDIMENT SCREENING VALUES
Former McCoy Field Wetland Area
New Bedford, Massachusetts

Constituent	Organic Carbon/Water Partition Coefficient ¹ (K _{OC}) (L/kg)	Fraction of Organic Carbon ² (f _{OC}) (unitless)	Soil/Water Partition Coefficient ³ (K _D) (L/kg)	Chronic Surface Water Benchmark Concentration ⁴ (C _{SW}) (µg/L)	Calculated Chronic Sediment Screening Value ⁵ (C _{SED}) (µg/kg)
Acenaphthene	2,380	0.0364	--	23	1,993
Benzo(b)fluoranthene	73,000	0.0364	--	0.42	1,116
Benzo(k)fluoranthene	121,000	0.0364	--	0.14	617
Benzo(g,h,i)perylene	311,000	0.0364	--	0.02	226
Indeno(1,2,3-cd)pyrene	800,000	0.0364	--	0.14	4,077
Barium	--	--	316	41,000	163,221,000
Selenium	--	--	3,981	5	19,905

L/kg = liters per kilogram.

µg/L = micrograms per liter.

µg/kg = micrograms per kilogram.

1. TPHCWG (1998). Composition of Petroleum Mixtures. Amherst Scientific Publishing. May.
2. For screening values, the 5th percentile organic carbon concentration in Site soil/sediment samples was applied (Table 4).
3. U.S. EPA (1999a). Partition Coefficients for Metals in Surface Water, Soil, and Waste (draft). June 22.
4. MADEP (2004). Proposed revised Method 1 Numerical Standards (and supporting documentation). September.
5. $C_{SED} = C_{SW} \times (K_{OC} \times f_{OC})$ (for organic constituents) or $C_{SED} = C_{SW} \times K_D$ (for metals).

**TABLE 4
CALCULATION OF UPPER AND LOWER PERCENTILES
OF SOIL/SEDIMENT TOTAL ORGANIC CARBON CONTENT
Former McCoy Field Wetland Area
New Bedford, Massachusetts**

Total Organic Carbon Data		
Ordered Data (%)	Rank	Percentile
2.3	1	1.6%
2.9	2	3.2%
3.45	3	4.8%
4.94	4	6.4%
5.92	5	8.0%
6.15	6	9.6%
6.69	7	11.2%
6.97	8	12.8%
7.37	9	14.4%
7.48	10	16.0%
8.53	11	17.6%
9.36	12	19.2%
11.49	13	20.8%
11.7	14	22.4%
12	15	24.0%
12.6	16	25.6%
13.14	17	27.2%
13.28	18	28.8%
13.7	19	30.4%
14.75	20	32.0%
15.1	21	33.6%
16.23	22	35.2%
17.09	23	36.8%
17.18	24	38.4%
17.56	25	40.0%
23	26	41.6%
24	27	43.2%
28	28	44.8%
28.6	29	46.4%
29.2	30	48.0%
30.27	31	49.6%
32.2	32	51.2%
33.4	33	52.8%
33.5	34	54.4%
37	35	56.0%
37.6	36	57.6%
38	37	59.2%
39	38	60.8%
39.9	39	62.4%
41	40	64.0%
41.9	41	65.6%
43.9	42	67.2%
44	43	68.8%
44.4	44	70.4%
45.2	45	72.0%
46	46	73.6%
46.9	47.5	76.0%
46.9	47.5	76.0%
48.6	48.5	77.6%
48.9	49.5	79.2%
50.5	50.5	80.8%
51	51.5	82.4%
53.7	52.5	84.0%
54.4	53.5	85.6%
54.6	54.5	87.2%
57.1	55.5	88.8%
58.6	56.5	90.4%
58.7	57.5	92.0%
61.8	58.5	93.6%
62.2	59.5	95.2%
62.5	60.5	96.8%
73.4	61.5	98.4%
73.5	62.5	100.0%
Mean Concentration		31.4
Median Concentration		32.2
5th percentile concentration ¹		3.64
95th percentile concentration ¹		62.2

1. Interpolated value.

TABLE 5
SUMMARY OF UPLAND GROUNDWATER ANALYTICAL RESULTS
Former McCoy Field Wetland Area
New Bedford, Massachusetts

Sample No.	Sample Date	Benzene µg/L	Methyl tert-butyl ether µg/L	Naphthalene (VOC) µg/L	Toluene µg/L	Naphthalene (PAH) µg/L	Barium (total) µg/L	Vanadium (total) µg/L
TB/OW-22	10/31/02	U	1.1	2.5	1.7	U	260	U
TB/OW-2	10/31/02	U	U	U	1.8	U	80	U
TB/OW-18	10/31/02	U	U	U	1.4	U	140	10
TB/OW-6	10/31/02	0.76	U	6.5	1.9	3.6	1,300	U
Method 1 GW-2 Groundwater Standard ¹		2,000	50,000	6,000	6,000	6,000	NE	NE
Method 1 GW-3 Groundwater Standard ¹		7,000	50,000	6,000	50,000	6,000	30,000	2,000

Only detected constituents are presented.

Samples analyzed for:

- Extractable petroleum hydrocarbons
- Volatile organic compounds (VOCs)
- Polycyclic aromatic hydrocarbons (PAHs)
- PCBs as Aroclors
- Priority pollutant metals

µg/L = micrograms per liter.

U = Undetected (quantitation limits unavailable).

NE = Standard not established.

1. 310 CMR 40.0974(2).

TABLE 6
PROPERTIES OF CONSTITUENTS OF CONCERN
Former McCoy Field Wetland Area
New Bedford, Massachusetts

Constituent	Water Solubility	Vapor Pressure	Henry's Law Constant	Organic Carbon/ Water Partition Coefficient	n-Octanol/Water Partition Coefficient	Soil/Water Partition Coefficient
	(S) (mg/L)	(VP) (atm)	(H) (cm ³ /cm ³)	(K _{oc}) (cm ³ /g)	(K _{ow}) (cm ³ /g)	(K _d) (cm ³ /g)
PCBs (as Aroclor 1254)	0.01 [3]	0.000001 [3]	0.155 [3]	998,000 [2]	1,070,000 [4]	NA
Acenaphthene	3.8 [1]	0.00002 [1]	0.0049 [1]	2,380 [1]	8,320 [1]	NA
Anthracene	0.045 [1]	0.0000008 [1]	0.0016 [1]	7,690 [1]	34,700 [1]	NA
Benzo(a)anthracene	0.011 [1]	0.000000006 [1]	0.00023 [1]	102,000 [1]	871,000 [1]	NA
Benzo(b)fluoranthene	0.0015 [1]	0.00000007 [1]	0.0000065 [5]	73,000 [1]	631,000 [1]	NA
Benzo(k)fluoranthene	0.0008 [1]	0.00000000004 [1]	0.0000065 [1]	121,000 [1]	1,000,000 [1]	NA
Benzo(g,h,i)perylene	0.0003 [1]	0.0000000002 [1]	0.000030 [1]	311,000 [1]	3,160,000 [1]	NA
Benzo(a)pyrene	0.0038 [1]	0.0000000002 [1]	0.000019 [1]	131,000 [1]	1,100,000 [1]	NA
Chrysene	0.0015 [1]	0.000000001 [1]	0.00018 [1]	81,400 [1]	309,000 [1]	NA
Fluoranthene	0.26 [1]	0.00000009 [1]	0.00042 [1]	27,800 [1]	166,000 [1]	NA
Fluorene	1.9 [1]	0.000007 [1]	0.0032 [1]	3,900 [1]	15,100 [1]	NA
Indeno(1,2,3-cd)pyrene	0.062 [1]	0.000000001 [1]	2.07E-11 [1]	800,000 [1]	10,000,000 [1]	NA
Phenanthrene	1.1 [1]	0.000001 [1]	0.0013 [1]	8,140 [1]	37,200 [1]	NA
Pyrene	0.132 [1]	0.0000001 [1]	0.00037 [1]	25,700 [1]	151,000 [1]	NA
Barium	NA	NA	NA	NA	NA	316 [6]
Cadmium	NA	NA	NA	NA	NA	1,995 [6]
Chromium (total)	NA	NA	NA	NA	NA	75,433 [6]
Lead	NA	NA	NA	NA	NA	39,810 [6]
Mercury	NA	NA	NA	NA	NA	7,943 [6]
Selenium	NA	NA	NA	NA	NA	3,981 [6]

mg/L = milligrams per liter.

atm = atmospheres.

cm³/cm³ = cubic centimeters per cubic centimeter (also, unitless).

cm³/g = cubic centimeters per gram (also, liters per kilogram).

NA = Not applicable or not available.

1. Total Petroleum Hydrocarbon Criteria Working Group (1998). Composition of Petroleum Mixtures. May. Amherst Scientific Publishing. May.
2. U.S. EPA (1999). Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities, EPA-530-D-99-001A, August.
3. U.S. EPA (1998). Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities, Peer Review Draft. EPA-530-D-98-001A, July.
4. U.S. EPA (2004b). Water9, Version 2.0.0, Database.
5. Assumed the same as benzo(k)fluoranthene.
6. U.S. EPA (1999a). Partition Coefficients for Metals in Surface Water, Soil, and Waste (Draft). June 22.

TABLE 7
SUMMARY OF HUMAN HEALTH TOXICITY VALUES AND RELATIVE ABSORPTION FACTORS
Former McCoy Field Wetland Area
New Bedford, Massachusetts

Constituent	Carcinogenic Weight of Evidence Category ¹	Chronic Oral Reference Dose (RfD) (mg/kg-dy)	Chronic Inhalation Reference Concentration (RfC) (mg/m ³)	Oral Cancer Slope Factor (SF) [(mg/kg-dy) ⁻¹]	Inhalation Cancer Unit Risk (UR) [(mg/m ³) ⁻¹]	Relative Absorption Factors ³ (RAF) (unitless)		
						Soil		Surface Water
						Oral	Dermal	Oral
PCB (as Aroclor 1254)	B2	0.00002 [2]	0.00002 [4]	2 [2]	0.1 [2]	0.85	0.16	1
Acenaphthene	Not assessed	0.06 [2]	0.05 [4]	--	--	0.36	0.1	1
Anthracene	D	0.3 [2]	0.05 [4]	--	--	0.36	0.1	1
Benzo(a)anthracene	B2	0.03 [4]	0.05 [4]	0.73 [5]	0.21 [5,6]	0.28	0.02	1
Benzo(b)fluoranthene	B2	0.03 [4]	0.05 [4]	0.73 [5]	0.21 [5,6]	0.28	0.02	1
Benzo(k)fluoranthene	B2	0.03 [4]	0.05 [4]	0.073 [5]	0.021 [5,6]	0.28	0.02	1
Benzo(g,h,i)perylene	D	0.03 [4]	0.05 [4]	--	--	0.36	0.1	0.91
Benzo(a)pyrene	B2	0.03 [4]	0.05 [4]	7.3 [2]	2.1 [6]	0.28	0.02	1
Chrysene	B2	0.03 [4]	0.05 [4]	0.073 [5]	0.021 [5,6]	0.28	0.02	1
Fluoranthene	D	0.04 [2]	0.05 [4]	--	--	0.36	0.1	1
Fluorene	D	0.04 [2]	0.05 [4]	--	--	0.36	0.1	1
Indeno(1,2,3-cd)pyrene	B2	0.03 [4]	0.05 [4]	0.73 [5]	0.21 [5,6]	0.28	0.02	1
Phenanthrene	D	0.03 [4]	0.05 [4]	--	--	0.36	0.1	0.91
Pyrene	D	0.03 [2]	0.05 [4]	--	--	0.36	0.1	1
Barium	D	0.07 [2]	0.0005 [4]	--	--	1	0.05	1
Cadmium	B1 (inhal)	0.001 [2,7]	0.00002 [4]	--	1.8 [2]	1	0.14	1
Chromium (total)	D	1.5 [2]	5 [6]	--	--	1	0.04	1
Lead	B2	0.00075 [3]	0.001 [4]	--	--	0.5	0.006	0.5
Mercury	D/C	0.0003 [2,8]	0.0003 [2]	--	--	1	0.05	1
Selenium	D	0.005 [2]	0.003 [4]	--	--	1	0.002	1

"--" No information available

mg/kg-dy = milligrams per kilogram per day.

mg/m³ = milligrams per cubic meter.

(mg/kg-dy)⁻¹ = risk per (milligram per kilogram per day).

(mg/m³)⁻¹ = risk per (milligram per cubic meter).

1. U.S. EPA's Weight of Evidence Category with respect to human carcinogenicity:

- B1/B2 = Probable human carcinogen
- C = Possible human carcinogen
- D = Not classifiable as to human carcinogenicity

2. U.S. EPA (2005). Integrated Risk Information System (IRIS), online database accessed March.

3. MADEP (2004). Proposed revised Method 1 Numerical Standards and supporting documentation. September.

4. MADEP (2004a). Revisions to Dose-Response Values Used in Human Health Risk Assessment. August 18.

5. Extrapolated from benzo(a)pyrene SF, using toxicity equivalency factors in MADEP (1995) Guidance for Disposal Site Risk Characterization.

6. No inhalation value available; calculated from oral RfD or SF, assuming a 20 m³/day inhalation rate for a 70 kg adult.

7. Value for "food."

8. Value for mercuric chloride.

TABLE 8
SUMMARY OF HUMAN HEALTH EXPOSURE FACTORS
Former McCoy Field Wetland Area
New Bedford, Massachusetts

Exposure Factor	Value	Reference
Soil/Sediment exposure point concentration (C_{soil})	Constituent-specific	The arithmetic mean concentration of each constituent of concern (COC) in soil/sediment is applied as the soil exposure point concentration, consistent with MCP guidance [310 CMR 40.0926(3)].
Surface water exposure point concentration (C_{sw})	Constituent-specific	Potential surface water concentrations are estimated from soil/sediment EPCs using equilibrium partitioning (Table 10).
Air particle exposure point concentration (C_{air})	Constituent-specific	Air particle exposure point concentrations are derived from soil/sediment EPCs, assuming an air particle concentration of $32 \mu\text{g}/\text{m}^3$, per MADEP guidance (MADEP 1995).
Soil/sediment ingestion rate (IR_s)	100 mg/day (child) 50 mg/day (youth) 50 mg/day (adult)	Values recommended by MADEP (1995).
Surface water ingestion rate (IR_{sw})	50 mL/day	Value recommended in MADEP (1995).
Relative absorption factor, oral, soil/water (RAFo)	1	All constituents assumed 100% absorbed through the oral route.
Exposed skin surface area, soil/sediment (SA_{soil})	1,351 cm^2 (child) 2,928 cm^2 (youth) 3,107 cm^2 (adult)	Values correspond to exposure of hands, forearms and feet, using guidance from MADEP (1995) and MADEP (2002a).
Soil adherence factor, (AF_{soil})	0.52 mg/cm^2 (child) 0.14 mg/cm^2 (youth) 0.1 mg/cm^2 (adult)	Calculated from body part-specific adherence factors (MADEP 2002a).
Dermal absorption per exposure event (DA_{Event})	Constituent-specific	Calculated by method described in U.S. EPA (2004) (Table 9).
Relative absorption factor, dermal (RAF _d)	Constituent-specific	Values used in MADEP (2004).
Particulate matter concentration in air (PM_{10})	$32 \mu\text{g}/\text{m}^3$	Value recommended for non-excavation-type scenarios (MADEP 1995).

TABLE 8 (continued)
SUMMARY OF HUMAN HEALTH EXPOSURE FACTORS
Former McCoy Field Wetland Area
New Bedford, Massachusetts

Exposure Factor	Value	Reference
Exposure frequency (EF)	80 events per year	Value is assumed, corresponding to exposure four times per week in June, July and August and twice per week in April, May, September, and October.
Exposure duration (ED)	1 day/event (soil/sediment) 5.6 hours per event (air)	Soil/sediment value is conventional value. Air exposure duration for trespassers is based on data on trespassing activities presented in U.S. EPA (1997).
Exposure period (EP)	7 years (child) 7 years (youth) 16 years (adult)	Age-specific breakdown used by MADEP (2004) for a 30-year total exposure.
Body weight (BW)	17 kg (child) 39.9 kg (youth) 58.7 kg (adult)	Values used in MADEP (2004).
Averaging period (AP)	<u>Non-carcinogens:</u> 7 years (child) 7 years (youth) 16 years (adult) <u>Carcinogens:</u> 70 years	Conventional averaging time for non-carcinogens (same as exposure period) and carcinogens (lifetime).

MADEP (2004). Proposed revised Method 1 Numerical Standards and Supporting Documentation, September.

MADEP (2002a). Technical Update: Weighted Skin-Soil Adherence Factors. April.

MADEP (1995). Guidance for Disposal Site Risk Characterization in Support of the Massachusetts Contingency Plan. Interim Final Policy WSC/ORS-95-141, July.

U.S. EPA (2004). Risk Assessment Guidance for Superfund: Volume I: Human Health Evaluation Manual (Part E: Supplemental Guidance for Dermal Risk Assessment). Final. EPA/540/R/99/005, July.

U.S. EPA (1997). Exposure Factors Handbook. EPA/600/P-95/002Fb. August.

U.S. EPA (1996). Soil Screening Guidance: Technical Background Document. Publication 9355.4-17A, May.

TABLE 9
CALCULATION OF DERMAL ABSORPTION FROM SURFACE WATER CONTACT
Former McCoy Field Wetland Area
New Bedford, Massachusetts

Organic constituents with $t_{event} < t^*$

$$DA_{event} = 2 \cdot FA \cdot K_p \cdot C_w \cdot \sqrt{\frac{6 \cdot \tau \cdot t_{event}}{\pi}}$$

$$t^* = 2.4 \tau$$

for $B \leq 0.6$

Inorganic constituents

$$DA_{event} = K_p \cdot C_w \cdot t_{event}$$

$$t^* = \tau \cdot (b - \sqrt{b^2 - c^2})$$

for $B > 0.6$

(All equations from reference 1).

$$B = K_p \frac{\sqrt{MW}}{2.6}$$

$$b = \frac{2 \cdot (1+B)^2}{\pi} - c$$

$$\log K_p = -2.8 + 0.66 \cdot \log K_{ow} - 0.0056 MW$$

$$c = \frac{1 + 3B + 3B^2}{3 \cdot (1+b)}$$

$$\tau = 0.105 \cdot 10^{(0.0056 MW)}$$

where:

DA_{event} = Dermal absorption per event per mg/cm^3 [$(mg/cm^2 \cdot event)/(mg/cm^3)$]
 FA = Fraction of dose absorbed (unitless)
 K_p = Dermal permeability constant (cm/hr)
 C_w = Chemical concentration in water (1 mg/cm^3 assumed)
 τ = Lag time per event (hr/event)
 t_{event} = Event duration (hr/event)
 π = Pi (3.14)

t^* = Time to reach steady state (= $2.4 \times t_{event}$)
 MW = Constituent molecular weight (g/g-mole)
 K_{ow} = Constituent octanol/water partition coefficient (unitless)
 B = Ratio of constituent permeability constant through stratum corneum relative to its permeability constant across viable epidermis (unitless)
 b = Empirical correlation coefficient (unitless)
 c = Empirical correlation coefficient (unitless)

Constituent	MW ² (g/mole)	log Kow ² (cm ³ /g)	Kp (cm/hr)	B (cm/hr)	b (unitless)	c (unitless)	τ (hr/event)	t_{event} ³ (hr/event)	t^* (hr)	FA ¹ (unitless)	DA _{event} [mg/cm ² -event]/ [mg/cm ³]	DA _{event} [mg/cm ² -event]/ [mg/L]
Acenaphthene	154.21	3.92	0.08	0.4	-	-	0.77	0.25	1.84	1	0.10	1.02E-04
Anthracene	178.2	4.54	0.16	0.8	1	1.0	1.04	0.25	4.01	1	0.22	2.23E-04
Benzo(a)anthracene	228.3	5.94	0.69	4.0	12	4.1	1.99	0.25	8.61	1	1.36	1.36E-03
Benzo(b)fluoranthene	252	5.80	0.41	2.5	5	2.6	2.71	0.25	11.26	1	0.94	9.41E-04
Benzo(k)fluoranthene	252	6.00	0.56	3.4	9	3.5	2.71	0.25	11.55	1	1.28	1.28E-03
Benzo(g,h,i)perylene	268.4	6.50	0.97	6.1	26	6.2	3.34	0.25	14.81	1	2.45	2.45E-03
Benzo(a)pyrene	250	6.04	0.61	3.7	10	3.8	2.64	0.25	11.32	1	1.37	1.37E-03
Chrysene	228.3	5.49	0.35	2.0	4	2.1	1.99	0.25	8.14	1	0.68	6.84E-04
Fluoranthene	202.3	5.22	0.33	1.78	3	1.9	1.43	0.25	5.75	1	0.54	5.37E-04
Fluorene	166.2	4.18	0.11	0.53	-	-	0.90	0.25	2.15	1	0.14	1.40E-04
Indeno(1,2,3-cd)pyrene	276.3	7.00	1.87	12.0	95	12.0	3.70	0.25	16.86	0.6	2.99	2.99E-03
Phenanthrene	178.2	4.57	0.165	0.8	1	1.0	1.04	0.25	4.01	1	0.23	2.34E-04
Pyrene	202.3	5.18	0.306	1.7	3	1.8	1.43	0.25	5.71	1	0.51	5.05E-04
Barium	-	-	0.001	-	-	-	-	0.25	-	1	0.0003	2.50E-07
Cadmium	-	-	0.001	-	-	-	-	0.25	-	1	0.0003	2.50E-07
Chromium (total)	-	-	0.001	-	-	-	-	0.25	-	1	0.0003	2.50E-07
Lead	-	-	0.001	-	-	-	-	0.25	-	1	0.0003	2.50E-07
Mercury	-	-	0.001	-	-	-	-	0.25	-	1	0.0003	2.50E-07
Selenium	-	-	0.001	-	-	-	-	0.25	-	1	0.0003	2.50E-07
PCB (Aroclor 1254)	361	6.03	0.144	1.1	1	1.2	11.04	0.25	42.62	0.5	0.33	3.31E-04

- U.S. EPA (2004). Risk Assessment Guidance for Superfund: Volume I: Human Health Evaluation Manual (Part E: Supplemental Guidance for Dermal Risk Assessment). Final. EPA/540/R/99/005, July.
- Molecular weights and octanol/water partition coefficients from:
 TPHCWG (1998). Composition of Petroleum Mixtures. Amherst Scientific Publishing. May.
 U.S. EPA (2004b), Water9, Version 2.2.0 database. (for PCBs).
- Assumed 15 minute cumulative exposure to surface water per event.

TABLE 10
CALCULATION OF SEDIMENT INTERSTITIAL WATER AND SURFACE WATER CONCENTRATIONS OF COCS
Former McCoy Field Wetland Area
New Bedford, Massachusetts

Constituent	Sediment Exposure Point Concentration	Sediment Exposure Point Concentration	Organic Carbon/Water Partition Coefficient	Sediment/Water Partition Coefficient	Organic Carbon Fraction of Sediment	Sediment Interstitial Water Concentration ¹	Estimated Surface Water Concentration ²	Sediment Interstitial Water Concentration ¹	Estimated Surface Water Concentration ²
	(Human Health)	(Environmental)				(Human Health)	(Human Health)	(Aquatic Invertebrates)	(Amphibian/Avian/Mammalian)
	C _{SED} (mg/kg)	C _{SED} (mg/kg)	K _{OC} (L/kg)	K _D (L/kg)	f _{OC} (fraction)	C _{SWI} (mg/L)	C _{SW} (mg/L)	C _{SWI} (mg/L)	C _{SW} (mg/L)
PCBs (as Aroclor 1254)	0.908	2.09	998,000 [3]	--	0.314	2.90E-06	2.90E-07	6.67E-06	6.67E-07
Acenaphthene	0.191	0.191	2,380 [4]	--	0.314	2.56E-04	2.56E-05	2.56E-04	2.56E-05
Anthracene	0.203	0.221	7,690 [4]	--	0.314	8.41E-05	8.41E-06	9.15E-05	9.15E-06
Benzo(a)anthracene	0.255	0.401	102,000 [4]	--	0.314	7.96E-06	7.96E-07	1.25E-05	1.25E-06
Benzo(b)fluoranthene	0.274	0.274	73,000 [4]	--	0.314	1.20E-05	1.20E-06	1.20E-05	1.20E-06
Benzo(k)fluoranthene	0.218	0.218	121,000 [4]	--	0.314	5.74E-06	5.74E-07	5.74E-06	5.74E-07
Benzo(g,h,i)perylene	0.213	0.213	311,000 [4]	--	0.314	2.18E-06	2.18E-07	2.18E-06	2.18E-07
Benzo(a)pyrene	0.249	0.395	131,000 [4]	--	0.314	6.05E-06	6.05E-07	9.60E-06	9.60E-07
Chrysene	0.246	0.377	81,400 [4]	--	0.314	9.62E-06	9.62E-07	1.47E-05	1.47E-06
Fluoranthene	0.329	0.329	27,800 [4]	--	0.314	3.77E-05	3.77E-06	3.77E-05	3.77E-06
Fluorene	0.191	0.203	3,900 [4]	--	0.314	1.56E-04	1.56E-05	1.66E-04	1.66E-05
Indeno(1,2,3-cd)pyrene	0.208	0.208	800,000 [4]	--	0.314	8.28E-07	8.28E-08	8.28E-07	8.28E-08
Phenanthrene	0.274	0.446	8,140 [4]	--	0.314	1.07E-04	1.07E-05	1.74E-04	1.74E-05
Pyrene	0.351	0.623	25,700 [4]	--	0.314	4.35E-05	4.35E-06	7.72E-05	7.72E-06
Barium	83	83	--	316 [5]	0.314	2.63E-01	2.63E-02	2.63E-01	2.63E-02
Cadmium	1.05	1.17	--	1,995 [5]	0.314	5.26E-04	5.26E-05	5.86E-04	5.86E-05
Chromium	13	13	--	75,433 [5]	0.314	1.72E-04	1.72E-05	1.72E-04	1.72E-05
Lead	98	138	--	39,810 [5]	0.314	2.46E-03	2.46E-04	3.47E-03	3.47E-04
Mercury	0.15	0.18	--	7,943 [5]	0.314	1.89E-05	1.89E-06	2.27E-05	2.27E-06
Selenium	0.92	0.92	--	3,981 [5]	0.314	2.31E-04	2.31E-05	2.31E-04	2.31E-05

mg/kg = milligrams per kilogram.

L/kg = liters per kilogram.

mg/L = milligrams per liter.

"--" = Value not applicable.

1. Estimated for organic constituents as $C_{SWI} = C_{SED} / (f_{OC} \times K_{OC})$. Estimated for inorganic constituents as $C_{SWI} = C_{SED} / K_D$.
2. One-tenth of the predicted sediment interstitial water concentration.
3. U.S. EPA (1999). Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities. EPA-530-D-99-001A, August.
4. Total Petroleum Hydrocarbon Criteria Working Group (1998). Composition of Petroleum Mixtures. Amherst Scientific Publishing.
5. U.S. EPA (1999a) Partition Coefficients for Metals in Surface Water, Soil, and Waste (draft). June 22.

TABLE 11
SUMMARY OF THREATENED OR ENDANGERED ENVIRONMENTAL SPECIES
OR SPECIES OF SPECIAL CONCERN IN NEW BEDFORD
Former McCoy Field Wetland Area
New Bedford, Massachusetts

Common (Scientific) Name	Taxonomic Group	State or Federal Rank	Habitat ¹
Marbled salamander (<i>Ambystoma opacum</i>)	Amphibian	Threatened (state)	Largely terrestrial, generally occurring in deciduous woods of the southern hardwood type, dominated by oak and hickory species with White Pine. Wooded vernal ponds or shallow depressions are required for breeding sites.
Eastern worm snake (<i>Carphophis amoenus</i>)	Reptile	Threatened (state)	Inhabits damp hilly woodlands, farmland that borders woodland, and partially wooded/grassy hillsides above streams. During dry periods they retreat underground where the soil is moister. ²
Spotted turtle (<i>Clemmys guttata</i>)	Reptile	Species of special concern (state)	Inhabit both forested and non-forested wetlands, require a soft substrate for burrowing, and prefer areas with aquatic vegetation. Hatchlings consume land and water insects, worms, and snails; adults feed exclusively underwater.
Eastern box turtle (<i>Terrapene Carolina</i>)	Reptile	Species of special concern (state)	Terrestrial; inhabits both dry and moist woodlands, brushy fields, thickets, marshes, bogs, stream banks, and well-drained bottomland.
Least Tern (<i>Sterna antillarum</i>)	Bird	Species of special concern (state); Endangered (federal)	Inhabits coastal beaches and barrier islands; not found inland.
Arctic tern (<i>Sterna paradisaea</i>)	Bird	Species of special concern (state)	Inhabits sandy, gravelly areas on island and barrier spits and, occasionally, on mainland shores.
Mystic Valley amphipod (<i>Crangonyx aberrans</i>)	Crustacean	Species of special concern (state)	Proposed for removal from state list. ³
American clam shrimp (<i>Limnadia lenticularis</i>)	Crustacean	Species of special concern (state)	Inhabits ephemeral (vernal) ponds.
Coastal swamp amphipod (<i>Synurella chamberlaini</i>)	Crustacean	Species of special concern (state)	Inhabits heavily vegetated, coastal wetland outlet streams of red maple and white cedar swamps in Buzzards Bay moraine deposits; elsewhere, in small streams, bogs, ponds, ditches.
Attenuated blueth damselfly (<i>Enallagma daeckii</i>)	Damselfly	Species of special concern (state)	Semi-aquatic insect; inhabits wetlands, most numerous on highly vegetated lakes and ponds. Also found in swamps, sandy ponds and vegetated stream backwaters. Nymphs are aquatic.
Pale green pinion moth (<i>Lithophane viridipallens</i>)	Moth	Species of special concern (state)	Inhabits moderately dry to wet pine and hardwood forests and in swamps.
Narrow-leaved spring beauty (<i>Claytonia virginica</i>)	Vascular plant	Endangered (state)	Grows in rich mesic (moderately moist), deciduous woods, thickets, and clearings composed of alluvial soils that are seasonally flooded.
Lesser snakeroot (<i>Eupatorium aromaticum</i>)	Vascular plant	Endangered (state)	Herbaceous perennial; grows in open, dry oak/hickory/white pine/red maple woods which were recently subjected to recent burns; it is believed that fire plays an important role in seed germination and establishment of colonies.

TABLE 11 (Continued)
SUMMARY OF THREATENED OR ENDANGERED ENVIRONMENTAL SPECIES
OR SPECIES OF SPECIAL CONCERN IN NEW BEDFORD
Former McCoy Field Wetland Area
New Bedford, Massachusetts

Common (Scientific) Name	Taxonomic Group	State or Federal Rank	Habitat ¹
Purple cudweed (<i>Gamochaeta purpurea</i>)	Vascular plant	Endangered (state)	Grows in old fields, thickets, prairies, stream banks, open woodlands. ⁴
Saltpond pennywort (<i>Hydrocotyle verticillata</i>)	Vascular plant	Threatened (state)	Member of parsley family; an aquatic herb growing along sandy to peaty margins or brackish ponds very near the ocean.
Bead pinweed (<i>Lechea pulchella</i> var <i>moniliformis</i>)	Vascular plant	Endangered (state)	Dry to moist sandy plains, shores, and open woods. ⁵
New England blazing star (<i>Liatris scariosa</i> var <i>. novae-angliae</i> ; syn <i>borealis</i>)	Vascular plant	Species of special concern (state)	Grows in open areas with dry, sandy, low nutrient soil, usually sand plain grasslands and coastal heathlands, or areas with early to mid-successional communities (e.g., absence of trees).
Rigid flax (<i>Linum medium</i> var <i>texanum</i>)	Vascular plant	Threatened (state)	Also called stiff yellow flax. No habitat information located.
Heartleaf twayblade (<i>Listera cordata</i>)	Vascular plant	Endangered (state)	Grows in wet, mossy coniferous woods.
Adder's-tongue fern (<i>Phlogossum pusillum</i>)	Vascular plant	Threatened (state)	Grows in boggy meadows, acidic fens, borders of marshes, wet fields, and moist woodland clearings.
Pale green orchis (<i>Platanthera flava</i> var <i>herbiola</i>)	Vascular plant	Threatened (state)	Prefers sunny to semi-shaded habitat where soils are rich, moderately acidic, and wet, and where periodic flooding or water level fluctuations are common.
Canadian sanicle (<i>Sanicula canadensis</i>)	Vascular plant	Threatened (state)	Grows in moist or dry open woods, preferring mesic slopes in stream valleys or lake margins.
Swamp oats (<i>Sphenipholis pensylvanica</i>)	Vascular plant	Threatened (state)	Grows in a variety of wet places in full sun; swamps, along streams, wet woods, wet meadows. Sensitive to drainage modifications. ⁶

1. From the Massachusetts National Heritage and Endangered Species Program (www.mass.gov/dfwele/dfw/nhesp/nhesp.htm), unless otherwise noted.
2. Ohio Public Library Information Network (2001). www.oplin.org/snake/fact%20pages/worm_snake_eastern/worm_snake_eastern.html.
3. Massachusetts Department of Fish and Game (2003). Press release, January 28. (www.mass.gov/dfwele/press/prs0301.htm#ItemB).
4. U.S. Geological Survey Northern Prairie Wildlife Research Center (undated). (www.npwrc.usgs.gov/resource/1999/soutflor/species/8/gamopurp.htm).
5. Ohio Department of Natural Resources (1993) (www.ohiodnr.com/dnap/heritage/..%5CAbstracts%5CK-L%5CLECHPULC.htm).
6. Ohio Department of Natural Resources (1984). (www.ohiodnr.com/dnap/heritage/..%5CAbstracts%5CS%5Csphepens.htm).

TABLE 12
SUMMARY OF REPRESENTATIVE ENVIRONMENTAL RECEPTORS AND EXPOSURE PATHWAYS
Former McCoy Field Wetland Area
New Bedford, Massachusetts

Class	Species (Common name)	Assessment endpoint	Feeding Habit ¹	Exposure Pathways ¹	Basis of Exposure
Oligochaete	Terrestrial invertebrates (earthworms)	Survival	--	Direct exposure	Constituent concentrations in soil
Crustacean	Aquatic invertebrates (e.g., scuds)	Survival	--	Direct exposure	Constituent concentrations in sediment interstitial water
Amphibian	Green Frog (embryonic/juvenile)	Survival, growth, reproducibility	--	Direct exposure	Constituent concentrations in surface water
Avian	American Robin	Survival, growth, reproducibility	Omnivore	Diet: 62% vegetation 38% terrestrial invertebrates Surface water ingestion Soil ingestion	Constituent concentrations in vegetation Constituent concentrations in terrestrial invertebrates Constituent concentrations in surface water Constituent concentrations in soil
	Red-tailed Hawk	Survival, growth, reproducibility	Carnivore	Diet: 100% Small mammals Surface water ingestion Soil ingestion	Constituent concentrations in mammalian prey species Constituent concentrations in surface water Constituent concentrations in soil
Mammalian	Short-tailed Shrew	Survival, growth, reproducibility	Insectivore	Diet: 83% Terrestrial invertebrates 17% Vegetation Surface water ingestion Soil ingestion	Constituent concentration in terrestrial invertebrates Constituent concentrations in vegetation Constituent concentrations in surface water Constituent concentrations in soil
	Raccoon	Survival, growth, reproducibility	Omnivore	Diet: 58% Vegetation 25% Small mammals 17% Terrestrial invertebrates Surface water ingestion Soil ingestion	Constituent concentrations in vegetation Constituent concentrations in mammalian prey species Constituent concentrations in terrestrial invertebrates Constituent concentrations in surface water Constituent concentrations in soil

1. Refer to risk calculation sheets in Appendices D and E for reference sources.

TABLE 13
SUMMARY OF ENVIRONMENTAL EXPOSURE FACTORS
Former McCoy Field Wetland Area
New Bedford, Massachusetts

Exposure Factor	Value	Reference
American Robin		
Soil ingestion rate (IR _{soil})	0.0143 kgDW/kgBW-dy	From Table 5-1 of U.S. EPA (1999).
Food ingestion rate (IR _{food})	0.44 kgWW/kgBW-dy	From Table 5-1 of U.S. EPA (1999).
Water ingestion rate (IR _{sw})	0.137 L/kgBW-dy	From Table 5-1 of U.S. EPA (1999).
Fraction in diet of i th food type (F _i)	0.62 (62%) vegetation 0.38 (38%) invertebrates	Average values for spring, summer, fall and spring in the eastern United States (U.S. EPA 1993).
Total organism foraging area (FA)	1.2 acres	Average value of 0.5 hectares for adult male and females (U.S. EPA 1993).
Red-Tailed Hawk		
Soil ingestion rate (IR _{soil})	0.00995 kgDW/kgBW-dy	From Table 5-1 of U.S. EPA (1999), assuming soil is 10% of diet.
Food ingestion rate (IR _{food})	0.185 kgWW/kgBW-dy	From Table 5-1 of U.S. EPA (1999).
Fraction in diet of i th food type (F _i)	1.0 (100%) small mammals	Has an all animal diet, consuming primarily rabbits and squirrels (U.S. EPA 1993).
Water ingestion rate (IR _{sw})	0.057 L/kgBW-dy	From U.S. EPA (1999).
Total organism foraging area (FA)	1,700 acres	Based on an average winter foraging area in Michigan of 697 hectares (ha), with a range of 381 to 989 ha (U.S. EPA 1993).

TABLE 13
SUMMARY OF ENVIRONMENTAL EXPOSURE FACTORS (Continued)
Former McCoy Field Wetland Area
New Bedford, Massachusetts

Exposure Factor	Value	Reference
Short-tailed shrew		
Soil ingestion rate (IR _{soil})	0.0145 kgDW/kgBW-dy (0.00022 kgDW/dy)	Assuming 10% of food ingestion rate and an average 71% food moisture (68% for invertebrates and 88% for vegetation) [= (0.5)(0.1)(1-0.71)].
Food ingestion rate (IR _{food})	0.5 kgWW/kgBW-dy (0.0075 kgWW/dy)	Average reported value (U.S. EPA 1993).
Water ingestion rate (IR _{sw})	0.151 L/kgBW-dy (0.0023 L/dy)	From Table 5-1 of U.S. EPA (1999).
Body Weight (BW)	0.015 kgBW	Representative value from U.S. EPA (1993).
Fraction in diet of ⁱ th food type (F _i)	0.83 (83%) invertebrates 0.17 (17%) vegetation	Reportedly consumes primarily invertebrates, including earthworms, slugs, snails, beetles, and moth larvae, in addition to fungi and vegetation (U.S. EPA 1993).
Total organism foraging area (FA)	0.9-acre	Midpoint of home ranges for Michigan and New York (U.S. EPA 1993).
Raccoon		
Soil ingestion rate (IR _{soil})	0.0058 kgDW/kgBW-dy	Assuming 10% of food ingestion rate and an average 80% food moisture (68% for invertebrates and 88% for vegetation) [= (0.29)(0.1)(1-0.8)].
Food ingestion rate (IR _{food})	0.29 kg/kgBW-dy	Estimated from the regression equation IR = 0.0687(wt) ^{0.822} and an average body weight of 5.8 kg (average of mean reported values for adult male and females) (U.S. EPA 1993).
Water ingestion rate (IR _{sw})	0.08 L/kgBW-dy	U.S. EPA (1993). Mean value for adult males and females.
Fraction in diet of ⁱ th food type (F _i)	0.58 (58%) vegetation 0.25 (25%) mammals 0.17 (17%) invertebrates	U.S. EPA (1993). From a study of summer diet of raccoons in New York.
Total organism foraging area (FA)	390 acres	U.S. EPA (1993). Average of mean values for adult males and females in a Michigan riparian environment.

TABLE 13
SUMMARY OF ENVIRONMENTAL EXPOSURE FACTORS (Continued)
Former McCoy Field Wetland Area
New Bedford, Massachusetts

Exposure Factor	Value	Reference
All Receptors		
Bioavailability from soil and food ($BA_{soil/food}$)	All organics: 1 Metals: Constituent-specific	Values for metals obtained from Risk Assessment Information System (RAIS) (http://risk.lsd.ornl.gov/index.shtml) and are presented on calculation spreadsheets. Assumed applicable to both mammals and avian species.
Soil-to-Plant soil bioconcentration factor (BCF_r)	Constituent-specific [(mg/kgDW)/(mg/kg soil)]	From values listed in Appendix C of U.S. EPA (1999) or calculated by the following regression equation: $\log BCF = 1.588 - 0.578 \times \log K_{ow}$ (U.S. EPA 1999).
Soil-to-Soil invertebrate bioconcentration factor (BCF_{ssi})	Constituent-specific [(mg/kgWW)/(mg/kg soil)]	From values listed in Appendix C of U.S. EPA (1999) or surrogate values based on structural similarities.
Food-to-Wildlife bioaccumulation factor (BA_{mammal})	Constituent-specific (dy/kgWW)	Calculated for organic constituents by: $BA_{mammal} = -7.6 + \log K_{ow}$, (U.S. EPA 1993). Values for inorganic constituents back-calculated from BCF values for short-tailed shrew, using a soil ingestion rate of 0.0145 kgDW/kgbw-dy and a body weight of 0.015 kg (U.S. EPA 1999).

mg = milligram.

kg = kilogram.

kgBW = kilograms body weight.

dy = day.

L = liter.

DW = dry weight.

WW = wet (fresh) weight.

ORNL (2005). Risk Assessment Information System (<http://risk.lsd.ornl.gov/index.shtml>).

U.S. EPA (1999). Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities. EPA 530-D-99-001A, August.

U.S. EPA (1993). Wildlife Exposure Factors Handbook. EPA/600/R-93/187a, December.

TABLE 14
SUMMARY OF 95th PERCENTILE UPPER CONFIDENCE LIMITS
FOR ENVIRONMENTAL RISK CHARACTERIZATION
Former McCoy Field Wetland Area
New Bedford, Massachusetts

Constituent	No. Samples ¹	Model-Recommended Statistical Distribution ²	Upper Confidence Limit (UCL) on Mean ² (mg/kg)	Model-Recommended UCL Method ²
PCBs	124	Non-parametric	2.089	97.5% Chebyshev (Mean, SD) UCL
Anthracene	122	Log-normal	0.221	95% H-UCL
Benzo(a)anthracene	122	Non-parametric	0.401	95% Chebyshev (Mean, SD) UCL
Benzo(a)pyrene	122	Non-parametric	0.395	95% Chebyshev (Mean, SD) UCL
Chrysene	122	Non-parametric	0.377	95% Chebyshev (Mean, SD) UCL
Fluorene	122	Log-normal	0.203	95% H-UCL
Phenanthrene	122	Non-parametric	0.446	95% Chebyshev (Mean, SD) UCL
Pyrene	122	Non-parametric	0.623	95% Chebyshev (Mean, SD) UCL
Cadmium	123	Log-normal	1.17	95% H-UCL
Lead	123	Log-normal	138	95% H-UCL
Mercury	123	Log-normal	0.18	95% H-UCL

mg/kg = milligrams per kilogram.

1. The average of WD-25, WD-25A, WD-25B, WD-25C, and WD-25D is applied as one data point.
 The maximum detected concentration or lowest quantitation limit (if not detected) is applied for WE-6, which was sampled twice.
2. Through application of ProUCL Version 3.0 (U.S. EPA 2004a) (Appendix C).

TABLE 15
SUMMARY OF TOXICITY REFERENCE VALUES
FOR TERRESTRIAL INVERTEBRATES
Former McCoy Field Wetland Area
New Bedford, Massachusetts

Constituent	U.S. EPA (1999) ¹	U.S. DOE (1997) ²	U.S. EPA ECO-SSL ³	Selected Toxicity Reference Value (TRV)
	Acute	Acute	Chronic	
(mg/kg)				
PCBs (as Aroclor 1254)	251 [4]	--	--	251
Acenaphthene	--	--	--	170 [6]
Anthracene	--	--	--	170 [6]
Benzo(a)anthracene	--	--	--	25 [7]
Benzo(b)fluoranthene	--	--	--	25 [7]
Benzo(k)fluoranthene	--	--	--	25 [7]
Benzo(g,h,i)perylene	--	--	--	170 [6]
Benzo(a)pyrene	--	25 [5]	--	25
Chrysene	--	--	--	25 [7]
Fluoranthene	--	--	--	170 [6]
Fluorene	--	170	--	170
Indeno(1,2,3-cd)pyrene	--	--	--	25 [7]
Phenanthrene	--	--	--	170 [6]
Pyrene	--	--	--	170 [6]
Barium	--	--	330	330
Cadmium	--	440	140	440
Chromium (total)	--	--	57 ⁸	57
Lead	--	5,491	1,700	5,491
Mercury	--	2.5	--	2.5
Selenium	77	--	--	77

mg/kg = milligram per kilogram.

1. U.S. EPA (1999). Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities, Volume 3, Appendix E, Table E-6. EPA-530-DD-99-001A, August.
2. Efroymson RA et al. (1997). Toxicological Benchmarks for Contaminants of Potential Concern for Effects on Soil and Litter Invertebrates and Heterotrophic Process. Lowest LC50 value listed in Table A-1, unless otherwise noted.
3. U.S. EPA (2005b). Ecological Soil Screening Levels (<http://www.epa.gov/ecotox/ecossl/>).
4. Median LC50 (median lethal concentration) value.
5. No values for earthworms; value presented is no observed effect level (NOEL) for common wood louse (endpoint: change in growth efficiency).
6. Value for fluorene applied to all non-carcinogenic PAHs.
7. Value for benzo(a)pyrene applied to all carcinogenic PAHs.
8. Not EcoSSL, but study cited in source document [maximum acceptable toxicant concentration (MATC)] (U.S. EPA 2005b).

TABLE 16
SUMMARY OF TOXICITY REFERENCE VALUES
FOR AQUATIC INVERTEBRATES
Former McCoy Field Wetland Area
New Bedford, Massachusetts

Constituent	U.S. EPA Ambient Water Quality Standard ¹	U.S. EPA Region 4 Ecological Screening Level ²	MADEP Surface Water Benchmark Concentration ³	Selected Toxicity Reference Value (TRV)
	Acute	Acute	Acute	
(µg/L)				
PCBs (as Aroclor 1254)	--	0.2	--	0.2
Acenaphthene	--	170	80	80
Anthracene	--	--	1.27	1.27
Benzo(a)anthracene	--	--	10	10
Benzo(b)fluoranthene	--	--	4.2	4.2
Benzo(k)fluoranthene	--	--	1.4	1.4
Benzo(g,h,i)perylene	--	--	0.2	0.2
Benzo(a)pyrene	--	--	--	0.4 [6]
Chrysene	--	--	0.7	0.7
Fluoranthene	--	398	33.6	33.6
Fluorene	--	--	33	33
Indeno(1,2,3-cd)pyrene	--	--	--	0.4 [6]
Phenanthrene	--	--	--	4 [7]
Pyrene	--	--	4	4
Barium	--	--	26,000	26,000
Cadmium	4.3 [4,5]	1.79	0.9	4.3
Chromium	570 [4,5]	984	183	570
Lead	65 [4,5]	33.78	14	65
Mercury	1.4 [4,5]	2.4	1.4	1.4
Selenium	--	20	12.83	12.83

µg/L = micrograms per liter.

1. U.S. EPA (2002). National Recommended Water Quality Criteria: 2002. EPA-822-R-02-047, November.
2. U.S. EPA (undated). Region 4 Ecological Screening Values (<http://www.epa.gov/Region4/waste/ots/epatab4.pdf>).
3. MADEP (2004). Proposed Revised Method 1 Numerical Standards and supporting documentation (basis of proposed GW-3 standards). September.
4. Value is based on the dissolved form of constituent.
5. Value is based on a water hardness of 100 mg/L; hardness of Site surface water is not known.
6. Value for dibenzo(a,h)anthracene applied (reference 3).
7. Value for pyrene applied.

TABLE 17
SUMMARY OF TOXICOLOGICAL DATA FOR AMPHIBIAN SPECIES
AND CALCULATION OF TOXICITY REFERENCE VALUES
Former McCoy Field Wetland Area
New Bedford, Massachusetts

Constituent	Species	Life Stage	Time	Endpoint	Water Concentration (ug/L)	Reference	Toxicity Reference Value (TRV) (ug/L)	Basis
Aroclor 1254	Northern leopard frog	Egg	96 hr	LC50	1.03	[1]	0.02	[14]
Aroclor 1254	American toad	Egg	96 hr	LC50	2.02	[1]		
Aroclor 1254	Fowler's toad	Egg	96 hr	LC50	3.74	[1]		
Benzo(a)pyrene	African clawed frog	Egg	96 hr	EC50	170	[2]	1.7	[15]
Fluoranthene	Northern leopard frog	Egg	1 hr	LC50	90	[3]	0.9	[14]
Cadmium (unspecified form)	Northwestern salamander	Tadpole	10 dy	NOAEL	12.8	[6]	1.3	[16]
Cadmium (unspecified form)	Northwestern salamander	Tadpole	24 dy	NOAEL	48.9	[6]		
Cadmium (unspecified form)	Northwestern salamander	Tadpole	10 dy	NOAEL	106	[8]		
Cadmium (unspecified form)	Northwestern salamander	Tadpole	24 dy	NOAEL	49	[8]		
Cadmium chloride	African clawed frog	Tadpole	48 hr	LOEL-development	1,000	[4]		
Cadmium sulfate	African clawed frog	Tadpole	48 hr	LOEL-development	1,000	[4]		
Chromium (unspecified valence)	Black spined toad	Tadpole	96 hr	LC50	49.3	[7]	0.4	[14]
Chromium (unspecified valence)	Eastern narrowmouth toad	Tadpole	7 dy	LC50	30	[5]		
Lead	Eastern narrowmouth toad	Tadpole	7 dy	LC50	40	[5]	0.4	[17]
Lead	Jefferson salamander	Egg	NR	NOAEL-development	2,000	[13]		
Lead (as nitrate)	Adult skipper frog	Adult	72 hr	LC50	1,542	[9]		
Mercury	Indian green frog	Tadpole	7 dy	LC50	59,900	[10]	0.24	[15]
Mercury	Marbled salamander	Tadpole	7 dy	LC50	1,075	[10]		
Methylmercury	African clawed frog	Egg	96 hr	EC50 - development	24	[11]		
Selenium	Eastern narrowmouth toad	Tadpole	7 dy	LC50	90	[5]	0.9	[18]
Selenium	African clawed frog	Tadpole	72 hr	LC50	8,040	[12]		

µg/L = micrograms per liter.

NOAEL = No observed adverse effect level.

LC50 = median lethal concentration.

LOEL = lowest observed effect level.

EC50 = median effective concentration.

NR = not reported.

All data obtained from *Reptile and Amphibian Toxicological Literature Database (RATL), Version 6*. National Wildlife Research Centre, Canada Wildlife Service, Environment Canada. Preference was given to studies defining a no observed adverse effect level (NOAEL) or lowest observed effect level (LOEL). If not available, median effective or lethal concentrations (EC50 and LC50, respectively) were used with uncertainty factors applied. Certain studies were not used including: studies in which multiple constituents were or may have been present, studies measuring only residues, *in vitro* tissue studies, studies using an injection route of administration, and studies for which concentration units were unclear.

- Birge, W.J., J.A. Black and A.G. Westerman. 1978. Effects of polychlorinated biphenyl compounds and proposed PCB-replacement products on embryo-larval stages of fish and amphibians. University of Kentucky Water Resources Research Institute, Lexington, Kentucky, Research Rep No 118. 33 pp. [1769].
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- Average LC50 divided by 100.
- Average EC50 divided by 100.
- Lowest NOAEL divided by 10.
- LC50 for tadpole divided by 100.
- Lowest LC50 divided by 100.

TABLE 18
SUMMARY OF TOXICITY REFERENCE VALUES FOR AVIAN SPECIES
Former McCoy Field Wetland Area
New Bedford, Massachusetts

Avian								
Constituent	U.S. EPA (1999) ¹	U.S. DOE (1996) ²	U.S. EPA Region 9 BTAG (2002) ³	Other	Selected Low Toxicity Reference Value	U.S. EPA Region 9 BTAG (2002) ³	U.S. EPA DOE (1996) ²	Selected High Toxicity Reference Value
	(Low)	(Low)	(Low)	(Low)	(TRV-Low)	(High)	(High)	(TRV-High)
(mg/kg-BW-dy)								
PCBs (as Aroclor 1254)	0.072	0.18	0.09	--	0.09	1.27	1.8	1.8
Acenaphthene	--	--	--	2 [4]	2	--	--	2
Anthracene	--	--	--	1 [5]	1	--	--	1
Benzo(a)anthracene	0.00079 [6]	--	--	1.1 [5]	1.1	--	--	1.1
Benzo(b)fluoranthene	0.00014 [6]	--	--	2 [4]	2	--	--	2
Benzo(k)fluoranthene	0.00014 [6]	--	--	2 [4]	2	--	--	2
Benzo(g,h,i)perylene	--	--	--	2 [4]	2	--	--	2
Benzo(a)pyrene	0.001 [6]	--	--	2 [4]	2	--	--	2
Chrysene	0.001 [6]	--	--	2 [4]	2	--	--	2
Fluoranthene	--	--	--	2 [4]	2	--	--	2
Fluorene	--	--	--	1 [5]	1	--	--	1
Indeno(1,2,3-cd)pyrene	0.001 [6]	--	--	2 [4]	2	--	--	2
Phenanthrene	--	--	--	1.1 [5]	1.1	--	--	1.1
Pyrene	--	--	--	2 [4]	2	--	--	2
Barium	20.8	20.8	--	--	20.8	--	47.1	47.1
Cadmium	1.45	1.45	0.08	--	1.45	10.4	20	20
Chromium	1	1	--	--	1	--	5	5
Lead	0.025	1.13	0.014	--	1.13	8.75	11.3	11.3
Mercury	3.25	0.45	0.039	--	0.039	0.18	0.9	0.9
Selenium	0.5	0.5	0.23	--	0.5	0.93	1	1

mg/kgBW-dy = milligrams per kilogram of body weight per day.

1. U.S. EPA (1999). Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities, Volume One. EPA-530-DD-99-001A, August.
2. Sample et al. (1996). Toxicological Benchmarks for Wildlife: 1996 Revision. U.S. DOE ES/ER/TM-86/R-3, June. Low value is based on no observed adverse effect level (NOAEL); high value based on lowest observed adverse effect level (LOAEL).
3. U.S. EPA (2002a). Region 9 Biological Technical Assistance Group (BTAG) Recommended Toxicity Reference Values for Birds (Revision Date 11/21/02).
4. Applied in U.S. DOE (2003) Final Quantico Creek Risk Screening Assessment, Quantico Watershed Study (February 13, 2003). Source cited is Trust et al., (1993) (no further citation provided). (http://web.ead.anl.gov/ecorisk/case/docs/Appendix_b_final.pdf).
5. Presented in Table 3.3.2-1. of U.S. Navy (1999). Screening Ecological Risk Assessment, Pearl Harbor Sediment RI/FS (December). Source cited is Schaefer et al.(1983) The acute oral toxicity, repellency, and hazard potential of 998 chemicals to one or more species of wild and domestic birds. Archives of Environmental Contamination and Toxicology, 12:355-382 (http://web.ead.anl.gov/ecorisk/cse/docs/study5docs/Table_332_1.pdf).
6. These values were derived from Brunston B, Broman D, Naf C (1991) Toxicity and EROD-inducing potency of 24 polycyclic aromatic hydrocarbons (PAHs) in chick embryos. Arch. Toxicol. 1991; 65(6):485-9. In this study, PAHs dissolved in peanut oil were directly injected into the air sacs of eggs; the LD50 values were reported as ug constituent/kg egg (i.e., the value for benzo(k)fluoranthene was 0.14 ug/kg egg). In the citation of this study in various ecological risk assessment documents, the LD50 has been reported at ug/(kg body weight-day). Given these factors, the appropriateness and applicability of this study to dietary intakes by juvenile or adult birds is suspect. For this reason, these TRVs are not applied.

TABLE 19
SUMMARY OF TOXICITY REFERENCE VALUES FOR MAMMALIAN SPECIES
Former McCoy Field Wetland Area
New Bedford, Massachusetts

Constituent	Mammalian							
	U.S. EPA (1999) ¹	U.S. DOE (1996) ²	U.S. EPA Region 9 BTAG ³	Other	Selected Low Toxicity Reference Value	U.S. EPA Region 9 BTAG (2002) ³	U.S. DOE (1996) ²	Selected High Toxicity Reference Value
	(Low)	(Low)	(Low)	(Low)	(TRV-Low)	(High)	(High)	(TRV-High)
(mg/kgBW-dy)								
PCBs (as Aroclor 1254)	0.000206 [4]	0.022 [5]	0.36	1.14 [8]	0.36	1.28	0.22	1.28
Acenaphthene	--	--	--	17.5 [7]	17.5	--	--	17.5
Anthracene	--	--	--	100 [7]	100	--	--	100
Benzo(a)anthracene	0.167	--	--	--	0.167	--	--	0.167
Benzo(b)fluoranthene	--	--	--	4 [7]	4	--	--	4
Benzo(k)fluoranthene	--	--	--	7.2 [7]	7.2	--	--	7.2
Benzo(g,h,i)perylene	--	--	--	7.2 [7]	7.2	--	--	7.2
Benzo(a)pyrene	0.1	0.29 [5]	1.31	--	1.31	32.8	2.9	32.8
Chrysene	--	--	--	0.17 [7]	0.17	--	--	0.17
Fluoranthene	--	--	--	12.5 [7]	12.5	--	--	12.5
Fluorene	--	--	--	--	12.5 [10]	--	--	12.5
Indeno(1,2,3-cd)pyrene	--	--	--	7.2	7.2	--	--	7.2
Phenanthrene	--	--	--	--	100 [11]	--	--	100
Pyrene	--	--	--	7.5 [7]	7.5	--	--	7.5
Barium	0.51	2.8 [5]	--	5.1 [7]	2.8	--	10.5	10.5
Cadmium	0.0252	0.51 [5]	0.06	0.19 [8]	0.51	2.64	5.1	5.1
Chromium (total or trivalent)	--	1,445 [5]	--	2.4 [8,9]	2.4	--	--	2.4
Lead	0.0375	4.22 [5]	1	0.48 [8]	4.22	241	42.2	241
Mercury	1.01	0.69 [5]	0.25 [6]	--	0.69	4.0	--	4.0
Selenium	0.076	0.11 [5]	0.05	0.2 [7]	0.076	1.2	0.174	1.2

mg/kgBW-dy = milligrams per kilogram of body weight per day.

- U.S. EPA (1999). Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities, Volume One. EPA-530-DD-99-001A, August.
- Sample et al. (1996). Toxicological Benchmarks for Wildlife: 1996 Revision. U.S. DOE ES/ER/TM-86/R3. Low values based on no observed adverse effect levels (NOAELs); high values based on lowest observed adverse effect levels (LOAELs).
- U.S. EPA (2002b). Region 9 Biological Technical Assistance Group (BTAG) Recommended Toxicity Reference Values for Mammals (Revision Date 11/21/02).
- Based on mink, which is not a target receptor for the Site.
- Lowest value presented for little brown bat, short-tailed shrew, white-footed mouse, meadow vole, cottontail rabbit, and red fox.
- Based on rat.
- Applied in U.S. DOE (2003) Final Quantico Creek Risk Screening Assessment, Quantico Watershed Study (February 13). Sources cited are PRC (1996) Region 5 Ecological Data Quality Levels, Final Report (August); Samples et al. (1996) (cited above); and IT Corp (1997) Predictive Ecological Risk Assessment Methodology, Environmental Restoration Program, Sandia National Laboratory, New Mexico (November). http://web.ead.anl.gov/ecorisk/case/docs/Appendix_B_final.pdf.
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- Based on hexavalent chromium.
- No value available; value for fluoranthene applied, based on structural similarity.
- No value available; value for anthracene applied, based on structural similarity.

TABLE 20
RISK CHARACTERIZATION
TERRESTRIAL INVERTEBRATES
Former McCoy Field Wetland Area
New Bedford, Massachusetts

Constituent	Environmental Soil/Sediment Exposure Point Concentration (C_{soil-sed}) (mg/kg)	Acute Terrestrial Invertebrate Toxicity Reference Value¹ (TRV) (mg/kg)	Is TRV Exceeded?	Hazard Quotient² (HQ) (unitless)
PCBs (as Aroclor 1254)	2.09	251	No	0.008
Acenaphthene	0.191	170	No	0.001
Anthracene	0.221	170	No	0.001
Benzo(a)anthracene	0.401	25	No	0.02
Benzo(b)fluoranthene	0.274	25	No	0.01
Benzo(k)fluoranthene	0.218	25	No	0.009
Benzo(g,h,i)perylene	0.213	170	No	0.001
Benzo(a)pyrene	0.395	25	No	0.02
Chrysene	0.377	25	No	0.02
Fluoranthene	0.329	170	No	0.002
Fluorene	0.203	170	No	0.001
Indeno(1,2,3-cd)pyrene	0.208	25	No	0.008
Phenanthrene	0.446	170	No	0.003
Pyrene	0.623	170	No	0.004
Barium	83	330	No	0.3
Cadmium	1.17	440	No	0.003
Chromium (total)	13	57	No	0.2
Lead	138	5,491	No	0.03
Mercury	0.18	2.5	No	0.07
Selenium	0.92	77	No	0.01
Total Hazard Index (HI)				0.7

mg/kg = milligrams per kilogram.

1. Basis presented on separate table.
2. $HQ = C_{\text{soil-sed}}/TRV$; $HI = \text{sum of all HQs}$.

TABLE 21
RISK CHARACTERIZATION
AQUATIC INVERTEBRATES
Former McCoy Field Wetland Area
New Bedford, Massachusetts

Constituent	Predicted Sediment Interstitial Water Concentration ¹ C _{SWI} (µg/L)	Acute Aquatic Invertebrate Toxicity Reference Value ² (TRV) (µg/L)	Is TRV Exceeded?	Hazard Quotient ³ (HQ) (unitless)
PCBs (as Aroclor 1254)	0.0067	0.2	No	0.03
Acenaphthene	0.26	80	No	0.003
Anthracene	0.092	1.27	No	0.07
Benzo(a)anthracene	0.013	10	No	0.001
Benzo(b)fluoranthene	0.012	4.2	No	0.003
Benzo(k)fluoranthene	0.0057	1.4	No	0.004
Benzo(g,h,i)perylene	0.0022	0.2	No	0.01
Benzo(a)pyrene	0.0096	0.4	No	0.02
Chrysene	0.015	0.7	No	0.02
Fluoranthene	0.038	33.6	No	0.001
Fluorene	0.17	33	No	0.005
Indeno(1,2,3-cd)pyrene	0.00083	0.4	No	0.002
Phenanthrene	0.17	4	No	0.04
Pyrene	0.077	4	No	0.02
Barium	263	26,000	No	0.01
Cadmium	0.59	4.3	No	0.1
Chromium	0.17	570	No	0.0003
Lead	3.47	65	No	0.05
Mercury	0.023	1.4	No	0.02
Selenium	0.23	12.83	No	0.02
Total Hazard index (HI)				0.5

µg/L = micrograms per liter.

- Estimated for organic constituents as $C_{SWI} = C_{sed}/(f_{oc} \times K_{oc})$, using mean Site f_{oc} .
 Estimated for inorganic constituents as $C_{SWI} = C_{sed}/K_D$. Refer to Table 10.
- Basis presented on separate table.
- HQ = C_{SWI}/TRV ; HI = sum of all HQs.

TABLE 22
RISK CHARACTERIZATION
AMPHIBIANS
Former McCoy Field Wetland Area
New Bedford, Massachusetts

Constituent	Estimated Surface Water Concentration¹ C_{sw} (µg/L)	Chronic Amphibian Toxicity Reference Value² (TRV) (µg/L)	Is Amphibian TRV Exceeded?	Hazard Quotient³ (HQ) (unitless)
PCBs (as Aroclor 1254)	0.00067	0.02	No	0.03
Acenaphthene	0.026	0.9	No	0.03
Anthracene	0.0092	0.9	No	0.01
Benzo(a)anthracene	0.0013	1.7	No	0.0007
Benzo(b)fluoranthene	0.0012	1.7	No	0.0007
Benzo(k)fluoranthene	0.00057	1.7	No	0.0003
Benzo(g,h,i)perylene	0.00022	0.9	No	0.0002
Benzo(a)pyrene	0.00096	1.7	No	0.0006
Chrysene	0.0015	1.7	No	0.0009
Fluoranthene	0.0038	0.9	No	0.004
Fluorene	0.017	0.9	No	0.02
Indeno(1,2,3-cd)pyrene	0.000083	1.7	No	0.00005
Phenanthrene	0.017	0.9	No	0.02
Pyrene	0.0077	0.9	No	0.009
Barium	26.3	2,600	No	0.01
Cadmium	0.059	1.3	No	0.05
Chromium	0.017	0.4	No	0.04
Lead	0.35	0.4	No	0.9
Mercury	0.0023	0.24	No	0.009
Selenium	0.023	0.9	No	0.03
Total Hazard Index (HI)				1.1

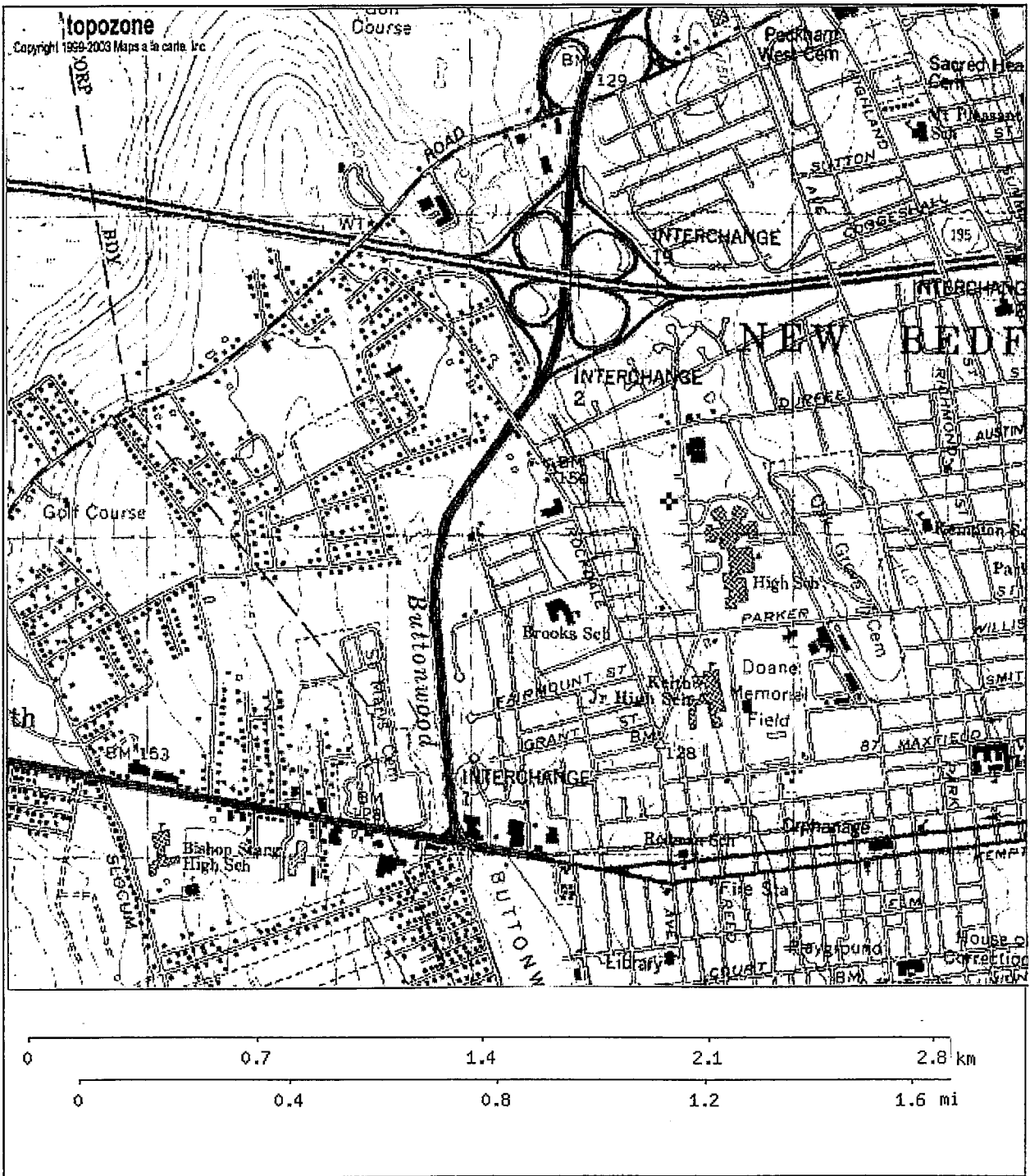
µg/L = micrograms per liter.

1. Estimated as one-tenth of the predicted interstitial water concentration; refer to Table 10.
2. Basis for selection presented on separate table.
3. $HQ = C_{\text{soil-sed}}/TRV$; $HI = \text{sum of all HQs}$.



Figures

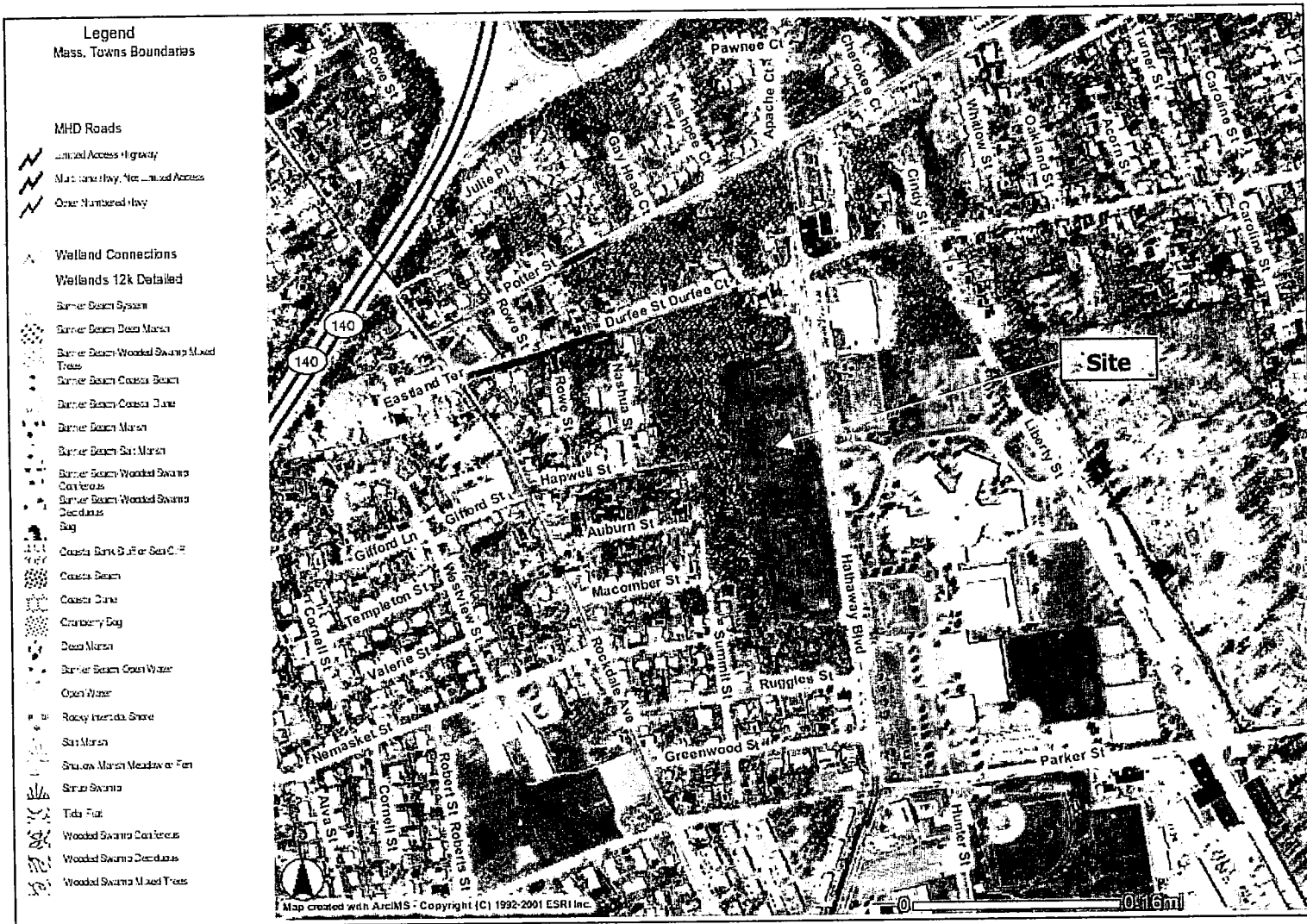




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Former McCoy Field
Wetland Area Site
New Bedford, Massachusetts
Scale: As shown

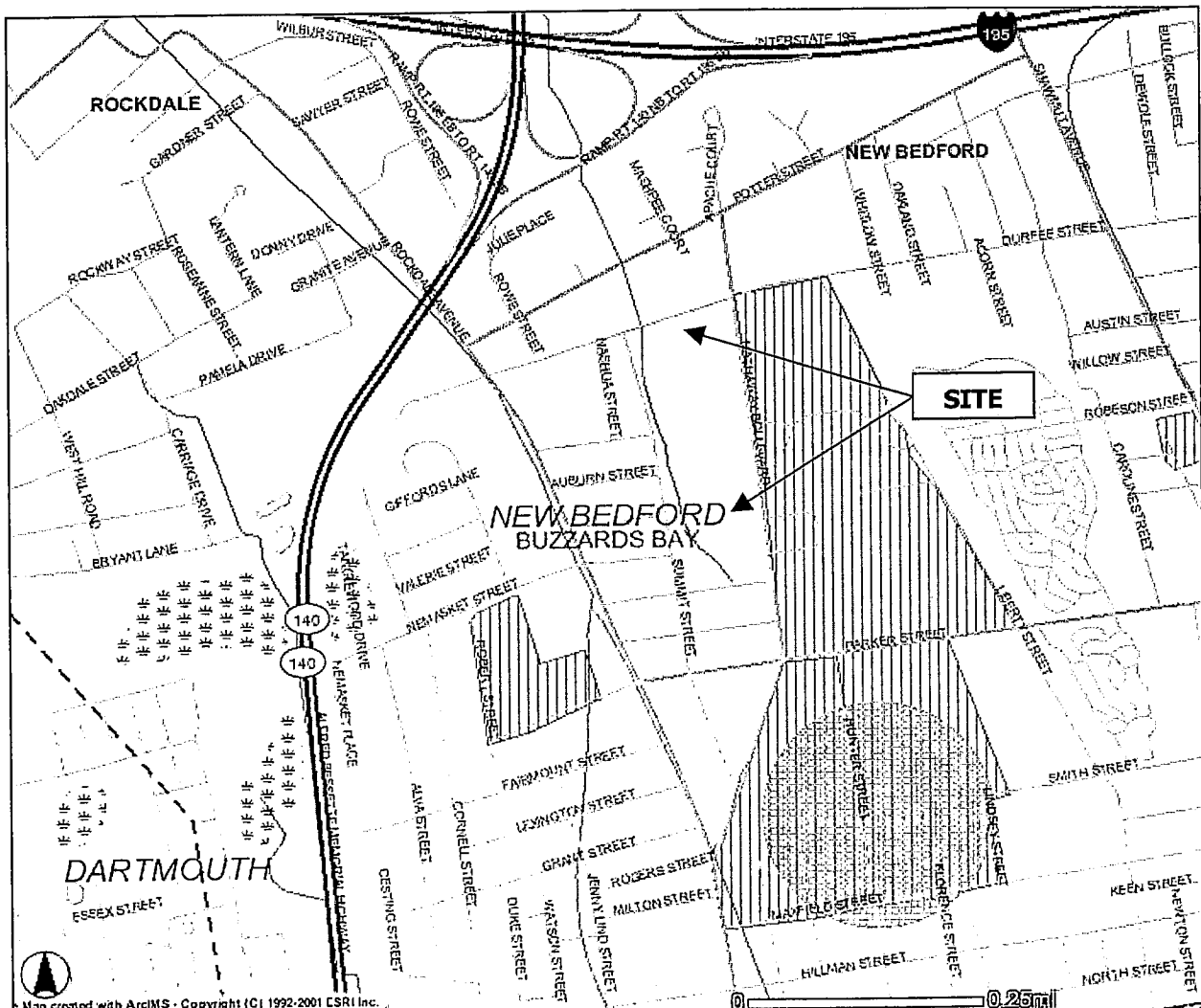
Former McCoy Field Site Setting
Figure 1



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Former McCoy Field
Wetland Area Site
New Bedford, Massachusetts
Scale: As shown

Wetlands Map
Figure 2



Map created with ArcIMS • Copyright (C) 1992-2001 CSR Inc.

DEP MCP 21e Map Legend

- Zone IIs
- IWPAs
- Zone A
- Sole Source Aquifers
- Solid Waste Sites
- Protected Openspace
- ACECs
- NHESP Estimated Habitat of Rare Wildlife in Wetland Areas
- Certified Vernal Pools 2003 NHESP
- Subbasins
- Mass Major Basins
- DEP Region
- Town Atts
- County Boundaries

- Public Water Supplies**
- COMMUNITY PUBLIC WATER SUPPLY GROUNDWATER
- COMMUNITY PUBLIC WATER SUPPLY SURFACE WATER
- NON COMMUNITY PUBLIC WATER SUPPLY
- Aquifers, By Yield**
- HIGH YIELD
- MEDIUM YIELD
- Non Potential Drinking Water Source Area**
- HIGH YIELD
- MEDIUM YIELD
- FEMA Floodplains**
- 100 YEAR FLOODPLAIN

- Hydrography**
- WATER
- RESERVOIR
- WETLANDS
- SALT WATER WETLANDS
- FLATS SHOALS
- Rivers and Streams**
- PERENNIAL
- INTERMITTENT
- SHORELINE
- MAN MADE SHORE
- DAM
- AQUEDUCT

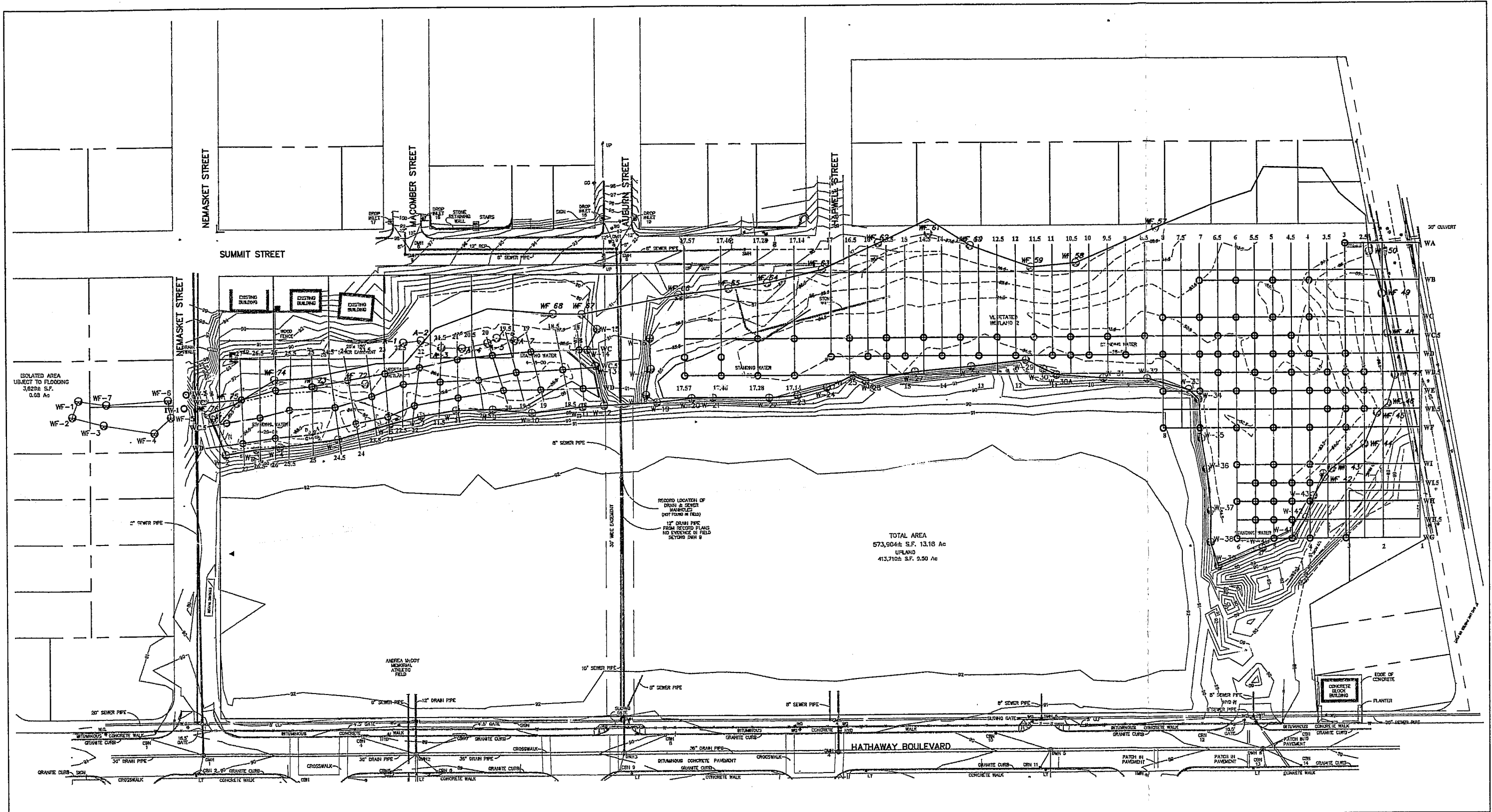
- MHD Roads**
- LIMITED ACCESS HIGHWAY
- MULTILANE HWY, NOT LIMITED ACCESS
- OTHER NUMBERED HWY
- MAJOR ROAD COLLECTOR
- MINOR STREET OR ROAD, RAMP
- Tracks and Trails MHD**
- TRACK
- TRAIL
- Transmission Lines**
- PIPELINE
- POWERLINE
- TRAIN



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Former McCoy Field
Wetland Area Site
New Bedford, Massachusetts
Scale: As shown

MADEP GIS Map
Figure 3



BETA Group, Inc.
 Engineers • Scientists • Planners

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 Norwood, MA 02062 781.255.1982
 email: BETA@BETA-inc.com

McCoy Field
 New Bedford, Massachusetts
 Scale: 1" = 100'

Wetlands
Contour Lines (5-26-05)



Appendix A
Toxicity Profiles



POLYCHLORINATED BIPHENYLS (PCBs)

General Background Information

The thermal stability, nonflammability, and dielectric capability of PCBs resulted in their use in electrical capacitors and transformers (NIOSH, 1986). The manufacturing, processing, distribution in commerce, and use of PCBs after January 1, 1978 was prohibited under Section 6(e) of the Toxic Substances Control Act. PCBs can be released to the environment during fires involving electrical equipment containing these compounds. PCBs are strongly adsorbed on solid surfaces, including glass and metal surfaces in laboratory apparatus, and onto soils, sediments, and particulates in the environment.

Pharmacokinetics

Gastrointestinal absorption of most PCB isomers is large. PCBs can also be absorbed by the inhalation and dermal routes but limited data are available (see section on Relative Absorption Factors). Distribution of PCBs follows a biphasic pattern. Initially, PCBs distribute to liver and muscle tissue. They are then redistributed to the fat, skin, and other fat-containing organs (ATSDR, 1989). PCBs are poorly metabolized in humans with major metabolites being 3- or 4-hydroxy compounds. Metabolism may proceed through formation of arene oxide intermediates (U.S. EPA, 1988). The slow metabolism of PCB congeners to more polar compounds is responsible for long biological half-lives of PCBs. Excretion occurs primarily through the feces (Goto et al., 1974).

Human Toxicological Profile

Dermatologic signs are the most persistent indicator of PCB toxicity. Skin manifestations have been observed also in newborn infants of mothers exposed to high levels of PCBs and related compounds. Cases of severe chloracne were reported in a work environment in which PCB air levels were found to be between 5.2 and 6.8 mg/m³. The workers developing chloracne had been exposed for 2 to 4 years. Other analyses revealed worker complaints of dry sore throat, skin rash, gastrointestinal disturbances, eye irritation, and headache at work area concentrations of 0.013 to 0.15 mg PCB/m³. Higher blood PCB levels are associated with higher serum triglyceride and/or cholesterol levels, as well as high blood pressure. Air PCB concentrations as low as 0.1 mg/m³ can produce toxic effects, and exposure to levels producing no overt toxicity can affect liver function. Recovery after termination of exposure occurs but is slow and depends upon the amount of PCBs stored in adipose tissue (Clayton and Clayton, 1981). Human exposures to PCBs resulting in toxic effects have almost all resulted from the ingestion of rice oil contaminated with "Kanechlor 400" in Japan (resulting in Yusho or rice oil disease) or from industrial exposure. Clinical symptoms of poisoning included acne-like skin eruptions (chloracne), eyelid edema, conjunctival discharge, skin and nail pigmentation, and hyperkeratosis. Yusho patients are estimated to have ingested approximately 0.07 mg/kg/day for at least 50 days. The rice oil was found to be contaminated with polychlorinated dibenzofuran, which is believed to have played a significant role in the observed toxicity (Bandiera et al., 1984; Kashimoto et al., 1981). As suggested by laboratory experiments with Rhesus monkeys, fetal and newborn primates, including humans, may be particularly susceptible to PCBs. Fein et al. (1984) studied the effects of low-level chronic exposure to PCBs in pregnant women and their newborn offspring from consumption of Lake Michigan fish. Low levels of PCBs were reported to cause decreases in birth weight, head circumference, and gestational age of the newborn. PCBs were apparently transmitted to the fetus across the placenta and to the newborn through breast milk. Behavioral deficiencies, including immaturity of reflexes and depressed responsiveness, were reportedly observed in infants exposed to PCBs. Jacobson et al. (1984) correlated maternal consumption of PCB-contaminated fish with behavioral abnormalities in newborns, including autonomic immaturity and depressed responsiveness. The authors likened these responses to similar effects in laboratory animals.

Mammalian Toxicological Profile

PCBs are only slightly toxic in acute exposures to laboratory animals. LD₅₀ values for rats, rabbits, and mice are generally in the range of 1 to 10 g/kg body weight (U.S. EPA, 1980). Nonhuman primates seem to be particularly sensitive to PCB-induced reproductive effects (U.S. EPA, 1980). Dietary exposures of cynomolgus and Rhesus monkeys to 200 ug of Aroclor 1254/kg-day, 5 days per week for 28 months, resulted in symptoms of enlarged tarsal glands, conjunctivitis, loss of eyelashes, progressive detachment of fingernails, exuberant nail beds, hyperplasia of biliary ducts, hepatocellular enlargement and necrosis, and normocytic anemia (Tryphonos et al., 1986a; Tryphonos et al., 1986b). Effects were less pronounced in cynomolgus monkeys.

Monkeys that were fed diets containing 1.0 ppm of Aroclor 1016 for approximately 7 months prior to mating and during pregnancy delivered infants with reduced birth weights (Barsotti and Van Miller, 1984). Fetal mortality occurred at >2.5 ppm (0.1 mg/kg/day) of Aroclor 1248 in the diet in other studies with monkeys (Allen and Barsotti, 1976; Barsotti et al., 1976; Allen et al., 1980). In rats, a dose of 269 ppm of Aroclor 1254 given continuously in the food over the duration of pregnancy caused a decrease in the number of impregnated rats that delivered litters. Pups that were born were underweight, and most died within 7 days of birth. Two lower doses (26 and 2.5 ppm) caused altered neurobehavioral and somatic ontogeny (Overmann et al., 1987). PCBs have been shown to be teratogenic in mice. Cleft palate, dilated kidney pelvis, and thymus hypoplasia were observed. The ED50 (effective dose for 50% of the animals) for formation of cleft palate was a single 100 mg/kg dose, with peak sensitivity occurring on the twelfth day of gestation (d'Argy et al., 1987).

Immunological effects (decreased IgM, IgG induction) were noted in monkeys following a 27 month exposure at a dose of 0.005 mg/kg/day (Tryphonos et al., 1989).

Genotoxicity

Most genotoxicity assays of PCBs have been negative. The majority of microbial assays of PCB mixtures and various congeners show no evidence of mutagenic effects (U.S. EPA, 1980). The carcinogenic effects of PCBs have been studied in rats and mice. In a study conducted by Kimbrough et al. (1975) rats were exposed via the diet to 100 ppm Aroclor 1260 for 21 months. Hepatocellular carcinomas were observed in 26 of the 184 treated rats but only in one of the 173 controls. Neoplastic nodules were not found in controls but occurred in 144/184 of treated rats. The National Cancer Institute (NCI, 1978) reported a high incidence of hepatocellular proliferative lesions in male and female Fischer 344 rats fed three dose levels of Aroclor 1254 for 104-105 weeks, but, in part due to the small number of animals tested, carcinogenicity was not statistically demonstrable. Norback and Weltman (1985) fed a diet containing relatively high concentrations Aroclor 1260 (100 ppm for 16 months followed by 50 ppm for an additional 8 months) to Sprague-Dawley rats. In the PCB-exposed group, neoplastic nodules were observed at 12 months followed by trabecular carcinoma at 15 months and adenocarcinoma at 24 months (52/93). In the control rats, the incidence of hepatocellular neoplasms was low (1/81). Metastases to distant organs was not observed and mortality in the PCB exposed animals was not increased. The incidence of these slow-growing hepatocellular neoplasms was strikingly higher in female rats than in male rats.

PCBs (Clophen C) have also been shown to be cocarcinogenic. When PCBs were mixed with diethylnitrosamine (DNA), twice as many tumors were observed as were observed in animals treated with DNA alone (Brunn, 1987).

Based on the positive evidence for carcinogenicity of Aroclor 1254, Aroclor 1260, Kaneclor 500, and Clophen A-30 and A-60 in animals, along with adequate evidence in humans, the U.S. EPA has placed these PCBs in category B2 - probable human carcinogen (U.S. EPA, 1988).

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Source: MADEP Residential Short Form

ACENAPHTHENE

General Background Information

Acenaphthene is a member of the polycyclic aromatic hydrocarbons (PAH). PAHs are a class of non-polar compounds that contain two or more aromatic rings. They are ubiquitous in nature and are both naturally occurring and man-made. The database for acenaphthene is very limited.

Pharmacokinetics

No data were found regarding the pharmacokinetics of acenaphthene.

Human Toxicological Profile

No data were found regarding the human toxicology of acenaphthene.

Mammalian Toxicological Profile

Adverse effects on the lungs, glands, and blood were observed in rats following aerosol administration of 12 mg/m³ acenaphthene for 5 months (U.S. EPA, 1981).

Genotoxicity

Mutagenicity tests for acenaphthene were negative (U.S. EPA, 1981). Carcinogenicity tests were negative (IARC, 1983).

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Source: MADEP Residential Short Form

ANTHRACENE

General Background Information

Anthracene is a polycyclic aromatic hydrocarbon (PAH). PAHs are a class of compounds which are non-polar and contain two or more aromatic rings. They are ubiquitous in nature and are both naturally occurring and man-made. As a PAH, anthracene is found in tobacco smoke, certain foods, and the emissions from industrial or natural burning.

Pharmacokinetics

Little data were found regarding the pharmacokinetics of anthracene. The intestinal absorption of anthracene is less dependent on the presence of bile in the stomach than is the absorption of larger PAHs such as benzo(a)pyrene (Rahman et al, 1986).

Human Toxicological Profile

Anthracene is a skin irritant and allergen (Sax, 1984). Humans exposed to anthracene in an occupational setting may demonstrate skin disorders (Clement, 1985). Anthracene has been associated with gastrointestinal tract toxicity in humans (Badiali et al, 1985). However, the usefulness of this study is limited due to confounding factors. Hematopoietic toxicity has also been observed in cancer patients who have been treated with anthracene-containing chemotherapeutics (Falkson et al, 1985). No control groups and concomitant exposure to other ingredients in the therapeutic agents prevents any definitive conclusions.

Mammalian Toxicological Profile

A subchronic study where anthracene was administered to mice by gavage for at least 90 days found no treatment-related effects at doses up to 1000 mg/kg-day (USEPA, 1989). The data on the carcinogenicity of anthracene are considered inadequate by EPA (IRIS, 1991).

Genotoxicity

Tests for DNA damage, mutation, chromosome effects and cell transformation in a variety of eukaryotic cell preparations have shown negative results. The majority of tests using anthracene in prokaryotes are negative, but positive results are reported in one or two tests (ATSDR, 1990; IRIS, 1991).

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Source: MADEP Residential Short Form

BENZO[a]ANTHRACENE

General Background Information

Benzo[a]anthracene (BaA) is a member of the polycyclic aromatic hydrocarbons (PAH). PAHs are a class of non-polar compounds that contain two or more aromatic rings. They are ubiquitous in nature and are both naturally occurring and man-made. The overall database for benzo[a]anthracene is limited. Human exposures to BaA can come from the oral, inhalation or dermal routes. BaA is produced when gasoline or other organic material is burned. It is also found in cigarette smoke and cooked food. People most at risk from exposure to BaA are those in the coal tar and asphalt production industries, cooking plants, coal gasification plants, smoke houses and industrial plants that burn wood, trash, coal or oil.

Pharmacokinetics

BaA is absorbed by the dermal and oral routes. There is no information on absorption by inhalation. Biotransformation to reactive intermediates is necessary for toxicity (ATSDR, 1990). BaA accumulates in adipose tissue. The metabolism of BaA is similar to the metabolism of benzo[a]pyrene (Cooper et al., 1983). In brief, the aromatic ring is oxidized by arene oxides to form reactive intermediates. The reactive intermediates are subsequently hydrolyzed to diols (Sims and Grover, 1974). The diols are conjugated with glutathione and excreted.

Human Toxicological Profile

There are no reports directly correlating human exposure to BaA with the development of excess tumors.

Mammalian Toxicological Profile

The only toxicity endpoint that has been adequately studied for BaA is dermal carcinogenicity. There is some evidence that benz[a]anthracene is carcinogenic in laboratory animals by the oral route (Klein, 1963; Bock and King, 1959) and also by subcutaneous injection (IARC, 1973). BaA has been shown to cause skin tumors after dermal application (Bingham and Falk, 1969). Tumorigenicity of the diol epoxide metabolite has been shown (Levin et al., 1978) as well as the mutagenicity of the diol epoxide (Wood et al., 1977).

Genotoxicity

The metabolism of BaA is an essential event in producing genotoxic effects in both *in vitro* and *in vivo* biological test systems (ATSDR, 1990). The intermediates formed by BaA metabolism are reactive electrophiles which are capable of interacting with DNA.

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Source: MADEP Residential Short Form

BENZO[b]FLUORANTHENE

General Background Information

Benzo[b]fluoranthene (BbF) is a member of the class of compounds referred to as polycyclic aromatic hydrocarbons (PAHs). PAHs contain two or more aromatic rings. PAHs are ubiquitous in nature and are both naturally occurring and man-made. Exposure to BbF can come from air, water, or soil. As a PAH, BbF is present in the emissions from industrial plants that produce coal tar, cooking plants, asphalt production plants, and home heating with wood and coal. BbF is also present in charcoal-broiled foods and cigarette smoke (ATSDR, 1990).

Pharmacokinetics

No data on the absorption, distribution or excretion of BbF were identified. BbF is metabolized under *in vitro* incubation conditions to phenol and dihydrodiol metabolites (Amin et al., 1982). The general metabolic pathways elucidated for benzo(a)pyrene are also active on BbF (Cooper et al., 1983; Levin et al., 1982; Grover et al., 1986). The reactive metabolites associated with the tumorigenic effects of BbF may not be the diol epoxides (Amin et al., 1982; Amin et al., 1985). As for the other PAHs, the material excreted is expected to consist primarily of dihydrodiol and phenol conjugates (Grover et al., 1986).

Human Toxicological Profile

The database for human toxicity is very limited. There are no studies correlating exposure to BbF and cancer or systemic toxicity. The only data implicating BbF as a carcinogen come from carcinogenicity studies using a mixture of PAHs.

Mammalian Toxicological Profile

The database on the toxicity of BbF is limited. Intratracheal administration of BbF to rats resulted in an increase in respiratory tract tumors (Deutsch-Wenzel et al., 1983). BbF has caused skin tumors in mice following dermal application (Wynder and Hoffman, 1959). The skin tumor initiating ability of BbF has been demonstrated in mice using a standard initiation/promotion protocol with either croton oil or phorbol myristate acetate as a tumor promoter (Amin et al., 1985; LaVoie et al., 1979, 1982).

Genotoxicity

The genotoxicity of BbF has been shown equivocally in three *in vitro* studies. BbF has been shown to be mutagenic in *Salmonella typhimurium* in the presence of an exogenous rat-liver preparation (LaVoie et al., 1979). Mutagenic activity has been reported in another similar study (Hermann, 1981). Negative results were reported by Mossanda (1979). The results cannot support an unequivocal determination regarding the genotoxicity of BbF at this time.

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Source: MADEP Residential Short Form

BENZO[k]FLUORANTHENE

General Background Information

Benzo[k]fluoranthene (BkF) is a member of the class of compounds referred to as polycyclic aromatic hydrocarbons (PAHs). PAHs contain two or more aromatic rings. PAHs are ubiquitous in nature and are both naturally occurring and man-made. Exposure to BkF can come from air, water, or soil. As a PAH, BkF is present in the emissions from industrial plants that produce coal tar, cooking plants, asphalt production plants, and home heating with wood and coal. BkF is also present in charcoal-broiled foods and cigarette smoke (ATSDR, 1990).

Pharmacokinetics

No data on the absorption, distribution or excretion of BkF were identified. BkF is believed to be metabolized to phenol and dihydrodiol metabolites (ATSDR, 1990). The general metabolic pathways elucidated for benzo[a]pyrene are believed to be active on BkF. As for the other PAHs, the material excreted is expected to consist primarily of dihydrodiol and phenol conjugates (Levin et al., 1982; Cooper et al., 1983; Grover et al., 1986).

Human Toxicological Profile

The database for human toxicity is very limited. There are no studies correlating exposure to BkF and cancer or systemic toxicity. The only data implicating BkF as a carcinogen come from carcinogenicity studies using a mixture of PAHs.

Mammalian Toxicological Profile

The database on the toxicity of BkF is limited. The skin tumor initiating ability of BkF has been demonstrated in mice using a standard initiation/promotion protocol with either croton resin or phorbol myristate acetate as tumor promoters (Van Duuren et al., 1966; LaVoie et al., 1982). Chronic dermal application of benzo[k]fluoranthene to mice resulted in no skin tumors, suggesting that BkF alone is not a complete carcinogen (Wynder and Hoffman, 1959).

Genotoxicity

The genotoxicity of BkF has not been documented in *in vitro* studies. In vivo, a single topical application of BkF was reported to bind to DNA in CD-1 mouse skin (Weyland et al., 1987). Covalent binding of chemicals to DNA can result in strand breaks and DNA damage, ultimately leading to mutations (ATSDR, 1990).

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Source: MADEP Residential Short Form

BENZO[g,h,i]PERYLENE

General Background

Benzo[g,h,i]perylene is a member of the polycyclic aromatic hydrocarbons (PAH). PAHs constitute a class of non-polar compounds that contain two or more aromatic rings. They are ubiquitous in nature and are both naturally occurring and man-made. The data regarding benzo[g,h,i]perylene are limited. As a PAH, it is found in food (charcoal broiled meats), vegetables, tobacco smoke and soot (U.S. EPA, 1980). Exposure occurs by inhalation, ingestion and by dermal contact.

Pharmacokinetics

No data were found regarding the pharmacokinetics of benzo[g,h,i]perylene.

Human Toxicological Profile

No data were found regarding the human toxicology of benzo[g,h,i]perylene.

Mammalian Toxicological Profile

No data were found regarding the mammalian toxicity of benzo[g,h,i]perylene.

Genotoxicity

No data were found regarding the genotoxicity of benzo[g,h,i]perylene.

REFERENCES

U.S. Environmental Protection Agency (U.S. EPA). (1980) An exposure risk assessment of polycyclic aromatic hydrocarbons (benzo[g,h,i]perylene). U.S. EPA Contract 68-01-6017. Office of Water Regulations and Standards. Washington, D.C.

Source: MADEP Residential Short Form

BENZO[a]PYRENE

General Background Information

Benzo[a]pyrene (BaP) is a member of the class of compounds generally referred to as polycyclic aromatic hydrocarbons (PAH). PAHs contain two or more aromatic rings. They are ubiquitous in nature and are both naturally occurring and man-made. BaP is a component of fossil fuels and is produced from incomplete combustion of organic compounds. BaP and other PAHs are found in coal tar, creosote oils and pitches formed from distillation of coal tars (ATSDR, 1990).

Pharmacokinetics

BaP is readily absorbed by dermal, inhalation and oral routes (see section on Relative Absorption Factors). Distribution of BaP is rapid among several tissues. Following inhalation exposure to ³H labeled BaP, maximum levels of radioactivity were found in the liver, esophagus, small intestine and blood after 30 minutes. After 12 hours, maximum levels were found in the cecum, stomach and large intestine (Sun et al., 1982). This and other studies provide evidence for the enterohepatic circulation of BaP metabolites.

Mammalian metabolism of BaP follows the mechanism established for smaller aromatic compounds (Williams, 1959). There is an initial oxidation of a double bond on one of the rings to an arene oxide. The oxide is then hydrolyzed to the diol. Oxidations may occur at multiple sites on the BaP molecule. Phase II metabolism is considered the detoxication pathway and involves the conjugation of the activated Phase I metabolites with easily eliminated substrates such as glutathione, glucuronide or sulfate (Cooper et al., 1983). In addition to being conjugated, the diol intermediate can undergo (1) further oxidation to several uncharacterized metabolites via the P-450 monooxygenase system, (2) spontaneous rearrangement to the phenol or (3) hydration to the trans-diols through a reaction catalyzed by epoxide hydrolase (Cooper et al., 1983). BaP 7,8-diol-9,10-epoxide has been established as an ultimate carcinogen (ATSDR, 1990). The primary route of excretion of BaP is through the feces. BaP undergoes first-pass metabolism and is reabsorbed via enterohepatic circulation (Chipman et al., 1982). Rats exposed by gavage to ¹⁴C labeled BaP in peanut oil excreted up to 85% in the feces. Excretion in the urine was 1 to 3% of the administered dose (Hecht et al., 1979).

Human Toxicological Profile

The database for the toxicological effects of BaP on humans, separate from PAHs, is limited. Toxic effects attributable to mixtures of PAHs include a variety of skin lesions and non-cancer lung diseases such as bronchitis (IARC, 1973).

Mammalian Toxicological Profile

BaP is a moderately potent experimental carcinogen in numerous species by many routes of exposure (IARC, 1983). Mice exposed to doses of BaP ranging from 1.5 to 400 mg/kg/d developed benign and malignant tumors of the forestomach (Hartwell, 1951; Thompson, 1971). Acute intragastric doses of 50 to 67 mg/kg of BaP have been shown to elicit pulmonary adenomas and forestomach papillomas in mice (Sparnins et al., 1986; Wattenberg and Beuding, 1986). Intermittent gavage exposure of mice to 50 to 67 mg/kg BaP resulted in 100% forestomach and pulmonary tumor incidences at 30 weeks of age (Sparnins et al., 1986; Wattenberg and Leong, 1970). Mice fed BaP at concentrations equivalent to 33.3 mg/kg/d exhibited gastric neoplasms following two or more days of consumption. However, lower concentrations of BaP (equivalent to 13.3 mg/kg/d) administered for up to 7 days did not produce any forestomach tumors (Neal and Rigdon, 1967). Hamsters have developed papillomas and carcinomas of the alimentary tract following gavage or dietary exposure to BaP (Chu and Malmgren, 1965). A single oral dose of 100 mg BaP (200mg/kg) produced mammary tumors in 88% of female Sprague-Dawley rats (Huggins and Yang, 1962). A 77% mammary tumor incidence was observed 90 weeks after a single oral dose of BaP of 50 mg (100mg/kg) was administered to rats (McCormick, 1981).

Genotoxicity

There are no studies relating exposure to BaP in humans to genotoxicity. In short-term *in vitro* and *in vivo* genetic toxicology tests, BaP has been shown to be a potent genotoxic agent when metabolically activated. In mice, oral exposure to 10 mg/kg BaP produced gene mutations in the mouse coat color spot test (Davidson and Dawson, 1976,1977). BaP shows positive mutagenic activity, *in vitro*, in several strains of *Salmonella typhimurium* in the presence of either rodent microsomes or hepatocytes for exogenous metabolic activation (ATSDR, 1990). Epidemiological studies have shown increased incidences of lung cancer in humans exposed via inhalation to mixtures of PAHs which include BaP (ATSDR, 1990).

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Source: MADEP Residential Short Form

CHRYSENE

General Background Information

Chrysene is one of the polycyclic aromatic hydrocarbon (PAH) compounds which are formed during the combustion of organic material. Chrysene often exists in particulate form, adsorbing to existing particulate material in air. Human exposure can occur in the workplace (coal and asphalt production plants, cooking plants, smoke houses) or in the environment due to chrysene contamination of air, food, soil and water (ATSDR, 1990).

Pharmacokinetics

Chrysene can be absorbed by all routes of exposure (see section on Relative Absorption Factors). Its absorption is believed to be qualitatively similar to benzo[a]pyrene (ATSDR, 1990). Following absorption, chrysene distributes to all organs, reaching the highest concentration in tissues with large fat content (adipose tissue, mammary tissue, brain) (Modica et al., 1983). Chrysene undergoes metabolic biotransformation mediated by the mixed function oxidase enzyme system to form reactive intermediates hypothesized to be responsible for its toxicity. The major metabolites include trans-dihydrodiols, phenols, diol epoxides and triol epoxides (Thakker et al., 1985). The reactive metabolites are conjugated and excreted primarily in feces (Schlede et al., 1970).

Human Toxicological Profile

There is no information available on threshold toxic effects of chrysene in humans. Since it is structurally similar to benzo[a]pyrene, it would be expected to produce effects similar to B[a]P following acute or chronic exposure (see Toxicity Profile on Benzo[a]pyrene).

Mammalian Toxicological Profile

There is no information available on threshold toxic effects of chrysene in animals. Since it is structurally similar to benzo[a]pyrene, it would be expected to produce effects similar to B[a]P following acute or chronic exposure (see Toxicity Profile for Benzo[a]pyrene).

Genotoxicity

The genotoxicity of chrysene has been evaluated in in vivo and in vitro cytogenetic tests. Chrysene produced weak positive results in bacterial mutation assays, human epithelial mutation studies, cell transformation assays and in vivo cytogenetic studies (Waters et al., 1987). Metabolism of chrysene is essential to produce the observed positive responses. Chrysene is not genotoxic in all test systems, however, it is believed to be a weak mutagen (ATSDR, 1990). The carcinogenicity of chrysene has not been adequately studied. There are no reports directly correlating human chrysene exposure and tumor development. There is limited evidence that chrysene is a skin carcinogen in animals following long-term dermal application (Wynder and Hoffmann, 1959; Hecht et al., 1974).

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Source: MADEP Residential Short Form

FLUORANTHENE

General Background Information

Fluoranthene is a member of the polyaromatic hydrocarbons (PAH). PAHs constitute a class of non-polar compounds that contain two or more aromatic rings. They are ubiquitous in nature and are both naturally occurring and man-made. Fluoranthene has been detected in food, cigarette smoke, and smoke from industrial and natural burning.

Pharmacokinetics

No data were found regarding the pharmacokinetics of fluoranthene.

Human Toxicological Profile

The database for the toxicological effects of fluoranthene on humans, separate from other PAHs, is limited. Toxic effects attributable to mixtures of PAHs include a variety of skin lesions and non-cancer lung diseases such as bronchitis (IARC, 1973).

Mammalian Toxicological Profile

The database on the toxicity of fluoranthene is limited. A 13 week subchronic study where CD-1 mice were gavaged with up to 500 mg/kg-day of fluoranthene indicated nephropathy, increased liver weights, hematological alterations and clinical effects (EPA, 1988). A developmental study in which fluoranthene was administered once via intraperitoneal injection to pregnant mice reported only an increased rate of embryo resorption (Irvin and Martin, 1987).

Chronic dermal application of up to 1 percent fluoranthene to the backs of mice did not induce skin tumors following lifetime application (Hoffman et al, 1972; Horton and Christian, 1974; and Wydner and Hoffman, 1959a). Fluoranthene is not a complete carcinogen (ATSDR, 1990) and does not exhibit initiation activity (Hoffman et al, 1972).

Genotoxicity

There is some evidence that fluoranthene is genotoxic (ATSDR, 1990). Genotoxic effects have been reported in human cells with exogenous metabolic activation, but negative results were recorded without metabolic activation.

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Source: MADEP Residential Short Form

FLUORENE

General Background Information

Fluorene is a member of the polyaromatic hydrocarbons (PAH). PAHs constitute a class of non-polar compounds that contain two or more aromatic rings. They are ubiquitous in nature and are both naturally occurring and man-made. The data on fluorene are very limited. Low levels of (5 to 67 ug/kg) have been detected in smoked meats (U.S. EPA, 1982).

Pharmacokinetics

No data were found regarding the pharmacokinetics of fluorene.

Human Toxicological Profile

The database for the toxicological effects of fluoranthene on humans, separate from other PAHs, is limited. Toxic effects attributable to mixtures of PAHs include a variety of skin lesions and non-cancer lung diseases such as bronchitis (IARC, 1973).

Mammalian Toxicological Profile

Limited information is available on the threshold effects of fluorene. An EPA study (EPA,1989) indicated that CD-1 mice exposed by gavage to up to 500 mg/kg-day of fluorene showed hypoactivity as well as a decrease in red blood cell count and packed cell volume and hemoglobin. Increases in absolute and relative liver, spleen and kidney weights was also observed. Gershbein (1975) reported that partially hepatectomized rats fed a diet of 180 mg/kg-day of fluorene for 10 days showed a statistically significant increase in liver regeneration, which is indicative of the ability to induce a proliferative response.

Fluorene is not reported to be a complete skin carcinogen (ATSDR, 1990). It was inactive as a tumor initiator when an estimated total dose of 1.0 mg was applied prior to the application of tetradecanoyl phorbol acetate (LaVoie et al, 1980).

Genotoxicity

There is no evidence that fluorene is genotoxic, but genotoxicity has been studied only in a few in vitro assays (ATSDR, 1990).

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Source; MADEP Residential Short Form

INDENO[1,2,3-cd]PYRENE

General Background Information

Indeno[1,2,3-cd]pyrene is a member of the polyaromatic hydrocarbons (PAH). PAHs constitute a class of non-polar compounds that contain two or more aromatic rings. They are ubiquitous in nature and are both naturally occurring and man-made. Indeno[1,2,3-cd]pyrene is present in cigarette smoke (IARC, 1983) as well as emissions from industrial stacks.

Pharmacokinetics

No data were found regarding the pharmacokinetics of indeno[1,2,3-cd]pyrene. However, its metabolism should be similar to another non-alternant PAH, benzo(b)fluoranthene (ATSDR, 1990).

Human Toxicological Profile

The database for the toxicological effects of indeno[1,2,3-cd]pyrene on humans, separate from other PAHs, is limited. Toxic effects attributable to mixtures of PAHs include a variety of skin lesions and non-cancer lung diseases such as bronchitis (IARC, 1973).

Mammalian Toxicological Profile

Studies on laboratory animals have demonstrated that indeno[1,2,3-cd]pyrene can induce skin tumors (i.e. it is a complete carcinogen) following dermal exposure (ATSDR, 1990). It has tumor initiating activity, but is not as potent as benzo(b)fluoranthene (Rice et al, 1985).

Carcinogenic PAHs as a group are immunosuppressant, with the degree of suppression correlated with the degree of potency (ATSDR, 1990)

Genotoxicity

In test systems using non-human cells, indeno[1,2,3-cd]pyrene was found to be genotoxic (ATSDR 1990).

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Source: MADEP Residential Short Form

PHENANTHRENE

General Background Information

Phenanthrene is a member of the polycyclic aromatic hydrocarbons (PAH). PAHs constitute a class of non-polar compounds that contain two or more aromatic rings. They are ubiquitous in nature and are both naturally occurring and man-made. The database on the potential health effects of phenanthrene is limited.

Pharmacokinetics

Little data are available regarding the pharmacokinetics of phenanthrene. The intestinal absorption of phenanthrene is less dependent on the presence of bile in the stomach than is the absorption of the larger PAHs (such as benzo(a)pyrene) (Rahman et al, 1986).

Human Toxicological Profile

Phenanthrene has been shown to be a skin photosensitizer in humans (Sax, 1984).

Mammalian Toxicological Profile

Phenanthrene has a reported LD 50 of 700 mg/kg in mice (Simmon et al., 1979). Rats injected intraperitoneally evidenced liver effects (Yoshikawa et al, 1987).

There is equivocal evidence for cancer from dermal application of phenanthrene in rats (IARC, 1983). Phenanthrene is not a complete skin carcinogen (ATSDR, 1990). It is neither an initiator (LaVoie et al, 1981; Roe, 1962) nor a promoter (Roe and Grant, 1964). Higgins and Yang (1962) reported no tumor production within two months after the ingestion of 200 mg of phenanthrene by rats.

Genotoxicity

There are limited data that suggest that phenanthrene is mutagenic (Wood et al., 1979). However, the majority of tests are negative (ATSDR, 1990).

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Source: MADEP Residential Short Form

PYRENE

General Background Information

Pyrene is a member of the polyaromatic hydrocarbons (PAH). PAHs constitute a class of non-polar compounds that contain two or more aromatic rings. They are ubiquitous in nature and are both naturally occurring and man-made. As with many of the other PAHs, pyrene has been detected in charbroiled meats and shellfish (U.S. EPA, 1982). It is found in tobacco smoke, industrial stack smoke, and smoke from forest fires.

Pharmacokinetics

No data were found regarding the pharmacokinetics of pyrene.

Human Toxicological Profile

Pyrene is reported to be a skin irritant (Sax, 1984).

Mammalian Toxicological Profile

Rats given 150 mg/kg of pyrene had changes in blood chemistry, liver and kidney damage (USEPA, 1982). A 1989 EPA study (EPA, 1989) reported nephropathy and decreased kidney weights in mice exposed to 125 mg/kg-day of pyrene by gavage for 13 weeks.

Mouse skin painting assays indicate that pyrene is neither a complete skin carcinogen, nor an initiating agent (ATSDR, 1990, IRIS, 1991).

Genotoxicity

The majority of genotoxic tests of pyrene are negative. Positive results have been recorded in Salmonella typhimurium mutagenicity tests and in in vitro mammalian cell systems (ATSDR, 1990).

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Source: MADEP Residential Short Form

BARIUM

Barium is a divalent alkaline-earth metal found only in combination with other elements in nature. The most important of these combinations are the peroxide, chloride, sulfate, carbonate, nitrate, and chlorate. The pure metal oxidizes readily and reacts with water emitting hydrogen. The most likely source of barium in the atmosphere is from industrial emissions. Barium compounds are used by the oil and gas industries to make drilling muds. Drilling muds make it easier to drill through rock by keeping the drill bit lubricated. They are also used to make paint, bricks, tiles, glass, and rubber. A barium compound (barium sulfate) is sometimes used by doctors to perform medical tests and to take barium-rays of the stomach. Since it is usually present as a particulate form, it can be removed from the atmosphere by wet precipitation and deposition. Due to the element's tendency to form salts with limited solubility in soil and water, it is expected to have a residence time of hundreds of years and is not expected to be very mobile. Trace amounts of barium were found in more than 99% of the surface waters and finished drinking water samples across the United States.

The soluble salts of barium are toxic in mammalian systems. They are absorbed rapidly from the gastrointestinal tract and are deposited in the muscles, lungs, and bone. Inhalation exposure of human populations to barium-containing dust can result in a benign pneumoconiosis called "baritosis." At low doses, barium acts as a muscle stimulant and at higher doses affects the nervous system eventually leading to paralysis. Acute and subchronic oral doses of barium cause vomiting and diarrhea, followed by decreased heart rate and elevated blood pressure. Higher doses result in cardiac irregularities, weakness, tremors, anxiety, and dyspnea. A drop in serum potassium may account for some of the symptoms. Death can occur from cardiac and respiratory failure. Acute doses around 0.8 grams can be fatal to humans.

The Department of Health and Human Services, the International Agency for Research on Cancer, and the Environmental Protection Agency (EPA) have not classified barium as to its human carcinogenicity.

CADMIUM

General Background Information

Cadmium typically exists in the environment as a salt of the +2 valence state or as a metal. It forms no stable organic compounds. Cadmium releases are generally associated with mining, smelting, manufacturing operations, and from the disposal of alkaline batteries containing cadmium (Doull, 1980; U.S. EPA, 1981).

Pharmacokinetics

Cadmium is absorbed by all routes of exposure (see section on Relative Absorption Factors). Absorption through the gastrointestinal tract is low, respiratory absorption more efficient and dermal absorption relatively insignificant (ATSDR, 1989). Absorbed cadmium is widely distributed throughout the body, with the major portion of the body burden located in liver and kidney (Sumino et al., 1975). The distribution of cadmium is linked to the distribution of metallothionein, a low-molecular-weight protein, rich in cadmium-binding sites. Cadmium is not known to undergo any direct metabolic conversions in vivo. The principle excretory route for absorbed cadmium is urinary. Excretion is slow, accounting for the long half-life of cadmium in the body (17-38 years) (ATSDR, 1989).

Human Toxicological Profile

Cadmium is a local respiratory tract irritant. Systemic symptoms occur in a few hours after an acute exposure to cadmium dust or fumes. Upper respiratory tract irritation is followed by coughing, chest pain, sweating, and chills. These symptoms resemble nonspecific upper respiratory infection (Sittig, 1985). Within 24 hours severe pulmonary irritation may develop, with progressively increasing pain in the chest, dyspnea, pulmonary edema, cough, and generalized weakness. Chronic exposure to cadmium fumes may result in emphysema-like lung damage (Sittig, 1984). Renal dysfunction may ensue (Friberg, 1950). Bernard and Lauwerys (1984) observed that the gastrointestinal tract is adversely affected by acute oral exposure with such symptoms as nausea, vomiting, salivation, abdominal pain, cramps, and diarrhea. The principal effects of chronic cadmium exposure are osteomalacia and osteoporosis (Itai Itai disease) secondary to glomerular and tubular necrosis in the kidney. The Itai Itai ("ouch-ouch") disease is endemic areas in Japan, which have been contaminated with mining wastes containing cadmium. Victims display the osteomalacia and osteoporosis as primary symptoms, as well as protein, sugar and amino acids not normally found in the urine. Other chronic effects include immunosuppression and decreases in measures of respiratory fitness (ventilation capacity, vital capacity, forced expiratory volume, etc.) (U.S. EPA, 1981).

Mammalian Toxicological Profile

Several subchronic and chronic oral toxicity studies have been conducted in animals. Koller et al. (1975) and Fitzhugh and Meiller (1941) conducted feeding studies using mice and rats, respectively. The first group of researchers reported immunological impact manifested by a decrease in the number of lymphocytes secreting antibodies (to sheep red blood cells) as well as some renal effects. The second set of authors observed hematological symptoms expressed as marked anemia. Yuhas et al. (1979) conducted a drinking water study using Sprague-Dawley male rats. Decreased weight gain was observed at the highest dose level. In addition, the authors identified increases in cadmium content and decreases in the zinc content of the bone. Renal dysfunction or otherwise generalized adverse effects on the kidney have been reported in a number of long-term cadmium ingestion studies (Friberg et al., 1974; Kijikawa et al., 1981; Schroeder et al., 1964; Kanisawa and Schroeder, 1969). In addition, the latter two research groups have observed renal and cardiac arteriosclerosis.

Genotoxicity

Results of mutagenicity tests in bacteria and yeasts have been inconclusive. Positive results have been obtained in mutation assays in Chinese hamster cells and in mouse lymphoma cells. Conflicting results have been obtained in assays of chromosomal aberrations in human lymphocytes treated in vitro or obtained from exposed workers. Cadmium treatment in vitro or in vivo appears to result in aneuploidy in germ cells of mice or hamsters (ATSDR, 1989). Reports of elevated prostate cancer in cadmium workers have been evaluated as insufficient evidence of the carcinogenic action of the compound (U.S. EPA, 1985), but the elevated risk of lung cancer observed by Thun et al. (1985) is more convincing. Thus, the carcinogenic potential of inhaled cadmium should be viewed as limited, but suggestive. Although ingestion of cadmium may result in kidney effects, no carcinogenic response has been demonstrated for this route.

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Source: MADEP Residential Short Form

CHROMIUM

General Background Information

Chromium is used in plating for corrosion resistance and decorative purposes (appliances, tools, automobiles, etc.), in the manufacture of alloys (including stainless steel and heat resistant alloys), and in printing, dyeing, photography, tanning, and numerous other industrial applications (ATSDR, 1989).

Pharmacokinetics

Absorption studies of chromium compounds indicate that it is absorbed by all routes of exposure (see section on Relative Absorption Factors) with chromium (VI) compounds being more readily absorbed than chromium (III) compounds. Once absorbed, chromium is rapidly distributed to all organs, including the developing fetus. Chromium VI is readily reduced to Cr III in vivo. Excretion occurs primarily through the kidneys via urine (ATSDR, 1989).

Human Toxicological Profile

In humans, the respiratory tract is the primary system of concern for chromium toxicity. Renal damage has also been observed. Hexavalent chromium has been shown to be highly toxic, causing ulceration of nasal mucosa and carcinoma of the lung following long-term occupational exposure. Cases of acute poisoning in man have been reported from the medical use of chromic acid.

Chronic exposures of workers in chromium-related industries have been observed to result in skin and nasopharyngeal irritations. Both Cr(III) and Cr(VI) can cause allergic contact dermatitis and irritation (Samitz and Shrager, 1966). Chromium was shown to be an allergen in recurrent contact dermatitis of the feet (Correia and Brandao, 1986). Hexavalent forms are responsible for effects on the upper respiratory system, including ulceration and perforation of the nasal septum, chronic rhinitis, and pharyngitis. Lindberg and Hedenstierna (1983) reported that subjective and objective evidence of adverse nasal effects were found at exposure levels of 2 to 20 $\mu\text{g Cr(VI)/m}^3$ but not at less than 1 $\mu\text{g/m}^3$. They also reported that workers exposed to 2 to 20 $\mu\text{g Cr(VI)/m}^3$ had slight transient decreases in measures of pulmonary mechanics (e.g., forced vital capacity, FVC) with recovery (no changes) seen by two (non-exposed) days later.

Mammalian Toxicological Profile

In laboratory animals, Cr compounds are of low oral acute toxicity. Hexavalent chromium is more acutely toxic than Cr(III), with kidney failure being the primary symptom. The LC_{50} in rats for inhalation of sodium chromate(VI) was reported as 33 $\text{mg Cr/m}^3/4\text{H}$, and the LD_{50} 's for oral and dermal exposures were given as 16.7 mg Cr/kg and 514 mg Cr/kg , respectively (Gad et al., 1986). Chromium was found to localize in the proximal renal tubules when intraperitoneal doses of potassium dichromate were administered to rats 5 times weekly for 8 months (Berry et al., 1978). Low level hexavalent chromium exposure increases respiratory defense mechanisms while they are inhibited by long-term, high level exposure (Glaser et al., 1985). Chromium salts have been shown to be teratogenic and embryotoxic in mice and hamsters following intravenous or intraperitoneal injection. However, these are unnatural routes of administration for assessing effects of environmental exposures, and further research is needed (U.S. EPA, 1984).

Genotoxicity

Both Cr(III) and Cr(VI) have been shown to interact with DNA in bacterial systems. Cr(III) is generally considered to be a relatively inactive genotoxic agent since it is unable to cross cell membranes. It was recently shown, however, to cause chromosomal aberrations in human lymphocytes (Friedman et al., 1987).

Hexavalent chromium has consistently caused transformations and mutations in a wide variety of in vitro assays (Bianchi and Lewis, 1985). Chromosomal damage has been observed in lymphocytes cultured from workers exposed to chromium. The epidemiologic studies of respiratory cancer in chromate production workers provide the bulk of the evidence for chromium carcinogenicity. Studies of chromate production facilities in the United States, Great Britain, and Japan have all found an association between occupational exposure to chromium and lung cancer (U.S. EPA, 1984). Workers were exposed to both Cr(VI) and Cr(III), and it is unclear whether Cr(VI) alone is the etiologic agent or whether Cr(III) is implicated as well. The U.S. EPA (1984) concluded that in rats, only calcium chromate had consistently produced lung tumors by several routes of administration, and that other Cr(VI) compounds produced local sarcomas or lung tumors in rats at the site of administration (subcutaneous, intraperitoneal, intermuscular, intrabroncheal, and intratracheal). Trivalent chromium compounds have not been found to be carcinogenic by any route of administration, but these compounds have not been studied as extensively.

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Source: MADEP Residential Short Form.

LEAD

General Background Information

Lead is used extensively in the manufacture of storage batteries and was used in gasoline and paint. Lead is also a natural constituent of many soils, for which concentrations normally range from 10 to 30 mg lead per kilogram of soil (U.S. EPA, 1980).

Pharmacokinetics

Lead can be absorbed by the oral, inhalation or dermal exposure routes (see section on Relative Absorption Factors). Gastrointestinal absorption of lead varies considerably depending upon chemical form, dietary intake, and age (Forbes and Reina, 1974; Barltrop and Meek, 1975). The deposition and absorption of inhaled lead depends upon particle size, chemical form and the rate and depth of breathing (Randall et al., 1975; Nozaki, 1966; Chamberlain et al., 1975). Once absorbed, lead is distributed to the various organs of the body, with most distribution occurring into mineralized tissues (ATSDR, 1990). Placental transfer to the developing fetus is possible (Bellinger et al., 1987). Inorganic lead is not known to be biotransformed within the body. Absorbed lead is excreted via the urinary or fecal routes (ATSDR, 1990).

Human Toxicological Profile

Cases of acute lead poisoning in humans are not common and have not been studied in experimental animals as thoroughly as chronic lead poisoning. Symptoms of acute lead poisoning from deliberate ingestion by humans may include vomiting, abdominal pain, hemolysis, liver damage, and reversible tubular necrosis (U.S. EPA, 1984). Subacute exposures in humans reportedly may produce a variety of neurological effects including dullness, restlessness, irritability, poor attention span, headaches, muscular tremor, hallucinations, and loss of memory. Nortier et al., (1980) report encephalopathy and renal damage to be the most serious complications of chronic toxicity in man and the hematopoietic system to be the most sensitive. For this reason, most data on the effects of lead exposure in humans are based upon blood lead levels. The effects of lead on the formation of hemoglobin and other hemoproteins, causing decreased levels, are reportedly detectable at lower levels of lead exposure than in any other organ system (Betts et al., 1973). Peripheral nerve dysfunction is observed in adults at levels of 30 to 50 µg/dL-blood. Children's nervous systems are reported to be affected at levels of 15 µg/dL-blood and higher (Benignus et al., 1981). In high doses, lead compounds may potentially cause abortions, premature delivery, and early membrane rupture (Rom, 1976).

Mammalian Toxicological Profile

Acute oral lethal doses of lead in animals depend upon chemical form, but generally range from 500 to 30,000 mg/kg. Several reproduction studies on the effects of subchronic oral exposure to lead in rats have been conducted (Kimmel et al., 1976; Grant et al., 1980; Fowler et al., 1980). These studies report that lead acetate administered in drinking water at various concentrations caused depressed body weights at 50 and 250 mg-Pb/L water, histological changes in the kidneys of offspring, cytochromeomegaly of the tubular epithelial cells of the inner cortex at concentrations greater than or equal to 25 mg/L and postnatal developmental delays at 50 to 250 mg/L. Higher oral doses of lead may result in decreased fertility and fetotoxic effects in a variety of species (Hilderbrand et al., 1973). A reduction in the number of offspring of rats and mice exposed to 25 mg Pb/L drinking water with a chromium deficient diet was reported by Schroeder et al. (1970). Chronic oral exposure of female Long-Evans rats to lead (5 mg/PB/L-water) reportedly resulted in slight effects on tissue excitability, systolic blood pressure, and cardiac ATP concentrations (Kopp et al., 1980a,b).

Genotoxicity

Results of *in vitro* studies with human lymphocyte cultures using lead acetate were nearly equally positive and negative. Results of *in vivo* tests are also contradictory but suggest that lead may have an effect on chromosomes (sister chromatid exchange).

Results for gene mutations, DNA modification, and recombinations in various microorganisms using lead acetate, lead nitrate and lead chloride were consistently negative with or without metabolic activation. Lead chloride has been reported to inhibit both DNA and RNA synthesis. In *in vitro* mammalian test systems, lead acetate gave conflicting results.

No epidemiological data regarding the oral carcinogenic potential of lead could be located in the available literature. Chronic inhalation may result in a statistically significant increase in deaths due to tumors in the digestive organs and respiratory systems in lead smelter workers and battery plant workers (Kang et al., 1980). Several studies have reported tumor formation in experimental animals orally administered specific lead salts, not normally ingested by humans (Zawirska and Medras, 1972; Boyland et al., 1962; Ito, 1973). The carcinogenicity of inhaled lead in experimental animals could not be located in the available literature. The U.S. EPA has classified lead and lead compounds as Group B2 - Probable Human Carcinogens.

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Source: MADEP Residential Short Form

MERCURY

General Background Information

Mercury has been used in the past for medicinal purposes (Gosselin et al., 1984). There are a number of occupations associated with mercury exposure, particularly through inhalation. These include mining, smelting, chloralkali production, and the manufacture of mercury-containing products such as batteries, measuring devices (thermometers) and paints. Mercury has also been used agriculturally as a seed and cereal protectant and as a fungicide.

Pharmacokinetics

The pharmacokinetics and pharmacodynamics of mercury depend largely on its chemical form, organic, inorganic or elemental. Absorption efficiencies vary depending on route of exposure and chemical form (see section on Relative Absorption Factors). Distribution, metabolism and excretion depend largely on the lipid solubility, ionization state and molecular size of the specific chemical form (ATSDR, 1989).

Human Toxicological Profile

Exposure to most forms of mercury is associated with a high degree of toxicity. Elemental (metallic) mercury causes behavioral effects and other nervous system damage. Inorganic mercury salts do not generally reach the brain, but will produce kidney damage. Divalent (mercuric) mercury is substantially more toxic in this regard than the monovalent (mercurous) form. Organic mercury compounds are also toxic. Symptoms of chronic mercury poisoning can be both neurological and psychological in nature as the central nervous system is the primary target organ. Hand and finger tremors, slurred or scanning speech patterns, and drunken, stupor-like (ataxic) gait are some motor-control impairments that have been observed in chronic mercurial toxicity. Visual disturbances may also occur, and the peripheral nervous system may be affected. A psychological syndrome known as erethism is known to occur. It is characterized by changes in behavior and personality including depression, fearfulness, restlessness, irritability, irascibility, timidity, indecision, and early embarrassment. Advanced cases may also experience memory loss, hallucination, and mental deterioration.

Mammalian Toxicological Profile

In a study by Mitsumori et al. (1981), male and female mice were fed methyl mercury chloride in their diet for up to 78 weeks. Most of the high dose group died from neurotoxicity before the 26th week. Renal tumors developed in 13 of 16 males in the intermediate dosage group by 53 weeks while only 1 male in the control group developed tumors. No renal tumors occurred in exposed or control females. Studies on rats have reported similar effects such as damage to kidneys and the peripheral nervous system (U.S. EPA, 1980). Mice treated with alkyl mercury phosphate were reported to have an increased frequency of offspring with cleft palates (Oharazawa, 1968) while mice treated with methylmercury had offspring with significantly lowered birth weights and possible neurological damage (Fujita, 1969). No adequate epidemiological studies exist on the teratogenic effects of methylmercury on humans (U.S. EPA, 1980).

Genotoxicity

Skerfving et al. (1974) reported a statistical relationship between chromosome breaks and concentrations of methyl mercury in the blood of Swedish subjects on fish diets. Concentrations were reported to be from 14-116 ng Hg/ml in the blood of exposed subjects and from 3-18 ng/ml in nonexposed subjects.

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Source: MADEP Residential Short Form

SELENIUM (CAS No. 7782-49-2)

General Background Information

Selenium occurs in several valence states: -2 (hydrogen selenide, sodium selenide, dimethyl selenium, trimethyl selenium, and selenoamino acids such as selenomethionine; 0 (elemental selenium); +4 (selenium dioxide, selenious acid, and sodium selenite); and +6 (selenic acid and sodium selenate). Toxicity of selenium varies with valence state and water solubility of the compound in which it occurs. The latter can affect gastrointestinal absorption rates.

Selenium is an essential trace element important in many biochemical and physiological processes including the biosynthesis of coenzyme Q (a component of mitochondrial electron transport systems), regulation of ion fluxes across membranes, maintenance of the integrity of keratins, stimulation of antibody synthesis, and activation of glutathione peroxidase (an enzyme involved in preventing oxidative damage to cells). Recommended human dietary allowances (average daily intake) for selenium are as follows: infants up to 1 year, 10-15 µg; children 1-10 years, 20-30 µg; adult males 11-51+ years, 40-70 µg; adult females 11-51+ years, 45-55 µg; pregnant or lactating women, 65-75 µg. There appears to be a relatively narrow range between levels of selenium intake resulting in deficiency and those causing toxicity.

Exposure Potential

Gastrointestinal absorption in animals and humans for various selenium compounds ranges from about 44% to 95% of the ingested dose (Thomson and Stewart, 1974; Bopp et al., 1982; Thomson, 1974). Respiratory tract absorption rates of 97% and 94% for aerosols of selenious acid have been reported for dogs and rats, respectively (Weissman et al., 1983; Medinsky et al., 1981). Selenium is found in all tissues of the body; highest concentrations occur in the kidney, liver, spleen, and pancreas (Schroeder and Mitchener, 1971a; Schroeder and Mitchener, 1972; Jacobs and Forst, 1981a; Julius et al., 1983; Shamberger, 1984; Echevarria et al., 1988). Excretion is primarily via the urine (0-15 g/L); however, excretory products can also be found in the feces, sweat, and in expired air.

Human Toxicity

In humans, acute oral exposures can result in excessive salivation, garlic odor to the breath, shallow breathing, diarrhea, pulmonary edema, and death (Civil and McDonald, 1978; Carter, 1966; Koppel et al., 1986). Other reported signs and symptoms of acute selenosis include tachycardia, nausea, vomiting, abdominal pain, abnormal liver function, muscle aches and pains, irritability, chills, and tremors. Acute toxic effects observed in animals include pulmonary congestion, hemorrhages and edema, convulsions, altered blood chemistry (increased hemoglobin and hematocrit); liver congestion; and congestion and hemorrhage of the kidneys (Smith et al., 1937; Anderson and Moxon, 1942; Hopper et al., 1985).

General signs and symptoms of chronic selenosis in humans include loss of hair and nails, acropachia (clubbing of the fingers), skin lesions (redness, swelling, blistering, and ulcerations), tooth decay (mottling, erosion and pitting), and nervous system abnormalities attributed to polyneuritis (peripheral anesthesia, acroparaesthesia, pain in the extremities, hyperreflexia of the tendon, numbness, convulsions, paralysis, motor disturbances, and hemiplegia).

In humans, inhalation of selenium or selenium compounds primarily affects the respiratory system. Dusts of elemental selenium and selenium dioxide can cause irritation of the skin and mucous membranes of the nose and throat, coughing, nosebleed, loss of sense of smell, dyspnea, bronchial spasms, bronchitis, and chemical pneumonia (Clinton, 1947; Hamilton, 1949). Other signs and symptoms following acute inhalation exposures include lacrimation, irritation and redness of the eyes, gastrointestinal distress

(nausea and vomiting), depressed blood pressure, elevated pulse rate, headaches, dizziness, and malaise (ATSDR, 1989). Information on toxicity of selenium in humans following chronic inhalation exposures is not available.

Some epidemiologic studies have indicated that selenium may have anti-neoplastic properties (see Whanger, 1983; Hocman, 1988). In studies on laboratory animals, selenites or selenates have not been found to be carcinogenic; however, selenium sulfide produced a significant increase in the incidence of hepatocellular carcinomas in male and female rats and in female mice and a significant increase in alveolar/bronchiolar carcinomas and adenomas in female mice following chronic oral exposures (NCI, 1980c). EPA has placed selenium and selenious acid in Group D, not classifiable as to carcinogenicity in humans (U.S. EPA, 1992a and 1992b), while selenium sulfide is placed in Group B2, probable human carcinogen (U.S. EPA, 1992d). Quantitative data are, however, insufficient to derive a slope factor for selenium sulfide. Pertinent data regarding the potential carcinogenicity of selenium by the inhalation route in humans or animals were not located in the available literature.

Environmental Toxicity

In domesticated animals, subchronic and chronic oral exposures can result in loss of hair, malformed hooves, rough hair coat, and nervous system abnormalities (impaired vision and paralysis). Damage to the liver and kidneys and impaired immune responses have been reported to occur in rodents following subchronic and/or chronic oral exposures (Ganther and Baumann, 1962; Beems and van Beek, 1985; NCI, 1980a; Tinsley et al., 1967; Harr et al., 1967; Schroeder, 1967).

Selenium is teratogenic in birds and possibly also in domesticated animals (pigs, sheep, and cattle), but evidence of teratogenicity in humans and laboratory animals is lacking (ASTDR, 1989). However, adverse reproductive and developmental effects (decreased rates of conception, increased rates of fetal resorption, and reduced fetal body weights) have been reported for domesticated and laboratory animals (Harr and Muth, 1972; Wahlstrom and Olson, 1959; Schroeder and Mitchener, 1971b).

In animals, acute inhalation exposures result in severe respiratory effects including edema, hemorrhage, and interstitial pneumonitis (Hall et al., 1951; Dudley and Miller, 1937) as well as in splenic damage (congestion, fissuring red pulp, and increased polymorphonuclear leukocytes) and liver congestion and mild central atrophy (Hall et al., 1951). Information on toxicity of selenium in animals following chronic inhalation exposures is not available.

MARCH 1993

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Prepared for: Oak Ridge Reservation Environmental Restoration Program.

*Managed by Martin Marietta Energy Systems, Inc., for the U.S. Department of Energy under Contract No. DE-AC05-84OR21400.

Appendix B
Human Health Risk
Characterization Calculations



APPENDIX B
TABLE B-1
RISK CHARACTERIZATION SUMMARY
TRESPASSERS
Former McCoy Field Wetland Area
New Bedford, Massachusetts

Exposure Pathway	Child Exposure		Youth Exposure		Adult Exposure		Combined Ages
	Non-Carcinogenic Hazard Index	Excess Lifetime Cancer Risk	Non-Carcinogenic Hazard Index	Excess Lifetime Cancer Risk	Non-Carcinogenic Hazard Index	Excess Lifetime Cancer Risk	Excess Lifetime Cancer Risk
Soil/Sediment Ingestion	0.2	5E-07	0.05	1E-07	0.03	2E-07	8E-07
Soil/Sediment Dermal Contact	0.08	3E-07	0.02	8E-08	0.01	9E-08	5E-07
Inhalation of Entrained Soil/Sediment Particles	0.0006	4E-10	0.0006	4E-10	0.0006	1E-09	2E-09
Surface Water Ingestion	0.0005	4E-10	0.0002	2E-10	0.0001	3E-10	9E-10
Surface Water Dermal Contact	0.0001	1E-08	0.00009	1E-08	0.00006	2E-08	5E-08
Total (All Pathways)	0.3	9E-07	0.07	2E-07	0.04	3E-07	1E-06
MADEP Maximum Acceptable Level	1.0	1E-05	1.0	1E-05	1.0	1E-05	1E-05

APPENDIX B
TABLE B-2
RISK CHARACTERIZATION
SOIL INGESTION
TRESPASSERS
Former McCoy Field Wetland Area
New Bedford, Massachusetts

Equation:
$$ADD = \frac{C_{soil} \cdot IR_{soil} \cdot RA_{Fo} \cdot EF \cdot ED \cdot EP \cdot CF}{BW \cdot AP}$$

where: ADD = Average daily dose (mg/kg-dy)
 C_{soil} = Constituent concentration in soil (mg/kg)
 IR_{soil} = Soil ingestion rate (kg/dy)
 RA_{Fo} = Oral relative absorption factor (unitless)
 EF = Exposure frequency (events/year)
 ED = Exposure duration (day/event)
 EP = Exposure period (yr)
 CF = Unit conversion factor (yr/dy)
 BW = Body weight (kg)
 AP = Averaging period (yr) (nc = non-carcinogen; ca = carcinogen)

HQ = ADD/RfD
 HI = Sum [HQ]
 Risk = ADD x SF

where: HQ = Non-carcinogenic hazard quotient (unitless)
 HI = Total hazard Index (unitless)
 Risk = Excess lifetime cancer risk (unitless)
 RfD = Reference dose (mg/kg-dy)
 SF = Cancer slope factor [(mg/kg-dy)⁻¹]

Child Exposure (ages 1 to 8)

Constituent	C _{soil} (mg/kg)	IR _{soil} (kg/dy)	RA _{Fo} (unitless)	EF (events/yr)	ED (dy/event)	EP (yr)	CF (yr/dy)	BW (kg)	AP (nc) (yr)	ADD (nc) (mg/kg-dy)	RfD (mg/kg-dy)	HQ (unitless)	AP (ca) (yr)	ADD (ca) (mg/kg-dy)	SF [(mg/kg-dy) ⁻¹]	Risk (unitless)
Acenaphthene	0.191	0.0001	1	80	1	7	2.74E-03	17	7	2.46E-07	0.06	0.000004	--	--	--	--
Anthracene	0.203	0.0001	1	80	1	7	2.74E-03	17	7	2.62E-07	0.3	0.000009	--	--	--	--
Benzo(a)anthracene	0.255	0.0001	1	80	1	7	2.74E-03	17	7	3.29E-07	0.03	0.00001	70	3.29E-08	0.73	2E-08
Benzo(b)fluoranthene	0.274	0.0001	1	80	1	7	2.74E-03	17	7	3.53E-07	0.03	0.00001	70	3.53E-08	0.73	3E-08
Benzo(k)fluoranthene	0.218	0.0001	1	80	1	7	2.74E-03	17	7	2.81E-07	0.03	0.000009	70	2.81E-08	0.073	2E-09
Benzo(g,h,i)perylene	0.213	0.0001	1	80	1	7	2.74E-03	17	7	2.75E-07	0.03	0.000009	--	--	--	--
Benzo(a)pyrene	0.249	0.0001	1	80	1	7	2.74E-03	17	7	3.21E-07	0.03	0.00001	70	3.21E-08	7.3	2E-07
Chrysene	0.246	0.0001	1	80	1	7	2.74E-03	17	7	3.17E-07	0.03	0.00001	70	3.17E-08	0.073	2E-09
Fluoranthene	0.329	0.0001	1	80	1	7	2.74E-03	17	7	4.24E-07	0.04	0.00001	--	--	--	--
Fluorene	0.191	0.0001	1	80	1	7	2.74E-03	17	7	2.46E-07	0.04	0.000006	--	--	--	--
Indeno(1,2,3-cd)pyrene	0.208	0.0001	1	80	1	7	2.74E-03	17	7	2.68E-07	0.03	0.000009	70	2.68E-08	0.73	2E-08
Phenanthrene	0.274	0.0001	1	80	1	7	2.74E-03	17	7	3.53E-07	0.03	0.00001	--	--	--	--
Pyrene	0.351	0.0001	1	80	1	7	2.74E-03	17	7	4.53E-07	0.03	0.00002	--	--	--	--
Barium	83	0.0001	1	80	1	7	2.74E-03	17	7	1.07E-04	0.07	0.002	--	--	--	--
Cadmium	1.05	0.0001	1	80	1	7	2.74E-03	17	7	1.35E-06	0.001	0.001	--	--	--	--
Chromium (total)	13	0.0001	1	80	1	7	2.74E-03	17	7	1.68E-05	1.5	0.0001	--	--	--	--
Lead	98	0.0001	1	80	1	7	2.74E-03	17	7	1.26E-04	0.00075	0.2	--	--	--	--
Mercury	0.15	0.0001	1	80	1	7	2.74E-03	17	7	1.93E-07	0.0003	0.0006	--	--	--	--
Selenium	0.92	0.0001	1	80	1	7	2.74E-03	17	7	1.19E-06	0.005	0.0002	--	--	--	--
PCB (Aroclor 1254)	0.908	0.0001	1	80	1	7	2.74E-03	17	7	1.17E-06	0.00002	0.06	70	1.17E-07	2	2E-07
Total									HI =			0.2	Risk =			9E-07

APPENDIX B
TABLE B-2
RISK CHARACTERIZATION
SOIL INGESTION
TRESPASSERS
Former McCoy Field Wetland Area
New Bedford, Massachusetts

Youth Exposure (ages 8 to 15)

Constituent	C _{soil} (mg/kg)	IR _{soil} (kg/dy)	RAFo (unitless)	EF (events/yr)	ED (dy/event)	EP (yr)	CF (yr/dy)	BW (kg)	AP (nc) (yr)	ADD (nc) (mg/kg-dy)	RfD (mg/kg-dy)	HQ (unitless)	AP [ca] (yr)	ADD [ca] (mg/kg-dy)	SF [(mg/kg-dy) ⁻¹]	Risk (unitless)
Acenaphthene	0.191	0.00005	1	80	1	7	2.74E-03	39.9	7	5.25E-08	0.06	0.000009	--	--	--	--
Anthracene	0.203	0.00005	1	80	1	7	2.74E-03	39.9	7	5.58E-08	0.3	0.000002	--	--	--	--
Benzo(a)anthracene	0.255	0.00005	1	80	1	7	2.74E-03	39.9	7	7.00E-08	0.03	0.000002	70	7.00E-09	0.73	5E-09
Benzo(b)fluoranthene	0.274	0.00005	1	80	1	7	2.74E-03	39.9	7	7.53E-08	0.03	0.000003	70	7.53E-09	0.73	5E-09
Benzo(k)fluoranthene	0.218	0.00005	1	80	1	7	2.74E-03	39.9	7	5.99E-08	0.03	0.000002	70	5.99E-09	0.073	4E-10
Benzo(g,h,i)perylene	0.213	0.00005	1	80	1	7	2.74E-03	39.9	7	5.85E-08	0.03	0.000002	--	--	--	--
Benzo(a)pyrene	0.249	0.00005	1	80	1	7	2.74E-03	39.9	7	6.84E-08	0.03	0.000002	70	6.84E-09	7.3	5E-08
Chrysene	0.246	0.00005	1	80	1	7	2.74E-03	39.9	7	6.76E-08	0.03	0.000002	70	6.76E-09	0.073	5E-10
Fluoranthene	0.329	0.00005	1	80	1	7	2.74E-03	39.9	7	9.04E-08	0.04	0.000002	--	--	--	--
Fluorene	0.191	0.00005	1	80	1	7	2.74E-03	39.9	7	5.25E-08	0.04	0.000001	--	--	--	--
Indeno(1,2,3-cd)pyrene	0.208	0.00005	1	80	1	7	2.74E-03	39.9	7	5.71E-08	0.03	0.000002	70	5.71E-09	0.73	4E-09
Phenanthrene	0.274	0.00005	1	80	1	7	2.74E-03	39.9	7	7.53E-08	0.03	0.000003	--	--	--	--
Pyrene	0.351	0.00005	1	80	1	7	2.74E-03	39.9	7	9.64E-08	0.03	0.000003	--	--	--	--
Barium	83	0.00005	1	80	1	7	2.74E-03	39.9	7	2.28E-05	0.07	0.0003	--	--	--	--
Cadmium	1.05	0.00005	1	80	1	7	2.74E-03	39.9	7	2.88E-07	0.001	0.0003	--	--	--	--
Chromium (total)	13	0.00005	1	80	1	7	2.74E-03	39.9	7	3.57E-06	1.5	0.000002	--	--	--	--
Lead	98	0.00005	1	80	1	7	2.74E-03	39.9	7	2.69E-05	0.00075	0.04	--	--	--	--
Mercury	0.15	0.00005	1	80	1	7	2.74E-03	39.9	7	4.12E-08	0.0003	0.0001	--	--	--	--
Selenium	0.92	0.00005	1	80	1	7	2.74E-03	39.9	7	2.53E-07	0.005	0.00005	--	--	--	--
PCB (Aroclor 1254)	0.908	0.00005	1	80	1	7	2.74E-03	39.9	7	2.49E-07	0.0002	0.01	70	2.49E-08	2	5E-08
Total									HI =			0.05	Risk =			1E-07

Adult Exposure (ages 15 to 31)

Constituent	C _{soil} (mg/kg)	IR _{soil} (kg/dy)	RAFo (unitless)	EF (events/yr)	ED (dy/event)	EP (yr)	CF (yr/dy)	BW (kg)	AP (nc) (yr)	ADD (nc) (mg/kg-dy)	RfD (mg/kg-dy)	HQ (unitless)	AP [ca] (yr)	ADD [ca] (mg/kg-dy)	SF [(mg/kg-dy) ⁻¹]	Risk (unitless)
Acenaphthene	0.191	0.00005	1	80	1	16	2.74E-03	58.7	16	3.57E-08	0.06	0.0000006	--	--	--	--
Anthracene	0.203	0.00005	1	80	1	16	2.74E-03	58.7	16	3.79E-08	0.3	0.0000001	--	--	--	--
Benzo(a)anthracene	0.255	0.00005	1	80	1	16	2.74E-03	58.7	16	4.76E-08	0.03	0.000002	70	1.09E-08	0.73	8E-09
Benzo(b)fluoranthene	0.274	0.00005	1	80	1	16	2.74E-03	58.7	16	5.12E-08	0.03	0.000002	70	1.17E-08	0.73	9E-09
Benzo(k)fluoranthene	0.218	0.00005	1	80	1	16	2.74E-03	58.7	16	4.07E-08	0.03	0.000001	70	9.30E-09	0.073	7E-10
Benzo(g,h,i)perylene	0.213	0.00005	1	80	1	16	2.74E-03	58.7	16	3.98E-08	0.03	0.000001	--	--	--	--
Benzo(a)pyrene	0.249	0.00005	1	80	1	16	2.74E-03	58.7	16	4.65E-08	0.03	0.000002	70	1.06E-08	7.3	8E-08
Chrysene	0.246	0.00005	1	80	1	16	2.74E-03	58.7	16	4.59E-08	0.03	0.000002	70	1.05E-08	0.073	8E-10
Fluoranthene	0.329	0.00005	1	80	1	16	2.74E-03	58.7	16	6.14E-08	0.04	0.000002	--	--	--	--
Fluorene	0.191	0.00005	1	80	1	16	2.74E-03	58.7	16	3.57E-08	0.04	0.0000009	--	--	--	--
Indeno(1,2,3-cd)pyrene	0.208	0.00005	1	80	1	16	2.74E-03	58.7	16	3.88E-08	0.03	0.000001	70	8.88E-09	0.73	6E-09
Phenanthrene	0.274	0.00005	1	80	1	16	2.74E-03	58.7	16	5.12E-08	0.03	0.000002	--	--	--	--
Pyrene	0.351	0.00005	1	80	1	16	2.74E-03	58.7	16	6.55E-08	0.03	0.000002	--	--	--	--
Barium	83	0.00005	1	80	1	16	2.74E-03	58.7	16	1.55E-05	0.07	0.0002	--	--	--	--
Cadmium	1.05	0.00005	1	80	1	16	2.74E-03	58.7	16	1.96E-07	0.001	0.0002	--	--	--	--
Chromium (total)	13	0.00005	1	80	1	16	2.74E-03	58.7	16	2.43E-06	1.5	0.000002	--	--	--	--
Lead	98	0.00005	1	80	1	16	2.74E-03	58.7	16	1.83E-05	0.00075	0.02	--	--	--	--
Mercury	0.15	0.00005	1	80	1	16	2.74E-03	58.7	16	2.80E-08	0.0003	0.00009	--	--	--	--
Selenium	0.92	0.00005	1	80	1	16	2.74E-03	58.7	16	1.72E-07	0.005	0.00003	--	--	--	--
PCB (Aroclor 1254)	0.908	0.00005	1	80	1	16	2.74E-03	58.7	16	1.70E-07	0.0002	0.008	70	3.87E-08	2	8E-08
Total									HI =			0.03	Risk =			2E-07

Combined ages (1 to 31)

Total Risk																8E-07
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**APPENDIX B
TABLE B-3
RISK CHARACTERIZATION
SOIL DERMAL CONTACT
TRESPASSERS
Former McCoy Field Wetland Area
New Bedford, Massachusetts**

Equation:
$$ADD = \frac{C_{soil} \cdot SA \cdot AF \cdot RAFd \cdot EF \cdot ED \cdot EP \cdot CF}{BW \cdot AP}$$

HQ = ADD / RfD
HI = Sum [HQ]
Risk = ADD x SF

where: ADD = Average daily dose (mg/kg-dy)
C_{soil} = Constituent concentration in soil (mg/kg)
SA = Exposed skin surface area (cm²/dy)
AF = Soil adherence factor (kg/cm²)
RAFd = Dermal relative absorption factor (unitless)
EF = Exposure frequency (events/yr)
ED = Exposure duration (day/event)
EP = Exposure period (yr)
CF = Unit conversion factor (yr/dy)
BW = Body weight (kg)
AP = Averaging period (yr) (nc = non-carcinogen; ca = carcinogen)

where: HQ = Non-carcinogenic hazard quotient (unitless)
HI = Total hazard index (unitless)
Risk = Excess lifetime cancer risk (unitless)
RfD = Reference dose (mg/kg-dy)
SF = Cancer slope factor [(mg/kg-dy)⁻¹]

Child Exposure (ages 1 to 8)

Constituent	C _{soil} (mg/kg)	SA (cm ² /dy)	AF (kg/cm ²)	RAFd (unitless)	EF (events/yr)	ED (dy/event)	EP (yr)	CF (yr/dy)	BW (kg)	AP (nc) (yr)	ADD (nc) (mg/kg-dy)	RfD (mg/kg-dy)	HQ (unitless)	AP [ca] (yr)	ADD [ca] (mg/kg-dy)	SF [(mg/kg-dy) ⁻¹]	Risk (unitless)
Acenaphthene	0.191	1,351	5.2E-07	0.1	80	1	7	2.74E-03	17	7	1.73E-07	0.06	0.000003	--	--	--	--
Anthracene	0.203	1,351	5.2E-07	0.1	80	1	7	2.74E-03	17	7	1.84E-07	0.3	0.0000006	--	--	--	--
Benzo(a)anthracene	0.255	1,351	5.2E-07	0.02	80	1	7	2.74E-03	17	7	4.62E-08	0.03	0.000002	70	4.62E-09	0.73	3E-09
Benzo(b)fluoranthene	0.274	1,351	5.2E-07	0.02	80	1	7	2.74E-03	17	7	4.96E-08	0.03	0.000002	70	4.96E-09	0.73	4E-09
Benzo(k)fluoranthene	0.218	1,351	5.2E-07	0.02	80	1	7	2.74E-03	17	7	3.95E-08	0.03	0.000001	70	3.95E-09	0.073	3E-10
Benzo(g,h,i)perylene	0.213	1,351	5.2E-07	0.1	80	1	7	2.74E-03	17	7	1.93E-07	0.03	0.000006	--	--	--	--
Benzo(a)pyrene	0.249	1,351	5.2E-07	0.02	80	1	7	2.74E-03	17	7	4.51E-08	0.03	0.000002	70	4.51E-09	7.3	3E-08
Chrysene	0.246	1,351	5.2E-07	0.02	80	1	7	2.74E-03	17	7	4.46E-08	0.03	0.000001	70	4.46E-09	0.073	3E-10
Fluoranthene	0.329	1,351	5.2E-07	0.1	80	1	7	2.74E-03	17	7	2.98E-07	0.04	0.000007	--	--	--	--
Fluorene	0.191	1,351	5.2E-07	0.1	80	1	7	2.74E-03	17	7	1.73E-07	0.04	0.000004	--	--	--	--
Indeno(1,2,3-cd)pyrene	0.208	1,351	5.2E-07	0.02	80	1	7	2.74E-03	17	7	3.77E-08	0.03	0.000001	70	3.77E-09	0.73	3E-09
Phenanthrene	0.274	1,351	5.2E-07	0.1	80	1	7	2.74E-03	17	7	2.48E-07	0.03	0.000008	--	--	--	--
Pyrene	0.351	1,351	5.2E-07	0.1	80	1	7	2.74E-03	17	7	3.18E-07	0.03	0.00001	--	--	--	--
Barium	83	1,351	5.2E-07	0.05	80	1	7	2.74E-03	17	7	3.76E-05	0.07	0.0005	--	--	--	--
Cadmium	1.05	1,351	5.2E-07	0.14	80	1	7	2.74E-03	17	7	1.33E-06	0.001	0.001	--	--	--	--
Chromium (total)	13	1,351	5.2E-07	0.04	80	1	7	2.74E-03	17	7	4.71E-06	1.5	0.000003	--	--	--	--
Lead	98	1,351	5.2E-07	0.006	80	1	7	2.74E-03	17	7	5.33E-06	0.00075	0.007	--	--	--	--
Mercury	0.15	1,351	5.2E-07	0.05	80	1	7	2.74E-03	17	7	6.79E-08	0.0003	0.0002	--	--	--	--
Selenium	0.92	1,351	5.2E-07	0.002	80	1	7	2.74E-03	17	7	1.67E-08	0.005	0.000003	--	--	--	--
PCB (Aroclor 1254)	0.908	1,351	5.2E-07	0.16	80	1	7	2.74E-03	17	7	1.32E-06	0.00002	0.07	70	1.32E-07	2	3E-07
Total										HI =			0.08	Risk =			3E-07

**APPENDIX B
TABLE B-3
RISK CHARACTERIZATION
SOIL DERMAL CONTACT
TRESPASSERS
Former McCoy Field Wetland Area
New Bedford, Massachusetts**

Youth Exposure (ages 8 to 15)

Constituent	C _{soil} (mg/kg)	SA (cm ² /dy)	AF (kg/cm ²)	RAFd (unitless)	EF (events/yr)	ED (dy/event)	EP (yr)	CF (yr/dy)	BW (kg)	AP (nc) (yr)	ADD (nc) (mg/kg-dy)	RfD (mg/kg-dy)	HQ (unitless)	AP [ca] (yr)	ADD [ca] (mg/kg-dy)	SF [(mg/kg-dy) ⁻¹]	Risk (unitless)
Acenaphthene	0.191	2,928	1.4E-07	0.1	80	1	7	2.74E-03	39.9	7	4.30E-08	0.06	0.0000007	--	--	--	--
Anthracene	0.203	2,928	1.4E-07	0.1	80	1	7	2.74E-03	39.9	7	4.57E-08	0.3	0.0000002	--	--	--	--
Benzo(a)anthracene	0.255	2,928	1.4E-07	0.02	80	1	7	2.74E-03	39.9	7	1.15E-08	0.03	0.0000004	70	1.15E-09	0.73	8E-10
Benzo(b)fluoranthene	0.274	2,928	1.4E-07	0.02	80	1	7	2.74E-03	39.9	7	1.23E-08	0.03	0.0000004	70	1.23E-09	0.73	9E-10
Benzo(k)fluoranthene	0.218	2,928	1.4E-07	0.02	80	1	7	2.74E-03	39.9	7	9.82E-09	0.03	0.0000003	70	9.82E-10	0.073	7E-11
Benzo(g,h,i)perylene	0.213	2,928	1.4E-07	0.1	80	1	7	2.74E-03	39.9	7	4.80E-08	0.03	0.0000002	--	--	--	--
Benzo(a)pyrene	0.249	2,928	1.4E-07	0.02	80	1	7	2.74E-03	39.9	7	1.12E-08	0.03	0.0000004	70	1.12E-09	7.3	8E-09
Chrysene	0.246	2,928	1.4E-07	0.02	80	1	7	2.74E-03	39.9	7	1.11E-08	0.03	0.0000004	70	1.11E-09	0.073	8E-11
Fluoranthene	0.329	2,928	1.4E-07	0.1	80	1	7	2.74E-03	39.9	7	7.41E-08	0.04	0.0000002	--	--	--	--
Fluorene	0.191	2,928	1.4E-07	0.1	80	1	7	2.74E-03	39.9	7	4.30E-08	0.04	0.0000001	--	--	--	--
Indeno(1,2,3-cd)pyrene	0.208	2,928	1.4E-07	0.02	80	1	7	2.74E-03	39.9	7	9.37E-09	0.03	0.0000003	70	9.37E-10	0.73	7E-10
Phenanthrene	0.274	2,928	1.4E-07	0.1	80	1	7	2.74E-03	39.9	7	6.17E-08	0.03	0.0000002	--	--	--	--
Pyrene	0.351	2,928	1.4E-07	0.1	80	1	7	2.74E-03	39.9	7	7.90E-08	0.03	0.0000003	--	--	--	--
Barium	83	2,928	1.4E-07	0.05	80	1	7	2.74E-03	39.9	7	9.34E-06	0.07	0.0001	--	--	--	--
Cadmium	1.05	2,928	1.4E-07	0.14	80	1	7	2.74E-03	39.9	7	3.31E-07	0.001	0.0003	--	--	--	--
Chromium (total)	13	2,928	1.4E-07	0.04	80	1	7	2.74E-03	39.9	7	1.17E-06	1.5	0.0000008	--	--	--	--
Lead	98	2,928	1.4E-07	0.006	80	1	7	2.74E-03	39.9	7	1.32E-06	0.00075	0.002	--	--	--	--
Mercury	0.15	2,928	1.4E-07	0.05	80	1	7	2.74E-03	39.9	7	1.69E-08	0.0003	0.00006	--	--	--	--
Selenium	0.92	2,928	1.4E-07	0.002	80	1	7	2.74E-03	39.9	7	4.14E-09	0.005	0.0000008	--	--	--	--
PCB (Aroclor 1254)	0.908	2,928	1.4E-07	0.16	80	1	7	2.74E-03	39.9	7	3.27E-07	0.00002	0.02	70	3.27E-08	2	7E-08
Total										HI =		0.02		Risk =			8E-08

Adult Exposure (ages 15 to 31)

Constituent	C _{soil} (mg/kg)	SA (cm ² /dy)	AF (kg/cm ²)	RAFd (unitless)	EF (events/yr)	ED (dy/event)	EP (yr)	CF (yr/dy)	BW (kg)	AP (nc) (yr)	ADD (nc) (mg/kg-dy)	RfD (mg/kg-dy)	HQ (unitless)	AP [ca] (yr)	ADD [ca] (mg/kg-dy)	SF [(mg/kg-dy) ⁻¹]	Risk (unitless)
Acenaphthene	0.191	3,107	1.0E-07	0.1	80	1	16	2.74E-03	58.7	16	2.22E-08	0.06	0.0000004	--	--	--	--
Anthracene	0.203	3,107	1.0E-07	0.1	80	1	16	2.74E-03	58.7	16	2.36E-08	0.3	0.0000008	--	--	--	--
Benzo(a)anthracene	0.255	3,107	1.0E-07	0.02	80	1	16	2.74E-03	58.7	16	5.92E-09	0.03	0.0000002	70	1.35E-09	0.73	1E-09
Benzo(b)fluoranthene	0.274	3,107	1.0E-07	0.02	80	1	16	2.74E-03	58.7	16	6.36E-09	0.03	0.0000002	70	1.45E-09	0.73	1E-09
Benzo(k)fluoranthene	0.218	3,107	1.0E-07	0.02	80	1	16	2.74E-03	58.7	16	5.06E-09	0.03	0.0000002	70	1.16E-09	0.073	8E-11
Benzo(g,h,i)perylene	0.213	3,107	1.0E-07	0.1	80	1	16	2.74E-03	58.7	16	2.47E-08	0.03	0.0000008	--	--	--	--
Benzo(a)pyrene	0.249	3,107	1.0E-07	0.02	80	1	16	2.74E-03	58.7	16	5.78E-09	0.03	0.0000002	70	1.32E-09	7.3	1E-08
Chrysene	0.246	3,107	1.0E-07	0.02	80	1	16	2.74E-03	58.7	16	5.71E-09	0.03	0.0000002	70	1.30E-09	0.073	1E-10
Fluoranthene	0.329	3,107	1.0E-07	0.1	80	1	16	2.74E-03	58.7	16	3.82E-08	0.04	0.000001	--	--	--	--
Fluorene	0.191	3,107	1.0E-07	0.1	80	1	16	2.74E-03	58.7	16	2.22E-08	0.04	0.0000006	--	--	--	--
Indeno(1,2,3-cd)pyrene	0.208	3,107	1.0E-07	0.02	80	1	16	2.74E-03	58.7	16	4.83E-09	0.03	0.0000002	70	1.10E-09	0.73	8E-10
Phenanthrene	0.274	3,107	1.0E-07	0.1	80	1	16	2.74E-03	58.7	16	3.18E-08	0.03	0.000001	--	--	--	--
Pyrene	0.351	3,107	1.0E-07	0.1	80	1	16	2.74E-03	58.7	16	4.07E-08	0.03	0.000001	--	--	--	--
Barium	83	3,107	1.0E-07	0.05	80	1	16	2.74E-03	58.7	16	4.81E-06	0.07	0.00007	--	--	--	--
Cadmium	1.05	3,107	1.0E-07	0.14	80	1	16	2.74E-03	58.7	16	1.71E-07	0.001	0.0002	--	--	--	--
Chromium (total)	13	3,107	1.0E-07	0.04	80	1	16	2.74E-03	58.7	16	6.03E-07	1.5	0.0000004	--	--	--	--
Lead	98	3,107	1.0E-07	0.006	80	1	16	2.74E-03	58.7	16	6.82E-07	0.00075	0.0009	--	--	--	--
Mercury	0.15	3,107	1.0E-07	0.05	80	1	16	2.74E-03	58.7	16	8.70E-09	0.0003	0.00003	--	--	--	--
Selenium	0.92	3,107	1.0E-07	0.002	80	1	16	2.74E-03	58.7	16	2.13E-09	0.005	0.0000004	--	--	--	--
PCB (Aroclor 1254)	0.908	3,107	1.0E-07	0.16	80	1	16	2.74E-03	58.7	16	1.69E-07	0.00002	0.008	70	3.85E-08	2	8E-08
Total										HI =		0.01		Risk =			9E-08

Combined ages (1 to 31)

Total Risk	5E-07
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APPENDIX B
TABLE B-4
RISK CHARACTERIZATION
INHALATION OF ENTRAINED SOIL PARTICLES
TRESPASSERS
Former McCoy Field Wetland Area
New Bedford, Massachusetts

$$C_{air} = C_{soil} \times PM_{10} \times CF$$

$$ADE = C_{air} \times EF \times ED \times EP \times CF / AP$$

$$HQ = ADE / RRC$$

$$HI = \text{Sum [HQ]}$$

$$\text{Risk} = ADE \times UR$$

where:

C_{air} = Constituent concentration in ambient air (mg/m³)
 C_{soil} = Constituent concentration in soil (mg/kg)
 PM_{10} = Particulate matter concentration in air (<= 10 microns) (mg/m³)
 CF = Unit conversion factor (kg/mg)
 ADE = Average daily exposure (mg/m³)
 EF = Exposure frequency (events/yr)
 ED = Exposure duration (hr/event)
 EP = Exposure period (yr)
 CF = Unit conversion factor (yr/hr)
 AP = Averaging period (yr) (nc = non-carcinogen; ca = carcinogen)

where: HQ = Non-carcinogen hazard quotient (unitless)
 HI = Total hazard index (unitless)
 RRC = Reference concentration (mg/m³)
 $Risk$ = Excess lifetime cancer risk (unitless)
 UR = Unit risk value [(mg/m³)⁻¹]

Child Exposure (ages 1 to 8)

Constituent	C_{soil} (mg/kg)	PM_{10} (mg/m ³)	CF (kg/mg)	C_{air} (mg/m ³)	EF (events/yr)	ED (hr/event)	EP (yr)	CF (yr/hr)	AP (nc) (yr)	ADE (nc) (mg/m ³)	RRC (mg/m ³)	HQ (unitless)	AP (ca) (yr)	ADE (ca) (mg/m ³)	UR (mg/m ³) ⁻¹	$Risk$ (unitless)
Acenaphthene	0.191	0.032	1.00E-06	6.11E-09	80	5.6	7	1.14E-04	7	3.13E-10	0.05	0.000000006	--	--	--	--
Anthracene	0.203	0.032	1.00E-06	6.50E-09	80	5.6	7	1.14E-04	7	3.32E-10	0.05	0.000000007	--	--	--	--
Benzo(a)anthracene	0.255	0.032	1.00E-06	8.16E-09	80	5.6	7	1.14E-04	7	4.17E-10	0.05	0.000000008	70	4.17E-11	0.21	9E-12
Benzo(b)fluoranthene	0.274	0.032	1.00E-06	8.77E-09	80	5.6	7	1.14E-04	7	4.48E-10	0.05	0.000000009	70	4.48E-11	0.21	9E-12
Benzo(k)fluoranthene	0.218	0.032	1.00E-06	6.98E-09	80	5.6	7	1.14E-04	7	3.57E-10	0.05	0.000000007	70	3.57E-11	0.021	7E-13
Benzo(g,h,i)perylene	0.213	0.032	1.00E-06	6.82E-09	80	5.6	7	1.14E-04	7	3.49E-10	0.05	0.000000007	--	--	--	--
Benzo(a)pyrene	0.249	0.032	1.00E-06	7.97E-09	80	5.6	7	1.14E-04	7	4.07E-10	0.05	0.000000008	70	4.07E-11	2.1	9E-11
Chrysene	0.246	0.032	1.00E-06	7.87E-09	80	5.6	7	1.14E-04	7	4.03E-10	0.05	0.000000008	70	4.03E-11	0.021	8E-13
Fluoranthene	0.329	0.032	1.00E-06	1.05E-08	80	5.6	7	1.14E-04	7	5.38E-10	0.05	0.00000001	--	--	--	--
Fluorene	0.191	0.032	1.00E-06	6.11E-09	80	5.6	7	1.14E-04	7	3.13E-10	0.05	0.000000006	--	--	--	--
Indeno(1,2,3-cd)pyrene	0.208	0.032	1.00E-06	6.66E-09	80	5.6	7	1.14E-04	7	3.40E-10	0.05	0.000000007	70	3.40E-11	0.21	7E-12
Phenanthrene	0.274	0.032	1.00E-06	8.77E-09	80	5.6	7	1.14E-04	7	4.48E-10	0.05	0.000000009	--	--	--	--
Pyrene	0.351	0.032	1.00E-06	1.12E-08	80	5.6	7	1.14E-04	7	5.74E-10	0.05	0.00000001	--	--	--	--
Barium	83	0.032	1.00E-06	2.66E-06	80	5.6	7	1.14E-04	7	1.36E-07	0.0005	0.0003	--	--	--	--
Cadmium	1.05	0.032	1.00E-06	3.36E-08	80	5.6	7	1.14E-04	7	1.72E-09	0.00002	0.00009	70	1.72E-10	1.8	3E-10
Chromium (total)	13	0.032	1.00E-06	4.16E-07	80	5.6	7	1.14E-04	7	2.13E-08	5	0.000000004	--	--	--	--
Lead	98	0.032	1.00E-06	3.14E-06	80	5.6	7	1.14E-04	7	1.60E-07	0.001	0.0002	--	--	--	--
Mercury	0.15	0.032	1.00E-06	4.80E-09	80	5.6	7	1.14E-04	7	2.45E-10	0.0003	0.00000008	--	--	--	--
Selenium	0.92	0.032	1.00E-06	2.94E-08	80	5.6	7	1.14E-04	7	1.51E-09	0.003	0.00000005	--	--	--	--
PCB (Aroclor 1254)	--	0.908	0.032	2.91E-08	80	5.6	7	1.14E-04	7	1.49E-09	0.00002	0.00007	70	1.49E-10	0.1	1E-11
Total										$HI =$		0.0006	$Risk =$			4E-10

**APPENDIX B
TABLE B-4
RISK CHARACTERIZATION
INHALATION OF ENTRAINED SOIL PARTICLES
TRESPASSERS
Former McCoy Field Wetland Area
New Bedford, Massachusetts**

Youth Exposure (ages 8 to 15)

Constituent	C _{soil} (mg/kg)	PM ₁₀ (mg/m ³)	CF (kg/mg)	C _{air} (mg/m ³)	EF (events/yr)	ED (hr/event)	EP (yr)	CF (yr/hr)	AP (nc) (yr)	ADE (nc) (mg/m ³)	RfC (mg/m ³)	HQ (unitless)	AP [ca] (yr)	ADE [ca] (mg/m ³)	UR (mg/m ³) ⁻¹	Risk (unitless)
Acenaphthene	0.191	0.032	1.00E-06	6.11E-09	80	5.6	7	1.14E-04	7	3.13E-10	0.05	0.000000006	--	--	--	--
Anthracene	0.203	0.032	1.00E-06	6.50E-09	80	5.6	7	1.14E-04	7	3.32E-10	0.05	0.000000007	--	--	--	--
Benzo(a)anthracene	0.255	0.032	1.00E-06	8.16E-09	80	5.6	7	1.14E-04	7	4.17E-10	0.05	0.000000008	70	4.17E-11	0.21	9E-12
Benzo(b)fluoranthene	0.274	0.032	1.00E-06	8.77E-09	80	5.6	7	1.14E-04	7	4.48E-10	0.05	0.000000009	70	4.48E-11	0.21	9E-12
Benzo(k)fluoranthene	0.218	0.032	1.00E-06	6.98E-09	80	5.6	7	1.14E-04	7	3.57E-10	0.05	0.000000007	70	3.57E-11	0.021	7E-13
Benzo(g,h,i)perylene	0.213	0.032	1.00E-06	6.82E-09	80	5.6	7	1.14E-04	7	3.49E-10	0.05	0.000000007	--	--	--	--
Benzo(a)pyrene	0.249	0.032	1.00E-06	7.97E-09	80	5.6	7	1.14E-04	7	4.07E-10	0.05	0.000000008	70	4.07E-11	2.1	9E-11
Chrysene	0.246	0.032	1.00E-06	7.87E-09	80	5.6	7	1.14E-04	7	4.03E-10	0.05	0.000000008	70	4.03E-11	0.021	8E-13
Fluoranthene	0.329	0.032	1.00E-06	1.05E-08	80	5.6	7	1.14E-04	7	5.38E-10	0.05	0.000000001	--	--	--	--
Fluorene	0.191	0.032	1.00E-06	6.11E-09	80	5.6	7	1.14E-04	7	3.13E-10	0.05	0.000000006	--	--	--	--
Indeno(1,2,3-cd)pyrene	0.208	0.032	1.00E-06	6.66E-09	80	5.6	7	1.14E-04	7	3.40E-10	0.05	0.000000007	70	3.40E-11	0.21	7E-12
Phenanthrene	0.274	0.032	1.00E-06	8.77E-09	80	5.6	7	1.14E-04	7	4.48E-10	0.05	0.000000009	--	--	--	--
Pyrene	0.351	0.032	1.00E-06	1.12E-08	80	5.6	7	1.14E-04	7	5.74E-10	0.05	0.000000001	--	--	--	--
Barium	83	0.032	1.00E-06	2.66E-06	80	5.6	7	1.14E-04	7	1.36E-07	0.0005	0.0003	--	--	--	--
Cadmium	1.05	0.032	1.00E-06	3.36E-08	80	5.6	7	1.14E-04	7	1.72E-09	0.00002	0.00009	70	1.72E-10	1.8	3E-10
Chromium (total)	13	0.032	1.00E-06	4.16E-07	80	5.6	7	1.14E-04	7	2.13E-08	5	0.000000004	--	--	--	--
Lead	98	0.032	1.00E-06	3.14E-06	80	5.6	7	1.14E-04	7	1.60E-07	0.001	0.0002	--	--	--	--
Mercury	0.15	0.032	1.00E-06	4.80E-09	80	5.6	7	1.14E-04	7	2.45E-10	0.0003	0.000000008	--	--	--	--
Selenium	0.92	0.032	1.00E-06	2.94E-08	80	5.6	7	1.14E-04	7	1.51E-09	0.003	0.000000005	--	--	--	--
PCB (Aroclor 1254)	0.908	0.032	1.00E-06	2.91E-08	80	5.6	7	1.14E-04	7	1.49E-09	0.00002	0.00007	70	1.49E-10	0.1	1E-11
Total										HI =		0.0006	Risk =			4E-10

Adult Exposure (ages 15 to 31)

Constituent	C _{soil} (mg/kg)	PM ₁₀ (mg/m ³)	CF (kg/mg)	C _{air} (mg/m ³)	EF (events/yr)	ED (hr/event)	EP (yr)	CF (yr/hr)	AP (nc) (yr)	ADE (nc) (mg/m ³)	RfC (mg/m ³)	HQ (unitless)	AP [ca] (yr)	ADE [ca] (mg/m ³)	UR (mg/m ³) ⁻¹	Risk (unitless)
Acenaphthene	0.191	0.032	1.00E-06	6.11E-09	80	5.6	16	1.14E-04	16	3.13E-10	0.05	0.000000006	--	--	--	--
Anthracene	0.203	0.032	1.00E-06	6.50E-09	80	5.6	16	1.14E-04	16	3.32E-10	0.05	0.000000007	--	--	--	--
Benzo(a)anthracene	0.255	0.032	1.00E-06	8.16E-09	80	5.6	16	1.14E-04	16	4.17E-10	0.05	0.000000008	70	9.54E-11	0.21	2.0031E-11
Benzo(b)fluoranthene	0.274	0.032	1.00E-06	8.77E-09	80	5.6	16	1.14E-04	16	4.48E-10	0.05	0.000000009	70	1.02E-10	0.21	2E-11
Benzo(k)fluoranthene	0.218	0.032	1.00E-06	6.98E-09	80	5.6	16	1.14E-04	16	3.57E-10	0.05	0.000000007	70	8.15E-11	0.021	2E-12
Benzo(g,h,i)perylene	0.213	0.032	1.00E-06	6.82E-09	80	5.6	16	1.14E-04	16	3.49E-10	0.05	0.000000007	--	--	--	--
Benzo(a)pyrene	0.249	0.032	1.00E-06	7.97E-09	80	5.6	16	1.14E-04	16	4.07E-10	0.05	0.000000008	70	9.31E-11	2.1	2E-10
Chrysene	0.246	0.032	1.00E-06	7.87E-09	80	5.6	16	1.14E-04	16	4.03E-10	0.05	0.000000008	70	9.20E-11	0.021	2E-12
Fluoranthene	0.329	0.032	1.00E-06	1.05E-08	80	5.6	16	1.14E-04	16	5.38E-10	0.05	0.000000001	--	--	--	--
Fluorene	0.191	0.032	1.00E-06	6.11E-09	80	5.6	16	1.14E-04	16	3.13E-10	0.05	0.000000006	--	--	--	--
Indeno(1,2,3-cd)pyrene	0.208	0.032	1.00E-06	6.66E-09	80	5.6	16	1.14E-04	16	3.40E-10	0.05	0.000000007	70	7.78E-11	0.21	2E-11
Phenanthrene	0.274	0.032	1.00E-06	8.77E-09	80	5.6	16	1.14E-04	16	4.48E-10	0.05	0.000000009	--	--	--	--
Pyrene	0.351	0.032	1.00E-06	1.12E-08	80	5.6	16	1.14E-04	16	5.74E-10	0.05	0.000000001	--	--	--	--
Barium	83	0.032	1.00E-06	2.66E-06	80	5.6	16	1.14E-04	16	1.36E-07	0.0005	0.0003	--	--	--	--
Cadmium	1.05	0.032	1.00E-06	3.36E-08	80	5.6	16	1.14E-04	16	1.72E-09	0.00002	0.00009	70	3.93E-10	1.8	7E-10
Chromium (total)	13	0.032	1.00E-06	4.16E-07	80	5.6	16	1.14E-04	16	2.13E-08	5	0.000000004	--	--	--	--
Lead	98	0.032	1.00E-06	3.14E-06	80	5.6	16	1.14E-04	16	1.60E-07	0.001	0.0002	--	--	--	--
Mercury	0.15	0.032	1.00E-06	4.80E-09	80	5.6	16	1.14E-04	16	2.45E-10	0.0003	0.000000008	--	--	--	--
Selenium	0.92	0.032	1.00E-06	2.94E-08	80	5.6	16	1.14E-04	16	1.51E-09	0.003	0.000000005	--	--	--	--
PCB (Aroclor 1254)	0.908	0.032	1.00E-06	2.91E-08	80	5.6	16	1.14E-04	16	1.49E-09	0.00002	0.00007	70	3.40E-10	0.1	3E-11
Total										HI =		0.0006	Risk =			1E-09

Combined Ages (1 to 31)

Total Risk																2E-09
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APPENDIX B
TABLE B-7
RISK CHARACTERIZATION
SURFACE WATER INGESTION
TRESPASSERS
Former McCoy Field Wetland Area
New Bedford, Massachusetts

Equation:
$$ADD = \frac{C_{sw} IR_{sw} RA_{Fo} EF ED EP CF}{BW \times AP}$$

HQ = ADD/RfD
 HI = Sum [HQ]
 Risk = ADD x SF

where: ADD = Average daily dose (mg/kg-dy)
 C_{sw} = Constituent concentration in surface water (mg/L)
 IR_{sw} = Surface water ingestion rate (L/dy)
 RA_{Fo} = Oral relative absorption factor (unitless)
 EF = Exposure frequency (events/year)
 ED = Exposure duration (day/event)
 EP = Exposure period (yr)
 CF = Unit conversion factor (yr/dy)
 BW = Body weight (kg)
 AP = Averaging period (yr) (nc = non-carcinogen; ca = carcinogen)

where: HQ = Non-carcinogenic hazard quotient (unitless)
 HI = Total hazard Index (unitless)
 Risk = Excess lifetime cancer risk (unitless)
 RfD = Reference dose (mg/kg-dy)
 SF = Cancer slope factor [(mg/kg-dy)⁻¹]

Child Exposure (ages 1 to 8)

Constituent	C _{sw} (mg/L)	IR _{sw} (L/dy)	RA _{Fo} (unitless)	EF (events/yr)	ED (dy/event)	EP (yr)	CF (yr/dy)	BW (kg)	AP (nc) (yr)	ADD (nc) (mg/kg-dy)	RfD (mg/kg-dy)	HQ (unitless)	AP [ca] (yr)	ADD [ca] (mg/kg-dy)	SF [(mg/Kg-dy) ⁻¹]	Risk (unitless)
Acenaphthene	2.56E-05	0.05	1	80	1	7	2.74E-03	17	7	1.65E-08	0.06	0.0000003	--	--	--	--
Anthracene	8.41E-06	0.05	1	80	1	7	2.74E-03	17	7	5.42E-09	0.3	0.0000002	--	--	--	--
Benzo(a)anthracene	7.96E-07	0.05	1	80	1	7	2.74E-03	17	7	5.13E-10	0.03	0.0000002	70	5.13E-11	0.73	4E-11
Benzo(b)fluoranthene	1.20E-06	0.05	1	80	1	7	2.74E-03	17	7	7.71E-10	0.03	0.0000003	70	7.71E-11	0.73	6E-11
Benzo(k)fluoranthene	5.74E-07	0.05	1	80	1	7	2.74E-03	17	7	3.70E-10	0.03	0.0000001	70	3.70E-11	0.073	3E-12
Benzo(g,h,i)perylene	2.18E-07	0.05	1	80	1	7	2.74E-03	17	7	1.41E-10	0.03	0.00000005	--	--	--	--
Benzo(a)pyrene	6.05E-07	0.05	1	80	1	7	2.74E-03	17	7	3.90E-10	0.03	0.0000001	70	3.90E-11	7.3	3E-10
Chrysene	9.62E-07	0.05	1	80	1	7	2.74E-03	17	7	6.20E-10	0.03	0.0000002	70	6.20E-11	0.073	5E-12
Fluoranthene	3.77E-06	0.05	1	80	1	7	2.74E-03	17	7	2.43E-09	0.04	0.0000006	--	--	--	--
Fluorene	1.56E-05	0.05	1	80	1	7	2.74E-03	17	7	1.01E-08	0.04	0.0000003	--	--	--	--
Indeno(1,2,3-cd)pyrene	8.28E-08	0.05	1	80	1	7	2.74E-03	17	7	5.34E-11	0.03	0.00000002	70	5.34E-12	0.73	4E-12
Phenanthrene	1.07E-05	0.05	1	80	1	7	2.74E-03	17	7	6.91E-09	0.03	0.0000002	--	--	--	--
Pyrene	4.35E-06	0.05	1	80	1	7	2.74E-03	17	7	2.80E-09	0.03	0.0000009	--	--	--	--
Barium	2.63E-02	0.05	1	80	1	7	2.74E-03	17	7	1.69E-05	0.07	0.002	--	--	--	--
Cadmium	5.26E-05	0.05	1	80	1	7	2.74E-03	17	7	3.39E-08	0.001	0.00003	--	--	--	--
Chromium (total)	1.72E-05	0.05	1	80	1	7	2.74E-03	17	7	1.11E-08	1.5	0.00000007	--	--	--	--
Lead	2.46E-04	0.05	1	80	1	7	2.74E-03	17	7	1.59E-07	0.00075	0.002	--	--	--	--
Mercury	1.89E-06	0.05	1	80	1	7	2.74E-03	17	7	1.22E-09	0.0003	0.000004	--	--	--	--
Selenium -	2.31E-05	0.05	1	80	1	7	2.74E-03	17	7	1.49E-08	0.005	0.000003	--	--	--	--
PCB (Aroclor 1254)	2.90E-07	0.05	1	80	1	7	2.74E-03	17	7	1.87E-10	0.00002	0.00001	70	1.87E-11	2	4E-11
Total									HI =			0.0005	Risk =			4E-10

**APPENDIX B
TABLE B-7
RISK CHARACTERIZATION
SURFACE WATER INGESTION
TRESPASSERS
Former McCoy Field Wetland Area
New Bedford, Massachusetts**

Youth Exposure (ages 8 to 15)

Constituent	C _{sw} (mg/L)	IR _{sw} (L/dy)	RAFo (unitless)	EF (events/yr)	ED (dy/event)	EP (yr)	CF (yr/dy)	BW (kg)	AP (nc) (yr)	ADD (nc) (mg/kg-dy)	RfD (mg/kg-dy)	HQ (unitless)	AP [ca] (yr)	ADD [ca] (mg/kg-dy)	SF [(mg/kg-dy) ⁻¹]	Risk (unitless)
Acenaphthene	2.56E-05	0.05	1	80	1	7	2.74E-03	39.9	7	7.02E-09	0.06	0.00000012	--	--	--	--
Anthracene	8.41E-06	0.05	1	80	1	7	2.74E-03	39.9	7	2.31E-09	0.3	0.000000008	--	--	--	--
Benzo(a)anthracene	7.96E-07	0.05	1	80	1	7	2.74E-03	39.9	7	2.19E-10	0.03	0.000000007	70	2.19E-11	0.73	2E-11
Benzo(b)fluoranthene	1.20E-06	0.05	1	80	1	7	2.74E-03	39.9	7	3.28E-10	0.03	0.00000001	70	3.28E-11	0.73	2E-11
Benzo(k)fluoranthene	5.74E-07	0.05	1	80	1	7	2.74E-03	39.9	7	1.58E-10	0.03	0.000000005	70	1.58E-11	0.073	1E-12
Benzo(g,h,i)perylene	2.18E-07	0.05	1	80	1	7	2.74E-03	39.9	7	5.99E-11	0.03	0.000000002	--	--	--	--
Benzo(a)pyrene	6.05E-07	0.05	1	80	1	7	2.74E-03	39.9	7	1.66E-10	0.03	0.000000006	70	1.66E-11	7.3	1E-10
Chrysene	9.62E-07	0.05	1	80	1	7	2.74E-03	39.9	7	2.64E-10	0.03	0.00000001	70	2.64E-11	0.073	2E-12
Fluoranthene	3.77E-06	0.05	1	80	1	7	2.74E-03	39.9	7	1.04E-09	0.04	0.00000003	--	--	--	--
Fluorene	1.56E-05	0.05	1	80	1	7	2.74E-03	39.9	7	4.28E-09	0.04	0.0000001	--	--	--	--
Indeno(1,2,3-cd)pyrene	8.28E-08	0.05	1	80	1	7	2.74E-03	39.9	7	2.27E-11	0.03	0.000000008	70	2.27E-12	0.73	2E-12
Phenanthrene	1.07E-05	0.05	1	80	1	7	2.74E-03	39.9	7	2.94E-09	0.03	0.0000001	--	--	--	--
Pyrene	4.35E-06	0.05	1	80	1	7	2.74E-03	39.9	7	1.19E-09	0.03	0.00000004	--	--	--	--
Barium	2.63E-02	0.05	1	80	1	7	2.74E-03	39.9	7	7.21E-06	0.07	0.0001	--	--	--	--
Cadmium	5.26E-05	0.05	1	80	1	7	2.74E-03	39.9	7	1.45E-08	0.001	0.00001	--	--	--	--
Chromium (total)	1.72E-05	0.05	1	80	1	7	2.74E-03	39.9	7	4.73E-09	1.5	0.000000003	--	--	--	--
Lead	2.46E-04	0.05	1	80	1	7	2.74E-03	39.9	7	6.76E-08	0.00075	0.00009	--	--	--	--
Mercury	1.89E-06	0.05	1	80	1	7	2.74E-03	39.9	7	5.19E-10	0.0003	0.000002	--	--	--	--
Selenium	2.31E-05	0.05	1	80	1	7	2.74E-03	39.9	7	6.35E-09	0.005	0.000011	--	--	--	--
PCB (Aroclor 1254)	2.90E-07	0.05	1	80	1	7	2.74E-03	39.9	7	7.96E-11	0.00002	0.000004	70	7.96E-12	2	2E-11
Total									HI =			0.0002	Risk =			2E-10

Adult Exposure (ages 15 to 31)

Constituent	C _{sw} (mg/L)	IR _{sw} (L/dy)	RAFo (unitless)	EF (events/yr)	ED (dy/event)	EP (yr)	CF (yr/dy)	BW (kg)	AP (nc) (yr)	ADD (nc) (mg/kg-dy)	RfD (mg/kg-dy)	HQ (unitless)	AP [ca] (yr)	ADD [ca] (mg/kg-dy)	SF [(mg/kg-dy) ⁻¹]	Risk (unitless)
Acenaphthene	2.56E-05	0.05	1	80	1	16	2.74E-03	58.7	16	4.77E-09	0.06	0.00000008	--	--	--	--
Anthracene	8.41E-06	0.05	1	80	1	16	2.74E-03	58.7	16	1.57E-09	0.3	0.000000005	--	--	--	--
Benzo(a)anthracene	7.96E-07	0.05	1	80	1	16	2.74E-03	58.7	16	1.49E-10	0.03	0.000000005	70	3.40E-11	0.73	2E-11
Benzo(b)fluoranthene	1.20E-06	0.05	1	80	1	16	2.74E-03	58.7	16	2.23E-10	0.03	0.000000007	70	5.10E-11	0.73	4E-11
Benzo(k)fluoranthene	5.74E-07	0.05	1	80	1	16	2.74E-03	58.7	16	1.07E-10	0.03	0.000000004	70	2.45E-11	0.073	2E-12
Benzo(g,h,i)perylene	2.18E-07	0.05	1	80	1	16	2.74E-03	58.7	16	4.07E-11	0.03	0.000000001	--	--	--	--
Benzo(a)pyrene	6.05E-07	0.05	1	80	1	16	2.74E-03	58.7	16	1.13E-10	0.03	0.000000004	70	2.58E-11	7.3	2E-10
Chrysene	9.62E-07	0.05	1	80	1	16	2.74E-03	58.7	16	1.80E-10	0.03	0.000000006	70	4.11E-11	0.073	3E-12
Fluoranthene	3.77E-06	0.05	1	80	1	16	2.74E-03	58.7	16	7.04E-10	0.04	0.000000002	--	--	--	--
Fluorene	1.56E-05	0.05	1	80	1	16	2.74E-03	58.7	16	2.91E-09	0.04	0.000000007	--	--	--	--
Indeno(1,2,3-cd)pyrene	8.28E-08	0.05	1	80	1	16	2.74E-03	58.7	16	1.55E-11	0.03	0.000000005	70	3.53E-12	0.73	3E-12
Phenanthrene	1.07E-05	0.05	1	80	1	16	2.74E-03	58.7	16	2.00E-09	0.03	0.000000007	--	--	--	--
Pyrene	4.35E-06	0.05	1	80	1	16	2.74E-03	58.7	16	8.12E-10	0.03	0.000000003	--	--	--	--
Barium	2.63E-02	0.05	1	80	1	16	2.74E-03	58.7	16	4.90E-06	0.07	0.00007	--	--	--	--
Cadmium	5.26E-05	0.05	1	80	1	16	2.74E-03	58.7	16	9.83E-09	0.001	0.00001	--	--	--	--
Chromium (total)	1.72E-05	0.05	1	80	1	16	2.74E-03	58.7	16	3.22E-09	1.5	0.000000002	--	--	--	--
Lead	2.46E-04	0.05	1	80	1	16	2.74E-03	58.7	16	4.60E-08	0.00075	0.00006	--	--	--	--
Mercury	1.89E-06	0.05	1	80	1	16	2.74E-03	58.7	16	3.53E-10	0.0003	0.00001	--	--	--	--
Selenium	2.31E-05	0.05	1	80	1	16	2.74E-03	58.7	16	4.31E-09	0.005	0.0000009	--	--	--	--
PCB (Aroclor 1254)	2.90E-07	0.05	1	80	1	16	2.74E-03	58.7	16	5.41E-11	0.00002	0.000003	70	1.24E-11	2	2E-11
Total									HI =			0.0001	Risk =			3E-10

Combined ages (1 to 31)

Total Risk	9E-10
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**APPENDIX B
TABLE B-8
RISK CHARACTERIZATION
SURFACE WATER DERMAL CONTACT
TRESPASSERS
Former McCoy Field Wetland Area
New Bedford, Massachusetts**

Equation:
$$ADD = \frac{C_{sw} \times SA \times Kp \times EF \times EP \times CF}{BW \times AP}$$

HQ = ADD/RfD
HI = Sum [HQ]
Risk = ADD x SF

where: ADD = Average daily dose (mg/kg-dy) (nc = non-carcinogen; ca = carcinogen)
C_{sw} = Constituent concentration in surface water (mg/L)
SA = Exposed skin surface area (cm²)
DA_{event} = Dermal absorption per event per mg/cm² [(mg/cm²-event)/(mg/L)]
EF = Exposure frequency (events/year)
EP = Exposure period (yr)
CF = Unit conversion factor (yr/dy)
BW = Body weight (kg)
AP = Averaging period (yr)

where: HQ = Non-carcinogenic hazard quotient (unitless)
HI = Total hazard Index (unitless)
Risk = Excess lifetime cancer risk (unitless)
RfD = Reference dose (mg/kg-dy)
SF = Cancer slope factor [(mg/kg-dy)⁻¹]

Child Exposure (ages 1 to 8)

Constituent	C _{sw} (mg/L)	SA (cm ²)	DA _{event} (mg/cm ² -event)/ (mg/L)	EF (events/yr)	EP (yr)	CF (yr/dy)	BW (kg)	AP (nc) (yr)	ADD (nc) (mg/kg-dy)	RfD (mg/kg-dy)	HQ (unitless)	AP [ca] (yr)	ADD [ca] (mg/kg-dy)	SF [(mg/kg-dy) ⁻¹]	Risk (unitless)
Acenaphthene	2.56E-05	1,351	1.02E-04	80	7	2.74E-03	17	7	4.52E-08	0.06	0.0000008	--	--	--	--
Anthracene	8.41E-06	1,351	2.23E-04	80	7	2.74E-03	17	7	3.27E-08	0.3	0.0000001	--	--	--	--
Benzo(a)anthracene	7.96E-07	1,351	1.36E-03	80	7	2.74E-03	17	7	1.88E-08	0.03	0.0000006	70	1.88E-09	0.73	1E-09
Benzo(b)fluoranthene	1.20E-06	1,351	9.41E-04	80	7	2.74E-03	17	7	1.96E-08	0.03	0.0000007	70	1.96E-09	0.73	1E-09
Benzo(k)fluoranthene	5.74E-07	1,351	1.28E-03	80	7	2.74E-03	17	7	1.27E-08	0.03	0.0000004	70	1.27E-09	0.073	9E-11
Benzo(g,h,i)perylene	2.18E-07	1,351	2.45E-03	80	7	2.74E-03	17	7	9.32E-09	0.03	0.0000003	--	--	--	--
Benzo(a)pyrene	6.05E-07	1,351	1.37E-03	80	7	2.74E-03	17	7	1.45E-08	0.03	0.0000005	70	1.45E-09	7.3	1E-08
Chrysene	9.62E-07	1,351	6.84E-04	80	7	2.74E-03	17	7	1.15E-08	0.03	0.0000004	70	1.15E-09	0.073	8E-11
Fluoranthene	3.77E-06	1,351	5.37E-04	80	7	2.74E-03	17	7	3.53E-08	0.04	0.0000009	--	--	--	--
Fluorene	1.56E-05	1,351	1.40E-04	80	7	2.74E-03	17	7	3.79E-08	0.04	0.0000009	--	--	--	--
Indeno(1,2,3-cd)pyrene	8.28E-08	1,351	2.99E-03	80	7	2.74E-03	17	7	4.31E-09	0.03	0.0000001	70	4.31E-10	0.73	3E-10
Phenanthrene	1.07E-05	1,351	2.34E-04	80	7	2.74E-03	17	7	4.36E-08	0.03	0.0000001	--	--	--	--
Pyrene	4.35E-06	1,351	5.05E-04	80	7	2.74E-03	17	7	3.83E-08	0.03	0.0000001	--	--	--	--
Barium	2.63E-02	1,351	2.50E-07	80	7	2.74E-03	17	7	1.14E-07	0.07	0.0000002	--	--	--	--
Cadmium	5.26E-05	1,351	2.50E-07	80	7	2.74E-03	17	7	2.29E-10	0.001	0.0000002	--	--	--	--
Chromium (total)	1.72E-05	1,351	2.50E-07	80	7	2.74E-03	17	7	7.50E-11	1.5	0.00000000005	--	--	--	--
Lead	2.46E-04	1,351	2.50E-07	80	7	2.74E-03	17	7	1.07E-09	0.00075	0.0000001	--	--	--	--
Mercury	1.89E-06	1,351	2.50E-07	80	7	2.74E-03	17	7	8.22E-12	0.0003	0.000000003	--	--	--	--
Selenium	2.31E-05	1,351	2.50E-07	80	7	2.74E-03	17	7	1.01E-10	0.005	0.000000002	--	--	--	--
PCB (Aroclor 1254)	2.90E-07	1,351	3.31E-04	80	7	2.74E-03	17	7	1.67E-09	0.00002	0.0001	70	1.67E-10	2	3E-10
Total								HI =			0.0001	Risk =			1E-08

APPENDIX B
TABLE B-8
RISK CHARACTERIZATION
RISKS WATER DERMAL CONTACT
TRESPASSERS
Former McCoy Field Wetland Area
New Bedford, Massachusetts

Youth Exposure (ages 8 to 15)

Constituent	C _{sw} (mg/L)	SA (cm ²)	DA _{event} (mg/cm ² -event)/ (mg/L)	EF (events/yr)	EP (yr)	CF (yr/dy)	BW (kg)	AP (nc) (yr)	ADD (nc) (mg/kg-dy)	RfD (mg/kg-dy)	HQ (unitless)	AP [ca] (yr)	ADD [ca] (mg/kg-dy)	SF [(mg/kg-dy) ⁻¹]	Risk (unitless)
Acenaphthene	2.56E-05	2,928	1.02E-04	80	7	2.74E-03	39.9	7	4.17E-08	0.06	0.0000007	--	--	--	--
Anthracene	8.41E-06	2,928	2.23E-04	80	7	2.74E-03	39.9	7	3.02E-08	0.3	0.0000001	--	--	--	--
Benzo(a)anthracene	7.96E-07	2,928	1.36E-03	80	7	2.74E-03	39.9	7	1.74E-08	0.03	0.0000006	70	1.74E-09	0.73	1E-09
Benzo(b)fluoranthene	1.20E-06	2,928	9.41E-04	80	7	2.74E-03	39.9	7	1.81E-08	0.03	0.0000006	70	1.81E-09	0.73	1E-09
Benzo(k)fluoranthene	5.74E-07	2,928	1.28E-03	80	7	2.74E-03	39.9	7	1.18E-08	0.03	0.0000004	70	1.18E-09	0.073	9E-11
Benzo(g,h,i)perylene	2.18E-07	2,928	2.45E-03	80	7	2.74E-03	39.9	7	8.61E-09	0.03	0.0000003	--	--	--	--
Benzo(a)pyrene	6.05E-07	2,928	1.37E-03	80	7	2.74E-03	39.9	7	1.34E-08	0.03	0.0000004	70	1.34E-09	7.3	1E-08
Chrysene	9.62E-07	2,928	6.84E-04	80	7	2.74E-03	39.9	7	1.06E-08	0.03	0.0000004	70	1.06E-09	0.073	8E-11
Fluoranthene	3.77E-06	2,928	5.37E-04	80	7	2.74E-03	39.9	7	3.26E-08	0.04	0.0000008	--	--	--	--
Fluorene	1.56E-05	2,928	1.40E-04	80	7	2.74E-03	39.9	7	3.50E-08	0.04	0.0000009	--	--	--	--
Indeno(1,2,3-cd)pyrene	8.28E-08	2,928	2.99E-03	80	7	2.74E-03	39.9	7	3.98E-09	0.03	0.0000001	70	3.98E-10	0.73	3E-10
Phenanthrene	1.07E-05	2,928	2.34E-04	80	7	2.74E-03	39.9	7	4.03E-08	0.03	0.0000001	--	--	--	--
Pyrene	4.35E-06	2,928	5.05E-04	80	7	2.74E-03	39.9	7	3.54E-08	0.03	0.0000001	--	--	--	--
Barium	2.63E-02	2,928	2.50E-07	80	7	2.74E-03	39.9	7	1.06E-07	0.07	0.0000002	--	--	--	--
Cadmium	5.26E-05	2,928	2.50E-07	80	7	2.74E-03	39.9	7	2.12E-10	0.001	0.0000002	--	--	--	--
Chromium (total)	1.72E-05	2,928	2.50E-07	80	7	2.74E-03	39.9	7	6.93E-11	1.5	0.00000000005	--	--	--	--
Lead	2.46E-04	2,928	2.50E-07	80	7	2.74E-03	39.9	7	9.90E-10	0.00075	0.0000001	--	--	--	--
Mercury	1.89E-06	2,928	2.50E-07	80	7	2.74E-03	39.9	7	7.59E-12	0.0003	0.00000003	--	--	--	--
Selenium	2.31E-05	2,928	2.50E-07	80	7	2.74E-03	39.9	7	9.29E-11	0.005	0.00000002	--	--	--	--
PCB (Aroclor 1254)	2.90E-07	2,928	3.31E-04	80	7	2.74E-03	39.9	7	1.54E-09	0.00002	0.0001	70	1.54E-10	2	3E-10
Total								HI =			0.0001	Risk =			1E-08

Adult Exposure (ages 15 to 31)

Constituent	C _{sw} (mg/L)	SA (cm ²)	DA _{event} (mg/cm ² -event)/ (mg/L)	EF (events/yr)	EP (yr)	CF (yr/dy)	BW (kg)	AP (nc) (yr)	ADD (nc) (mg/kg-dy)	RfD (mg/kg-dy)	HQ (unitless)	AP [ca] (yr)	ADD [ca] (mg/kg-dy)	SF [(mg/kg-dy) ⁻¹]	Risk (unitless)
Acenaphthene	2.56E-05	3,107	1.02E-04	80	16	2.74E-03	58.7	16	3.01E-08	0.06	0.0000005	--	--	--	--
Anthracene	8.41E-06	3,107	2.23E-04	80	16	2.74E-03	58.7	16	2.18E-08	0.3	0.0000007	--	--	--	--
Benzo(a)anthracene	7.96E-07	3,107	1.36E-03	80	16	2.74E-03	58.7	16	1.25E-08	0.03	0.0000004	70	2.86E-09	0.73	2E-09
Benzo(b)fluoranthene	1.20E-06	3,107	9.41E-04	80	16	2.74E-03	58.7	16	1.30E-08	0.03	0.0000004	70	2.98E-09	0.73	2E-09
Benzo(k)fluoranthene	5.74E-07	3,107	1.28E-03	80	16	2.74E-03	58.7	16	8.49E-09	0.03	0.0000003	70	1.94E-09	0.073	1E-10
Benzo(g,h,i)perylene	2.18E-07	3,107	2.45E-03	80	16	2.74E-03	58.7	16	6.21E-09	0.03	0.0000002	--	--	--	--
Benzo(a)pyrene	6.05E-07	3,107	1.37E-03	80	16	2.74E-03	58.7	16	9.64E-09	0.03	0.0000003	70	2.20E-09	7.3	2E-08
Chrysene	9.62E-07	3,107	6.84E-04	80	16	2.74E-03	58.7	16	7.64E-09	0.03	0.0000003	70	1.75E-09	0.073	1E-10
Fluoranthene	3.77E-06	3,107	5.37E-04	80	16	2.74E-03	58.7	16	2.35E-08	0.04	0.0000006	--	--	--	--
Fluorene	1.56E-05	3,107	1.40E-04	80	16	2.74E-03	58.7	16	2.52E-08	0.04	0.0000006	--	--	--	--
Indeno(1,2,3-cd)pyrene	8.28E-08	3,107	2.99E-03	80	16	2.74E-03	58.7	16	2.87E-09	0.03	0.0000001	70	6.57E-10	0.73	5E-10
Phenanthrene	1.07E-05	3,107	2.34E-04	80	16	2.74E-03	58.7	16	2.90E-08	0.03	0.0000001	--	--	--	--
Pyrene	4.35E-06	3,107	5.05E-04	80	16	2.74E-03	58.7	16	2.55E-08	0.03	0.0000008	--	--	--	--
Barium	2.63E-02	3,107	2.50E-07	80	16	2.74E-03	58.7	16	7.62E-08	0.07	0.0000001	--	--	--	--
Cadmium	5.26E-05	3,107	2.50E-07	80	16	2.74E-03	58.7	16	1.53E-10	0.001	0.0000002	--	--	--	--
Chromium (total)	1.72E-05	3,107	2.50E-07	80	16	2.74E-03	58.7	16	5.00E-11	1.5	0.00000000003	--	--	--	--
Lead	2.46E-04	3,107	2.50E-07	80	16	2.74E-03	58.7	16	7.14E-10	0.00075	0.0000001	--	--	--	--
Mercury	1.89E-06	3,107	2.50E-07	80	16	2.74E-03	58.7	16	5.48E-12	0.0003	0.00000002	--	--	--	--
Selenium	2.31E-05	3,107	2.50E-07	80	16	2.74E-03	58.7	16	6.70E-11	0.005	0.00000001	--	--	--	--
PCB (Aroclor 1254)	2.90E-07	3,107	3.31E-04	80	16	2.74E-03	58.7	16	1.11E-09	0.00002	0.00006	70	2.54E-10	2	5E-10
Total								HI =			0.00006	Risk =			2E-08

Combined ages (1 to 31)

Total Risk															5E-08
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APPENDIX B
TABLE B-9
SUMMARY OF CHEMICAL-SPECIFIC INPUT VARIABLES
Former McCoy Field Wetland Area
New Bedford, Massachusetts

Constituent	Soil Exposure Point Concentrations C_{soil} (mg/kg)	Estimated Surface Water Exposure Point Concentrations ¹ C_{sw} (mg/L)	Relative Absorption Factor ² (RAF _o)			
			Soil Ingestion (EPA) (unitless)	Soil Ingestion (MADEP) (unitless)	Soil Dermal (unitless)	Surface Water (unitless)
Acenaphthene	0.191	2.56E-05	1	0.36	0.1	1
Anthracene	0.203	8.41E-06	1	0.36	0.1	1
Benzo(a)anthracene	0.255	7.96E-07	1	0.28	0.02	1
Benzo(b)fluoranthene	0.274	1.20E-06	1	0.28	0.02	1
Benzo(k)fluoranthene	0.218	5.74E-07	1	0.28	0.02	1
Benzo(g,h,i)perylene	0.213	2.18E-07	1	0.36	0.1	1
Benzo(a)pyrene	0.249	6.05E-07	1	0.28	0.02	1
Chrysene	0.246	9.62E-07	1	0.36	0.02	1
Fluoranthene	0.329	3.77E-06	1	0.36	0.1	1
Fluorene	0.191	1.56E-05	1	0.36	0.1	1
Indeno(1,2,3-cd)pyrene	0.208	8.28E-08	1	0.28	0.02	1
Phenanthrene	0.274	1.07E-05	1	0.36	0.1	1
Pyrene	0.351	4.35E-06	1	0.36	0.1	1
Barium	83	2.63E-02	1	1	0.05	1
Cadmium	1.05	5.26E-05	1	1	0.14	1
Chromium (total)	13	1.72E-05	1	1	0.04	1
Lead	98	2.46E-04	1	0.5	0.006	1
Mercury	0.15	1.89E-06	1	1	0.05	1
Selenium	0.92	2.31E-05	1	1	0.002	1
PCB (Aroclor 1254)	0.908	2.90E-07	1	0.85	0.16	1

1. Calculated on separate sheet.

2. MADEP (2004). Proposed Revised Method 1 Numerical Standards and supporting documentation. September.

APPENDIX B
TABLE B-10
SUMMARY OF EXPOSURE FACTORS
TRESPASSERS
Former McCoy Field Wetland Area
New Bedford, Massachusetts

Notation	Parameter	Value	Units	Reference
IR _{soil}	Soil ingestion rate - child	0.0001	kg/day	MADEP (1995).
	Soil ingestion rate - youth	0.00005	kg/day	MADEP (1995).
	Soil ingestion rate - adult	0.00005	kg/day	MADEP (1995).
IR _{sw}	Surface water ingestion rate	0.05	L/day	MADEP (1995).
SA	Exposed skin surface area (child)	1,351	cm ²	MADEP (2002a), corresponds to exposure of hands, forearms and feet.
	Exposed skin surface area (youth)	2,928	cm ²	MADEP (2002a), corresponds to exposure of hands, forearms and feet.
	Exposed skin surface area (adult)	3,107	cm ²	MADEP (2002a), corresponds to exposure of hands, forearms and feet.
AF _{soil}	Soil adherence factor (child)	5.20E-07	kg/cm ²	Calculated from data in MADEP (2002a).
	Soil adherence factor (youth)	1.40E-07	kg/cm ²	MADEP (2002a), corresponds to exposure of hands, forearms and feet.
	Soil adherence factor (adult)	1.00E-07	kg/cm ²	Calculated from data in MADEP (2002a).
PM ₁₀	Particulate matter concentration in air	0.032	mg/m ³	MADEP (1995); value for open field air PM ₁₀ concentrations.
EF	Exposure frequency	80	events/yr	Four days per week in June, July, August and 2 days per week in April, May, September, October.
ED	Exposure duration (soil, sediment)	1	dy/event	Conventional value.
	Exposure duration (surface water, air)	5.6	hr/event	From U.S. EPA (1997).
EP	Exposure period (child)	7	yr	Age-specific exposure period.
	Exposure period (youth)	7	yr	Age-specific exposure period.
	Exposure period (adult)	16	yr	Age-specific exposure period.
AP	Averaging period (child) (non-carcinogenic)	7	yr	Same as exposure period.
	Averaging period (youth) (non-carcinogenic)	7	yr	Same as exposure period.
	Averaging period (adult) (non-carcinogenic)	16	yr	Same as exposure period.
	Averaging period (all) (carcinogenic)	70	yr	Conventional lifetime averaging for carcinogens.
BW	Body weight (child)	17	kg	Average weight for age group (MADEP 2004).
	Body weight (youth)	39.9	kg	Average weight for age group (MADEP 2004).
	Body weight (adult)	58.7	kg	Average weight for age group (MADEP 2004).
CF	Unit conversion factor	1.00E-06	kg/mg	Unit conversion.
	Unit conversion factor	0.001	L/cm ³	Unit conversion.
	Unit conversion factor	2.74E-03	yr/dy	Unit conversion.
	Unit conversion factor	1.14E-04	yr/hr	Unit conversion.

MADEP (1995). Guidance for Disposal Site Risk Characterization in Support of the Massachusetts Contingency Plan. Interim Final Policy WSC/ORS-95-141, July.
MADEP (2004). Proposed revised Method 1 Numerical Standards (and supporting documentation). September.
MADEP (2002a). Technical Update: Weighted Skin-Soil Adherence Factors. April.
U.S. EPA (1997). Exposure Factors Handbook. EPA/600/P-95-002F. April.

Appendix C
ProUCL Upper Confidence
Limit Summaries



General Statistics

Data File		J:\B345-000 Beta McCoy\Risk Stuff\Wetlands\Variable: Total PCBs	
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	128	Lilliefors Test Statistic	0.317457
Number of Unique Samples	109	Lilliefors 5% Critical Value	0.078312
Minimum	3.5	Data not normal at 5% significance level	
Maximum	11800		
Mean	968.168	95% UCL (Assuming Normal Distribution)	
Median	120.5	Student's-t UCL	1265.71
Standard Deviation	2031.641		
Variance	4127564	Gamma Distribution Test	
Coefficient of Variation	2.098438	A-D Test Statistic	5.391085
Skewness	3.237643	A-D 5% Critical Value	0.845668
Gamma Statistics		K-S Test Statistic	0.175941
k hat	0.391493	K-S 5% Critical Value	0.088209
k star (bias corrected)	0.387526	Data do not follow gamma distribution at 5% significance level	
Theta hat	2473.015		
Theta star	2498.332	95% UCLs (Assuming Gamma Distribution)	
nu hat	100.2222	Approximate Gamma UCL	1243.759
nu star	99.20657	Adjusted Gamma UCL	1247.306
Approx. Chi Square Value (.05)	77.22447		
Adjusted Level of Significance	0.048125	Lognormal Distribution Test	
Adjusted Chi Square Value	77.00485	Lilliefors Test Statistic	0.085815
Log-transformed Statistics		Lilliefors 5% Critical Value	0.078312
Minimum of log data	1.252763	Data not lognormal at 5% significance level	
Maximum of log data	9.375855		
Mean of log data	5.188726	95% UCLs (Assuming Lognormal Distribution)	
Standard Deviation of log data	1.954951	95% H-UCL	2105.459
Variance of log data	3.821832	95% Chebyshev (MVUE) UCL	2551.743
		97.5% Chebyshev (MVUE) UCL	3153.101
		99% Chebyshev (MVUE) UCL	4334.352
		95% Non-parametric UCLs	
		CLT UCL	1263.54
		Adj-CLT UCL (Adjusted for skewness)	1318.449
		Mod-t UCL (Adjusted for skewness)	1274.275
		Jackknife UCL	1265.71
		Standard Bootstrap UCL	1256.996
		Bootstrap-t UCL	1337.161
		Hall's Bootstrap UCL	1314.654
RECOMMENDATION		Percentile Bootstrap UCL	1266.559
Data are Non-parametric (0.05)		BCA Bootstrap UCL	1338.297
		95% Chebyshev (Mean, Sd) UCL	1750.91
Use 97.5% Chebyshev (Mean, Sd) UCL		97.5% Chebyshev (Mean, Sd) UCL	2089.603
		99% Chebyshev (Mean, Sd) UCL	2754.9

General Statistics

Data File	J:\B345-000 Beta McCoy\Risk Stuff\Wetlands\Variable: Anthracene		
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	122	Lilliefors Test Statistic	0.258033
Number of Unique Samples	64	Lilliefors 5% Critical Value	0.080215
Minimum	25	Data not normal at 5% significance level	
Maximum	2050		
Mean	203.3566	95% UCL (Assuming Normal Distribution)	
Median	130	Student's-t UCL	244.5708
Standard Deviation	274.6393		
Variance	75426.74	Gamma Distribution Test	
Coefficient of Variation	1.350531	A-D Test Statistic	3.741105
Skewness	4.60292	A-D 5% Critical Value	0.772765
		K-S Test Statistic	0.146855
Gamma Statistics		K-S 5% Critical Value	0.085523
k hat	1.398811	Data do not follow gamma distribution	
k star (bias corrected)	1.369879	at 5% significance level	
Theta hat	145.3781		
Theta star	148.4486	95% UCLs (Assuming Gamma Distribution)	
nu hat	341.3099	Approximate Gamma UCL	232.0809
nu star	334.2504	Adjusted Gamma UCL	232.4449
Approx. Chi Square Value (.05)	292.8806		
Adjusted Level of Significance	0.048033	Lognormal Distribution Test	
Adjusted Chi Square Value	292.422	Lilliefors Test Statistic	0.071925
		Lilliefors 5% Critical Value	0.080215
Log-transformed Statistics		Data are lognormal at 5% significance level	
Minimum of log data	3.218876		
Maximum of log data	7.625595	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	4.916734	95% H-UCL	220.7732
Standard Deviation of log data	0.812922	95% Chebyshev (MVUE) UCL	258.6259
Variance of log data	0.660842	97.5% Chebyshev (MVUE) UCL	288.6032
		99% Chebyshev (MVUE) UCL	347.4876
		95% Non-parametric UCLs	
		CLT UCL	244.2553
		Adj-CLT UCL (Adjusted for skewness)	255.3271
		Mod-t UCL (Adjusted for skewness)	246.2978
		Jackknife UCL	244.5708
		Standard Bootstrap UCL	243.4193
		Bootstrap-t UCL	262.8563
RECOMMENDATION		Hall's Bootstrap UCL	276.3142
Data are lognormal (0.05)		Percentile Bootstrap UCL	246.0861
		BCA Bootstrap UCL	258.5
Use H-UCL		95% Chebyshev (Mean, Sd) UCL	311.7392
		97.5% Chebyshev (Mean, Sd) UCL	358.6364
		99% Chebyshev (Mean, Sd) UCL	450.7569

General Statistics

Data File		J:\B345-000 Beta McCoy\Risk Stuff\Wetlands\Variable: Benzo(a)anthracene	
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	122	Lilliefors Test Statistic	0.278838
Number of Unique Samples	65	Lilliefors 5% Critical Value	0.080215
Minimum	25	Data not normal at 5% significance level	
Maximum	2300		
Mean	254.7418	95% UCL (Assuming Normal Distribution)	
Median	150	Student's-t UCL	310.1845
Standard Deviation	369.4532		
Variance	136495.7	Gamma Distribution Test	
Coefficient of Variation	1.450305	A-D Test Statistic	5.793696
Skewness	3.639634	A-D 5% Critical Value	0.779188
		K-S Test Statistic	0.184496
Gamma Statistics		K-S 5% Critical Value	0.085992
k hat	1.152554	Data do not follow gamma distribution	
k star (bias corrected)	1.129677	at 5% significance level	
Theta hat	221.0237		
Theta star	225.4996	95% UCLs (Assuming Gamma Distribution)	
nu hat	281.2233	Approximate Gamma UCL	294.8037
nu star	275.6413	Adjusted Gamma UCL	295.3152
Approx. Chi Square Value (.05)	238.1835		
Adjusted Level of Significance	0.048033	Lognormal Distribution Test	
Adjusted Chi Square Value	237.7709	Lilliefors Test Statistic	0.107589
		Lilliefors 5% Critical Value	0.080215
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	3.218876		
Maximum of log data	7.740664	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	5.047375	95% H-UCL	275.7314
Standard Deviation of log data	0.89592	95% Chebyshev (MVUE) UCL	326.9201
Variance of log data	0.802673	97.5% Chebyshev (MVUE) UCL	368.2521
		99% Chebyshev (MVUE) UCL	449.4408
		95% Non-parametric UCLs	
		CLT UCL	309.7601
		Adj-CLT UCL (Adjusted for skewness)	321.5371
		Mod-t UCL (Adjusted for skewness)	312.0215
		Jackknife UCL	310.1845
		Standard Bootstrap UCL	310.7558
		Bootstrap-t UCL	333.3715
RECOMMENDATION		Hall's Bootstrap UCL	318.4108
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	310.7705
		BCA Bootstrap UCL	321.0164
Use 95% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	400.5414
		97.5% Chebyshev (Mean, Sd) UCL	463.629
		99% Chebyshev (Mean, Sd) UCL	587.5524

General Statistics

Data File		J:\B345-000 Beta McCoy\Risk Stuff\Wetlands\Variable: Benzo(a)pyrene	
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	122	Lilliefors Test Statistic	0.272951
Number of Unique Samples	65	Lilliefors 5% Critical Value	0.080215
Minimum	25	Data not normal at 5% significance level	
Maximum	2300		
Mean	249.332	95% UCL (Assuming Normal Distribution)	
Median	137.5	Student's-t UCL	304.6748
Standard Deviation	368.7875		
Variance	136004.3	Gamma Distribution Test	
Coefficient of Variation	1.479103	A-D Test Statistic	5.732254
Skewness	3.689594	A-D 5% Critical Value	0.779793
		K-S Test Statistic	0.173771
Gamma Statistics		K-S 5% Critical Value	0.086036
k hat	1.129364	Data do not follow gamma distribution	
k star (bias corrected)	1.107058	at 5% significance level	
Theta hat	220.7719		
Theta star	225.2204	95% UCLs (Assuming Gamma Distribution)	
nu hat	275.5649	Approximate Gamma UCL	288.99
nu star	270.1221	Adjusted Gamma UCL	289.4968
Approx. Chi Square Value (.05)	233.0533		
Adjusted Level of Significance	0.048033	Lognormal Distribution Test	
Adjusted Chi Square Value	232.6453	Lilliefors Test Statistic	0.093823
		Lilliefors 5% Critical Value	0.080215
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	3.218876		
Maximum of log data	7.740664	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	5.014679	95% H-UCL	268.8588
Standard Deviation of log data	0.902358	95% Chebyshev (MVUE) UCL	319.0559
Variance of log data	0.814251	97.5% Chebyshev (MVUE) UCL	359.6514
		99% Chebyshev (MVUE) UCL	439.3935
		95% Non-parametric UCLs	
		CLT UCL	304.2511
		Adj-CLT UCL (Adjusted for skewness)	316.1683
		Mod-t UCL (Adjusted for skewness)	306.5336
		Jackknife UCL	304.6748
		Standard Bootstrap UCL	304.4391
		Bootstrap-t UCL	319.6562
RECOMMENDATION		Hall's Bootstrap UCL	316.1793
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	306.7992
		BCA Bootstrap UCL	317.6025
Use 95% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	394.8689
		97.5% Chebyshev (Mean, Sd) UCL	457.8428
		99% Chebyshev (Mean, Sd) UCL	581.5429

General Statistics

Data File	J:\B345-000 Beta McCoy\Risk Stuff\Wetlands	Variable:	Chrysene	
Raw Statistics		Normal Distribution Test		
Number of Valid Samples	122	Lilliefors Test Statistic	0.267731	
Number of Unique Samples	65	Lilliefors 5% Critical Value	0.080215	
Minimum	25	Data not normal at 5% significance level		
Maximum	2050			
Mean	245.6025	95% UCL (Assuming Normal Distribution)		
Median	150	Student's-t UCL	295.6675	
Standard Deviation	333.6182			
Variance	111301.1	Gamma Distribution Test		
Coefficient of Variation	1.358367	A-D Test Statistic	5.149324	
Skewness	3.528294	A-D 5% Critical Value	0.777036	
		K-S Test Statistic	0.17132	
Gamma Statistics		K-S 5% Critical Value	0.085835	
k hat	1.235059	Data do not follow gamma distribution		
k star (bias corrected)	1.210153	at 5% significance level		
Theta hat	198.8589			
Theta star	202.9516	95% UCLs (Assuming Gamma Distribution)		
nu hat	301.3544	Approximate Gamma UCL	282.7696	
nu star	295.2774	Adjusted Gamma UCL	283.2428	
Approx. Chi Square Value (.05)	256.4662			
Adjusted Level of Significance	0.048033	Lognormal Distribution Test		
Adjusted Chi Square Value	256.0377	Lilliefors Test Statistic	0.097641	
		Lilliefors 5% Critical Value	0.080215	
Log-transformed Statistics		Data not lognormal at 5% significance level		
Minimum of log data	3.218876			
Maximum of log data	7.625595	95% UCLs (Assuming Lognormal Distribution)		
Mean of log data	5.047103	95% H-UCL	268.7445	
Standard Deviation of log data	0.873659	95% Chebyshev (MVUE) UCL	317.6407	
Variance of log data	0.763279	97.5% Chebyshev (MVUE) UCL	356.9093	
		99% Chebyshev (MVUE) UCL	434.0447	
		95% Non-parametric UCLs		
		CLT UCL	295.2842	
		Adj-CLT UCL (Adjusted for skewness)	305.5937	
		Mod-t UCL (Adjusted for skewness)	297.2756	
		Jackknife UCL	295.6675	
		Standard Bootstrap UCL	294.0972	
		Bootstrap-t UCL	309.5599	
RECOMMENDATION		Hall's Bootstrap UCL	303.6979	
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	297.5492	
		BCA Bootstrap UCL	308.6557	
Use 95% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	377.2603	
		97.5% Chebyshev (Mean, Sd) UCL	434.2287	
		99% Chebyshev (Mean, Sd) UCL	546.1322	

General Statistics

Data File	J:\B345-000 Beta McCoy\Risk Stuff\Wetlands	Variable:	Fluorene	
Raw Statistics		Normal Distribution Test		
Number of Valid Samples	122	Lilliefors Test Statistic	0.268247	
Number of Unique Samples	62	Lilliefors 5% Critical Value	0.080215	
Minimum	25	Data not normal at 5% significance level		
Maximum	2050			
Mean	190.6434	95% UCL (Assuming Normal Distribution)		
Median	130	Student's-t UCL	230.858	
Standard Deviation	267.9776			
Variance	71811.99	Gamma Distribution Test		
Coefficient of Variation	1.405648	A-D Test Statistic	4.2328	
Skewness	5.007586	A-D 5% Critical Value	0.771457	
		K-S Test Statistic	0.153513	
Gamma Statistics		K-S 5% Critical Value	0.085428	
k hat	1.448958	Data do not follow gamma distribution		
k star (bias corrected)	1.418793	at 5% significance level		
Theta hat	131.5728			
Theta star	134.3702	95% UCLs (Assuming Gamma Distribution)		
nu hat	353.5458	Approximate Gamma UCL	217.0541	
nu star	346.1854	Adjusted Gamma UCL	217.3883	
Approx. Chi Square Value (.05)	304.0623			
Adjusted Level of Significance	0.048033	Lognormal Distribution Test		
Adjusted Chi Square Value	303.5948	Lilliefors Test Statistic	0.076043	
		Lilliefors 5% Critical Value	0.080215	
Log-transformed Statistics		Data are lognormal at 5% significance level		
Minimum of log data	3.218876			
Maximum of log data	7.625595	95% UCLs (Assuming Lognormal Distribution)		
Mean of log data	4.867224	95% H-UCL	203.303	
Standard Deviation of log data	0.781127	95% Chebyshev (MVUE) UCL	237.0035	
Variance of log data	0.610159	97.5% Chebyshev (MVUE) UCL	263.5079	
		99% Chebyshev (MVUE) UCL	315.5706	
		95% Non-parametric UCLs		
		CLT UCL	230.5501	
		Adj-CLT UCL (Adjusted for skewness)	242.3031	
		Mod-t UCL (Adjusted for skewness)	232.6913	
		Jackknife UCL	230.858	
		Standard Bootstrap UCL	229.3676	
		Bootstrap-t UCL	258.6419	
RECOMMENDATION		Hall's Bootstrap UCL	268.8789	
Data are lognormal (0.05)		Percentile Bootstrap UCL	232.8033	
		BCA Bootstrap UCL	250.2254	
Use H-UCL		95% Chebyshev (Mean, Sd) UCL	296.3971	
		97.5% Chebyshev (Mean, Sd) UCL	342.1568	
		99% Chebyshev (Mean, Sd) UCL	432.0428	

General Statistics

Data File		J:\B345-000 Beta McCoy\Risk Stuff\Wetlands\Variable: Phenanthrene	
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	122	Lilliefors Test Statistic	0.311662
Number of Unique Samples	64	Lilliefors 5% Critical Value	0.080215
Minimum	25	Data not normal at 5% significance level	
Maximum	2600		
Mean	274.4139	95% UCL (Assuming Normal Distribution)	
Median	150	Student's-t UCL	339.6919
Standard Deviation	434.9922		
Variance	189218.2	Gamma Distribution Test	
Coefficient of Variation	1.585168	A-D Test Statistic	7.582306
Skewness	3.594295	A-D 5% Critical Value	0.781982
		K-S Test Statistic	0.197626
Gamma Statistics		K-S 5% Critical Value	0.086196
k hat	1.045446	Data do not follow gamma distribution	
k star (bias corrected)	1.025203	at 5% significance level	
Theta hat	262.485		
Theta star	267.6679	95% UCLs (Assuming Gamma Distribution)	
nu hat	255.0889	Approximate Gamma UCL	319.9869
nu star	250.1495	Adjusted Gamma UCL	320.5713
Approx. Chi Square Value (.05)	214.5229		
Adjusted Level of Significance	0.048033	Lognormal Distribution Test	
Adjusted Chi Square Value	214.1318	Lilliefors Test Statistic	0.117132
		Lilliefors 5% Critical Value	0.080215
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	3.218876		
Maximum of log data	7.863267	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	5.065349	95% H-UCL	289.6588
Standard Deviation of log data	0.922676	95% Chebyshev (MVUE) UCL	344.6947
Variance of log data	0.851332	97.5% Chebyshev (MVUE) UCL	389.4287
		99% Chebyshev (MVUE) UCL	477.2998
		95% Non-parametric UCLs	
		CLT UCL	339.1921
		Adj-CLT UCL (Adjusted for skewness)	352.8857
		Mod-t UCL (Adjusted for skewness)	341.8278
		Jackknife UCL	339.6919
		Standard Bootstrap UCL	340.8476
		Bootstrap-t UCL	364.2026
RECOMMENDATION		Hall's Bootstrap UCL	353.5453
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	342.9959
		BCA Bootstrap UCL	350.0738
Use 95% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	446.0776
		97.5% Chebyshev (Mean, Sd) UCL	520.3566
		99% Chebyshev (Mean, Sd) UCL	666.2633

General Statistics

Data File	J:\B345-000 Beta McCoy\Risk Stuff\Wetlands\Variable: Pyrene		
Raw Statistics			
Number of Valid Samples	122	Normal Distribution Test	
Number of Unique Samples	69	Lilliefors Test Statistic	0.331381
Minimum	25	Lilliefors 5% Critical Value	0.080215
Maximum	5600	Data not normal at 5% significance level	
Mean	350.7172	95% UCL (Assuming Normal Distribution)	
Median	170	Student's-t UCL	454.4241
Standard Deviation	691.0707	Gamma Distribution Test	
Variance	477578.8	A-D Test Statistic	8.02026
Coefficient of Variation	1.97045	A-D 5% Critical Value	0.786553
Skewness	5.4638	K-S Test Statistic	0.200448
Gamma Statistics		K-S 5% Critical Value	0.0865
k hat	0.93018	Data do not follow gamma distribution	
k star (bias corrected)	0.912771	at 5% significance level	
Theta hat	377.0424	95% UCLs (Assuming Gamma Distribution)	
Theta star	384.2335	Approximate Gamma UCL	412.9156
nu hat	226.9639	Adjusted Gamma UCL	413.7172
nu star	222.7161	Lognormal Distribution Test	
Approx. Chi Square Value (.05)	189.1679	Lilliefors Test Statistic	0.098352
Adjusted Level of Significance	0.048033	Lilliefors 5% Critical Value	0.080215
Adjusted Chi Square Value	188.8014	Data not lognormal at 5% significance level	
Log-transformed Statistics		95% UCLs (Assuming Lognormal Distribution)	
Minimum of log data	3.218876	95% H-UCL	359.6613
Maximum of log data	8.630522	95% Chebyshev (MVUE) UCL	430.2313
Mean of log data	5.234038	97.5% Chebyshev (MVUE) UCL	488.1767
Standard Deviation of log data	0.962164	99% Chebyshev (MVUE) UCL	601.999
Variance of log data	0.925759	95% Non-parametric UCLs	
CLT UCL			
453.6301			
Adj-CLT UCL (Adjusted for skewness)			
486.7004			
Mod-t UCL (Adjusted for skewness)			
459.5824			
Jackknife UCL			
454.4241			
Standard Bootstrap UCL			
453.8195			
Bootstrap-t UCL			
534.6792			
Hall's Bootstrap UCL			
873.495			
RECOMMENDATION			
Data are Non-parametric (0.05)			
Percentile Bootstrap UCL			
461.2582			
BCA Bootstrap UCL			
505.377			
Use 95% Chebyshev (Mean, Sd) UCL			
95% Chebyshev (Mean, Sd) UCL			
623.4387			
97.5% Chebyshev (Mean, Sd) UCL			
741.4455			
99% Chebyshev (Mean, Sd) UCL			
973.2471			

General Statistics

Data File	J:\B345-000 Beta McCoy\Risk Stuff\Wetlands			Variable:	Cadmium	
Raw Statistics		Normal Distribution Test				
Number of Valid Samples	123	Lilliefors Test Statistic	0.216269			
Number of Unique Samples	89	Lilliefors 5% Critical Value	0.079888			
Minimum	0.19	Data not normal at 5% significance level				
Maximum	5.75					
Mean	1.054797	95% UCL (Assuming Normal Distribution)				
Median	0.79	Student's-t UCL	1.191722			
Standard Deviation	0.916214					
Variance	0.839448	Gamma Distribution Test				
Coefficient of Variation	0.868617	A-D Test Statistic	1.968531			
Skewness	2.686119	A-D 5% Critical Value	0.764672			
		K-S Test Statistic	0.11545			
Gamma Statistics		K-S 5% Critical Value	0.084566			
k hat	2.105922	Data do not follow gamma distribution				
k star (bias corrected)	2.059978	at 5% significance level				
Theta hat	0.500872					
Theta star	0.512043	95% UCLs (Assuming Gamma Distribution)				
nu hat	518.0569	Approximate Gamma UCL	1.173382			
nu star	506.7547	Adjusted Gamma UCL	1.174852			
Approx. Chi Square Value (.05)	455.5405					
Adjusted Level of Significance	0.048049	Lognormal Distribution Test				
Adjusted Chi Square Value	454.9707	Lilliefors Test Statistic	0.070481			
		Lilliefors 5% Critical Value	0.079888			
Log-transformed Statistics		Data are lognormal at 5% significance level				
Minimum of log data	-1.660731					
Maximum of log data	1.7492	95% UCLs (Assuming Lognormal Distribution)				
Mean of log data	-0.202482	95% H-UCL	1.172277			
Standard Deviation of log data	0.692457	95% Chebyshev (MVUE) UCL	1.346756			
Variance of log data	0.479497	97.5% Chebyshev (MVUE) UCL	1.481446			
		99% Chebyshev (MVUE) UCL	1.746018			
		95% Non-parametric UCLs				
		CLT UCL	1.190682			
		Adj-CLT UCL (Adjusted for skewness)	1.212061			
		Mod-t UCL (Adjusted for skewness)	1.195056			
		Jackknife UCL	1.191722			
		Standard Bootstrap UCL	1.187447			
		Bootstrap-t UCL	1.232909			
RECOMMENDATION		Hall's Bootstrap UCL	1.216191			
Data are lognormal (0.05)		Percentile Bootstrap UCL	1.192276			
		BCA Bootstrap UCL	1.22187			
Use H-UCL		95% Chebyshev (Mean, Sd) UCL	1.414895			
		97.5% Chebyshev (Mean, Sd) UCL	1.57071			
		99% Chebyshev (Mean, Sd) UCL	1.876778			

General Statistics

Data File	J:\B345-000 Beta McCoy\Risk Stuff\Wetlands	Variable:	Lead	
Raw Statistics		Normal Distribution Test		
Number of Valid Samples	123	Lilliefors Test Statistic	0.255915	
Number of Unique Samples	93	Lilliefors 5% Critical Value	0.079888	
Minimum	1.7	Data not normal at 5% significance level		
Maximum	810			
Mean	97.55805	95% UCL (Assuming Normal Distribution)		
Median	46	Student's-t UCL	119.3962	
Standard Deviation	146.1268			
Variance	21353.05	Gamma Distribution Test		
Coefficient of Variation	1.497845	A-D Test Statistic	2.445085	
Skewness	2.783457	A-D 5% Critical Value	0.796806	
		K-S Test Statistic	0.107818	
Gamma Statistics		K-S 5% Critical Value	0.08689	
k hat	0.734122	Data do not follow gamma distribution		
k star (bias corrected)	0.721637	at 5% significance level		
Theta hat	132.8908			
Theta star	135.19	95% UCLs (Assuming Gamma Distribution)		
nu hat	180.594	Approximate Gamma UCL	117.2554	
nu star	177.5226	Adjusted Gamma UCL	117.51	
Approx. Chi Square Value (.05)	147.7012			
Adjusted Level of Significance	0.048049	Lognormal Distribution Test		
Adjusted Chi Square Value	147.3811	Lilliefors Test Statistic	0.049995	
		Lilliefors 5% Critical Value	0.079888	
Log-transformed Statistics		Data are lognormal at 5% significance level		
Minimum of log data	0.530628			
Maximum of log data	6.697034	95% UCLs (Assuming Lognormal Distribution)		
Mean of log data	3.762625	95% H-UCL	138.3066	
Standard Deviation of log data	1.318884	95% Chebyshev (MVUE) UCL	171.1125	
Variance of log data	1.739456	97.5% Chebyshev (MVUE) UCL	201.2634	
		99% Chebyshev (MVUE) UCL	260.489	
		95% Non-parametric UCLs		
		CLT UCL	119.2303	
		Adj-CLT UCL (Adjusted for skewness)	122.7637	
		Mod-t UCL (Adjusted for skewness)	119.9473	
		Jackknife UCL	119.3962	
		Standard Bootstrap UCL	118.7295	
		Bootstrap-t UCL	123.1889	
RECOMMENDATION		Hall's Bootstrap UCL	122.9418	
Data are lognormal (0.05)		Percentile Bootstrap UCL	119.912	
		BCA Bootstrap UCL	123.2833	
Use H-UCL		95% Chebyshev (Mean, Sd) UCL	154.9901	
		97.5% Chebyshev (Mean, Sd) UCL	179.841	
		99% Chebyshev (Mean, Sd) UCL	228.6557	

General Statistics

Data File	J:\B345-000 Beta McCoy\Risk Stuff\Wetlands	Variable:	Mercury	
Raw Statistics		Normal Distribution Test		
Number of Valid Samples	123	Lilliefors Test Statistic	0.249912	
Number of Unique Samples	99	Lilliefors 5% Critical Value	0.079888	
Minimum	0.0055	Data not normal at 5% significance level		
Maximum	2.06			
Mean	0.148659	95% UCL (Assuming Normal Distribution)		
Median	0.106	Student's-t UCL	0.180365	
Standard Deviation	0.212161			
Variance	0.045012	Gamma Distribution Test		
Coefficient of Variation	1.427167	A-D Test Statistic	1.772303	
Skewness	6.54453	A-D 5% Critical Value	0.775742	
		K-S Test Statistic	0.096561	
Gamma Statistics		K-S 5% Critical Value	0.085475	
k hat	1.285201	Data do not follow gamma distribution		
k star (bias corrected)	1.259275	at 5% significance level		
Theta hat	0.115669			
Theta star	0.118051	95% UCLs (Assuming Gamma Distribution)		
nu hat	316.1595	Approximate Gamma UCL	0.170562	
nu star	309.7816	Adjusted Gamma UCL	0.170838	
Approx. Chi Square Value (.05)	269.9996			
Adjusted Level of Significance	0.048049	Lognormal Distribution Test		
Adjusted Chi Square Value	269.5633	Lilliefors Test Statistic	0.079072	
		Lilliefors 5% Critical Value	0.079888	
Log-transformed Statistics		Data are lognormal at 5% significance level		
Minimum of log data	-5.203007			
Maximum of log data	0.722706	95% UCLs (Assuming Lognormal Distribution)		
Mean of log data	-2.343128	95% H-UCL	0.179466	
Standard Deviation of log data	0.94172	95% Chebyshev (MVUE) UCL	0.21403	
Variance of log data	0.886837	97.5% Chebyshev (MVUE) UCL	0.242237	
		99% Chebyshev (MVUE) UCL	0.297643	
		95% Non-parametric UCLs		
		CLT UCL	0.180124	
		Adj-CLT UCL (Adjusted for skewness)	0.192186	
		Mod-t UCL (Adjusted for skewness)	0.182247	
		Jackknife UCL	0.180365	
		Standard Bootstrap UCL	0.179932	
		Bootstrap-t UCL	0.205917	
RECOMMENDATION		Hall's Bootstrap UCL	0.319697	
Data are lognormal (0.05)		Percentile Bootstrap UCL	0.181663	
		BCA Bootstrap UCL	0.195232	
Use H-UCL		95% Chebyshev (Mean, Sd) UCL	0.232044	
		97.5% Chebyshev (Mean, Sd) UCL	0.268125	
		99% Chebyshev (Mean, Sd) UCL	0.338998	

Appendix D
Avian Risk
Characterization Calculations



**APPENDIX D
TABLE D-1
RISK CHARACTERIZATION CALCULATIONS
AMERICAN ROBIN
Former McCoy Field Wetland Area
New Bedford, Massachusetts**

$Intake_{soil} = C_{soil} \times IR_{soil} \times BA_{soil/food} \times A/FA$
 $Intake_{food} = [(C_{food1} \times F_1) + (C_{food2} \times F_2)] \times IR_{food} \times BA_{soil/food} \times A/FA$
 $Intake_{water} = C_{water} \times IR_{water} \times A/FA$
 $Intake_{total} = Intake_{soil} + Intake_{food} + Intake_{water}$
 $HI-Low = Intake_{total}/TRV-High$
 $HI-High = Intake_{total}/TRV-Low$

HI-Low = Low estimate of hazard Index (unitless)
 HI-High = High estimate of hazard Index (unitless)
 TRV-Low = Toxicity reference value (low (mg/kgBW-dy))
 TRV-High = Toxicity reference value (high (mg/kgBW-dy))
 Intake_{total} = Total intake of constituent from all pathways (mg/kgBW-dy)
 Intake_{soil} = Intake of constituent from soil ingestion (mg/kgBW-dy)
 Intake_{food} = Intake of constituent from food ingestion (mg/kgBW-dy)
 Intake_{water} = Intake of constituent from water ingestion (mg/kgBW-dy)
 C_{soil} = Soil constituent concentration (mg/kgDW)
 IR_{soil} = Soil ingestion rate (kgDW/kgBW-day)
 BA_{soil/food} = Bioavailability from soil/food (unitless)
 C_{food} = Food constituent concentration in *l*th food type (mg/kg WW)
 F_{*l*} = Fraction of *l*th food type in diet (unitless)
 IR_{food} = Total food ingestion rate (kgWW/kgBW-day)
 C_{water} = Water constituent concentration (mg/L)
 IR_{water} = Water ingestion rate (L/kgBW-day)
 A = On-site foraging area (acres)
 FA = Total foraging area for organism (acres)
 C_{food1 (invert)} = C_{soil} × BCF_{SSI}
 BCF_{SSI} = Soil-to-soil invertebrate bioaccumulation factor [(mg/kg WW)/(mg/kg soil)]
 C_{food2 (veg)} = C_{soil} × BCF_r × 0.12
 BCF_r = Plant-soil biotransfer factor [(mg/kg DW)/(mg/kg soil)]
 0.12 = Dry weight (DW) to wet weight (WW) conversion factor (unitless)
 [A/FA] = 1 or less

Value	Source
Calculated	--
Calculated	--
Constituent-specific	see applicable table.
Constituent-specific	see applicable table.
Calculated	--
Calculated	--
Calculated	--
Calculated	--
Constituent-specific	--
0.0143	U.S. EPA (1999)
Constituent-specific	--
Constituent-specific	--
0.38 Invertebrates	U.S. EPA (1993)
0.62 vegetation	U.S. EPA (1993)
0.44	U.S. EPA (1999)
Constituent-specific	--
0.137	U.S. EPA (1999)
4 Site estimate	Estimated site wetland area.
1.2	U.S. EPA (1993)

Constituent	C _{soil} (mg/kg DW)	BA _{soil/food} (unitless)	IR _{soil} (kgDW/kgBW-dy)	BCF _{SSI} (mg/kg WW)/(mg/kg DW soil)	C _{food (invert)} (mg/kg WW)	F _{food (invert)} (unitless)	BCF _r (mg/kg DW)/(mg/kg DW soil)	0.12 (unitless)	C _{food (veg)} (mg/kg WW)	F _{food (veg)} (unitless)	IR _{food} (kgWW/kgBW-dy)	C _{water} (mg/L)	IR _{water} (L/kgBW-day)	A/FA (unitless)	Intake _{soil} (mg/kgBW-dy)	Intake _{food} (mg/kgBW-dy)	Intake _{water} (mg/kgBW-dy)	Intake _{total} (mg/kgBW-dy)	TRV-Low (mg/kgBW-dy)	HI- High (unitless)	TRV-High (mg/kgBW-dy)	HI-Low (unitless)
PCBs (as Aroclor 1254)	2.09	1	0.0143	1.13	2.36E+00	0.38	1.27E-02	0.12	3.18E-03	0.62	0.44	6.67E-07	0.137	1	2.99E-02	3.96E-01	9.14E-08	4.26E-01	0.09	5	1.8	0.2
Acenaphthene	0.191	1	0.0143	0.05	9.55E-03	0.38	2.10E-01	0.12	4.81E-03	0.62	0.44	2.56E-05	0.137	1	2.73E-03	2.91E-03	3.50E-06	5.64E-03	2	0.003	2	0.003
Anthracene	0.221	1	0.0143	0.05	1.11E-02	0.38	9.20E-02	0.12	2.44E-03	0.62	7	9.15E-06	0.137	1	3.16E-03	4.00E-02	1.25E-06	4.31E-02	1	0.04	1	0.04
Benzo(a)anthracene	0.401	1	0.0143	0.03	1.20E-02	0.38	1.43E-02	0.12	6.87E-04	0.62	0.44	1.25E-06	0.137	1	5.73E-03	2.20E-03	1.72E-07	7.93E-03	1.1	0.007	1.1	0.007
Benzo(b)fluoranthene	0.274	1	0.0143	0.07	1.92E-02	0.38	1.72E-02	0.12	5.66E-04	0.62	0.44	1.20E-06	0.137	1	3.92E-03	3.36E-03	1.64E-07	7.28E-03	2	0.004	2	0.004
Benzo(k)fluoranthene	0.218	1	0.0143	0.08	1.74E-02	0.38	1.32E-02	0.12	3.45E-04	0.62	0.44	5.74E-07	0.137	1	3.12E-03	3.01E-03	7.86E-08	6.13E-03	2	0.003	2	0.003
Benzo(g,h,i)perylene	0.213	1	0.0143	0.05	1.07E-02	0.38	6.78E-03	0.12	1.73E-04	0.62	0.44	2.18E-07	0.137	1	3.05E-03	1.83E-03	2.99E-08	4.87E-03	2	0.002	2	0.002
Benzo(a)pyrene	0.395	1	0.0143	0.07	2.77E-02	0.38	1.25E-02	0.12	5.92E-04	0.62	0.44	9.60E-07	0.137	1	5.65E-03	4.78E-03	1.32E-07	1.04E-02	2	0.005	2	0.005
Chrysene	0.377	1	0.0143	0.04	1.51E-02	0.38	2.60E-02	0.12	1.18E-03	0.62	0.44	1.47E-06	0.137	1	5.39E-03	2.84E-03	2.02E-07	8.23E-03	2	0.004	2	0.004
Fluoranthene	0.329	1	0.0143	0.05	1.65E-02	0.38	3.72E-02	0.12	1.47E-03	0.62	0.44	3.77E-06	0.137	1	4.70E-03	3.15E-03	5.16E-07	7.86E-03	2	0.004	2	0.004
Fluorene	0.203	1	0.0143	0.05	1.02E-02	0.38	1.49E-01	0.12	3.62E-03	0.62	0.44	1.66E-05	0.137	1	2.90E-03	2.68E-03	2.27E-06	5.59E-03	1	0.006	1	0.006
Indeno(1,2,3-cd)pyrene	0.208	1	0.0143	0.08	1.66E-02	0.38	3.48E-03	0.12	8.69E-05	0.62	0.44	8.28E-08	0.137	1	2.97E-03	2.81E-03	1.13E-08	5.78E-03	2	0.003	2	0.003
Phenanthrene	0.446	1	0.0143	0.05	2.23E-02	0.38	8.84E-02	0.12	4.73E-03	0.62	0.44	1.74E-05	0.137	1	6.38E-03	5.02E-03	2.39E-06	1.14E-02	1.1	0.01	1.1	0.01
Pyrene	0.623	1	0.0143	0.05	3.12E-02	0.38	3.93E-02	0.12	2.94E-03	0.62	0.44	7.72E-06	0.137	1	8.91E-03	6.01E-03	1.06E-06	1.49E-02	2	0.007	2	0.007
Barium	83	0.07	0.0143	0.01	8.30E-01	0.38	1.50E-01	0.12	1.49E+00	0.62	0.44	2.63E-02	0.137	1	8.31E-02	3.82E-02	3.60E-03	1.25E-01	20.8	0.006	47.1	0.003
Cadmium	1.17	0.01	0.0143	0.96	1.12E+00	0.38	3.64E-01	0.12	5.11E-02	0.62	0.44	5.86E-05	0.137	1	1.67E-04	2.02E-03	8.03E-06	2.19E-03	1.45	0.002	20	0.0001
Chromium	13	0.005	0.0143	0.01	1.30E-01	0.38	7.50E-03	0.12	1.17E-02	0.62	0.44	1.72E-05	0.137	1	9.30E-04	1.25E-04	2.36E-06	1.06E-03	1	0.001	5	0.0002
Lead	138	0.12	0.0143	0.03	4.14E+00	0.38	4.50E-02	0.12	7.45E-01	0.62	0.44	3.47E-04	0.137	1	2.37E-01	1.07E-01	4.75E-05	3.44E-01	1.13	0.3	11.3	0.03
Mercury	0.18	0.07	0.0143	0.04	7.20E-03	0.38	3.75E-02	0.12	8.10E-04	0.62	0.44	2.27E-06	0.137	1	1.80E-04	9.97E-05	3.10E-07	2.80E-04	0.039	0.007	0.9	0.0003
Selenium	0.92	0.44	0.0143	0.01	9.20E-03	0.38	1.60E-02	0.12	1.77E-03	0.62	0.44	2.31E-05	0.137	1	5.79E-03	8.89E-04	3.17E-06	6.68E-03	0.5	0.01	1.0	0.007
																			HI =	5	HI =	0.4

U.S. EPA (1999). Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities. EPA 530-D-99-001A, August.
 U.S. EPA (1993). Wildlife Exposure Factors Handbook, Volume I. EPA/600/R-93/187a, December.

**APPENDIX D
TABLE D-2
RISK CHARACTERIZATION CALCULATIONS
RED-TAILED HAWK
Former McCoy Field Wetland Area
New Bedford, Massachusetts**

$Intake_{soil} = C_{soil} \times IR_{soil} \times BA_{soil/food} \times A/FA$
 $Intake_{food} = [(C_{food} \times F) \times IR_{food} \times BA_{soil/food} \times A/FA]$
 $Intake_{water} = C_{water} \times IR_{water} \times A/FA$
 $Intake_{total} = Intake_{soil} + Intake_{food} + Intake_{water}$
 $HI-Low = Intake_{total}/TRV-High$
 $HI-High = Intake_{total}/TRV-Low$

	Value	Source
HI-Low =	Low estimate of hazard index (unitless)	Calculated
HI-High =	High estimate of hazard index (unitless)	Calculated
TRV-Low =	Toxicity reference value (low) (mg/kgBW-dy)	Constituent-specific
TRV-High =	Toxicity reference value (high) (mg/kgBW-dy)	Constituent-specific
Intake _{total} =	Total Intake of constituent from all pathways (mg/kgBW-dy)	Calculated
Intake _{soil} =	Intake of constituent from soil ingestion (mg/kgBW-dy)	Calculated
Intake _{food} =	Intake of constituent from food ingestion (mg/kgBW-dy)	Calculated
Intake _{water} =	Intake of constituent from water ingestion (mg/kgBW-dy)	Calculated
C _{soil} =	Soil constituent concentration (mg/kgDW)	Constituent-specific
IR _{soil} =	Soil ingestion rate (kgDW/kgBW-day)	0.00995
C _{food} =	Food constituent concentration in <i>i</i> th food type (mg/kg WW)	Constituent-specific
F _i =	Fraction of <i>i</i> th food type in diet (unitless)	1 small mammals
IR _{food} =	Total food ingestion rate (kgWW/kgBW-day)	0.185
BA _{soil/food} =	Bioavailability from soil/food (unitless)	Constituent-specific
C _{water} =	Water constituent concentration (mg/L)	Constituent-specific
IR _{water} =	Water ingestion rate (L/kgBW-day)	0.057
A =	On-site foraging area (acres)	4
FA =	Total foraging area for organism (acres)	1,700

$C_{food} = BA_{mammal} [(C_{soil} \times BCF_{soil} \times BA_{soil/food} \times IR_{food-shrew}) + (C_{soil} \times BA_{soil/food} \times IR_{soil-shrew}) + (C_{sw} \times IR_{sw-shrew})]$
 where:

- BA_{mammal} = Mammal biotransfer factor (dy/kg)
- IR_{food-shrew} = Shrew consumption rate of worms (kg/dy)
- IR_{soil-shrew} = Shrew consumption rate of soil (kg/dy)
- IR_{sw-shrew} = Shrew consumption rate of surface water (L/dy)

[A/FA]= 1 or less

Constituent	C _{soil} (mg/kg)	BA _{soil/food} (unitless)	IR _{soil} (kg/kgBW-dy)	BCF _{soil} (mg/kg WW)/(mg/kg dry soil)	BA _{mammal} (day/kg FW tissue)	IR _{food-shrew} (kg/dy)	IR _{soil-shrew} (kg/dy)	IR _{sw-shrew} (L/dy)	C _{food} (mg/kg WW)	IR _{food} (kgWW/kgBW-dy)	F _{food} (kg/kgBW-dy)	C _{water} (mg/L)	IR _{water} (L/kgBW-day)	A/FA (unitless)	Intake _{soil} (mg/kgBW-dy)	Intake _{food} (mg/kgBW-dy)	Intake _{water} (mg/kgBW-dy)	Intake _{total} (mg/kgBW-dy)	TRV-Low (mg/kgBW-dy)	HI-High (unitless)	TRV-High (mg/kgBW-dy)	HI-Low (unitless)	
PCBs (as Aroclor 1254)	2.09	1	0.00995	1.13	2.69E-02	0.0075	0.00022	0.0023	4.89E-04	0.185	1	6.67E-07	0.057	0.0024	4.89E-05	2.13E-07	8.94E-11	4.91E-05	0.09	0.0005	1.8	0.00003	
Acenaphthene	0.191	1	0.00995	0.05	2.09E-04	0.0075	0.00022	0.0023	2.37E-08	0.185	1	2.56E-05	0.057	0.0024	4.47E-06	1.03E-11	3.43E-09	4.48E-06	2	0.000002	2	0.000002	
Anthracene	0.221	1	0.00995	0.05	8.71E-04	0.0075	0.00022	0.0023	1.14E-07	0.185	1	9.15E-06	0.057	0.0024	5.17E-06	4.97E-11	1.23E-09	5.18E-06	1	0.000005	1	0.000005	
Benzo(a)anthracene	0.401	1	0.00995	0.03	2.19E-02	0.0075	0.00022	0.0023	3.88E-06	0.185	1	1.25E-06	0.057	0.0024	9.39E-06	1.69E-09	1.68E-10	9.39E-06	1.1	0.000009	1.1	0.000009	
Benzo(b)fluoranthene	0.274	1	0.00995	0.07	1.58E-02	0.0075	0.00022	0.0023	3.22E-06	0.185	1	1.20E-06	0.057	0.0024	6.41E-06	1.40E-09	1.60E-10	6.42E-06	2	0.000003	2	0.000003	
Benzo(k)fluoranthene	0.218	1	0.00995	0.08	2.51E-02	0.0075	0.00022	0.0023	4.48E-06	0.185	1	5.74E-07	0.057	0.0024	5.10E-06	1.95E-09	7.70E-11	5.11E-06	2	0.000003	2	0.000003	
Benzo(g,h,i)perylene	0.213	1	0.00995	0.05	7.94E-02	0.0075	0.00022	0.0023	1.00E-05	0.185	1	2.18E-07	0.057	0.0024	4.99E-06	4.36E-09	2.93E-11	4.99E-06	2	0.000002	2	0.000002	
Benzo(a)pyrene	0.395	1	0.00995	0.07	2.75E-02	0.0075	0.00022	0.0023	8.08E-06	0.185	1	9.60E-07	0.057	0.0024	9.25E-06	3.52E-09	1.29E-10	9.25E-06	2	0.000002	2	0.000002	
Chrysene	0.377	1	0.00995	0.04	7.76E-03	0.0075	0.00022	0.0023	1.51E-06	0.185	1	1.47E-06	0.057	0.0024	8.83E-06	6.59E-10	1.98E-10	8.83E-06	2	0.000005	2	0.000005	
Fluoranthene	0.329	1	0.00995	0.05	4.17E-03	0.0075	0.00022	0.0023	8.13E-07	0.185	1	3.77E-06	0.057	0.0024	7.70E-06	3.54E-10	5.05E-10	7.70E-06	2	0.000004	2	0.000004	
Fluorene	0.203	1	0.00995	0.05	3.80E-04	0.0075	0.00022	0.0023	4.57E-08	0.185	1	1.66E-05	0.057	0.0024	4.75E-06	1.99E-11	2.22E-09	4.75E-06	1	0.000005	1	0.000005	
Indeno(1,2,3-cd)pyrene	0.208	1	0.00995	0.08	2.51E-01	0.0075	0.00022	0.0023	4.27E-05	0.185	1	8.28E-08	0.057	0.0024	4.87E-06	1.86E-08	1.11E-11	4.89E-06	2	0.000002	2	0.000002	
Phenanthrene	0.446	1	0.00995	0.05	9.33E-04	0.0075	0.00022	0.0023	2.47E-07	0.185	1	7.72E-06	0.057	0.0024	1.46E-05	6.11E-10	1.04E-09	1.46E-05	2	0.000007	2	0.000007	
Pyrene	0.623	1	0.00995	0.05	3.80E-03	0.0075	0.00022	0.0023	1.40E-06	0.185	1	2.63E-02	0.057	0.0024	1.36E-04	5.05E-10	3.52E-06	1.40E-04	20.8	0.000007	47.1	0.000003	
Barium	83	0.07	0.00995	0.01	9.43E-03	0.0075	0.00022	0.0023	1.66E-05	0.185	1	5.86E-05	0.057	0.0024	2.74E-07	2.85E-12	7.87E-09	2.82E-07	1.45	0.0000002	20	0.0000001	
Cadmium	1.17	0.01	0.00995	0.96	7.54E-03	0.0075	0.00022	0.0023	6.55E-07	0.185	1	1.72E-05	0.057	0.0024	1.52E-06	1.43E-11	2.31E-09	1.52E-06	1	0.000002	5	0.000003	
Chromium	13	0.005	0.00995	0.01	3.45E-01	0.0075	0.00022	0.0023	6.57E-06	0.185	1	3.47E-04	0.057	0.0024	3.88E-04	7.20E-09	4.65E-08	3.88E-04	1.13	0.0003	11.3	0.00003	
Lead	138	0.12	0.00995	0.03	1.88E-02	0.0075	0.00022	0.0023	1.38E-04	0.185	1	2.27E-06	0.057	0.0024	2.95E-07	6.49E-11	3.04E-10	2.95E-07	0.039	0.000008	0.9	0.000003	
Mercury	0.18	0.07	0.00995	0.04	3.26E-01	0.0075	0.00022	0.0023	2.13E-06	0.185	1	2.31E-05	0.057	0.0024	9.48E-06	3.23E-09	3.10E-09	9.48E-06	0.5	0.00002	1	0.000009	
Selenium	0.92	0.44	0.00995	0.01	1.43E-01	0.0075	0.00022	0.0023	1.69E-05	0.185	1												
Total																				HI =	0.001	HI =	0.0001

U.S. EPA (1999). Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities. EPA 530-D-99-001A, August.
 U.S. EPA (1993). Wildlife Exposure Factors Handbook, Volume I. EPA/600/R-93/187a, December.

APPENDIX D
TABLE D-3
CHEMICAL PROPERTIES AND INTERMEDIATE CALCULATIONS
AVIAN RECEPTORS
Former McCoy Field Wetland Area
New Bedford, Massachusetts

Constituent	Soil/Sediment Concentration C_{soil} (mg/kg)	Estimated Surface Water Concentration C_{SW} (mg/L)	Bioavailability from Soil ¹ BA_{soil} (unitless)	n-Octanol/Water Partition Coefficient K_{ow} (L/kg)	Sediment/Water Partition Coefficient ² K_D (L/kg)	Soil-to-Soil Invertebrate Bioconcentration Factor BCF_{SSI} (mg/kg WW)/(mg/kg DW soil)	Soil-to-Plant Bioconcentration Factor BCF_r (mg/kg DW)/(mg/kg DW soil)	Mammal Biotransfer Factor BA_{mammal} (day/kg WW tissue)	Shrew Food Ingestion Rate ³ $IR_{food-shrew}$ (kg/dy)	Shrew Soil Ingestion Rate ³ $IR_{soil-shrew}$ (kg/dy)	Shrew Surface Water Ingestion Rate ³ $IR_{SW-shrew}$ (L/dy)
PCBs (as Aroclor 1254)	2.09	6.67E-07	1	1.07E+06 [7]	--	1.13E+00 [9]	1.27E-02 [11]	2.69E-02 [4]	0.0075	0.00022	0.0023
Acenaphthene	0.191	2.56E-05	1	8.32E+03 [8]	--	5.00E-02 [10]	2.10E-01 [11]	2.09E-04 [4]	0.0075	0.00022	0.0023
Anthracene	0.221	9.15E-06	1	3.47E+04 [8]	--	5.00E-02 [10]	9.20E-02 [11]	8.71E-04 [4]	0.0075	0.00022	0.0023
Benzo(a)anthracene	0.401	1.25E-06	1	8.71E+05 [8]	--	3.00E-02 [9]	1.43E-02 [11]	2.19E-02 [4]	0.0075	0.00022	0.0023
Benzo(b)fluoranthene	0.274	1.20E-06	1	6.31E+05 [8]	--	7.00E-02 [9]	1.72E-02 [11]	1.58E-02 [4]	0.0075	0.00022	0.0023
Benzo(k)fluoranthene	0.218	5.74E-07	1	1.00E+06 [8]	--	8.00E-02 [9]	1.32E-02 [11]	2.51E-02 [4]	0.0075	0.00022	0.0023
Benzo(g,h,i)perylene	0.213	2.18E-07	1	3.16E+06 [8]	--	5.00E-02 [10]	6.78E-03 [11]	7.94E-02 [4]	0.0075	0.00022	0.0023
Benzo(a)pyrene	0.395	9.60E-07	1	1.10E+06 [8]	--	7.00E-02 [9]	1.25E-02 [11]	2.75E-02 [4]	0.0075	0.00022	0.0023
Chrysene	0.377	1.47E-06	1	3.09E+05 [8]	--	4.00E-02 [9]	2.60E-02 [11]	7.76E-03 [4]	0.0075	0.00022	0.0023
Fluoranthene	0.329	3.77E-06	1	1.66E+05 [8]	--	5.00E-02 [10]	3.72E-02 [11]	4.17E-03 [4]	0.0075	0.00022	0.0023
Fluorene	0.203	1.66E-05	1	1.51E+04 [8]	--	5.00E-02 [10]	1.49E-01 [11]	3.80E-04 [4]	0.0075	0.00022	0.0023
Indeno(1,2,3-cd)pyrene	0.208	8.28E-08	1	1.00E+07 [8]	--	8.00E-02 [9]	3.48E-03 [11]	2.51E-01 [4]	0.0075	0.00022	0.0023
Phenanthrene	0.446	1.74E-05	1	3.72E+04 [8]	--	5.00E-02 [10]	8.84E-02 [11]	9.33E-04 [4]	0.0075	0.00022	0.0023
Pyrene	0.623	7.72E-06	1	1.51E+05 [8]	--	5.00E-02 [10]	3.93E-02 [11]	3.80E-03 [4]	0.0075	0.00022	0.0023
Barium	83	2.63E-02	0.07	-	3.16E+02	1.00E-02 [5]	1.50E-01 [9]	9.43E-03 [12]	0.0075	0.00022	0.0023
Cadmium	1.17	5.86E-05	0.01	-	2.00E+03	9.60E-01 [9]	3.64E-01 [9]	7.54E-03 [12]	0.0075	0.00022	0.0023
Chromium	13	1.72E-05	0.005	-	7.54E+04	1.00E-02 [9]	7.50E-03 [9]	3.45E-01 [12]	0.0075	0.00022	0.0023
Lead	138	3.47E-04	0.15	-	3.98E+04	3.00E-02 [9]	4.50E-02 [9]	1.88E-02 [12]	0.0075	0.00022	0.0023
Mercury	0.18	2.27E-06	0.07	-	7.94E+03	4.00E-02 [6,9]	3.75E-02 [6,9]	3.26E-01 [12]	0.0075	0.00022	0.0023
Selenium	0.92	2.31E-05	0.44	-	3.98E+03	1.00E-02 [5]	1.60E-02 [9]	1.43E-01 [12]	0.0075	0.00022	0.0023

mg = milligrams.

kg = kilograms.

L = liters.

dy = day

DW = dry weight.

WW = wet (fresh) weight.

1. Assumed value for organics; see associated table for metal references.

2. U.S. EPA (1999a) Partition Coefficients for Metals in Surface Water, Soil, and Waste (draft). June 22.

4. For organic constituents, $\log BA_{mammal} = -7.6 + \log K_{ow}$. (U.S. EPA 1999)

3. Calculated as 0.5 kg/kgBW-dy x 0.015 kg body weight (for food); 0.0145 kg/kgBW-dy x 0.015 kg (for soil); 0.151 L/kgW-dy x 0.015 kg (for surface water) (U.S. EPA 1999).

5. Reportedly does not bioaccumulate; lowest value of assessed metals applied [U.S. EPA (2005b) <http://www.epa.gov/region5/superfund/ecology/html/toxprofiles.htm>].

6. Value for mercuric chloride applied.

7. U.S. EPA (2004a). Water9 Version 2.0.0 Database.

8. TPHCWG (1998). Composition of Petroleum Mixtures. May.

9. U.S. EPA (1999). Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities. EPA 530-D-99-001A, August.

10. No value available; midpoint of available values for PAHs applied.

11. Calculated from the following regression equation: $\log BCF = 1.588 - 0.578 \times \log K_{ow}$ per U.S. EPA (1999).

12. For metals, BA_{mammal} values were back-calculated from BCF values presented in U.S. EPA (1999) Table D-3 for short-tailed shrew, using a soil ingestion rate of 0.0145 kg/kg-dy and a body weight of 0.015 kg.

Appendix E
Mammalian Risk
Characterization Calculations



APPENDIX E
TABLE E-1
RISK CHARACTERIZATION CALCULATIONS
SHORT-TAILED SHREW
Former McCoy Field Wetland Area
New Bedford, Massachusetts

$Intake_{soil} = C_{soil} \times IR_{soil} \times BA_{soil/food} \times A/FA$
 $Intake_{food} = [(C_{food1} \times F_1) + (C_{food2} \times F_2)] \times IR_{food} \times BA_{soil/food} \times A/FA$
 $Intake_{water} = C_{water} \times IR_{water} \times A/FA$
 $Intake_{total} = Intake_{soil} + Intake_{food} + Intake_{water}$
HI-High = $Intake_{total}/TRV-Low$
HI-Low = $Intake_{total}/TRV-High$

	Value	Source
HI-High =	High estimate of hazard index (unitless)	Calculated
HI-Low =	Low estimate of hazard index (unitless)	Calculated
TRV-Low =	Toxicity Reference Value - Low (mg/kgBW-dy)	Constituent-specific
TRV-High =	Toxicity Reference Value - High (mg/kgBW-dy)	Constituent-specific
Intake _{total} =	Total intake of constituent from all pathways (mg/kgBW-dy)	Calculated
Intake _{soil} =	Intake of constituent from soil ingestion (mg/kgBW-dy)	Calculated
Intake _{food} =	Intake of constituent from food ingestion (mg/kgBW-dy)	Calculated
Intake _{water} =	Intake of constituent from water ingestion (mg/kgBW-dy)	Calculated
C _{soil} =	Soil constituent concentration (mg/kgDW)	Constituent-specific
IR _{soil} =	Soil ingestion rate (kgDW/kgBW-day)	0.0145
BA _{soil/food} =	Bioavailability from soil and food (unitless)	Constituent-specific
C _{food} =	Food constituent concentration in <i>lth</i> food type (mg/kgWW)	Constituent-specific
F _{food1} =	Fraction of diet for <i>lth</i> food (unitless)	0.83 Invertebrates U.S. EPA (1993)
F _{food2} =		0.17 vegetation U.S. EPA (1993)
IR _{food} =	Total food ingestion rate (kgWW/kgBW-day)	0.5 U.S. EPA (1993)
C _{water} =	Water constituent concentration (mg/L)	Constituent-specific
IR _{water} =	Water ingestion rate (L/kgBW-day)	0.151 U.S. EPA (1999)
A =	On-site foraging area (acres)	4 Site estimate
FA =	Total foraging area for organism (acres)	0.9 U.S. EPA (1993)

$C_{food} (invertebrates) = C_{soil} \times BCF_{ss}$
 $BCF_{ss} =$ Soil-to-soil invertebrate bioaccumulation factor [(mg/kg WW)/(mg/kgDW soil)]

$C_{food} (vegetation) = C_{soil} \times BCF_v \times 0.12$
 where: $BCF_v =$ Plant-soil bioconcentration factor [(mg/kgDW)/(mg/kgDW soil)]
 0.12 = Dry weight (DW) to wet weight (WW) conversion factor (unitless) (assumed vegetation is 88% moisture).

$A/FA =$ 1 or less

Constituent	C _{soil} (mg/kg)	BA _{soil/food} (unitless)	IR _{soil} (kg/kgBW-dy)	Soil-to-Soil Invertebrate BCF _{ss} (mg/kg WW)/(mg/kg DW soil)	C _{food(invert)} (mg/kg WW)	F _{food(invert)} (kg/kgBW-dy)	BCF _v (mg/kg WW)/(mg/kg DW soil)	0.12 (unitless)	C _{food(veg)} (mg/kg WW)	F _{food(veg)} (kg/kgBW-dy)	IR _{food} (kg/kgBW-dy)	C _{water} (mg/L)	IR _{water} (L/kgBW-day)	A/FA (unitless)	Intake _{soil} (mg/kgBW-dy)	Intake _{food} (mg/kgBW-dy)	Intake _{water} (mg/kgBW-dy)	Intake _{total} (mg/kgBW-dy)	TRV-Low (mg/kgBW-dy)	HI-High (unitless)	TRV-High (mg/kgBW-dy)	HI-Low (unitless)		
PCBs (as Aroclor 1254)	2.09	1	0.0145	1.13	2.36E+00	0.83	1.27E-02	0.12	2.20E-05	0.17	0.5	6.67E-07	0.151	1	3.03E-02	9.80E-01	1.01E-07	1.01E+00	0.36	3	1.28	0.8		
Acenaphthene	0.191	1	0.0145	0.05	9.55E-03	0.83	2.10E-01	0.12	3.65E-04	0.17	0.5	2.56E-05	0.151	1	2.77E-03	3.99E-03	3.86E-06	6.77E-03	17.5	0.0004	17.5	0.0004		
Anthracene	0.221	1	0.0145	0.05	1.11E-02	0.83	9.20E-02	0.12	1.60E-04	0.17	0.5	9.15E-06	0.151	1	3.20E-03	4.60E-03	1.38E-06	7.81E-03	100	0.00008	100	0.00008		
Benzo(a)anthracene	0.401	1	0.0145	0.03	1.20E-02	0.83	1.43E-02	0.12	2.48E-05	0.17	0.5	1.25E-06	0.151	1	5.81E-03	4.99E-03	1.89E-07	1.08E-02	0.167	0.06	0.167	0.06		
Benzo(b)fluoranthene	0.274	1	0.0145	0.07	1.92E-02	0.83	1.72E-02	0.12	2.99E-05	0.17	0.5	1.20E-06	0.151	1	3.97E-03	7.96E-03	1.80E-07	1.19E-02	4	0.003	4	0.003		
Benzo(k)fluoranthene	0.218	1	0.0145	0.08	1.74E-02	0.83	1.32E-02	0.12	2.29E-05	0.17	0.5	5.74E-07	0.151	1	3.16E-03	7.24E-03	8.66E-08	1.04E-02	7.2	0.001	7.2	0.001		
Benzo(g,h,i)perylene	0.213	1	0.0145	0.05	1.07E-02	0.83	6.78E-03	0.12	1.18E-05	0.17	0.5	2.18E-07	0.151	1	3.09E-03	4.42E-03	3.29E-08	7.51E-03	7.2	0.001	7.2	0.001		
Benzo(a)pyrene	0.395	1	0.0145	0.07	2.77E-02	0.83	1.25E-02	0.12	2.17E-05	0.17	0.5	9.60E-07	0.151	1	5.73E-03	1.15E-02	1.45E-07	1.72E-02	1.31	0.01	32.8	0.0005		
Chrysene	0.377	1	0.0145	0.04	1.51E-02	0.83	2.60E-02	0.12	4.52E-05	0.17	0.5	1.47E-06	0.151	1	5.47E-03	6.26E-03	2.23E-07	1.17E-02	0.17	0.07	0.17	0.07		
Fluoranthene	0.329	1	0.0145	0.05	1.65E-02	0.83	3.72E-02	0.12	6.48E-05	0.17	0.5	3.77E-06	0.151	1	4.77E-03	6.83E-03	5.69E-07	1.16E-02	12.5	0.0009	12.5	0.0009		
Fluorene	0.203	1	0.0145	0.05	1.02E-02	0.83	1.49E-01	0.12	2.59E-04	0.17	0.5	1.66E-05	0.151	1	2.94E-03	4.23E-03	2.50E-08	7.18E-03	12.5	0.0006	12.5	0.0006		
Indeno(1,2,3-cd)pyrene	0.208	1	0.0145	0.08	1.66E-02	0.83	3.48E-03	0.12	6.06E-06	0.17	0.5	8.28E-08	0.151	1	3.02E-03	6.91E-03	1.25E-08	9.92E-03	7.2	0.001	7.2	0.001		
Phenanthrene	0.446	1	0.0145	0.05	2.23E-02	0.83	8.84E-02	0.12	1.54E-04	0.17	0.5	1.74E-05	0.151	1	6.47E-03	9.27E-03	2.63E-06	1.57E-02	100	0.0002	100	0.0002		
Pyrene	0.623	1	0.0145	0.05	3.12E-02	0.83	3.93E-02	0.12	6.83E-05	0.17	0.5	7.72E-06	0.151	1	9.03E-03	1.29E-02	1.17E-06	2.20E-02	7.5	0.003	7.5	0.003		
Barium	83	0.07	0.0145	0.01	8.30E-01	0.83	1.50E-01	0.12	2.61E-04	0.17	0.5	2.63E-02	0.151	1	8.42E-02	2.41E-02	3.97E-03	1.12E-01	2.8	0.04	10.5	0.01		
Cadmium	1.17	0.01	0.0145	0.96	1.12E+00	0.83	3.64E-01	0.12	6.33E-04	0.17	0.5	5.86E-05	0.151	1	1.70E-04	4.66E-03	8.86E-06	4.84E-03	0.51	0.009	5.1	0.0009		
Chromium	13	0.005	0.0145	0.01	1.30E-01	0.83	7.50E-03	0.12	1.31E-05	0.17	0.5	1.72E-05	0.151	1	9.43E-04	2.70E-04	2.60E-06	1.21E-03	2.4	0.0005	2.4	0.0005		
Lead	138	0.12	0.0145	0.03	4.14E+00	0.83	4.50E-02	0.12	7.83E-05	0.17	0.5	3.47E-04	0.151	1	2.40E-01	2.06E-01	5.23E-05	4.46E-01	4.22	0.1	241	0.002		
Mercury	0.18	0.07	0.0145	0.04	7.20E-03	0.83	3.75E-02	0.12	6.53E-05	0.17	0.5	2.27E-06	0.151	1	1.83E-04	2.10E-04	3.42E-07	3.93E-04	0.69	0.0006	4	0.0001		
Selenium	0.92	0.44	0.0145	0.01	9.20E-03	0.83	1.60E-02	0.12	2.78E-05	0.17	0.5	2.31E-05	0.151	1	5.87E-03	1.68E-03	3.49E-06	7.55E-03	0.076	0.1	1.2	0.006		
HI =																			3		HI =		1	

U.S. EPA (1999). Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities. EPA 530-D-99-001A, August.
 U.S. EPA (1993). Wildlife Exposure Factors Handbook, Volume I. EPA/600/R-93/187a, December.

**APPENDIX E
TABLE E-2
RISK CHARACTERIZATION CALCULATIONS
RACCOON
Former McCoy Field Wetland Area
New Bedford, Massachusetts**

$Intake_{soil} = C_{soil} \times IR_{soil} \times BA_{soil/food} \times A/FA$
 $Intake_{food} = [(C_{food1} \times F_1) + (C_{food2} \times F_2) + (C_{food3} \times F_3)] \times IR_{food} \times BA_{soil/food} \times A/FA$
 $Intake_{water} = C_{water} \times IR_{water} \times A/FA$
 $Intake_{total} = Intake_{soil} + Intake_{food} + Intake_{water}$
 $HI-High = Intake_{total}/TRV-Low$
 $HI-Low = Intake_{total}/TRV-High$

	Value	Source
HI-High =	High estimate of hazard index (unitless)	Calculated
HI-Low =	Low estimate of hazard index (unitless)	Calculated
TRV-Low =	Toxicity Reference Value - low (mg/kgBW-dy)	Constituent-specific
TRV-High =	Toxicity Reference Value - High (mg/kgBW-dy)	Constituent-specific
Intake _{total} =	Total Intake of constituent from all pathways (mg/kgBW-dy)	Calculated
Intake _{food} =	Intake of constituent from food Ingestion (mg/kgBW-dy)	Calculated
Intake _{water} =	Intake of constituent from water Ingestion (mg/kgBW-dy)	Calculated
C _{soil} =	Soil constituent concentration (mg/kgDW)	Constituent-specific
IR _{soil} =	Soil Ingestion rate (kgDW/kgBW-day)	0.0058
BA _{soil/food} =	Bioavailability from soil and food (unitless)	Constituent-specific
C _{food} =	Constituent concentration in <i>th</i> food (mg/kg WW)	Calculated
F _{food} =	Fraction of diet for <i>th</i> food (unitless)	F _{food1} = 0.58 vegetation F _{food2} = 0.17 Invertebrates F _{food3} = 0.25 mammals
IR _{food} =	Total food ingestion rate (kgWW/kgBW-day)	0.29 Assume 10% of food ingestion rate; 80% food moisture (68% for invertebrates and mammals; 88% for vegetation).
C _{water} =	Water constituent concentration (mg/L)	Constituent-specific
IR _{water} =	Water Ingestion rate (L/kgBW-day)	0.08
A =	On-site foraging area (acres)	4 Site estimate
FA =	Total foraging area for organism (acres)	390 U.S. EPA (1993)

$C_{food (veg)} = C_{soil} \times BCF_r \times 0.12$
 where:
 $BCF_r =$ Plant-soil bioconcentration factor [(mg/kg DW)/(mg/kg soil)]
 0.12 = Dry weight (DW) to wet weight (WW) conversion factor (unitless)

$C_{food (invert)} = C_{soil} \times BCF_{si}$
 where:
 $BCF_{si} =$ Soil to soil invertebrate bioaccumulation factor [(mg/kg WW)/(mg/kg soil)]

$C_{food (mammal)} = BA_{mammal} [(C_{invert} \times BA_{soil/invert} \times IR_{food-shrew}) + (C_{soil} \times BA_{soil/food} \times IR_{soil-shrew}) + (C_{SW} \times IR_{SW-shrew})]$
 where:
 $BA_{mammal} =$ Mammal biotransfer factor (dy/kg)
 $IR_{food-shrew} =$ Shrew consumption rate of food (kg/dy)
 $IR_{soil-shrew} =$ Shrew consumption rate of soil (kg/dy)
 $IR_{SW-shrew} =$ Shrew consumption rate of surface water (L/dy)

[A/FA] = 1 or less

Constituent	C _{soil} (mg/kg)	BA _{soil/food} (unitless)	IR _{soil} (kg/kgBW-dy)	BCF _r (mg/kg FW)/(mg/kg DW soil)	0.12 (unitless)	C _{food(veg)} (mg/kg WW)	F _{food(veg)} (kg/kgBW-dy)	BCF _{ssi} (mg/kg WW)/(mg/kg DW soil)	C _{food (invert)} (mg/kg WW)	F _{food (invert)} (kg/kgBW-dy)	BA _{mammal} (day/kgWW tissue)	IR _{food-shrew} (kg/dy)	IR _{soil-shrew} (kg/dy)	IR _{SW-shrew} (L/dy)	C _{food (mammal)} (mg/kg WW)	F _{food (mammal)} (kg/kgBW-dy)	IR _{food} (kg/kgBW-dy)	C _{SW} (mg/L)	IR _{water} (L/kgBW-day)	A/FA (unitless)	Intake _{soil} (mg/kgBW-dy)	Intake _{food} (mg/kgBW-dy)	Intake _{water} (mg/kgBW-dy)	Intake _{total} (mg/kgBW-dy)	TRV-Low (mg/kgBW-dy)	HI-High (unitless)	TRV-High (mg/kgBW-dy)	HI-Low (unitless)	
PCBs (as Aroclor 1254)	2.09	1	0.0058	1.27E-02	0.12	3.18E-03	0.58	1.13	2.36E+00	0.17	2.69E-02	0.0075	0.0002	0.0023	4.89E-04	0.25	0.29	6.67E-07	0.08	0.010	1.25E-04	1.21E-03	5.47E-10	1.33E-03	0.36	0.004	1.28	0.001	
Acenaphthene	0.191	1	0.0058	2.10E-01	0.12	4.81E-03	0.58	0.05	9.55E-03	0.17	2.09E-04	0.0075	0.0002	0.0023	2.37E-08	0.25	0.29	2.56E-05	0.08	0.010	1.14E-05	1.32E-05	2.10E-08	2.46E-05	17.5	0.000001	17.5	0.000001	
Anthracene	0.221	1	0.0058	9.20E-02	0.12	2.44E-03	0.58	0.05	1.11E-02	0.17	8.71E-04	0.0075	0.0002	0.0023	1.14E-07	0.25	0.29	9.15E-06	0.08	0.010	1.32E-05	9.84E-06	7.51E-09	2.31E-05	100	0.0000002	100	0.0000002	
Benzo(a)anthracene	0.401	1	0.0058	1.43E-02	0.12	6.87E-04	0.58	0.03	1.20E-02	0.17	2.19E-02	0.0075	0.0002	0.0023	3.88E-06	0.25	0.29	1.25E-06	0.08	0.010	2.40E-05	7.31E-06	1.03E-09	3.13E-05	0.167	0.0002	0.167	0.0002	
Benzo(b)fluoranthene	0.274	1	0.0058	1.72E-02	0.12	5.66E-04	0.58	0.07	1.92E-02	0.17	1.58E-02	0.0075	0.0002	0.0023	3.22E-06	0.25	0.29	1.20E-06	0.08	0.010	1.64E-05	1.07E-05	9.81E-10	2.71E-05	4	0.000007	4	0.000007	
Benzo(k)fluoranthene	0.218	1	0.0058	1.32E-02	0.12	3.45E-04	0.58	0.08	1.74E-02	0.17	2.51E-02	0.0075	0.0002	0.0023	4.48E-06	0.25	0.29	5.74E-07	0.08	0.010	1.30E-05	9.46E-06	4.71E-10	2.25E-05	7.2	0.000003	7.2	0.000003	
Benzo(g,h,i)perylene	0.213	1	0.0058	6.78E-03	0.12	1.73E-04	0.58	0.05	1.07E-02	0.17	7.94E-02	0.0075	0.0002	0.0023	1.00E-05	0.25	0.29	2.18E-07	0.08	0.010	1.27E-05	5.72E-06	1.79E-10	1.85E-05	7.2	0.000003	7.2	0.000003	
Benzo(a)pyrene	0.395	1	0.0058	1.25E-02	0.12	5.92E-04	0.58	0.07	2.77E-02	0.17	2.75E-02	0.0075	0.0002	0.0023	8.08E-06	0.25	0.29	9.60E-07	0.08	0.010	2.36E-05	1.51E-05	7.88E-10	3.87E-05	1.31	0.00003	32.8	0.000001	
Chrysene	0.377	1	0.0058	2.60E-02	0.12	1.18E-03	0.58	0.04	1.51E-02	0.17	7.76E-03	0.0075	0.0002	0.0023	1.51E-06	0.25	0.29	1.47E-06	0.08	0.010	2.25E-05	9.70E-06	1.21E-09	3.22E-05	0.17	0.0002	0.17	0.0002	
Fluoranthene	0.329	1	0.0058	3.72E-02	0.12	1.47E-03	0.58	0.05	1.65E-02	0.17	4.17E-03	0.0075	0.0002	0.0023	8.13E-07	0.25	0.29	3.77E-06	0.08	0.010	1.97E-05	1.09E-05	3.09E-09	3.06E-05	12.5	0.000002	12.5	0.000002	
Fluorene	0.203	1	0.0058	1.49E-01	0.12	3.62E-03	0.58	0.05	1.02E-02	0.17	3.80E-04	0.0075	0.0002	0.0023	4.57E-08	0.25	0.29	1.66E-05	0.08	0.010	1.21E-05	1.14E-05	1.36E-08	2.36E-05	12.5	0.000002	12.5	0.000002	
Indeno(1,2,3-cd)pyrene	0.208	1	0.0058	3.48E-03	0.12	8.69E-05	0.58	0.08	1.66E-02	0.17	2.51E-01	0.0075	0.0002	0.0023	4.27E-05	0.25	0.29	8.28E-08	0.08	0.010	1.24E-05	8.64E-06	6.79E-11	2.11E-05	7.2	0.000003	7.2	0.000003	
Phenanthrene	0.446	1	0.0058	8.84E-02	0.12	4.73E-03	0.58	0.05	2.23E-02	0.17	9.33E-04	0.0075	0.0002	0.0023	2.47E-07	0.25	0.29	1.74E-05	0.08	0.010	2.67E-05	1.95E-05	1.43E-08	4.62E-05	100	0.0000005	100	0.0000005	
Pyrene	0.623	1	0.0058	3.93E-02	0.12	2.94E-03	0.58	0.05	3.12E-02	0.17	3.80E-03	0.0075	0.0002	0.0023	1.40E-06	0.25	0.29	7.72E-06	0.08	0.010	3.72E-05	2.09E-05	6.33E-09	5.82E-05	7.5	0.000008	7.5	0.000008	
Barium	83	0.07	0.0058	1.50E-01	0.12	1.49E+00	0.58	0.01	8.30E-01	0.17	9.43E-03	0.0075	0.0002	0.0023	1.66E-05	0.25	0.29	2.63E-02	0.08	0.010	3.47E-04	2.11E-04	2.16E-05	5.80E-04	2.8	0.0002	10.5	0.00006	
Cadmium	1.17	0.01	0.0058	3.64E-01	0.12	5.11E-02	0.58	0.96	1.12E+00	0.17	7.54E-03	0.0075	0.0002	0.0023	6.55E-07	0.25	0.29	5.86E-05	0.08	0.010	6.99E-07	6.59E-06	4.81E-08	7.34E-06	0.19	0.00004	5.1	0.000001	
Chromium (total)	13	0.005	0.0058	7.50E-03	0.12	1.17E-02	0.58	0.01	1.30E-01	0.17	3.45E-01	0.0075	0.0002	0.0023	6.57E-06	0.25	0.29	1.72E-05	0.08	0.010	3.89E-06	4.32E-07	1.41E-08	4.33E-06	2.4	0.000002	2.4	0.000002	
Lead	138	0.12	0.0058	4.50E-02	0.12	7.45E-01	0.58	0.03	4.14E+00	0.17	1.88E-02	0.0075	0.0002	0.0023	1.38E-04	0.25	0.29	3.47E-04	0.08	0.010	9.90E-04	4.07E-04	2.84E-07	1.40E-03	4.22	0.0003	241	0.000006	
Mercury	0.18	0.07	0.0058	3.75E-02	0.12	8.10E-04	0.58	0.04	7.20E-03	0.17	3.26E-01	0.0075	0.0002	0.0023	2.13E-06	0.25	0.29	2.27E-06	0.08	0.010	7.53E-07	3.54E-07	1.86E-09	1.11E-06	0.69	0.000004	4	0.0000003	
Selenium	0.92	0.44	0.0058	1.60E-02	0.12	1.77E-03	0.58	0.01	9.20E-03	0.17	1.43E-01	0.0075	0.0002	0.0023	1.69E-05	0.25	0.29	2.31E-05	0.08	0.010	2.42E-05	3.41E-06	1.90E-08	2.76E-05	0.076	0.0002	1.21	0.0002	
																										HI =	0.005	HI =	0.002

U.S. EPA (1999). Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities. EPA 530-D-99-001A, August.
 U.S. EPA (1993). Wildlife Exposure Factors Handbook, Volume I. EPA/600/R-93/187a, December.

APPENDIX E
TABLE E-3
CHEMICAL PROPERTIES AND INTERMEDIATE CALCULATIONS
MAMMALIAN RECEPTORS
Former McCoy Field Wetland Area
New Bedford, Massachusetts

Constituent	Soil/Sediment Concentration C_{soil} (mg/kg)	Estimated Surface Water Concentration C_{SW} (mg/L)	Bioavailability from Soil and Food ¹ $BA_{soil/food}$ (unitless)	n-Octanol/Water Partition Coefficient K_{ow} (L/kg)	Sediment/Water Partition Coefficient ² K_p (L/kg)	Soil-to-Soil Invertebrate Bioconcentration Factor BCF_{SSI} (mg/kg WW)/(mg/kg DWsoil)	Soil-to-Plant Bioconcentration Factor BCF_p (mg/kg DW)/(mg/kg DWsoil)	Mammal Biotransfer Factor BA_{mammal} (day/kg FW tissue)	Shrew Food Ingestion Rate ³ $IR_{food-shrew}$ (kg/dy)	Shrew Soil Ingestion Rate ³ $IR_{soil-shrew}$ (kg/dy)	Shrew Surface Water Ingestion Rate ³ $IR_{SW-shrew}$ (L/dy)
PCBs (as Aroclor 1254)	2.09	6.67E-07	1	1.07E+06 [7]	--	1.13E+00 [9]	1.27E-02 [11]	2.69E-02 [4]	0.0075	0.00022	0.0023
Acenaphthene	0.191	2.56E-05	1	8.32E+03 [8]	--	5.00E-02 [10]	2.10E-01 [11]	2.09E-04 [4]	0.0075	0.00022	0.0023
Anthracene	0.221	9.15E-06	1	3.47E+04 [8]	--	5.00E-02 [10]	9.20E-02 [11]	8.71E-04 [4]	0.0075	0.00022	0.0023
Benzo(a)anthracene	0.401	1.25E-06	1	8.71E+05 [8]	--	3.00E-02 [9]	1.43E-02 [11]	2.19E-02 [4]	0.0075	0.00022	0.0023
Benzo(b)fluoranthene	0.274	1.20E-06	1	6.31E+05 [8]	--	7.00E-02 [9]	1.72E-02 [11]	1.58E-02 [4]	0.0075	0.00022	0.0023
Benzo(k)fluoranthene	0.218	5.74E-07	1	1.00E+06 [8]	--	8.00E-02 [9]	1.32E-02 [11]	2.51E-02 [4]	0.0075	0.00022	0.0023
Benzo(g,h,i)perylene	0.213	2.18E-07	1	3.16E+06 [8]	--	5.00E-02 [10]	6.78E-03 [11]	7.94E-02 [4]	0.0075	0.00022	0.0023
Benzo(a)pyrene	0.395	9.60E-07	1	1.10E+06 [8]	--	7.00E-02 [9]	1.25E-02 [11]	2.75E-02 [4]	0.0075	0.00022	0.0023
Chrysene	0.377	1.47E-06	1	3.09E+05 [8]	--	4.00E-02 [9]	2.60E-02 [11]	7.76E-03 [4]	0.0075	0.00022	0.0023
Fluoranthene	0.329	3.77E-06	1	1.66E+05 [8]	--	5.00E-02 [10]	3.72E-02 [11]	4.17E-03 [4]	0.0075	0.00022	0.0023
Fluorene	0.203	1.66E-05	1	1.51E+04 [8]	--	5.00E-02 [10]	1.49E-01 [11]	3.80E-04 [4]	0.0075	0.00022	0.0023
Indeno(1,2,3-cd)pyrene	0.208	8.28E-08	1	1.00E+07 [8]	--	8.00E-02 [9]	3.48E-03 [11]	2.51E-01 [4]	0.0075	0.00022	0.0023
Phenanthrene	0.446	1.74E-05	1	3.72E+04 [8]	--	5.00E-02 [10]	8.84E-02 [11]	9.33E-04 [4]	0.0075	0.00022	0.0023
Pyrene	0.623	7.72E-06	1	1.51E+05 [8]	--	5.00E-02 [10]	3.93E-02 [11]	3.80E-03 [4]	0.0075	0.00022	0.0023
Barium	83	2.63E-02	0.07	-	3.16E+02	1.00E-02 [5]	1.50E-01 [9]	9.43E-03 [12]	0.0075	0.00022	0.0023
Cadmium	1.17	5.86E-05	0.01	-	2.00E+03	9.60E-01 [9]	3.64E-01 [9]	7.54E-03 [12]	0.0075	0.00022	0.0023
Chromium	13	1.72E-05	0.005	-	7.54E+04	1.00E-02 [9]	7.50E-03 [9]	3.45E-01 [12]	0.0075	0.00022	0.0023
Lead	138	3.47E-04	0.15	-	3.98E+04	3.00E-02 [9]	4.50E-02 [9]	1.88E-02 [12]	0.0075	0.00022	0.0023
Mercury	0.18	2.27E-06	0.07	-	7.94E+03	4.00E-02 [6,9]	3.75E-02 [6,9]	3.26E-01 [12]	0.0075	0.00022	0.0023
Selenium	0.92	2.31E-05	0.44	-	3.98E+03	1.00E-02 [5]	1.60E-02 [9]	1.43E-01 [12]	0.0075	0.00022	0.0023

mg = milligrams.
kg = kilograms.
L = liters.
dy = days.
DW = dry weight.
WW = wet (fresh) weight.

1. Assumed values for organics; see associated table for metal references.
2. U.S. EPA (1999a) Partition Coefficients for Metals in Surface Water, Soil, and Waste (draft). June 22.
3. Calculated as 0.5 kg/kgBW-dy x 0.015 kg body weight (for worms); 0.0145 kg/kgBW-dy x 0.015 kg (for soil); 0.151 L/kgBW-dy x 0.015 kg (for surface water).
4. For organic constituents, $\log BA_{mammal} = -7.6 + \log K_{ow}$. (U.S.EPA 1999).
5. Calculated as 0.5 kg/kgBW-dy x 0.015 kg body weight (for worms); 0.0145 kg/kgBW-dy x 0.015 kg (for soil); 0.151 L/kgBW-dy x 0.015 kg (for surface water).
6. Reportedly does not bioaccumulate; lowest value of assessed metals applied [U.S. EPA (2005b) <http://www.epa.gov/region5/superfund/ecology/html/toxprofiles.htm>].
7. Value for mercuric chloride applied.
8. U.S. EPA (2004a). Water9 Version 2.0.0 Database.
9. TPHCWG (1998). Composition of Petroleum Mixtures. May.
10. U.S. EPA (1999). Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities. EPA 530-D-99-001A, August.
11. No value available; midpoint of available values for PAHs applied.
12. Calculated from the following regression equation: $\log BCF = 1.588 - 0.578 \times \log K_{ow}$ per U.S. EPA (1999).
13. For metals, BA_{mammal} values were back-calculated from BCF values presented in U.S. EPA (1999), Table D-3 for short-tailed shrew, using a soil ingestion rate of 0.0145 kg/kg-dy and a body weight of 0.015 kg.

Attachment B

Notice of Intent –
May 27, 2005

Notice of Intent

Wetland Remediation Activities

McCoy Field/New Keith Middle School Property
225 Hathaway Boulevard
New Bedford, Massachusetts

May 27, 2005

Prepared for:

City of New Bedford
New Bedford Public Schools
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6 Blackstone Valley Place, Lincoln, RI 02865 401.333.2382 fax: 401.333.9225
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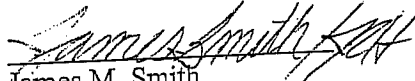
Notice of Intent

McCoy Field/New Keith Middle School Property
225 Hathaway Boulevard
New Bedford, MA 02740

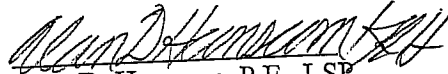
Prepared for: City of New Bedford
133 William Street
New Bedford, MA 02740

Prepared by: BETA Group, Inc.
315 Norwood Park South
Norwood, MA 02062

Project
Scientist:


James M. Smith

Associate:


Alan D. Hanscom, P.E., LSP
Licensed Site Professional No. 2152

May 27, 2005

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B. Wetlands Protection Act Form 3

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3	Wetlands Cross Sections

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Appendix	Description
A	ESS Method 3 Risk Assessment Executive Summary
B	Wetland Restoration and Plantings Plan (BOUND SEPARATELY)
C	Construction Specifications C1 Site Preparation C2 Earthwork C3 Excavation and Management of Wetland Sediment C4 Sedimentation and Erosion Control
D	Dewatering Plan
E	Stormwater Pollution Prevention Plan, September 2004
F	Site Photos
G	Nover-Armstrong Memos
H	Certified Abutters List

May 27, 2005

Ms. Sarah Porter, Conservation Agent
New Bedford Conservation Commission
133 William Street
New Bedford, MA 02740

**Re: Submittal of Notice of Intent - McCoy Field
Wetland Remediation
BETA Project No.: 2685**

Dear Ms. Porter:

On behalf of the City of New Bedford, BETA Group, Inc. (BETA) is submitting the enclosed Notice of Intent (NOI) for the proposed remediation of the wetland portion of McCoy Field (the Site). This cover letter shall serve to provide you with an overview description of the proposed project. Please refer to the enclosed Wetlands Protection Act (WPA) Form 3 and its appendices for specific project details and all required submittals.

Background

As part of ongoing site assessment and remediation activities at the Site, BETA has compiled results of sediment sampling in the wetlands to the west of the new Keith Middle School construction project. Results compiled to date indicate an average exposure point concentration of polychlorinated biphenyls (PCBs) in this wetland area of approximately 1.3 parts per million (ppm).

ESS Group, Inc. has performed an ecological risk assessment of the wetlands area and concluded that no further action is required. Other contaminants of concern, including heavy metals and polynuclear aromatic hydrocarbons, were detected at concentrations that did not pose an unacceptable level of risk to the environment.

In recent consultation with U.S. Environmental Protection Agency (EPA) and the Massachusetts Department of Environmental Protection (DEP) representatives, it was determined that cleanup of sediments with residual concentrations of PCBs greater than 1 ppm is the appropriate remedy. Please refer to the attached Executive Summary from the ESS Environmental Risk Characterization Report dated March 2005.

Proposed Remedial Approach

We propose to implement the removal of an estimated approximately 2 to 4 inches of PCB-impacted sediments at selected locations within the area illustrated on Figure 2 Site plan. The following activities are proposed:

- Clearing of vegetation and physical removal of leaf litter, surface vegetation, and surface sediment/soil by WES Construction Corporation (WES);
- Direction of Site activities by BETA's on-site representative;
- Live loading, transportation and disposal of sediment to appropriately licensed disposal facilities; and
- Restoration of disturbed areas, including replacement of the removed sediment/soil with clean sandy soil and seeding with wetlands mix, similar to that used for the current slope stabilization project at McCoy Field in accordance with the enclosed Wetland Restoration and Planting Plan prepared by Nover-Armstrong Associates.

Siltation and Sedimentation Control

Prior to the initiation of any Site activities, BETA will direct the placement of a double row of staked hay bales in staggered formation along the limit of work line as shown on Figure 2. All work and all Site disturbance will occur within the limit of work/hay bale line.

During the project, the Site contractor will be implementing the provisions of the Storm Water Pollution Prevention Plan (SWPPP) dated September 2004, included as Appendix E. The SWPPP addresses proper procedures for such items as removing silt from trucks and adjacent roadways, preventing fuel spills, and managing stormwater flow. Additionally, the contractor will be required to place jute erosion mats over open excavation areas to minimize erosion by stormwater runoff.

Temporary Driveways

WES will install temporary driveways where necessary to allow construction vehicle access to the areas of proposed excavation. These driveways will be constructed by the placement of non-woven geotextile fabric on the existing cleared ground surface followed by the placement of 6-12 inches of crushed stone. The driveways will be completely removed upon the completion of excavation and these areas will be restored in accordance with the Wetland Restoration and Planting Plan, included as Appendix B.

Excavation

WES will use a combination of a Bobcat or equivalent loader, hand tools, and vacuum excavation to remove 2 to 4 inches of leaf litter, sediment, and soil from the proposed area of excavation. Hand tools and vacuum excavation will be used to remove all soil within a five-foot radius of trees with a minimum 6-inch trunk diameter to maintain their viability. Trees will remain alive for a minimum of one year from the completion of backfilling or will be replaced by the Contractor. Excavated sediment will be transferred directly into dump trucks for removal from the Site and appropriate disposal.

Dewatering

Depending on Site conditions, limited dewatering may be necessary to remove standing surface water prior to excavation. If such dewatering is necessary, the Contractor will install shallow groundwater extraction wells (typically 4-6 feet deep) within the limits of work to remove surface water and provide a limited lowering of the local water table

during excavation. The extracted surface and groundwater will be pumped to an on-Site fractionation tank to provide settling followed by discharge into a settling basin to be constructed on-Site. This treatment and discharge will be performed under a National Pollutant Discharge Elimination System (NPDES) exclusion letter or an NPDES Construction General Permit (CGP), as appropriate, to be obtained by BETA from the EPA. A copy of a previously submitted NPDES application form, a CGP NOI form, and treatment system details are attached. BETA will be providing EPA with an updated application form for this project.

Regulatory Considerations

As discussed with the Conservation Commission, no Site work will be performed prior to a Site inspection and approval of the siltation controls by the Conservation Agent. Subsequently, BETA will coordinate a Commission inspection of the Site at the following project milestones:

- When erosion controls are installed, prior to any other work;
- After sediment has been excavated (Commission will inspect the soils to be replaced in the restored wetland at this time);
- After soils have been replaced (Commission will inspect plant material to be placed in restoration area at this time); and
- After final plantings are complete.

All siltation controls will be maintained until such time as authorization for their removal is provided by the Conservation Commission.

As discussed, in order to minimize disturbance to the wetland, BETA's goal is to have the work performed from August to early September, during the anticipated driest portion of the year. In anticipation of meeting this schedule, we are hopeful that the Conservation Commission will be able to provide an Order of Conditions for this project by mid July.

If you have any questions or concerns regarding this request, please call me at 781-255-1982.

Sincerely,
BETA GROUP, INC.



Alan D. Hanscom
Associate

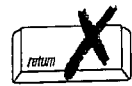
C: Scott Alfonse
Lenore White



Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands
WPA Form 3 – Notice of Intent
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by DEP:
DEP File Number
Document Transaction Number
New Bedford
City/Town

Important:
When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



Note:
Before completing this form consult your local Conservation Commission regarding any municipal bylaw or ordinance.

A. General Information

1. Project Location (**Note:** electronic filers will click on button for GIS locator):

225 Hathaway Blvd. New Bedford 02740
a. Street Address b. City/Town c. Zip Code

Latitude and Longitude: 69-125, 75-167
d. Latitude e. Longitude

60, 75 69-125, 75-167
f. Assessors Map/Plat Number g. Parcel /Lot Number

2. Applicant:

Jacqueline Coucci City of New Bedford
a. First Name b. Last Name c. Company

133 William Street
d. Mailing Address

New Bedford MA 02740
e. City/Town f. State g. Zip Code

508-979-1433 jcoucci@ci.new-bedford.ma.us
h. Phone Number i. Fax Number j. Email address

3. Property owner (if different from applicant): Check if more than one owner

Jacqueline Coucci City of New Bedford
a. First Name b. Last Name c. Company

133 William Street
d. Mailing Address

New Bedford MA 02740
e. City/Town f. State g. Zip Code

508-979-1433 jcoucci@ci.new-bedford.ma.us
h. Phone Number i. Fax Number j. Email address

4. Representative (if any):

BETA Group, Inc
a. Firm

Alan Hanscom
b. Contact Person First Name c. Contact Person Last Name

315 Norwood Park South
d. Mailing Address

Norwood MA 02062
e. City/Town f. State g. Zip Code

781-255-1982 781-255-1974 ahanscom@beta-inc.com
h. Phone Number i. Fax Number j. Email address

5. Total WPA Fee Paid (from NOI Wetland Fee Transmittal Form):

exempt 0 0
a. Total Fee Paid b. State Fee Paid c. City/Town Fee Paid

6. General Project Description:

Removal of contaminated soils and sediments from the wetland area located adjacent to the McCoy Field/Keith Middle School construction project. Reference is made to Attachments A and G which describe the proposed wetlands remediation activities, and the anticipated temporary ecological impacts and proposed mitigation measures.



B. Resource Area Effects

1. Inland Resource Areas

Check all that apply below. Attach narrative and any supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.

Online Users:
Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.

Resource Area	Size of Proposed Alteration	Proposed Replacement (if any)
a. <input type="checkbox"/> Bank	1. linear feet	2. linear feet
b. <input checked="" type="checkbox"/> Bordering Vegetated Wetland	Approx. 60,000 1. square feet	2. square feet
c. <input type="checkbox"/> Land Under Waterbodies and Waterways	1. square feet 3. cubic yards dredged	2. square feet
d. <input type="checkbox"/> Bordering Land Subject to Flooding	1. square feet 3. cubic feet of flood storage lost	2. square feet 4. cubic feet of flood storage replaced
e. <input type="checkbox"/> Isolated Land Subject to Flooding	1. square feet 2. cubic feet of flood storage lost	3. cubic feet of flood storage replaced
f. <input type="checkbox"/> Riverfront area	1. Name of Waterway (if available)	

1. Width of Riverfront Area (check one):

- 25 ft. - Designated Densely Developed Areas only
- 100 ft. - New agricultural projects only
- 200 ft. - All other projects

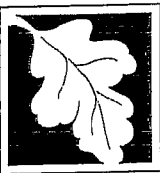
2. Total area of Riverfront Area on the site of the proposed project: _____ Square Feet

3. Proposed alteration of the Riverfront Area:

a. Total Square Feet	b. Square Feet within 100 ft.	c. Square Feet between 100 ft. and 200 ft.
----------------------	-------------------------------	--

4. Has an alternatives analysis been done and is it attached to this NOI? Yes No

5. Was the lot where the activity is proposed created prior to August 1, 1996? Yes No



WPA Form 3 – Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by DEP:

DEP File Number

Document Transaction Number

New Bedford

City/Town

B. Resource Area Effects

2. Coastal Resource Areas:

Check all that apply below. Attach narrative and supporting documentation describing how the project will meet all performance standards for each of the resource areas altered, including standards requiring consideration of alternative project design or location.

Online Users:
Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.

<u>Resource Area</u>	<u>Size of Proposed Alteration</u>	<u>Proposed Replacement (if any)</u>
a. <input type="checkbox"/> Designated Port Areas	Indicate size under Land Under the Ocean, below	
b. <input type="checkbox"/> Land Under the Ocean	1. Square feet 2. Cubic yards dredged	
c. <input type="checkbox"/> Barrier Beach	Indicate size under Coastal Beaches and/or Coastal Dunes below	
d. <input type="checkbox"/> Coastal Beaches	1. Square feet	2. Cubic yards beach nourishment
e. <input type="checkbox"/> Coastal Dunes	1. Square feet	2. Cubic yards dune nourishment
f. <input type="checkbox"/> Coastal Banks	1. Linear feet	
g. <input type="checkbox"/> Rocky Intertidal Shores	1. Square feet	
h. <input type="checkbox"/> Salt Marshes	1. Square feet	2. Sq ft restoration, rehab., or creation
i. <input type="checkbox"/> Land Under Salt Ponds	1. Square feet 2. Cubic yards dredged	
j. <input type="checkbox"/> Land Containing Shellfish	1. Square feet	2. Square feet restoration, rehab.
k. <input type="checkbox"/> Fish Runs	Indicate size under Coastal Banks, inland Bank, Land Under the Ocean, and/or inland Land Under Waterbodies and Waterways, above 1. Cubic yards dredged	
l. <input type="checkbox"/> Land Subject to Coastal Storm Flowage	1. Square feet	

3. Limited Project:

Is any portion of the proposed activity eligible to be treated as a limited project subject to 310 CMR 10.24 or 310 CMR 10.53?

a. Yes No If yes, describe which limited project applies to this project:

310 CMR 10.53(3)(g) Assessment, monitoring, mitigation, and remediation activities

b. Limited Project



WPA Form 3 – Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by DEP:
DEP File Number
Document Transaction Number
New Bedford
City/Town

C. Bordering Vegetated Wetland Delineation Methodology

Check all methods used to delineate the Bordering Vegetated Wetland (BVW) boundary:

1. Final Order of Resource Area Delineation issued by Conservation Commission or DEP (attached)
2. DEP BVW Field Data Form (attached)
3. Final Determination of Applicability issued by Conservation Commission or DEP (attached)
4. Other Methods for Determining the BVW Boundary (attach documentation):
 - a. 50% or more wetland indicator plants
 - b. Saturated/inundated conditions exist
 - c. Groundwater indicators
 - d. Direct observation
 - e. Hydric soil indicators
 - f. Credible evidence of conditions prior to disturbance
5. Other resource areas delineated: _____

Online Users:
Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.

For all projects affecting other Resource Areas, please attach a narrative explaining how the resource area was delineated.

D. Other Applicable Standards and Requirements

1. Is any portion of the proposed project located in estimated habitat as indicated on the most recent Estimated Habitat Map of State-Listed Rare Wetland Wildlife published by the Natural Heritage and Endangered Species Program?
 - a. Yes No If yes, include proof of mailing or hand delivery of NOI to:
Natural Heritage and Endangered Species Program
Division of Fisheries and Wildlife
Route 135, North Drive
Westborough, MA 01581
 - b. Date of Map: June 1, 2003
2. For coastal projects only, is any portion of the proposed project located below the mean high water line or in a fish run?
 - a. Yes No If yes, include proof of mailing or hand delivery of NOI to:
Massachusetts Division of Marine Fisheries
251 Causeway Street, Suite 400
Boston, MA 02114
 - b. Not applicable – project is in inland resource area only
3. Is any portion of the proposed project within an Area of Critical Environmental Concern (ACEC)?
 - a. Yes No If yes, provide name of ACEC (see instructions to WPA Form 3 or DEP Website for ACEC locations). **Note:** electronic filers click on Website.
 - b. ACEC: _____



WPA Form 3 – Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

Provided by DEP:

DEP File Number

Document Transaction Number

New Bedford

City/Town

D. Other Applicable Standards and Requirements

Online Users: Include your document transaction number (provided on your receipt page) with all supplementary information you submit to the Department.

4. Is any portion of the site subject to a Wetlands Restriction Order under the Inland Wetlands Restriction Act (M.G.L. c. 131, § 40A) or the Coastal Wetlands Restriction Act (M.G.L. c. 130, § 105)?
- a. Yes No
5. Is any activity within any Resource Area or Buffer Zone exempt from performance standards of the wetlands regulations, 310 CMR 10.00.
- a. Yes No If yes, describe which exemption applies to this project:
- b. Exemption
6. Is this project subject to the DEP Stormwater Policy? a. Yes No
- If yes, stormwater management measures are required. Applicants should complete the Stormwater Management Form and submit it with this form.
- b. If no, explain why the project is exempt:
- The project is located within a wetland area. There will be no activities conducted outside the wetland boundary within the scope of this NOI which may alter storm water flow or pose a storm water management concern.

E. Additional Information

Applicants must include the following with this Notice of Intent (NOI). See instructions for details.

Online Users: Attach the document transaction number (provided on your receipt page) for any of the following information you submit to the Department.

- USGS or other map of the area (along with a narrative description, if necessary) containing sufficient information for the Conservation Commission and the Department to locate the site. (Electronic filers may omit this item.)
- Plans identifying the location of proposed activities (including activities proposed to serve as a Bordering Vegetated Wetland [BVW] replication area or other mitigating measure) relative to the boundaries of each affected resource area.
- Other material identifying and explaining the determination of resource area boundaries shown on plans (e.g., a DEP BVW Field Data Form).
- List the titles and dates for all plans and other materials submitted with this NOI.
- If there is more than one property owner, please attach a list of these property owners not listed on this form.
- Attach proof of mailing for Natural Heritage and Endangered Species Program, if needed.
- Attach proof of mailing for Massachusetts Division of Marine Fisheries, if needed.
- Attach NOI Wetland Fee Transmittal Form
- Attach Stormwater Management Form, if needed.



WPA Form 3 - Notice of Intent

Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

DEP File Number
Document Transaction Number
New Bedford
City/Town

F. Fees

The fees for work proposed under each Notice of Intent must be calculated and submitted to the Conservation Commission and the Department (see Instructions and NOI Wetland Fee Transmittal Form).

No filing fee shall be assessed for projects of any city, town, county, or district of the Commonwealth, federally recognized Indian tribe housing authority, municipal housing authority, or the Massachusetts Bay Transportation Authority.

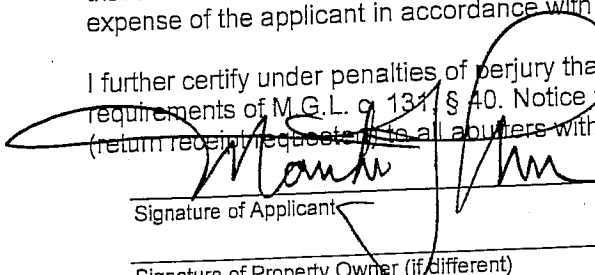
Applicants must submit the following information (in addition to pages 1 and 2 of the NOI Wetland Fee Transmittal Form) to confirm fee payment:

1. Municipal Check Number	2. Check date
3. State Check Number	4. Check date
5. Payor name on check: First Name	6. Payor name on check: Last Name

G. Signatures and Submittal Requirements

I hereby certify under the penalties of perjury that the foregoing Notice of Intent and accompanying plans, documents, and supporting data are true and complete to the best of my knowledge. I understand that the Conservation Commission will place notification of this Notice in a local newspaper at the expense of the applicant in accordance with the wetlands regulations, 310 CMR 10.05(5)(a).

I further certify under penalties of perjury that all abutters were notified of this application, pursuant to the requirements of M.G.L. c. 131, § 40. Notice must be made in writing by hand delivery or certified mail (return receipt requested) to all abutters within 100 feet of the property line of the project location.

	Date <u>5/27/05</u>
Signature of Applicant	Date
Signature of Property Owner (if different)	Date
Signature of Representative (if any)	Date

For Conservation Commission:

Two copies of the completed Notice of Intent (Form 3), including supporting plans and documents; two copies of pages 1 and 2 of the NOI Wetland Fee Transmittal Form; and the city/town fee payment must be sent to the Conservation Commission by certified mail or hand delivery.

For DEP:

One copy of the completed Notice of Intent (Form 3), including supporting plans and documents; one copy of pages 1 and 2 of the NOI Wetland Fee Transmittal Form; and a copy of the state fee payment must be sent to the DEP Regional Office (see Instructions) by certified mail or hand delivery. (E-filers may submit these electronically.)

Other:

If the applicant has checked the "yes" box in any part of Section D, Item 3, above, refer to that section and the Instructions for additional submittal requirements.

The original and copies must be sent simultaneously. Failure by the applicant to send copies in a timely manner may result in dismissal of the Notice of Intent.

Provided by DEP:



Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands

WPA Form 3 - Notice of Intent
Massachusetts Wetlands Protection Act M.G.L. c. 131, §40

DEP File Number
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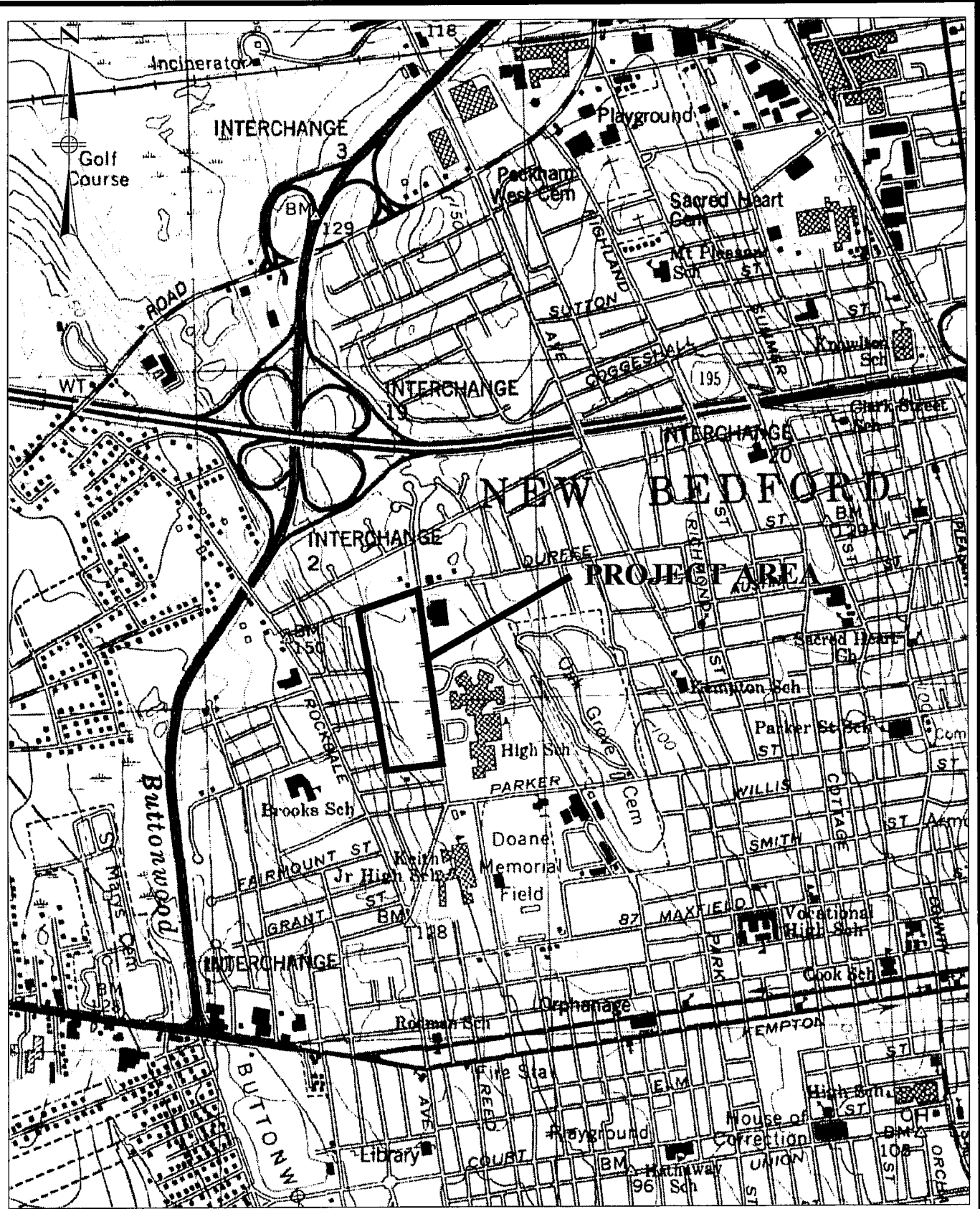
	Date
Signature of Applicant	
	Date
Signature of Property Owner (if different)	
	Date
Signature of Representative (if any)	

For Conservation Commission:
Two copies of the completed Notice of Intent (Form 3), including supporting plans and documents; two copies of pages 1 and 2 of the NOI Wetland Fee Transmittal Form; and the city/town fee payment must be sent to the Conservation Commission by certified mail or hand delivery.

For DEP:
One copy of the completed Notice of Intent (Form 3), including supporting plans and documents; one copy of pages 1 and 2 of the NOI Wetland Fee Transmittal Form; and a copy of the state fee payment must be sent to the DEP Regional Office (see Instructions) by certified mail or hand delivery. (E-filers may submit these electronically.)

Other:
If the applicant has checked the "yes" box in any part of Section D, Item 3, above, refer to that section and the instructions for additional submittal requirements.

The original and copies must be sent simultaneously. Failure by the applicant to send copies in a timely manner may result in dismissal of the Notice of Intent.



BETA Group, Inc.
 Engineers • Scientists • Planners

315 Norwood Park South
 Norwood, MA 02062 781.255.1982
 email: BETA@BETA-inc.com

**McCOY FIELD/NEW KEITH
 MIDDLE SCHOOL PROPERTY**
 New Bedford, Massachusetts

Figure No. 1
USGS Locus Map

THE FOLLOWING FIGURES ARE AVAILABLE AS HARD COPY (PAPER) PLANS

Figures 2A & 2B – Site Topographic Plan (1" = 40') With Sequence of Construction

Figure 3 – Wetlands Cross Sections

THESE PLANS ARE AVAILABLE FOR VIEWING AT:

**CITY OF NEW BEDFORD PUBLIC LIBRARY
613 PLEASANT STREET
NEW BEDFORD, MA 02740**

CONTACT NUMBERS

PHONE: (508) 991-6275

FAX: (508) 979-1481

SCHEDULE OF HOURS

MONDAY – THURSDAY

9:00AM – 9:00PM

FRIDAY & SATURDAY

9:00 AM – 5:00 PM

CLOSED SUNDAY & HOLIDAYS

HANDICAPPED ACCESSIBLE

Appendix A

**ESS Method 3 Risk Assessment
Executive Summary**

EXECUTIVE SUMMARY

A Method 3 Risk Characterization was performed for the former McCoy Field wetland areas located at the property bounded by Hathaway Boulevard to the east, Durfee Street to the north, Summit Street to the west, and Ruggles Street to the south in New Bedford, Massachusetts [Release Tracking Number (RTN) 4-15685] (the Site). The Method 3 Risk Characterization evaluated the potential risk of harm to human health, the environment, public welfare, and safety in accordance with the Massachusetts Contingency Plan (310 CMR 40.0000) (MCP) and *Guidance for Disposal Site Risk Characterization in Support of the Massachusetts Contingency Plan* (Massachusetts Department of Environmental Protection [MADEP], July 1995). The conclusion of the Method 3 Risk Characterization is that the Site poses **No Significant Risk of harm to human health, public welfare, safety and the environment.** No activity and use limitations (AULs) or use of engineered barriers were assumed in the risk characterization.

McCoy Field is a former recreational field located in a residential section of New Bedford; bounded by Hathaway Boulevard to the east, Durfee Street to the north, Summit Street to the west, and Ruggles Street to the south. The former McCoy Field property consists of two distinct areas: an upland area that being developed as the new Keith Middle School, and a heavily vegetated, deciduous wood swamp wetland area located north and west of the upland area, which is addressed in this risk characterization. The wetland area contains an unnamed stream that originates from another wetland area about 1.5 miles north of the Site and either terminates or is culverted at the southern end of the Site. The wetland area typically dries up in summer.

McCoy Field was constructed in the 1960s by filling a low area with fill material obtained from the site of the high school during the high school's construction. The high school site was historically operated as a burning dump and fill material from this site consisted of black fine sand and organic silt containing ash, asphalt, concrete, brick, glass, metal, and wood materials. During planning activities for the new middle school, subsurface investigations identified the presence of the fill material in the upland area and, in it, chemical constituents above MADEP reportable concentrations. Historic filling of the wetland area did not occur, but some chemical constituents in the fill material reached the wetland area through atmospheric dispersion, erosion, or other pathways.

The human health risk characterization assessed the potential risk posed by the Site to recreational receptors, pedestrians, and trespassers, all of which were assessed for the same level of exposure. These receptors were assessed for exposure through soil/sediment ingestion, soil/sediment dermal contact, inhalation of entrained soil particles (dust), surface water ingestion, and surface water dermal contact. Constituents of concern (COCs) included polychlorinated biphenyls (PCBs, as Aroclor 254), thirteen polycyclic aromatic hydrocarbons (PAHs), and the metals barium, cadmium, total chromium, lead, mercury, and selenium. The numerical results of the human health risk characterization are summarized below:

RECREATIONAL/PEDESTRIAN/TRESPASSER RISK CHARACTERIZATION SUMMARY							
Exposure Pathway	Child		Youth		Adult		Combined Ages
	Hazard Index	Cancer Risk	Hazard Index	Cancer Risk	Hazard Index	Cancer Risk	Cancer Risk
Total (all pathways)	0.3	6×10^{-7}	0.06	2×10^{-7}	0.04	2×10^{-7}	1×10^{-6}
Maximum Acceptable Level	1.0	1×10^{-5}	1.0	1×10^{-5}	1.0	1×10^{-5}	1×10^{-5}

Total HIs and total cancer risks are below maximum acceptable levels for all age groups, indicating that the Site poses no significant risk of harm to human health for these receptor groups.

The environmental risk characterization assessed terrestrial and aquatic invertebrates for survival, and amphibians, two avian species (American robins and red-tailed hawks), and two mammalian species

(short-tailed shrew and raccoons) for survival, growth and reproduction. Terrestrial invertebrates were assessed for direct exposure to COCs in soil; aquatic invertebrates and amphibians were assessed for direct exposure to COCs in sediment interstitial (pore) water or surface water impacted by COCs in sediment; avian and mammalian receptors were assessed for exposure to COCs through soil ingestion, surface water ingestion, and COCs in their diet. For both of these receptors, low and high hazard indices (HI) were calculated. Numerical results of the environmental risk characterization are summarized below:

Receptor Group	Hazard Index -Low	Hazard Index-High
Terrestrial Invertebrates	0.4	-- 1
Aquatic Invertebrates	0.6	--
Amphibians	1.4	--
American Robin	16	1
Red-Tailed Hawk	0.2	0.01
Short-tailed Shrew	19	3
Raccoon	0.4	0.2
Benchmark Hazard Index	1.0	1.0

1. A "high" scenario was not assessed for this receptor group.

Total HIs for terrestrial invertebrates, aquatic invertebrates, red-tailed hawk, and raccoons are below the maximum acceptable HI benchmark of 1.0, indicating that the Site poses no significant risk of harm to these receptor groups.

The HI of 1.4 for amphibians slightly exceeds the maximum acceptable HI benchmark of 1.0 as a result of exposure to lead. However, based on the number of conservatisms inherent in the risk characterization, some of which are presented below, the risk characterization concludes that a significant risk of harm is not posed to amphibians:

- The lead TRV of 0.4 µg/L is based on the most sensitive species for which data was located;
- The lead TRV was based on a median lethal concentration (LC50) divided by an uncertainty factor of 100;
- The lead TRV is below the federal ambient water quality criterion of 0.54 µg/L at the lowest considered water hardness of 25 mg/L;
- The lead surface water EPC of 0.44 µg/L is also below the federal ambient water quality criterion of 0.54 µg/L at a water hardness of 25 mg/L;
- The EPC was based on one-tenth of the predicted interstitial water concentration, whereas the overlying water column may be much more diluted from on-flowing surface water; and,
- The predicted interstitial water concentration was based on the 95th upper confidence limit (UCL) of the mean soil/sediment lead concentration of 175.8 mg/kg, while the mean soil/sediment lead concentration is 141 mg/kg and the median concentration is 93 mg/kg.

The total HI-Low of 16 and HI-High of 1 for the American robin were primarily associated with exposure to PCBs and lead. However, based on the number of conservatisms inherent in the risk characterization, some of which are presented below, the risk characterization concludes that a significant risk of harm is not posed to American robins:

- Robins were assumed to feed nowhere else but at the Site;
- There was no consideration of the periodic inaccessibility of wetland soil due to submergence;
- The soil/sediment EPCs for PCBs and lead are both 95% UCL mean concentrations;
- All COCs were assumed 100% absorbed through the ingestion route;

- Bioaccumulation and bioconcentration factors did not consider the reduction of accumulation that may stem from the high binding capacity of the soil/sediment (the average total organic carbon content of the soil/sediment is 31.7%);
- The TRV-Low value applied for PCBs was on the low end of the range of values available. Using the highest TRV-Low value, the HQ for PCBs would be reduced from 12 to 6.
- The range of the HIs calculated (1 – 16) is well within the range of uncertainty associated with the assessment.

The total HI-Low of 19 and HI-High of 3 for short-tailed shrew were primarily associated with exposure to PCBs and lead. However, based on the number of conservatisms inherent in the risk characterization, some of which are presented below, the risk characterization concludes that a significant risk of harm is not posed to short-tailed shrew:

- Shrew were assumed to feed nowhere else but at the Site;
- There was no consideration of the periodic inaccessibility of wetland soil due to submergence;
- The soil/sediment EPCs for PCBs and lead are both 95% UCL mean concentrations;
- All COCs are assumed 100% absorbed through the ingestion route;
- Bioconcentration factors do not consider the reduction of accumulation that may stem from the high binding capacity of the soil/sediment;
- The TRV-Low values applied for PCBs and lead were in the center of the ranges of relevant values available. Using the highest TRV-Low values, the HQ for PCBs would be reduced from 9 to 3 and the HQ for lead would be reduced from 5 to 1.2. From these two changes, the overall HI-Low would be reduced from 19 to 9.
- The range of the HIs calculated (3 – 19) is well within the range of uncertainty associated with the assessment.

Potential risks to safety and public welfare were conducted according in MADEP guidance. These assessments concluded that the Site poses no significant risk of harm to safety or public welfare.

Appendix C

Construction Specifications

Appendix C1

Site Preparation

SECTION 02100
SITE PREPARATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Bidding requirements, Contract Forms, General and Supplementary Conditions and Division 1, General Requirements are hereby made a part of this Section. The Order of Conditions, File No. ____, issued by the New Bedford Conservation Commission is included in this contract.

1.02 DESCRIPTION OF WORK

- A. The scope of work consists of all materials, equipment, labor and services required for all Site Preparation work, including all items incidental thereto, as specified herein and as shown on the Drawings.
- B. Include the following:
1. Protection of trees (including roots) marked by Engineer with trunks greater than six (6) inches in diameter.
 2. Clearing within the limits of work by cutting and removing, together with proper disposal of, shrubs, brush, trees of trunk diameter less than six (6) inches, and other objectionable materials, if any, except as otherwise provided herein.
 3. No burning on the site shall be permitted.

1.03 RELATED WORK SPECIFIED ELSEWHERE

- A. Carefully examine all of the Contract Documents for requirements which affect the work of this section.
- B. Other specifications sections which directly relate to the work of this section include, but are not limited to, the following:
1. Excavation and Management of Wetland Sediment
 2. Section 02200 – Earthwork
 3. Section 02270 – Sedimentation and Erosion Control

1.04 CODES, STANDARDS, ORDINANCES AND PERMITS

- A. Perform all work in strict accordance with all rules, regulations, standards, codes, ordinances, or laws of local, State and Federal authorities having lawful jurisdiction, and be responsible for compliance therewith. Such authorities include but are not limited to the following:
1. Occupational Safety and Health Administration (OSHA)
 2. American Society of Testing Materials (ASTM)
 3. Massachusetts Department of Public Safety Standard Specification (MASS DPS)
 4. Massachusetts Department of Environmental Protection (DEP)

5. Commonwealth of Massachusetts, Board of Fire Prevention Regulations, 527 CMR 9.00
 6. National Fire Protection Association, Standard No. 30, Flammable and Combustible Liquids Code
- B. The Contractor shall give the proper authority all requisite notices and secure all permits, licenses, inspections and certificates relating to his work.

1.05 SUBMITTALS

- A. Prior to commencement of any site preparation operations, submit to the Architect, for review, a schedule for the proposed methods to insure against possible damage to existing areas adjacent to where excavation operations will occur.
- B. Include a full description and plan for securing the site, safety devices and measures to be taken and time table for implementation.

1.06 SURFACE/SUBSURFACE INFORMATION

- A. The Owner assumes no responsibility for the Contractor's failure to make his own site investigation.

1.07 PROTECTION

- A. All rules and regulations governing the respective utilities shall be observed in executing all work under this Section. All work shall be executed in such a manner as to prevent any damage to existing buildings, streets, curbs, paving, service utility lines, structures and adjoining property. Monuments and benchmarks shall be carefully maintained and, if disturbed or destroyed, replaced as directed.
- B. Prior to start of Contractor's work, Engineer will mark selected trees (generally with trunk diameters of six (6) inches or greater) within the limit of work. Trees so marked shall be protected during the work such that they will remain undamaged and remain viable as a result of excavation and backfilling as described in this and related sections. Trees that are not viable at one year after the completion of backfilling shall be replaced by Contractor at his sole expense.
- C. The Contractor shall assume full responsibility for damages caused by his or his Subcontractor's equipment and personnel to the existing streets, vegetation, and grounds, as well as adjoining private property.
- D. The work of this Section shall be performed in such a manner as to cause no interference with access by the Subcontractors or other Contractors to all portions of the site as is necessary for the normal conduct of their work.

1.08 CLEAN UP

- A. Any soil, demolition debris or similar material which has been brought onto paved areas by hauling operations or otherwise shall be removed promptly, keeping these areas clean at all times.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 PREPARATION

- A. Notify all corporations, companies, individuals or local authorities owning, or having jurisdiction over, utilities running to, through or across areas disturbed by demolition operations.

- B. Have all utility services not otherwise designated to be disconnected by the Contractor disconnected at service mains in accordance with requirements governing the utility involved unless otherwise shown on the plan or directed by the Architect.
- C. Install siltation barrier as described in City of New Bedford Conservation Commission Order of Conditions No. _____ and in Section 02270 Sedimentation and Erosion Control.

3.03 CLEARING

- A. Clearing shall consist of the cutting and removal of all trees (excepting those marked by the Engineer for protection), shrubs, brush, and other objectionable material from within the Limit of Work Line unless otherwise shown on the plans or directed by Engineer.

3.04 DISPOSAL AND CLEAN UP

A. Disposal:

- 1. Cleared vegetation consisting of trees, shrubs, and brush that prior to the start of clearing was not in contact with the ground, may be disposed of as non-contaminated landscaping debris.
- 2. Other objectionable removed material will be disposed of by the Contractor at a facility approved by the Engineer.
- 3. Soil, sediment, leaf litter, and vegetation debris excavated for wetland remediation shall be disposed of in accordance with "Excavation and Management of Wetland Sediment."
- 3. Keep all public ways clear of all spillage from trucks hauling material to and from the project site.

B. Premises:

- 1. The premises shall be left in a safe, clean and relatively orderly condition upon completion of work under this Section.

C. Dust Control:

- 1. Thoroughly wet down all work being demolished and all trucking ways as necessary to prevent spreading dust. If necessary, provide all water, hoses and connections required for dust control.

END OF SECTION

Appendix C2

Earthwork

SECTION 02200

EARTHWORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Bidding requirements, Contract Forms, General and Supplementary Conditions and Division I, General Requirements are hereby made a part of this Section. The Order of Conditions, File No.____, issued by the New Bedford Conservation Commission is included in this contract.

1.02 DESCRIPTION OF WORK

- A. The scope of work consists of all materials, equipment, labor and services required for all Earthwork work, including all items incidental thereto, as specified herein and as shown on the Drawings. The following work shall be included:
1. Provide crushed stone placed on geotextile fabric to create temporary driveways from site upland areas to the wetland areas of excavation.
 2. Pumping and/or bailing necessary to maintain excavated spaces free from water from any source whatsoever.
 3. Remove four (4) to six (6) inches of sediment by Bobcat loader, hand tools, and vacuum excavation to the horizontal limits shown on Figure 2.
 4. Provide clean sandy fill, with 8-10% organic content, as specified, for wetland restoration.
 5. Protect all existing utilities, roads, pavements, lawns, planting and other improvements from damage due to construction. Install fencing and safety devices or controls as necessary.
 6. Dust control and clean up.

1.03 RELATED WORK SPECIFIED ELSEWHERE

- A. Other specifications sections, which directly relate to the work of this section include, but are not limited to, the following:
1. Section 02100 - Site Preparation
 2. Section 02270 - Sedimentation and Erosion Control
 3. Excavation and Management of Wetland Sediment

1.04 REFERENCE STANDARDS

- A. Definitions and Reference Standards:
1. ASTM: Specifications of the American Society for Testing and Materials.
 2. AASHTO: American Association of State Highway and Transportation Officials.
 3. ACI: American Concrete Institute.
 4. Building Code: Commonwealth of Massachusetts State Building Code, latest edition.
 5. EPA: United States Environmental Protection Agency.

6. DEP: Massachusetts Department of Environmental Protection.
7. SSHB: Standard Specifications for Highways and Bridges, the Commonwealth of Massachusetts, Mass. Highway Department, latest edition.

1.05 BENCHMARKS AND ENGINEERING

- A. Lines and grade work in accordance with Drawings and Specifications shall be laid out by a registered Civil Engineer or Surveyor employed by the Contractor. The Contractor shall establish permanent benchmarks, to which access can easily be had during the progress of the work. The Contractor shall maintain all established bounds and benchmarks and replace, as directed, any that may be disturbed or destroyed. The selection of the registered Civil Engineer or Surveyor shall be subject to the Architect's approval. The General Contractor shall pay all costs of the services of the Civil Engineer or Surveyor.
- B. The Contractor shall verify dimensions and elevations on the ground and report any discrepancies immediately to the Architect. Any discrepancies not reported prior to construction shall not be the basis for claims for extra compensation.

1.06 SUBSURFACE INFORMATION

- A. The Owner assumes no responsibility for the Contractor's failure to make his own site investigation and makes no representation regarding the character of the soil or subsurface conditions which may be encountered during the performance of the work.

1.07 FINISHED GRADES

- A. The words "finished grades" as used herein mean the required final grade elevations indicated on the Drawings. Where not otherwise indicated, areas shall be given uniform slopes between points for which finished grades are shown, or between such points and existing grade except that vertical curves or roundings shall be provided at abrupt changes in slope.

1.08 PROTECTION

- A. All rules and regulations governing the respective utilities shall be observed in executing all work under this Section. All work shall be executed in such a manner as to prevent any damage to existing buildings, streets, curbs, paving, service utility lines, structures and adjoining property. Monuments and benchmarks shall be carefully mainlined and, if disturbed or destroyed, replaced as directed.
- B. The Contractor shall protect selected trees of six (6) inch trunk diameter or greater marked by the Engineer and their roots in the excavation area as described in excavation section below.
- C. Contractor shall place hay bales at perimeter of work area as required by the Cit of New Bedford Conservation Commission. The location and installation of the hay bales will be approved by the Conservation Commission. No disturbance of soil or vegetation shall be allowed outside of this designated work area.
- D. The Contractor, under this Section, shall provide at his own expense adequate pumping and drainage facades to keep the excavation sufficiently dry as not to affect adversely the quality or time of excavation.
- E. The Contractor shall assume full responsibility for damages caused by him or his Subcontractor's equipment and personnel to the existing buildings and grounds as well as adjoining private property.
- F. The work of this Section shall be performed in such a manner as to cause no interference with access by the Subcontractors or other Contractors to all portions of the site as is necessary for the normal conduct of their work.

PART 2 - PRODUCTS

2.01 FILL MATERIAL

- A. Crushed Stone: Crushed stone to be placed on geotextile fabric to serve as a temporary driveway for excavation equipment shall be washed, graded free of organic materials one and one-quarter (1-1/4) inch to one-half (1/2) inch size. Gradation shall conform to SSHB., Section M2.01.3 as follows:

<u>U.S. Standard Sieve Size</u>	<u>Percent by Weight</u>	
	<u>Minimum</u>	<u>Passing Maximum</u>
1-1/2 inches	100%	-
1-1/4 inches	85%	100%
3/4 inch	10%	25%
1/2 inch	0%	8%

- B. Wetland topsoil fill: Clean sandy soil shall be used as backfill for restoring the excavated area of the wetland:

<u>U.S. Standard Sieve Size</u>	<u>Percent by Weight</u>	
	<u>Minimum</u>	<u>Passing Maximum</u>
3/4 inch	100%	100%
No. 4	80%	100%
No. 200	0%	10%
(Based on fraction passing No. 4)		
Organic Content	8%	10%

PART 3 - EXECUTION

3.01 EXCAVATION

- A. General:

- Excavate all vegetation, leaf litter, soil, and sediment to the elevations and dimensions shown on the Drawings. Excavation will generally be 2-4 inches in depth and is not expected to extend greater than six (6) inches below grade. Confirmation of sufficient initial excavation shall be by the visual observations of the Engineer. Contractor shall coordinate with the Engineer regarding the Engineer's collection of post-excavation confirmatory soil samples to verify the removal of sufficient contaminated sediment.
- Contractor shall remove sediment from areas within five (5) feet of trees marked by Engineer for protection using vacuum excavation. Contractor shall loosen soils in these areas using hand tools prior to vacuuming, taking care to minimize damage to tree roots.
- In order to allow excavating equipment (Bobcat skid steer loader, or equivalent) access to the areas to be excavated, Contractor shall, as necessary, construct temporary driveway(s) to consist of six (6) to twelve (12) inches of crushed stone placed on geotextile fabric.
- The Contractor shall obtain from the proper authorities locations of all utilities within the scope of this work so that there will be no damage done to such utilities. Neither the Owner nor the Architect will be responsible for any such damage, and the Contractor shall restore any structure or utility so damaged without additional compensation. Written notifications to the appropriate utility agencies shall be made at least ten (10) days prior to the commencement of any work.

5. Any unsanitary conditions encountered, such as broken sewer mains or uncovered garbage, shall be corrected or removed entirely as directed by the Architect.

3.02 DEWATERING

- A. Provide all pumps and pumping facilities, including a well point system as necessary with attendants, to keep all areas of excavation free from water from whatever source at all times, when work is in progress or when necessary for protection and integrity of the work in place. Dewatering treatment and discharge will be conducted by the Contractor in accordance with either an NPDES exclusion letter or NPDES Construction General Permit, as appropriate, to be obtained by the Engineer.

3.03 FILLS, BACKFILLS AND COMPACTION

A. Samples and Testing:

1. All fill material and its placement shall be subject to quality control testing. A qualified laboratory may be selected by the Owner to perform tests on materials. All costs of testing will be paid for by the Owner. Test results and laboratory recommendations shall be available to the Architect.
2. Provide samples of each fill material from the proposed source of supply including on-site sources. Allow sufficient time for testing and evaluation of results before material is needed. Submit samples from alternate source if required.
3. Architect will be sole and final judge of suitability of all material.

B. Placing Fills and Compacting

1. Fill material shall be placed in a single lift. Compaction will be _____.
2. Contractor shall use hand tools to ensure fill is worked into areas of protected trees' exposed roots.
3. Notify the Engineer when excavation is ready for inspection. Filling and backfilling shall not be started until conditions have been approved by the Engineer.

3.04 DUST CONTROL

- A. If needed, the Contractor shall employ all possible methods and/or materials to prevent the spread of dust. Chemical materials may not be used.

3.05 Wetland Restoration

- A. Contractor shall seed and replant area of excavation in accordance with the "Wetland Restoration and Plantings Plan" dated _____ prepared by Nover-Armstrong Associates, Inc. of Carver, Massachusetts and incorporated in its entirety in this section by reference.

3.06 CLEAN UP

- A. Contractor shall remove all geotextile and crushed stone used for driveways upon completion of sediment excavation. Areas previously covered by a temporary driveway shall be seeded and planted in accordance with the Wetlands Restoration Plan.
- B. The Contractor shall remove all debris, construction equipment and scrap material from all areas within the limit of work prior to inspection for acceptance.

END OF SECTION

Appendix C3

**Excavation and Management
of Wetland Sediment**

EXCAVATION AND MANAGEMENT OF WETLAND SEDIMENT

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Work under this Section shall include all labor, materials, equipment, supervision and supplies necessary for the excavation, removal, segregation, handling, temporary stockpiling, loading, transportation and off-site management of contaminated soils and sediment in the wetlands area immediately adjacent to the new Keith Middle School construction site, to the lines and grades indicated on the Contract and/or as directed by the Engineer. For purposes of this Section, the Engineer (or Engineer) is BETA Group, Inc. The unsuitable sediment and soils contain levels of polychlorinated biphenyls (PCBs), heavy metals (particularly barium and lead), and polynuclear aromatic hydrocarbons (PAHs).
- B. The contaminated soil and sediment to be excavated under this project exist within six inches of grade. No excavation will be permitted deeper than six inches without the specific authorization of the Engineer.
- C. The Work shall include, but not be limited to, the following:
1. Mobilization and demobilization of all personnel, equipment, materials and supplies required to perform the Work;
 2. Submittal of all required certifications demonstrating that personnel are properly trained and qualified to perform the Work in accordance with applicable OSHA regulations and all laws governing the Work;
 3. Securing all permits and licenses, as necessary, including notification of local emergency personnel and notification/reporting requirements, with respect to unforeseen conditions;
 4. Installation of a double row of staked haybales in staggered formation at the perimeter of the work area as shown on Figure 2, Wetlands Sediment Remediation Area;
 5. Clearing and grubbing of all vegetation, including trees less than six (6) inches in diameter as measured at breast height above existing grade;
 6. Excavation, on-site handling, loading and transportation of contaminated soils, primarily consisting of vegetation; leaf litter; sand, silt, and clay sediment; and other unsuitable subgrade materials, as directed by Engineer;
 7. Assisting Engineer in obtaining environmental samples;
 8. Segregating and temporarily storing portions of the excavated wastes/regulated spoils, if directed by the Engineer;
 9. Coordinating all off-site recycle/disposal of excavated materials, based upon existing in-situ characterization results and/or supplemental sampling and analytical results provided by Engineer;
 10. Selecting appropriately licensed off-site recycle or disposal facilities;
 11. Backfilling excavated areas with clean, off-Site, sandy soil;
 12. Placement of a wetmix/wetlands seed mix over the replacement sandy soil. The wetmix will be composed of seeds that will germinate and produce a permanent cover of grasses, forbs, wildflowers, legumes, and grasses;
 13. If it becomes necessary to delay restoration because of adverse or unsuitable weather conditions, the excavated area shall be covered with mulch or organic cover to protect against erosion until conditions for re-vegetation (as determined by the Engineer) are more suitable; and

13. Perform general site cleanup.
- D. Schedule – Work shall not commence until the Engineer determines that site conditions are suitably dry and/or otherwise acceptable so as to reduce the compaction impacts by equipment and/or other excessive site disturbances.

1.02 APPLICABLE LAWS AND REGULATIONS

- A. Work under this Section shall be performed in strict compliance with all applicable Federal, State and local laws, rules, regulations related to the handling and off-site management of contaminated wastes and regulated soil. Specific reference is made to the fact that PCB-impacted soil to be excavated and managed off-site is regulated under the Toxic Substances Control Act (TSCA).
- B. Pertinent Federal and State Authorities having jurisdiction over this project include:
1. Occupational Safety and Health Administration (OSHA)
 2. U.S. Environmental Protection Agency (EPA)
 3. Massachusetts Department of Environmental Protection (MADEP)
- C. The following OSHA regulations will apply:
1. Occupational Safety and Health Standards, Hazardous Waste Operations and Emergency Response - 29 CFR 1910.120.
 2. Safety and Health Regulations for Construction - 29 CFR 1926.

1.03 RELATED WORK SPECIFIED ELSEWHERE

- A. Other Sections that directly relate to the Work of this Section include, but are not limited to, the following:
1. Section 02100 – Site Preparation
 2. Section 02200 - Earthwork
 3. Section 02270 – Sedimentation and Erosion Control

1.04 SUBMITTALS

- A. No Work will be permitted to proceed until the required submittals have been received and approved by the Engineer. In the event the Engineer requests additional information, it shall be the Contractor's responsibility to provide such additional information in a complete and timely manner, so that construction can proceed by the date stipulated in the Information for Bidders.
- B. Within seven (7) calendar days after execution of this Contract, the Contractor shall submit three (3) copies of the following to the Engineer for approval:
- i. Names and qualifications of all proposed subcontractors, if any, identifying the tasks to be performed by each proposed Subcontractor.
- C. Approval of submittals by the Engineer shall not impose any liability upon the Engineer or the City of New Bedford, nor shall any such approval relieve the Contractor of his/her

responsibilities to meet all of the requirements and comply with all applicable laws, regulations and other applicable requirements under this Contract.

- D. Within 21 days after substantial completion of the Work, the Contractor shall submit to the Engineer one (1) original copy of all manifests, certified weigh slips (tons), bills-of-lading, and records of final waste disposition from the accepting disposal facility (ies), and all other pertinent documentation, including a summary of dates and quantities relating to the off-site management of wastes and regulated soil.

1.05 EXISTING ENVIRONMENTAL CONDITIONS

- A. The project site is a confirmed disposal site, as defined under the Massachusetts Contingency Plan (MCP). The Department of Environmental Protection (DEP) has assigned the Site a release tracking number of 4-0015685.
- B. The project site has received "Special Project" designation, as defined under the MCP, by the Southeast Regional Office of the DEP.
- D. The material to be excavated from the Site is at a depth of six inches or less below existing wetlands elevation, and primarily consist of surface deposition of sediment from runoff from the adjacent ash and C&D landfill. The contaminants of concern include semi-polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), barium, cadmium, total chromium, lead, mercury, and selenium. The concentrations of these contaminants do not pose a Significant Risk as determined by an MCP Method 3 Risk Assessment under any foreseen exposure scenarios.
- D. The Contractor shall satisfy himself/herself as to the conditions existing at the Site, the type of equipment required to perform this Work, and the quality and quantity of the materials to be removed. Additional environmental data relative to in-situ characterization of wastes and soils to be excavated under this Contract will be provided by the Engineer.
- E. Failure of the Contractor to become fully acquainted with the available information will not relieve him/her of the responsibility to completely and properly perform the work in full compliance with the Contract Documents. The Engineer assumes no responsibility for any conclusion or interpretation made by the Contractor on the basis of information made available by the Owner or Engineer.

PART 2 - PRODUCTS [NOT USED]

PART 3 - EXECUTION

3.01 GENERAL

- A. Provide adequate barriers and demarcation of excavations and exclusion zones to warn site visitors and the public of potential hazards.
- B. Provide for on-site monitoring of VOC's, if any, and airborne particulates (dust).
- C. Take appropriate means to prevent a release or the spread of hazardous wastes or contaminated materials as a result of the Contractor's operations.

- D. Assist the Engineer with collection of post-excavation soil and/or groundwater samples for laboratory analyses, as requested.
- E. Separately stockpile characteristically different soil, material and other bulky wastes from that which is live-loaded for off-site management, for separate characterization by the Engineer. The quantity of wastes/soil to be segregated for separate characterization and off-site management is not expected to exceed 500 cubic yards.

3.02 SITE HEALTH & SAFETY

- A. The Contractor is solely responsible for controlling Site health and safety, including the provision of a Site H&S Officer. In the performance of its Work, the Contractor shall provide for the safety of all Contractor personnel, other Contractors' personnel, regulatory agency personnel, and the public for the duration of the Contract.
- B. The Contractor is solely responsible for his/her construction means and methods.
- C. The Engineer will be responsible for the H&S of its personnel only.
- D. The Contractor shall rely on the existing Health and Safety Plan (HASP) which addresses identified contaminants of concern for the Work under this Contract and conforms to the requirements of OSHA 1910.120 and all other applicable federal, state, and local laws, regulations, ordinances, and procedures. The HASP shall continue to be implemented by the Contractor's Safety Officer experienced with the health and safety requirements of OSHA 1910.120. The HASP shall be revised, as needed, whenever new information about site hazards is obtained.
- G. All personnel performing Work in contaminated or hazardous areas shall be fully trained in accordance with the OSHA 1910.120 and the HASP and shall be thoroughly briefed on anticipated hazards, safety equipment to be employed, safety practices to be followed, and emergency procedures and communications. The Contractor shall have a medical monitoring surveillance program in place for all personnel in accordance with all applicable laws and regulations.

3.03 MISCELLANEOUS PROVISIONS

- A. If hazardous wastes are to be transported from the Site, Contractor must have a valid EPA identification number and any other permits or licenses required by federal, state, and local laws, regulations, ordinances, and procedures.
- B. With the exception of the NPDES dewatering discharge permit, the Contractor shall be responsible for securing all necessary and applicable permits, certificates, licenses, and approvals required for the performance of this Work and shall be responsible for the payment of all associated fees.
- C. The Contractor shall comply with all required reporting and record keeping requirements in accordance with the provisions of this Contract and all applicable federal, state, and local laws, regulations, ordinances, and procedures.
- D. The Contractor shall be responsible for all notifications required by federal, state, and local laws, regulations, ordinances, and procedures. All notifications shall be coordinated with the Engineer.

- E. Material Shipping Records and/or Bills of Lading, as appropriate, will be provided and coordinated by the Engineer. The Owner will be responsible for signing all waste manifests and bills of lading. In order for Contractor's operations to proceed without interruption, complete and accurate information shall be provided by the Contractor during the Submittals process.
- F. The Contractor will be responsible for providing EPA Waste Manifests and other such documentation required by any out-of-state receiving facilities.

3.04 DUST MONITORING & CONTROL MEASURES

- A. The Contractor is responsible for monitoring the Work for overt evidence of airborne particulates (dusts) emanating from the Work area. It shall be the Contractor's responsibility to continuously monitor the work area (including the exclusion zone) for dust levels. The maximum allowable particulate level is 400 µg per cubic meter.
- B. The Contractor shall take appropriate measures to substantially eliminate the generation of dusts within the Work Area, including use of water provided by the Contractor and covering all stockpiled wastes and/or soils, except in the immediate vicinity of the excavation, where water may be required to control dust emissions.
- C. The Engineer will also be monitoring the site for elevated levels of dusts. In the event that visible emissions are observed, or levels are measured in excess of 200 µg per cubic meter, the Engineer may direct the contractor to take appropriate measures to mitigate the condition. Failure of the Contractor to implement measures that reduce dust levels below 200 µg per cubic meter may be caused for suspension of the Work, until otherwise directed by the Engineer.

3.05 EXCAVATION OF WASTES AND SOIL

- A. Sediment and soil shall be excavated to the horizontal limits indicated on the drawings and to the depth(s) as directed by the Engineer.
- B. Dewatering shall be performed to the extent necessary to excavate the wastes and soil and provide for the placement of graded fill and/or common borrow.
- C. All excavation operations shall be conducted in a manner suitable for removal of wastes and contaminated soil without cross contamination of "clean" soil.

3.06 TEMPORARY ON-SITE SOIL STOCKPILING

- A. If directed by the Engineer, "suspect" characteristically different excavated material shall be stockpiled out of the immediate work area and in a location acceptable by Owner, on 20-mil polyethylene sheeting. All stockpiled soils shall be covered with 20-mil polyethylene sheeting at the end of every working day. Sheeting shall be properly secured and maintained such that it remains fully intact during all weather conditions.
- B. The Contractor shall segregate the soils into separate stockpile areas to facilitate separate characterization by Engineer, and subsequent off-site management.
- C. The Contractor shall take care to segregate apparently uncontaminated or lightly contaminated materials from wastes and other overtly contaminated materials, as directed by Engineer. It will be the responsibility of the Engineer to decide what portion of the excavated materials may be suitable for on-site reuse.

- D. All stockpiled soil shall be either reused on site or transported from the site as soon as possible. In no event shall the volume of on-site stockpiled soil exceed 500 cubic yards, without the specific approval of Engineer.

3.07 OFF-SITE MANAGEMENT OF EXCAVATED WASTES, SOIL AND INVESTIGATION DERIVED WASTE (IDW)

- A. The Contractor shall be responsible for the off-site transportation and disposal of all soil designated by the Engineer for off-site management. In addition, all investigation derived waste (IDW) generated from in-situ pre-characterization of the site and otherwise generated over the course of the project, shall be disposed of at the facility approved by Engineer.
- B. All soil and IDW requiring off-site disposal shall be properly disposed off-site at appropriately permitted landfill or disposal facility(ies) in good standing and holding current, valid permits and licenses in accordance with all federal, state, and local laws, regulations, ordinances, and procedures. The Contractor shall be responsible for identification and selection of the disposal facility (ies) for approval by the Engineer.
- C. The Engineer will be responsible for all additional sampling and analyses as may be required by the receiving disposal facility (ies) for off-site disposal of soil and IDW. However, **it is the Contractor's responsibility to identify any additional receiving facility requirements that have not been met by the analytical results summary provided in these documents, including all subsequent environmental data provided by the Engineer.**
- D. The Contractor shall contain all soil and IDW in DOT-approved containers and/or transport in DOT-approved vehicles. All containers or transport vehicles shall be provided with appropriately sized polyethylene bladder bags and/or polyethylene liners that can be secured by duct tape or other appropriate means, to the satisfaction of the Engineer, prior to leaving the site. In addition, all loose soil, dusts and other deleterious materials shall be rinsed from the all containers and transport vehicles at the decontamination area, after loading and prior to leaving the site.
- E. All vehicles used for transportation of soil and IDW shall be properly labeled and placarded, as required for off-site transportation for conformance with all federal, state, and local laws, regulations, ordinances, and procedures.
- F. The Contractor shall be responsible for coordination of all transporter and receiving facility activities. Transporter vehicles used for the transportation of soil and IDW shall be covered, substance compatible, licensed, insured, and permitted pursuant to federal, state, and local laws, regulations, ordinances, and procedures.
- G. All vehicles departing the site shall be properly logged to show the vehicle identification, driver's name, time of departure, destination, and approximate volume and content of material carried. Location from which the wastes/soil originated will be provided by the Engineer for inclusion on the shipping documentation.
- H. No materials shall leave the site until the designated receiving facility has agreed in writing to accept the type and quantity of waste/soil to be shipped.
- I. The Contractor shall complete all required manifests and other pertinent forms for proper transportation and disposal. The Engineer shall review and the City will sign all manifests.

Signatures from the receiving location of all materials transported off-site are required. The Contractor shall be held accountable for ensuring that all requirements of the transporter and receiving disposal facility (ies) and federal, state, and local laws, regulations, ordinances, and procedures are complied with and properly documented.

- J. Documentation shall be maintained indicating that all applicable laws have been satisfied and that all soil and IDW has been successfully transported and received at the disposal facility (ies).
- K. Actual quantities which are subject to unit rates and measurements in the field shall be tabulated by the Contractor and verified by Engineer on a daily basis. The Contractor will not be reimbursed for unit rate work performed without the prior approval of quantities by Engineer.

3.08 SITE CLEANUP

- A. During the course of the Work, the Contractor shall keep the Site and his operations clean and neat at all times. The Contractor shall dispose of all residue resulting from the site clearing operations; and at the conclusion for the day's Work, he shall remove and haul away any surplus materials, lumber, equipment, temporary structures, and any other refuse remaining from the site clearing operations and shall leave the entire site in a neat and orderly condition.

END OF SECTION

Appendix C4

Sedimentation and Erosion Control

SECTION 02270

SEDIMENTATION AND EROSION CONTROL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Bidding requirements, Contract Forms, General and Supplementary Conditions and Division I, General Requirements are hereby made a part of this Section. The Order of Conditions, File No. _____ issued by the New Bedford Conservation Commission is included in this contract and attached to this Section.

1.02 DESCRIPTION OF WORK

- A. Furnish all labor, materials, equipment and incidentals necessary to perform all installation, maintenance, removal and area cleanup related to sedimentation control work as shown on the Drawings and as specified herein. The work shall include, but not necessarily be limited to; installation of temporary diversion swales, silt/hay bale fences, temporary slope drains, sediment removal and disposal, device maintenance, removal of temporary devices and final clean up.

1.03 RELATED WORK SPECIFIED ELSEWHERE

- A. Carefully examine all of the Contract Documents for requirements which affect the work of this section.
- B. Other specifications sections, which directly relate to the work of this section include, but are not limited to, the following:
1. Excavation and Management of Wetland Sediment
 2. Section 02100 - Site Preparation
 3. Section 02200 - Earthwork

1.04 REFERENCE SPECIFICATIONS

- A. ASTM - American Society for Testing and Materials.
- B. AASHTO - American Association of State Highway and Transportation Officials.
- C. SSHB - Standard Specifications for Highways and Bridges, the Commonwealth of Massachusetts, Massachusetts Highway Department, latest edition.

1.04 PERFORMANCE REQUIREMENTS

- A. The Contractor shall be responsible for the timely installation and maintenance of all sedimentation control and dewatering devices necessary to prevent the movement of sediment from the construction site to off site areas or into wetlands, or other drainage systems. Measures in addition to those shown on the Drawings necessary to prevent the movement of sediment off site shall be installed, maintained, removed and cleaned up at the expense of the Contractor. No additional charges to the owner shall be considered.
- B. Sedimentation and erosion control measures shall conform to the requirements outlined in the forthcoming New Bedford Conservation Commission's Order of Conditions.

PART 2 - MATERIALS

2.01 SILT FENCE

- A. Steel posts shall be a minimum of five feet (5') in length, two and one-half inch by two and one-half inch by one-quarter inch (2-1/2" x 2-1/2" x 1/4") angle post with self-fastening tabs and a five inch by four inch (5" x 4") (nominal) steel anchor plate at bottom.
- B. Welded wire fabric shall be four inch by four inch (4" x 4") mesh of twelve (12) gauge by twelve (12) gauge steel wire.
- C. Silt fence fabric shall be a woven, polypropylene, ultraviolet resistant material such as Mirafi 100X as manufactured by Mirafi, Inc., Charlotte, North Carolina or approved equal.
- D. Tie wires for securing silt fence fabric to wire mesh shall be light gauge metal clips (hog rings), or one-thirty second inch (1/32") diameter soft aluminum wire.
- E. Prefabricated commercial silt fence may be substituted for built-in-field fence. Prefabricated silt fence shall be "Envirofence" as manufactured by Celanese Corp., Charlotte, North Carolina, or approved equal.

2.02 EROSION CONTROL MAT

- A. During the period between the completion of excavation and backfilling, Jute erosion mat shall be placed on all sloped surfaces and in all low-lying areas subject to erosion due to runoff. Use jute mat made of unbleached, undyed, and loosely-twisted yarn. The unit yarn weight shall be from 0.90 to 1.50 lb/yd² (488 to 814 g/m²). A 48 in (1.2 m) width shall show between 76 and 80 warpings, and a 36 in (900 mm) length shall show between 39 and 43 weftings.
- B. The Erosion Control Blanket shall be placed in intimate contact with the soils without wrinkles or folds and anchored on a smooth graded surface approved by the Engineer. The Erosion Control Blanket shall be placed in such a manner that placement of the overlying materials will not excessively stretch so as to tear the Erosion Control Blanket. Anchoring of the terminal ends of the Erosion Control Blanket shall be accomplished through the use of key trenches or aprons at the crest and toe of the slope.
- C. The Erosion Control Blanket shall be placed with the machine direction parallel to the slope. For streambank and channel protection the Erosion Control Blanket shall be placed with the machine direction parallel to the direction of water flow and perpendicular to wave action. Adjacent Erosion Control Blankets shall be joined by overlapping and anchoring. Overlapped seams of roll ends shall be a minimum of (1.5 ft.) except where placed under water. In such instances the overlap shall be a minimum of (2.5 ft). Overlaps of adjacent rolls shall be a minimum of (3 in) in all instances.
- D. When overlapping, successive sheets, the Erosion Control Blankets shall be overlapped upstream over downstream, and/or upslope over downslope. In areas subject to high winds, Erosion Control Blankets shall be overlapped upwind over downwind and/or upslope over downslope.
- E. Care shall be taken during installation so as to avoid damage occurring to the Erosion Control Blankets as a result of the installation process. Should the Erosion Control Blankets be damaged during installation, a material patch shall be placed over the damaged area extending (3.0 ft) beyond the perimeter of the damage.
- G. Anchoring:
 1. U-shaped wire staples, metal geotextile stake pins, or triangular wooden stakes can be used to anchor mats to the ground surface. Wire staples should be a minimum of 11 gauge. Metal stake pins should be 3/16 inch (4.8 mm) diameter steel with a 1 1/2 inch (38.1 mm) steel washer at the head of the pin. Wire staples and metal stakes should be driven flush to the soil surface. All anchors should

- be 6-8 inches (0.2-0.5 m) long and have sufficient ground penetration to resist pullout. Longer anchors may be required for loose soils.
2. Blankets shall be stapled sufficiently to anchor blanket and maintain intimate contact with the soil. Staples shall be placed down the center and staggered with the staples placed along the edges. Slopes 2:1 or greater require 2 staples per square yard. Moderate slopes, 2:1 to 3:1, require 1-2 staples per square yard (1 staple 3' o.c.). Gentle slopes require 1 staple per square yard.
 - H. Field monitoring shall be performed to verify that the placement does not damage the Erosion Control Blankets.
 - I. Any Erosion Control Blankets damaged during placement shall be replaced as directed by the Engineer, at the contractor's expense.

2.03 HAY BALES

- A. Hay bales shall be bailed hay using two (2)-wrapping wires.

2.04 HAY BALE STAKES

- A. Wood stakes for hay bales shall be two-inch (2") square by thirty-two inches (32") long, hardwood stakes.

PART 3 - EXECUTION

3.01 SILT FENCE AND HAY BALE INSTALLATION

- A. Silt fences and hay bales shall be positioned as indicated on the Drawings and as necessary to prevent off site movement of sediment produced by construction activities as directed by the Architect and as shown on the Drawings.
- B. Dig trench approximately six inches (6") wide and six inches (6") deep along proposed fence lines.
- C. Drive hardwood stakes, eight feet (8') on center (maximum) at back edge of trenches. Stakes shall be driven two feet (2') (minimum) into ground.
- D. Hang four by four (4 x 4) woven wire mesh on posts, setting bottom of wire in bottom of trench. Secure wire to posts with self-fastening tabs.
- E. Hang filter fabric on wire carrying to bottom of trench with about four inches (4") of fabric laid across bottom of trench. Stretch fabric fairly taut along fence length and secure with tie wires eighteen inches (18") on center both ways.
- F. Backfill trench with excavated material and tamp.
- G. Install a double row of hay bales in staggered formation, and stake with two (2) hardwood stakes per bale.
- H. Furnish, place and maintain silt fence and hay bales as specified and as shown on the Drawings. Remove after final inspection by Conservation Commission and with approval of Engineer.

3.02 MAINTENANCE AND INSPECTIONS

- A. Inspections:

1. Contractor shall make a visual inspection of all sedimentation control devices once per week and promptly after every rainstorm. If such inspection reveals that additional measures are needed to prevent movement of sediment to off site areas the Contractor shall promptly install additional devices as needed. Sediment controls in need of maintenance shall be repaired promptly. Maintain stockpiles on site of siltation fence, hay bales, straw mat, and repair kits.

B. Maintenance:

1. Silt Fences and Hay Bales:

- a. Remove accumulated sediment once it builds up to one-half (1/2) of the height of the haybale.
- b. Replace damaged fabric, or patch with a two-foot (2') minimum overlap.
- c. Make other repairs as necessary to ensure that the fence is filtering all runoff directed to the fence.
- d. Replace hay bales when saturated with silt or otherwise damaged.

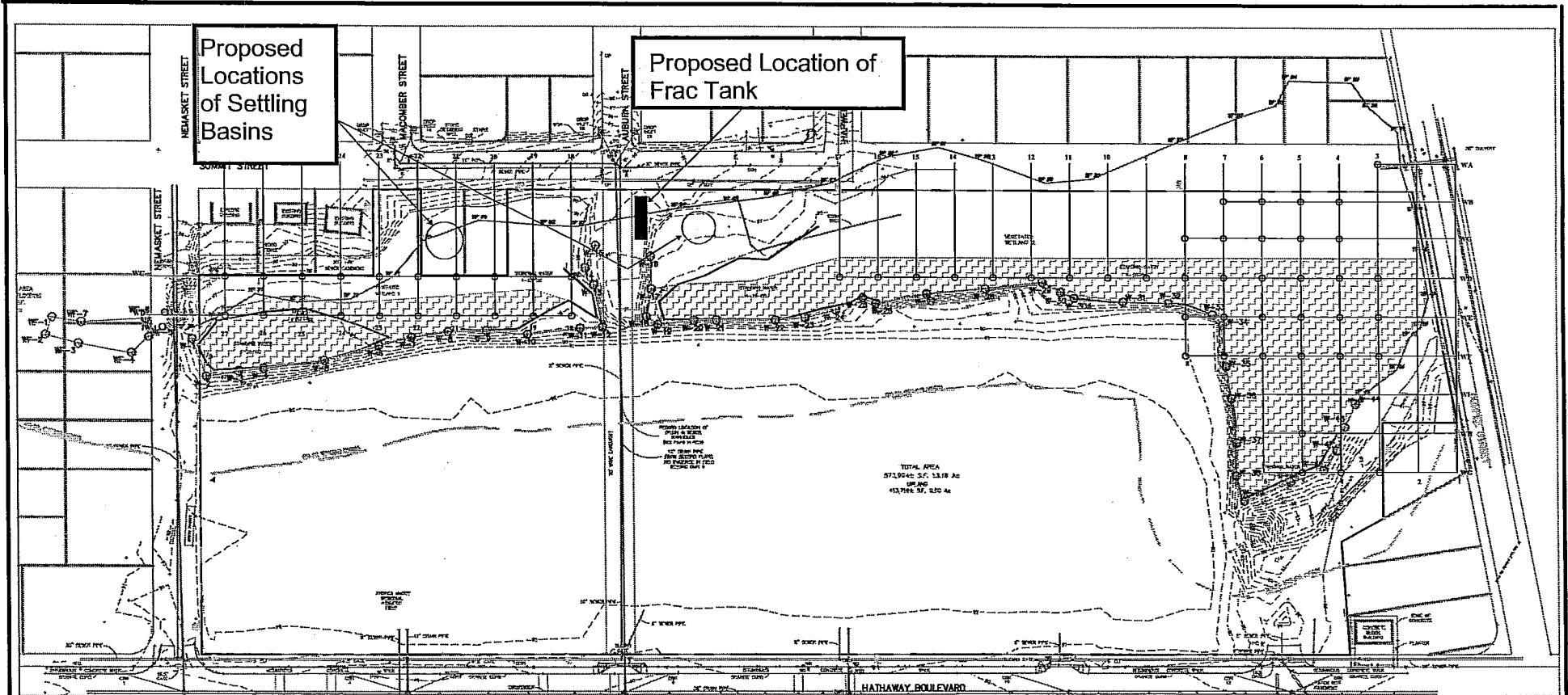
3.05 REMOVAL AND FINAL CLEANUP

- A. Once the site has been fully stabilized against erosion (approximately one full growing season) and after authorization by Engineer, remove sediment control devices and all accumulated silt. Dispose of silt and waste materials in proper manner. Regrade all areas disturbed during this process and stabilize against erosion with surfacing materials and erosion control devices as directed by the Architect until vegetation has sufficiently developed.

END OF SECTION

Appendix D

Dewatering



Proposed Locations of Settling Basins

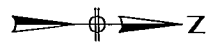
Proposed Location of Frac Tank



Indicates approximate limits of areas to be cleared and PCB-impacted sediments to be removed (PCB concentrations > 1 ppm)

BETA Group, Inc.
 Engineers • Scientists • Planners
 315 Norwood Park South
 Norwood, MA 02062 781.255.1982
 email: BETA@BETA-inc.com

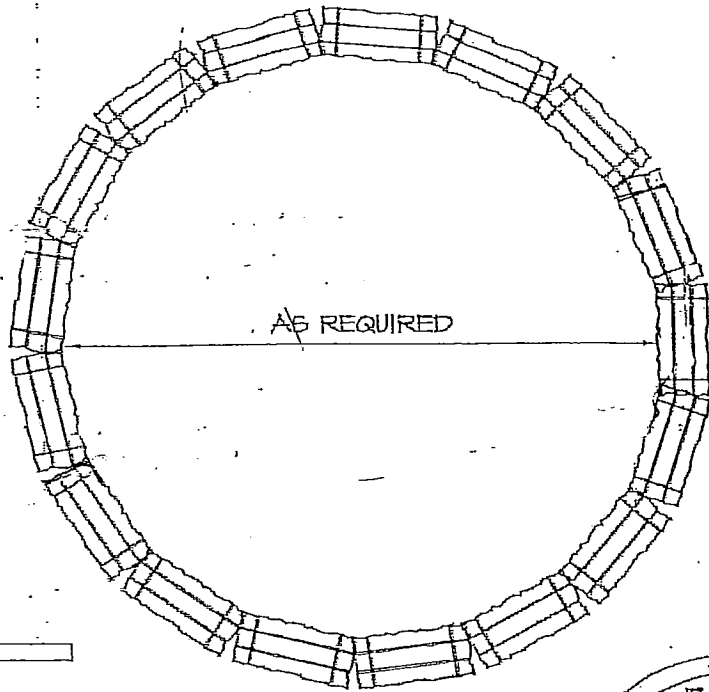
McCoy Field/New Keith Middle School



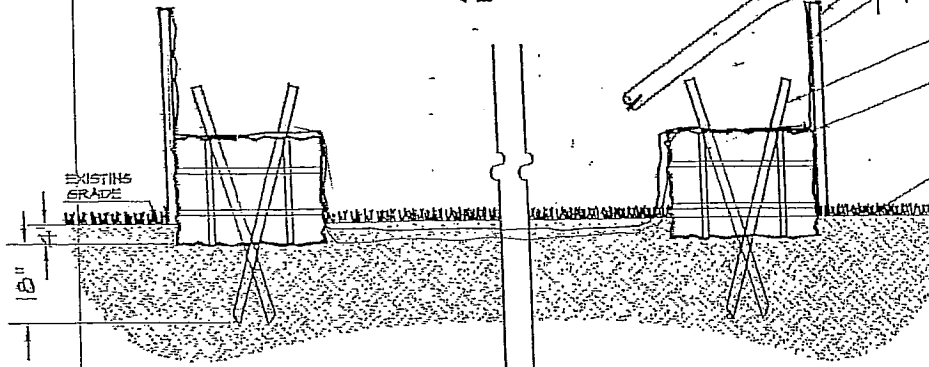
New Bedford, MA
 Scale: 1" = 100'

Wetlands Sediment Remediation Areas

April 29, 2005



PLAN VIEW



PERIMETER CONTROL SECTION

DISCHARGE PIPE

SILT FENCE

FILTER FABRIC

2"X2"X30" WOOD STAKES OR
#4 REBAR SET AT ANGLE

HAY BALE

FINISHED GRADE

5
L-3

SETTLING BASIN

SCALE: N.T.S.

NPDES PERMIT EXCLUSION APPLICATION - INCIDENT NOTIFICATION REPORT				HBR CASE NO.	
U.S. EPA - Region I, One Congress Street, Suite 1100 (HBR), BOSTON, MA 02114				NPDES Exclusion Ref.#	
Received: 1 1		Military Time:		GRANTED BY:	
A) REPORTER INFO,	Requested by: Alan D. Hanscom, P.E., LSP				
	Organization Name: BETA GROUP, INC.				
	Address: 315 Norwood Park South fax: 781-255-1974				
	City: Norwood	County: Norfolk	State: MA		
Zip: 02062	Phone No. (781) 255-1982		Ext: 1116		
B) DISCHARGER/ PERMITTEE/ OWNER	Same As Above In A		Name/Company Name City of New Bedford School Department		
	Address: 455 County St Room 141 Contact: Lawrence Oliveira				
	City: New Bedford	County: Bristol	State: MA		
	Zip: 02740	Phone No. (508) 997-4511		Ext: 3258	
C) DISCHARGE INCIDENT LOCATION	Same As Above In B		Site Location Name: McCoy Field (site for New Keith Middle School)		
	Address: field is bound by Hathaway Blvd, Summer St, and Durfee St.				
	City: New Bedford	County: Bristol	State: MA		
	Zip: 02740	Phone No. ()		Ext:	
D) DATES	Discharge Start Date: April 14, 2004		Discharge Duration: May 31, 2004		
E) GROUND WATER CONT.	Contaminant 1		Contaminant 2		Contaminant 3
	Barium		Toluene		Vanadium
	Approx. Concentration		170 ug/L		1.8 ug/L
	10 ug/L		10 ug/L		
Contaminant 4		Contaminant 5		Contaminant 6	
Approx. Concentration					
F) TREATMENT SYSTEM	Treatment Equipment: (check applicable)		Frac Tank 20,000-gal		Airstripper
	GAC Filter		Bag Filter		Oil/Water Separator
	Equalization Tanks		Other => Describe:		
	Written Description of System: Groundwater will be pumped from the excavation to a frac tank for solids settling prior to discharge to a temporary settling basin. Water quality will be monitored and a GAC filter will be used if necessary.				
G) RECEIVING WATERS	Discharge Via: (check applicable)		Direct	Storm Drain	Wetlands
	Within Facility		Other => Describe: settling basin		Unnamed River/ Brook
Receiving Waterway Name:					
H) PURPOSE OF DISCHARGE	Dewatering Activity: (check applicable)		UST Replacement/Removal		Contaminated Excavation
	Recovery & Treatment		Other => Describe:		Pump Test
	Description: A clean corridor will be excavated for relocation of subsurface utilities.				
I) FLOW	Maximum Flow Rate: N/A		GPM water will be discharged to settling basin		
J) INFO	Site ID #: 4-15685				
	Agency Name: MA DEP BWSC			Contact: Gerard M.R. Martin	
	Agency Name: MA DEP Wetlands			Contact: Brenda Harper	

Revised 01/05/99

New Bedford Con Comm - Sarah Porter, Agent

New Bedford School System-McCoy Field
Results of Groundwater Analysis
Samples Collected October 31, 2002

Parameter	Method 1 Groundwater Standards		Sample Location			
	GW-3	Units	TB/OW-22	TB/OW-2	TB/OW-1B	TB/OW-6
Total Metals						
Antimony, Total	300	ug/l	ND	ND	ND	ND
Arsenic, Total	400	ug/l	ND	ND	ND	ND
Barium, Total	30000	ug/l	260	70	140	1300
Beryllium, Total	50	ug/l	ND	ND	ND	ND
Cadmium, Total	10	ug/l	ND	ND	ND	ND
Chromium, Total	2000	ug/l	ND	ND	ND	ND
Lead, Total	30	ug/l	ND	ND	ND	ND
Nickel, Total	80	ug/l	ND	ND	ND	ND
Selenium, Total	80	ug/l	ND	ND	ND	ND
Silver, Total	7	ug/l	ND	ND	ND	ND
Thallium, Total	400	ug/l	ND	ND	10	ND
Vanadium, Total	2000	ug/l	ND	ND	ND	ND
Zinc, Total	800	ug/l	ND	ND	ND	ND
Volatile Organic Compounds (VOCs)-8260						
Benzene	7000	ug/l	ND	ND	ND	0.76
Toluene	50000	ug/l	1.7	1.8	1.4	1.9
Ethylbenzene	4000	ug/l	ND	ND	ND	ND
Vinyl chloride	40000	ug/l	ND	ND	ND	ND
Methyl tert butyl ether	50000	ug/l	1.1	ND	ND	ND
Total Xylenes	50000	ug/l	ND	ND	ND	ND
Hexachlorobutadiene	80	ug/l	ND	ND	ND	ND
Naphthalene	6000	ug/l	2.5	ND	ND	6.5
Semi-Volatile Organic Compounds (SVOCs)-8270						
Hexachlorobenzene	40	ug/l	ND	ND	ND	ND
1,4-Dichlorobenzene	8000	ug/l	ND	ND	ND	ND
Hexachlorobutadiene	80	ug/l	ND	ND	ND	ND
Benzo(a)anthracene	3000	ug/l	ND	ND	ND	ND
Benzo(a)pyrene	3000	ug/l	ND	ND	ND	ND
Benzo(b)fluoranthene	3000	ug/l	ND	ND	ND	ND
Benzo(k)fluoranthene	3000	ug/l	ND	ND	ND	ND
Chrysene	3000	ug/l	ND	ND	ND	ND
Dibenzo(a,h)anthracene	3000	ug/l	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	3000	ug/l	ND	ND	ND	ND
Pentachlorophenol	80	ug/l	ND	ND	ND	ND
Polycyclic Aromatic Hydrocarbons (PAHs)-8270M						
Acenaphthene	5000	ug/l	ND	ND	ND	ND
Fluoranthene	200	ug/l	ND	ND	ND	3.6
Naphthalene	6000	ug/l	ND	ND	ND	ND
Benzo(a)anthracene	3000	ug/l	ND	ND	ND	ND
Benzo(a)pyrene	3000	ug/l	ND	ND	ND	ND
Benzo(b)fluoranthene	3000	ug/l	ND	ND	ND	ND
Benzo(k)fluoranthene	3000	ug/l	ND	ND	ND	ND
Chrysene	3000	ug/l	ND	ND	ND	ND
Acenaphthylene	3000	ug/l	ND	ND	ND	ND
Anthracene	3000	ug/l	ND	ND	ND	ND
Benzo(ghi)perylene	3000	ug/l	ND	ND	ND	ND
Fluorene	3000	ug/l	ND	ND	ND	ND
Phenanthrene	50	ug/l	ND	ND	ND	ND
Dibenzo(a,h)anthracene	3000	ug/l	ND	ND	ND	ND
Indeno(1,2,3-cd)Pyrene	3000	ug/l	ND	ND	ND	ND
Pyrene	3000	ug/l	ND	ND	ND	ND
2-Methylnaphthalene	3000	ug/l	ND	ND	ND	ND
Polychlorinated Biphenyls (PCBs)						
Aroclor 1221	0.3	ug/l	ND	ND*	ND*	ND
Aroclor 1232	0.3	ug/l	ND	ND*	ND*	ND
Aroclor 1242/1016	0.3	ug/l	ND	ND*	ND*	ND
Aroclor 1248	0.3	ug/l	ND	ND*	ND*	ND
Aroclor 1254	0.3	ug/l	ND	ND*	ND*	ND
Aroclor 1260	0.3	ug/l	ND	ND*	ND*	ND
Extractable Petroleum Hydrocarbons (EPH)						
C9-C18 Aliphatics	20000	ug/l	ND	ND	ND	ND
C19-C36 Aliphatics	20000	ug/l	ND	ND	ND	ND
C11-C22 Aromatics, Unadjusted	30000	ug/l	ND	ND	ND	ND

ND-not detected.
ND*-not detected, but the laboratory minimum detection limit (MDL) was above Method 1 Standards.

NPDES
Form



United States Environmental Protection Agency
Washington, DC 20460

Notice of Intent (NOI) for Storm Water Discharges Associated with
Construction Activity Under an NPDES General Permit

Submission of this Notice of Intent (NOI) constitutes notice that the party identified in Section II of this form requests authorization to discharge pursuant to the NPDES Construction General Permit (CGP) permit number identified in Section I of this form. Submission of this NOI also constitutes notice that the party identified in Section II of this form meets the eligibility requirements of the CGP for the project identified in Section III of this form. Permit coverage is required prior to commencement of construction activity until you are eligible to terminate coverage as detailed in the CGP. To obtain authorization, you must submit a complete and accurate NOI form. Refer to the instructions at the end of this form.

I. Permit Number

MAR100000

II. Operator Information

Name: WES CONSTRUCTION CORPORATION

IRS Employer Identification Number (EIN): 04 - 2077178

Mailing Address:

Street: 175 COMMERCIAL CIRCLE

City: DEDHAM State: MA Zip Code: 02026 -

Phone: 781 - 326 - 4030 Fax (optional): 781 - 326 - 9957

E-mail (optional): WESGCC@VERIZON.NET

III. Project/Site Information

Project/Site Name: KEITH MIDDLE SCHOOL

Project Street/Location: 225 HATHAWAY BOULEVARD

City: NEW BEDFORD State: MA Zip Code: 02740 -

County or similar government subdivision: BRISTOL

Latitude/Longitude (Use one of three possible formats, and specify method)

Latitude	1. 41° 38' 43" N (degrees, minutes, seconds)	Longitude	1. 070° 56' 56" W (degrees, minutes, seconds)
	2. ° ' " N (degrees, minutes, decimal)		2. ° ' " W (degrees, minutes, decimal)
	3. 41.6454° N (decimal)		3. -70.9488° W (decimal)

Method: U.S.G.S. topographic map EPA web site GPS Other:
• If you used a U.S.G.S. topographic map, what was the scale: GEOSEARCH.COM

Project Located in Indian country? Yes No
If so, name of Reservation or if not part of a Reservation, put "Not Applicable":

Estimated Project Start Date: 09 / 20 / 2004 Estimated Project Completion Date: 12 / 30 / 2004
Month Date Year Month Date Year

Estimated Area to be Disturbed (to the nearest quarter acre): 0.0075
1.5

IV. SWPPP Information

Has the SWPPP been prepared in advance of filing this NOI? Yes No

Location of SWPPP for viewing: Address in Section II Address in Section III Other

SWPPP Street: 315 NORWOOD PARK SOUTH

City: NORWOOD

State: MA Zip Code: 02062

SWPPP Contact Information (if different than that in Section II):

Name: ALAN HANSCOM, PE, LSP

Phone: 781 - 255 - 1982 Fax (optional): 781 - 255 - 1974

E-mail (optional): AHANSCOM@BETA-INC.COM

V. Discharge Information

Identify the name(s) of waterbodies to which you discharge. UNNAMED TRIBUTARY TO THE APPONAGANSETT SWAMP.

Is this discharge consistent with the assumptions and requirements of applicable EPA approved or established TMDL(s)? Yes No

VI. Endangered Species Information

Under which criterion of the permit have you satisfied your ESA eligibility obligations?

A B C D E F

* If you select criterion F, provide permit tracking number of operator under which you are certifying eligibility:

VII. Certification Information

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Print Name: ALAN D. HANSCOM, P.E., LSP

Print Title: ASSOCIATE

Signature:

Date: 9/15/2004

Instructions for Completing EPA Form 3510-9

Notice of Intent (NOI) for Storm Water Discharges Associated with
Construction Activity Under an NPDES General Permit

NPDES Form

This Form Replaces Form 3510-9 (8/98)

Form Approved OMB Nos. 2040-0188 and 2040-0211

Who Must File an NOI Form

Under the provisions of the Clean Water Act, as amended (33 U.S.C. 1251 et seq.; the Act), federal law prohibits storm water discharges from certain construction activities to waters of the U.S. unless that discharge is covered under a National Pollutant Discharge Elimination System (NPDES) Permit. Operator(s) of construction sites where one or more acres are disturbed, smaller sites that are part of a larger common plan of development or sale where there is a cumulative disturbance of at least one acre, or any other site specifically designated by the Director, must submit an NOI to obtain coverage under an NPDES general permit. Each person, firm, public organization, or any other entity that meets either of the following criteria must file this form: (1) they have operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications; or (2) they have day-to-day operational control of those activities at the project necessary to ensure compliance with SWPPP requirements or other permit conditions. If you have questions about whether you need an NPDES storm water permit, or if you need information to determine whether EPA or your state agency is the permitting authority, refer to www.epa.gov/npdes/stormwater/cgp or telephone the Storm Water Notice Processing Center at (866) 352-7755.

Where to File NOI Form

See the applicable CGP for information on where to send your completed NOI form.

Completing the Form

Obtain and read a copy of the appropriate EPA Storm Water Construction General Permit for your area. To complete this form, type or print, using uppercase letters, in the appropriate areas only. Please place each character between the marks (abbreviate if necessary to stay within the number of characters allowed for each item). Use one space for breaks between words, but not for punctuation marks unless they are needed to clarify your response. If you have any questions on this form, refer to www.epa.gov/npdes/stormwater/cgp or telephone the Storm Water Notice Processing Center at (866) 352-7755. Please submit original document with signature in ink - do not send a photocopied signature.

Section I. Permit Number

Provide the number of the permit under which you are applying for coverage (see Appendix B of the general permit for the list of eligible permit numbers).

Section II. Operator Information

Provide the legal name of the person, firm, public organization, or any other entity that operates the project described in this

application. An operator of a project is a legal entity that controls at least a portion of site operations and is not necessarily the site manager. Provide the employer identification number (EIN from the Internal Revenue Service; IRS), also commonly referred to as your taxpayer ID. If the applicant does not have an EIN enter "NA" in the space provided. Also provide the operator's mailing address, telephone number, fax number (optional) and e-mail address (if you would like to be notified via e-mail of NOI approval when available). Correspondence for the NOI will be sent to this address.

Section III. Project/Site Information

Enter the official or legal name and complete street address, including city, state, zip code, and county or similar government subdivision of the project or site. If the project or site lacks a street address, indicate the general location of the site (e.g., intersection of State Highways 61 and 34). Complete site information must be provided for permit coverage to be granted.

The applicant must also provide the latitude and longitude of the facility either in degrees, minutes, seconds; degrees, minutes, decimal; or decimal format. The latitude and longitude of your facility can be determined in several different ways, including through the use of global positioning system (GPS) receivers, U.S. Geological Survey (U.S.G.S.) topographic or quadrangle maps, and EPA's web-based siting tools, among others. Refer to www.epa.gov/npdes/stormwater/cgp for further guidance on the use of these methodologies. For consistency, EPA requests that measurements be taken from the approximate center of the construction site. Applicants must specify which method they used to determine latitude and longitude. If a U.S.G.S. topographic map is used, applicants are required to specify the scale of the map used.

Indicate whether the project is in Indian country, and if so, provide the name of the Reservation. If the project is in Indian Country Lands that are not part of a Reservation, indicate "not applicable" in the space provided.

Enter the estimated construction start and completion dates using four digits for the year (i.e., 05/27/1998). Enter the estimated area to be disturbed including but not limited to: grubbing, excavation, grading, and utilities and infrastructure installation. Indicate to the nearest quarter acre. Note: 1 acre = 43,560 sq. ft.

Section IV. SWPPP Information

Indicate whether or not the SWPPP was prepared in advance of filing the NOI form. Check the appropriate box for the location where the SWPPP may be viewed. Provide the name,

Instructions for Completing EPA Form 3510-9

Notice of Intent (NOI) for Storm Water Discharges Associated with
Construction Activity Under an NPDES General Permit

NPDES Form

This Form Replaces Form 3510-9 (8/98)

Form Approved OMB Nos. 2040-0188 and 2040-0211

fax number (optional), and e-mail address (optional) of the contact person if different than that listed in Section II of the NOI form.

Section V. Discharge Information

Enter the name(s) of receiving waterbodies to which the project's storm water will discharge. These should be the first bodies of water that the discharge will reach. (Note: If you discharge to more than one waterbody, please indicate all such waters in the space provided and attach a separate sheet if necessary.) For example, if the discharge leaves your site and travels through a roadside swale or a storm sewer and then enters a stream that flows to a river, the stream would be the receiving waterbody. Waters of the U.S. include lakes, streams, creeks, rivers, wetlands, impoundments, estuaries, bays, oceans, and other surface bodies of water within the confines of the U.S. and U.S. coastal waters. Waters of the U.S. do not include man-made structures created solely for the purpose of wastewater treatment. U.S. Geological Survey topographical maps may be used to make this determination. If the map does not provide a name, use a format such as "unnamed tributary to Cross Creek". If you discharge into a municipal separate storm sewer system (MS4), you must identify the waterbody into which that portion of the storm sewer discharges. That information should be readily available from the operator of the MS4.

Indicate whether your storm water discharges from construction activities will be consistent with the assumptions and requirements of applicable EPA approved or established TMDL(s). To answer this question, refer to www.epa.gov/npdes/stormwater/cgp for state- and regional-specific TMDL information related to the construction general permit. You may also have to contact your EPA regional office or state agency. If there are no applicable TMDLs or no related requirements, please check the "yes" box in the NOI form.

Section VI. Endangered Species Information

Indicate for which criterion (i.e., A, B, C, D, E, or F) of the permit the applicant is eligible with regard to protection of federally listed endangered and threatened species, and designated critical habitat. See Part 1.3.C.6 and Appendix C of the permit. If you select criterion F, provide the permit tracking number of the operator under which you are certifying eligibility. The permit tracking number is the number assigned to the operator by the Storm Water Notice Processing Center after EPA acceptance of a complete NOI.

Section VII. Certification Information

All applications, including NOIs, must be signed as follows:
For a corporation: By a responsible corporate officer. For the purpose of this Section, a responsible corporate officer means:

(i) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production, or operating facilities, provided, the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long-term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

For a partnership or sole proprietorship: By a general partner or the proprietor, respectively; or

For a municipality, state, federal, or other public agency: By either a principal executive officer or ranking elected official. For purposes of this Part, a principal executive officer of a federal agency includes (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrator of EPA).

Include the name and title of the person signing the form and the date of signing. An unsigned or undated NOI form will not be considered eligible for permit coverage.

Paperwork Reduction Act Notice

Public reporting burden for this application is estimated to average 3.7 hours. This estimate includes time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. Send comments regarding the burden estimate, any other aspect of the collection of information, or suggestions for improving this form, including any suggestions which may increase or reduce this burden to: Chief, Information Policy Branch 2136, U.S. Environmental Protection Agency, 1200 Pennsylvania Avenue, NW, Washington, D.C. 20460. Include the OMB control number on any correspondence. Do not send the completed form to this address.

Appendix E

Stormwater Pollution Prevention Plan

KEITH MIDDLE SCHOOL CONSTRUCTION POLLUTION PREVENTION PLAN

SITE DESCRIPTION	
Project Name and Location; (Latitude, Longitude, or Address)	Keith Middle School 225 Hathaway Blvd. New Bedford, MA 02740
Owner Name and Address:	New Bedford Public Schools 455 County Road New Bedford, MA 02740-5194
Project Description: (Purpose and Types of Soil Disturbing Activities)	Phase II of this project will consist of earthwork for site remediation, preparation for site utilities and pile driving. Phase III will consist of site development and building construction.
Soil disturbing activities will include: Phase II - Stripping topsoil, removal and replacement of fill layer and regulated soils with clean granular fill (to a depth of 3 feet below proposed finished grade in lawn and landscape areas and 4 feet below proposed finished grade under all paved areas), installation of miscellaneous bases, concrete filled steel bollards, underground utilities including water, sewer and drainage systems, and steel piles for building support. Phase III - Construction of new Middle School building, installation of underground electric and gas services and light poles, paving of drives, parking areas and walkways, construction of permanent fencing, and installation of loam, lawns, planting and irrigation.	
Site Area:	The site is approximately 8.65 acres.
Sequence of Major Activities	
The order of activities will be as follows: See Attachment C.	
Name of Receiving Waters:	The entire site drains to the adjacent Unnamed Wetland and eventually flows into the Appongansett Swamp, which is approximately one mile NW of the site (see Attachment G).

CONTROLS

Erosion and Sediment Controls are already in place.

Stabilization Practices

Temporary Stabilization - Topsoil stockpiles and disturbed portions of the site where construction activity temporarily ceases for at least 21 days will be stabilized with temporary seed and mulch no later than 14 days from the last construction activity in that area. The temporary seed shall be Rye (grain) applied at the rate of 50 pounds per 1000 sq. ft. After seeding, each area shall be mulched with straw.

Permanent Stabilization - Disturbed portions of the site where construction activities permanently cease shall be stabilized with permanent seed no later than 14 days after the last construction activity. The permanent seed mix shall be as specified in the construction documents or as directed by the Conservation Commission.

Material stockpiles will be encompassed by plastic poly sheeting to contain any sediment from washing away from the area.

All work will be completed in accordance with the Conservation Commission's Order of Conditions DEP file No. SE49-461

Storm Water Management

Storm water drainage will be provided by closed drainage system consisting of catch basins, manholes and two detention basins for the developed areas. The areas which are not developed will have permanent seeding or plantings.

The new drainage system was designed in accordance with the DEP Stormwater Management Policy that requires a minimum treatment efficiency of 80% removal for TSS.

OTHER CONTROLS

Waste Disposal:

Waste Materials

All waste materials will be collected and stored in a metal dumpster rented from the ABC Disposal, which is a licensed solid waste management company in New Bedford, MA. The dumpster will meet all local Town and any State solid waste management regulations. All trash and construction debris from the site will be deposited in the dumpster. The dumpster will be emptied as needed, and the trash will be hauled off site. No construction waste materials will be buried onsite. All personnel will be instructed regarding the correct procedure for waste disposal. Notices stating these practices will be posted in the office trailer and Mr. Adams, the individual who manages the day-to-day site operations, will be responsible for seeing that these procedures are followed.

Hazardous Waste

All hazardous waste materials will be disposed of in the manner specified by local or State regulation or by the manufacturer. Site personnel will be instructed in these practices and Mr. Michael Adams of Wes Construction, the site health and safety officer and the individual who manages day-to-day site operations, will be responsible for seeing that these practices are followed.

Sanitary Waste

All sanitary waste will be collected from the portable units a minimum of once a week by the Bay-state Portable Restroom, a licensed sanitary waste management contractor, as required by local regulation.

Offsite Vehicle Tracking:

A stabilized construction entrance has been provided to help reduce vehicle tracking of sediments. The paved street adjacent to the site entrance will be swept daily to remove any excess mud, dirt or rock tracked from the site. Dump trucks hauling material from the construction site will be lined with waterproof plastic poly sheeting, covered with a tarpaulin and washed down before leaving the site. Additionally, weekly inspections of the stabilized construction entrance and road will be performed and logged (see Attachment A).

The road at the construction entrance is at a lower elevation than the site. During Phase I activities, seepage of vehicle wash-water onto the road occurred where the driveway meets the road. The wash-water found a conduit by moving laterally through the topsoil towards the road. A four foot deep trench was installed across the entrance to the driveway and filled with crushed stone to prevent future lateral movement of wash-water onto the road by enabling it to drain downwards into the ground. Since the installation of the trench, no seepage has occurred.

TIMING OF CONTROLS/MEASURES

As indicated in Attachment C - Intended Sequence of Site Activities, as part of Phase I activities, the hay bales and erosion control fence and stabilized construction entrance have already been constructed. Also, the perimeter slopes along the wetland boundary have been graded and stabilized with permanent seed and grass. Additionally, as part of Phase II activities, hay bails and erosion control fence will be constructed the remaining perimeter of the site.

Areas where construction activity temporarily ceases for more than 21 days will be stabilized with temporary seed and mulch within 14 days of the last disturbance. Once construction activity ceases permanently the area will be stabilized with permanent seed.

CERTIFICATION OF COMPLIANCE WITH FEDERAL, STATE, AND LOCAL REGULATIONS

The City of New Bedford currently has no wetland bylaws for storm water management erosion and sediment control and is guided by the State regulations. The storm water pollution prevention plan reflects the State wetland regulations as stated in the Wetlands Protection Act 310 CMR 10.00. To ensure compliance, this plan was prepared in accordance with the Storm Water Management For Construction Activities, published by the United States Environmental Protection Agency. There are no other applicable State or Federal requirements for sediment and erosion site plans (or permits), or storm water management site plans (or permits).

MAINTENANCE/INSPECTION PROCEDURES

Erosion and Sediment Control Inspection and Maintenance Practices

Erosion and sediment controls have been installed along the portions of the perimeter of the site that border the wetlands. The slope has been graded, stabilized and seeded. Grass has taken and is helping to stabilize the slope and prevent erosion during storm events. The entire rest of the site is relatively level. Historically, during Phase I activities, runoff from stormwater events in these areas percolated into the ground.

These are the inspection and maintenance practices that will be used to maintain erosion and sediment controls.

- Less than one half of the site will be denuded at one time.
- All control measures will be inspected at least once each week and following any storm event of 0.5 inches or greater.
- All measures will be maintained in good working order; if a repair is necessary, it will be initiated within 24 hours of report.
- Built up sediment will be removed from silt fence when it has reached one-third the height of the fence.
- Silt fence will be inspected for depth of sediment, tears, to see if the fabric is securely attached to the fence posts, and to see that the fence posts are firmly in the ground.
- Temporary and permanent seeding and planting will be inspected for bare spots, washouts, and healthy growth.
- Maintenance inspection reports will be made after each inspection of the Erosion Control Methods and the Site Stabilization Measures. Copies of the report forms to be completed by the inspector (see Attachment A).
- Mr. Adams, the site health and safety officer for Wes Construction Corp., will select three individuals who will be responsible for inspections, maintenance and repair activities, and filling out the inspection and maintenance report.
- Personnel selected for inspection and maintenance responsibilities will receive training from Mr. Adams. They will be trained in all the inspection and maintenance practices necessary for keeping the erosion and sediment controls used onsite in good working order.

MAINTENANCE /INSPECTION PROCEDURES (Continued)

Non Storm-Water Discharges

It is expected that the following non-storm water discharges will occur from the site during the construction period:

- Contaminated groundwater (from dewatering excavation),
- Non-contaminated groundwater (from dewatering excavation).

All non-storm water discharges will be directed to the on-site storage tank to be discharged into the designated on-site, above-ground, stilling basin. The stilling basin is constructed of silt fabric and allows the water to percolate back into the ground while removing any suspended solids. Solids will be removed from the basin before the design capacity is reduced by 50 percent.

MATERIAL INVENTORY FOR POLLUTION PREVENTION PLAN

The materials or substances listed below are expected to be present onsite during construction:

- | | |
|---|--|
| <ul style="list-style-type: none">• Concrete• Steel Pilings• Steel and PVC Pipe for Utilities• Detergents• Paints (enamel and latex)• Metal Studs• Concrete• Tar | <ul style="list-style-type: none">• Gravel• Clean Sand for Fill• Fertilizers• Petroleum Based Products• Cleaning Solvents• Wood• Masonry Block• Roofing Materials |
|---|--|

SPILL PREVENTION

Material Management Practices

The following are the material management practices that will be used to reduce the risk of spills or other accidental exposure of materials and substances to storm water runoff.

Good Housekeeping

The following good housekeeping practices will be followed onsite during the construction project

- An effort will be made to store only enough products required to do the job
- All materials stored onsite will be stored in a neat, orderly manner in their appropriate containers and, if possible, under a roof or other enclosure
- Products will be kept in their original containers with the original manufacturer's label
- Substances will not be mixed with one another unless recommended by the manufacturer
- Whenever possible, all of a product will be used up before disposing of the container
- Manufacturers' recommendations for proper use and disposal will be followed
- The site superintendent will inspect daily to ensure proper use and disposal of materials onsite.

Hazardous Products:

These practices are used to reduce the risks associated with hazardous materials.

- Products will be kept in original containers unless they are not re-sealable
- Original labels and material safety data will be retained; they contain important product information
- If surplus product must be disposed of, manufacturers' or local and State recommended methods for proper disposal will be followed.

Product Specific Practices

The following product specific practices will be followed onsite:

Petroleum Products

All onsite vehicles will be monitored for leaks and receive regular preventive maintenance to reduce the chance of leakage. Petroleum products will be stored in tightly sealed containers which are clearly labeled. Any asphalt substances used onsite will be applied according to the manufacturer's recommendations.

Fertilizers:

Fertilizers used will be applied only in the minimum amounts recommended by the manufacturer. Once applied, fertilizer will be worked into the soil to limit exposure to storm water. Storage will be in a covered shed. The contents of any partially used bags of fertilizer will be transferred to a sealable plastic bin to avoid spills.

Paints:

All containers will be tightly sealed and stored when not required for use. Excess paint will not be discharged to the storm sewer system but will be properly disposed of according to manufacturers' instructions or State and local regulations.

Concrete Trucks:

Concrete trucks will not be allowed to wash out or discharge surplus concrete or drum wash water on the site.

Spill Control Practices

In addition to the good housekeeping and material management practices discussed in the previous sections of this plan, the following practices will be followed for spill prevention and cleanup:

- Manufacturers' recommended methods for spill cleanup will be clearly posted and site personnel will be made aware of the procedures and the location of the information and cleanup supplies.
- Materials and equipment necessary for spill cleanup will be kept in the material storage area onsite. Equipment and materials will include but not be limited to brooms, dust pans, mops, rags, gloves, goggles, kitty litter, sand, sawdust, and plastic and metal trash containers specifically for this purpose.
- All spills will be cleaned up immediately after discovery.
- The spill area will be kept well ventilated and personnel will wear appropriate protective clothing to prevent injury from contact with a hazardous substance.
- Spills of toxic or hazardous material will be reported to the appropriate State or local government agency, regardless of the size.
- The Health and Safety Plan will be adjusted to include measures to prevent this type of spill from reoccurring and how to clean up the spill if there is another one. A description of the spill, what caused it, and the cleanup measures will also be included.
- Mr. Adams, the site health and safety officer responsible for the day-to-day site operations, will be the spill prevention and cleanup coordinator. He will designate at least three other site personnel who will receive spill prevention and cleanup training. These individuals will each become responsible for a particular phase of prevention and cleanup. The names of responsible spill personnel will be posted in the material storage area and in the office trailer onsite.

POLLUTION PREVENTION PLAN CERTIFICATION

I certify under the penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed: _____
Alan D. Hanscom, P.E., LSP
Associate
BETA Group, Inc.

Date: _____

CONTRACTOR'S CERTIFICATION

I certify under the penalty of law that I understand the terms and conditions of the general National Pollutant Discharge Elimination System (NPDES) permit that authorizes the storm water discharges associated with industrial activity from the construction site identified as part of this certification.

Signature	For	Responsible for
_____ Ken Vogel Senior Project Manager Date: _____ _____	Wes Construction Corporation 175 Commercial Circle Dedham, MA 02026 (781) 326-4030	General Contractor

Appendix F

Site Photographs



PHOTOGRAPHIC DOCUMENTATION

McCoy Field
New Bedford, Massachusetts
NAA File PI372

Appendix G

Nover-Armstrong Memos

NOVER-ARMSTRONG ASSOCIATES, INC.

Carver Square Marketplace, 124 Main Street, Unit 2GG
Carver, Massachusetts 02330

Telephone 508.866.8383
Facsimile 508.866.9898

MEMORANDUM

TO: Alan Hanscom
BETA Group, Inc.

FROM: Lenore White, PWS

RE: McCoy Field
New Bedford, MA
NAA File P1372

DATE: 04/28/05

Pursuant to a review of the project scope for the above referenced project and relevant data gathered to date, Nover-Armstrong Associates, Inc. (NAA) has the following preliminary comments regarding the ecological impacts of the project and the preliminary restoration goals. It is our overall opinion that the proposed project will serve to improve the natural capacity of the resource area and a successful restoration can be accomplished.

The project is designed as a limited project, pursuant to 310 CMR 10.53 (3) (q), for the "assessment, monitoring, containment, mitigation, and remediation of...hazardous material in accordance with the provisions of 310 CMR 40.00000." More specifically, the project is an undertaking by the City of New Bedford to significantly reduce the risk associated with the hazardous material at the site by excavating it and restoring the natural wetland community. As such, the work will improve the natural capacity of the resource area by providing a cleaner environmental for all endemic species. Although a Method 3 Risk Characterization of the Wetland Areas concludes that there is "**no significant risk of harm to human health, public welfare, safety and the environment**", the work is being conducted as an additional assurance for the City of New Bedford. The temporary disturbance will be conducted at a time when the area is sufficiently dry or frozen to reduce impacts caused by the compaction of equipment. Once all of the significantly contaminated areas have been excavated, the area will be restored and re-vegetated. Prior to any restoration, additional sampling will be conducted to ensure that the remaining areas are sufficiently hazard free.

A plan titled "Wetlands Sampling Grid" accompanies this Notice of Intent and shows the area of proposed work. An area of approximately 1.5 acres will be altered by this proposed project. According to the test results to date, the area of contamination is primarily limited to the base of the existing slope, where contamination has migrated off the slope and into the low, flat area of the wetlands. The area proposed for remediation encompasses this area, and an area of wetlands at the north end of the site.

Any areas where PCB concentrations exceed 1ppm are proposed for remediation. As shown in the attached photographs, the area is well established with wetland vegetation. Prior to any excavation work, I recommend that an erosion control barrier be installed between the work and any adjacent wetland areas. A double row of staked hay bales in staggered formation should be installed at the perimeter of the work area. In addition to protecting non-contaminated wetland areas, the barrier will serve to alert any equipment operators on the extent of the disturbance area. Once the area has been excavated and sampled, it is anticipated that re-vegetation efforts can commence. The goal of the restoration effort will be to restore the natural plant community so that the impacts of the proposed activity are minimized. To this end, I propose that the base of the slope be re-seeded with a Wetmix species, composed of seeds that will germinate and produce a permanent cover of grasses, forbs, wildflowers, legumes and grasses. This mix is especially suited to produce a no-maintenance cover and is appropriate cover for cut and fill slopes, flooded areas, and disturbed areas adjacent to commercial and residential areas. Should it be necessary to delay restoration because of adverse or unsuitable weather conditions, the area can be protected with a mulch or organic cover to protect against unexpected erosion until conditions for re-vegetation are more suitable. The area to the north can be supplemented with a matrix of trees and shrubs including red maple, highbush blueberry, viburnum species and winterberry as necessary to fully restore the area.

As mentioned previously, the project is proposed as a "limited project". As such, the issuing authority has the discretion to waive the performance standards. In the instant case, the project has been designed to meet the performance standards to the extent practical. Once the project is complete, it is expected that there will be no loss or impairment of the resource area. In the unlikely event that areas do not become primarily re-vegetated with wetland plant species, NAA can provide additional oversight and recommendations to improve the condition. The goals of reducing the contamination and attendant risks will be actualized. The temporary impacts to the resource area will be minimized with the use of erosion control barriers and mitigation in the form of restoration will be accomplished. In summary, NAA is of the opinion that the proposed work meets the State Wetlands Protection Act and regulations and will not result in any long-term ecological risks.

I will be available at the public meeting to address any additional concerns you may have. In the meantime, please do not hesitate to contact me.

MEMORANDUM

TO: Alan Hanscom, P.E., LSP
BETA Group, Inc.

FROM: Lenore White, PWS

RE: McCoy Field
New Bedford, MA
NAA File P1372

DATE: 05/12/05

Pursuant to an on-site inspection on May 11, 2005 at the above-referenced site, Nover-Armstrong Associates, Inc. (NAA) is submitting the following comments. This memo is meant to supplement an earlier memo to you dated April 28, 2005, for inclusion in the pending Notice of Intent application.

On May 11, 2005 I met with Ms. Sarah Porter of the New Bedford Conservation Commission and Ms. Dorian Boardman. The purpose of the site inspection was to review the delineation of the boundary of the bordering vegetated wetland (BVW), in preparation for the submittal of a Notice of Intent. Our site inspection focused primarily on the edge of the BVW along the west side of the subject site. Ms. Boardman flagged the BVW boundary on or about April 25, 2005. The determination is critical in this area because there are adjacent private properties that could be affected by the boundary determination.

The area is defined as a bordering vegetated wetland, pursuant to the definition found at 310 CMR 10.55. It borders on an open water body at the north end of the site. Although the USGS topographic map shows a stream within the wetland, there was no discernible channel evident on the day of the site inspection. A utility easement bisects the wetland but it remains hydraulically connected via an underground drainage channel. Vegetation within the wetland is a diverse community of mature forest species, punctuated by pockets of standing water and emergent herbaceous species. Predominant wetland vegetation includes red maple trees and saplings, high bush blueberry bushes, viburnum shrubs, and phragmites.

In general, the boundary flagged by Ms. Boardman was accurate. There were several areas of minor modification that were made on May 11 and agreed to by all parties. Areas that were modified included 4 to 5 flags at the southwest end of the work area and 3 flags at the far northwest end. Relocated flags in the southwest are now consistent with a previously established edge. In the area to the northwest, the flags were relocated to better represent the

predominance of hydro-phytic vegetation and lower elevations. These new flag locations will be surveyed and located on a revised plan to be submitted at a later date. It is important to note that the flags which were relocated are not within the area proposed to be altered.

During the course of the inspection, Ms. Porter and I also observed the wetland edge along the east side of the work area. The boundary of the wetland is clear in this area, as it is limited to the low, flat area at the toe of the slope. No changes were made to the BVW boundary on the east side. There was no evidence of erosion into the wetland observed on the day of the site inspection. The up-gradient slope has been re-vegetated with a seed mix that has become well established and the slope is stable. Standing water was observed in one area at the base of the slope, on the uplands side of the hay bale barrier. The standing water could be an indication that the wetland is somewhat more extensive in this area. If so, the erosion control measures (i.e. hay bales and siltation curtain) could be relocated on the up-gradient side to better protect this area from any unforeseen potential alterations.

I will be available at the public hearing to further discuss my observations and findings. In the meantime, please do not hesitate to contact me with any questions. Thank-you.



WETLAND RESTORATION DESIGN
McCoy Field
New Bedford, Massachusetts
NAA File P1372



124 Main Street, Unit 2GG
Carver, Massachusetts 02330

Telephone 508.866.8383
Facsimile 508.866.9898
www.noverarmstrong.com

WETLAND RESTORATION DESIGN
McCoy Field
New Bedford, Massachusetts
NAA File P1372

Prepared For:

Alan Hanscom, P.E., LSP
BETA Group, Inc.
315 Norwood Park South
Norwood, MA 02062

May 26, 2005



124 Main Street, Unit 2GG
Carver, Massachusetts 02330

Telephone 508.866.8383
Facsimile 508.866.9898
www.noverarmstrong.com

May 26, 2005

Alan Hanscom, P.E., LSP
BETA Group, Inc.
315 Norwood Park South
Norwood, MA 02062

Re: Wetland Restoration Design
McCoy Field
New Bedford, Massachusetts
NAA File P1372

Mr. Hanscom:

This narrative serves as a guidance document for the restoration of a wetland system proposed to be altered which totals approximately 1.5 acres. The wetland system will be **temporarily** altered by the proposed risk-based, clean-up and remediation of the wetlands immediately adjacent to the new Keith Middle School construction site. The project is filed as a limited project pursuant to 310 CMR 10.53 (3) (g) and this Design accompanies the Notice of Intent filed for the subject work.

Nover-Armstrong Associates, Inc. (NAA) believes that a successful wetland restoration is possible on this site. The single most important environmental variable for success is the occurrence of the groundwater at or near the surface for a substantial portion of the growing season. NAA recommends that the specific steps detailed in this narrative be taken to ensure the success of the wetland restoration effort.

Sincerely,
Nover-Armstrong Associates, Inc.

Lenore White
Professional Wetlands Scientist

Attachment

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1.0 EXISTING WETLAND RESOURCE AREAS TO BE ALTERED

This narrative serves as a guidance document for the restoration of a wetland system proposed to be altered by the risk-based clean-up and remediation of the site totaling approximately 1.5 acres. Areas to be remediated are part of a Bordering Vegetated Wetland (BVW) adjacent to the new Keith Middle School construction site in New Bedford, Massachusetts (the site). The boundary of the bordering vegetated wetlands has previously been confirmed as accurate.

1.1 Wetland Vegetation

The remediation activities will result in approximately 1.5 acres of temporary alteration to the surrounding BVW. The surrounding BVW is well vegetated with a diverse community consisting of red maple trees and saplings, highbush blueberry shrubs, viburnum shrubs and emergent herbaceous plants.

Existing species dominating the BVW are listed below in Table 1 – *Existing Dominant Species in Adjacent Bordering Vegetated Wetlands*. The proposed species to be planted will replace the wooded wetland system composition in kind with similar density and species as required by the Massachusetts Wetland Regulation's Performance Standards.

TABLE 1 – Existing Dominant Species in Adjacent Bordering Vegetated Wetland

<u>Common Name</u>	<u>Scientific Name</u>	<u>USFWS-Wetland Indicator Category</u>
Viburnum	<i>Viburnum spp.</i>	FACW
Cinnamon fern	<i>Osmunda cinnamomea</i>	FACW
Red Maple	<i>Acer rubrum</i>	FAC
High bush blueberry	<i>Vaccinium corymbosum</i>	FACW
Swamp azalea	<i>Rhododendron viscosum</i>	OBL

2.0 WETLAND RESTORATION DETAILS

2.1 Introduction

The approximate 1.5 acres of restoration will occur throughout the wetland area, wherever remediation has resulted in alteration or loss of the wetland. Remediation means removal of all on-site soils and/or media that are contaminated with PCB in excess of 1 ppm. PCB contamination of the wetland is from material moving down into the wetland from the up-

gradient site. It is the intention of this Design to fully restore the wetland to the previous elevation and vegetative community that existed prior to any clean-up and remediation activities. Removal of the contaminated material will be conducted under the supervision of a licensed site professional (LSP) as required by the Massachusetts Contingency Plan, 310 CMR 40.000.

2.2 Erosion Controls

Erosion control during construction activities, including wetland restoration shall adhere to the specifications detailed on the plan submitted with the Notice of Intent titled Wetlands Sampling Grid. In particular reference to construction of the wetland restoration area, a silt fence reinforced by hay bales staked end-to-end will be placed within the wetland to separate and protect areas not proposed for remediation. In the event that flooding rains occur or excess water develops in the work area, the applicant will be proposing a strategy to de-water the site and properly treat any discharge.

Remediation activities will result in some areas being cleared of existing vegetation and excavated. NAA recommends that if large trees need to be cut to allow equipment access, the stumps should remain to minimize soil disturbance. Leaving the stumps will increase the likelihood that the trees will sprout new growth. Any debris, including slash and felled trees will be stockpiled in the upland area adjacent to the site work. If the vegetative debris contains contaminated soil remnants, it will be handled and disposed of under the supervision of an LSP. Contaminated soil will be stored and handled under the supervision of an LSP and disposed of in accordance with all state and federal laws governing the disposal of such. If the contaminated material cannot be immediately removed from the site, proper storage shall be ensured by the LSP.

Individual large diameter trees that are Facultative or wetter will be evaluated and marked to remain in the wetland restoration area to take advantage of their shading effect. Selection of canopy trees will be performed by the qualified professional hired to oversee the wetland restoration activities. This will also create a pit and mound topography creating microenvironments. The root systems of these stems should be evaluated prior to excavating soils in the vicinity of their stems to prevent existing tree mortality. Based on our inspection of this area, the wetland indicator canopy is fairly dense and consists of some large red maples, oaks and willows.

2.3 Hydrology

The hydrology at the wetland restoration site is critical in controlling the plant community that develops. Therefore, hydrology must be evaluated before remediation commences. Monitoring by a qualified professional trained in soil evaluation and hydrology is a necessary component to the overall success of wetland restoration. The name, affiliation, address, telephone number and qualifications of the individual or firm to oversee the wetland restoration process shall be provided to the Commission for approval at least two (2) weeks prior to initiation of the work.

The restoration area will be excavated to the extent necessary to remove the contaminated soil. Soil samples taken within the wetland reveal that the contamination is limited to within approximately the top 6 inches. Prior to any excavation, the existing elevations will be determined. NAA intends that once the work is complete, the final elevations will be the same as current elevations. Any soil amendments needed to create a soil profile to support the planted wetland vegetation will be placed to bring the ground surface to finished elevation. Elevations may be adjusted in the field based on existing field conditions. Excavation should be completed during non-flood conditions. If the adjacent BVW is flooded, activities should be postponed until drier conditions exist or until the Commission has approved a de-watering plan.

2.4 Soils

An important aspect of wetland restoration is the proper use of soils. NAA proposes to supplement the restoration area as necessary with soil amendments brought in from off-site. Composition of soil amendments needs to provide an 8-10% organic component. The development of hydric soils provides substrate for wetland plants, which in turn supports wildlife habitat. Hydric soil acts as a sponge to treat groundwater, adsorb and absorb pollutants, and support vegetation that slows floodwaters. Appropriate hydrology must be provided to maintain the soils in a hydric condition. Prior to placement of soil amendments in the restoration area, all excavation within the restoration area to appropriate sub grade elevations will be completed.

Soil translocation is the preferred method for obtaining replication soils. Based on NAA's site inspection and review of the work scope, it is assumed supplemental soils will be necessary. Organic soils necessary for final grading within the wetland restoration area will be brought in from an off site source. The amended soils used for the replication area A-horizon will consist of a mixture of 8-10% organic and the remainder of mineral materials. These materials will be uncontaminated and will contain no woodchips. The organic material will be well decomposed. Clean leaf compost will be sought for use in this profile layer. The mineral materials will contain minimal quantities of gravel or boulders.

The material brought in from off-site will not be stockpiled for more than two (2) weeks. While it is stockpiled, it will be kept wet. Soils will be transported in clean vehicles so that no exotic/invasive seeds from other sites will be mixed in with them. Documentation of the soil's origin will be submitted with the report provided to the Commission upon completion of wetland restoration. Included in this documentation will be a statement from the source of the soil amendments that no source for invasive plant species will be found in the soils.

2.5 Planting

In accordance with 310 CMR 10.55, at least 75% of the surface area of the restoration area must be re-established with indigenous wetland plant species within two growing seasons. NAA has determined that the vegetative re-establishment will be successful, as evidenced by the suitability of the existing hydrology within the wetland restoration area.

The planting procedures will be overseen by qualified professionals with wetland science training. The name, affiliation, address, telephone number and qualifications of the individual or firm to oversee the wetland restoration process shall be provided to the Commission for approval at least two (2) weeks prior to initiation of the work.

Once the restoration area is properly prepared, it will be seeded with New England Wetmix at a rate of one pound per 5000 square feet as an understory seeding, to stabilize the area prior to planting bare root nursery stock. The wetland seed mix contains a wide variety of native seeds that are suitable for most wetland mitigation and restoration sites, which are not permanently inundated. All species are best suited to moist disturbed ground as found in most wet meadow, scrub shrub, or forested wetland mitigation and restoration areas. During the first season of growth, several species will produce seeds, while other species will produce seeds after the second growing season.

The wetland seeds in this mix can be hand sown, dispersed with a hand-held spreader, or hydro-seeded, as long as there is no permanent snow cover. The seed mix should be lightly raked to ensure proper soil-seed contact. Seeding can take place on frozen soil, as the freezing and thawing dynamics will work the seeds into the soil. Species used in the New England Wetmix include the following species at varying proportions:

TABLE 2 – Wetmix Species

<u>Common Name</u>	<u>Scientific Name</u>
Fringed Sedge	<i>Carex crinita</i>
Bearded Sedge	<i>Carex comosa</i>
Blue Vervain	<i>Verbena hastata</i>
Green Bulrush	<i>Scirpus atrovirens</i>
Woolgrass	<i>Scirpus cyperinus</i>
Joe-pye Weed	<i>Eupatoriadeophus maculatus</i>
Chufa	<i>Cyperus esculentus</i>
Hop Sedge	<i>Carex lupulina</i>
Boneset	<i>Eupatorium perfoliatum</i>
Red-Top Panic Grass	<i>Panicum rigidulum</i>

Bare root nursery stock will supplement the wetland seed mix. Trees will be planted at 12 feet on center and shrubs will be planted 8 feet on center as recommended by the Department of Environmental Protection. Shrub and tree densities will be used to determine the total number of specimens within the restoration area. The wetland professional shall be responsible to establish the plantings in a naturalistic manner (i.e. clumping, mini-communities, etc.). It is expected that the surrounding forested wetland will provide a supplemental seed source. In addition, NAA recommends a planting plan that improves the diversity of the north area of the site, where the Phragmites dominates. In this area, NAA is recommending a mix of buttonbush and swamp azalea shrubs. (See attached memo).

The following commercially-available bare root nursery stock will be used in duplicating the vegetative components of the altered forested wetland and adjacent naturally occurring wooded swamp:

TABLE 3 – Plant Material

<u>Common Name</u>	<u>Scientific Name</u>	<u>USFWS-Wetland Indicator Category</u>
Red maple	<i>Acer rubrum</i>	FACW
Sweet pepperbush	<i>Clethra alnifolia</i>	FAC
Winterberry	<i>Ilex verticillata</i>	FACW
Highbush blueberry	<i>Vaccinium corymbosum</i>	FACW
Buttonbush	<i>Cephalanthus occidentalis</i>	OBL
Swamp Azalea	<i>Rhododendron viscosum</i>	OBL

In addition, consideration will be given to leaving existing mature upland trees on hummocks, if any, within the restoration area if they are facultative or wetter, as they may provide shading to the plantings installed around these hummocks. This consideration shall be made by the Wetland Professional hired to oversee the entire restoration effort.

Proper measures will be taken to reduce/eliminate the risk of establishment of invasive species. Invasive species will not be present in soil amendments. Use of hydro-seeding has been found to stabilize a site quickly and may possibly hinder the growth of invasive species. If hydro-seeding is not practical due to the density of remaining vegetation, the area can be seeded by hand.

TABLE 4 – Invasive Species

<u>Common Name</u>	<u>Scientific Name</u>
Purple Loosestrife	<i>Lythrum salicaria</i>
Common Reedgrass	<i>Phragmites australis</i>
Buckthorn	<i>Rhamnus Frangula alnus</i>
Honeysuckles	<i>Lonicera spp.</i>
Garlic Mustard	<i>Alliaria petiolata</i>
Japanese Knotweed	<i>Polygonum cuspidatum</i> or <i>Fallopia Japonica</i>
Japanese Stilt Grass	<i>Microstegium vimineum</i>
Reed Canary Grass	<i>Phalaris arundinacea</i>
Bittersweet nightshade	<i>Celastrus Orbiculatus</i>
Black Swallow-wort	<i>Cynanchum nigrum</i>
Pale Swallow-wort	<i>Cynanchum rossicum</i>

2.6 Schedule

All planting will occur at the beginning or end of the growing season. Fall plantings should be done before the first frost. However, shrubs and trees may be planted up to October 26th, weather permitting. It should be noted that some plant species are ill-suited to fall planting (including red maple) and therefore, individual plant tolerances should be considered prior to scheduling and planting.

Wetland vegetation shall not be placed in the restoration area until the qualified wetland professional has verified that the final grade for the area is accurate. This surface grade measurement will be collected by field instrument survey and verified by the wetland professional-in-charge.

If for some reason the site is excavated to the sub grade in the fall and a delay is inevitable, consideration will be given to stabilizing the site for winter, and conducting the final grading and planting in the spring.

3.0 MONITORING

In order for a successful restoration effort, the project will be supervised by a qualified professional during all work phases. The project monitor shall be present during the most important tasks which include:

1. Before vegetation clearing and grading to inspect the placement of the erosion controls. Canopy trees to remain, if any, will be selected and tagged with tree marking paint at this time.
2. Before placement of soil amendments to confirm post-construction ground water elevations and soil profile for the restoration area, and to inspect organic material.
3. Before installation of plant material to ensure specie types and health and to field check final grading.
4. During planting and seeding to inspect planting techniques and to direct placement of plantings.
5. After one growing season to observe vegetation development, to identify invasive species challenges, and to evaluate overall regulatory compliance.
6. After two growing seasons to determine vegetation development and regulatory compliance.

Initially, a report shall be submitted to the Commission by the Project Monitor certifying that the restoration work was completed in compliance with this design. A monitoring report shall then be submitted to the Commission in the late spring and at the end of each of the first two growing

seasons. Reports will include recommendations for additional plantings should the restoration area appear unlikely to meet the 75% re-establishment standard within two years. Monitoring for invasive species will also be conducted and any invasive species noted should be handpicked before becoming widespread and established. The final monitoring report will be accompanied by an as-built plan and will indicate the conditions at the restoration site have been successfully restored.

The wetland restoration guidelines will be followed to ensure the success of the restoration. However, in the event of unforeseen on-site challenges, our efforts and design will be evaluated and changes made to ensure its long term success.

4.0 REFERENCES

Massachusetts Department of Environmental Protection Guidance No.: BRP/DWM/WetG02-2
Massachusetts Inland Wetland Replication Guideline; dated March 1, 2002

MEMORANDUM

TO: Alan Hanscom
BETA Group, Inc.

FROM: Lenore White, PWS

RE: **Planting Plan**
McCoy Field
New Bedford, MA
NAA File P1372

DATE: 05/25/05

Nover-Armstrong Associates, Inc (NAA) is proposing the following planting plan to accompany the Wetland Restoration Design. The locations set forth below follow the grid locations identified on the Notice of Intent plan, titled Wetlands Sampling Plan. Trees are to be planted 12 feet on center and shrubs are to be 8 feet on center.

WD 19 through 24 is to be planted with a matrix of red maple, high bush blueberry, sweet pepper bush, and winterberry.

WD 25 through 27 is to be planted with an equal mix of winterberry and swamp azalea. Any lower elevations can be supplemented with buttonbush.

WD 11 through 15 is to be planted with an equal mix of red maple, sweet pepper bush and high bush blueberry.

WD 5 and 6 and WE 3 is to be planted with an equal mix of swamp azalea, high bush blueberry and winterberry.

WH 1 is to be planted with an equal mix of buttonbush and swamp azalea.

NAA suggests that the Wetlands Sampling Plan be amended with the above noted information. Please contact me should you have any additional questions. Thank-you.

Appendix H

Certified Abutters List

I, Bill Bonney, ~~Acting~~ Administrative Assistant to the Board of Assessors of the City of New Bedford, do hereby certify that the names and addresses as identified on the attached "Abutters List", RE: Plot 69 Lot 125 are duly recorded and appear on the most recent tax list. Date: 5/16/05

SUBJECT PROPERTY:

MAP 69 LOT 125

LOCATION Hathaway Blvd.

OWNER NAME City of New Bedford

MAILING ADDRESS _____

CONTACT PERSON James Smith, BETA Group

TELEPHONE NUMBER 781-223-4670

REASON FOR REQUEST:

Notice of Intent Filing - Conservation Commission

9

Map 69

CERTIFIED ABUTTER'S LIST
(VARIANCES and SPECIAL PERMITS)

(As required under Chapter 40A, Section 11, Massachusetts General Laws)

PARCELS within a 100 Foot BUFFER

MAP/LOT	OWNER	ADDRESS
69/123	Sharon J. Reynolds Trustee Summit Nominee Realty Trust	2484 Railside Circle SW, Byron Center, MI 49315
69/94	Thomas Dolores	177 Summit St, New Bedford, MA 02740
69/96	Bethel AME Church	532 County Street, New Bedford, MA 02740
69/97	Bethel AME Church	532 County Street, New Bedford, MA 02740
69/98	"	" "
69/99	"	" "
69/100	"	" "
69/93	"	" "
69/345	City of New Bedford, NBPS	131 William St. New Bedford, MA 02740

[Signature] Acting Administrative Assistant to the Board of Assessors of the City of New Bedford, do hereby certify that the names and addresses as identified on the attached "Abutters List", RE: Plot 75 Lot 167 are duly recorded and appear on the most recent tax list. Date: 5/13/05

SUBJECT PROPERTY:

MAP 75 LOT 167

LOCATION Hathaway Blvd.

OWNER NAME City of New Bedford

MAILING ADDRESS _____

CONTACT PERSON James Smith

TELEPHONE NUMBER 781-223-4670

REASON FOR REQUEST:

Notice of Intent Filing - Conservation Commission

9

Map 69

CERTIFIED ABUTTER'S LIST
 (VARIANCES and SPECIAL PERMITS)
 (As required under Chapter 40, Section 11, Massachusetts General Laws)
 PARCELS within a 100 Foot BUFFER

MAP/LOT	OWNER	ADDRESS
✓ 69/345	City of N.B., MA H.S.	131 William St. New Bedford, MA 02740
✓ 69/125 (75/200) NR	City of New Bedford	131 William St. New Bedford, MA 02740
✓ 69/133	CHRISTO D. Rebeiro Davis Gomes Jr.	244 Summit St. New Bedford, MA 02740
✓ 69/124	STEVEN S. Pina Diana Pina	258 Summit St. New Bedford, MA 02740
✓ 69/111	Stephanie A. Rocha Michael Chase	235 Summit St. New Bedford, MA 02740
✓ 69/122 (120) NR	Natalie Mendes Marcel Mendes	154 Macomber St. New Bedford, MA 02740

9

Map 75

CERTIFIED ABUTTER'S LIST
 (VARIANCES and SPECIAL PERMITS)
 (As required under Chapter 40, Section 11, Massachusetts General Laws)
 PARCELS within a 100 Foot BUFFER

MAP/LOT	OWNER	ADDRESS
✓ 75/280	Delta M. Martins Manuel Martins	32 Donny Dr. New Bedford 02740
✓ 75/282	" "	" "
✓ 75/283	David Neves c/o Rose Neves Lamba	30 Nashua St. New Bedford 02740
✓ 75/285	" "	" "
✓ 75/286	Lillian Clark Vrainar Clark Lillian Clark	18 Ellis St. Rumford, RI 02916
✓ 75/287	Vrainar Clark	
✓ 75/288	Norma Rodrigues	48 Nashua St. New Bedford, MA 02740
✓ 75/289	Lillian S. Clark Rodrigues Fam. Trst	" "
✓ 75/290	" "	" "
✓ 75/291	" "	" "
✓ 75/195	Maria A. Lopes Thomas Lopes	147 Auburn St. New Bedford, MA 02740
✓ 75/196	Esperanza Gilmette	277 Summit St. New Bedford 02740
✓ 75/207	Lori B. Michaud	283 Summit St. New Bedford 02740

9
Map 75

CERTIFIED ABUTTER'S LIST
(VARIANCES and SPECIAL PERMITS)
(As required under Chapter 40, Section 11, Massachusetts General Laws)
PARCELS within a 100 Foot BUFFER

MAP/LOT	OWNER	ADDRESS
75/165	Michael Gubler	156 Campbell St. New Bedford 02740
75/166	"	" "
75/157	Mareen G. Woolley Brian Woolley	249 Summit St. New Bedford 02740
75/163	Dorothy L. Montague James Montague Jr.	253 Summit St. New Bedford 02740
75/163 75/344	City of New Bedford, Fred Souza	133 William St. New Bedford 02740
75/344 75/164	Dorothy L. Montague James Montague Jr.	253 Summit St. New Bedford 02740
75/5	John Ferreira	288 Durfee St. New Bedford 02740
75/6	Alexinia M. Rito Duarte M. Rito	289 Durfee St. New Bedford 02740
75/7	Corner Sports Store Inc.	219 Hathaway Blvd. New Bedford 02740
75/8	Comm. of Mass.	100 Cambridge St. Boston, MA 02202
75/12	City of N.B., N.B. H.S.	131 William St. New Bedford 02740

9

Map 75
outer

CERTIFIED ABUTTER'S LIST
 (VARIANCES and SPECIAL PERMITS)
 (As required under Chapter 40, Section 11, Massachusetts General Laws)
PARCELS within a 100 Foot BUFFER

MAP/LOT	OWNER	ADDRESS	
✓ 75/269	Feabel S. Pacheco Manuel Pacheco	10 Nashua St.	New Bedford 02740
✓ 75/268	"	"	"
✓ 75/230	Rose Lomba	30 Nashua St.	New Bedford 02740
✓ 75/272	Abeline Cruz c/o Edward Cruz	75 Florence St.	New Bedford 02740
✓ 75/275	"	"	"
✓ 75/276	"	"	"
✓ 75/277	Norma Rodrigues	48 Nashua St.	New Bedford 02740
✓ 75/278	Norma Rodrigues	48 Nashua St.	New Bedford 02740

Map 81

CERTIFIED ABUTTER'S LIST
 (VARIANCES and SPECIAL PERMITS)
 (As required under Chapter 40, Section 11, Massachusetts General Laws)
 PARCELS within a 100 Foot BUFFER

MAP/LOT	OWNER	ADDRESS
✓ 81/58	Barbara S. Deeley Kenneth Offley	325 Durfee St. New Bedford 02740
✓ 81/129	Janet L. Williams Barry Williams	(331 Durfee St. New Bedford, MA 02740) 55 Potter St. New Bedford 02740
✓ 81/126	Hilda O. Williams Barry Williams	" "
✓ 81/130	Liesdette Hunt	345 New Boston Rd. Fairhaven, MA 02719
✓ 81/11	Elizabeth A. Zarecki John Zarecki	299 Durfee St. New Bedford 02740
✓ 81/33	Francis MORIN Edmond Morin Jr.	293 Durfee St. New Bedford 02740 (c/o Ann Murphy 417 Matfield St. W. Bridgewater, MA 02879)
✓ 81/12	Joseph Pike Jr.	115 Durfee St. New Bedford, MA 02740
✓ 81/16	Joseph Pike Jr.	40 Linda Wood 8 meadowbrook Dr. Marlboro, MA 01752
✓ 81/23	Jorge Guzman	257 Durfee St. New Bedford, MA 02740
✓ 81/24	"	" "

THE FOLLOWING CD-ROM IS AVAILABLE FOR VIEWING AT:

**CITY OF NEW BEDFORD PUBLIC LIBRARY
613 PLEASANT STREET
NEW BEDFORD, MA 02740**

CONTACT NUMBERS

PHONE: (508) 991-6275

FAX: (508) 979-1481

SCHEDULE OF HOURS

MONDAY – THURSDAY

9:00AM – 9:00PM

FRIDAY & SATURDAY

9:00 AM – 5:00 PM

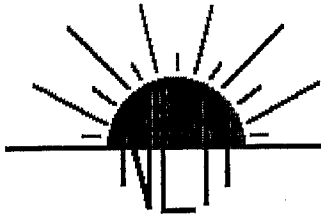
**CLOSED SUNDAY & HOLIDAYS
HANDICAPPED ACCESSIBLE**

Attachment C

Laboratory Analytical
Reports on CD-ROM

Attachment D

QA/QC Plan for Cleanup
Verification



QA/QC Plan for Cleanup Verification

One of the objectives for performing the environmental analysis of samples in this project is to determine, within a known degree of certainty, whether or not a sample contains more than or less than 50 mg/Kg (ppm) of total PCBs. To that end, there are field sampling and laboratory actions which must be completed during sampling and analysis and then the results of these actions must be evaluated to determine the overall usability of the data to meet the project objectives.

The original Work Plan detailed the need for acquiring field duplicates and sufficient sample on a per project basis to allow matrix spike/matrix spike duplicate (MS/MSD) analysis be performed and these QC samples must continue to be collected going forward. The wetland samples pose a special sampling issue in that they contain high moisture content which may adversely impact the overall usability of results (e.g., EPA Region I requires all results for samples containing less than 30% solids to be considered estimated). The sampling team should use *Region I, EPA-New England, Sediment Sampling Guidance*, Draft September 1998, as a guide to minimizing water content in the samples (e.g., allowing the collected sample to settle and then to decant any standing water prior to filling sample containers).

Upon receipt at the laboratory, the samples should quickly be analyzed for percent solids content prior to analysis. All samples with percent solids $\leq 30\%$ will need to be pre-treated before solvent extraction to increase the solids content. For PCBs, either air drying or freeze drying should be performed in a clean environment. After pre-treatment, the percent solids content should be determined and must be over 30% before the sample is extracted (NOTE: the percent solids used in calculation of dry weight for calculation of final results must be the solids content after pre-treatment, if performed).

All data will undergo a Tier I-type evaluation whereby a completeness check (+ review of PE samples, if provided) is made by the data assessor to ensure that there are data for all of the samples sent to the lab and that the data package contains all of the necessary SDG paperwork so that the data package is considered complete and could be used to perform Tier II or Tier III DV, if required. The laboratory, at the client's discretion, may provide the data using the MADEP MCP methods and reporting requirements (e.g., WSC-CAM-VA for SW-846 Method 8082); whereby a project is reported with a MADEP MCP Analytical Method Report Certification Form; however, due to the project requirement for Data Usability assessment, the laboratory must also provide, at a minimum, the following information:

- Narrative which clearly indicates any non-compliance issues with MCP criteria and which clearly states of compliance of analysis (e.g., instrument calibrations within

criteria). If there are any non-compliance issues, a summary of the non-compliance must be present in the data package (e.g., if an initial calibration is non-compliant, a summary of the initial calibration must be present in the data package).

- Copies of percent solids determinations (prior to pre-treatment and after pre-treatment, if applicable) and sample preparation logbooks indicating extraction methods, weights of sample extracted, final volume for analysis, and dilutions for analysis. This includes information for the entire extraction batch.
- The laboratory must qualify any Aroclor data which have imprecision between Column 1 and 2 of more than 25% (percent difference, %D > 25%) and provide a summary of the Column 1 and 2 results.
- The laboratory must maintain all chromatograms for standards and samples and have these readily available if requested by the client, if these are not provided in the data package.

A modified Tier II-type review will be performed on all of the data using the following QC indicators:

- Holding Time (criteria: solids extracted within 14 days from collection and extracts analyzed within 40 days of extraction)
- Surrogate recovery (criteria: 30-150% recovery)
- Laboratory Control Sample recovery (criteria: 40-140% recovery)
- MS/MSD recovery and precision (criteria: 40-140% recovery and RPD \leq 50%)
- Acceptability of Method Blanks and Field Blanks, if applicable (criteria: Aroclors < Reporting Limit)
- Acceptability of Initial Calibrations and Continuing Calibration Verification (initial calibration criteria: minimum of 5-level for Aroclors 1016 and 1260 and single level for all others, %RSD \leq 20% or 'r' \geq 0.99; continuing calibration criteria: %D or % Drift \leq 15%)
- Field Duplicate precision (criteria: RPD \leq 50%)
- Percent Solids content of sample (criteria: percent solids > 30%)
- Dual Column precision (criteria %D < 25% accept data as reported or 25% < %D < 500%, estimate results)

Data assessment will use the Data Quality Objectives specified and in the Work Plan and will use *Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, Part I and Part II (Volatile/Semivolatile Data Validation Functional Guidelines)*, December 1996 and *Part III (Pesticide/PCB Data Validation Functional Guidelines)*, Draft February 2004.

The result of the data assessment will be a letter report compliant with EPA Protocols detailing the results of the data assessment.

Attachment E

BRP WW10 Major Project
Certification



Enter your transmittal number

W065206

Transmittal Number

Your unique Transmittal Number can be accessed online: <http://www.mass.gov/dep/counter/trasmfrm.shtml> or call DEP's InfoLine at 617-338-2255 or 800-462-0444 (from 508, 781, and 978 area codes).

Massachusetts Department of Environmental Protection Transmittal Form for Permit Application and Payment

1. Please type or print. A separate Transmittal Form must be completed for each permit application.

2. Make your check payable to the Commonwealth of Massachusetts and mail it with a copy of this form to: DEP, P.O. Box 4062, Boston, MA 02211.

3. Three copies of this form will be needed.

Copy 1 - the original must accompany your permit application.

Copy 2 must accompany your fee payment.

Copy 3 should be retained for your records

4. Both fee-paying and exempt applicants must mail a copy of this transmittal form to:

DEP
P.O. Box 4062
Boston, MA
02211

* Note:
For BWSC Permits,
enter the LSP.

A. Permit Information

BRP WW 10

1. Permit Code: 7 or 8 character code from permit instructions
Excavation and fill of bordering vegetated wetland
3. Type of Project or Activity

Major Project Certification

2. Name of Permit Category

B. Applicant Information – Firm or Individual

City of New Bedford

1. Name of Firm - Or, If party needing this approval is an individual enter name below:

Alfonse

Scott

2. Last Name of Individual

3. First Name of Individual

4. MI

133 William Street

5. Street Address

New Bedford

MA

02740

781-979-1487

6. City/Town

7. State

8. Zip Code

9. Telephone #

10. Ext. #

Scott Alfonse

11. Contact Person

12. e-mail address (optional)

C. Facility, Site or Individual Requiring Approval

City of New Bedford

1. Name of Facility, Site Or Individual

133 William Street

2. Street Address

New Bedford

MA

02740

508-979-1487

3. City/Town

4. State

5. Zip Code

6. Telephone #

7. Ext. #

8. DEP Facility Number (if Known)

9. Federal I.D. Number (if Known)

10. BWSC Tracking # (if Known)

D. Application Prepared by (if different from Section B)*

Beta Group, Inc.

1. Name of Firm Or Individual

315 Norwood Park South

2. Address

Norwood

MA

02062

781-255-1982

3. City/Town

4. State

5. Zip Code

6. Telephone #

7. Ext. #

Alan Hanscom

8. Contact Person

9. LSP Number (BWSC Permits only)

E. Permit - Project Coordination

1. Is this project subject to MEPA review? yes no
If yes, enter the project's EOE file number - assigned when an Environmental Notification Form is submitted to the MEPA unit:

number not yet assigned
EOEA File Number

F. Amount Due

Special Provisions:

1. Fee Exempt (city, town or municipal housing authority)(state agency if fee is \$100 or less).
There are no fee exemptions for BWSC permits, regardless of applicant status.
2. Hardship Request - payment extensions according to 310 CMR 4.04(3)(c).
3. Alternative Schedule Project (according to 310 CMR 4.05 and 4.10).
4. Homeowner (according to 310 CMR 4.02).

DEP Use Only

Permit No:

Rec'd Date:

Reviewer:

Check Number

Dollar Amount

Date

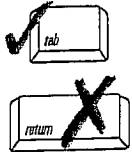


Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wetlands and Waterways
BRP WW 10 Major Project Certification
BRP WW 11 Minor Project Certification
401 water Quality Certification for Fill and excavation
Projects in waters and Wetlands

W 065206
Transmittal Number #

A. Applicant Information

Important:
When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



1. Which permit category are you applying for?

BRP WW 10 BRP WW 11

2. Applicant/Owner:

City of New Bedford

Name

133 William Street

Address

New Bedford

City/Town

Scott Alfonse

Contact Person

Telephone (home)

MA
State

02740
Zip Code

508-979-1487
(work)

3. Authorized Agent

BETA Group, Inc.

Name

315 Norwood Park South

Address

Norwood

City/Town

Alan D. Hanscom

Contact Person

Telephone (home)

MA
State

02062
Zip Code

781-255-1982
(work)



Massachusetts Department of Environmental Protection
Bureau of Resource Protection – Wetlands and Waterways
BRP WW 10 Major Project Certification
BRP WW 11 Minor Project Certification
401 water Quality Certification for Fill and excavation
Projects in waters and Wetlands

W 065206
Transmittal Number #

B. Project Information

1. Project Location:

225 Hathaway Blvd.

Address

New Bedford

City/Town

New Bedford Harbor

Nearest or Adjacent Waterbody

MA
State

02740
Zip Code

2. Project Name (if any):

McCoy Field/New Keith Middle School Wetland Remediation Activities

3. a. Describe project purpose:

This project is a wetlands restoration project. It consists of a cleanup of sediments in the wetland area with residual contamination of polychlorinated biphenyls (PCBs) greater than one part per million (ppm). The proposed scope of work includes the removal of up to six inches of PCB-impacted sediments at designated locations within the wetland area, followed with restoration of the impacted wetlands. Note: Anticipated restoration areas within the wetland total approximately 38,000 square feet. In the Notice of Intent, submitted to the New Bedford Conservation Commission on May 27, 2005, an initial estimate of 60,000 square feet of disturbance was indicated. This was a conservative estimate, which also factored incidental disturbance which may occur as a result of gaining access to target cleanup areas. Targeted cleanup areas are not anticipated to exceed 38,000 square feet. See Notice of Intent (included in Attachment A) for more detailed information.

- b. Is the project

water-dependent

non water-dependent



Massachusetts Department of Environmental Protection
 Bureau of Resource Protection – Wetlands and Waterways
BRP WW 10 Major Project Certification
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 401 water Quality Certification for Fill and excavation
 Projects in waters and Wetlands

W 065206
 Transmittal Number #

B. Project Information (cont.)

4. a. provide a brief description of the proposed project (See Application Instructions and include a copy of the Notice of intent, if any.):

Specific activities include (1) clearing of vegetation and physical removal of leaf litter, surface vegetation, and surface sediment/soil; (2) live loading, transportation, and disposal of sediment to an appropriately licensed receiving facility, and; (3) complete restoration of all disturbed areas, including replacement of the removed sediment/soil with clean soil and seeding with wetlands seed mix. See Notice of Intent (included in Attachment A) for more detailed information.

b. Notice of Intent File number (if any): SE 49-543

5. Identify the loss in square feet of each type of resource area (see Application Instructions for additional information.):

a. Bordering vegetated wetland:	(38,000 sf excavation and restoration - no net loss)
	<u>0</u>
b. Isolated vegetated wetland:	square feet
	<u>0</u>
c. Land under water:	square feet
	<u>0</u>
d. Total cumulative loss of a. + b. + c.:	square feet
	<u>0</u>
e. Salt marsh:	square feet
	<u>0</u>

6. a. Will the proposed project occur in any wetlands or waters designated as "Outstanding Resource Waters"?

Yes No

If yes has public notice been published in the Environmental Monitor?

Yes No

Date of Publication

- b. Is this project a subdivision or any part of a subdivision?

Yes No

- c. Is the project categorically subject to MEPA?

Yes No

If yes, has final action been taken?

Yes No

If yes, please include copy of MEPA certificate.



Massachusetts Department of Environmental Protection
 Bureau of Resource Protection – Wetlands and Waterways
BRP WW 10 Major Project Certification
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 Projects in waters and Wetlands

W 065206
 Transmittal Number #

B. Project information (cont.)

7. Alternatives Analysis:

As related to the project purpose, attach a detailed description of alternatives to the proposed project that were considered and why none are available that avoid adverse impacts to wetlands and waters.

If no alternatives are available, describe how the activity will minimize or mitigate the adverse impacts to wetlands and waters.

See application instructions for information required. Attach required documentation.

Alternatives Analysis included as an attachment to Appendix A.

C. Additional Information

1. Is any of your proposed work exempt from the Massachusetts Wetlands Protection Act or taking place in a federal non-state wetland?

Yes No

If yes, see Application Instructions for additional information needed.

2. Public notice to a newspaper of general circulation within the area of the proposed activity must be published within 10 days of the date of this application. Is proof of public notice submitted?

Yes No

(See Application Instructions for additional information)

Legal Notice request to New Bedford Standard Times included as Appendix B.

D. Certification

Application is hereby made for water quality certification.

"I certify that I am familiar with the work proposed and that to the best of my knowledge and belief the information contained in this application is true, complete, and accurate"

Scott Alfonse
 Applicant's Signature

Scott Alfonse
 Print name

Alan D. Hanscom
 Agent's Signature

Alan D. Hanscom
 Print Name

6/17/05
 Date

Attachment F

Environmental Notification
Form

Commonwealth of Massachusetts
Executive Office of Environmental
Affairs ■ MEPA Office

ENF Environmental
Notification Form

<i>For Office Use Only</i> <i>Executive Office of Environmental Affairs</i>	
EOEA No.:	_____.
MEPA Analyst:	_____.
Phone: 617-626-	_____.

The information requested on this form must be completed to begin MEPA Review in accordance with the provisions of the Massachusetts Environmental Policy Act, 301 CMR 11.00.

Project Name: McCoy Field/New Keith Middle School		
Street: 225 Hathaway Blvd.		
Municipality: New Bedford	Watershed: Buzzards Bay Watershed	
Universal Tranverse Mercator Coordinates: 19 337524E, 4612343N	Latitude: 41.6463 N Longitude: 70.9510W	
Estimated commencement date: September 2005	Estimated completion date: November 2005 2005	
Approximate cost:	Status of project design:	100 %complete
Proponent: City of New Bedford		
Street: 133 William Street		
Municipality: New Bedford	State: MA	Zip Code: 02740
Name of Contact Person From Whom Copies of this ENF May Be Obtained: Scott Alfonse		
Firm/Agency: City of New Bedford	Street: 133 William Street	
Municipality: New Bedford	State: MA	Zip Code: 02740
Phone: 508-979-1487	Fax: 508-961-3045	E-mail:

Does this project meet or exceed a mandatory EIR threshold (see 301 CMR 11.03)?
 Yes No

Has this project been filed with MEPA before?
 Yes (EOEA No. _____) No

Has any project on this site been filed with MEPA before?
 Yes (EOEA No. _____) No

Is this an Expanded ENF (see 301 CMR 11.05(7)) requesting:
 a Single EIR? (see 301 CMR 11.06(8)) Yes No
 a Special Review Procedure? (see 301CMR 11.09) Yes No
 a Waiver of mandatory EIR? (see 301 CMR 11.11) Yes No
 a Phase I Waiver? (see 301 CMR 11.11) Yes No

Identify any financial assistance or land transfer from an agency of the Commonwealth, including the agency name and the amount of funding or land area (in acres): none

Are you requesting coordinated review with any other federal, state, regional, or local agency?
 Yes (if yes, then list agencies) No

List Local or Federal Permits and Approvals: DEP Water Quality Certification, MA WPA Notice of Intent/Order of Conditions, Army Corps of Engineers Section 404 Permit, EPA Risk Based Cleanup

Request _____

Which ENF or EIR review threshold(s) does the project meet or exceed (see 301 CMR 11.03):

- | | | |
|---------------------------------|---------------------------------------|--|
| <input type="checkbox"/> Land | <input type="checkbox"/> Rare Species | <input checked="" type="checkbox"/> Wetlands, Waterways, & Tidelands |
| <input type="checkbox"/> Water | <input type="checkbox"/> Wastewater | <input type="checkbox"/> Transportation |
| <input type="checkbox"/> Energy | <input type="checkbox"/> Air | <input type="checkbox"/> Solid & Hazardous Waste |
| <input type="checkbox"/> ACEC | <input type="checkbox"/> Regulations | <input type="checkbox"/> Historical & Archaeological Resources |

Summary of Project Size & Environmental Impacts	Existing	Change	Total	State Permits & Approvals
LAND				<input checked="" type="checkbox"/> Order of Conditions <input type="checkbox"/> Superseding Order of Conditions <input type="checkbox"/> Chapter 91 License <input checked="" type="checkbox"/> 401 Water Quality Certification <input type="checkbox"/> MHD or MDC Access Permit <input type="checkbox"/> Water Management Act Permit <input type="checkbox"/> New Source Approval <input type="checkbox"/> DEP or MWRA Sewer Connection/ Extension Permit <input checked="" type="checkbox"/> Other Permits (including Legislative Approvals) – Specify:
Total site acreage	~3.87 acres Wetland			
New acres of land altered		~0.87 acres wetland*		
Acres of impervious area	0	0	0	
Square feet of new bordering vegetated wetlands alteration		~38,000 sf*		
Square feet of new other wetland alteration		0		
Acres of new non-water dependent use of tidelands or waterways		0		
STRUCTURES				<input type="checkbox"/> DEP or MWRA Sewer Connection/ Extension Permit <input checked="" type="checkbox"/> Other Permits (including Legislative Approvals) – Specify:
Gross square footage	0	0	0	
Number of housing units	0	0	0	
Maximum height (in feet)	0	0	0	
TRANSPORTATION				<u>Army Corps Of Engineers</u> <u>Section 404 Permit</u> _____ _____ _____ _____
Vehicle trips per day	0	0	0	
Parking spaces	0	0	0	
WASTEWATER				_____ _____ _____ _____
Gallons/day (GPD) of water use	0	0	0	
GPD water withdrawal	0	0	0	
GPD wastewater generation/ treatment	0	0	0	
Length of water/sewer mains (in miles)	0	0	0	

*-Total of approximately 0.87 acres of wetlands to be disturbed during remedial activities, to be restored upon completion of work.

CONSERVATION LAND: Will the project involve the conversion of public parkland or other Article 97 public natural resources to any purpose not in accordance with Article 97?

Yes (Specify _____) No

Will it involve the release of any conservation restriction, preservation restriction, agricultural preservation restriction, or watershed preservation restriction?

Yes (Specify _____) No

RARE SPECIES: Does the project site include Estimated Habitat of Rare Species, Vernal Pools, Priority Sites of Rare Species, or Exemplary Natural Communities?

Yes (Specify _____) No

HISTORICAL /ARCHAEOLOGICAL RESOURCES: Does the project site include any structure, site or district listed in the State Register of Historic Place or the inventory of Historic and Archaeological Assets of the Commonwealth?

Yes (Specify _____) No

If yes, does the project involve any demolition or destruction of any listed or inventoried historic or archaeological resources?

Yes (Specify _____) No

AREAS OF CRITICAL ENVIRONMENTAL CONCERN: Is the project in or adjacent to an Area of Critical Environmental Concern?

Yes (Specify _____) No

PROJECT DESCRIPTION: The project description should include (a) a description of the project site, (b) a description of both on-site and off-site alternatives and the impacts associated with each alternative, and (c) potential on-site and off-site mitigation measures for each alternative (You may attach one additional page, if necessary.)

The project site contains approximately 3.87 acres of wetlands, and is part of a larger construction site, currently under construction for the building of a new middle school. Of the 3.87 acres of total wetland, this project is proposing to perform remedial actions on approximately 0.87 acres.

As part of ongoing site assessment and remediation activities at the Site, BETA has compiled results of sediment sampling in the wetlands. Results compiled to date indicate an average exposure point concentration of polychlorinated biphenyls (PCBs) in this wetland area of approximately 1.3 parts per million (ppm). Other contaminants of concern, including heavy metals and polynuclear aromatic hydrocarbons, were detected at concentrations that did not pose an unacceptable level of risk to the environment.

Proposed remedial actions include the removal of up to six inches of PCB-impacted sediments at selected locations within the wetland area. Specific activities include (1) clearing of vegetation and physical removal of leaf litter, surface vegetation, and surface sediment/soil; (2) live loading, transportation, and disposal of sediment to an appropriately licensed receiving facility, and; (3) complete restoration of all disturbed areas, including replacement of the removed sediment/soil with clean soil and seeding with wetlands seed mix.

An alternative available to conducting the proposed remedial actions would be to not conduct any remedial actions. However, in recent consultation with U.S. Environmental Protection Agency (EPA) and the Massachusetts Department of Environmental Protection (DEP) representatives, it was determined that cleanup of sediments with residual concentrations of PCBs greater than 1 ppm is the appropriate remedy. Therefore, an alternative of no remedial action does not seem appropriate.

This project is regulated under the Toxic Substances Control Act (TSCA). A Risk Based Cleanup Request has been submitted to EPA on June 17, 2005 as part of this regulation. The proposed remedial actions will have no impacts on adjacent properties. For additional information, please refer to the Risk Based Cleanup Plan, included as Attachment A.

LAND SECTION – all proponents must fill out this section

I. Thresholds / Permits

A. Does the project meet or exceed any review thresholds related to land (see 301 CMR 11.03(1))
 ___ Yes X No; if yes, specify each threshold:

II. Impacts and Permits

A. Describe, in acres, the current and proposed character of the project site, as follows:

	<u>Existing</u>	<u>Change</u>	<u>Total</u>
Footprint of buildings	<u>0</u>	<u>0</u>	<u>0</u>
Roadways, parking, and other paved areas	<u>0</u>	<u>0</u>	<u>0</u>
Other altered areas (describe)	<u>0</u>	<u>0</u>	<u>0</u>
Undeveloped areas	<u>3.87</u>	<u>0</u>	<u>3.87</u>

B. Has any part of the project site been in active agricultural use in the last three years?
 ___ Yes X No; if yes, how many acres of land in agricultural use (with agricultural soils) will be converted to nonagricultural use?

C. Is any part of the project site currently or proposed to be in active forestry use?
 ___ Yes X No; if yes, please describe current and proposed forestry activities and indicate whether any part of the site is the subject of a DEM-approved forest management plan:

D. Does any part of the project involve conversion of land held for natural resources purposes in accordance with Article 97 of the Amendments to the Constitution of the Commonwealth to any purpose not in accordance with Article 97? ___ Yes X No; if yes, describe:

E. Is any part of the project site currently subject to a conservation restriction, preservation restriction, agricultural preservation restriction or watershed preservation restriction? ___ Yes X No; if yes, does the project involve the release or modification of such restriction? ___ Yes ___ No; if yes, describe:

F. Does the project require approval of a new urban redevelopment project or a fundamental change in an existing urban redevelopment project under M.G.L.c.121A? ___ Yes X No; if yes, describe:

G. Does the project require approval of a new urban renewal plan or a major modification of an existing urban renewal plan under M.G.L.c.121B? ___ Yes X No; if yes, describe:

H. Describe the project's stormwater impacts and, if applicable, measures that the project will take to comply with the standards found in DEP's Stormwater Management Policy: Project is not subject to DEP stormwater policy. Project will not alter the volume of stormwater flow which currently enters the wetland.

I. Is the project site currently being regulated under M.G.L.c.21E or the Massachusetts Contingency Plan? Yes X No ___; if yes, what is the Release Tracking Number (RTN)? RTN # 4-15685

J. If the project is site is within the Chicopee or Nashua watershed, is it within the Quabbin, Ware, or Wachusett subwatershed? ___ Yes X No; if yes, is the project site subject to regulation under the Watershed Protection Act? ___ Yes ___ No

K. Describe the project's other impacts on land: This project will have no adverse impacts on any adjacent properties. The portions of the wetland which are proposed to be disturbed will be fully restored upon completion of the site activities.

III. Consistency

A. Identify the current municipal comprehensive land use plan and the open space plan and describe the consistency of the project and its impacts with that plan(s): Current municipal land use plan for this area of wetland is to leave the wetland in its natural state, following the removal of contaminated sediment/soil and restoration of disturbed areas.

B. Identify the current Regional Policy Plan of the applicable Regional Planning Agency and describe the consistency of the project and its impacts with that plan: N/A

C. Will the project require any approvals under the local zoning by-law or ordinance (i.e. text or map amendment, special permit, or variance)? ___ Yes No; if yes, describe:

D. Will the project require local site plan or project impact review?

Yes ___ No; if yes, describe:

Requires Notice of Intent filing with New Bedford Conservation Commission.

RARE SPECIES SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **rare species or habitat** (see 301 CMR 11.03(2))? ___ Yes No; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **rare species or habitat**? ___ Yes No

C. If you answered "No" to both questions A and B, proceed to the **Wetlands, Waterways, and Tidelands Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Rare Species section below.

II. Impacts and Permits

A. Does the project site fall within Priority or Estimated Habitat in the current Massachusetts Natural Heritage Atlas (attach relevant page)? ___ Yes ___ No. If yes,

1. Which rare species are known to occur within the Priority or Estimated Habitat (contact: Environmental Review, Natural Heritage and Endangered Species Program, Route 135, Westborough, MA 01581, allowing 30 days for receipt of information):

2. Have you surveyed the site for rare species? ___ Yes ___ No; if yes, please include the results of your survey.

3. If your project is within Estimated Habitat, have you filed a Notice of Intent or received an Order of Conditions for this project? ___ Yes ___ No; if yes, did you send a copy of the Notice of Intent to the Natural Heritage and Endangered Species Program, in accordance with the Wetlands Protection Act regulations? ___ Yes ___ No

B. Will the project "take" an endangered, threatened, and/or species of special concern in accordance with M.G.L. c.131A (see also 321 CMR 10.04)? ___ Yes ___ No; if yes, describe:

C. Will the project alter "significant habitat" as designated by the Massachusetts Division of Fisheries and Wildlife in accordance with M.G.L. c.131A (see also 321 CMR 10.30)? ___ Yes ___ No; if yes, describe:

D. Describe the project's other impacts on rare species including indirect impacts (for example, stormwater runoff into a wetland known to contain rare species or lighting impacts on rare moth habitat):

WETLANDS, WATERWAYS, AND TIDELANDS SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **wetlands, waterways, and tidelands** (see 301 CMR 11.03(3))? Yes ___ No; if yes, specify, in quantitative terms: Alteration of 5,000 or more square feet of bordering or isolated vegetated wetlands.

B. Does the project require any state permits (or a local Order of Conditions) related to **wetlands, waterways, or tidelands**? Yes ___ No; if yes, specify which permit: This project requires a filing of a Notice of Intent, with the goal of achieving an Order of Conditions.

C. If you answered "No" to both questions A and B, proceed to the **Water Supply Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Wetlands, Waterways, and Tidelands Section below.

II. Wetlands Impacts and Permits

A. Describe any wetland resource areas currently existing on the project site and indicate them on the site plan: The site under consideration is the wetland portion of a larger construction site. The wetland portion borders most of the northern and western perimeters of the construction area. Specific portions of the wetland which are proposed to be disturbed are shown on the site plan.

B. Estimate the extent and type of impact that the project will have on wetland resources, and indicate whether the impacts are temporary or permanent:

<u>Coastal Wetlands</u>	<u>Area (in square feet) or Length (in linear feet)</u>
Land Under the Ocean	0
Designated Port Areas	0
Coastal Beaches	0
Coastal Dunes	0
Barrier Beaches	0
Coastal Banks	0
Rocky Intertidal Shores	0
Salt Marshes	0
Land Under Salt Ponds	0
Land Containing Shellfish	0
Fish Runs	0
Land Subject to Coastal Storm Flowage	0
<u>Inland Wetlands</u>	
Bank	0
Bordering Vegetated Wetlands	Approx. 38,000 sf
Land under Water	0
Isolated Land Subject to Flooding	0
Bordering Land Subject to Flooding	0
Riverfront Area	0

C. Is any part of the project

1. a limited project? Yes ___ No
2. the construction or alteration of a dam? ___ Yes No; if yes, describe:
3. fill or structure in a velocity zone or regulatory floodway? ___ Yes No
4. dredging or disposal of dredged material? ___ Yes No; if yes, describe the volume of dredged material and the proposed disposal site:
5. a discharge to Outstanding Resource Waters? ___ Yes No
6. subject to a wetlands restriction order? ___ Yes No; if yes, identify the area (in square feet):

D. Does the project require a new or amended Order of Conditions under the Wetlands Protection Act (M.G.L. c.131A)? Yes ___ No; if yes, has a Notice of Intent been filed or a local Order of

Conditions issued? Yes No; if yes, list the date and DEP file number: NOI filed 5/27/05, DEP File # SE 049-0543. Was the Order of Conditions appealed? Yes No. Will the project require a variance from the Wetlands regulations? Yes No.

E. Will the project:

1. be subject to a local wetlands ordinance or bylaw? Yes No
2. alter any federally-protected wetlands not regulated under state or local law?
 Yes No; if yes, what is the area (in s.f.)?

F. Describe the project's other impacts on wetlands (including new shading of wetland areas or removal of tree canopy from forested wetlands): The removal of sediment/soil from select portions of the wetland area will result in temporary impacts to those portions of the wetland. All disturbed areas will be appropriately restored upon completion of remedial actions. There will be no net gain or loss of wetlands as a result of this project.

III. Waterways and Tidelands Impacts and Permits

A. Is any part of the project site waterways or tidelands (including filled former tidelands) that are subject to the Waterways Act, M.G.L.c.91? Yes No; if yes, is there a current Chapter 91 license or permit affecting the project site? Yes No; if yes, list the date and number:

B. Does the project require a new or modified license under M.G.L.c.91? Yes No; if yes, how many acres of the project site subject to M.G.L.c.91 will be for non-water dependent use?
Current Change Total

C. Is any part of the project

1. a roadway, bridge, or utility line to or on a barrier beach? Yes No; if yes, describe:
2. dredging or disposal of dredged material? Yes No; if yes, volume of dredged material:
3. a solid fill, pile-supported, or bottom-anchored structure in flowed tidelands or other waterways? Yes No; if yes, what is the base area? _____
4. within a Designated Port Area? Yes No

D. Describe the project's other impacts on waterways and tidelands: none

IV. Consistency:

A. Is the project located within the Coastal Zone? Yes No; if yes, describe the project's consistency with policies of the Office of Coastal Zone Management:

B. Is the project located within an area subject to a Municipal Harbor Plan? Yes No; if yes, identify the Municipal Harbor Plan and describe the project's consistency with that plan:

WATER SUPPLY SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **water supply** (see 301 CMR 11.03(4))? Yes No; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **water supply**? Yes No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Wastewater Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Water Supply Section below.

II. Impacts and Permits

A. Describe, in gallons/day, the volume and source of water use for existing and proposed activities at the project site:

	<u>Existing</u>	<u>Change</u>	<u>Total</u>
Withdrawal from groundwater	_____	_____	_____
Withdrawal from surface water	_____	_____	_____
Interbasin transfer	_____	_____	_____
Municipal or regional water supply	_____	_____	_____

B. If the source is a municipal or regional supply, has the municipality or region indicated that there is adequate capacity in the system to accommodate the project? ___ Yes ___ No

C. If the project involves a new or expanded withdrawal from a groundwater or surface water source,

1. have you submitted a permit application? ___ Yes ___ No; if yes, attach the application
2. have you conducted a pump test? ___ Yes ___ No; if yes, attach the pump test report

D. What is the currently permitted withdrawal at the proposed water supply source (in gallons/day)?
 _____ Will the project require an increase in that withdrawal? ___ Yes ___ No

E. Does the project site currently contain a water supply well, a drinking water treatment facility, water main, or other water supply facility, or will the project involve construction of a new facility? ___ Yes ___ No. If yes, describe existing and proposed water supply facilities at the project site:

	<u>Existing</u>	<u>Change</u>	<u>Total</u>
Water supply well(s) (capacity, in gpd)	_____	_____	_____
Drinking water treatment plant (capacity, in gpd)	_____	_____	_____
Water mains (length, in miles)	_____	_____	_____

F. If the project involves any interbasin transfer of water, which basins are involved, what is the direction of the transfer, and is the interbasin transfer existing or proposed?

- G. Does the project involve
1. new water service by a state agency to a municipality or water district? ___ Yes ___ No
 2. a Watershed Protection Act variance? ___ Yes ___ No; if yes, how many acres of alteration?
 3. a non-bridged stream crossing 1,000 or less feet upstream of a public surface drinking water supply for purpose of forest harvesting activities? ___ Yes ___ No

H. Describe the project's other impacts (including indirect impacts) on water resources, quality, facilities and services:

III. **Consistency** -- Describe the project's consistency with water conservation plans or other plans to enhance water resources, quality, facilities and services:

WASTEWATER SECTION

I. **Thresholds / Permits**

A. Will the project meet or exceed any review thresholds related to **wastewater** (see 301 CMR 11.03(5))? ___ Yes X No; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **wastewater**? ___ Yes X No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Transportation -- Traffic Generation Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Wastewater Section below.

II. **Impacts and Permits**

A. Describe, in gallons/day, the volume and disposal of wastewater generation for existing and proposed activities at the project site (calculate according to 310 CMR 15.00):

	<u>Existing</u>	<u>Change</u>	<u>Total</u>
Discharge to groundwater (Title 5)	_____	_____	_____
Discharge to groundwater (non-Title 5)	_____	_____	_____
Discharge to outstanding resource water	_____	_____	_____
Discharge to surface water	_____	_____	_____
Municipal or regional wastewater facility	_____	_____	_____
TOTAL	_____	_____	_____

B. _____ Is there sufficient capacity in the existing collection system to accommodate the project?
 ___ Yes ___ No; if no, describe where capacity will be found:

C. Is there sufficient existing capacity at the proposed wastewater disposal facility? ___ Yes ___ No;
 if no, describe how capacity will be increased:

D. Does the project site currently contain a wastewater treatment facility, sewer main, or other
 wastewater disposal facility, or will the project involve construction of a new facility? ___ Yes ___
 No. If yes, describe as follows:

	<u>Existing</u>	<u>Change</u>	<u>Total</u>
Wastewater treatment plant (capacity, in gpd)	_____	_____	_____
Sewer mains (length, in miles)	_____	_____	_____
Title 5 systems (capacity, in gpd)	_____	_____	_____

E. If the project involves any interbasin transfer of wastewater, which basins are involved, what is the
 direction of the transfer, and is the interbasin transfer existing or proposed?

F. Does the project involve new sewer service by an Agency of the Commonwealth to a municipality
 or sewer district? ___ Yes ___ No

G. Is there any current or proposed facility at the project site for the storage, treatment, processing,
 combustion or disposal of sewage sludge, sludge ash, grit, screenings, or other sewage residual
 materials? ___ Yes ___ No; if yes, what is the capacity (in tons per day):

	<u>Existing</u>	<u>Change</u>	<u>Total</u>
Storage	_____	_____	_____
Treatment, processing	_____	_____	_____
Combustion	_____	_____	_____
Disposal	_____	_____	_____

H. Describe the project's other impacts (including indirect impacts) on wastewater generation and
 treatment facilities:

III. Consistency -- Describe measures that the proponent will take to comply with federal, state,
 regional, and local plans and policies related to wastewater management:

A. If the project requires a sewer extension permit, is that extension included in a comprehensive
 wastewater management plan? ___ Yes ___ No; if yes, indicate the EOEA number for the plan and
 describe the relationship of the project to the plan

TRANSPORTATION -- TRAFFIC GENERATION SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **traffic generation** (see 301 CMR 11.03(6))? ___ Yes X No; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **state-controlled roadways**? ___ Yes X No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Roadways and Other Transportation Facilities Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Traffic Generation Section below.

II. Traffic Impacts and Permits

A. Describe existing and proposed vehicular traffic generated by activities at the project site:

	<u>Existing</u>	<u>Change</u>	<u>Total</u>
Number of parking spaces	_____	_____	_____
Number of vehicle trips per day	_____	_____	_____
ITE Land Use Code(s):			

B. What is the estimated average daily traffic on roadways serving the site?

	<u>Roadway</u>	<u>Existing</u>	<u>Change</u>	<u>Total</u>
1.	_____	_____	_____	_____
2.	_____	_____	_____	_____
3.	_____	_____	_____	_____

C. Describe how the project will affect transit, pedestrian and bicycle transportation facilities and services:

III. Consistency -- Describe measures that the proponent will take to comply with municipal, regional, state, and federal plans and policies related to traffic, transit, pedestrian and bicycle transportation facilities and services:

ROADWAYS AND OTHER TRANSPORTATION FACILITIES SECTION

I. Thresholds

A. Will the project meet or exceed any review thresholds related to **roadways or other transportation facilities** (see 301 CMR 11.03(6))? ___ Yes X No; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **roadways or other transportation facilities**? ___ Yes X No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Energy Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Roadways Section below.

II. Transportation Facility Impacts

A. Describe existing and proposed transportation facilities at the project site:

	<u>Existing</u>	<u>Change</u>	<u>Total</u>
Length (in linear feet) of new or widened roadway	_____	_____	_____
Width (in feet) of new or widened roadway	_____	_____	_____

Other transportation facilities:

- B. Will the project involve any
1. Alteration of bank or terrain (in linear feet)? _____
 2. Cutting of living public shade trees (number)? _____
 3. Elimination of stone wall (in linear feet)? _____

III. Consistency -- Describe the project's consistency with other federal, state, regional, and local plans and policies related to traffic, transit, pedestrian and bicycle transportation facilities and services, including consistency with the applicable regional transportation plan and the Transportation Improvements Plan (TIP), the State Bicycle Plan, and the State Pedestrian Plan:

ENERGY SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **energy** (see 301 CMR 11.03(7))?
 ___ Yes X No; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **energy**? ___ Yes X No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Air Quality Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Energy Section below.

II. Impacts and Permits

A. Describe existing and proposed energy generation and transmission facilities at the project site:

	<u>Existing</u>	<u>Change</u>	<u>Total</u>
Capacity of electric generating facility (megawatts)	_____	_____	_____
Length of fuel line (in miles)	_____	_____	_____
Length of transmission lines (in miles)	_____	_____	_____
Capacity of transmission lines (in kilovolts)	_____	_____	_____

B. If the project involves construction or expansion of an electric generating facility, what are

1. the facility's current and proposed fuel source(s)?
2. the facility's current and proposed cooling source(s)?

C. If the project involves construction of an electrical transmission line, will it be located on a new, unused, or abandoned right of way? ___ Yes ___ No; if yes, please describe:

D. Describe the project's other impacts on energy facilities and services:

III. Consistency -- Describe the project's consistency with state, municipal, regional, and federal plans and policies for enhancing energy facilities and services:

AIR QUALITY SECTION

I. Thresholds

A. Will the project meet or exceed any review thresholds related to **air quality** (see 301 CMR 11.03(8))? ___ Yes X No; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **air quality**? ___ Yes X No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Solid and Hazardous Waste Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Air

Quality Section below.

II. Impacts and Permits

A. Does the project involve construction or modification of a major stationary source (see 310 CMR 7.00, Appendix A)? ___ Yes ___ No; if yes, describe existing and proposed emissions (in tons per day) of:

	<u>Existing</u>	<u>Change</u>	<u>Total</u>
Particulate matter	_____	_____	_____
Carbon monoxide	_____	_____	_____
Sulfur dioxide	_____	_____	_____
Volatile organic compounds	_____	_____	_____
Oxides of nitrogen	_____	_____	_____
Lead	_____	_____	_____
Any hazardous air pollutant	_____	_____	_____
Carbon dioxide	_____	_____	_____

B. Describe the project's other impacts on air resources and air quality, including noise impacts:

III. Consistency

A. Describe the project's consistency with the State Implementation Plan:

B. Describe measures that the proponent will take to comply with other federal, state, regional, and local plans and policies related to air resources and air quality:

SOLID AND HAZARDOUS WASTE SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **solid or hazardous waste** (see 301 CMR 11.03(9))? ___ Yes X No; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **solid and hazardous waste**? ___ Yes X No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Historical and Archaeological Resources Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Solid and Hazardous Waste Section below.

II. Impacts and Permits

A. Is there any current or proposed facility at the project site for the storage, treatment, processing, combustion or disposal of solid waste? ___ Yes ___ No; if yes, what is the volume (in tons per day) of the capacity:

	<u>Existing</u>	<u>Change</u>	<u>Total</u>
Storage	_____	_____	_____
Treatment, processing	_____	_____	_____
Combustion	_____	_____	_____
Disposal	_____	_____	_____

B. Is there any current or proposed facility at the project site for the storage, recycling, treatment or disposal of hazardous waste? ___ Yes ___ No; if yes, what is the volume (in tons or gallons per day) of the capacity:

	<u>Existing</u>	<u>Change</u>	<u>Total</u>
Storage	_____	_____	_____
Recycling	_____	_____	_____
Treatment	_____	_____	_____
Disposal	_____	_____	_____

C. If the project will generate solid waste (for example, during demolition or construction), describe alternatives considered for re-use, recycling, and disposal:

D. If the project involves demolition, do any buildings to be demolished contain asbestos?
 Yes No

E. Describe the project's other solid and hazardous waste impacts (including indirect impacts):

III. Consistency--Describe measures that the proponent will take to comply with the State Solid Waste Master Plan:

HISTORICAL AND ARCHAEOLOGICAL RESOURCES SECTION

I. Thresholds / Impacts

A. Is any part of the project site a historic structure, or a structure within a historic district, in either case listed in the State Register of Historic Places or the Inventory of Historic and Archaeological Assets of the Commonwealth? Yes No; if yes, does the project involve the demolition of all or any exterior part of such historic structure? Yes No; if yes, please describe:

B. Is any part of the project site an archaeological site listed in the State Register of Historic Places or the Inventory of Historic and Archaeological Assets of the Commonwealth? Yes No; if yes, does the project involve the destruction of all or any part of such archaeological site? Yes No; if yes, please describe:

C. If you answered "No" to all parts of both questions A and B, proceed to the **Attachments and Certifications** Sections. If you answered "Yes" to any part of either question A or question B, fill out the remainder of the Historical and Archaeological Resources Section below.

D. Have you consulted with the Massachusetts Historical Commission? Yes No; if yes, attach correspondence

E. Describe and assess the project's other impacts, direct and indirect, on listed or inventoried historical and archaeological resources:

II. Consistency -- Describe measures that the proponent will take to comply with federal, state, regional, and local plans and policies related to preserving historical and archaeological resources:

ATTACHMENTS:

1. Plan, at an appropriate scale, of existing conditions of the project site and its immediate context, showing all known structures, roadways and parking lots, rail rights-of-way, wetlands and water bodies, wooded areas, farmland, steep slopes, public open spaces, and major utilities.
2. Plan of proposed conditions upon completion of project (if construction of the project is proposed to be phased, there should be a site plan showing conditions upon the completion of each phase).
3. **Original** U.S.G.S. map or good quality **color** copy (8-1/2 x 11 inches or larger) indicating the project location and boundaries
4. List of all agencies and persons to whom the proponent circulated the ENF, in accordance with 301 CMR 11.16(2).
5. Other:

CERTIFICATIONS:

1. The Public Notice of Environmental Review has been/will be published in the following newspapers in accordance with 301 CMR 11.15(1):

(Name)	(Date)
<u>New Bedford Standard Times</u>	<u>(Undetermined)</u>

2. This form has been circulated to Agencies and Persons in accordance with 301 CMR 11.16(2).

<u>6/17/05</u> Date	<u>Scott Alfonse</u> Signature of Responsible Officer or Proponent	<u>6/17/05</u> Date	<u>Alan D. Hanscom</u> Signature of person preparing ENF (if different from above)
------------------------	--	------------------------	--

Scott Alfonse
Name (print or type)

Alan D. Hanscom
Name (print or type)

City of New Bedford
Firm/Agency

BETA Group, Inc.
Firm/Agency

133 William Street
Street

315 Norwood Park South
Street

New Bedford, MA 02740
Municipality/State/Zip

Norwood, MA 02062
Municipality/State/Zip

508-979-1487
Phone

781-255-1982
Phone

Attachment G

Section 404 Permit

(33 CFR 325)

Public reporting burden for this collection of information is estimated to average 5 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters Service Directorate of Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302; and to the Office of Management and Budget, Paperwork Reduction Project (0710-0003), Washington, DC 20503. Please DO NOT RETURN your form to either of those addresses. Completed applications must be submitted to the District Engineer having jurisdiction over the location of the proposed activity.

PRIVACY ACT STATEMENT

Authority: 33 USC 401, Section 10: 1413, Section 404. Principal Purpose: These laws require authorizing activities in, or affecting, navigable waters of the United States, the discharge or fill material into waters of the United States, and the transportation of dredged material for the purpose of dumping it into ocean waters. Routine Uses: Information provided on this form will be used in evaluating the application for a permit. Disclosure: Disclosure of requested information is voluntary. If information is not provided, however, the permit application cannot be processed nor can a permit be issued.

One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETED
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(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME City of New Bedford - Scott Alfonse (contact)	8. AUTHORIZED AGENT'S NAME AND TITLE (an agent is not required) Alan Hanscom, BETA Group, Inc.
6. APPLICANT'S ADDRESS 133 William Street, New Bedford, MA 02740	9. AGENT'S ADDRESS 315 Norwood Park South Norwood, MA 02062
7. APPLICANT'S PHONE NOS. W/AREA CODE a. 508-979-1487 b.	10. AGENT'S PHONE NOS. W/AREA CODE a. 781-255-1982 b.

11. STATEMENT OF AUTHORIZATION

I hereby authorize, Alan Hanscom to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

Scott Alfonse Scott Alfonse
APPLICANT'S SIGNATURE

6/17/05
DATE

NAME, LOCATION, AND DESCRIPTION OR PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE (see instructions) McCoy Field/New Keith Middle School Wetland Remediation Activities	
13. NAME OF WATERBODY, IF KNOWN (if applicable) N/A N/A	14. PROJECT STREET ADDRESS (if applicable) 225 Hathaway Boulevard New Bedford, MA 02740
15. LOCATION OF PROJECT Bristol MA COUNTY STATE	
16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (see instructions) Section, Township, Range, Lat/Lon, and/or Accessors's Parcel Number, for example. Assessor Map 69 Lot 125 and Map 75 Lot 167	
17. DIRECTIONS TO THE SITE From Route 140, take exit 3. Take left at end of exit ramp, onto Hathaway Road. At first set of lights, take right (Shawmut Street). Travel on Shawmut Street approx 2/3 mile to stop sign. Take right onto Durfee Street. Travel approx 1/4 mile on Durfee Street to stop sign, take left onto Hathaway Boulevard. Site is 1/10 mile on right.	

18. Nature of Activity (Description of project, include all features)

Specific activities include (1) clearing of vegetation and physical removal of leaf litter, surface vegetation, and surface sediment/soil; (2) live loading, transportation, and disposal of sediment to an appropriately licensed receiving facility, and; (3) complete restoration of all disturbed areas, including replacement of the removed sediment/soil with clean soil and seeding with wetlands seed mix.

19. Project Purpose (Describe the reason or purpose of the project, see instructions)

This project is a wetlands restoration project. It consists of a cleanup of sediments in the wetland area with residual contamination of polychlorinated biphenyls (PCBs) greater than one part per million (ppm). The proposed scope of work includes the removal of approximately 2 to 4 inches of PCB-impacted sediments at selected locations within the wetland area.

USE BLOCKS 20-22 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED

20. Reason(s) for Discharge

21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Yards

22. Surface Area in Acres of Wetlands or Other Waters Filled (see instructions)
None.

23. Is Any Portion of the Work Already Complete? Yes ___ No X IF YES, DESCRIBE THE COMPLETED WORK

24. Addresses of Adjoining Property Owners, Lessees, Etc., Whose Property Adjoins the Waterbody (If more than can be entered here, please attach a supplemental list).

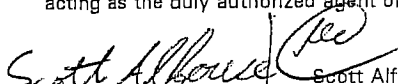
See attached list of adjoining property owners.

25. List of Other Certifications or Approvals/Denials Received from other Federal, State, or Local Agencies for Work Described in This Application.

AGENCY	TYPE APPROVAL*	IDENTIFICATION NUMBER	DATE APPLIED	DATE APPROVED	DATE DENIED
MEPA	ENF		June 17, 2005		
MDEP	WQC		June 17, 2005		
NB Con Com	Order of Conditions		May 27, 2005		
US EPA	Risk Based Cleanup Request		June 17, 2005		

* Would include but is not restricted to zoning, building, and flood plain permits

26. Application is hereby made for a permit or permits to authorize the work described in this application. I certify that the information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.


 Scott Alfonse
 SIGNATURE OF APPLICANT

6/17/05
 DATE


 Alan Hanscom
 SIGNATURE OF AGENT

6/17/05
 DATE

The application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in block 11 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or