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TECHNICAL MEMORANDUM

DATE: January 5, 2001

TO: Sharon Coleman and Hamilton Hazelhurst, Wright Runstad & Company

FROM: Julie Wukelic and Mike Ehlebracht, Hart Crowser

RE: **Summary of Environmental Investigations and Preliminary Evaluation of Remedial Options Dearborn Corporate Campus Site Seattle, Washington**
J-7206-01

CC: Charles R. Wolfe, Foster Pepper & Shefelman
Dan Cargill and Steve Alexander, Washington State Department of Ecology

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This memorandum summarizes the environmental investigations conducted to date and provides a preliminary evaluation of remedial options for the Dearborn Corporate Campus Site (Site) located on the 1400 block of South Dearborn Street in Seattle, Washington. In it we present an overview of general site characteristics and a summary of previous environmental investigations and remedial actions conducted at the Site. We conclude this technical memorandum with a discussion of preliminary evaluation of remedial alternatives for the Site. Tables and figures are presented at the end of this technical memorandum.

At our meeting with Ecology on January 11, 2001, we plan to discuss moving forward with Wright Runstad's proposed Prospective Purchaser Agreement (PPA), the environmental status of the Site, and preliminary remedial options. Following the meeting, we will prepare a work plan for Ecology's review that outlines our proposed scope of work for performing additional site characterization. The purpose of the additional characterization would be to assist in finalizing a cleanup action plan (CAP) and completion of the final detailed PPA submittal. We will seek Ecology's comments and input through the process of development of the work plan and final design of the PPA CAP, and will be interested in your latest thoughts on how the project can be staffed for this purpose, as well as likely time frames for relevant benchmarks.

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As part of this effort, we will recommend performing additional soil and groundwater sampling and analysis near the former dry cleaning operation inside the main Goodwill Building to further investigate previously detected chlorinated solvents in the groundwater. A major renovation of the main Goodwill Building is a key part of the overall redevelopment project. As warranted, remediation of soil and groundwater in or near the main Goodwill Building will be addressed in the final PPA CAP, even if partially outside of the proposed Wright Runstad purchase area.

INTRODUCTION AND BACKGROUND

The Dearborn Corporate Campus Site is located on the north side of South Dearborn Street and west of Rainier Avenue South in Seattle, Washington (Figure 1).

Wright Runstad & Company (WRC) is currently seeking a Prospective Purchaser Agreement (PPA) from Ecology for the Dearborn Corporate Campus Site, the location of a proposed redevelopment project to be undertaken by WRC in partnership with Seattle Goodwill Industries (SGI). The redevelopment will be located on a property currently owned by SGI (and an adjacent property not subject to this proposal) at the northwest corner of South Dearborn Street and Rainer Avenue South in Seattle, Washington.

In the last 10 to 12 years, a number of environmental investigations, collecting soil and groundwater samples, have occurred on the Site and adjacent properties. Underground storage tanks (USTs) and soil removal have also occurred on the adjacent properties. Elevated concentrations of petroleum hydrocarbons, metals, and chlorinated solvents have been encountered in Site soils and groundwater.

Hexavalent chromium (a toxic and mobile form of chromium) has been detected in soils in the southwestern portion of the Site and is present at elevated concentrations in the groundwater. The source of the hexavalent chromium is likely the plating and painting operations formerly located in this area of the Site.

Practical soil remedial alternatives for the Site are limited by the nature of the planned redevelopment excavation. The alternatives are limited to that of excavation and treatment and/or off-site disposal prior to site redevelopment. The redevelopment plans include soil excavation below an impacted but low-yielding, perched water-bearing zone. This will effectively eliminate this water-bearing zone as a contaminant migration pathway. In

addition, dewatering activities likely conducted, as part of construction will further minimize potential off-site migration of contaminants.

Site Description

The Dearborn Corporate Campus Site (Site) addressed by the previous PPA proposal is defined as the area between South Dearborn Street and South Lane Street and Rainier Avenue South and 13th Avenue South, except for the Herzog Glass property (1300-1308 South Dearborn Street). See Figure 2 for Site boundaries as well as the entire proposed redevelopment project boundaries. Corwin Place South and Dearborn Place South transverse through the Site. The Site consists of nine parcels with five existing buildings. The remainder of the Site is covered with asphalt and used for parking or storage. The five buildings are currently being used as a training center (Goodwill), storage (Goodwill), and storage and shipping (Mar-Lac Distributing). The Herzog Glass property (not owned or retained by either SGI or WRC) is considered a separate facility and is currently not a part of redevelopment plans. The main Goodwill Building is also considered a separate facility (retained by SGI) although major renovation of this building is part of the Dearborn Corporate Campus redevelopment project. The major renovation of the main Goodwill Building will provide extensive additional space for SGI's operation of educational programs and overall donation processing.

Historical Land Use

The Site was originally part of a large brick, tile, and terra cotta manufacturing company in 1893 and 1904. The streets, South Dearborn, South Lane, Corwin Place South, and Dearborn Place South, did not extend through the brick company during that time frame. By 1916, South Dearborn and South Lane Streets existed through the Site and the brick company was gone. Extensive soil excavation occurred through the Site in 1909, known as the Dearborn Cut, to construct the 12th Avenue South Bridge (Jose Rizal Bridge).

The building at 1416 (currently one of the Mar-Lac Buildings) first appeared in the 1916 Sanborn map and was the first building to appear along the north side of South Dearborn Street between 13th Avenue South and Rainier Avenue South. In the 1916 Sanborn map, a parking garage called the Dearborn Street Garage was located just north of the Site but in the current location of the east end of the main Goodwill Building.

According to the 1950 Sanborn map, the Site was developed with an auto painting shop, pattern shop and plating works, plating works company, sausage factory, refrigerator machinery and repair, service station, and donut factory located on the north side of South Dearborn Street and between Rainier Avenue South and the current Herzog Glass property. Several storage buildings were also located behind the South Dearborn Street properties on the south side of South Lane Street.

General Paint Corporation occupied a portion of the Site (current location of the Goodwill Learning Center building) directly east of Corwin Place along the north side of South Dearborn Street from the 1930s to the 1960s. Further east along South Dearborn Street were businesses such as bottling works, macaroni and envelope manufacturing companies, and a service station on the northwest corner of South Dearborn Street and Rainier Avenue South.

By 1969, the pattern shop and plating workshops were gone along South Dearborn Street. A rag warehouse was visible in the 1969 Sanborn in the northwest corner of South Dearborn Street and Corwin Place South. The service station was gone by 1960. A large portion of the Site between South Dearborn and South Lane Street consisted of asphalt pavement used for parking.

The main Goodwill Building located directly north of the Site first appeared in the 1950 Sanborn map along the north side of South Lane Street. The 1950 Sanborn map also indicated areas within the main Goodwill Building such as used furniture, furniture storage, general storage, repair shop, chapel, laundry, and a paint shop.

Single and multi-story residences and boarding houses dominated the area just north of the main Goodwill Building (south side of South Weller Street) on the 1950 Sanborn map. However, an iron and machine works shop was located adjacent to this same row of residences.

An auto body and repair shop (currently Herzog Glass buildings at 1300-1308 South Dearborn Street) was also located and operated on the west side of the Site until the late 1960s.

In the 1969 Sanborn map, the Seattle Goodwill Building had expanded to the west and north. The iron and machine works shop and residences along the south side of South

Weller Street were gone. Apparently, a large fire destroyed a majority of these buildings and the first Goodwill Building in approximately 1945.

Review of the 1950 and 1969 Sanborn maps indicated that a laundry facility was located in the middle of the main Goodwill Building. The laundry included dry cleaning operations from the 1950s until 1997.

Proposed Land Use

The Dearborn Corporate Campus redevelopment project will consist of three new five-story office buildings fronting South Dearborn and South Lane Streets. Building A, approximately 148,000 gsf, will be located between 12th Avenue South (Jose Rizal bridge) and 13th Avenue South; Building B, approximately 173,000 gsf, will be located between the Herzog Glass building (to the west) and Corwin Place South; and Building C, approximately 182,000 gsf, will be located between Corwin Place South and Dearborn Place South. The buildings will include one to two levels of below-grade parking, one level of at-grade parking, and four levels of office area. Building B and Building C are located in areas that have been identified as contaminated, thus providing an opportunity for cleanup to be conducted under a PPA in conjunction with the development plans.

Seattle Goodwill will retain ownership of the main Goodwill Building and will continue to operate its charitable retail, educational program, and administrative facilities. The renovation will provide SGI with 148,000 square feet of space, dramatically expanding the space available for operation of its educational programs, consolidating its donation center, and streamlining the donation processing facility.

RESULTS OF PREVIOUS ENVIRONMENTAL STUDIES AND REMEDIAL ACTIVITIES

Over the last 10 to 12 years, a number of environmental investigations collected soil and groundwater samples from the Site and adjacent properties. Elevated concentrations of petroleum hydrocarbons, metals, and chlorinated solvents have been encountered in Site soils and groundwater.

Herzog Glass Site (1300-1308 South Dearborn Street)

Although this Site is not considered part of the "Dearborn Corporate Campus Redevelopment Property," this Site is located in the middle of the redevelopment area and has had several environmental investigations conducted over the past 10 years as well as underground storage tank and petroleum-contaminated soil (PCS) removals. According to Ecology files, one 2,000-gallon diesel/bunker oil UST and petroleum-affected soils were removed in 1991. In July 1993, two gasoline USTs (4,000- and 6,000-gallon capacities) were removed. In 1994, approximately 800 tons of PCS were removed in the area of the former USTs. At the time of the PCS removal, another 2,000-gallon gasoline UST was discovered and removed. A 500-gallon fuel oil UST located inside the building was also closed in-place in 1994.

In 1995, the Washington State Department of Transportation (WSDOT) conducted additional soil removal in the area of the former storage shed (northwest portion of the property), which was being removed at the time to make way for a new storage building (existing). The PCS was limited to the upper 2.5 feet and was near a sump that was discovered during the soil excavation.

Based on the verification soil samples collected and analyzed during the duration of these UST and soil removal activities, there appears to be a limited amount of PCS still remaining under the building.

Hart Crowser performed soil and groundwater sampling and analysis in 1993, which included the installation of four groundwater monitoring wells. Hand-auger borings were also advanced inside the building to collect shallow soil samples. Hart Crowser identified shallow petroleum-affected soils and low concentrations of chlorinated volatile organics in one of the groundwater monitoring wells (HC-4). This same groundwater monitoring well also had elevated concentrations of chromium above MTCA Method A cleanup level.

HC-4
Chl. Solv.
Cr 3+

In 1994, Dames and Moore conducted additional soil and groundwater sampling and analysis at the Site. Dames and Moore's 1994 assessment of the Site confirmed the presence of chlorinated volatile organics and chromium in this same groundwater monitoring well consistent with concentrations detected by Hart Crowser. Further analysis of the chromium indicated that the chromium present is in the hexavalent form, rather than the trivalent form.

Former Unocal Gasoline Service Station (1590 South Dearborn Street)

A gas station was formerly located at the corner of South Dearborn Street and Rainier Avenue South. This property is owned by Goodwill and is located to the east across Dearborn Place. Two USTs were discovered at this Site in 1994. In addition, there was also a form in Ecology's file that indicated that two to three other USTs were removed in 1990. No detailed documentation was available on the removal or closure of these USTs or their location relative to the subject property. However, GeoEngineers prepared an Underground Facilities Removal and Subsurface Explorations report on November 6, 1996. This report documents the removal of four USTs, product piping, hydraulic hoist, sumps, and building foundations. Additional soil sampling and analyses were conducted along with the installation of five groundwater monitoring wells. The five groundwater monitoring wells were sampled quarterly from 1992 to 1998. Some PCS was removed and disposed of at Regional Disposal Company's permitted landfill in Roosevelt, Washington.

Dearborn Corporate Campus Site

Thirty-two soil borings were advanced on the Site between April and July 2000. Eighteen of these borings were converted to "mini" or standard groundwater monitoring wells. In addition, a number of additional borings and groundwater monitoring wells have previously been advanced or installed on the adjacent property (Herzog Glass) and the former Unocal site at the corner of South Dearborn Street and Rainier Avenue South. Most of the soil borings were advanced to a depth of approximately 15 to 20 feet below ground surface. Figure 2 shows the location of the soil borings and wells as well as several of the previous monitoring wells.

Soil samples were collected at approximately 5-foot-depth intervals in the borings. These soil samples were screened for volatile organics using a photoionization detector (PID). Groundwater samples were collected from 12 of the wells in April and an additional round of groundwater samples were collected in July from the 12 wells, 6 new wells, and the 3 existing wells from the former Unocal site (MW-A, MW-B, and MW-C). Three hand-auger borings were also advanced to a depth of 3.5 feet below the concrete floor slab in the basement of the Mar-Lac building at 1426 South Dearborn Street.

Chemical analyses were conducted on select soil samples and the groundwater monitoring wells. Selections of soil samples were based on our field observations and screening and general location of the borings. Chemical analyses conducted on the selected soil and

groundwater samples included total petroleum hydrocarbons (TPH); volatile organic compounds (VOCs); total and dissolved metals; and benzene, toluene, ethylbenzene, and total xylenes (BTEX). The results from the soil and groundwater samples collected and analyzed between April and July 2000 are presented in Tables 1 and 2. The soil sample results from the three hand-auger borings at the Mar-Lac site contained non-detectable concentrations of TPH. NO TPH/BTEX

PHYSICAL SUBSURFACE CHARACTERISTICS

The subsurface soil and groundwater characteristics were evaluated to understand the physical setting with respect to potential contaminant occurrence and migration. This interpretation of the physical setting is based on field investigations performed at the Site by Hart Crowser in 1993 and 2000, and data reported by Dames and Moore and GeoEngineers from investigations in areas adjacent to the Site. Figure 2, Site and Exploration Plan, shows the locations of most of the explorations that have been performed at the Site.

Geologic Characteristics

The Site is relatively flat with an elevation of approximately 90 feet, and is covered with either paved parking areas or buildings. To the west of the Site, across 13th Avenue, ground surface rises steeply to the northwest. The soils in this area are highly erratic, with fill materials slide debris, and glacial till. Based on the field explorations, four general soil units were identified at the Site, as described below.

Fill and Sandy, Silty Clay. The upper soil unit in this area varies from a silty, gravelly sand fill, to a sandy, silty clay. Some peat was encountered in HC-3 in the upper 7 feet. Brick and ash were encountered in the fill beneath the eastern portions of the Site. The thickness of the fill and sandy, silty clay varies from about 6 to 20 feet.

Silty Sand and Gravel. This soil unit is present across most of the Site, beneath the fill and sandy, silty clay. In some areas it is interbedded with sandy clay. This unit was generally encountered to depths of up to 20 feet below the ground surface.

Clayey Silt and Clayey Sand. Throughout most of the Site a clayey sand or sandy clay with interbedded sandy silt was encountered to depths of up to 50 to 60 feet. In the

southwestern part of this Site, fractured clayey silt was encountered to depths up to 102 feet below the ground surface.

Gravelly Sand and Silt. Gravelly sand, with zones of till-like gravelly, silty sand, was the deepest soil unit we encountered during our exploration program. These soils are dense to very dense, and generally range in depth from about 50 to 60 feet below the ground surface.

Groundwater Characteristics

Depth to groundwater at six Site wells was measured on July 20, 2000. Typical depth to water at the Site ranges from 6 to 13 feet below ground surface, depending on location and ground surface elevation. Using the approximate ground surface elevation at each location, the approximate groundwater elevation was calculated as shown below. Based on data from wells screened to depths less than 15 feet, the direction of shallow groundwater flow at the Site appears to be to the south to southeast.

Groundwater Elevation Data

Exploration Number	Screened Interval in Feet Below Ground Surface	Approximate Ground Surface Elevation in Feet	Approximate Groundwater Elevation in Feet
HC-104	25 to 30	92.5	80
HC-105	5 to 15	91	84
HC-106	10 to 15	90	84
HC-107S	5 to 15	87	80
HC-107D	25 to 30	87	79
HC-112	5 to 15	87	81

Since shallow groundwater appears to flow in the southerly to southeasterly direction, contaminants in site groundwater (see **Nature and Extent of Contamination** section) will likely migrate toward South Dearborn Street.

NATURE AND EXTENT OF CONTAMINATION

The results of soil and groundwater quality testing are presented in this section. First, screening levels are developed to evaluate and identify chemicals of concern. Then, the nature and extent of chemicals of potential concern are discussed. Evaluation of potential impacts to human health and the environment and exposure pathways is presented in the Preliminary Evaluation of Remedial Alternatives section.

Soil and groundwater quality data generated as part of the Environmental site investigations were reviewed by an environmental chemist to determine the validity of the data based on general quality control criteria. Based on this review, the analytical results were deemed acceptable for the purposes of this work. No soil or groundwater quality data collected during the Environmental site investigations were rejected based on data deficiencies.

Identification of Chemicals of Potential Concern

Site characterization data collected on the Dearborn Corporate Campus Site were compared to risk-based criteria to identify chemicals of potential concern. The proposed Model Toxics Control Act (MTCA) Method A residential criteria (Ecology, 2000) were used to initially evaluate the soil quality data. Although shallow groundwater beneath the Site is not currently used as a drinking water source and will not likely be used as a potable water supply in the future, groundwater quality data are compared to Method A and B drinking water criteria.

Soil and groundwater screening levels for selected potential chemicals of concern are presented in Tables 1 and 2.

Occurrence of Chemicals of Concern

This section discusses the nature and extent of chemicals of potential concern. The discussion is first organized by medium, and then by the particular chemical being considered.

Soil

The primary chemicals of potential concern in soils sampled on the Dearborn Corporate Campus Site include petroleum hydrocarbons, BTEX compounds, trichloroethene, and

chromium (Table 1). Petroleum hydrocarbons appear to be derived primarily from a middle distillate-type product and were fairly localized within the southeast corner of the parking lot (Figure 1). Elevated concentrations of toluene, ethylbenzene, and xylenes were also encountered in this area. However, the only BTEX compound exceeding screening levels was xylenes (16 mg/kg) in one sample collected from boring SP-6.

Trichloroethene (TCE) was detected in one soil sample (SP25-S2) at a concentration (0.16 mg/kg) exceeding the screening level of 0.03 mg/kg. TCE was not detected in groundwater at this location and was not detected in any of the other Site soil samples submitted for volatile organic analysis.

Elevated concentrations of chromium were encountered in soils sampled east of the Herzog Glass building and near the former plating facility. Groundwater in this area also appears to be impacted by the presence of chromium.

A more detailed discussion of the chemicals of potential concern identified in soil is presented below. Refer also to Table 1, which presents specific soil chemistry data for each sample.

Petroleum Hydrocarbons

Elevated concentrations of petroleum hydrocarbons were encountered in soils sampled near the UST located in the southeast corner of the parking lot (behind the Goodwill Training Center). The highest concentration of petroleum hydrocarbons (4,000 mg/kg) in this area was encountered in boring SP6-S2 near the top of the groundwater table (approximately 5 to 6 feet below ground surface). A middle distillate-type product was also encountered in boring SP-6W at a concentration of 530 mg/kg.

BTEX Compounds

BTEX compounds were also detected within the UST area (boring SP-6) discussed above. Ethylbenzene (4.7 mg/kg) and xylenes (16 mg/kg) were detected in boring SP-6 and appear to be associated with the presence of the mineral spirit-type product. The concentration of xylenes in this sample exceeds the Method A residential screening level of 9 mg/kg. Benzene was detected in boring SP-2 at a concentration (0.33 mg/kg) exceeding the soil screening level of 0.03 mg/kg. The presence of BTEX compounds in shallow subsurface soils within the UST area appears to impact local groundwater quality. Benzene was

NCW 173-340 ETHB = 6 mg/kg

encountered in a groundwater sample collected from boring SP-6 at a concentration (6.4 ug/L) that slightly exceeds the groundwater screening level of 5 ug/L.

Trichloroethene (TCE)

TCE was detected in a soil sample (SP25-S2) collected in the northwestern corner of the Site at a concentration (0.16 mg/kg) exceeding the screening level of 0.03 mg/kg. The source of TCE at this location is not known. Although no other volatile organic compounds were detected in soils at this location, dichlorobenzenes were detected in groundwater sampled from boring SP-25. The additional characterization in this vicinity will further address the potential source of this detected constituent.

Chromium

Elevated concentrations of chromium were encountered in soils sampled in the southwestern portion of the Site. The highest chromium concentrations were detected in soil samples collected at depths of 7 to 10 feet below ground surface in borings SP-23 (300 mg/kg) and SP-17 (110 mg/kg). Potential sources of chromium in this area include historical painting and metal finishing activities at the Herzog Glass location and former metal plating operations conducted to the east of Herzog Glass. Since plating and painting operations likely produced a significant portion of the chromium contamination encountered at the Site, much of the chromium is likely in the hexavalent form (particularly in groundwater). Hexavalent chromium is more toxic and mobile than the trivalent form that predominates in most soils.

Assuming that soils located to the east of Herzog Glass contain mostly hexavalent chromium, total chromium concentrations measured in soil samples can be compared to the proposed MTCA Method A cleanup level for hexavalent chromium of 19 mg/kg. Because this cleanup level is below background levels of total chromium in Puget Sound soils, we highlighted concentrations exceeding the natural background concentration of 48 mg/kg as being of potential concern (Table 1). Although only two soil samples exceed this background concentration, we anticipate that additional soils located along the east side of the Herzog Glass facility exceed this screening level.

Groundwater

The primary chemicals of potential concern in shallow groundwater sampled on the Site include benzene, chlorinated solvents, arsenic, and chromium (Table 2). Benzene was detected in one well (SP-6) located in the southeast parking lot area at a concentration slightly exceeding the groundwater screening level (Figure 3). The occurrence of chlorinated solvents (including TCE, tetrachloroethene [PCE], and dichlorobenzenes) was more widespread and appeared to be associated with multiple sources including metal plating, painting, and possibly dry cleaning operations.

Elevated arsenic concentrations were detected in a number of wells located in the central and western portion of the Site (Figure 4). The arsenic is likely derived primarily from natural sources. Arsenic appears to be elevated in oxygen-deficient (i.e., reducing) environments caused by the presence of abundant wood or peat deposits.

Relatively high concentrations of chromium were encountered in the southwestern portion of the Site near the Herzog Glass facility. Up to 3 mg/L of dissolved chromium were detected in groundwater sampled in wells located along the southwestern boundary of the Site.

Total (unfiltered) lead concentrations in several groundwater samples exceeded screening levels. However, no dissolved (filtered) lead was detected in Site groundwater. Due to the high suspended solids content in many of the wells sampled at the Site, total metals concentrations are not representative of actual groundwater quality conditions. Based on the positive bias caused by the presence of suspended solids, total lead is not considered to be a constituent of concern.

A more detailed discussion of the chemicals of potential concern identified in groundwater is presented below. Refer also to Table 2, which presents specific groundwater chemistry data for each sample.

Benzene

Benzene was detected in only one groundwater sample (SP-6) collected at the Site (Figure 3). The concentration of benzene in sample SP-6 (6.4 ug/L) slightly exceeds the groundwater screening level of 5 ug/L. Benzene in this well may be derived from a mineral spirit-type product encountered in SP-6 soils or from an upgradient source. The only

benzene detected in Site soils was observed in boring SP-2, which is located upgradient of well SP-6.

Chlorinated Solvents

Chlorinated solvents (including TCE, PCE, and dichlorobenzenes) were detected at concentrations exceeding MTCA cleanup levels in several wells scattered across the Site. Elevated concentrations of TCE and PCE were detected in wells SP-7 and SP-11 at concentrations ranging from 6 to 47 ug/L (Figure 3). The source of these solvents is unknown but may be related to historical dry cleaning operations conducted in the main Goodwill Building or from an upgradient source. Additional characterization near the area of the former dry cleaning operations in the main Goodwill building and upgradient of the Goodwill Building will further assess the potential source of this constituent.

TCE was also detected at concentrations exceeding the groundwater screening level of 5 ug/L in well SP-15A (Table 2). However, it appears that TCE at this location is derived from a separate source than the well SP-7 and SP-11 occurrences. The suites of chlorinated solvents detected in the two areas differ. At well SP-15A, no PCE was detected but trichloroethane (TCA) and dichloroethane (DCA) were present (Table 2). TCA and DCA were also encountered in exploration HC-4 during a previous sampling event. The presence of chlorinated solvents in the southwestern portion of the property may be derived from painting or metal plating operations conducted in the area.

Dichlorobenzenes were detected in well SP-25 at a total concentration of 10 ug/L (Figure 3). The concentration of p-dichlorobenzene (3.8 ug/L) in the sample slightly exceeds the groundwater screening level of 1.8 ug/L. The source of these solvents is not known.

Arsenic

Dissolved arsenic concentrations in nine Site wells exceed the groundwater screening level of 0.005 mg/L. However, arsenic was not identified as a constituent of concern in Site soils. Most of the exceedences were encountered in wells located in the western portion of the Site where wood and/or peat deposits were present in shallow soils.

We believe that the elevated arsenic concentrations are the result of localized oxygen-deficient (reducing) conditions caused by the presence of this natural organic material. Arsenic concentrations appeared to be strongly correlated with dissolved iron

concentrations (Figure 4). Both arsenic and iron are much more soluble and mobile under oxygen-deficient conditions.

Chromium

Relatively high concentrations of chromium were encountered in the southwestern portion of the Site near the Herzog Glass facility. Wells SP-14 (0.061 mg/L), SP-15A (3 mg/L), and HC-4 (0.13 mg/L) contained the highest concentrations of dissolved chromium and exceed the chromium screening level of 0.08 mg/L. Most of this chromium appears to be present in the more toxic hexavalent form.

Based on the relatively high chromium concentrations observed along the southwestern boundary of the Site, it is likely that chromium-containing groundwater is migrating off-site toward South Dearborn Street.

PRELIMINARY EVALUATION OF REMEDIAL ALTERNATIVES

This section discusses an evaluation of remedial alternatives that could be used to address impacted soil and groundwater on the Dearborn Corporate Campus Site. Additional characterization of the soil and groundwater will be conducted as necessary to assist in finalizing the CAP. Further sampling will be performed following discussions with Ecology on the results from the environmental investigations conducted to date and their review of the preliminary evaluation of the remedial alternatives.

Cleanup Objectives

The overall objective of remediation is to reduce potential risk to human health and the environment. Potential exposure pathways for soil and groundwater are discussed below, along with the resulting remedial action objectives (RAOs).

Potential Exposure Pathways

Impacted Soil

The primary exposure pathways for soil include direct contact, soil to groundwater, and soil to air. Because elevated concentrations of organic and inorganic contaminants have been

encountered within the upper 15 feet of soil at the Site, the direct contact exposure pathway is of concern. The soil to groundwater pathway also appears to be of concern at the Site based on the presence of chlorinated solvents and chromium in site groundwater. The soil-to-air pathway is of potential concern for volatile constituents such as benzene and chlorinated solvents. Transport of vapors through the soil to the surface may occur via diffusion or result from changes in atmospheric pressure. The Site is currently paved and will likely remain paved (or covered with a building) in the future. Pavement and building foundations minimize release of vapors to ambient air on the property. Exposure via the soil-to-air pathway is of a greater concern for indoor air in buildings constructed over contaminated soil or groundwater.

Impacted Groundwater

Groundwater in various portions of the Site is impacted primarily by the presence of volatile organic compounds and chromium. Although it is unlikely that shallow groundwater beneath the Site or under adjacent properties will be used as a potable water source, the primary potential groundwater exposure pathway is impact to human health via drinking water ingestion and direct contact.

Remedial Action Objectives (RAOs)

Risks to human health and the environment via the exposure pathways discussed appear to be significant and will require mitigation. The objectives of the cleanup action are:

- **Prevent Direct Contact.** Minimize direct contact with impacted soils.
- **Protect Groundwater.** Remove or treat impacted soil and groundwater to minimize potential off-site impacts and exposures.
- **Prevent Potential Air Impacts.** Remove or treat soils containing volatile organic contaminants or install institutional controls to minimize potential migration of vapors from soil and groundwater into ambient or indoor air on the property.

ARARs and Applicable Regulations

Potential remedial technologies were evaluated based on their ability to meet Applicable or Relevant and Appropriate Requirements (ARARs) associated with federal, state, and regional regulations. The following ARARs have been identified:

- **Model Toxics Control Act (MTCA 70.105D RCW, Chapter 173-340 WAC).** MTCA contains detailed requirements and Washington State's expectations for cleanup of contaminated sites.

- **State Environmental Policy Act (SEPA - 43.21 RCW, Chapter 197-11 WAC).** An environmental checklist is necessary as part of any permitting activity within the City of Seattle and pursuant to MTCA.

- **Minimum Standards for Construction and Maintenance of Wells (Chapter 173-160 WAC).** This regulation contains requirements for abandonment and construction of resource protection wells.

- **Dangerous Waste Regulations (Chapter 173-403 WAC).** This regulation addresses requirements for identification and proper management of dangerous wastes. It is possible that chromium-impacted soils on the Site would be designated as Dangerous or Extremely Hazardous Wastes.

- **State Clean Air Act (RCW 70.94), General Regulations for Air Pollution Sources (Chapter 173-403 WAC), and Toxic Air Contaminant New Source Review Guidelines.** Emissions during any on-site treatment operations may be subject to these regulations and will require a Notice of Construction Permit from the Puget Sound Clean Air Agency (PSCAA).

Cleanup Levels

Preliminary cleanup levels for soil and groundwater are presented in Tables 1 and 2. They are based on proposed MTCA Method A residential cleanup levels for soil, and MTCA Method A and B drinking water cleanup levels for groundwater.

It should be noted that the preliminary cleanup levels proposed for soil and groundwater are probably overly conservative. Method A residential cleanup levels for Site contaminants are

based primarily on protection of drinking water via the soil to groundwater pathway. Because groundwater at the Site will not likely be used as a drinking water source, less stringent site-specific cleanup levels could be developed.

Remedial Alternatives Development and Evaluation

The proposed remedial action selected for the Site will be consistent with MTCA in that it will provide a permanent remedy in a reasonable timeframe, will greatly reduce environmental risk, will use preferred treatment technologies, and will not rely exclusively on institutional controls.

The nature of the planned redevelopment excavation limits the range of practicable soil remedial alternatives to that of excavation and treatment and/or off-site disposal prior to Site redevelopment. Redevelopment plans will result in significant soil excavation below an impacted but low-yielding, perched water-bearing zone. The redevelopment plan of mass soil excavation provides a practical remedial solution that will effectively eliminate this water-bearing zone as a contaminant migration pathway. Dewatering activities likely conducted as part of construction will further minimize potential off-site migration of contaminants.

The proposed remedial action activities for the Dearborn Corporate Campus Site are described in more detail below.

Chromium in Soil and Groundwater

Since chromium-affected soil near the former plating works is designated for removal as part of the development construction plans, soil removal and disposal (or possibly treatment) is the selected remedial action. The chromium-affected soil appears to be limited to isolated areas in the former plating works area. Chemical results to date do not indicate that any of the soil would be designated as a dangerous waste.

The proposed remedial action for the impacted soils will be conducted in a phased approach and coordinated with the proposed redevelopment of the Dearborn Corporate Campus. The tasks proposed include:

- A grid-sampling program to define the specific areas of hot spot removal; and

- Excavation and off-site removal and/or treatment, where practical, of chromium-contaminated soil in the former plating works area.

Excavation of chromium-containing soils and construction dewatering will likely prevent future releases and off-site migration of chromium. Source removal and natural attenuation should sufficiently address chromium-affected groundwater. Any additional assessment of chromium-affected groundwater migrating off-site will be considered in the work plan for additional characterization.

Chlorinated Solvent-Impacted Groundwater

The proposed remedial action for the chlorinated solvent-impacted groundwater will consist of possible in situ treatment and compliance monitoring. In addition, most of the chlorinated solvents present in site groundwater will likely be removed during construction dewatering. Only a limited volume of chlorinated solvent-impacted soils has been detected to date. However, additional characterization within and near the former dry cleaning operations in the main Goodwill Building will provide more information on the nature and extent of chlorinated solvents in soil and groundwater.

If the results from the additional characterization in the main Goodwill Building indicate chlorinated solvent-impacted soil and groundwater, remedial alternatives will be evaluated and implemented in the CAP as warranted.

In addition, a construction contingency plan will be prepared and implemented as part of the redevelopment construction plans. The construction contingency plan would provide common sense criteria for recognizing suspect chlorinated solvent impacted soils based on appearance, odor, etc., and would identify chain of command links for notification during construction. As a key element, the plan would also outline procedures for sampling and analysis needed prior to implementing disposal treatment options for suspect materials.

If soils with concentrations of chlorinated solvents above MTCA cleanup levels are discovered, the soils will either be excavated and be disposed of off-site at a RCRA permitted landfill, be treated in situ, or contained on site under a restrictive covenant with prior approval from Ecology using Ecology's Area of Contamination and Contained-In policies.

Underground Storage Tank (UST) and Petroleum-Contaminated Soil (PCS) Removal

The three identified USTs would be removed in accordance with Ecology UST removal regulations. The associated soils with concentrations of TPH above MTCA cleanup levels will also be removed and disposed of off site at a permitted landfill.

As described previously, a construction contingency plan will be prepared and implemented as part of the redevelopment construction plans. The construction contingency plan would also include the appropriate criteria for recognizing suspect TPH-affected soils and the chain of command links for notification during construction. If petroleum-affected soils are encountered during development, they will be sampled, tested, and disposed of appropriately.

Compliance Monitoring

A compliance monitoring program will be implemented for the subject property. The scope of the compliance monitoring program will be developed as part of the cleanup action plan.

The work plan for additional characterization of the Site will be completed following our meeting and discussions with Ecology on January 11, 2001. Results from the supplemental characterization activities will provide additional information to further assess the dry cleaning area and possibly other areas and to complete the CAP. Our intended approach is to work with Ecology during these further studies and final design of the CAP to enable finalization of a PPA.

LIMITATIONS

Work for this project was performed, and this technical memorandum prepared, in accordance with generally accepted professional practices for the nature and conditions of the work completed, in the same or similar localities, at the time the work was performed. It is intended for the exclusive use of Wright Runstad & Company for specific application to the referenced property. This technical memorandum is not meant to represent a legal opinion. No other warranty, express or implied, is made.

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Attachments:
Table 1 - Analytical Results for Soil Samples
Table 2 - Analytical Results for Water Samples
Figure 1 - Vicinity Map
Figure 2 - Dearborn Corporate Campus Site and Exploration Plan
Figure 3 - Summary of Groundwater Quality Data - Volatile Organics
Figure 4 - Summary of Groundwater Quality Data - Dissolved Metals

Table 1 - Analytical Results for Soil Samples

Sample ID:	Proposed MTCA Method A	SP1-S3	SP2-S3	SP4-S2	SP6-S1	SP6-S2	SP6-S3	SP6N-S2	SP6W-S2	SP7-S3	SP8-S3	SP11-S3	SP13-S3
Sample Depth (in Feet)	Residential	7-10	7-10	4-7	1-4	4-7	7-10	4-7	4-7	7-10	7-10	7-10	7-10
Metals in mg/kg													
Arsenic	20		20 U	20 U		20 U						20 U	
Barium	NA		20 U	20 U		20 U						20 U	
Cadmium	2.0		1 U	1 U		1 U						1 U	
Chromium(c)	19(a)/2000(b)		20 U	20 U		20 U						20 U	
Lead	250		5 U	**7.3**		5 U						**7.7**	
Mercury	2.0		0.01 U	0.01 U		0.01 U						0.01 U	
Selenium	NA		20 U	20 U		20 U						20 U	
Silver	NA		20 U	20 U		20 U						20 U	
NWTPH-Gx in mg/kg													
Mineral spirits/Stoddard solvent	30					**4000**							
Gasoline	30					**5** U							
NWTPH-Dx in mg/kg													
Kerosene/Jet fuel	2000				20 U	20 U	20 U	20 U	**530**				
Diesel/Fuel oil	2000				20 U	20 U	20 U	20 U	20 U				
Heavy oil	2000				50 U	50 U	50 U	50 U	50 U				
NWTPH-HCID in mg/kg													
Gasoline	30	20 U	20 U	20 U		20 U				20 U	20 U	20 U	20 U
Stoddard solvent/Mineral spirits	30	20 U	20 U	20 U		**D**				20 U	20 U	20 U	20 U
Kensol	30	20 U	20 U	20 U		20 U				20 U	20 U	20 U	20 U
Kerosene/Jet fuel	30	20 U	20 U	20 U		20 U				20 U	20 U	20 U	20 U
Diesel/Fuel oil	2000	50 U	50 U	50 U		50 U				50 U	50 U	50 U	50 U
Bunker C	2000	50 U	50 U	50 U		50 U				50 U	50 U	50 U	50 U
Heavy oil	2000	100 U	100 U	100 U		100 U				100 U	100 U	100 U	100 U
Volatiles in mg/kg													
1,1,1-Trichloroethane	2.0		0.05 U	0.05 U		0.05 U					0.05 U	0.05 U	
Trichloroethene	0.03		0.05 U	0.05 U		0.05 U					0.05 U	0.05 U	
1,1-Dichloroethane	NA		0.25 U	0.25 U		0.25 U					0.25 U	0.25 U	
Tetrachloroethene	0.05		0.05 U	0.05 U		0.05 U					0.05 U	0.05 U	
cis-1,2-Dichloroethene	NA		0.25 U	0.25 U		0.25 U					0.25 U	0.25 U	
p-Dichlorobenzene	NA		0.05 U	0.05 U		0.05 U					0.05 U	0.05 U	
o-Dichlorobenzene	NA		0.05 U	0.05 U		0.05 U					0.05 U	0.05 U	
Benzene	0.03		**0.33**	0.05 U		0.05 U					0.05 U	0.05 U	
Toluene	7.0		**0.30**	0.05 U		0.05 U					0.05 U	0.05 U	
Ethylbenzene	6.0		0.05 U	0.05 U		**4.7**					0.05 U	0.05 U	
Xylenes	9.0		0.05 U	0.05 U		**16**					0.05 U	0.05 U	
Chlorobenzene	NA		**0.25**	0.25 U		0.25 U					0.25 U	0.25 U	

Table 1 - Analytical Results for Soil Samples

Sample ID:	Proposed MTCA Method A	SP14-S3	SP15-S3	SP17-S3	SP23-S2	SP23-S3	SP25-S2	SP27-S3	SP28-S2	HC1-COMP	HC2-COMP	HC3-COMP
Sample Depth (in Feet)	Residential	7-10	7-10	7-10	4-7	7-10	4-7	7-10	4-7			
Metals in mg/kg												
Arsenic	20	20 U	20 U	20 U	20 U	20 U			20 U			
Barium	NA	20 U	20 U	20 U	20 U	20 U			20 U			
Cadmium	2.0	1 U	1 U	1 U	1 U	1 U			1 U			
Chromium(c)	19(a)/2000(b)	**41**	**20**	**110**	**28**	**300**			20 U			
Lead	250	**6.9**	5 U	**10**	5 U	5 U			**15**			
Mercury	2.0	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U			0.01 U			
Selenium	NA	20 U	20 U	20 U	20 U	20 U			20 U			
Silver	NA	20 U	20 U	20 U	20 U	20 U			20 U			
NWTPH-Gx in mg/kg												
Mineral spirits/Stoddard solvent	30											
Gasoline	30											
NWTPH-Dx in mg/kg												
Kerosene/Jet fuel	2000									20 U	20 U	20 U
Diesel/Fuel oil	2000									20 U	20 U	20 U
Heavy oil	2000									50 U	50 U	50 U
NWTPH-HCID in mg/kg												
Gasoline	30	20 U		20 U	20 U	20 U		20 U				
Stoddard solvent/Mineral spirits	30	20 U		20 U	20 U	20 U		20 U				
Kensol	30	20 U		20 U	20 U	20 U		20 U				
Kerosene/Jet fuel	30	20 U		20 U	20 U	20 U		20 U				
Diesel/Fuel oil	2000	50 U		50 U	50 U	50 U		50 U				
Bunker C	2000	50 U		50 U	50 U	50 U		50 U				
Heavy oil	2000	100 U		100 U	100 U	100 U		100 U				
Volatiles in mg/kg												
1,1,1-Trichloroethane	2.0						0.05 U					
Trichloroethene	0.03						**0.16**					
1,1-Dichloroethane	NA						0.25 U					
Tetrachloroethene	0.05						0.05 U					
cis-1,2-Dichloroethene	NA						0.25 U					
p-Dichlorobenzene	NA						0.05 U					
o-Dichlorobenzene	NA						0.05 U					
Benzene	0.03						0.05 U					
Toluene	7.0						0.05 U					
Ethylbenzene	6.0						0.05 U					
Xylenes	9.0						0.05 U					
Chlorobenzene	NA						0.25 U					

U = Not detected at indicated detection limit.
Blank indicates sample not analyzed for analyte.
(a) Based on hexavalent chromium
(b) Based on trivalent chromium
Detected results presented in bold
Concentrations exceeding proposed MTCA criteria
D Detected at or above listed reporting limits.
(c) Because hexavalent chromium is not available, only total chromium results exceeding Puget Sound background of 48 mg/kg were boxed

Table 2 - Analytical Results for Water Samples

Date Sampled	Proposed MTCA A Groundwater	MTCA B Groundwater	SP-6 04/19/00	SP-7 04/19/00	SP-7 07/17/00	SP-8 04/19/00	SP-8 07/17/00	SP-11 04/17/00	SP-11 07/17/00	SP-12 04/19/00
Conventionals in mg/L										
Total Suspended Solids				**3,200**		**1,100**		**360**		**410**
NWTPH-G in mg/L										
Mineral Spirits/Stoddard Solvent	1	NA	NA	0.1 U	NA	NA	NA	NA	NA	0.1 U
Gasoline	0.8	NA	NA	0.1 U	NA	NA	NA	NA	NA	0.1 U
NWTPH-Dx in mg/L										
Kerosene/Jet Fuel	0.8	NA	0.2 U	0.2 U	NA	0.2 U	NA	NA	NA	0.2 U
Diesel/Fuel Oil	0.5	NA	0.2 U	0.2 U	NA	0.2 U	NA	NA	NA	0.2 U
Heavy Oil	0.5	NA	0.5 U	0.5 U	NA	0.5 U	NA	NA	NA	0.5 U
Volatile Organics in mg/L										
1,1,1-Trichloroethane 0.200	0.2	7.2	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	**0.0065**	0.001 U	NA
Trichloroethene 0.005	0.005	0.005	0.001 U	**0.0074**	**0.006**	0.001 U	0.001 U	**0.047**	0.001 U	NA
1, 1-Dichloroethane	NA	0.8	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	NA
Tetrachloroethene 0.005	0.005	0.005	0.001 U	**0.015**	**0.042**	0.001 U	**0.0044**	**0.0079**	0.001 U	NA
cis-1, 2-Dichloroethene	NA	0.08	0.005 U	0.005 U	**0.0044**	0.005 U	0.005 U	**0.02**	**0.027**	NA
p-Dichlorobenzene	NA	0.0064	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	NA
o-Dichlorobenzene	NA	0.72	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	NA
Benzene 0.005	0.005	0.005	**0.0064**	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Toluene 1.0	1	1.6	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Ethylbenzene 0.7	0.7	0.8	**0.0035**	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Xylenes 1.0	1	16	**0.0053**	**0.009**	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Total Metals in mg/L										
Arsenic	0.005	0.0000053	NA	NA	0.001 U	NA	**0.0021**	NA	**0.019**	NA
Barium	NA	1.12	NA	NA	**0.047**	NA	**0.16**	NA	**0.18**	NA
Cadmium	0.005	0.016	NA	NA	0.0005 U	NA	**0.0012**	NA	**0.0011**	NA
Chromium (Total)	0.05	0.08	NA	NA	0.01 U	NA	**0.015**	NA	**0.028**	NA
Chromium (+6)	NA	0.08							0.005 U	
Copper	NA	0.59	NA	NA	NA	NA	NA	NA	NA	NA
Lead	0.015	NA	NA	NA	**0.0014**	NA	**0.015**	NA	**0.0064**	NA
Mercury	0.002	0.0048	NA	NA	0.0002 U	NA	0.0002 U	NA	0.0002 U	NA
Selenium	NA	0.08	NA	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA
Silver	NA	0.08	NA	NA	0.1 U	NA	0.1 U	NA	0.15 U	NA
Zinc	NA	4.8	NA	NA	NA	NA	NA	NA	NA	NA
Dissolved Metals in mg/L										
Arsenic	0.005	0.0000053	NA	NA	0.001 U	NA	**0.0011**	0.0015 U	**0.016**	**0.0024**
Barium	NA	1.12	NA	NA	**0.038**	NA	**0.12**	**0.082**	**0.1**	**0.18**
Cadmium	0.005	0.016	NA	NA	0.0005 U	NA	0.0005 U	**0.00095**	0.0005 U	0.0005 U
Chromium (Total)	0.05	0.08	NA	NA	0.01 U	NA	0.01 U	0.01 U	0.01 U	0.01 U
Chromium (+6)	NA	0.08								
Copper	NA	0.59	NA	NA	0.001 U	NA	**0.0014**	NA	0.001 U	0.001 U
Iron	NA	NA					0.47		14	
Lead	0.015	NA	NA	NA	0.0005 U	NA	0.0005 U	0.0005 U	0.0005 U	0.0005 U
Mercury	0.002	0.0048	NA	NA	0.0002 U	NA	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Nickel	NA	0.10					0.011		0.006	
Selenium	NA	0.08	NA	NA	0.5 U	NA	0.5 U	0.4 U	0.5 U	0.4 U
Silver	NA	0.08	NA	NA	0.15 U	NA	0.18 U	0.0005 U	0.15 U	0.0005 U
Zinc	NA	4.8	NA	NA	NA	NA	**0.097**	NA	**0.011**	NA

Table 2 - Analytical Results for Water Samples

Date Sampled	SP-12 07/17/00	SP-14 04/17/00	SP-14 07/17/00	SP-15A 04/20/00	SP-15A 07/17/00	SP-19 04/19/00	SP-19 07/17/00	SP-21 04/18/00	SP-21 07/17/00	SP-23 04/18/00
Conventionals in mg/L										
Total Suspended Solids		43								
NWTPH-G in mg/L										
Mineral Spirits/Stoddard Solvent	NA	NA	NA	0.1 U	NA	NA	NA	NA	NA	0.1 U
Gasoline	NA	NA	NA	0.1 U	NA	NA	NA	NA	NA	0.1 U
NWTPH-Dx in mg/L										
Kerosene/Jet Fuel	NA	NA	NA	0.2 U	NA	NA	NA	0.2 U	NA	0.2 U
Diesel/Fuel Oil	NA	NA	NA	0.2 U	NA	NA	NA	0.2 U	NA	0.2 U
Heavy Oil	NA	NA	NA	0.5 U	NA	NA	NA	0.5 U	NA	0.5 U
Volatile Organics in mg/L										
1,1,1-Trichloroethane 0.200	0.001 U	0.001 U	NA	0.0074	0.0019	0.001 U	0.001 U	0.001 U	NA	NA
Trichloroethene 0.005	0.001 U	0.001 U	NA	0.059	0.011	0.001 U	0.001 U	0.001 U	NA	NA
1, 1-Dichloroethane	0.005 U	0.005 U	NA	0.048	0.014	0.005 U	0.005 U	0.005 U	NA	NA
Tetrachloroethene 0.005	0.001 U	0.001 U	NA	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	NA	NA
cis-1, 2-Dichloroethene	0.005 U	0.005 U	NA	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	NA	NA
p-Dichlorobenzene	0.001 U	0.001 U	NA	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	NA	NA
o-Dichlorobenzene	0.001 U	0.001 U	NA	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	NA	NA
Benzene	0.001 U	0.001 U	NA	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	NA	0.001 U
Toluene	0.001 U	0.001 U	NA	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	NA	0.001 U
Ethylbenzene	0.001 U	0.001 U	NA	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	NA	0.001 U
Xylenes	0.001 U	0.001 U	NA	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	NA	0.001 U
Total Metals in mg/L										
Arsenic 0.005	0.023	0.004 U	0.0027	0.0077	0.001 U	NA	0.027	NA	0.086	0.004 U
Barium	0.19	0.058	0.2	0.21	0.034	NA	0.21	NA	0.13	0.093
Cadmium	0.00063	0.0005 U	0.0011	0.0005 U	0.0005 U	NA	0.00096	NA	0.00055	0.0005 U
Chromium (Total) 0.050	0.01 U	0.036	0.15	2.9	2	NA	0.054	NA	0.014	0.065
Chromium (+6)	0.025 U		0.01 U		1.6		0.025 U		0.025 U	
Copper	NA	NA	NA	NA	NA	NA	NA	NA	NA U	NA
Lead	0.0005 U	0.0016	0.024	0.01	0.0012	NA	0.0053	NA	0.0013	0.011
Mercury	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	NA	0.0002 U	NA	0.0002 U	0.0002 U
Selenium	0.5 U	0.4 U	0.5 U	0.4 U	0.5 U	NA	0.5 U	NA	0.5 U	0.4 U
Silver	0.1 U	0.0005 U	0.1 U	0.0013	0.1 U	NA	0.15 U	NA	0.1 U	0.0005 U
Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA U	NA
Dissolved Metals in mg/L										
Arsenic	0.013	0.0015 U	NA	0.0015 U	0.001 U	NA	0.034	NA	0.14	0.0015 U
Barium	0.2	0.061	NA	0.021	0.018	NA	0.12	NA	0.11	0.03
Cadmium	0.0005 U	0.00064	NA	0.0005 U	0.0005 U	NA	0.0005 U	NA	0.0005 U	0.00055
Chromium (Total)	0.01 U	0.061	NA	3	2.2	NA	0.01 U	NA	0.01 U	0.012
Chromium (+6)										
Copper	0.001 U	NA	NA	NA	0.0013	NA	0.001 U	NA	0.001 U	NA
Iron	30				0.1 U		18		52	
Lead	0.0005 U	0.0005 U	NA	0.0005 U	0.0005 U	NA	0.0005 U	NA	0.0005 U	0.0005 U
Mercury	0.0002 U	0.0002 U	NA	0.0002 U	0.0002 U	NA	0.0002 U	NA	0.0002 U	0.0002 U
Nickel	0.0027				0.019		0.0046		0.0012	
Selenium	0.5 U	0.4 U	NA	0.4 U	0.5 U	NA	0.5 U	NA	0.5 U	0.4 U
Silver	0.15 U	0.0005 U	NA	0.0005 U	0.15 U	NA	0.15 U	NA	0.15 U	0.0005 U
Zinc	0.02	NA	NA	NA	0.007	NA	0.0085	NA	0.0091	NA

Table 2 - Analytical Results for Water Samples

Date Sampled	SP-23 07/17/00	SP-24 04/18/00	SP-24 07/17/00	SP-25 04/18/00	SP-25 07/17/00	SP-28 04/20/00	SP-28 07/17/00	HC-104 06/29/00	HC-105 06/29/00	HC-106 06/29/00
Conventionals in mg/L										
Total Suspended Solids								14	3,800	33
NWTPH-G in mg/L										
Mineral Spirits/Stoddard Solvent	NA	NA U	NA	0.1 U	NA	0.1 U	NA	0.1 U	0.1 U	0.1 U
Gasoline	NA	NA U	NA	0.1 U	NA	0.1 U	NA	0.1 U	0.1 U	0.1 U
NWTPH-Dx in mg/L										
Kerosene/Jet Fuel	NA	0.2 U	NA	0.2 U	NA	0.2 U	NA	0.2 U	0.2 U	0.2 U
Diesel/Fuel Oil	NA	0.2 U	NA	0.2 U	NA	0.2 U	NA	0.2 U	0.2 U	0.2 U
Heavy Oil	NA	0.5 U	NA	0.5 U	NA	0.5 U	NA	0.5 U	0.5 U	0.5 U
Volatile Organics in mg/L										
1,1,1-Trichloroethane	0.0016	0.001 U	0.001 U	0.001 U	NA	NA	0.001 U	0.001 U	0.001 U	0.001 U
Trichloroethene	0.001 U	0.001 U	0.001 U	0.001 U	NA	NA	0.001 U	0.001 U	0.001 U	0.001 U
1, 1-Dichloroethane	0.007	0.005 U	0.005 U	0.005 U	NA	NA	0.005 U	0.005 U	0.005 U	0.005 U
Tetrachloroethene	0.001 U	0.001 U	0.001 U	0.001 U	NA	NA	0.001 U	0.001 U	0.001 U	0.001 U
cis-1, 2-Dichloroethene	0.005 U	0.005 U	0.005 U	0.005 U	NA	NA	0.005 U	0.005 U	0.005 U	0.005 U
p-Dichlorobenzene	0.001 U	0.001 U	0.001 U	0.0038	NA	NA	0.001 U	0.001 U	0.001 U	0.001 U
o-Dichlorobenzene	0.001 U	0.001 U	0.001 U	0.0062	NA	NA	0.001 U	0.001 U	0.001 U	0.001 U
Benzene	0.001 U	0.001 U	0.001 U	0.001 U	NA	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Toluene	0.001 U	0.001 U	0.001 U	0.001 U	NA	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Ethylbenzene	0.001 U	0.001 U	0.001 U	0.001 U	NA	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Xylenes	0.001 U	0.001 U	0.001 U	0.001 U	NA	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Total Metals in mg/L										
Arsenic	0.001 U	NA	0.017	NA	0.0048	0.0074	0.029	0.004 U	0.019	0.004 U
Barium	0.005 U	NA	0.22	NA	0.073	0.35	0.18	0.074	0.44	0.13
Cadmium	0.00082	NA	0.00092	NA	0.00053	0.00057	0.0005 U	0.0005 U	0.00078	0.0005 U
Chromium (Total)	0.01 U	NA	0.056	NA	0.01 U	0.49	0.029	0.01 U	0.14	0.01 U
Chromium (+6)	0.022							0.01 U	0.024	0.01 U
Copper	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	0.0055	NA	0.0081	NA	0.00084	0.037	0.00054	0.0005 U	0.02	0.0005 U
Mercury	0.0002 U	NA	0.0002 U	NA	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Selenium	0.5 U	NA	0.5 U	NA	0.5 U	0.4 U	0.5 U	0.05 U	0.05 U	0.05 U
Silver	0.1 U	NA	0.1 U	NA	0.1 U	0.00058	0.1 U	0.05 U	0.05 U	0.05 U
Zinc	NA	NA	NA	NA	NA	NA	NA	0.019	0.18	0.021
Dissolved Metals in mg/L										
Arsenic	0.001 U	NA	0.001 U	NA	0.0092	0.002	0.056	0.0059	0.001 U	0.0076
Barium	0.036	NA	0.036	NA	0.069	0.089	0.19	0.071	0.067	0.12
Cadmium	0.0005 U	NA	0.0005 U	NA	0.0005 U	0.00089	0.0005 U	0.0005 U	0.0005 U	0.0005 U
Chromium (Total)	0.023	NA	0.01 U	NA	0.01 U	0.01 U	0.023	0.01 U	0.01 U	0.01 U
Chromium (+6)							0.025 U	0.01 U	0.01 U	0.01 U
Copper	0.0016	NA	0.0015	NA	0.0019	NA	0.0013	0.001 U	NA	NA
Iron	0.1 U		0.1 U		15		25			
Lead	0.0005 U	NA	0.0005 U	NA	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U
Mercury	0.0002 U	NA	0.0002 U	NA	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Nickel	0.018		0.0069		0.0045		0.0052			
Selenium	0.5 U	NA	0.5 U	NA	0.5 U	0.4 U	0.5 U	0.05 U	0.05 U	0.05 U
Silver	0.15 U	NA	0.15 U	NA	0.15 U	0.0005 U	0.18 U	0.01 U	0.01 U	0.01 U
Zinc	0.004 U	NA	0.0053	NA	0.0056	NA	0.013	0.01 U	0.01 U	0.01 U

Hart Crowser
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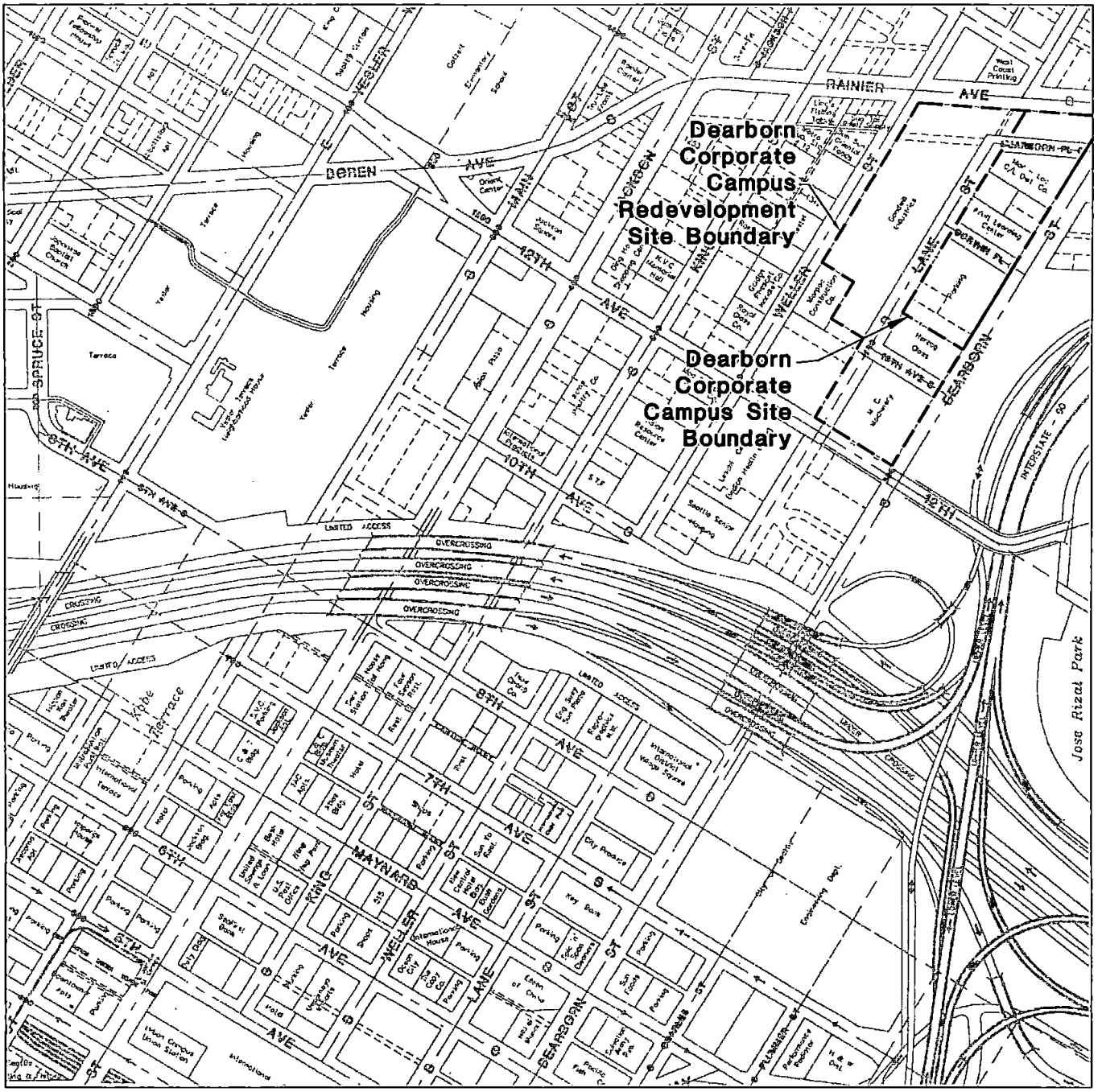
Table 2 - Analytical Results for Water Samples

Date Sampled	HC-107S 06/29/00	HC-107D 06/29/00	HC-112W 06/29/00	MW-A 06/29/00	MW-B 06/29/00	MW-C 06/29/00
Conventionals in mg/L						
Total Suspended Solids	**810**	**55**	**340**	**14**	**160**	**6**
NWTPH-G in mg/L						
Mineral Spirits/Stoddard Solvent	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Gasoline	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
NWTPH-Dx in mg/L						
Kerosene/Jet Fuel	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Diesel/Fuel Oil	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Heavy Oil	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Volatile Organics in mg/L						
1,1,1-Trichloroethane	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Trichloroethene	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
1, 1-Dichloroethane	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Tetrachloroethene	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
cis-1, 2-Dichloroethene	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
p-Dichlorobenzene	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
o-Dichlorobenzene	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Benzene	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Toluene	**0.063**	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Ethylbenzene	**0.0051**	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Xylenes	**0.018**	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Total Metals in mg/L						
Arsenic	0.004 U	0.004 U	**0.007**	0.004 U	**0.0067**	0.004 U
Barium	**0.11**	**0.063**	**0.2**	**0.018**	**0.082**	**0.018**
Cadmium	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U
Chromium (Total)	0.01 U	0.01 U	**0.031**	0.01 U	**0.027**	0.01 U
Chromium (+6)	**0.017**	0.1 U	**0.014**	0.01 U	0.005 U	0.005 U
Copper	NA	NA	NA	NA	NA	NA
Lead	**0.0013**	0.0005 U	**0.0053**	0.0005 U	**0.004**	0.0005 U
Mercury	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Selenium	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Silver	0.05 U	0.05 U	0.05 U	0.05 U	0.01 U	0.01 U
Zinc	**0.03**	**0.085**	**0.088**	**0.051**	**0.036**	0.01 U
Dissolved Metals in mg/L						
Arsenic	**0.0035**	**0.0012**	**0.0066**	0.001 U	**0.0015**	**0.0012**
Barium	**0.096**	**0.029**	**0.097**	**0.015**	**0.018**	**0.016**
Cadmium	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U
Chromium (Total)	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Chromium (+6)	0.01 U	0.1 U	0.01 U	0.01 U	0.005 U	0.005 U
Copper	NA	NA	NA	NA	NA	NA
Iron						
Lead	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U
Mercury	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Nickel						
Selenium	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Silver	0.01 U	0.01 U	0.01 U	0.01 U	0.05 U	0.05 U
Zinc	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U

U Not detected at detection limit indicated.
NA Not Analyzed
Detected results in bold
Concentrations exceeding MTCA A Groundwater criteria

Vicinity Map



0 500 1000

Scale in Feet

N

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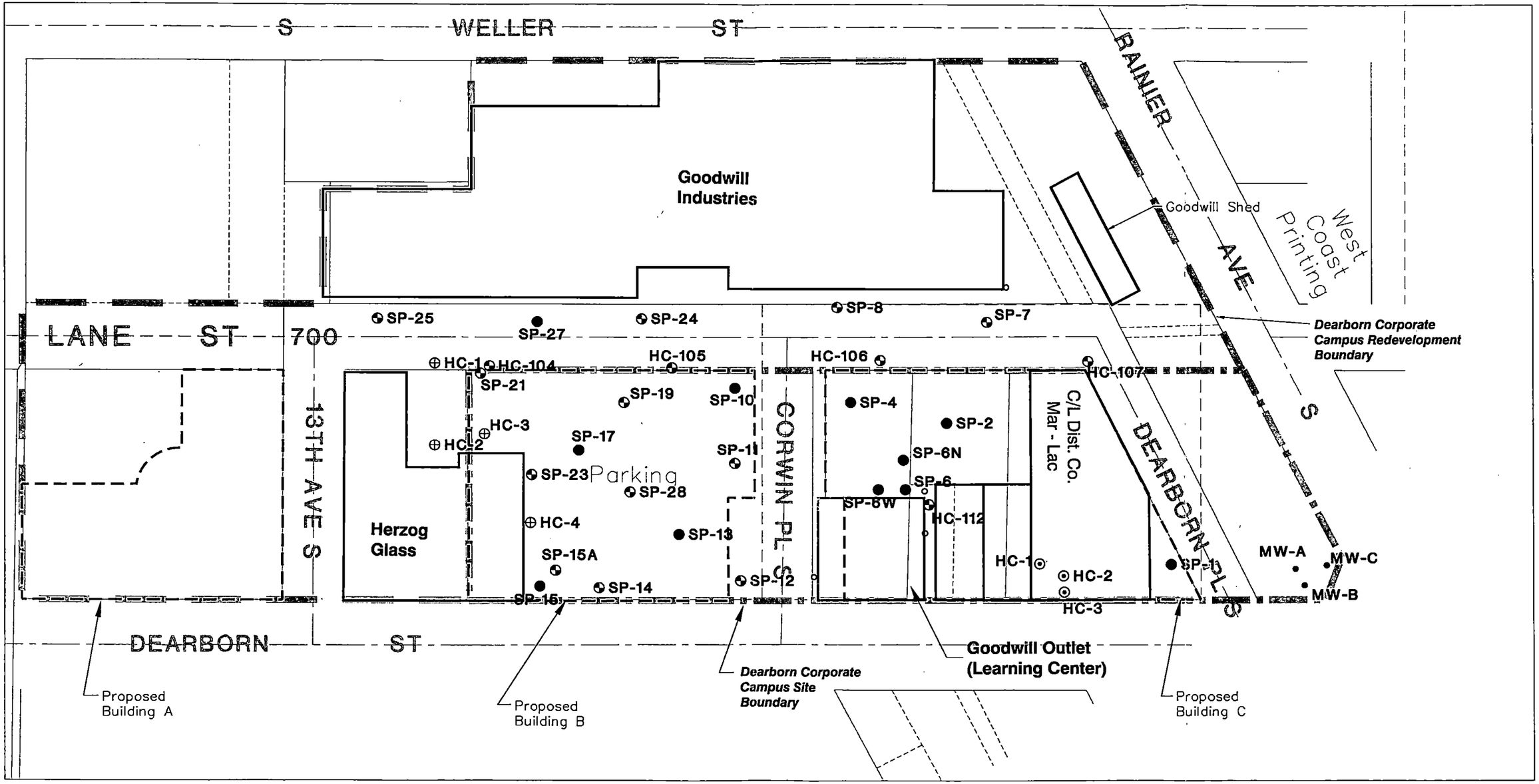
J-7206-01 12/00

Figure 1

DTN 12/29/00 1=500 charlie.pc2
vicinitymap.dwg

Dearborn Corporate Campus Site and Exploration Plan



Approximate Location of Proposed Features

Approximate Location of Existing Features

Exploration Location and Number

- ● SP-2 Strataprobe Boring
- ⊕ SP-8 Strataprobe Monitoring Well
- ⊕ HC-109 HSA Monitoring Well
- ⊕ HC-4 Previous Monitoring Well (Hart Crowser)
- • MW-A Previous Monitoring Well (Geo Engineers)
- ⊙ HC-1 Previous Hand Auger Boring (Hart Crowser)

0 100 200

Scale in Feet

N

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Figure 2

DTN 12/29/00 1=1 charlie.pc2
72060101

Summary of Groundwater Quality Data

Volatile Organics

S WELLER ST

RAINIER AVE S

LANE ST

13TH AVE S

CORWIN PL S

DEARBORN PL S

DEARBORN ST

700

SP-11

Date	PCE	TCE	B	DCB
4/2000	7.9	47	ND	ND
7/2000	ND	ND	ND	ND

SP-7

Date	PCE	TCE	B	DCB
4/2000	15	7.4	ND	ND
7/2000	42	6	ND	ND

SP-25

Date	PCE	TCE	B	DCB
4/2000	ND	ND	ND	10

SP-8

Date	PCE	TCE	B	DCB
4/2000	ND	ND	ND	ND
7/2000	4.4	ND	ND	ND

Goodwill Industries

Goodwill Shed

West Coast Printing

Dearborn Corporate Campus Redevelopment Boundary

SP-25 SP-27 ND SP-24 SP-8 SP-7

HC-1 ND HC-104 ND HC-105 HC-106 ND HC-107

SP-21 ND SP-19 ND SP-10 SP-4 SP-2

HC-3 HC-2 SP-17 SP-11 SP-6N SP-6

ND SP-23 Parking SP-28 ND SP-6W HC-112 ND

Herzog Glass

HC-4 SP-13 HC-1 HC-2 SP-1

SP-15A ND SP-14 ND SP-12 HC-3

SP-15

C/L Dist. Co. Mar - Lac

Former Unsocial Sta.

MW-A ND MW-C ND MW-B ND

Goodwill Outlet (Learning Center)

Dearborn Corporate Campus Site Boundary

Proposed Building A

Proposed Building B

Proposed Building C

SP-15A

Date	PCE	TCE	B	DCB
4/2000	ND	59	ND	ND
7/2000	ND	11	ND	ND

SP-6

Date	PCE	TCE	B	DCB
4/2000	ND	ND	6.4	ND

Approximate Location of Proposed Features

Approximate Location of Existing Features

- **SP-2** Strataprobe Boring
- **SP-8** Strataprobe Monitoring Well
- **HC-109** HSA Monitoring Well
- **HC-4** Previous Monitoring Well (Hart Crowser)
- **MW-A** Previous Monitoring Well (Geo Engineers)
- **HC-1** Previous Hand Auger Boring (Hart Crowser)

PCE Tetrachloroethene (ug/L)

TCE Trichloroethene (ug/L)

B Benzene (ug/L)

DCB Total Dichlorobenzenes (ug/L)

ND Not Detected

11 Shaded results exceed applicable MTCA Groundwater Cleanup Levels

N

0 100 200

Scale in Feet

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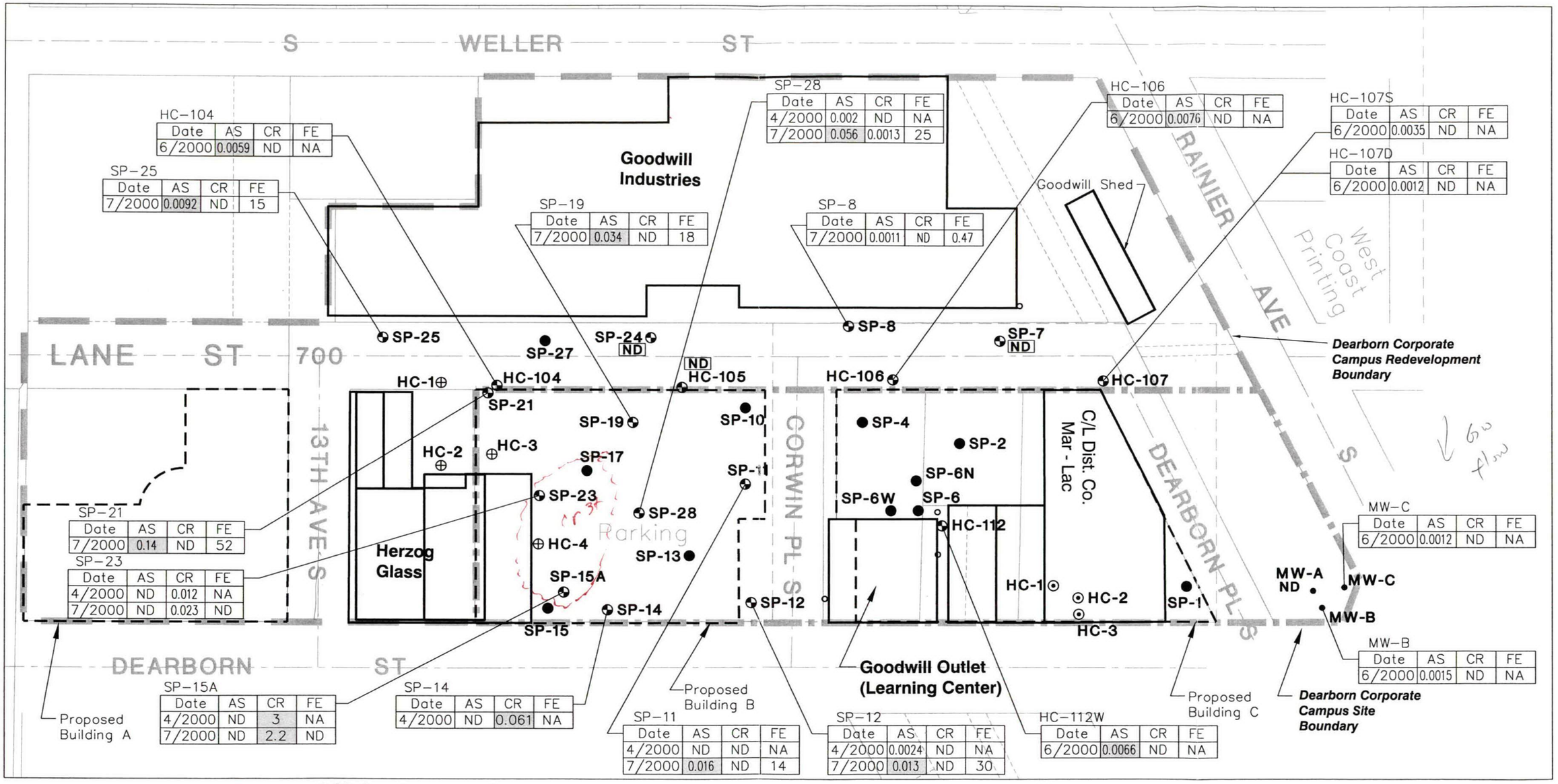
Figure 3

D:\N 12/29/00 1=1 charlie.pc2
72060103

Summary of Groundwater Quality Data

Dissolved Metals



HC-104			
Date	AS	CR	FE
6/2000	0.0059	ND	NA

SP-25			
Date	AS	CR	FE
7/2000	0.0092	ND	15

SP-28			
Date	AS	CR	FE
4/2000	0.002	ND	NA
7/2000	0.056	0.0013	25

SP-19			
Date	AS	CR	FE
7/2000	0.034	ND	18

SP-8			
Date	AS	CR	FE
7/2000	0.0011	ND	0.47

HC-106			
Date	AS	CR	FE
6/2000	0.0076	ND	NA

HC-107S			
Date	AS	CR	FE
6/2000	0.0035	ND	NA

HC-107D			
Date	AS	CR	FE
6/2000	0.0012	ND	NA

SP-21			
Date	AS	CR	FE
7/2000	0.14	ND	52

SP-23			
Date	AS	CR	FE
4/2000	ND	0.012	NA
7/2000	ND	0.023	ND

SP-15A			
Date	AS	CR	FE
4/2000	ND	3	NA
7/2000	ND	2.2	ND

SP-14			
Date	AS	CR	FE
4/2000	ND	0.061	NA

SP-11			
Date	AS	CR	FE
4/2000	ND	ND	NA
7/2000	0.016	ND	14

SP-12			
Date	AS	CR	FE
4/2000	0.0024	ND	NA
7/2000	0.013	ND	30

HC-112W			
Date	AS	CR	FE
6/2000	0.0066	ND	NA

MW-C			
Date	AS	CR	FE
6/2000	0.0012	ND	NA

MW-B			
Date	AS	CR	FE
6/2000	0.0015	ND	NA

Approximate Location of Proposed Features

Approximate Location of Existing Features

- **SP-2** Strataprobe Boring
- **SP-8** Strataprobe Monitoring Well
- **HC-109** HSA Monitoring Well
- **HC-4** Previous Monitoring Well (Hart Crowser)
- **MW-A** Previous Monitoring Well (Geo Engineers)
- **HC-1** Previous Hand Auger Boring (Hart Crowser)

As Arsenic (mg/L)

Cr Total Chromium (mg/L)

Fe Iron (mg/L)

ND Not Detected

NA Not Analyzed

2.2 Shaded results exceed applicable MTCA Groundwater Cleanup Levels

N

0 100 200

Scale in Feet

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J-7206-01 12/00

Figure 4

DTN 12/29/00 1=1 charlie.pc2
72060104