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DRAFT
Terrestrial Ecological
Evaluation

Cornet Bay Marina, Whidbey
Island, Washington

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Prepared for
Washington State
Department of Ecology
Toxics Cleanup Program
P.O. Box 47600
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Section 1: Introduction

On behalf of the Washington State Department of Ecology (Ecology), Kennedy/Jenks Consultants prepared this Terrestrial Ecological Evaluation (TEE) for the Cornet Bay Marina located on the southern side of Deception Pass at 200 Cornet Bay Road, Whidbey Island, Washington (site). Ecology's Model Toxics Control Act (MTCA) recommends a tiered approach for evaluating potential impacts to terrestrial ecological receptors, in accordance with regulations published in Washington Administrative Code (WAC) 173-340-7490 through 173-340-7494. Discussion of the regulatory framework and the TEE results are presented in the following sections.

In June 1992, Ecology entered into a Consent Decree (No. 93-2-00018-3) with Mr. Milton A. Woods (owner of Cornet Bay Marina) for performance of a remedial investigation and feasibility study (RI/FS) at the site. Following performance of the RI/FS, the Consent Decree requires that a cleanup action be performed to protect human health and the environment in accordance with MTCA regulations. This TEE has been prepared as a requirement under MTCA and provides supporting information for evaluation of potential impacts to terrestrial ecological receptors at and near the site.

1.1 Objectives and Approach

The purpose of the TEE process is to determine if a release of hazardous chemicals at the site may cause potential adverse effects to terrestrial ecological receptors. Following the tiered approach from the WAC 173-340-7490 through 173-340-7494, the first step in the TEE process evaluates if the site qualifies for a primary exclusion under WAC 173-340-7941. The next steps in the tiered approach determine if the site qualifies for a simplified TEE under WAC 173-340-7942 or requires additional evaluation and a site-specific TEE under WAC 173-240-7943.

In preparing this TEE, the site was evaluated relative to the criteria in WAC 173-340-7941, as described in Section 2. Available information about the site was reviewed and historical analytical data were evaluated for use in the TEE. Previous environmental investigations have yielded extensive soil data for the site. The TEE process included screening the site-wide soil concentrations against appropriate literature values from MTCA as part of the site-specific TEE, as described in Section 3.

1.2 Site Description and Background

Cornet Bay Marina and associated facilities were constructed in the 1960s. The marina includes a wooden bulkhead about 300 feet long, which separates the upland facilities (general store and parking areas) from the marina. The site is bound to the east by Cornet Bay Road, to the north by Deception Pass State Park, and to the west by Cornet Bay. The site consists of approximately 2.8 acres of paved and unpaved areas, with approximately 10 percent of the site currently paved. The unpaved areas of the site are primarily covered by gravel. The site is zoned "rural village", including a mixture of residential and light commercial land uses. The upland portion of the site is currently used for commercial purposes as a general store and parking lot.

Four underground storage tanks (UST) were installed at the site in 1964 with a total capacity of 18,000 gallons of gasoline and 3,000 gallons of diesel. In 1989, a release occurred resulting from ruptured underground fuel lines, which caused impacts to soil and groundwater behind the bulkhead. Sheen was observed on the surface of Cornet Bay Marina that extended from the bulkhead. The four USTs were removed by Technical Services, Inc. (under contract to Welch Enterprises) in 1990, and soil from the tank excavation was placed back into the ground (Welch 1990). In late 1990, the current fueling system, a two-compartment 12,000-gallon UST (9,000-gallon gasoline and 3,000-gallon diesel) was installed within a portion of the former UST excavation, enclosed in an underground reinforced concrete vault. In 1992, Ecology entered into a Consent Decree with the property owner for cleanup of the property.

From 1995 through 2011, Ecology (and their contractors) performed a series of investigations at the site to characterize the distribution of impacted soil and groundwater from the release. Soil sampling locations and existing monitoring well locations are shown on Figure 1. Analytical results for soil samples collected at the site are presented in Appendix A.

1.3 Available Data

Consistent with the objectives of the TEE process, upland soil data were used to evaluate the potential for adverse effects to terrestrial ecological receptors. Available soil data from previous site investigations includes the following:

In November 1995, Ecology advanced 10 soil borings (B1 through B10) and collected soil samples at the site (refer to Figure 1 for previous sampling locations). The highest concentrations of gasoline and diesel-range total petroleum hydrocarbons (TPH) were detected in the soil from borings B3 and B8, at concentrations of 4,900 and 4,030 milligrams per kilogram (mg/kg), respectively (Ecology 1996).

In June 2003, Ecology advanced and sampled 10 direct-push borings (DP1 through DP10) at the site. Gasoline- and diesel-range TPH as well as benzene, toluene, ethylbenzene, and xylenes (BTEX) were detected at concentrations above the MTCA Method A cleanup levels for unrestricted land use in areas where elevated hydrocarbon concentrations had been detected during the 1995 investigation.

In April and June 2005, EA Engineering, Science and Technology, Inc. (EA) advanced and sampled three hand-auger borings (HA-1 through HA-3) and eight direct-push soil borings (GP-1 through GP-8) to investigate petroleum hydrocarbon impacts at the site. Results are presented in the Investigation Report (EA 2005) and a subsequent letter to Ecology that summarize the results of these field investigations (EA 2006). Except for the bulkhead area, the results of these investigations indicate soil and groundwater impacts appear to be generally confined to the site. Gasoline- and diesel-range TPH concentrations were below MTCA Method A cleanup levels around the perimeter of the site, with the exception of hand-auger borings HA-1 and HA-2 where concentrations of diesel range TPH were elevated. Oil-range TPH was also detected in these borings, which suggests that the impacts are not related to operations at the marina (EA 2006).

In June 2006, EA excavated five test pits (TP1 through TP5) to identify soil types and investigate the possible presence of light non-aqueous phase liquid (LNAPL) on the water table. Groundwater was encountered from approximately 4 to 6 feet during the test pit excavations,

and LNAPL was encountered in three of the five excavations (refer to Figure 1 for test pit sampling locations). Strong odors, sheens, and/or elevated photoionization (PID) readings were also noted (with the exception of test pit TP4) during the investigation. LNAPL was also observed in monitoring wells MW-2 and MW-3, and sheen was noted seeping from the bulkhead at the southern side of the store (EA 2007).

In September and November 2011, Kennedy/Jenks Consultants completed additional soil and groundwater investigations for the upland portion of the site. Gasoline- and diesel-range TPH as well as BTEX were detected in soil at concentrations above the MTCA Method A cleanup levels in areas where elevated hydrocarbon concentrations had been detected during previous investigations.

In summary, through performance of the RI, the distribution of impacted soil at the site has been characterized and the analytical results for soil samples are included in Appendix A.

Section 2: Regulatory Framework

2.1 TEE Exclusion

The site was evaluated for the potential to pose a threat to terrestrial ecological receptors. To qualify for exclusion from a TEE, the site must meet one of the four criteria in WAC 173-340-7491. The site does not meet any of the exclusion criteria:

- The impacted soil is located above the point of compliance [site surface extending to 15 feet below ground surface(bgs)]
- All impacted soil at the site is not covered by a physical barrier that prevents potential ecological exposure
- There are more than 1.5 acres of contiguous undeveloped land within 500 feet of the site
- Concentrations in the soil are not below natural background levels.

Because the site does not qualify for exclusion from a TEE, further evaluation for the potential threat to terrestrial ecological receptors is required. MTCA regulations (WAC 173-340-7491) require a site-specific TEE if the site is 1) adjacent to a greenbelt or other natural habitat, 2) used by special status species, or 3) bounded by at least 10 acres of native vegetation within 500 feet of the site. Based on these criteria, the site qualifies for a site-specific TEE, as discussed in the following sections.

2.2 Site-Specific TEE

The site is adjacent to Deception Pass State Park to the north and east across Cornet Bay Road, with several hundred acres of native vegetation and wildlife habitat. Because the State Park is greater than 10 acres, the site qualifies for a site-specific TEE. The site-specific TEE consists of two steps: 1) problem formulation to determine if terrestrial ecological receptors are exposed to impacted soil at the site; and 2) selection of appropriate ecological evaluation methods, if warranted. The first step is performed in the following sections. Based on the results of the first step, the second step was determined to not be warranted for the site at this time.

Soil analytical data for the site are presented in Appendix A. A summary of the soil screening evaluation and a discussion of potential exposure pathways and ecological receptors are presented in the following sections.

Section 3: Problem Formulation

3.1 Chemicals of Potential Ecological Concern

The first step of the site-specific TEE includes an evaluation of available soil data to identify chemicals of potential ecological concern (COPECs). Because the site is currently used for commercial purposes, and is expected to be used for commercial purposes for the foreseeable future, only wildlife protection values need to be considered in this site-specific TEE. Therefore, the soil results collected for the RI were screened against ecological indicator soil concentrations (EISC) for wildlife provided in MTCA Table 749-3. A summary of the risk-based screening evaluation is presented in Table 1, which identifies the soil sample locations and chemicals that exceed the EISCs. The corresponding soil sample locations are shown on Figure 1.

For the metals analytical data, the maximum site-wide arsenic concentration of 20 mg/kg exceeds the corresponding wildlife protection screening value of 7 mg/kg for arsenic III. In general, the locations where soil samples that exceed the arsenic screening value of 7 mg/kg are distributed throughout the subject site in areas that are unpaved. Six of eight total samples submitted for metals analysis exceed the arsenic screening value of 7 mg/kg. For comparison, in the 2001 MTCA rule revisions, Ecology decided to use 20 mg/kg to characterize natural background arsenic concentrations in Washington soils (Ecology 2010).

There are no wildlife screening values for VOCs or for the heavy/lube oil range hydrocarbons that were analyzed; however, wildlife screening values are presented for gasoline- and diesel-range hydrocarbons in Table 749-3 of Ecology's TEE guidance. Of the soil samples that were analyzed for gasoline- and diesel-range hydrocarbons (over 100 samples), only three samples exceeded the corresponding wildlife screening values for gasoline- and for diesel-range hydrocarbons of 5,000 and 6,000 mg/kg, respectively.

Table 2 summarizes the selected COPECs for the site: these include arsenic, as well as gasoline- and diesel-range hydrocarbons. The MTCA Method A soil cleanup levels for unrestricted land use are also presented for comparison. For gasoline- and diesel-range hydrocarbons, the EISCs are higher than the MTCA Method A soil cleanup levels. Therefore, the use of the MTCA Method A soil cleanup levels will be protective of potential adverse effects to terrestrial ecological receptors. For arsenic, the EISC screening value is below the MTCA Method A concentration of 20 mg/kg, which is based on natural background of arsenic. The maximum detected arsenic concentration does not exceed the natural background concentration, and there are no known releases of arsenic at the site. Therefore, arsenic is not considered a COPEC.

3.2 Current and Future Exposure Pathways

As discussed, the site is used for commercial purposes, and as previously described, consists of approximately 2.8 acres of property with approximately 90 percent of the property currently unpaved. The unpaved areas of the site are primarily covered by gravel, which prevents potential ecological exposures. Furthermore, the State Park is located immediately adjacent to the site and provides preferential ecological habitat. As a result, the upland portions of the Cornet Bay Marina do not provide a beneficial habitat for wildlife (potential ecological receptors).

Additionally, the rural village zoning is unlikely to create additional ecological habitat for wildlife in the future. The potential exposure of terrestrial ecological receptors to contaminants in soil at the site is considered insignificant.

Section 4: Summary and Recommendations

The only potential exposure pathway to terrestrial wildlife at the site is through direct contact to soil. A site-specific TEE was completed for the site by conducting a risk-based screening of historical soil data collected during previous site investigations with wildlife protection screening values from Table 749-3. Because the site is currently used for commercial purposes, only the wildlife protection values were considered for this TEE. As shown in Table 1, three constituents were detected in soil above their corresponding wildlife protection values. However, as shown in Table 2, the ecological screening values are greater than the MTCA Method A soil cleanup levels for protection of human health or below natural background in the case of arsenic. Therefore, use of the MTCA Method A soil cleanup levels for protection of human health will also be protective of terrestrial ecological receptors.

As previously described, a majority of the site is either paved or covered by gravel, so the potential exposure of terrestrial ecological receptors to soil at the site is considered insignificant. By addressing potential human health risks, remedial actions will be protective of potential adverse effects to terrestrial ecological receptors. Additional evaluation of terrestrial ecological receptors is not warranted at this time.

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Tables

Table 1: Occurrence, Distribution, and Selection of Chemical of Potential Ecological Concren, Terrestrial Ecological Evaluation

Analyte	Number of Samples ^(a)	Number of Detected Concentrations	Percent Detected	Maximum Detect	Units	EISC ^(b)	Notes	COPEC?	Location of Max Detect	Reason for Selection/Exclusion
Volatile Organic Compounds (VOCs)										
Benzene	104	64	62%	150	mg/kg	N/A	--	N	--	EISC not established for the protection of wildlife
Ethylbenzene	103	56	54%	96	mg/kg	N/A	--	N	--	EISC not established for the protection of wildlife
Toluene	103	41	40%	420	mg/kg	N/A	--	N	--	EISC not established for the protection of wildlife
m, p-Xylene	84	39	46%	380	mg/kg	N/A	--	N	--	EISC not established for the protection of wildlife
o-Xylene	85	47	55%	140	mg/kg	N/A	--	N	--	EISC not established for the protection of wildlife
Total Xylenes	19	14	74%	219	mg/kg	N/A	--	N	--	EISC not established for the protection of wildlife
Total Petroleum Hydrocarbons (TPH)										
Gasoline Range Organics	116	71	61%	9,400	mg/kg	5,000	w	Y	KJ-B19-5	Max detect exceeds screening value
Diesel Range Organics	116	65	56%	7,700	mg/kg	6,000	w	Y	KJ-B36-8	Max detect exceeds screening value
Lube Oil Range Hydrocarbons	79	9	11%	72	mg/kg	N/A	--	N	--	EISC not established for the protection of wildlife
Heavy Fuel Oil	12	6	50%	54.9	mg/kg	N/A	--	N	--	EISC not established for the protection of wildlife
Metals										
Arsenic	8	8	100%	20	mg/kg	7	w^(c)	Y	KJ-B10-8	Max detect exceeds screening value
Barium	8	8	100%	74	mg/kg	102	w	N	--	Max detect does not exceed screening value
Cadmium	8	1	13%	0.20	mg/kg	14	w	N	--	Max detect does not exceed screening value
Chromium	8	8	100%	47.4	mg/kg	67	w ^(d)	N	KJ-B35-4	Max detect does not exceed screening value
Lead	18	13	72%	6.6	mg/kg	118	w	N	--	Max detect does not exceed screening value
Mercury	8	4	50%	0.030	mg/kg	6	w ^(e)	N	--	Max detect does not exceed screening value
Phosphorus	3	3	100%	695	mg/kg	N/A	--	N	--	EISC not established for the protection of wildlife
Potassium	3	3	100%	3,790	mg/kg	N/A	--	N	--	EISC not established for the protection of wildlife

Table 1: Occurrence, Distribution, and Selection of Chemical of Potential Ecological Concern, Terrestrial Ecological Evaluation

Analyte	Number of Samples ^(a)	Number of Detected Concentrations	Percent Detected	Maximum Detect	Units	EISC ^(b)	Notes	COPEC?	Location of Max Detect	Reason for Selection/Exclusion
Semivolatile Organic Compounds (SVOCs)										
1-Methylnaphthalene	8	8	100%	13	mg/kg	N/A	--	N	--	EISC not established for the protection of wildlife
2-Methylnaphthalene	8	8	100%	21	mg/kg	N/A	--	N	--	EISC not established for the protection of wildlife
Acenaphthene	8	8	100%	2.6	mg/kg	N/A	--	N	--	EISC not established for the protection of wildlife
Acenaphthylene	8	1	13%	0.0084	mg/kg	N/A	--	N	--	EISC not established for the protection of wildlife
Anthracene	8	7	88%	0.41	mg/kg	N/A	--	N	--	EISC not established for the protection of wildlife
Benzo(a)anthracene	8	4	50%	0.051	mg/kg	N/A	--	N	--	EISC not established for the protection of wildlife
Benzo(a)pyrene	8	3	38%	0.021	mg/kg	12	w	N	--	Max detect does not exceed screening value
Benzo(g,h,i)perylene	8	1	13%	0.011	mg/kg	N/A	--	N	--	EISC not established for the protection of wildlife
Chrysene	8	4	50%	0.063	mg/kg	N/A	--	N	--	EISC not established for the protection of wildlife
Dibenzofuran	8	7	88%	0.96	mg/kg	N/A	--	N	--	EISC not established for the protection of wildlife
Fluoranthene	8	7	88%	0.22	mg/kg	N/A	--	N	--	EISC not established for the protection of wildlife
Fluorene	8	8	100%	1.6	mg/kg	N/A	--	N	--	EISC not established for the protection of wildlife
Indeno(1,2,3-cd)pyrene	8	1	13%	0.0081	mg/kg	N/A	--	N	--	EISC not established for the protection of wildlife
Naphthalene	8	8	100%	9.0	mg/kg	N/A	--	N	--	EISC not established for the protection of wildlife
Phenanthrene	8	8	100%	3.2	mg/kg	N/A	--	N	--	EISC not established for the protection of wildlife
Pyrene	8	7	88%	0.20	mg/kg	N/A	--	N	--	EISC not established for the protection of wildlife

Abbreviations

COPEC = chemical of potential ecological concern

mg/Kg = milligrams per kilogram

N/A = screening value not established for the protection of wildlife (MTCA Table 749-3)

w = screening value for the protection of wildlife

Notes:

(a) Data set includes all soil data from 1995 - 2011 for the site.

(b) Screening values from MTCA Table 749-3: Ecological Indicator Soil Concentrations (EISCs) for Protection of Terrestrial Plants and Animals (Ecology 2007).

(c) Screening value for arsenic III used for arsenic.

(d) Screening value for total chromium used for chromium.

(e) Screening value for inorganic mercury used for mercury.

Table 2: Summary of Chemicals of Potential Ecological Concern, Terrestrial Ecological Evaluation

Analyte	Percent Detected ^(a)	Maximum Detect	Units	Location of Max Detect	EISC ^(b)	Notes	RI/FS Cleanup Levels ^(c)	Reason for Selection/Exclusion
Gasoline Range Organics	61%	9,400	mg/kg	KJ-B19-5	5,000	w	100	RI/FS soil cleanup level is greater than EISC
Diesel Range Organics	56%	7,700	mg/kg	KJ-B36-8	6,000	w	2,000	RI/FS soil cleanup level is greater than EISC
Arsenic	100%	20	mg/kg	KJ-B10-8	7	w ^(d)	20	Cleanup level represents natural background; maximum detect does not exceed natural background

Abbreviations

COPEC = chemical of potential ecological concern

mg/Kg = milligrams per kilogram

w = screening value for the protection of wildlife

Notes:

(a) Data set includes all soil data from 1995 - 2011 for the site.

(b) Screening values from MTCA Table 749-3: Ecological Indicator Soil Concentrations (EISCs) for Protection of Terrestrial Plants and Animals (Ecology 2007).

(c) MTCA Method A soil cleanup levels presented in RI/FS Work Plan (Kennedy/Jenks 2011).

(d) Screening value for arsenic III used for arsenic.

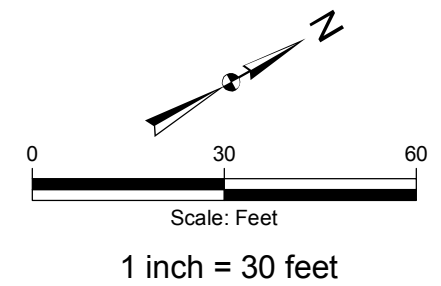
Figure



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Legend

- | | |
|----------------------------------|-------------------|
| Sample Locations | — Timber Bulkhead |
| ● Proposed Boring | ▭ Grass |
| ● Proposed Well | ▨ Concrete |
| ● Existing Monitoring Well | ▩ Gravel |
| ● Kennedy/Jenks Locations | |
| ● Previous Probe/Boring Location | |
| ● Test Pit | |



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Site Map with Sampling Locations

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Figure 1

Aerials Express 0.3 to 0.6m resolution imagery for metropolitan areas and the best available United States Department of Agriculture (USDA) National Agriculture Imagery Program (NAIP) imagery and enhanced versions of United States Geological Survey (USGS) Digital Ortho Quarter Quad (DOQQ) imagery for other areas. For more information on this map, visit us online at http://goto.arcgisonline.com/maps/World_Imagery

Appendix A

Soil Data

Table A1: Soil Data Summary from Previous Investigations - BTEX, Petroleum Hydrocarbons, and Lead

Location	Sample Depth (feet bgs)	Sample Date	Analytical Method	Units	Benzene	Toluene	Ethylbenzene	m,p-Xylene	o-Xylene	Total Xylenes	Diesel Range Organics	Gasoline Range Organics	Lube Oil Range Organics	Heavy Fuel Oil	Lead
B-1	2.5 - 3.5	11/1995	1,2	mg/kg	0.547 J		< 0.273	< 1.09	< 0.273		50	13			
B-1	6.2 - 7.2	11/1995	1,2	mg/kg	2.63	0.177 J	2.04	7.78	1.31		670	380			
B-2	2.5 - 3.8	11/1995	1,2	mg/kg	10.3	18.1 J	18.8	21.7 J	7.55 J		53	1,300			
B-2	5.0 - 6.2	11/1995	1,2	mg/kg	0.352 J	0.617	0.506	2.14	0.762		63	110			
B-3	2.5 - 3.7	11/1995	1,2	mg/kg	6.29	9.71					4,030	4,900			
B-3	4.2 - 5.4	11/1995	1,2	mg/kg	0.759 J	0.386 J	0.732	2.28	0.261 J		63	47			
B-4	12 - 13.2	11/1995	1,2	mg/kg	< 0.529	< 0.264	< 0.264	0.266 J	0.0023 J		59	11			
B-4	2.5 - 3.7	11/1995	1,2	mg/kg	0.347 J	< 0.204	< 0.204	0.215 J	0.0045 J		51	12			
B-5	6.0 - 7.2	11/1995	1,2	mg/kg	3.25	0.532	11.9 J	42.7	6.19 J		2,300	990			
B-6	2.5 - 3.7	11/1995	1,2	mg/kg	< 0.464	< 0.232	< 0.232	0.319 J	0.019 J		57	11			
B-6	7.2 - 8.4	11/1995	1,2	mg/kg	2.1	< 0.588	0.083 J	< 0.615 J	< 0.588		48	13			
B-8	3.0 - 4.2	11/1995	1,2	mg/kg	4.44	44	23.1	86.6	32.1		7,400	2,200			
B-8	5.5 - 6.7	11/1995	1,2	mg/kg	35.5	5.28	44.9	107	33.1		2,700	2,600			
B-9	2.5 - 3.7	11/1995	1,2	mg/kg	0.656 J	0.87 J	2.45	10.5	2.26		180 A	260			
B-9	4.5 - 5.7	11/1995	1,2	mg/kg	0.668 J	< 1.09	4.93	14.4	1.06 J		1,470	620			
B-10	2.7 - 3.9	11/1995	1,2,3	mg/kg	< 2.42	< 1.21	< 1.21	< 4.84	< 1.21		58	11			6.1
B-10	5.5 - 6.7	11/1995	1,2,3	mg/kg	< 2.68	< 1.34	< 1.34	< 1.34	< 1.34		64	13			4.5
B-11	15	10/1996	1,3,4	mg/kg	< 0.075	< 0.075	< 0.075	< 0.15	< 0.075		< 70	< 9			4.6
B-11	30	10/1996	1,3,4	mg/kg	< 0.13	< 0.13	< 0.13	< 0.27	< 0.13		< 100 J	< 16			2.2
B-12	10	10/1996	1,3,4	mg/kg	0.34	< 0.11	0.066 J	0.049 J	< 0.11		< 89	< 13			2.6
B-12	15	10/1996	1,3,4	mg/kg	0.59	< 0.12	< 0.12	< 0.24	< 0.12		< 110	< 14			4.3
B-12	5	10/1996	1,3,4	mg/kg	0.79	0.16	2.3	1.7	0.18		870	440			3.4
B-13	10	10/1996	1,3,4	mg/kg	0.096 J	0.042 J	0.44	1.4	0.03 J		110	100			3.9
B-13	15	10/1996	1,3,4	mg/kg	0.098 J	0.029 J	0.3	0.92			160	92			6.6
B-13	20	10/1996	1,3,4	mg/kg	< 0.091	< 0.091	< 0.091	< 0.18	< 0.091		< 99	< 11			< 2
DP-1	3	6/25/2003	5,6,7	mg/kg	0.0901	< 0.05	0.124			0.239	108	13.8		32.3	
DP-1	5	6/25/2003	5,6,7	mg/kg	4.29	0.949	39.3			22.2	7,050	2,730		< 1,000	
DP-2	5	6/25/2003	5,6,7	mg/kg	0.260	0.0612	0.175			0.795	13.4	7.67		< 25.0	
DP-3	3	6/25/2003	5,6,7	mg/kg	< 0.300	< 0.500	9.25			3.36	1,850	769		< 250	
DP-4	3	6/25/2003	5,6,7	mg/kg	0.0668	< 0.100	1.46			1.30	98.9	173		25.0	
DP-5	3	6/25/2003	5,6,7	mg/kg	10.7	202	47.6			219	158	5,150		54.9	
DP-5	5	6/25/2003	5,6,7	mg/kg	1.26	2.21	0.728			4.02	16.8	44.7		27.6	
DP-6	5	6/25/2003	5,6,7	mg/kg	0.594	0.0960	0.146			0.584	16.6	< 5.0		38.9	
DP-7	5	6/25/2003	5,6,7	mg/kg	0.164	< 0.0500	0.100			< 0.100	< 10.0	< 5.0		< 25.0	
DP-8	5	6/25/2003	5,6,7	mg/kg	0.643	0.0991	0.700			3.32	23.6	41.3		37.4	
DP-9	5	6/25/2003	5,6,7	mg/kg	5.88	1.40	25.8			54.8	5,170	1,910		< 1,000	
DP-10	5	6/25/2003	5,6,7	mg/kg	4.89	< 2.50	10.4			40.1	73.4	5,310		< 25.0	
GP1	5	6/29/2005	6,8,9	mg/kg	< 0.0217	< 0.0361	< 0.0361			< 0.0723	< 10	< 3.61	< 25		
GP2	5	6/29/2005	6,8,9	mg/kg	< 0.0204	< 0.034	< 0.034			< 0.068	< 10	< 3.4	< 25		
GP3	5	6/29/2005	6,8,9	mg/kg	< 0.0193	< 0.0322	< 0.0322			< 0.0644	< 10	< 3.22	31.2		
GP5	8	6/29/2005	6,8,9	mg/kg	< 0.0219	< 0.0364	< 0.0364			< 0.0729	< 10	< 3.64	< 25		
GP6	7	6/29/2005	6,8,9	mg/kg	2.39	0.933	12.9			49.9	108	1,240	32.7		
GP6 ^(a)	7	6/29/2005	6,8,9	mg/kg	3.09	1.23	17.6			66.9	57.1	1,960	26.6		
GP7	8	6/29/2005	6,8,9	mg/kg	0.03	< 0.0382	< 0.0382			0.102	< 10	4.05	< 25		

Table A1: Soil Data Summary from Previous Investigations - BTEX, Petroleum Hydrocarbons, and Lead

Location	Sample Depth (feet bgs)	Sample Date	Analytical Method	Units	Benzene	Toluene	Ethylbenzene	m,p-Xylene	o-Xylene	Total Xylenes	Diesel Range Organics	Gasoline Range Organics	Lube Oil Range Organics	Heavy Fuel Oil	Lead
TP1	2	6/1/2006	6,9	mg/kg							12	4.03	< 27		
TP1	4	6/1/2006	6,9	mg/kg							719	2,470	< 76.8		
TP2	2	6/1/2006	6,9	mg/kg							< 11.7	21.5	< 29.3		
TP2	4	6/1/2006	6,9	mg/kg							174	1,900	< 32.2		
TP2	6	6/1/2006	6,9	mg/kg							208	218	< 30.7		
TP3	1.5	6/1/2006	6,9	mg/kg							277	396	28.6		
TP3	4	6/1/2006	6,9	mg/kg							25.5	37.2	42.6		
TP3	6	6/1/2006	6,9	mg/kg							15.2	61.5	< 27.7		
TP4	2	6/1/2006	6,9	mg/kg							< 12.3	< 4.5	< 30.7		
TP4	4	6/1/2006	6,9	mg/kg							< 12.2	9.52	< 30.6		
TP5	4	6/1/2006	6,9	mg/kg							569	43.9	< 63.6		
TP5 ^a	4	6/1/2006	6,9	mg/kg							85.6	33.3	< 32.1		
MTCA Method A Soil Cleanup Level					0.03	7	6	9	9	9	2,000	100	2,000	2,000	250

Notes:

(a) A duplicate sample was collected at location GP6 and TP5 and submitted to the laboratory for analysis.

Table lists detected analytes only.

Bold indicates exceedance of MTCA cleanup level.

< = Indicates analyte not detected above laboratory reporting limits.

feet bgs = feet below ground surface

MTCA = Model Toxics Control Act

mg/kg = milligrams per kilogram

"J" denotes an estimated value.

"A" denotes the value is an estimate, as a small fraction may represent gasoline.

Analytical Method Codes:

- 1 Soil samples were analyzed for BTEX compounds by EPA Method 8020.
- 2 Soil samples were analyzed for gasoline range and diesel range organics by EPA Method 8020.
- 3 Soil samples were analyzed for lead by EPA Method 200.7.
- 4 Soil samples were analyzed for gasoline range and diesel range organics by Washington method WTPH.
- 5 Soil samples were analyzed for BTEX compounds by EPA Method 8021B.
- 6 Soil samples were analyzed for gasoline and diesel range organics by methods NWTPH-Gx and NWTPH-Dx.
- 7 Soil samples were analyzed for heavy fuel oil range hydrocarbons by method NWTPH-Dx.
- 8 Soil samples were analyzed for BTEX compounds by method NWTPH-Gx.
- 9 Soil samples were analyzed for lube oil range hydrocarbons by method NWTPH-Dx.

Table A2: Current Investigation Soil Data Summary -- BTEX and Petroleum Hydrocarbons

Location	Sample Depth (feet bgs)	Sample Date	Analytical Method	Units	Benzene	Toluene	Ethylbenzene	m, p-Xylene	o-Xylene	Diesel Range Organics	Gasoline Range Organics	Lube Oil Range Hydrocarbons
B1	4	9/12/2011	1,2	mg/kg	< 0.029	< 0.029	< 0.029	< 0.058	0.043	< 6.6	< 12	16
B2	12	9/12/2011	1,2	mg/kg	0.60	< 0.017	0.025	< 0.034	0.046	< 6.1	< 6.9	< 12
B3	9	9/12/2011	1,2	mg/kg	1.3	< 0.018	0.079	0.081	< 0.018	< 6.1	< 7	< 12
B4	6	9/12/2011	1,2	mg/kg	< 0.015	< 0.015	< 0.015	< 0.029	0.018	< 5.8	< 5.9	< 12
B5	5	9/12/2011	1,2	mg/kg	< 0.015	< 0.015	< 0.015	< 0.03	0.16	9.6	< 6	53
B6	7	9/12/2011	1,2	mg/kg	< 0.015	< 0.015	< 0.015	< 0.03	< 0.015	< 5.8	< 5.9	< 12
B7	13	9/12/2011	1,2	mg/kg	0.48	< 0.016	0.025	< 0.031	0.23	< 6.2	10	< 12
B7	8	9/12/2011	1,2	mg/kg	0.29	< 0.018	0.15	0.088	0.10	< 6.1	8.3	< 12
B8	14	9/12/2011	1,2	mg/kg	< 0.016	0.019	< 0.016	< 0.031	0.033	< 5.9	< 6.2	< 12
B9	13	9/12/2011	1,2	mg/kg	< 0.014	< 0.014	< 0.014	< 0.029	0.055	< 5.9	< 5.8	< 12
B10	8	9/12/2011	1,2	mg/kg	1.7	< 0.014	0.46	0.43	0.073	< 5.9	15	< 12
B11	5	9/13/2011	1,2	mg/kg	< 0.021	1.6	0.14	0.61	0.47	41	1,200	< 11
B12	6	9/13/2011	1,2	mg/kg	0.025	0.024	< 0.014	< 0.028	0.75	< 5.8	< 5.6	< 12
B13	4	9/13/2011	1,2	mg/kg	< 0.021	< 0.021	< 0.021	< 0.042	0.059	< 6.5	< 8.4	< 13
B14	3	9/13/2011	1,2	mg/kg	< 0.014	0.022	0.022	0.031	< 0.014	13	11	< 10
B15	4	9/13/2011	1,2	mg/kg	< 0.015	< 0.015	< 0.015	< 0.03	0.043	< 5.8	< 6.1	< 12
B16	4	9/13/2011	1,2	mg/kg	< 0.015	0.044	< 0.015	< 0.031	< 0.015	11	< 6.1	72
B17	4	9/13/2011	1,2	mg/kg	< 0.014	< 0.014	< 0.014	< 0.028	< 0.014	< 5.7	< 5.7	< 11
B18	4	9/13/2011	1,2	mg/kg	0.050	< 0.014	< 0.014	< 0.028	0.033	< 5.5	< 5.6	< 11
(B100) ^(a)	4	9/13/2011	1,2	mg/kg	< 0.013	< 0.013	< 0.013	< 0.027	0.029	< 5.3	15	< 11
B19	5	9/13/2011	1,2	mg/kg	54	420	96	380	140	69	9,400	< 12
B19	7	9/13/2011	1,2	mg/kg	2.8	4.3	1.9	5.4	1.6	27	310	< 11
B20	7	9/13/2011	1,2	mg/kg	0.58	6.6	9.2	33	12	20	760	< 12
B20	10	9/13/2011	1,2	mg/kg	0.56	0.027	0.10	0.064	< 0.018	< 6.1	< 7	< 12
B21	3	9/13/2011	1,2	mg/kg	15	14	3.0	12	4.4	64	230	< 12
B22	5	9/13/2011	1,2	mg/kg	4.9	89	50	200	72	520	4,600	< 60
B22	9	9/13/2011	1,2	mg/kg	0.023	< 0.014	< 0.014	< 0.029	< 0.014	< 5.6	< 5.8	< 11
B23	8	9/14/2011	1,2	mg/kg	0.19	0.026	0.72	0.97	0.04	< 6.1	13	< 12
B24	7	9/14/2011	1,2	mg/kg	< 0.016	< 0.016	< 0.016	< 0.033	0.034	< 6.1	< 6.5	< 12
B25	4	9/14/2011	1,2	mg/kg	< 0.018	< 0.018	< 0.018	< 0.036	< 0.018	< 6.3	< 7.1	< 13
B26	8	9/14/2011	1,2	mg/kg	< 0.014	< 0.014	< 0.014	< 0.029	0.078	< 6.0	< 5.8	< 12
B27	12	9/14/2011	1,2	mg/kg	0.13	< 0.017	< 0.017	< 0.034	0.061	< 6.0	< 6.9	< 12
B28	7	9/14/2011	1,2	mg/kg	22	0.061	1.8	0.32	< 0.018	810	180	< 61
B28	12	9/14/2011	1,2	mg/kg	0.45	< 0.014	< 0.014	< 0.029	< 0.014	< 5.8	< 5.8	< 12
B28	16	9/14/2011	1,2	mg/kg	1.5	< 0.017	< 0.017	< 0.034	< 0.017	< 5.9	< 6.8	< 12
B29	18	9/14/2011	1,2	mg/kg	0.67	< 0.017	0.030	< 0.034	< 0.017	< 5.8	< 6.9	< 12
B29	7	9/14/2011	1,2	mg/kg	1.4	0.014	0.046	0.047	0.018	< 6.0	7.5	< 12
B30	8	9/14/2011	1,2	mg/kg	1.2	0.23	4.4	1.4	0.19	1,200	500	< 110
B30	17	9/14/2011	1,2	mg/kg	< 0.015	< 0.015	< 0.015	< 0.029	< 0.015	< 5.6	< 5.9	< 11

Table A2: Current Investigation Soil Data Summary -- BTEX and Petroleum Hydrocarbons

Location	Sample Depth (feet bgs)	Sample Date	Analytical Method	Units	Benzene	Toluene	Ethylbenzene	m, p-Xylene	o-Xylene	Diesel Range Organics	Gasoline Range Organics	Lube Oil Range Hydrocarbons
B31	4	9/14/2011	1,2	mg/kg	< 0.014	< 0.014	< 0.014	< 0.029	< 0.014	< 5.4	< 5.8	< 11
B32	4	9/14/2011	1,2	mg/kg	0.018	0.093	0.60	0.12	0.057	98	250	< 10
B33	4	9/15/2011	1,2	mg/kg	0.073	< 0.014	< 0.014	< 0.029	< 0.014	37	< 5.7	< 11
B34	5	9/15/2011	1,2	mg/kg	1.1	< 0.18	15	1.5	< 0.18	710	2,400	< 63
(B101) ^(b)	5	9/15/2011	1,2	mg/kg	< 0.18	< 0.18	8.2	< 0.36	< 0.18	760	1,400	< 57
B35	4	9/15/2011	1,2	mg/kg	3.0	< 0.14	13	2.4	< 0.14	970	1,000	< 120
B35	8	9/15/2011	1,2	mg/kg	< 0.018	< 0.018	< 0.018	< 0.036	< 0.018	< 6.2	< 7.3	< 12
B36	8	9/15/2011	1,2	mg/kg	150	7.2	72	33	2.5	7,700	4,000	< 600
B37	9	9/16/2011	1,2	mg/kg	< 0.019	< 0.019	< 0.019	< 0.039	< 0.019	< 7.0	< 7.7	< 14
B38	13	9/16/2011	1,2	mg/kg	1.5	< 0.015	< 0.015	< 0.031	< 0.015	< 6.1	< 6.1	< 12
B39	8	9/16/2011	1,2	mg/kg	2.9	0.024	0.070	0.23	< 0.015	6.0	7.8	< 12
B40	4	9/16/2011	1,2	mg/kg	< 0.014	< 0.014	< 0.014	< 0.029	< 0.014	< 5.6	< 5.7	< 11
B41	6	9/16/2011	1,2	mg/kg	0.70	0.29	2.1	5.0	0.39	45	1,000	64
B42	8	9/16/2011	1,2	mg/kg	0.36	< 0.018	0.55	0.098	< 0.018	< 5.8	12	< 12
B43	4	9/16/2011	1,2	mg/kg	< 0.070	< 0.070	0.36	< 0.14	0.49	27	940	< 12
B44	4	9/16/2011	1,2	mg/kg	0.12	0.098	< 0.015	0.24	0.18	20	320	< 11
MW4	13	9/15/2011	1,2	mg/kg	< 0.014	< 0.014	< 0.014	< 0.029	< 0.014	9.4	< 5.8	< 12
MW5	12	9/15/2011	1,2	mg/kg	< 0.017	< 0.017	< 0.017	< 0.034	< 0.017	< 6.2	11	< 12
MW6	4	9/15/2011	1,2	mg/kg	< 0.12	< 0.12	2.1	< 0.25	< 0.12	1,800	1,300	< 210
MW6	14	9/15/2011	1,2	mg/kg	< 0.015	< 0.015	< 0.015	< 0.03	< 0.015	< 6.0	< 6.0	< 12
MW7	5	9/15/2011	1,2	mg/kg	< 0.018	< 0.018	< 0.018	< 0.037	< 0.018	< 6.7	< 7.4	< 13
MTCA Method A Soil Cleanup Level					0.03	7	6	9	9	2,000	100	2,000

Notes:

(a) A duplicate sample was collected at location B18 and submitted to the laboratory for analysis as "B100".

(b) A duplicate sample was collected at location B34 and submitted to the laboratory for analysis as "B101".

Table lists detected analytes only.

Bold indicates exceedance of MTCA cleanup level.

< = Indicates analyte not detected above method laboratory limits.

feet bgs = feet below ground surface

MTCA = Model Toxics Control Act

mg/kg = milligrams per kilogram

Analytical Method Codes:

1 Soil samples were analyzed for BTEX by EPA Method 8021B.

2 Soil samples were analyzed for gasoline range and diesel range organics by methods NWTPH-Gx and NWTPH-Dx.

Table A3: Current Investigation Soil Data Summary -- Metals and PAHs

Analyte	Analytical Method	Units	Location Sample Depth (feet bgs) Sample Date	B2	B10	B20	B27	B30	B35	B38	MW6	MTCA Method A Soil Cleanup Level
				12	8	7	12	8	4	7	14	
				9/12/2011	9/12/2011	9/13/2011	9/14/2011	9/14/2011	9/15/2011	9/16/2011	9/15/2011	
Metals												
Arsenic	1	mg/kg		6.0	20	6.0	9.0	9.0	11	7.0	8.0	20
Barium	1	mg/kg		26	74	27	46	65	63	37	43	16,000 ^(a)
Cadmium	1	mg/kg		< 0.20	< 0.60	< 0.20	0.20	< 0.20	< 0.20	< 0.30	< 0.20	2
Chromium	1	mg/kg		16	39	25	44	45	47	23	34	19
Lead	1	mg/kg		< 2.0	< 6.0	< 2.0	4.0	4.0	5.0	< 3.0	3.0	250
Selenium	1	mg/kg		< 6.0	< 10	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	400 ^a
Silver	1	mg/kg		< 0.30	< 0.80	< 0.30	< 0.40	< 0.40	< 0.30	< 0.40	< 0.30	400 ^a
Mercury	2	mg/kg		< 0.03	0.03	< 0.02	0.03	< 0.03	0.02	0.03	< 0.02	2
Polycyclic Aromatic Hydrocarbons												
1,2-Dibromoethane (EDB)	6	µg/kg		< 1	< 1	< 300	< 1	< 130	< 62	< 82	< 54	5
1,2-Dichloroethane	6	µg/kg		< 1	< 1	< 300	< 1	< 130	< 62	< 82	< 54	59.4
Methyl tertiary-butyl ether (MTBE)	6	µg/kg		< 1	< 1	< 300	< 1	< 130	< 62	< 82	< 54	100
1-Methylnaphthalene	3	µg/kg		64	72	1,800	12	6,200	13,000	8,300	64	NA
2-Methylnaphthalene	3	µg/kg		77	61	3,500	15	9,300	21,000	13,000	120	NA
Acenaphthene	3	µg/kg		110	61	28	56	2,100	2,600	2,600	12	4,800,000 ^(a)
Acenaphthylene	3	µg/kg		< 4.6	< 4.6	8.4	< 4.8	< 4.4	< 4.6	< 4.9	< 4.4	NA
Anthracene	3	µg/kg		18	< 4.6	5.9	64	260	280	410	16	24,000,000 ^(a)
Benzo(a)anthracene	3	µg/kg		< 4.6	< 4.6	< 4.6	51	12	7.2	17	< 4.4	1,370 ^(a)
Benzo(a)pyrene	3	µg/kg		< 4.6	< 4.6	< 4.6	21	4.6	< 4.6	6.7	< 4.4	100
Benzo(g,h,i)perylene	3	µg/kg		< 4.6	< 4.6	< 4.6	11	< 4.4	< 4.6	< 4.9	< 4.4	NA
Chrysene	3	µg/kg		< 4.6	< 4.6	< 4.6	63	17	20	27	< 4.4	137,000 ^(a)
Dibenzo(a,h)anthracene	3	µg/kg		< 4.6	< 4.6	< 4.6	< 4.8	< 4.4	< 4.6	< 4.9	< 4.4	137 ^a
Dibenzofuran	3	µg/kg		50	28	6.4	15	460	960	690	< 4.4	80,000 ^(a)
Fluoranthene	3	µg/kg		38	5.1	14	220	57	49	87	< 4.4	3,200,000 ^(a)
Fluorene	3	µg/kg		77	29	14	32	840	1,600	1,400	6	3,200,000 ^(a)
Indeno(1,2,3-cd)pyrene	3	µg/kg		< 4.6	< 4.6	< 4.6	8.1	< 4.4	< 4.6	< 4.9	< 4.4	1,370 ^(a)
Naphthalene	3	µg/kg		390	190	2,300	13	2,700	9,000	4,000	49	5,000
Phenanthrene	3	µg/kg		130	37	26	42	1,900	3,200	2,800	14	NA
Pyrene	3	µg/kg		24	5.4	14	160	84	200	160	< 4.4	2,400,000 ^(a)
Total Benzofluoranthenes	3	µg/kg		< 4.6	< 4.6	< 4.6	48	10	5.6	14	< 4.4	15.07 ^(a,b)
PAHs (carcinogenic)	--	µg/kg		ND	ND	ND	193.5 (calc'd)	47.8 (calc'd)	39.7 (calc'd)	69.6 (calc'd)	ND	100 ^(c)

Notes:
(a) MTCA Method B cleanup level for soil (Ecology 2007).
(b) Cleanup level based on benzo(a)pyrene surrogate value.
(c) Cleanup level based on benzo(a)pyrene surrogate value. Carcinogenic PAHs results summed for the purposes of comparison to cleanup level. Nondetects included in sum as one half the detection limit.

Table lists detected analytes only. MTCA = Model Toxics Control Act
Bold indicates exceedance of MTCA cleanup level. NA = Not available
< = Indicates analyte not detected above laboratory reporting limits. ND = Not detected
feet bgs = feet below ground surface µg/kg = micrograms per kilogram
mg/kg = milligrams per kilogram PAHs = polycyclic aromatic hydrocarbons

Analytical Method Codes:
1 Soil samples were analyzed for RCRA metals by EPA Method 6010B.
2 Soil samples were analyzed for mercury by EPA Method 7471A.
3 Soil samples were analyzed for PAHs by EPA Method 8270D with Selective Ion Monitoring (SIM).