Cleanup Action Plan
South Dearborn Facility

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1. INTRODUCTION

This Cleanup Action Plan (CAP) is provided by King County Department of Metropolitan Services (Metro) to describe the proposed remedial action for the Metro property located on South Dearborn Street in Seattle, Washington. Cleanup actions are being initiated under a Consent Decree between Metro and the Washington State Department of Ecology (Ecology) under the Washington State Model Toxics Control Act (MTCA, WAC 173-340) and specifically according to WAC 173-340-360 (10).

The purposes of this CAP are the following:

- describe the site, including a summary of its history and extent of contamination as presented in the site characterization study (results of characterization work collectively constitute the Remedial Investigation, or RI, under MTCA);
- identify the site-specific cleanup standards for site soil and groundwater;
- summarize the remedial alternatives for site soils and groundwater presented in the Feasibility Study (FS); and
- identify, describe, and justify the selected alternative for site remediation.

Detailed descriptions of the site, site history. site contamination, assessment of human health risks, and remedial alternatives are presented in the following documents:

- Tank Removal Activities Dearborn Street Facility, Boateng Environmental Scientists, January 1991 (Boateng, 1991);
- Environmental Assessment Report, Northwest Industrial Hygiene, January 8, 1992 (NIH, 1992);.
- Focused First Phase of Soil and Groundwater Assessment of the Metro Dearborn Facility, Enviros, November 5, 1991 (Enviros, 1991);
- Second Phase of Site Characterization of the Metro South Dearborn Facility, Enviros, October 22, 1993 (Enviros, 1993a);
- Human Health Risk Assessment and Feasibility Study of the Metro South Dearborn Facility, Enviros, October 22, 1993 (Enviros, 1993b);
- Report of October 1993 Groundwater Sampling and Analysis, Enviros, December 3, 1993 (Enviros, 1993c); and
- Report of January and February 1994 Groundwater Sampling and Analysis, Enviros, March 25, 1994 (Enviros, 1994).

Cleanup standards and cleanup action strategies have been developed by assuming future residential development of the property and most likely use as a community center for civic, recreational, child day care, elderly residences, and office purposes.

Environmental work to date has been conducted on an independent basis. Future cleanup work will be conducted under a Consent Decree between Metro and Ecology.

2. SITE DESCRIPTION

2.1 Site Location

The Metro South Dearborn facility is located adjacent to, and north of, the intersection of 8th Avenue South and South Dearborn Street (in the NW 1/4 of the NW 1/4 of Section 5, Township 24 N, Range 4 E) in Seattle (King County), Washington as shown in Figures 2.1 and 2.2. The site is approximately 3/4-mile south of the Seattle Central Business District at the south end of the International District. Surrounding properties are used for commercial and retail purposes. Interstate Highway 5 immediately adjoins the eastern boundary of the site. The City of Seattle Charles Street Vehicle Maintenance Facility is located immediately south from the site across South Dearborn Street. The property is not in an environmentally sensitive area.

The site is at an elevation of approximately 70 feet above mean sea level. The ground surface slopes approximately 5% to the southwest towards Elliott Bay, which is approximately 3/4 miles to the west.

The site consists of two parcels separated by 8th Avenue South. Figure 2.2 shows the general layout of the site with the east and west parts of the site. Figure 2.3 illustrates the east parcel and shows the general topography.

The east parcel has an area of approximately 40,000 square feet or approximately 1 acre. A two-story, concrete block structure covers approximately 13,000 square feet of the parcel along the Dearborn Street side of the property. Figure 2.4 shows the existing floor plan of the building which was used as a service and garage facility over most of its 46-year existence. The remainder of the site is a fenced, largely paved, vacant area.

The west parcel is approximately 27,450 square feet in area or approximately 0.6 acre and is currently a paved parking lot. Figure 2.5 shows the topography of the west parcel.

2.2 Site History

Prior to 1936 several buildings occupied the west parcel: one larger building was used as a hotel, restaurant and later a winery. Three residences also occupied a portion of the west parcel. All of these structures were demolished in 1964 and 1965 and the property was converted into a parking area.

Prior to 1947 the east parcel was vacant and undeveloped along South Dearborn Street and 8th Avenue South on the south and west sides of the property. Until 1947, on the Lane Street side of the property two residential structures were present prior to 1936. In 1947, the east parcel of the site was developed by Grayline Sightseeing Co. into a bus storage and service facility. The present concrete block, 2-story building was erected in 1947 to serve as an office and garage for the bus sightseeing company. Two 1,000-gallon and, in 1958, one 10,000-gallon and one

6,000-gallon underground storage tanks were located at the facility. The two larger tanks were apparently installed to replace the two smaller original tanks. A hoist was also used at the facility until the 1960's. In 1955 a second elongated garage structure with a concrete floor was built north and east of the existing garage building. During the 1950's, to the east of the existing building, there was also a building which was used by a laundry and dry cleaning business called Spic 'N Span Cleaners. This business occupied the building until 1964 when the building as well as the second bus garage were demolished for the construction of the Interstate 5 Freeway. The western half of the east parcel of the site remained in use by Grayline Sightseeing or a subsequent property owner, Metro Terminal Company, until purchase of both east and west parcels by Metro in February 1974.

According to available records, Metro used the east parcel for vehicle maintenance, fueling, and vehicle parking until the late 1980s. Five underground storage tanks (USTs; one fresh motor oil, two unleaded gasoline, and two diesel) were in place on the east parcel in December 1990 when they were decommissioned. The locations and a summary of the UST contents and volumes are presented in Figure 2.3. Since the USTs were decommissioned, the east parcel of the site has been vacant or used as a warehouse for Metro equipment.

Metro used the west parcel for vehicle parking since acquiring the property in 1974. Currently, the west part of the site is used for public parking.

3. SUMMARY OF SITE CHARACTERIZATION WORK

In December 1990 the site USTs were decommissioned and disposed off-site. A Metro contractor, Boateng, collected soil samples and interpreted the analytical results of soil samples collected from the tank excavations. According to a summary report prepared by Boateng (1991), soil contamination was found in three of the four tank excavation areas: Areas 2, 3, and 4 as shown in Figure 2.3. Chemical analyses interpreted by Boateng indicated that residual soils contained petroleum contamination consisting of light-fraction hydrocarbons (gasoline and a hydrocarbon characterized as kerosene), and possibly diesel fuel. The tank excavations were apparently backfilled with a mixture of excavated overburden material and imported clean fill. The UST piping, facility building, and associated sumps remain in-place.

Since contamination associated with the former USTs was confirmed in December 1990, Enviros has conducted two phases of soil and groundwater characterization at the site. Phase 1 characterization work is documented in Enviros (1991). Phase 2 work is presented in Enviros (1993a). Metro conducted quarterly groundwater sampling from selected Metro wells and City of Seattle (City) wells at the Charles Street Maintenance facility across South Dearborn Street. Two rounds of quarterly sampling are presented in Enviros (1993c and 1994). Seven monitoring wells, 28 borings, and 25 hand auger holes were advanced in the east and west parcels of the site during the two phases of site characterization.

3.1 Soil Characterization

Lithology from the ground surface to depths between 15 and 35 feet below grade consists of clayey soils which are underlain by a silty sandy stratum. The thickness of the silty sandy stratum has not been determined. Based upon information in the literature regarding lithology beneath Seattle, interbedded unconsolidated clay, sand, silt, and gravel material underlie the site to depths of up to 1,000 meters (3,281 feet) where bedrock is encountered.

Figures 2.3, 2.4, and 2.5 show RI Phase 1 and Phase 2 boring and well locations for the east part of the site, the building interior, and the west part of the site, respectively. On the east part of the site, sampling locations were focused around previously confirmed contamination sources (i.e., UST Areas 2, 3, and 4) and around other possible source areas in the interior of the site building (e.g., boiler room, air compressor, hydraulic system, sump, paint and solvent use areas). Borings in the upper lot of the east part of the site, and on the west part of the site, were placed in a grid pattern because no source areas or releases are known in these areas.

The principal contaminants detected in site soils are fuel hydrocarbons, such as oil, diesel, gasoline and volatile components of gasoline, or benzene/ toluene/ ethylbenzene/ xylenes (BTEX). The site assessment indicated the presence of two primary hot spots in site soils: one around UST Area 2 and one around UST Area 4 which extends beneath the site building. Concentrations of fuel hydrocarbons in the hot spot soils have been measured up to 10,000 milligrams per kilogram (mg/Kg, or parts per million-ppm) gasoline, 3,200 mg/Kg diesel, and 26,000 mg/Kg heavier fraction. The general distribution of the hydrocarbon concentrations above MTCA A Cleanup Levels is shown on Figures 2.6, 2.7, 2.8 and 2.9.

Detectable concentrations of acetone, tetrachloroethylene (PCE), trichloroethylene (TCE) and trichlorofluoromethane were detected during the Phase 2 soil assessment. The detection of these volatile organic compounds was limited to generally one sample in shallow soil material from around the sump area in the interior of the former garage building and all were below MTCA Method A Cleanup Levels.

Soil contamination units were broken out according to location, depth, and media as described below:

Unit A: shallow clayey soils with oil-related hydrocarbons and in locations not associated with USTs;

Unit B: excavatable clayey soil with fuel hydrocarbons shallower than 15 feet below present ground surface (does not include Unit A);

Unit C: non-excavatable clayey soil with fuel hydrocarbons below 15 feet below grade; and

Unit D: non-excavatable deeper sandy soil above the groundwater surface with fuel hydrocarbon contamination.

3.2 Groundwater Characterization

Groundwater was encountered at a depth of approximately 37.5 feet below the grade of the concrete slab floor of the site building in silty sandy material. The upper-most groundwater conditions are unconfined and the inferred gradient direction is generally towards the south and west with varying westward components depending upon season and location. The observed hydraulic gradient across the site is approximately 0.001 foot/ foot. Interpretation of slug test measurements indicate a hydraulic conductivity between 10^{-5} and 10^{-8} feet per second. Figure 3.1 shows a potentiometric surface map inferred from groundwater head elevations measured since 1992. The map in Figure 3.1 is discussed in detail in Enviros (1994).

No free phase floating petroleum products have been encountered on the groundwater. Dissolved petroleum fuel hydrocarbons primarily related to gasoline were detected in groundwater at the site. BTEX compounds were also detected in groundwater from several monitoring wells at the site. Gasoline compounds have been determined to be the most prevalent compounds in the site groundwater and total petroleum hydrocarbons as gasoline concentrations have been measured up to 67,000 micrograms per liter (µg/l, or parts per billion-ppb) in well W4. Gasoline contamination in groundwater is localized in the southwest corner of the east parcel and has not migrated to the west parcel of the site (no gasoline has been measured in Metro well W8) or to City property (no gasoline has been measured in City wells MW-11 and MW-13 south and across South Dearborn Street from the site). The measured concentrations of gasoline and benzene in groundwater at the site is summarized on Figures 3.2 and 3.3.

Diesel concentrations have been measured in three of the Metro wells. However, no diesel was measured in the January/ February 1994 round of groundwater sampling (Enviros, 1994). Detections of total petroleum hydrocarbons as oil (using EPA Method 418.1) in site groundwater are likely to result from interferences from the gasoline and thus misrepresent amount of diesel present. Diesel and oil concentrations in site groundwater are minor relative to gasoline concentrations.

Some solvents, phenols, and non-carcinogenic polynuclear aromatic hydrocarbons (PAHs) were also measured in site groundwater and are coincident with gasoline distribution. 1,2-dichloroethane (DCA) has been detected in four site wells. Quantities of 1,1 Dichloroethene (DCE), 1,2-DCE, methyl ethyl ketone (MEK), acetone, 2-hexanone, tetrachloroethane, chloromethane, carbon disulfide, chloroform, and methylene chloride have also been detected (Figure 3.4). Concentrations of phenols (4-methylphenol, 2,4-dimethylphenol, phenol), naphthalenes (2-methylnaphthalene, naphthalene), phthalates (di-n-butylphthalate, bis(2-ethylhexyl)phthalate), and isophorone have also been detected in site groundwater (Figure 3.5). Solvent, phenol, and PAH compounds have not been detected in the northern-most City wells or in groundwater on the west parcel of the site (with the exception of methylene chloride and phthalates; both of which have been detected in laboratory blanks suggesting lab contamination).

The origin of the solvent, phenol, and PAH concentrations at the site is not certain. Some of these compounds may be constituents of cleaning solvents. DCA has historically been used as an additive to leaded gasoline, and cleaning solvents associated with machinery repair facilities, and dry cleaning operations. Naphthalenes are contained in diesel fuels. Phthalates are constituents of plastics and could easily be introduced into water samples during analytical work. Volatile organic compounds such as methylene chloride and acetone are also common laboratory contaminants.

Total lead has been detected in all wells sampled for lead. Dissolved lead was detected in the January/ February 1994 round of groundwater sampling in two Metro wells and in one City well.

4. CLEANUP STANDARDS

Compliance with cleanup standards is determined by compliance with cleanup levels and points of compliance specified in this section. Cleanup standards were developed for this site based upon WAC 173-340. Method A cleanup levels for soils and groundwater will be utilized for indicator hazardous substances which are those substances which contribute the largest overall threat to human health and the environment because of their prevalence, toxicity, mobility, and distribution. Use of Method A cleanup levels is justified at this site because data indicate that soil contamination consists of relatively few hazardous substances (generally fuel hydrocarbons and incidental compounds) and because cleanup is focused on fuel hydrocarbons.

4.1 Soil Cleanup Levels

The occurrence of petroleum fuel hydrocarbons associated with the former UST systems dictates that TPH (as gasoline, diesel, oil) be the indicator contaminant during soil cleanup at this site. Other measured soil contaminants are considered to be incidental to TPH contamination from the former UST systems and will be remediated with the cleanup of contamination as TPH. Cleanup levels for soils at the site will be Method A levels as specified in WAC 173-340-740 and are presented in Table 4.1 below.

Table 4.1. Cleanup Levels for Soil Indicator Compounds.

Compound		Cleanup Level (mg/kg)
Total Petroleum Hydrocarbons	Gasoline	100 (Method A)
	Diesel	200 (Method A)
	Oil	200 (Method A)

4.2 Groundwater Cleanup Levels

The Human Health Risk Assessment and FS for the site, Enviros (1993b), concluded that there is negligible adverse risk to human health and the environment if contact with groundwater through onsite inhalation and onsite ingestion is prevented. Risk arguments demonstrate that risk to off-site receptors is low and that groundwater cleanup for protection of off-site receptors is not mandated in the context of this MTCA cleanup. However, in an effort to avoid reliance on burdensome institutional controls, to minimize the potential of off-site migration, and to expedite groundwater restoration, Metro will conduct groundwater cleanup.

The occurrence of petroleum fuel hydrocarbons associated with the former UST systems dictates that TPH be the indicator contaminant during groundwater cleanup at this site. The most prevalent TPH compound in the site groundwater is gasoline and therefore TPH as gasoline will be the indicator contaminant for groundwater cleanup at the site. Benzene contamination, incidental to TPH as gasoline, will also be an indicator compound for groundwater restoration because of its prevalence, carcinogenicity, and relatively high mobility.

Other measured contaminants in groundwater (solvents, phenols, and non-carcinogenic PAHs) are considered to be incidental to TPH contamination from the former UST systems and will be remediated with the cleanup of contamination as TPH and as benzene. Volatile solvent compounds are less prevalent in site groundwater and are therefore not considered to be indicator compounds driving site cleanup. However, volatile solvent compounds in site groundwater will also be addressed with groundwater cleanup for TPH as gasoline and for benzene. PAH compounds and TPH as diesel are not considered to be indicator contaminants driving groundwater cleanup because these compounds have been less prevalent in site groundwater, and because of their relatively lower toxicity. Degradation of PAHs and TPH as diesel will be enhanced by stimulation of biological activity with the introduction of oxygen during groundwater sparging.

Cleanup levels for indicator groundwater contaminants at the site will be Method A levels as specified in WAC 173-340-720 and are presented in Table 4.2 below. If groundwater cleanup action cannot achieve Method A cleanup levels after two years, and it is demonstrated that residual groundwater contamination has been reduced to the maximum extent practicable, groundwater cleanup will be terminated. Institutional controls limiting on-site groundwater usage will be substituted for continued groundwater cleanup.

Table 4.2. Cleanup Levels for Groundwater Indicator Compounds.

Compound	Cleanup Level (µg/l)
TPH-Gasoline	1,000 (Method A)
Benzene	5.0 (Method A)

Sampling for volatile and semi-volatile organic compounds will be conducted as part of the confirmational sampling at well locations that have previously shown the presence of such compounds at levels which exceed the MTCA Method A Cleanup levels. The detailed sampling protocol will be set forth in the draft Engineering Design Report.

4.3 Soil and Groundwater Points of Compliance

A reasonable estimate of depth of soil that could be excavated and distributed at the soil surface as a result of future site development activities is assumed to be 15 feet below the ground surface according to WAC 173-340-740(6)(c). Therefore, the top 15 feet of soil will be the vertical extent of the point-of-compliance for soil cleanup. The lateral extent of the point of compliance shall be the property boundaries with appropriate set-backs to protect adjacent road and underground utility foundations. Details of performance monitoring, including precise locations for excavation related to the soil cleanup action will be set forth in the draft Engineering Design Report.

The monitoring points for evaluating performance of the groundwater treatment technology will be along lines approximately defined by current Monitoring Wells 1, 4, and 6. Those lines will approximately parallel the south and west property lines of the east parcel as required by WAC 173-340-720 (6) (c). A final determination will be set for in the draft Engineering Design Report.

5. SUMMARY OF CLEANUP ACTION ALTERNATIVES

MTCA requires, as a minimum, that all cleanup actions protect human health and the environment, comply with cleanup standards, comply with applicable state and federal laws, and provide for compliance monitoring. In addition, all cleanup actions must consider implementation time, permanence of solutions, and utilization of Ecology-preferred resource recovery technologies to the maximum extent practicable.

Metro considered a wide range of potential cleanup technologies for each of four soil contamination units (Units A, B, C and D) and the groundwater (Enviros, 1993b) in order to select the most effective, implementable, and cost-effective remediation alternative for site cleanup.

The detailed evaluation in the FS considered the following:

- All Soil Units:
  - No-action/ natural attenuation;
  - Institutional controls to limit exposure to residual hazardous substances at the site;

- Soil Unit A (surficial clayey soils with oil-related hydrocarbon contamination not associated with former USTs):
  - Maintenance of existing pavement cover in good condition to prevent human contact with soils and to minimize infiltration of rainwater and subsequent downward migration of contaminants;
  - Installation of an engineered impermeable pavement cover (cap) to prevent human contact with soils and to minimize infiltration of rainwater and subsequent downward migration of contaminants;
  - Off-site disposal of soil exceeding cleanup levels, and backfill with imported clean fill;
  - On-site ex-situ biotreatment/ aeration of soil exceeding cleanup levels, and backfill with treated soils; and
  - On-site ex-situ thermal desorption of soil exceeding cleanup levels, and backfill with treated soils.

- Soil Unit B (excavatable clayey hot spot soils shallower than 15 feet below present grade with fuel hydrocarbon contamination and associated with former USTs):
  - Maintenance of existing pavement cover in good condition to prevent human contact with soils and to minimize infiltration of rainwater and subsequent downward migration of contaminants;
  - Installation of an engineered impermeable pavement cover (cap) to prevent human contact with soils and to minimize infiltration of rainwater and subsequent downward migration of contaminants;
  - Off-site disposal of soil exceeding cleanup levels, and backfill with clean imported fill;
  - On-site ex-situ biotreatment/ aeration of soil exceeding cleanup levels, and backfill with treated soils; and
  - On-site ex-situ thermal desorption of soil exceeding cleanup levels, and backfill with treated soils.

- Soil Unit C (non-excavatable clayey soils with fuel hydrocarbon contamination from depths greater than 15 feet below present grade):
  - Maintenance of existing pavement cover in good condition to prevent human contact with soils and to minimize infiltration of rainwater and subsequent downward migration of contaminants; and
  - Installation of an engineered impermeable pavement cover (cap) to prevent human contact with soils and to minimize infiltration of rainwater and subsequent downward migration of contaminants.

- Soil Unit D (non-excavatable sandy soil above the groundwater surface with fuel hydrocarbon contamination):
  - Vapor monitoring to assess volatile vapor concentrations over time;
  - Maintenance of existing pavement cover in good condition to prevent human contact with soils and to minimize infiltration of rainwater and subsequent downward migration of contaminants;
  - Installation of an engineered impermeable pavement cover (cap) to prevent human contact with soils and to minimize infiltration of rainwater and subsequent downward migration of contaminants; and
  - In-situ vapor extraction of volatile vapors and discharge to atmosphere after emissions controls required by applicable laws.

- Groundwater:
  - Groundwater monitoring to assess contaminant concentrations over time;
  - Pump, treat (air stripping, carbon adsorption), and discharge to sanitary sewer;
  - Pump, treat (biological treatment), and discharge to sanitary sewer; and
  - In-situ sparging (with vapor extraction in soil Unit D) which would entail injection of air into contaminated groundwater mobilizing volatile constituents to the vapor extraction system which would discharge vapors to the atmosphere after emissions controls required by applicable laws.

Based upon the results of the human health risk assessment, bench-scale technology simulation (treatability evaluation), and the FS process, the most favored alternatives for each contamination unit were assembled in the FS into a package of recommended remedial action alternatives. Based on further analysis, FS recommendations were altered as set forth in Section 6.

6. SELECTED CLEANUP ACTION

A number of the cleanup alternatives considered in the FS for cleanup of contamination units would positively impact the quality of soils and groundwater at the site. The cleanup strategy recommended in the FS is modified in this CAP into a more proactive approach. This revised cleanup strategy offers the following advantages over the recommended strategy outlined in the FS:

- decrease quantity of residual soil contamination remaining on-site (excavate and treat surficial Unit A soils);

- decrease reliance on institutional controls and constructed cover (cap);

- option to accelerate cleanup of soils (on-site thermal desorption treatment instead of on-site ex-situ biotreatment); and

- accelerate restoration of groundwater (vapor extraction combined with groundwater sparging from the initiation of cleanup action; the FS recommended groundwater monitoring for five years while extracting vapors from non-excavatable sandy Unit D soils to determine if groundwater cleanup levels are achieved).

The disadvantage is increased cost.

6.1 Detailed Description of Selected Cleanup Action Strategy

The cleanup action strategy selected for this site is summarized below. As part of the cleanup action, the site building will be demolished in order to allow access to underlying soil contamination.

- <u>All Soil Units and Groundwater:</u> Institutional controls will be utilized to limit exposure to residual concentrations of hazardous substances above cleanup levels.

- <u>Unit A Surficial Soils and Unit B Hot Spot Soils:</u> Remove surface pavement and excavate Unit A and B soils until cleanup levels are achieved in the excavation side walls and floor. If cleanup levels have not been reached at the depth of fifteen (15) feet below ground surface, and no construction will occur beyond that depth, then cleanup to the point of compliance shall have been completed. If construction below that depth is likely and cleanup levels have not been met, then a marker will be employed as described in the Engineering Design Report. Treat Unit A and B soils using either on-site thermal desorption, or on-site ex-situ biotreatment. Emissions, dust, and noise controls will be employed as necessary to comply with applicable laws. Performance standards will be cleanup levels for indicator contaminants. The excavations will be backfilled to grade with treated soil in compacted lifts.

- Unit C Non-Excavatable Clayey Soil: No action/natural attenuation.

- Unit D Non-Excavatable Sandy Soil/ Groundwater: Vapor extraction in permeable Unit D soils will be operated so as to intercept downward migration of volatile hydrocarbons from Unit C soils and to remove volatile contaminants from the surface of the groundwater. The effectiveness of removal of groundwater contaminants will be enhanced by the injection of air into groundwater (sparging) to mobilize volatile contaminants to the vapor extraction system. Extracted vapors will be treated as required by applicable laws prior to discharge to the atmosphere. Operation of the vapor extraction/ sparging system will continue until groundwater cleanup levels are achieved for indicator contaminants at the point of compliance. Alternatively, the system may be discontinued when cleanup is no longer practicable under MTCA which will be determined when indicator contaminant concentrations approach an asymptotic steady state above cleanup levels, or after two years of operation- whichever occurs first. If groundwater cleanup levels cannot be practicably achieved, institutional controls may be required to limit exposure to residual groundwater contamination.

6.2 Compliance Monitoring

Compliance monitoring as described in MTCA WAC 173-340-410 will be provided as part of the cleanup action. A compliance monitoring plan which will be prepared and submitted to Ecology during the design phase of this project. Performance monitoring will confirm that residual contamination remaining in the site subgrade is below cleanup levels and that soil treatment achieves performance standards (equal to cleanup levels). Protection monitoring will confirm that human health and the environment are adequately protected during remedial action and the operation and maintenance period of cleanup action. Confirmational groundwater monitoring will confirm the long-term effectiveness of the groundwater cleanup action.

7. JUSTIFICATION FOR SELECTED CLEANUP ACTION

7.1 Compliance With MTCA Requirements

MTCA requires that any alternative selected for site remediation must, at a minimum, meet four threshold requirements: 1. protect human health and the environment; 2. comply with cleanup standards; 3. comply with applicable state and federal laws; and, 4. provide for compliance monitoring.

Protection of Human Health and the Environment

The risks identified in the baseline human health Risk Assessment (Enviros, 1993b) are the following:

- dermal contact, ingestion and inhalation of volatile constituents in on-site groundwater; and

- direct contact with contaminated soil that is on-site, inhalation of dust emissions and volatilized contaminants during excavation activities.

The selected cleanup action will entail sparging of volatile contaminants from site groundwater and removal and destruction of the contaminant vapors as a groundwater residual contamination source control measure. In addition, the selected cleanup action eliminates risks from exposure to site groundwater contamination by a deed restriction which would prohibit the extraction and use of site groundwater unless contaminant levels are confirmed to remain below cleanup levels. The use of the groundwater as a potable source of drinking water is highly unlikely given the site location and WAC 173-160-205 (Minimum Standards for Construction and Maintenance of Wells).

The selected cleanup action eliminates risks from exposure to contaminated soils and volatile vapors potentially emanating from contaminated soils by residual contamination source control including excavation and treatment of soils from shallower than 15 feet below present grade using thermal desorption, or biotreatment, followed by backfilling on-site.

Compliance with Cleanup Standards

The selected cleanup action strategy is designed to comply with cleanup standards as set forth in Section 4.

Compliance with State and Federal Laws

The selected cleanup action is designed to comply with regulatory requirements identified below for the South Dearborn site:

State Laws and Regulations:

- Minimum Standards for Construction and Maintenance of Water Wells (WAC 173-160);
- Water Quality Standards for Surface Waters of the State of Washington (WAC 173-201)
- NPDES Permit Program (WAC 173-220)
- Submission of Plans and Reports for Construction of Wastewater Facilities (WAC 173-240)
- Dangerous Waste Regulations (WAC 173-303);
- Model Toxics Control Act Cleanup Regulation (WAC 173-340);
- Hazardous Waste Cleanup (RCW 70.1050);
- Ambient Air Quality Standards for Particulate Matter (WAC 173-470);
- State Environmental Policy Act (WAC 197-11);
- General Safety and Health Standards (WAC 296-24); and
- General Occupational Health Standards (WAC 296-62);
- Washington Industrial Safety and Health Act (WISHA);
- Water Pollution Control (RCW 90.48;

- Washington Clean Air Act (RCW 70.94);
- Shoreline Management Act.

Federal Laws and Regulations:

- Clean Water Act (40 CFR 122, 123, 124);
- Resource Conservation and Recovery Act (RCRA, 42 U.S.C. 6901 et. seq.); and
- Occupational Safety and Health Act (OSHA, 29 CFR, subpart 1910.120).

Provision for Compliance Monitoring

The selected cleanup action provides for compliance monitoring as outlined in Section 6.

Provision for a Reasonable Restoration Time Frame

The duration of the soil cleanup will be definite and predictable once a schedule is established. The operational duration of the groundwater sparging system could be indeterminate, but is not anticipated to extend beyond two years after completion of the soil remediation work at which point further treatment will be either shown to be impracticable, or cleanup levels will be achieved.

Ecology will conduct a review of site conditions five years after the cleanup action is completed to assess whether the cleanup goals and objectives have been achieved.

Utilization of Permanent Solutions to the Maximum Extent Practicable

MTCA WAC 173-340-360 (5d) identifies five criteria (in addition to overall protection of human health and the environment discussed in subsection 7.1 and consideration of community concerns discussed in Section 8) which are used to determine whether a cleanup action is permanent to the maximum extent practicable:

Long-term Effectiveness:

The selected cleanup strategy should permanently remove residual contamination from site soils shallower than 15 feet below present grade by thermal desorption, or biotreatment, and from site groundwater by volatilization.

Short-term Effectiveness:

Residual contamination source control in site soils shallower than 15 feet below present grade and in site groundwater included in the selected cleanup strategy should result in immediate reduction of risks to human health and the environment to on-site and off-site receptors.

Permanent Reduction of Toxicity, Mobility, and Volume:

The selected cleanup strategy will permanently remove residual contamination from site soils shallower than 15 feet below present grade by thermal desorption, or biotreatment, and from site groundwater by volatilization. Emissions from the thermal desorption unit and from the vapor extraction blower will be controlled by destruction means as necessary.

Ability to be Implemented:

Technologies to be employed utilize conventional earthwork technologies and thermal desorption, or biotreatment, and vapor extraction/ sparge technologies which have successful records on similar sites. Therefore, the selected cleanup action is considered to be readily implemented.

Cleanup Costs:

MTCA stipulates that a cleanup action shall not be considered practicable if the incremental cost of the cleanup action is substantial and disproportionate to the incremental degree of protection it would achieve over a lower preference cleanup action. In the initial technology screening in the FS, when selecting from among two or more cleanup action alternatives which had equivalent levels of preference under MTCA, preference was given to the least cost alternative. In some instances, costs were used as a basis to eliminate alternatives from further consideration when a higher preference technology was less expensive than a lower preference technology (e.g., off-site thermal desorption, and off-site biotreatment were eliminated from consideration on this basis).

Utilization of Ecology-Preferred Technologies

Preferred technologies minimize the amount of untreated hazardous substances remaining at a site, favor site recycling of treated media, and favor permanent solutions. The selected cleanup strategy utilizes the highest ranked cleanup technologies, including the following:

- recycling (treated soils will be reused on-site); and
- destruction (hydrocarbons removed during thermal desorption, or biotreatment, and vapor extraction will be destroyed to allow compliance with PSAPCA permit requirements).

7.2 Elimination of Other Cleanup Alternatives

Alternatives for All Units:

Cleanup alternatives which did not result in an integrated site-wide cleanup were excluded as were reliance on no-action/ natural attenuation or institutional controls alone. However use of institutional controls may be useful to supplement more active residual contaminant source control in order to prevent or limit exposure to hazardous substances.

Reliance on impermeable covers alone does not provide a permanent reduction of contamination and limits site use. Isolation or containment technologies, such as capping, limit contact with hazardous substances and minimize infiltration-driven contaminant migration, but are not preferred.

In the initial technology screening in the FS, costs were used as a basis to eliminate some cleanup alternatives from further consideration when a higher preference technology was less expensive than a lower preference technology (e.g., off-site thermal desorption, and off-site biotreatment were eliminated from consideration on this basis).

Alternatives for Units A Surficial Soil and Unit B Hot Spot Soil:

Off-site disposal of Unit A and Unit B soils at an engineered facility was eliminated because off-site disposal is not a permanent solution. The off-site disposal alternative is less cost effective than more favorable on-site, ex-situ treatment and site reuse alternatives considered.

Alternatives for Non-Excavatable Unit C Clayey Soil:

Excavation and treatment or disposal of Unit C soils was not considered because the cost of excavation and shoring to access soils deeper than 15 feet below grade is substantially greater than the benefits because of the low levels of sporadic contamination. In-situ cleanup alternatives considered for Unit C soils are not practicable because of the high clay fraction. Cleanup of Unit C soils therefore relies on the elimination of overlying residual soil contamination, capture of contaminates migrating from Unit C soils, and natural attenuation processes.

Alternatives for Non-Excavatable Unit D Sandy Soil:

Excavation and treatment or disposal of Unit D soils was not considered because the cost of excavation and shoring to access soils deeper than 15 feet below grade renders these alternatives not practicable under MTCA. Other in-situ cleanup alternatives, besides the selected vapor extraction alternative, were not considered to be as reliable, implementable, and cost effective, and were eliminated from further consideration.

Alternatives for Groundwater:

Groundwater monitoring alone does not achieve cleanup standards (except by natural attenuation), and may not be a permanent solution.

Groundwater treatment technologies relying on withdrawal and treatment were eliminated from consideration because they were not considered to be practicable under MTCA. Groundwater withdrawal and treatment will not be as effective as the selected sparging (with vapor extraction in Unit D) cleanup alternative and the restoration time frame will likely be much longer than with the selected alternative.

8. CONSIDERATION OF PUBLIC CONCERNS AND COMMUNITY ACCEPTANCE

State and community acceptance will be evaluated based on the comments received during the public comment period for the Consent Decree and draft CAP. The draft CAP will be modified based on public comments received.

9. REFERENCES

Boateng & Associates, Tank Removal Activities Dearborn Street Facility, January 1991.

Enviros, Inc., Focused First Phase of Soil and Groundwater Assessment of the Metro Dearborn Facility, November 5, 1991.

Enviros, Inc., Second Phase of Site Characterization of the Metro South Dearborn Facility, Seattle, Washington, October 22, 1993 (1993a).

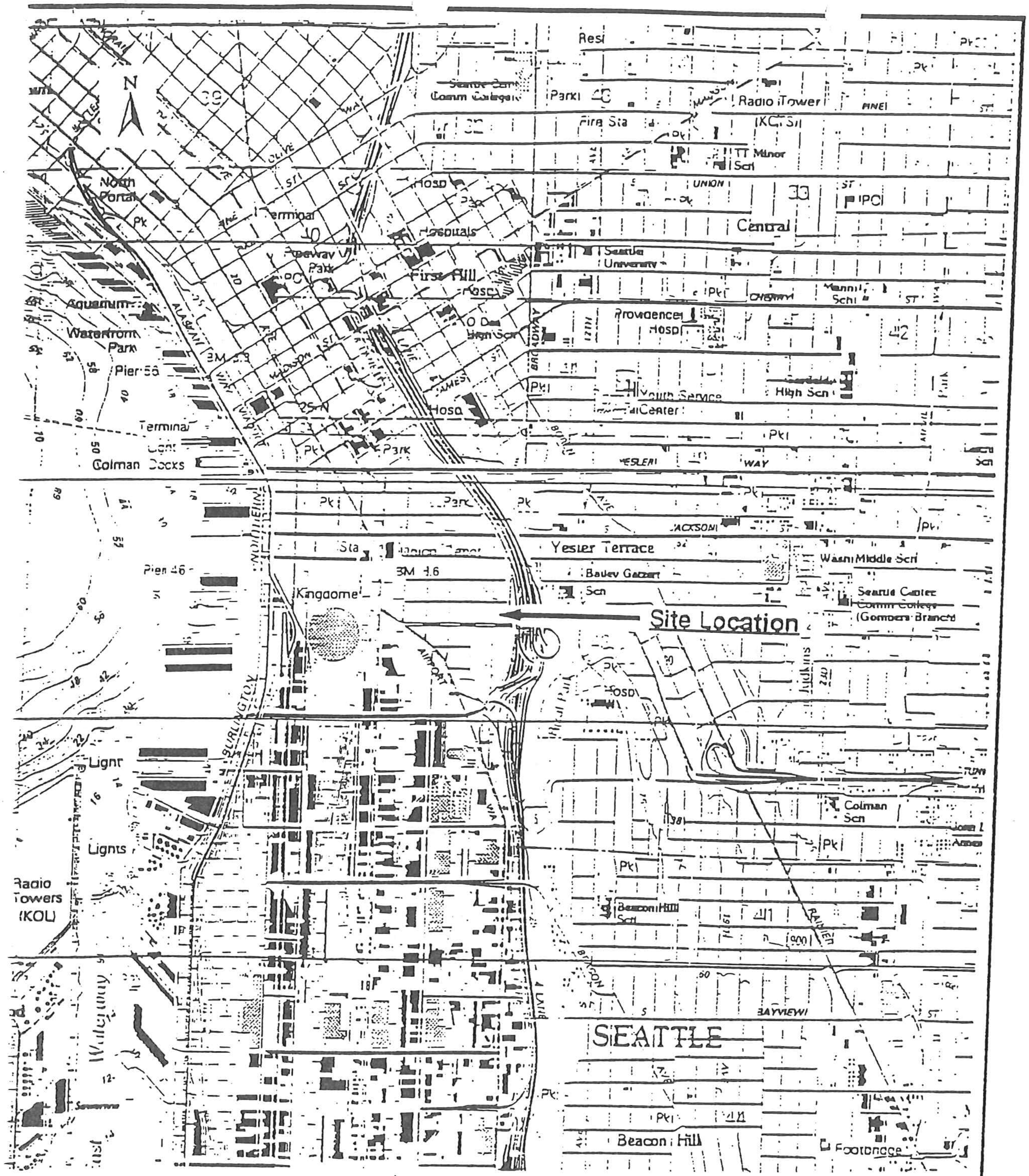
Enviros, Inc., Human Health Risk Assessment and Feasibility Study of the Metro South Dearborn Facility, Seattle, Washington, October 22, 1993 (1993b).

Enviros, Inc., Report of October 1993 Groundwater Sampling and Analysis, December 3, 1993 (1993c).

Enviros, Inc., Report of January and February 1994 Groundwater Sampling and Analysis, March 25, 1994.

Northwest Industrial Hygiene, Inc., Environmental Assessment Report, January 8, 1992.

FIGURES

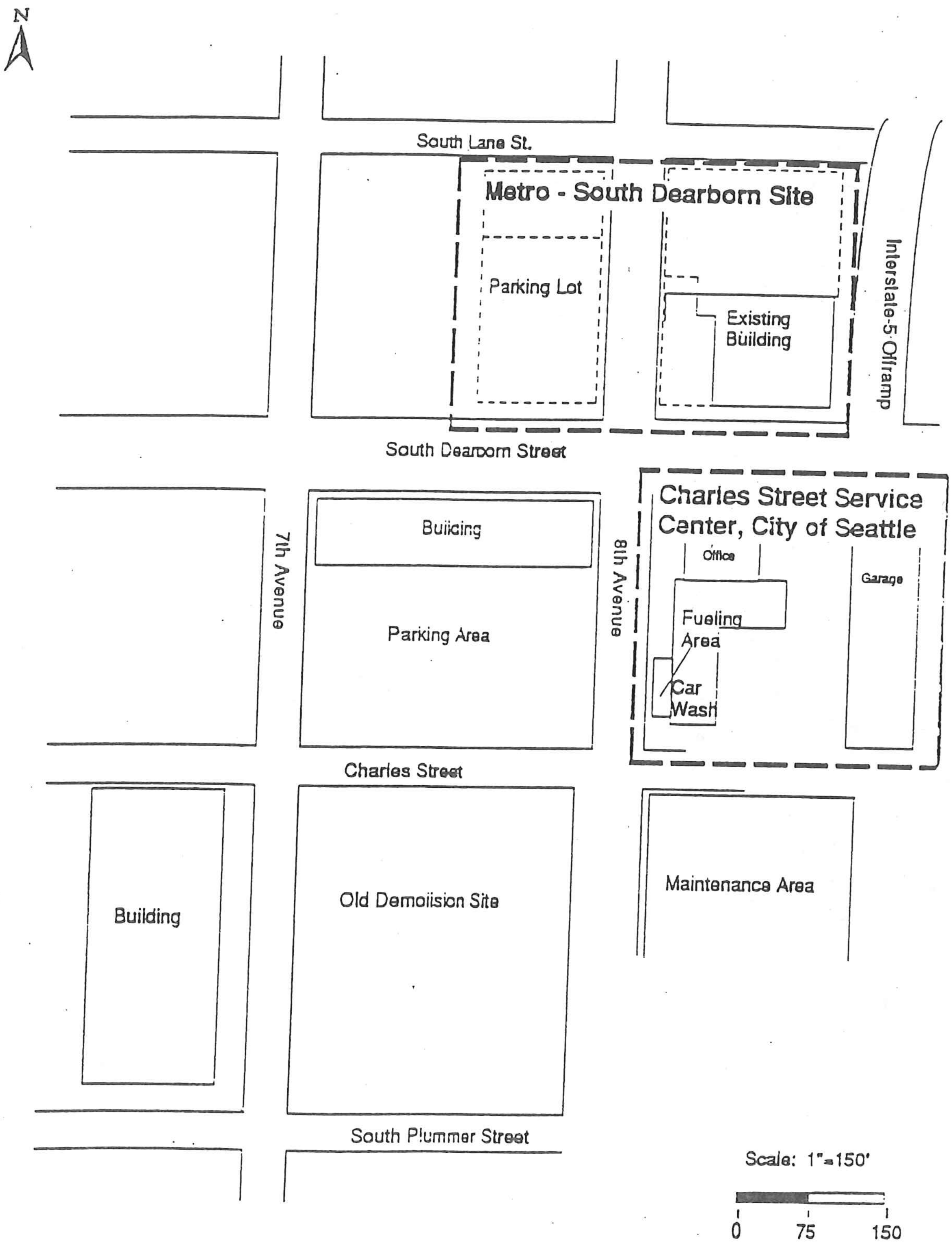


Scale: 1" : 2,000'

Source: U.S.G.S. 7.5 x 15 minute Quadrangle Map of South Seattle, Washington, dated 1977 and edited 1983.

gure 2.1. Site Vicinity Map, South Dearborn Street, Seattle, King County, Washington	*enviros* Project: 920307

wn By: AIS Date: 1/4/94	Approved By: TJC Date: 4·25·94



gure 2.2. South Dearborn Site and Adjacent Properties.

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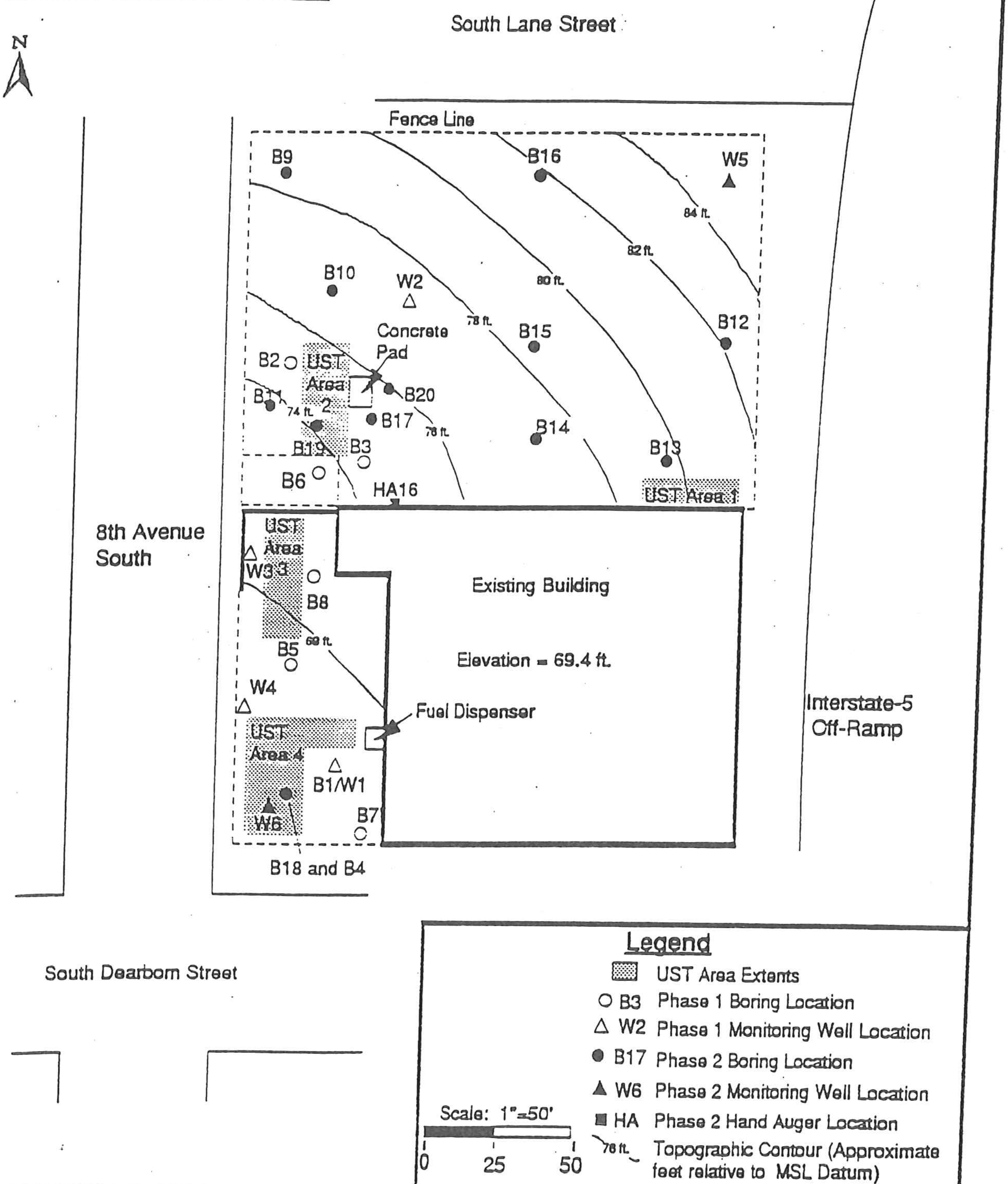
Project: 920307

wn By: MBG Date: 1/5/94 Approved By: TJC Date: 4·25·94

ummary of USTs Formerly In Place
the Site

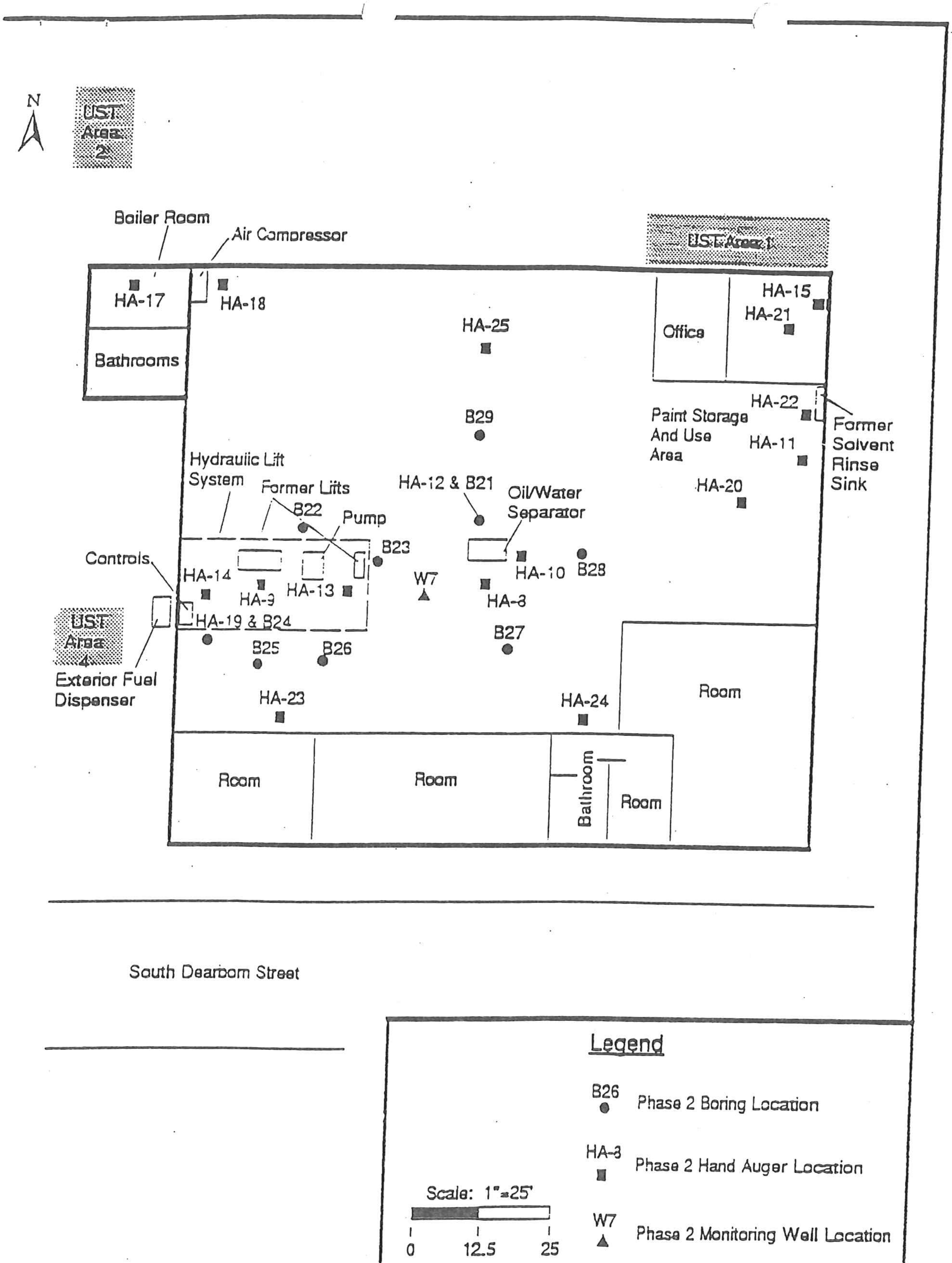
T Area	Contents	Capacity (Gallons)
1	Fresh Motor Oil	300
2	Unleaded Gasoline	10,000
3	Diesel	6,000
	Diesel	500
4	Unleaded Gasoline	4,000



ure 2.3. Map of East Part of Site Showing Topography and
erior Drilling Locations for Phase 1 and Phase 2 RI Work.

enviros®
Project: 920307

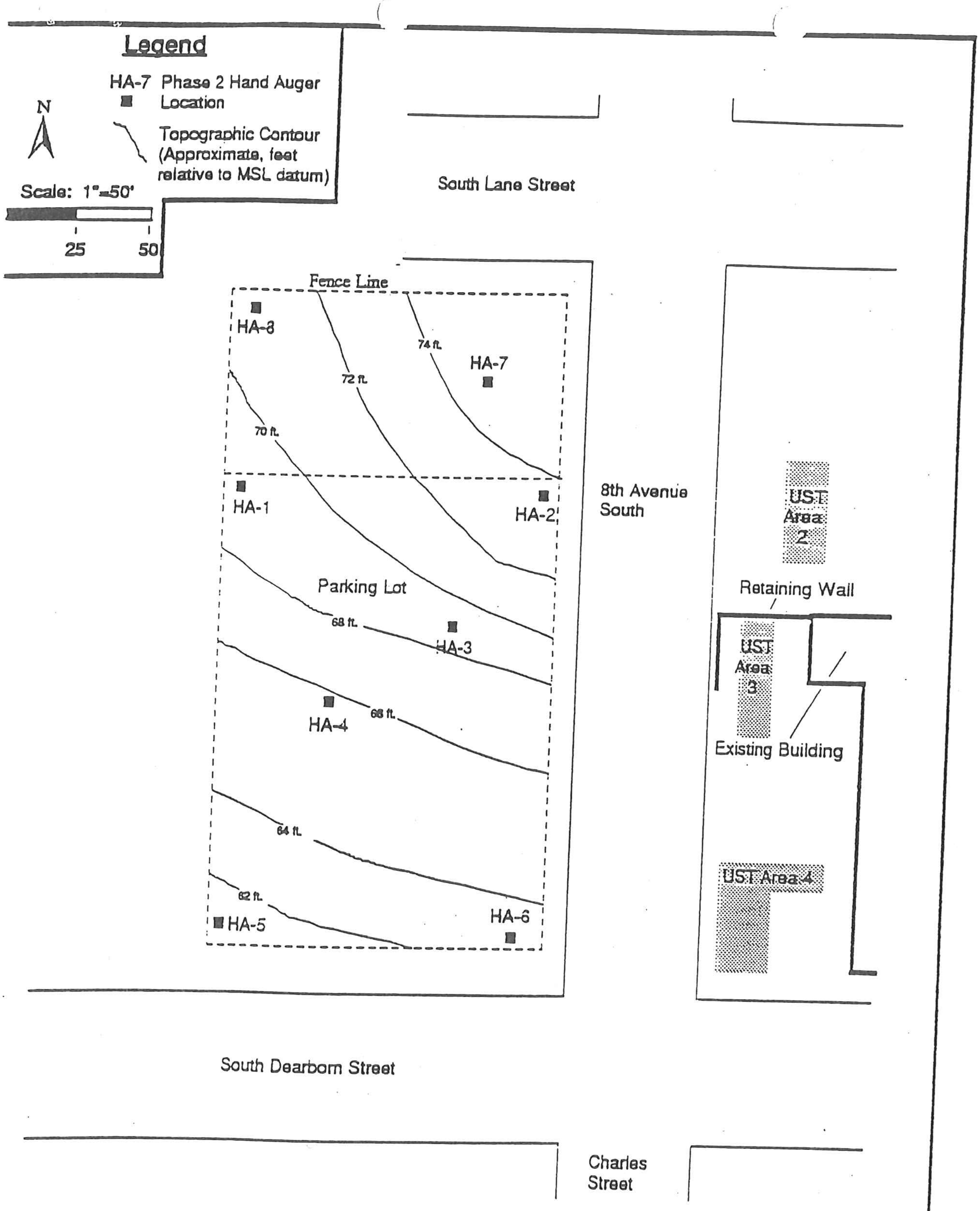
n By: MBG	Date: 1/5/94	Approved By: TJC	Date: 4-28-94



...gure 2.4. Map of East Part of Site Showing Interior Drilling Locations
... Phase 2 RI Work

enviros
Project: 920307

...wn By: MBG Date: 1/5/94 | Approved By: TJC | Date: 4·28·94

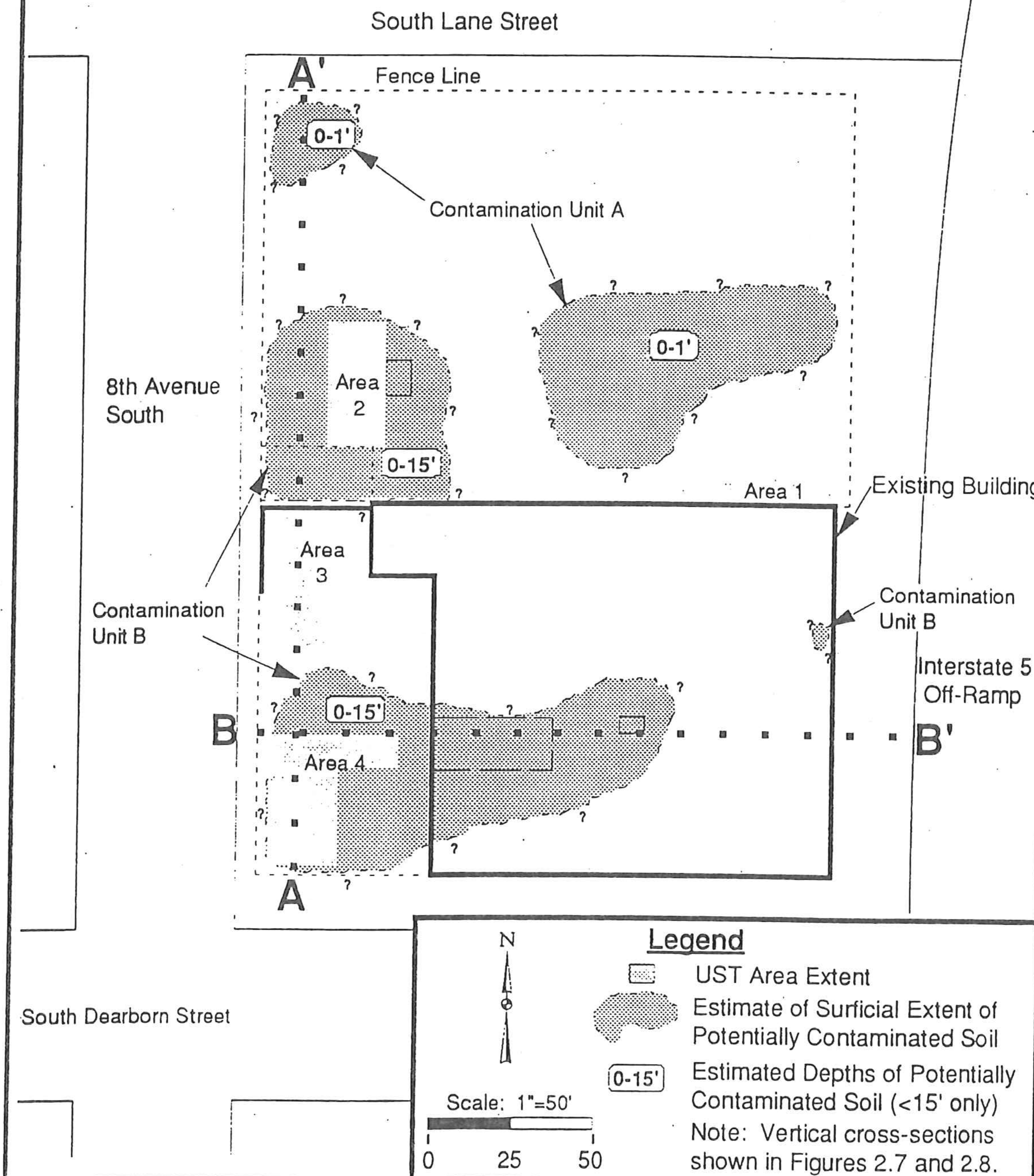


gure 2.5. Map of West Part of Site Showing General Topography and and Auger Locations for Phase 2 RI Work.

enviros®
Project: 920307

ıwn By: MBG	Date: 1/5/94	Approved By: TJC	Date: 4·28·94

Note: Extents of potentially contaminated soil shown in this Figure are conservative estimates of contaminant concentrations exceeding MTCA Method A cleanup level of 200 ppm based upon field observations and analytical results. Actual volumes of soil which will require cleanup will likely be less than indicated here.



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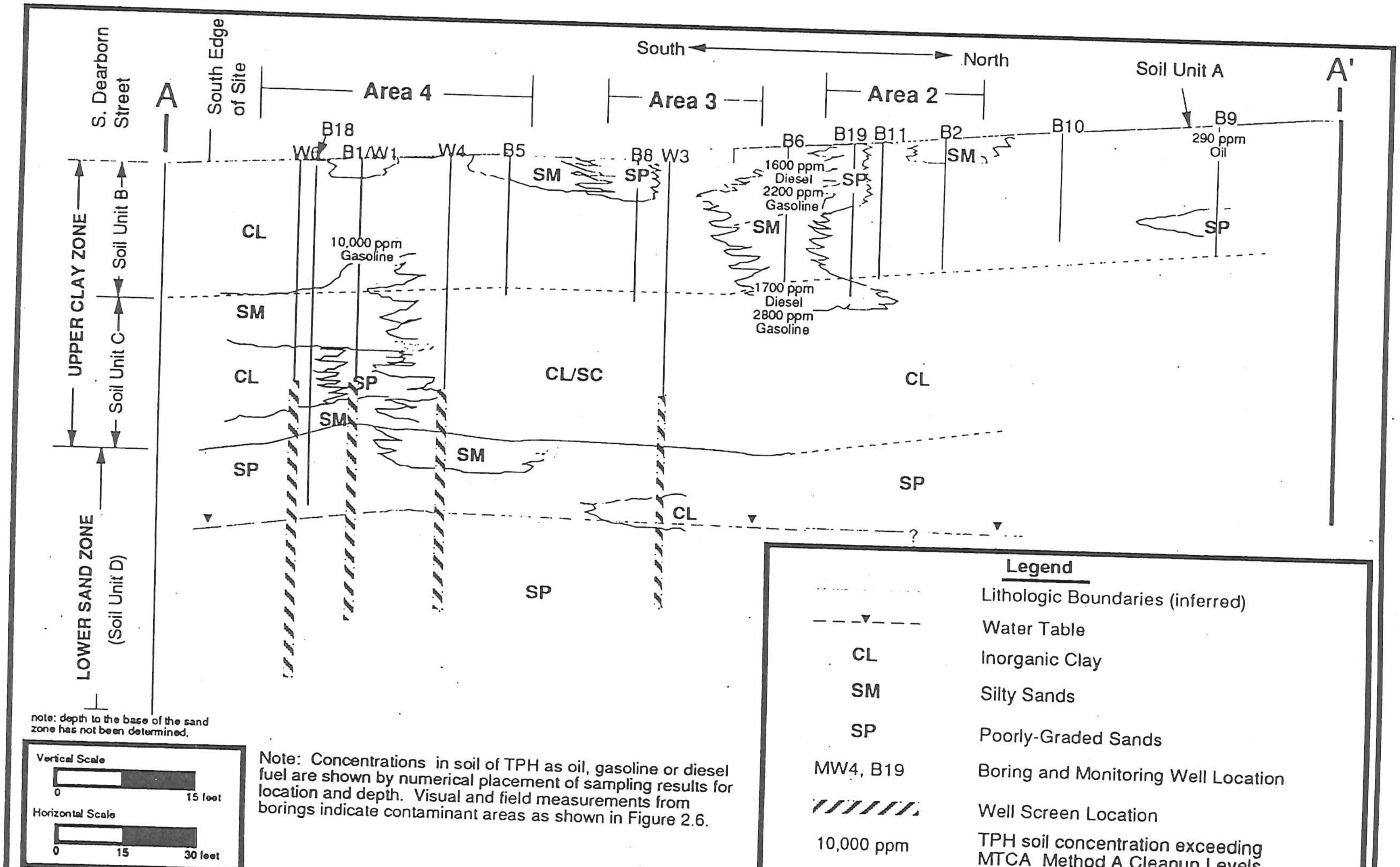
Drawn by: MB Gilbrough
Revised By: TJC/TGS
Approved: mjn
Date: June 29, 1992
Revision Date: Aug. 2, 1994

Estimated Surficial Extent of Contaminated Soil on the East Parcel of the Metro Dearborn Site.

Figure 2.6

E1/920307.01



Note: Concentrations in soil of TPH as oil, gasoline or diesel fuel are shown by numerical placement of sampling results for location and depth. Visual and field measurements from borings indicate contaminant areas as shown in Figure 2.6.

Legend

······	Lithologic Boundaries (inferred)
– – ▼ – –	Water Table
CL	Inorganic Clay
SM	Silty Sands
SP	Poorly-Graded Sands
MW4, B19	Boring and Monitoring Well Location
//////	Well Screen Location
10,000 ppm	TPH soil concentration exceeding MTCA Method A Cleanup Levels

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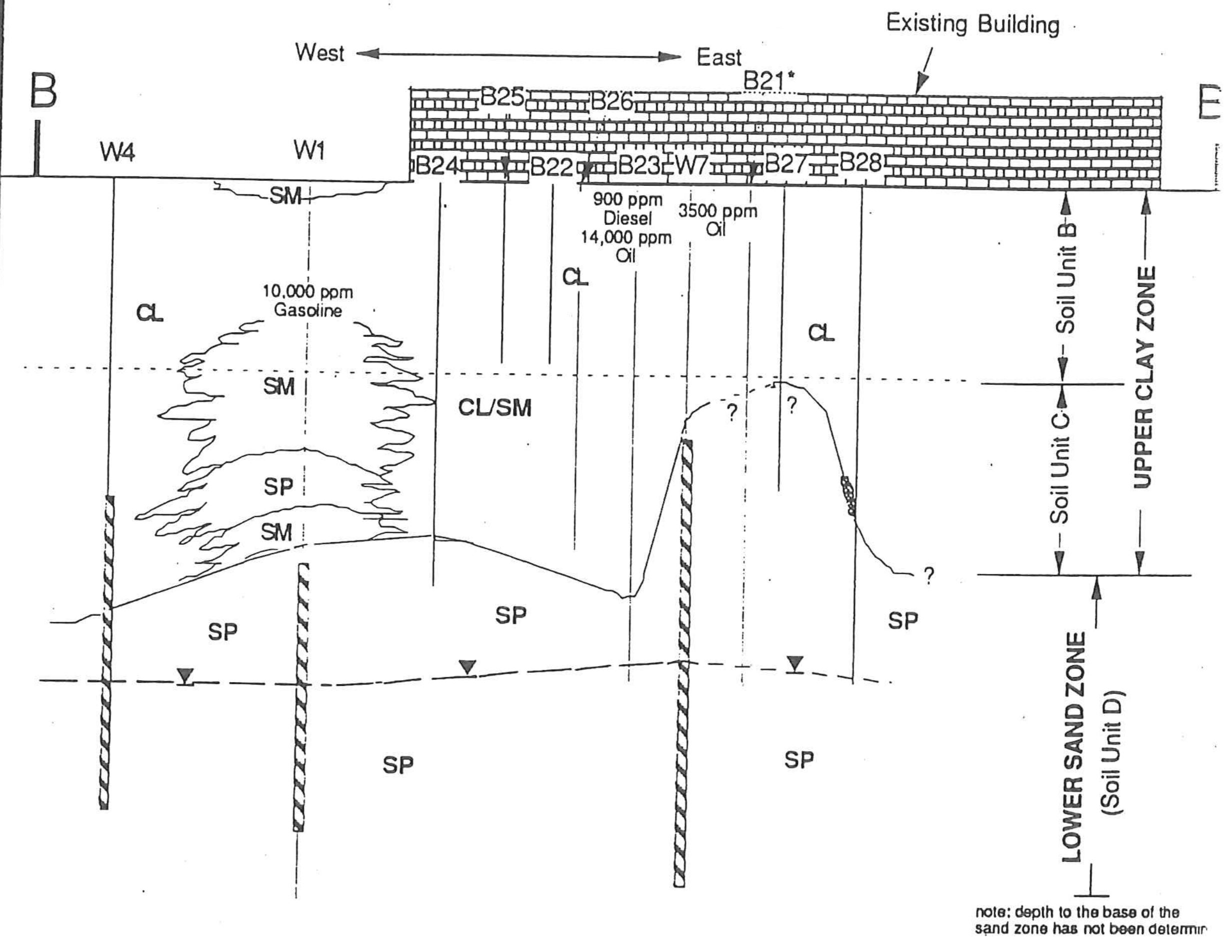
Drawn by : JO/TGS
Date: August 5, 1992
Approved by: [signature]
Revised: June 21, 1994

North to South Generalized Cross Section of West Border of the East Parcel of the Metro Dearborn Site

Figure

2.7

Note: Concentrations in soil of TPH as oil, gasoline or diesel fuel are shown by numerical placement of sampling results for location and depth. Visual and field measurements from borings indicate contaminant areas as shown in Figure 2.6.



*note: No SP soil was encountered in B21.

Vertical Scale

0 15 feet

Horizontal Scale

0 15 30 feet

Legend

———	Lithologic Boundaries (inferred)	MW4, B19	Boring and Monitoring Well Locati
— — ▼ — —	Water Table	//////////	Well Screen Location
CL	Inorganic Clay		
SM	Silty Sands		
SP	Poorly-Graded Sands	10,000 ppm	TPH soil concentration exceeding MTCA Method A Cleanup Levels

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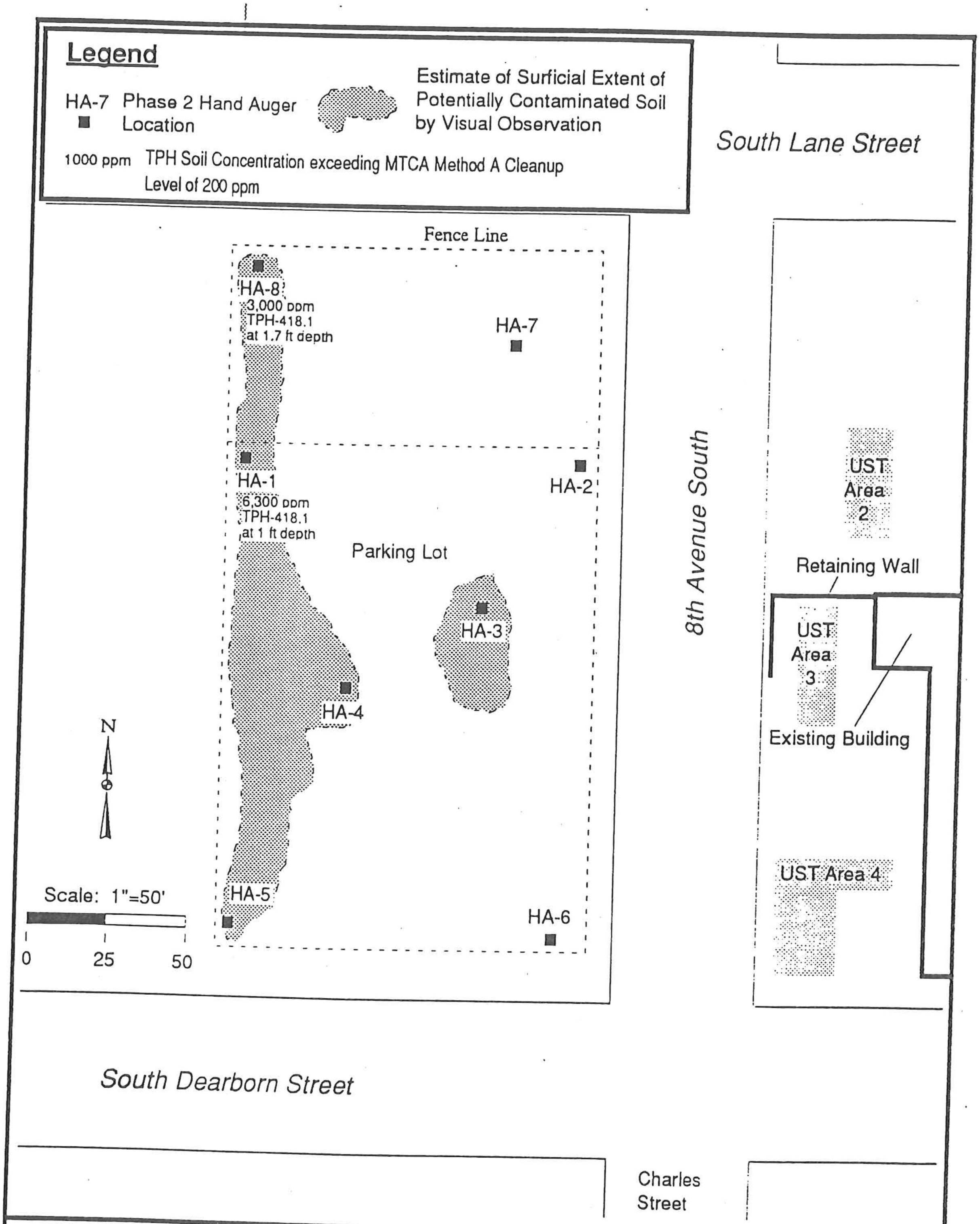
Drawn by : JO/TGS/MJN
Date: August 5, 1992
Approved: mjh
Revised: Aug. 2, 1994

West to East Generalized Subsurface Cross Section of the East Parcel of the Metro Dearborn Site.

Figure 2.8

E1/920307.01



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Drawn by: MB Gilbrough
Revised By: T. Cline/ MJN
Approved: mjn
Date: August 3, 1994

Contaminated Shallow Soil on the West Parcel of the Metro South Dearborn Site.

Figure

2.9

920307.01

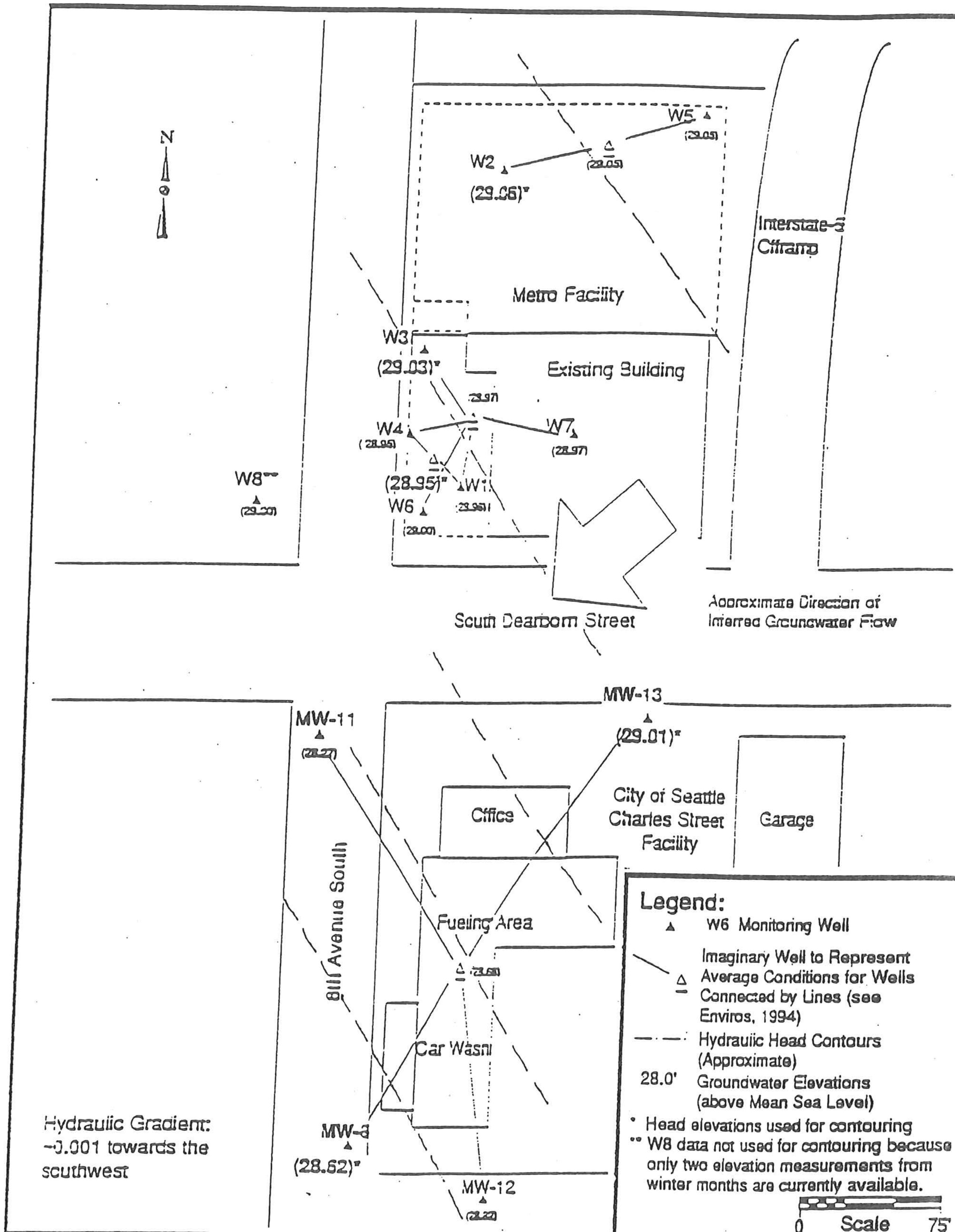

Figure 3.1. Map Showing Metro and City Facilities, Monitoring Wells, and the Potentiometric Surface Map Interpreted in Enviros (1994).

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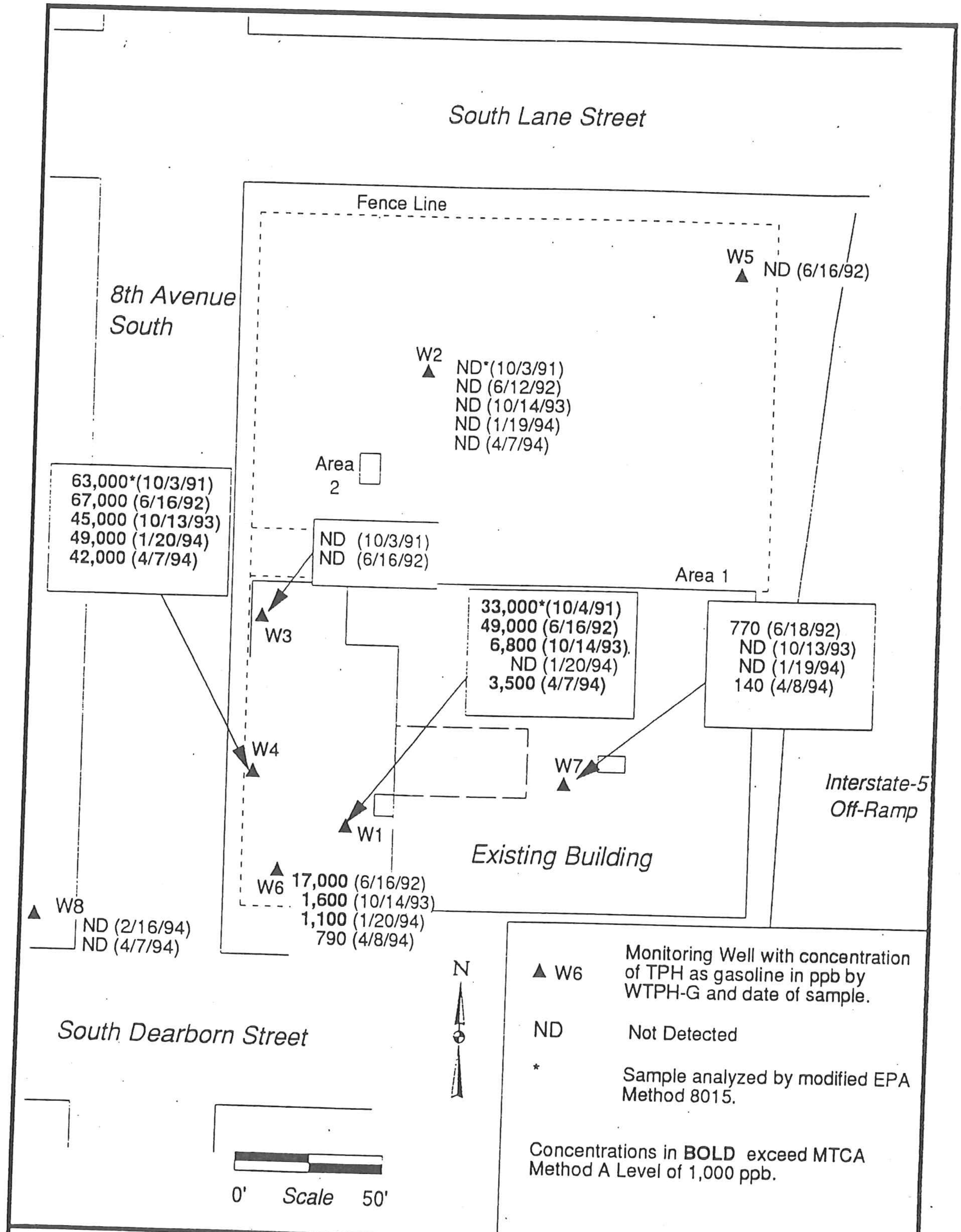

Figure 3.2 Gasoline Concentrations in Groundwater
Metro South Dearborn Site.

Drawn by: MB Gilbrough
Revised By: A. Torrico/MJN

Date: August 3, 1994 Approved: MJN

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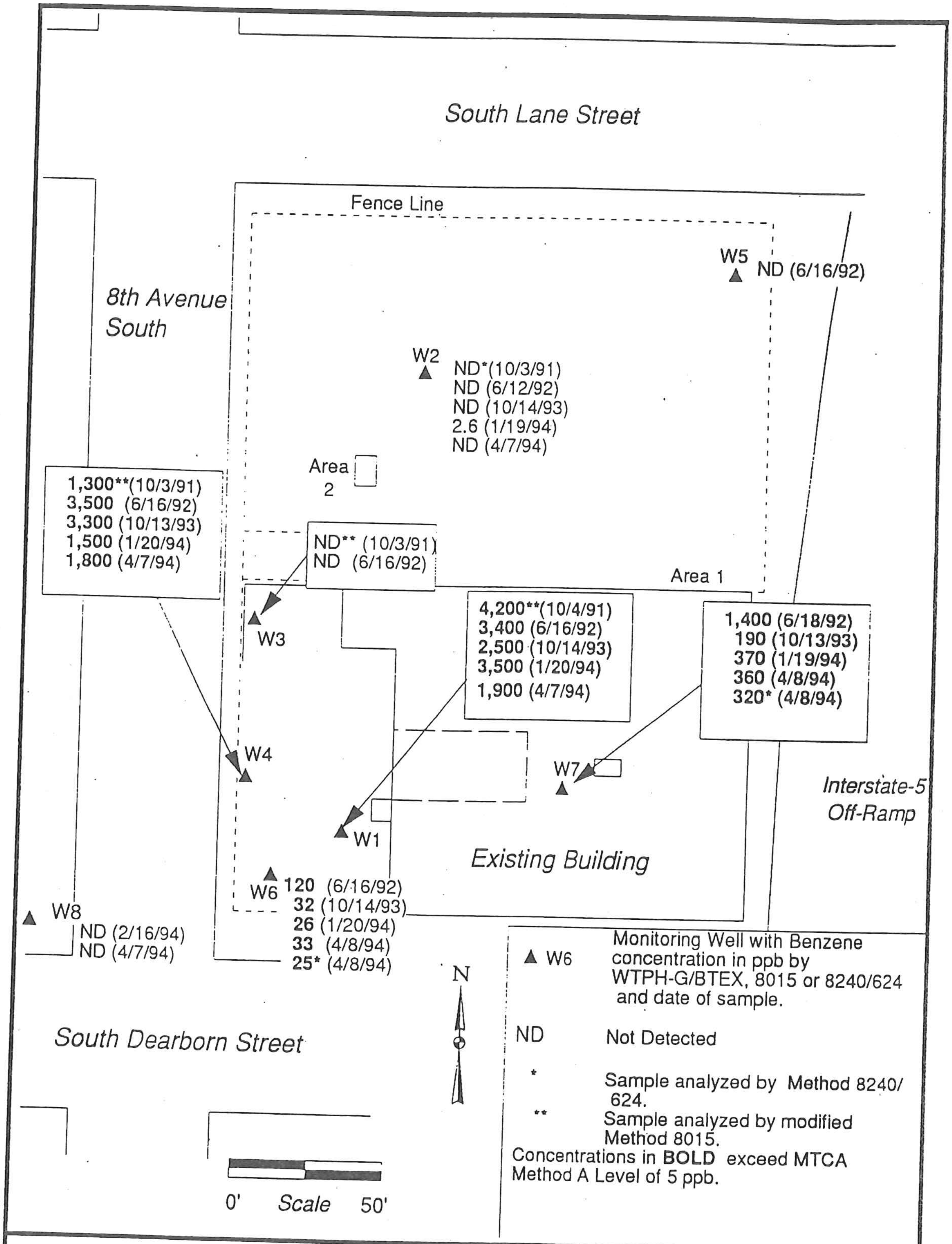

Figure 3.3. Benzene Concentrations in Groundwater Metro South Dearborn Site.

Drawn by: MB Gilbrough
Revised By: A. Torrico/MJN

Date: June 21, 1994 Approved: MJN

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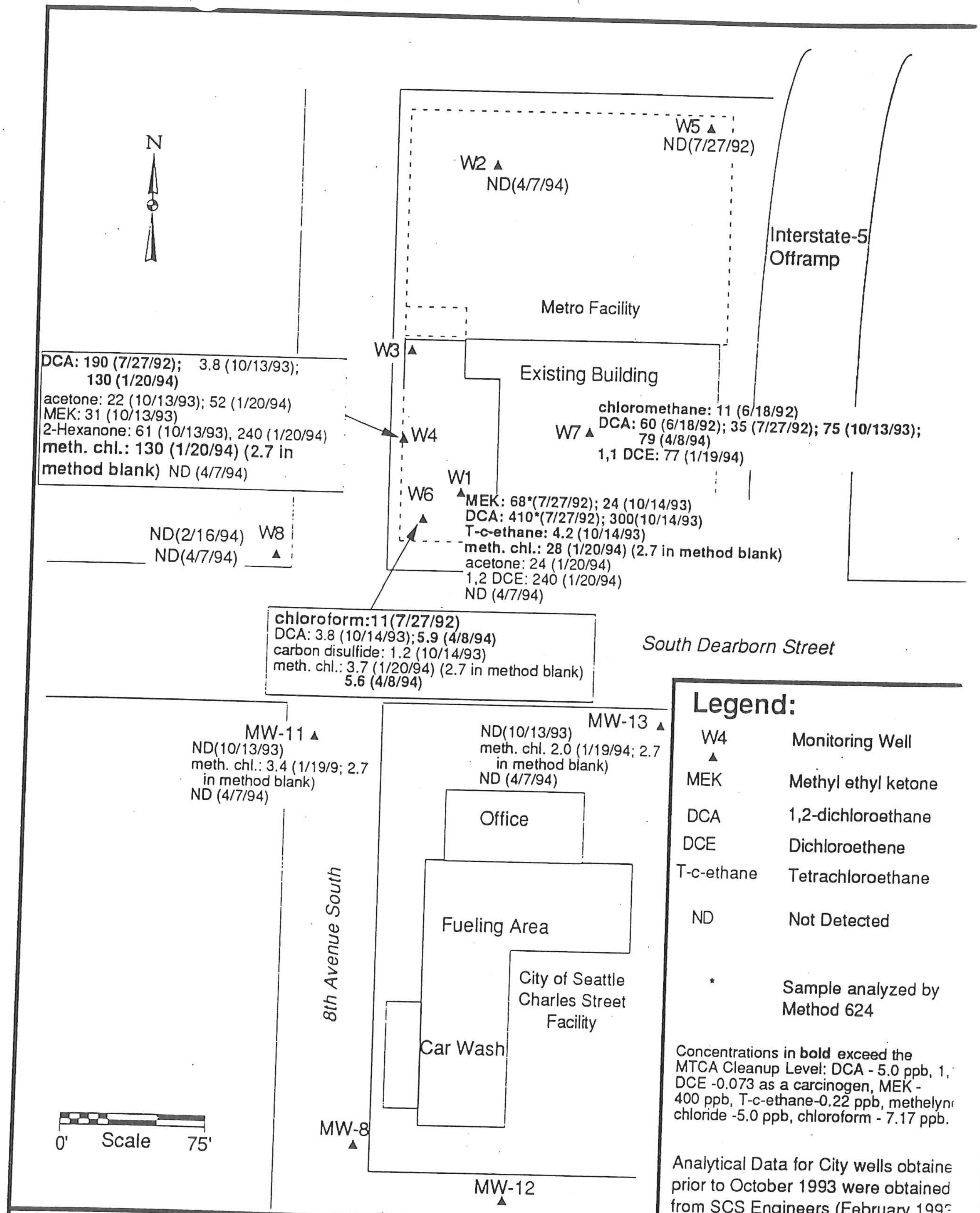

Figure 3.4 Detected Solvent Concentrations in Groundwater (ppb) Measured by EPA Method 8240 Metro South Dearborn Site.

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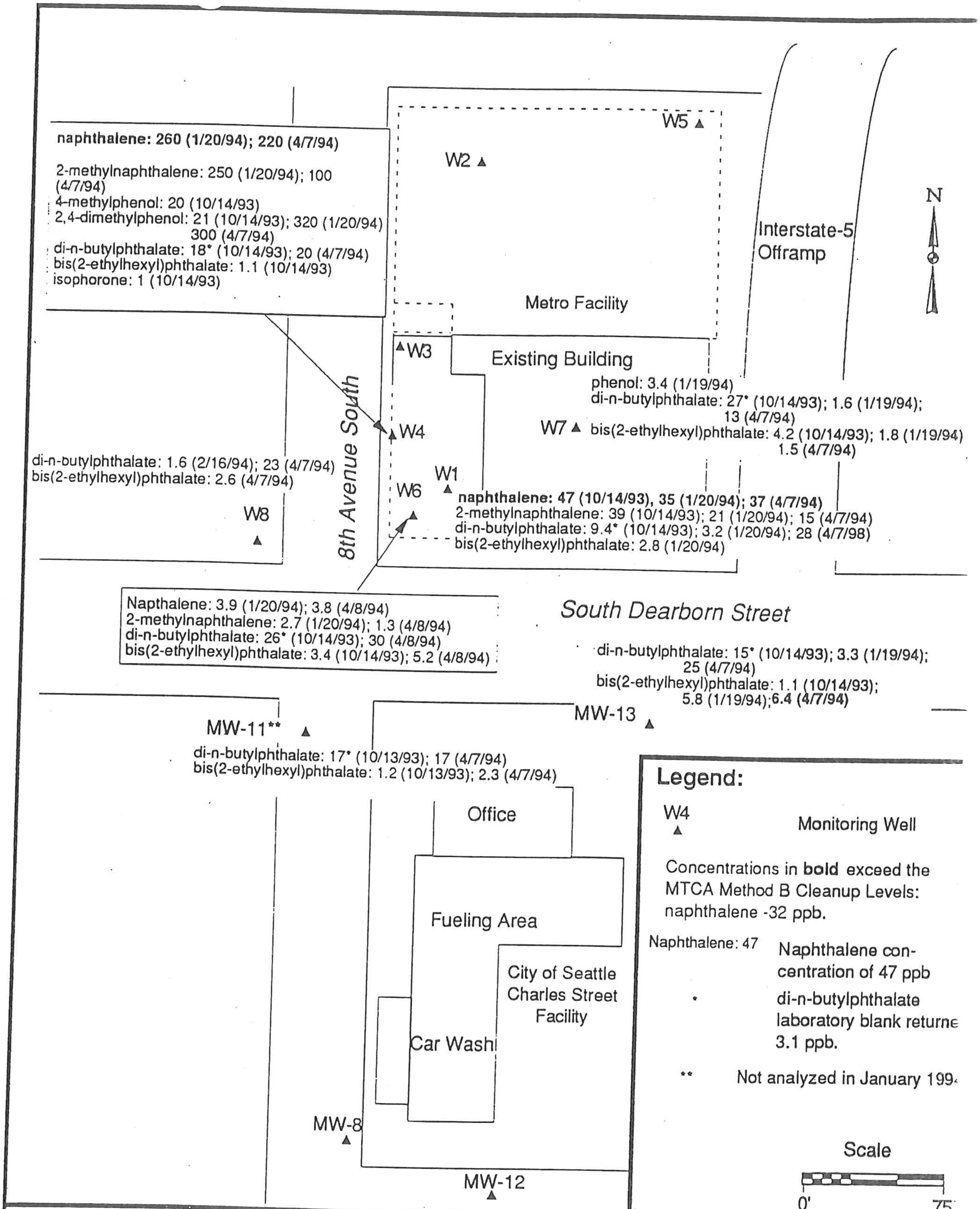

Figure 3.5 Detected Phenol and Polynuclear Aromatic Hydrocarbon Concentrations in Groundwater (ppb) Measured by EPA Method 8270 - Metro South Dearborn Site.

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Drawn By: TJC/AIS /MJN Date: 8/3/94 | Approved By: MJN Date: 8/3/94