

**Wisconsin Department of
Natural Resources**
810 Maple Street
Spooner, Wisconsin 54801

**Request or No Further Action
Determination**

Wisconsin Central Ltd. Property

**Solid Waste Disposal
Kreher Park Area
Ashland, Wisconsin**

25968XF

July 2000





July 17, 2000

Mr. Jamie Dunn
Wisconsin Department of Natural Resources
810 Maple Street
Spooner, Wisconsin 54801

Subject: Request for No Further Action Determination, Solid Waste Disposal, Wisconsin Central Ltd. Property, Kreher Park Area, Ashland, Wisconsin -- STS Project No. 25968XF

Dear Mr. Dunn:

Wisconsin Central Ltd. (WC) is requesting a No Further Action (NFA) determination under Wisconsin Administrative Code Chapter NR 708 in response to the Wisconsin Department of Natural Resources (WDNR) Responsible Party Notification dated December 10, 1997. In its notification, the WDNR indicated that WC was responsible for investigating the extent of any hazardous substance contamination that has originated from solid waste disposed of on WC property and then selecting and implementing the most appropriate remedial action. No further action is justified because 1) the extent and degree of contamination present have been defined by the work of others conducted on the site, 2) fill material, if present on WC property, appears to consist of materials such as demolition debris that should not contribute to groundwater degradation, and 3) there is no apparent risk of direct contact exposure associated with the materials present.

Background

The Ashland Lakefront Property (the Property) includes the area defined by Kreher Park and is bounded by Prentice Avenue and a jetty extension of Prentice Avenue to the east, the WC right-of-way (ROW) to the south, Ellis Avenue and the marina extension of Ellis Avenue to the west, and Chequamegon Bay to the north (Figure 1). The area immediately south of the Property consists of the WC ROW and a 30-foot-high bluff. Figure 2 shows the ROW relative to the city property to the north. A manufactured gas plant (MGP) operated at the top of the bluff from the 1880s to approximately 1947. During the time the MGP operated, a former ravine, extending from the MGP site through the bluff to the southern edge of the ROW, was filled.

The Property is created land formerly part of Chequamegon Bay. Based on data collected in previous site investigation activities, it consists largely of wood slabs, pieces, and sawdust mixed with earthen fill. Demolition debris including bricks, concrete, steel wire, and glass have also been encountered. Various lumber companies owned the Property until 1939, when Ashland County (County) took title. The County transferred title to the City of Ashland (City) in 1942. The City's wastewater treatment plant was located along the north shore of the Property. The plant is no longer in operation, and the Property consists predominantly of open-grassed areas.

The railroad ROW was owned by the Wisconsin Central Railroad (WCRR) in the late 1800s and early 1900s. The WCRR was purchased by the Soo Line Railroad in the mid-1900s, and title to

the ROW south of the Property passed to the Soo Line. Soo Line operating properties and ROWs with existing trackage in Wisconsin were purchased by the WC in October 1987.

Site investigation activities have been conducted at the Property and ROW by Northern Environmental Technologies, Inc. (Northern), for the City; by Short Elliot Hendrickson, Inc. (SEH), on behalf of the WDNR; and by Dames & Moore on behalf of Northern States Power (NSP). Previous reports document that widespread volatile organic compound (VOC) and semi-volatile organic compound (SVOC) contamination have been identified at the Property, on the ROW, in the upgradient ravine area, and in offshore sediments. Contamination is present in the shallow groundwater, soils, sediments, and deep groundwater. Previous reports prepared by SEH and Dames & Moore indicate that VOC and SVOC contamination are likely present from an upgradient source. Based on data previously collected, the WDNR did not include this issue in the Responsible Party Notification to WC.

Previous reports also indicate that lead and iron contamination exist in soil and/or groundwater at the site. The reports indicated that lead contamination appears to be highest in shallow fill soils along the northern portion of the site and that elevated iron concentrations were found in groundwater samples from various wells on the Property. The remainder of this request addresses the fill material and contaminants possibly associated with the fill that are documented to be present on the Property and under the ROW.

Fill Materials

WDNR records indicate that prior to 1880, Chequamegon Bay extended south near the location of the current WC railroad corridor. Significant industrial activity began about that time. The City-owned parcel, now known as Kreher Park, was created in the late 1800s and early 1900s by the placement of various fill materials into Chequamegon Bay. In the eastern portion of the former bay, the fill material consisted of mainly sawdust and wood waste from a series of sawmills that operated on the site from the early 1880s until about 1932. The uncontrolled filling of the rest of this area occurred during and after the operation of the sawmills, with the western portion of the former bay filled in with primarily demolition waste materials.

A review of Sanborn Fire Insurance (Sanborn) maps included in the WDNR files indicated that the current WC railroad track, for the most part, is constructed on the historic shoreline of Chequamegon Bay. The 1890 map shows the WCRR as already being present along the shoreline. Subsequent maps, including 1895 and 1901, show the addition of "Grounds Made of Sawdust & Slabwood" to the north of the WCRR. Based on a comparison of current maps to the Sanborn maps, it appears that the current WC track is in the same location as the original WCRR line. This indicates that a minimal amount of fill should be present below the current WC track.

The February 1995 *Existing Conditions Report* prepared by SEH indicated that site stratigraphy consisted of fill material underlain by a thin silty sand layer, underlain by lean clay. The report indicated that fill materials generally consisted of a 1- to 5-foot-thick soil layer overlying wood

waste. Some demolition debris and/or solid waste was reportedly observed in the soil fill layer. A review of test pit and boring logs indicated that the fill material consists of soil, wood slabs, sawdust, bricks, concrete, steel wire, glass, and cinders.

Contaminants Present and Apparent Risk

The February 1995 report and subsequent reports by SEH and Dames & Moore indicate the presence of VOCs, SVOCs, cadmium, selenium, lead, arsenic, chromium, and iron in soil and groundwater on the Property and are assumed to be present under the ROW. The enclosed tables from SEH's 1998 *Supplemental Investigation Report* summarize the soil and groundwater data. Work conducted by Northern in 1989 included the monitoring of the groundwater indicator parameters biological oxygen demand, chloride, and sulfate. Indicator parameters are used at solid waste landfills to determine if the decomposition of solid waste is impacting groundwater. Typically, if decomposition is occurring, one or more of the indicator parameters will be elevated. All results were within normal ranges (Table 3) in the wells monitored at the Property, indicating that decomposition of solid waste is not occurring and consequently that solid wastes likely to decompose are not present.

Previous reports have documented that the primary source of VOC and SVOC contamination is likely the former upgradient MGP site. Therefore, the WDNR did not include the potential MGP contaminant issues in the Responsible Party Notification letter. Some of the metal contamination may also be attributable to this source. However, the lead, cadmium, selenium, arsenic, chromium, and iron may be present within the fill material present on the Property. Of these metals, only lead has been consistently detected at concentrations greater than a state standard in soil, and only iron has been consistently detected at concentrations greater than a state standard in groundwater. Therefore, the following discussion only addresses the metals of concern--lead and iron.

The February 1995 SEH report indicated that lead concentrations were the highest in a wide band on the northern portion of the site. This would place the highest lead concentrations well north of the ROW. Borings and test pits in close proximity to the ROW, including TP-3, TP-6, TW-3, TW-6, TW-7, and TW-9 (Figure 3), yielded lead concentrations of 177 milligrams per kilogram (mg/kg), 54.9 mg/kg, no detect, 42.7 mg/kg, no detect, and no detect, respectively (Table 1). Results indicate that lead is present in isolated areas in the vicinity of the ROW. All but two of the reported concentrations are below the Wisconsin Administrative Code Chapter NR 720 non-industrial residual contaminant level (RCL) for lead of 50 mg/kg. Samples exceeding the non-industrial RCL were collected from TP-3 and TP-6. Additional sampling conducted by SEH in 1997 confirmed elevated lead concentrations (Table 2) in the vicinity of a seep that has been fenced to limit access. The samples that did exceed the non-industrial RCL were collected from depths greater than 2 feet below the ground surface in TP-3 and TP-6, indicating that there is not a direct contact risk unless soils are excavated. In addition, the TP-6 and 1997 sampling locations appear to be located within the fence surrounding the seep. Therefore the potential for direct contact is further reduced.

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There are no state standards for iron in soil. Groundwater standards do exist for iron and the NR 140 enforcement standard of 300 milligrams per liter has been exceeded. However, the extent of contamination has been defined, and no groundwater extraction wells exist on site. Therefore, there is no apparent risk to human health.

Conclusions

Based on a review of the existing data, the requirements of the WDNR's December 10, 1997, letter have been met. Investigation activities have determined that iron and lead are the chemicals of concern associated with fill material on the Property and ROW. The activities have also defined the extent and degree of lead and iron contamination. Given the documented concentrations, the distribution of contaminants, and the lack of apparent risk to human health, no further action by WC is an appropriate remedial action. Therefore, WC is requesting that the WDNR issue a NFA determination in accordance with Wisconsin Administrative Code Chapter NR 708.09. A fee of \$250 is enclosed for review of this NFA determination request.

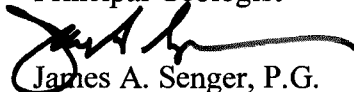
Thank you for your assistance in bringing this issue to resolution. If you have any questions or would like additional information, please contact Mr. Mark Bergeon at 800-949-1978.

Sincerely,

STS CONSULTANTS, LTD.


Mark A. Bergeon, P.G.

Principal Geologist


James A. Senger, P.G.

Chief Technical Officer

MAB/jls.wd

Enclosures:

Figure 1 - Site Location Map

Figure 2 - Plat Map

Figure 3 - Total Lead Concentrations in Soils

Table 1 - Soil Analytical Results

Table 2 - Soil Analytical Results (Continued)

Table 3 - Groundwater Analytical Results (4 pages)

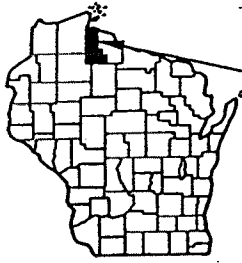
\$250 Check

Copy: Geoffrey C. Nokes

Wisconsin Central Ltd.

P.O. Box 5062

Rosemont, Illinois 60017-5062



INDEX MAP

APPROXIMATE MEAN LAKE E R 4 W 102

ASHLAND COUNTY

BAYFIELD CO
ASHLAND CO

SITE

Wastewater
Disposal

Memorial Park

Powerplant

Maslowski Park

PRENTICE PARK

NORTH WESTERN

NORTHERN

Golf Course

Courthouse

Highway

Highway

Highway

Highway

Highway

Highway

Highway

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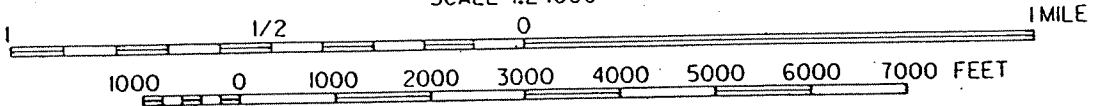
Highway

Highway

Highway

SOURCE: USGS 7.5 MINUTE QUADRANGLE,
ASHLAND WEST, WISCONSIN, 1975

SCALE 1:24000



CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL



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SITE LOCATION MAP
CITY OF ASHLAND KREHER PARK AREA
WCL NFA REQUEST

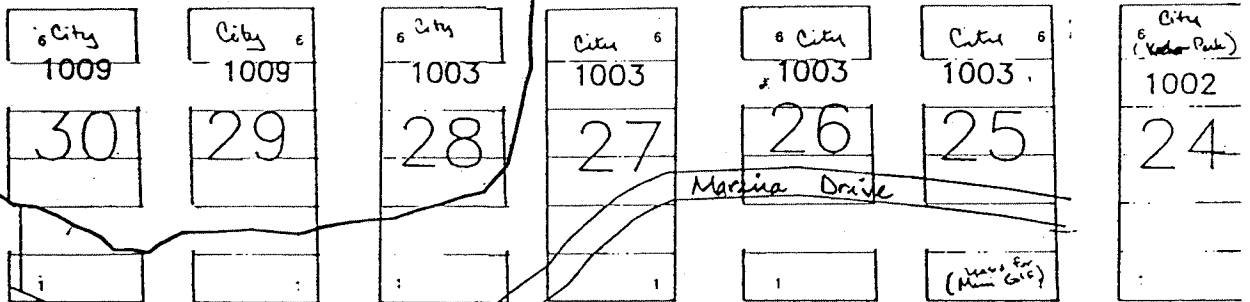
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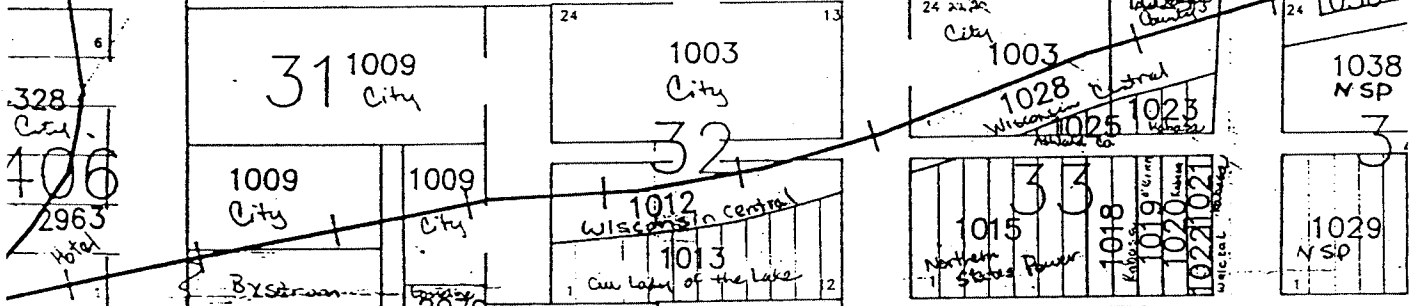
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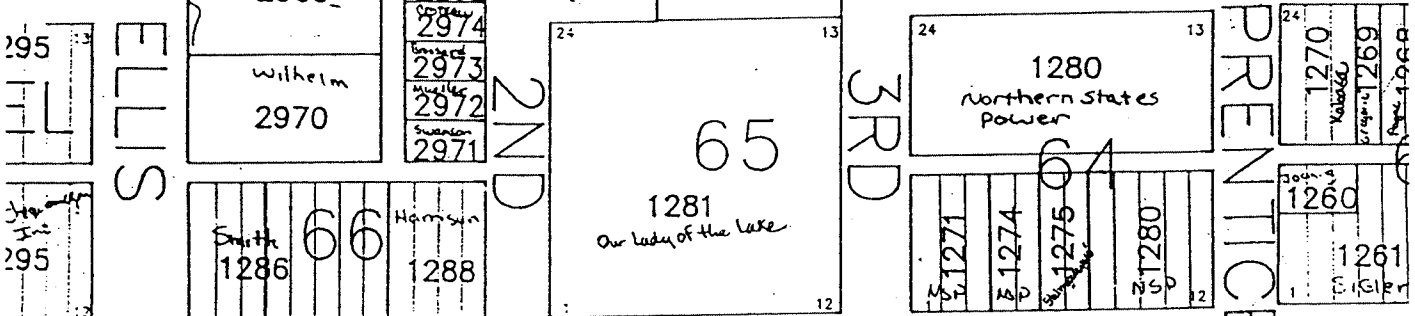
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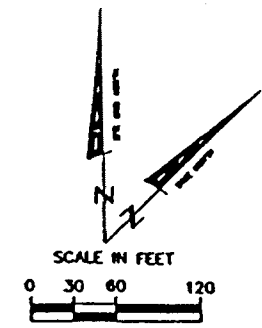
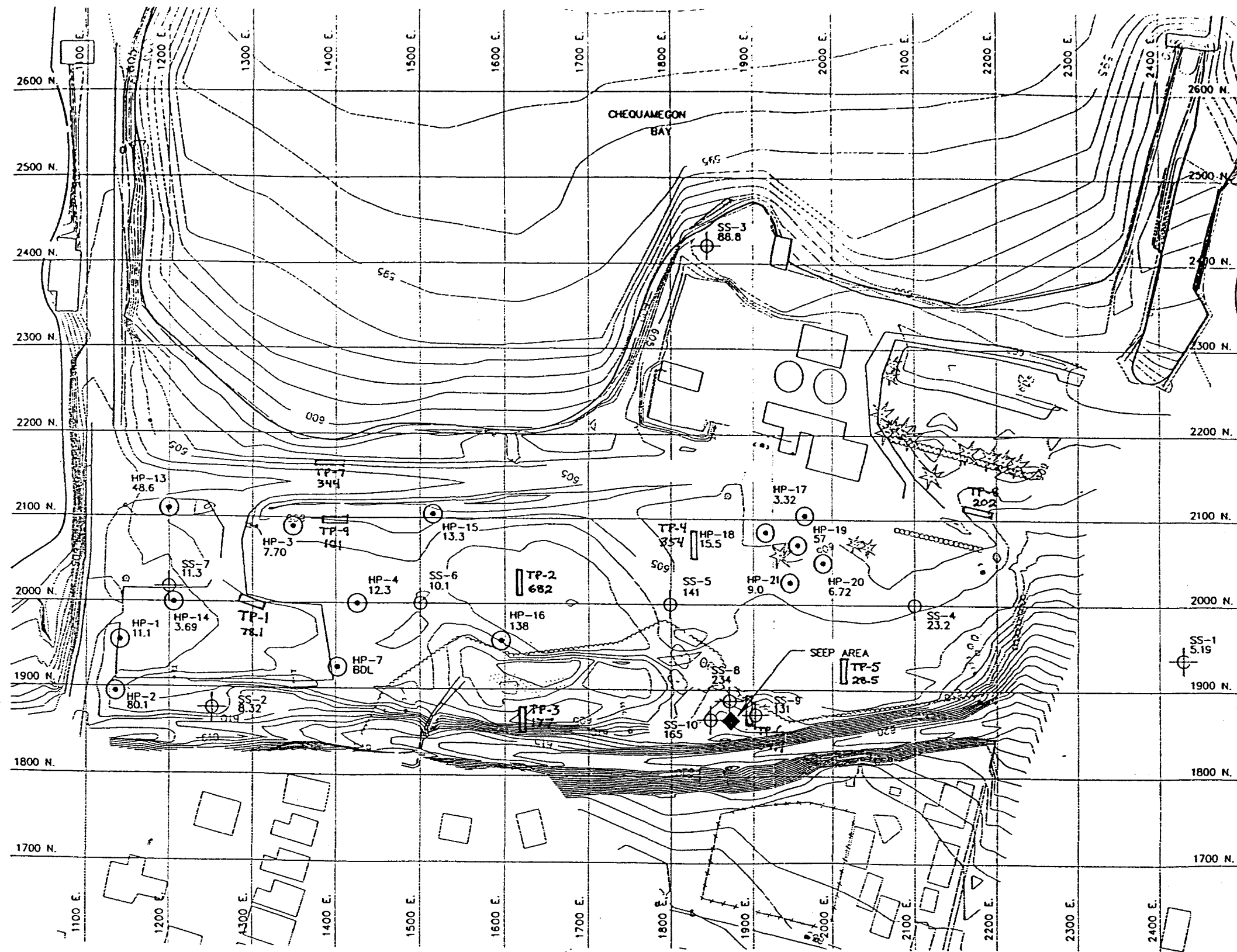


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PLAT MAP
CITY OF ASHLAND KREHER PARK AREA
WCL NFA REQUEST

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LEGEND

- 595 — TOPOGRAPHIC CONTOUR (1' INTERVAL)
- SS-6 10.1
⊕ HAND AUGER BORING LOCATION, NUMBER, AND TOTAL Pb CONCENTRATION (mg/kg)
- HP-15 13.3
⊙ HYDRAULIC PROBE LOCATION, NUMBER, AND TOTAL Pb CONCENTRATIONS (mg/kg)

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**TOTAL LEAD CONCENTRATION IN SOIL
CITY OF ASHLAND KREHER PARK AREA
WCL NFA REQUEST**



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25968XF
STS PROJECT FILE

SCALE
AS SHOWN
FIGURE NO.
3

Table 1
Soil Analytical Results

Analytical Parameters	ch. NR 720 soil cleanup standards	Site Location/Boring or Test Pit No./Depth (ft)/Date																															
		Ashland Lakefront Property																															
		88-2/88-5	88-4	TW-1		TW-2		TW-3	TW-4	TW-5			TW-6		TW-7	TW-8	TW-10		TW-11	TW-12	TP-1	TP-2		TP-3	TP-4	TP-5	TP-6	TP-7	TP-8	T-9			
		Composh*	*	4.5-4.5	12-14	8.5-11.5	14.5-16.5	7-9	7-9	8.5-11.5	12-14	14.5-16.5	7-9	8.5-11.5	14.5-16.5	12-14	4.5-4.5	4.5-4.5	12-14	4.5-4.5	12-14	4.5-4.5	6-7	2-4	6-8	2-4	4-4	6-8	6-7	2-4	6-7	2-4	
		1/17-18/89	1/24/89	9/6/94							9/7/94							9/8/94							9/7/94								
Metals (μg/g)																																	
Arsenic	0.39	--	100	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Cadmium	8	--	--	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	24.8	BDL	BDL	BDL	0.465	0.394	0.845	0.432	0.981	1.94	BDL	BDL	2.99	BDL	BDL		
Chromium (+3)	16,000	--	5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Copper	NSE	--	46.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		
Lead	50	--	--	180	BDL	BDL	BDL	BDL	43.9	22.2	BDL	BDL	42.7	14.9	6.52	BDL	1,321	129	BDL	12	204	78.1	682	358	177	354	28.5	54.9	344	202	101		
Selenium	NSE	--	--	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	15.1	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	16.5	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL		
Zinc	NSE	--	165	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
PAHs¹ (μg/g)																																	
Acenaphthene	NSE	4.4	**	BDL	0.11	14.8	BDL	1.71	BDL	349	0.041	BDL	836	35.2	1.12	BDL	4.38	4.68	1.73	46.4	0.106	6.64	0.098	0.0488	BDL	241	782	BDL	1.15	1	4.91		
Acenaphthylene	NSE	BDL	**	12.4	BDL	1.81	BDL	0.233	BDL	BDL	BDL	BDL	27.3	1.32	0.397	BDL	0.827	0.275	0.386	1.26	BDL	1.01	0.292	0.0835	6.24	1,875	27.3	BDL	3.26	BDL	4.22		
Anthracene	NSE	7.1	**	3.47	0.048	4.94	BDL	1.16	BDL	83.6	0.047	0.024	295	16.5	1.09	BDL	4.27	0.9	1.23	15.1	BDL	3.13	0.52	0.313	1.66	640	324	BDL	1.54	BDL	2.82		
Benzo(a)Anthracene	NSE	10	**	0.271	BDL	16.9	BDL	1.09	BDL	34.3	BDL	BDL	186	10	2.75	BDL	8.31	1.29	0.794	8.23	0.203	4.7	2.78	1.39	5.65	323	204	BDL	6.06	0.535	8.08		
Benzo(a)Pyrene	NSE	8.9	**	20.1	BDL	9.77	BDL	0.862	BDL	21.4	BDL	BDL	126	6.34	1.89	BDL	6.06	1.1	0.657	4.81	0.172	6.66	2.05	0.845	20.9	205	206	BDL	14.7	BDL	12.5		
Benzo(b)Fluoranthene	NSE	8	**	12.6	BDL	8.14	BDL	0.641	BDL	19.7	BDL	BDL	110	4.6	1.78	BDL	5.02	1.28	0.509	3.85	0.247	5.83	3.14	1.43	11.3	191	118	BDL	10	BDL	11.2		
Benzo(k)Fluoranthene	NSE	BDL	**	2.61	BDL	2.62	BDL	0.188	BDL	4.09	BDL	BDL	17.1	2.15	1.14	BDL	3.05	BDL	BDL	2.31	BDL	BDL	0.972	0.33	4.53	BDL	74	BDL	3.65	BDL	2.52		
Benzo(ghi)Perylene	NSE	4.7	**	86	BDL	3.98	BDL	0.492	BDL	10.1	BDL	BDL	65.7	BDL	1.04	BDL	3.02	BDL	BDL	BDL	0.179	4.96	2.44	0.772	24.7	BDL	79	BDL	26.3	BDL	25.1		
Chrysene	NSE	10	**	5.03	BDL	13.4	BDL	0.959	BDL	27.6	BDL	BDL	118	8.53	2.35	BDL	8.13	0.94	0.691	6.94	0.151	5.32	1.92	1	5.9	313	208	BDL	5.8	0.449	6.69		
Dibenzo(a,h)Anthracene	NSE	1.4	**	3.03	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	10.3	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.513	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL		
2,6-Dinitrotoluene	NSE	1.6	**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Fluoranthene	NSE	15	**	2.33	0.111	29.6	BDL	1.73	0.616	66.5	0.057	0.035	276	14.9	4.23	BDL	13.5	1.87	1.59	13.2	0.18	5.33	5.7	3.11	4.67	605	366	0.049	4.45	0.887	5.65		
Fluorene	NSE	4.9	**	1.74	0.038	4.48	BDL	1.15	BDL	113	BDL	BDL	306	10.1	0.725	BDL	3	1.25	1.4	19.4	BDL	2.7	0.187	0.099	1.31	1,003	279	BDL	0.898	BDL	2.01		
Indeno(1,2,3-cd)Pyrene	NSE	3.5	**	42.8	BDL	3.53	BDL	BDL	BDL	8.7	BDL	BDL	58.5	BDL	1.15	BDL	3.22	1.05	BDL	BDL	BDL	4.35	2.2	0.788	19.4	BDL	65.6	BDL	22	BDL	17.4		
2-Methyl Naphthalene	NSE	BDL	**	BDL	0.092	1.08	BDL	1.6	BDL	711	0.033	0.025	1,064	55.4	0.51	BDL	1.37	1.05	1.38	82.4	0.24	6.4	0.071	0.036	BDL	8,745	706	BDL	BDL	BDL	3.1		
Naphthalene	NSE	3.3	**	BDL	0.149	4.09	BDL	0.975	BDL	924	0.052	BDL	1,583	118	1.48	BDL	3.38	6.21	0.504	50.7	0.204	4.93	0.169	0.0591	BDL	10,225	1,077	BDL	1.11	BDL	5.26		
Phenanthrene	NSE	11	**	BDL	0.148	5.37	BDL	3.79	0.469	426	0.192	0.103	1,308	56.8	3.75	BDL	13.8	3.37	5.9	64.6	0.237	10.1	2.98	1.75	1.94	2,690	1,254	0.049	1.67	1.69	7		
Pyrene	NSE	35	**	5.39	0.195	50.5	BDL	3.13	0.75	124	0.108	0.061	616	32.7	5.78	BDL	20.6	3.49	2.65	24.2	0.286	13.8	3.42	1.91	10.8	945	759	0.063	14.2	1.61	17.8		
VOCs² (μg/g)																																	
Benzene	0.0055	--	BDL	2.6	BDL	BDL	BDL	BDL	BDL	8.38	BDL	BDL	BDL	BDL	0.018	BDL	1.92	0.011	BDL	BDL	BDL	2.1	BDL	0.005	BDL	645	5.62	0.068	1.01	0.337	0.675		
n-Butylbenzene	NSE	--	BDL	BDL	BDL	BDL	BDL	BDL	BDL	25.1	BDL	0.009	BDL	5.52	0.022	BDL	BDL	0.343	BDL	3.74	BDL	3.48	BDL	0.02	BDL	648	54.9	BDL	0.14	0.058	0.415		
sec-Butylbenzene	NSE	--	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.065	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2,688	BDL	BDL	BDL	BDL	BDL		
Ethylbenzene	2.9	--	BDL	BDL	BDL	BDL	BDL	BDL	BDL	38.2	BDL	BDL	276	7.91	0.014	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2,973	51.1	BDL	0.147	0.149	0.323		
Isopropylbenzene	NSE	--	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	190	6.2	BDL	0.029	BDL	0.056		
p-Isopropyltoluene	NSE	--	BDL	BDL	BDL	1.51	BDL	2.81	0.49	BDL	BDL	BDL	BDL	20.2	BDL	BDL	2.34	0.066	BDL	BDL	0.019	1.16	BDL	BDL	BDL	95.1	21.3	BDL	BDL	0.283	0.104		
Naphthalene	NSE	--	BDL	3.86	0.293	BDL	0.125	1.63	2.81	666	0.254	0.342	2,260	375	1.58	0.137	19.2	0.064	BDL	83.6	0.07	10.2	BDL	0.019	29	28,469	1,122	0.008	1.23	1.57	2		
n-Propylbenzene	NSE	--	BDL	BDL	BDL	1.85	0.02	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.142	BDL	BDL	BDL	BDL	BDL	BDL	BDL	101	4.89	BDL	BDL	0.053	0.056		
Toluene	1.5	--	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	101	4.89	BDL	BDL	0.053	0.056		
1,2,4-Trimethylbenzene	NSE	--	BDL	BDL	BDL	BDL	BDL	BDL	BDL	21.4	BDL	BDL	157	5.24	0.053	BDL	BDL	0.079	BDL	2.93	BDL	1.81	BDL	BDL	BDL	2,007	BDL	BDL	BDL	BDL	BDL		
1,3,5-Trimethylbenzene	NSE	--	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	2,994	6.15	BDL	0.187	0.042	0.282		
Total Xylenes	4.1	--	BDL	BDL	BDL	BDL	BDL	BDL	BDL	41.3	BDL	BDL	197	9.37	0.179	BDL	BDL	0.031	BDL	BDL	BDL	BDL	BDL	BDL	BDL	742	17.4	BDL	0.068	0.112	0.154		

* = Sample collected by Northern Environmental Technologies, Inc.; no depth interval documented
 ** = Analytical results not readily available
 BDL = Below laboratory detection limits
 -- = Not analyzed for
█ = Exceeds ch. NR 720 soil cleanup standards
 NSE = No standard established
¹ = PAH list is not complete; PAHs not listed are BDL
² = VOC list is not complete; VOCs not listed are BDL
 Compiled by: TJB Checked by: KEA

Table 2 (Continued)
Soil Analytical Results

Analytical Parameters	ch. NR 720 soil cleanup standards ¹		Date/Boring No./Depth (ft)																								
			11/6/97										12/10/97	12/10/97	12/11/97	12/11/97	12/11/97	12/10/97	12/10/97	12/10/97	12/10/97	12/10/97	12/11/97	12/11/97	12/11/97	12/11/97	
	SS-1	SS-2	SS-3	SS-4	SS-5	SS-6	SS-7	SS-8	SS-9	SS-10	HP-1	HP-2	HP-3	HP-4	HP-7	HP-13	HP-14	HP-15	HP-16	HP-17	HP-18	HP-19	HP-20	HP-21			
	Indu- trial Sites	Non- Indu- trial Sites	0-8	0-8	0-8	0-8	0-8	0-8	0-8	0-8	0-8	0-8	0-8	0-8	0-4	0-4	0-4	0-2	0-2	0-4	0-4	0-4	0-4	0-4	0-4	0-4	
Metals + Cyanide (mg/kg)																											
Arsenic	1.6	0.39	4.50	13.7	7.70	9.11	8.74	13.9	6.77	13.2	7.56	7.50	--	--	--	6.81	--	--	--	--	6.34	--	--	--	--	--	
Cadmium	510	8	0.143	0.208	1.14	0.195	0.376	0.161	0.233	1.77	0.945	2.11	--	--	--	BDL	--	--	--	--	0.251	--	--	--	--	--	
Calcium	NSE	NSE	1,930	10,700	9,250	26,300	17,500	21,400	35,100	6,030	15,100	27,830	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Chromium	200 ³	14 ³	5.84	9.17	11.6	12.8	12	<u>16.4</u>	7.44	16.5	11.5	<u>18.2</u>	--	--	--	3.97	--	--	--	--	8.05	--	--	--	--	--	
Copper	NSE	NSE	19	15.8	65	17.7	31.2	19.8	77.6	110	43	74.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Iron	NSE	NSE	6,810	11,800	10,200	12,500	11,600	17,800	9,870	30,600	16,500	13,400	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Lead	500	50	5.19	8.32	<u>88.8</u>	23.2	141	10.1	11.3	<u>234</u>	<u>131</u>	<u>165</u>	11.1	<u>80.1</u>	7.70	12.3	BDL	48.6	3.69	13.3	<u>138</u>	3.32	15.5	<u>57</u>	6.72	9.0	
Magnesium	NSE	NSE	1,730	6,370	2,330	8,200	5,870	9,730	3,110	2,970	3,350	4,280	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Potassium	NSE	NSE	441	1,010	573	1,210	1,150	1,780	587	867	785	917	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Selenium	NSE	NSE	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	--	--	--	BDL	--	--	--	--	BDL	--	--	--	--	--	
Sodium	NSE	NSE	39.5	80.5	42.8	82	65.3	136	87.9	171	123	176	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Zinc	NSE	NSE	25	32.6	167	47.8	127	52.5	44.4	309	524	712	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Cyanide	NSE	NSE	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.68	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Barium	NSE	NSE	--	--	--	--	--	--	--	--	--	--	--	--	--	58.3	--	--	--	--	122	--	--	--	--	--	
Silver	NSE	NSE	--	--	--	--	--	--	--	--	--	--	--	--	--	BDL	--	--	--	--	BDL	--	--	--	--	--	
Mercury	NSE	NSE	--	--	--	--	--	--	--	--	--	--	--	--	--	BDL	--	--	--	--	0.0239	--	--	--	--	--	

BDL = Below laboratory detection limits
 -- = Not analyzed for
 495 = Exceeds ch. NR 720 soil cleanup standards
 16.4 = Exceeds ch. NR 720 soil cleanup standards for non-industrial sites
 NSE = No standard established
¹ = PAH list is not complete; PAHs not listed are BDL
² = VOC list is not complete; VOCs not listed are BDL
³ = Chromium RCL values listed are for hexavalent chromium
 Compiled by: JEG Checked by: TJB

Table 3 (Continued)
Groundwater Analytical Results

Analytical Parameters	NR 140 Standards		Site Name/Well No./Sampling Date																											
	ES	PAL	Ashland Lakefront Property																											
			TW-10		TW-10 (Dup.)	TW-11				TW-11 (Dup.)	TW-12				Supply Well	AW-1				AW-2			TP-2	Seep Sample						
			9/19/94	10/20/94	10/20/94	9/19/94	10/20/94	9/3/97	12/10/97	9/19/94	9/19/94	10/20/94	9/3/97	12/11/97	1/25/99	6/28/94	9/19/94	10/20/94	12/10/97	9/19/94	10/20/94	12/10/97	8/28/91	9/19/94	10/20/94	5/17/95	6/95	12/12/97		
Metals (µg/l)																														
Aluminum	NSE	NSE	--	--	--	--	--	--	--	--	--	--	--	--	61	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Arsenic	50	5	--	--	--	--	--	--	--	--	BDL	BDL	--	--	BDL	2.1	BDL	<u>5.07</u>	--	BDL	1.45	--	--	--	--	--	--	--	--	
Cadmium	5	0.5	--	--	--	--	--	--	--	--	BDL	BDL	--	--	--	--	--	--	--	--	--	--	--	--	--	9.5	*	--		
Calcium (mg/l)	NSE	NSE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	9.4	*	--		
Chromium	100	10	--	--	--	--	--	--	--	--	BDL	BDL	--	--	BDL	--	BDL	BDL	--	BDL	BDL	--	--	--	--	BDL	*	158		
Copper	1,300	130	--	--	--	--	--	--	--	--	BDL	BDL	--	--	BDL	--	BDL	26	--	BDL	15	--	--	--	--	89	*	--		
Cyanide (mg/l)	0.2	0.04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Iron	300	150	--	--	--	--	--	--	--	--	2,910	8,080	--	--	---	BDL	10	15	--	BDL	18	--	--	--	--	--	--	--	<u>0.125</u>	
Lead	15	1.5	--	--	--	--	--	--	BDL	--	BDL	BDL	--	BDL	--	--	<u>4.72</u>	BDL	BDL	BDL	BDL	BDL	--	--	--	30,000	*	--		
Magnesium (mg/l)	NSE	NSE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	75	*	--		
Potassium (mg/l)	NSE	NSE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	54.9	
Selenium	50	10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	9.15	
Sodium (mg/l)	NSE	NSE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	790	*	--	--	
Zinc	5,000	2,500	--	--	--	--	--	--	--	--	23	BDL	--	--	8.0	--	58	BDL	--	BDL	BDL	--	--	--	--	--	--	--	57.2	
Indicators (mg/l)																														
BOD	NSE	NSE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Chloride	250	125	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
COD	NSE	NSE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Sulfate	250	125	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1,200	--	--	--	--	--	--	--	
TOC	NSE	NSE	22.1	15.2	--	24.4	5.93	--	--	--	18.2	12.6	--	--	--	BDL	12.6	BDL	--	4.81	BDL	--	--	--	--	--	--	--	--	
PAHs¹ (µg/l)																														
Acenaphthene	NSE	NSE	523	216	--	447	375	60	209	--	39.3	68.1	41	32.5	BDL	BDL	--	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Acenaphthylene	NSE	NSE	77.4	40.6	--	7.25	17.1	BDL	BDL	--	2.47	BDL	BDL	BDL	BDL	BDL	--	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Anthracene	NSE	NSE	164	69.3	--	60.2	113	3.2	18.6	--	1.09	BDL	BDL	1.28	BDL	BDL	--	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Benzo(a)Anthracene	NSE	NSE	116	30	--	27.1	36.2	BDL	7.50	--	BDL	BDL	BDL	0.115	BDL	BDL	--	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Benzo(a)Pyrene	0.2	0.02	<u>104</u>	<u>29.2</u>	--	14.5	27.5	1.8	8.79	--	7.59	5.37	BDL	0.388	BDL	BDL	--	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Benzo(b)Fluoranthene	NSE	NSE	74.1	20.7	--	12.6	20.5	BDL	3.55	--	5.46	BDL	BDL	0.356	BDL	BDL	--	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Benzo(k)Fluoranthene	NSE	NSE	43.6	11.6	--	9.36	14.5	BDL	1.79	--	2.33	BDL	BDL	0.084	BDL	BDL	--	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Benzo(ghi)Perylene	NSE	NSE	40.1	14.9	--	BDL	12.4	BDL	2.36	--	14.4	7.45	BDL	BDL	BDL	BDL	--	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
bis(2-Ethylhexyl)phthalate	NSE	NSE	--	--	--	--	--	BDL	--	--	--	--	BDL	--	BDL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Chrysene	NSE	NSE	102	30.9	--	19.7	34.9	BDL	6.84	--	BDL	BDL	BDL	1.19	BDL	BDL	--	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Dibenzo(a,h)Anthracene	NSE	NSE	BDL	BDL	--	BDL	BDL	BDL	5.56	--	BDL	BDL	BDL	0.182	BDL	BDL	--	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Dibenzofuran	NSE	NSE	**	**	--	**	**	1.9	--	--	**	**	BDL	--	**	**	--	**	**	--	**	**	--	--	**	**	**	**	**	
Di-n-Butylphthalate	NSE	NSE	--	--	--	--	--	BDL	--	--	--	--	BDL	--	4.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
Fluoranthene	NSE	NSE	176	70.2	--	47.8	88.2	BDL	14.4	--	2.19	BDL	BDL	1.79	BDL	BDL	--	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Fluorene	400	80	<u>223</u>	<u>101</u>	--	<u>122</u>	<u>159</u>	13	<u>80.1</u>	--	6.11	11.9	4.8	4.82	BDL	BDL	--	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Indeno(1,2,3-cd)Pyrene	NSE	NSE	36.5	13.8	--	BDL	11.6	BDL	3.04	--	10.2	5.76	BDL	0.140	BDL	BDL	--	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
1-Methyl Naphthalene	NSE	NSE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methyl Naphthalene	NSE	NSE	977	149	--	732	518	140	--	--	5.18	9.44	BDL	--	BDL	BDL	--	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Naphthalene	40	8	<u>1,005</u>	<u>23.1</u>	--	<u>2,794</u>	<u>656</u>	<u>710</u>	<u>2,350</u>	--	<u>459</u>	<u>563</u>	<u>250</u>	<u>150</u>	BDL	BDL	--	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Phenanthrene	NSE	NSE	864	229	--	280	282	20	57	--	4.42	6.81	BDL	3.21	BDL	BDL	--	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Phenol	6,000	1,200	--	--	--	--	--	BDL	--	--	--	--	BDL	--	BDL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	

Table 3 (Continued)
Groundwater Analytical Results

Analytical Parameters	NR 140 Standards		Site Name/Well No./Sampling Date																								
	ES	PAL	Ashland Lakefront Property																								
			BW-1	BW-2	HP-1	HP-2	HP-3	HP-3A	HP-3B	HP-4	HP-5	HP-6	HP-7	HP-8	HP-9	HP-11	HP-12	HP-17	HP-18	HP-19	HP-20	HP-21	HP-22	HP-23	HP-24	HP-25	
			12/10/97	12/10/97	12/10/97	12/10/97	12/11/97	12/11/97	12/11/97	12/11/97	12/11/97	12/11/97	12/11/97	12/11/97	12/11/97	12/11/97	12/11/97	12/11/97	12/11/97	12/11/97	12/11/97	12/11/97	12/11/97	12/11/97	12/11/97	12/11/97	12/11/97
Metals (µg/l)																											
Aluminum	NSE	NSE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Arsenic	50	5	1.69	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cadmium	5	0.5	60.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Calcium (mg/l)	NSE	NSE	BDL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chromium	100	10	BDL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	1,300	130	BDL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cyanide (mg/l)	0.2	0.04	BDL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Iron	300	150	0.66	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	15	1.5	BDL	--	1.49	5.47	1.24	BDL	BDL	BDL	BDL	BDL	1.56	BDL	--	BDL	1.91	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Magnesium (mg/l)	NSE	NSE	27.7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Potassium (mg/l)	NSE	NSE	6.31	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Selenium	50	10	BDL	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sodium (mg/l)	NSE	NSE	20.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	5,000	2,500	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Indicators (mg/l)																											
BOD	NSE	NSE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chloride	250	125	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
COD	NSE	NSE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sulfate	250	125	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TOC	NSE	NSE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PAHs¹ (µg/l)																											
Acenaphthene	NSE	NSE	--	6.74	BDL	BDL	335	32,800	35.6	3,530	618	20,400	13,700	2,190	31,700	10,000	2,820	732	399	374	381	442	36,900	2,890	7,620	6.16	
Acenaphthylene	NSE	NSE	--	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Anthracene	NSE	NSE	--	8.63	0.092	BDL	156	13,600	15.4	1,000	194	7,410	5,420	700	9,850	4,290	1,420	338	206	158	134	238	16,100	1,450	4,070	4.58	
Benzo(a)Anthracene	NSE	NSE	--	8.53	BDL	BDL	73.60	3,190	5.75	170	82.8	1,980	1,850	147	1,990	1,500	550	200	161	120	73.3	312	4,850	538	1,800	5.42	
Benzo(a)Pyrene	0.2	0.02	--	11.40	BDL	BDL	58	1,370	6.67	124	47.9	867	766	43.1	584	799	276	122	75.6	67.6	51.3	218	774	253	900	14.2	
Benzo(b)Fluoranthene	NSE	NSE	--	10.50	BDL	0.096	36.2	645	4.46	32	31.6	475	413	28.6	337	462	184	45.2	55.3	47.5	36.5	154	1,370	204	549	11.5	
Benzo(k)Fluoranthene	NSE	NSE	--	3.23	BDL	0.047	15.1	397	1.85	34	19.1	367	345	22.7	286	326	116	28.2	34.2	27.2	20	84.5	754	122	308	3.53	
Benzo(ghi)Perylene	NSE	NSE	--	5.83	BDL	0.062	27.4	322	3.80	15	22.2	297	279	13.4	152	323	74.3	17.6	30.5	34.7	28.9	112	998	115	334	10.2	
bis(2-Ethylhexyl)phthalate	NSE	NSE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chrysene	NSE	NSE	--	7.03	BDL	BDL	44.2	2,040	3.76	118	47.8	1,180	1,100	79.3	1,430	881	387	144	93.4	69.1	47.5	175	3,430	310	1,140	2.98	
Dibenzo(a,h)Anthracene	NSE	NSE	--	BDL	BDL	BDL	38.6	517	4.67	BDL	35.4	533	475	29.4	314	526	144	31.4	47.1	47.3	38.3	158	1,150	194	431	12.4	
Dibenzofuran	NSE	NSE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Di-n-Butylphthalate	NSE	NSE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4-Dimethylphenol	NSE	NSE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fluoranthene	NSE	NSE	--	37.50	BDL	BDL	285	18,100	23.6	1,200	406	9,970	9,210	858	12,100	7,210	2,650	794	479	370	237	877	32,400	2,420	7,980	14.5	
Fluorene	400	80	--	3.74	0.515	BDL	204	18,700	19.1	2,020	412	13,000	9,010	1,390	19,200	7,020	1,880	408	199	189	168	229	20,200	2,430	4,980	0.687	
Indeno(1,2,3-cd)Pyrene	NSE	NSE	--	6.24	BDL	0.102	35.4	338	4.54	16.7	27.9	298	274	13.5	149	286	76.7	19.5	34	38	30.7	119	874	112	295	8.59	
1-Methyl Naphthalene	NSE	NSE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methyl Naphthalene	NSE	NSE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Methylphenol	NSE	NSE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
3 & 4-Methylphenol	NSE	NSE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1-Naphthalene	40	8	--	5.47	1.01	0.398	1,550	62,200	133	12,400	1,700	60,400	17,300	5,750	69,300	7,020	3,130	2,790	641	674	2,030	1,100	130,000	2,380	16,200	1.02	
Phenanthrene	NSE	NSE	--	31.8	0.261	0.191	396	42,000	42.8	3,310	712	21,700	16,600	2,150	30,200	13,300	4,060	698	404	403	333	445	53,400	3,540	12,400	3.80	