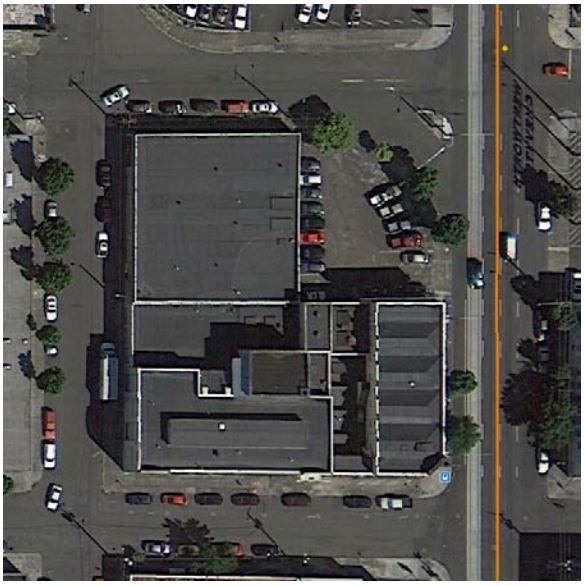
REMEDIAL ACTION PLAN

Former Salvation Army Property
139 SE Martin Luther King Jr. Boulevard
Portland, Oregon 97214
ESCI File No. 5555



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November 14, 2013

Project No. 847-12001-02

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November 14, 2013

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TABLES AND FIGURES

ACRONYM AND ABBREVIATION LIST

bgs	below ground surface
COCs	constituents of concern
COIs	constituents of interest
COPCs	constituents of potential concern
DRO	diesel-range organics
ENW	EVREN Northwest, Inc.
EPA	US Environmental Protection Agency
ESA	Environmental Site Assessment
GAC	granular activated carbon
GRO	gasoline-range organics
ID	internal diameter
µg/L	micrograms per Liter
µg/m^3	micrograms per cubic meter
mg/Kg	milligrams per Kilogram
ODEQ	Oregon Department of Environmental Quality
O&M	operation and maintenance
OWRDGD	Oregon Water Resources Department Grid Database
PAHs	polynuclear aromatic hydrocarbons
PCB	polychlorinated biphenyls
PCE	tetrachloroethene
PE	polyethylene
PID	photoionization detector
PVC	polyvinyl chloride
RAO	Remedial Action Objectives
RAP	Remedial Action Plan
RBCs	risk-based concentrations
RBDM	*Risk-Based Decision Making for the Remediation of Petroleum-Contaminated Sites*, ODEQ's guidance document (2003 revision)
RCRA	Resource Conservation & Recovery Act
RRO	residual (oil)-range organics
SLRBC	screening-level risk-based concentration
SMP	Soil Management Plan
SSD	sub-slab depressurization
TCE	trichloroethene
TMB	trimethylbenzene
TPH	total petroleum hydrocarbons
UIC	underground injection control
UST	underground storage tank
VOCs	volatile organic constituents

1.0 INTRODUCTION

On behalf of Ash Street Development, LLC EVREN Northwest, Inc. (ENW) has prepared this Remedial Action Plan (RAP) for the Salvation Army property located at 139 SE Martin Luther King Jr. Boulevard, Portland, Oregon (see Figures 1 and 2). This RAP was prepared as required by the draft Consent Judgment between the State of Oregon Director of the Department of Environmental Quality (ODEQ) and Ash Street Development, LLC (under public review). Site assessment has shown that petroleum constituents and chlorinated solvent impacts have been detected in soil, soil gas, and sub-slab vapors, and petroleum constituents have also been detected in ground water. The ODEQ has identified mitigation of risk of vapor intrusion into indoor air as a requirement of regulatory closure of this facility. This RAP is designed to address this requirement.

2.0 SITE DESCRIPTION

The 0.64-acre site is composed of one tax lot currently developed with a large warehouse that has situs address 139 SE Martin Luther King Jr. Boulevard, Portland, Oregon 97214. According to the Assessor's Office of the City of Portland, the subject property is currently owned by The Salvation Army of Long Beach, California, and identified as follows:

Table 2-1. Site Description

Street Address	Property Identification Number	Tax Lot	Current Occupancy/Use	Legal Description	Size (Acres)
139 SE Martin Luther King Jr. Boulevard	R150038	1N1E34DD 1800	Warehouse, multi-story storage, tenant is the Salvation Army	East Portland, Block 78, Lots 1-4, 5&6	0.64

The warehouse is divided into north, central, and south areas (see Figures 2 and 3). The north and central portions were mainly used for the sorting and transporting of used household items. The south portion has four levels that contained offices, a workshop, storage areas, and basement. The building did have storage for hazardous materials; however, the hazardous materials were not for on-site use.

The warehouse building is slated for demolition in preparation for the construction of the "Element 78" development, a future high-rise development. Element 78 conceptual development plans consist of ground level parking / lobby areas with some live/work units and up to 10 floors of future one- and two-bedroom residential housing units.

The site is bounded by SE Ankeny Street to the north, SE 3rd Avenue to the west, SE Ash Street to the south, and the south-bound Central Loop of the Portland Street Car Line and Martin Luther King Jr. Boulevard to the east. A turning radius from east-bound SE Ankeny Street to south-bound Martin Luther King Jr. Boulevard crosses the northeast corner of the block.

Surrounding properties consist of industrial properties, a Chevrolet dealership, a scooter retailer and shop, and a wine storage building.

2.1 Topography / Surface Water Hydrology

The subject site is located within the US Geological Survey Portland, Oregon Quadrangle at an elevation of approximately 48 feet (Figure 1). The regional topographic slope in the vicinity of the site is gently south and west, toward the Willamette River. Consequently surface drainage, where unmodified, is also generally toward the south and west. No wetlands, seeps, springs, flood plains, ephemeral drainages or other surface water bodies are present in the immediate vicinity of the subject site. The site is outside the 100-year flood plain, according to the Portlandmaps.com website. The site is not located within any environmentally sensitive areas (e.g., wetlands, wildlife habitat, riparian zones, etc.).

2.2 Geology

The site is located in the Portland Basin. The Portland Basin is a low-lying area between the Oregon Cascade Range to the east and the Portland Hills and Tualatin Mountains to the west. The Columbia and Willamette Rivers are the principal streams within the basin.

During the late Pleistocene (approximately 12,000 years ago), numerous catastrophic floods swept into the Portland Basin through the Columbia River Gorge to the east. The floods deposited great thicknesses of sediments within the basin. The subject site is mapped as located on channel facies of the late Pleistocene catastrophic flood deposits. These sediments are typically composed of boulders, cobbles, gravels, and sands and silts in this area[1].

Borings completed at the site indicate that the upper soils below the site consist of silts, clayey silts and silty clays, probably placed as fill. Gravel-bearing sediments were encountered at between 17 and 25 feet below ground surface (bgs) in the deeper borings. However, much of the soils sampled below the site may have been placed as fill, based on fragments of brick and wood encountered in some of the deeper borings. Borings completed at the margins of the property consisted of sandy gravels, silt, and sand/silt/gravel mix.

2.3 Hydrogeology

ENW accessed the Oregon Water Resources Department Grid Database (OWRDGD) to determine ground water conditions in the vicinity of the subject site. The OWRDGD did not indicate that any water wells are present on the subject site. According to borings at the site, first water was encountered between 16 and 23 feet below floor grade. Based on regional studies, ground water flow direction is expected be to the west, towards the Willamette River.

[1] Beeson, M.H., Tolan, T.L., and Madin, I.P., 1989, Geologic map of the Portland Quadrangle, Multnomah and Washington Counties, Oregon, and Clark County, Washington: Oregon Department of Geology and Mineral Industries, Geological Map Series, GMS-75, 1:24,000.

3.0 OPERATIONAL AND HISTORICAL BACKGROUND

In November 2010 and again in October 2013, ENW conducted *Phase I Environmental Site Assessment* (ESA)[2,3] which identified the following site operational and other historical records.

3.1 Overview of Operating History

The building property was developed by the late 1880s with commercial storefronts and furnished rooms; however, the site was redeveloped by 1909 with several shops including a drycleaner and dye works. In 1924 a creamery occupied a portion of the site along with the cleaners. A plating facility subsequently occupied a small portion of the adjacent property located in the northeast corner of the same block. By 1950 an auto garage shared the site with the cleaners, and gasoline and oil use was indicated on historical maps at the northwest corner of the building. The Salvation Army acquired the property in 1964. In 1996 a leaking diesel underground storage tank (UST) located just outside the northwest corner of the building was decommissioned and received regulatory closure.

3.2 Review of Historical Records

Building permits on file with the City of Portland for the subject property were reviewed by ENW. The building is 2,036 square feet and single-story, except for the southern segment which consists of four levels, including basement, office space, and storage areas. Heating is currently provided by a natural gas units. Other than the leaking diesel UST that was decommissioned in 1996 and received regulatory closure, no other tanks were indicated on the site.

City of Portland Department of Building Services indicated that in 1930 Enkye City Dye works altered the building and installed a hydraulic elevator in 1941. The building evidently had a fire around 1966. The building was re-roofed with asbestos containing materials in 1989.

3.3 Historical Aerial Photographs

Regional aerial photographs for 1955, 1963, 1970, 1981, 1984, 1994, and 2005 were obtained by ENW from Environmental Data Resources, Inc. for review. ENW's review concluded there was no evidence of recognized environmental conditions evident from the photos. ENW also reviewed the City of Portland's high resolution aerial photographs for 2001 through 2009 from the Portlandmaps.com web site. The following is a brief summary of the subject site and immediate vicinity conditions, as interpreted in the aerial photographs:

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[2] ENW, November 2, 2010, *Phase I Environmental Site Assessment Report,* Salvation Army Facility, 139 SE Martin Luther King Jr. Boulevard, Portland, Oregon 97214: Prepared for Stumptown Coffee, ENW Project No. 495-10001-01.

[3] ENW, October 3, 2013, *Phase I Environmental Site Assessment*, Salvation Army Facility, 139 SE Martin Luther King Jr. Boulevard, Portland, Oregon 97214: Prepared for Ash Street Development LLC, ENW Project No. 847-12001-04 (in preparation).

- In the 1955 photograph, the building property is developed with the current structure. Adjacent blocks are all commercially/industrially developed. Additionally, a rail spur easement crosses the northeast quadrant of this city block, connecting the railroad easement to the west with SE 2nd Avenue on a northwest-southeast trend. The surrounding area is well developed with light industrial and commercial buildings.
- By 1970, the site is essentially the same. Another warehouse has been constructed northwest of the subject property.
- In the 1994 photograph the northern portion of the site's warehouse has a different roof color.
- The 2001 through 2009 photographs are similar.

3.4 Historical Fire Insurance Sanborn Maps

A brief description of the Sanborn maps reviewed (1909, 1924, 1950 and 1969) is provided below.

In the 1909 map the building property is developed with City Cleaning and Dyeing Works, a shoe factory and other unnamed shops. The northwest quadrant of the property is undeveloped. Star Laundry occupies the adjacent property to the northeast. The surrounding area is increasingly becoming more developed with light industrial. A foundry is present to the northwest.

In the 1924 map, the building property is now developed with Enkes City Dye Works, a Creamery, carpet cleaning service, and a produce store. Enkes City Dye Works has a room designated as "benzene room" and several indicated water tanks. The adjacent property to the northeast is occupied by a Star Laundry and a machine shop that performs nickel plating. The surrounding area is mostly light industrial.

In the 1950 map, the site is developed with Enkes City Dye Works, an auto garage and a carpet cleaning company. A gas and oil refueling facility is located in the northwest corner of the building property. The surrounding area is mostly light industrial.

In 1969, the building property is now occupied by the Salvation Army. A gasoline tank is indicated adjacent to the former automobile refueling facility. The surrounding area is a mix of auto part suppliers, mechanics, and building suppliers.

3.5 City Directories

ENW reviewed the historical city directories search for the subject site. The results are indicated in the table below.

Table 3-1. Historical City Directories

Year	Listing
139 SE Martin Luther King Jr. Boulevard – Subject Property	
--	No information returned
139 SE Union Avenue	
1935	Federal Emergency Relief Agency
1940	Enkes City Dye Works, Inc
1950	Victor Fur Factory
1955	Vacant
1960, 1965, 1970, 1981, 1985	Salvation Army Men's Social Service Center
200 SE Ash	
---	No listings
301 SE Ash St.	
1935, 1940, 1950	Enkes City Dye Works
1955	Vacant
106 SE 3rd Avenue	
1935, 1940, 1946, 1950, 1955, 1960	Ankeny Auto Service Co. (garage, repairs, and gas and oil)
114 SE 3rd Ave	
--	No information returned
136 SE 3rd Avenue	
1992	Hazel Creative Crafts
7 Union Ave N	
1935	Buscher & Lewis Inc. Battery and electric service

4.0 ENVIRONMENTAL SITE ASSESSMENT

This section summarizes work conducted to characterize and assess the nature and extent of impacts (identified as petroleum-related constituents and chlorinated solvents) in the subsurface below and adjacent to the subject site.

4.1 Summary of Work

4.1.1 UST Decommissioning[4]

In 1996, a diesel UST located near the northwest corner of the site was decommissioned by removal according to national standards of practice and with regulatory review and closure by ODEQ. The tank reportedly released low levels of petroleum hydrocarbons to adjacent soils. The tank decommissioning was granted regulatory closure in 1996.

4.1.2 Phase II ESA[5]

In December 2010, ENW conducted a Phase II ESA, after the Phase I ESA2 identified the following recognized environmental conditions:

- *The building property was historically used for dry cleaning. Dry cleaning has usually involved use of hazardous solvents.*
- *The immediately adjacent property to the northeast was historically occupied by a machine shop and metal plating facility.*
- *The building property is listed as a historical automobile repair shop and a refueling station, and Sanborn maps show a historical gasoline tank in the northwestern-most portion of the building property.*

The Phase II ESA included:

- A geophysical survey which identified drain and subsurface utility lines, confirmed that the UST at the northwest corner of the building had been removed, confirmed the position of a 675-gallon UST at the south side of the building, and cleared locations for soil borings. No other magnetic or other anomalies were identified.
- Fifteen (15) borings were completed at the site, and soil samples were collected from most of the borings.
- A water sample was collected from the dry well/cistern suspected of being a pressure blow-off feature for a historical boiler.

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[4] Hahn and Associates, Inc., May 15, 1996, *UST Decommissioning Report*, The Salvation Army, 139 SE Martin Luther King Jr. Boulevard, Portland, Oregon 97214: Prepared for The Salvation Army, HAI Project No. 3420, 9 p., maps, figures, appendices.

[5] ENW, December, 2010, *Phase II Environmental Site Assessment*, Salvation Army Facility, 139 SE Martin Luther King Jr. Boulevard, Portland, Oregon 97214; Prepared for Stumptown Coffee, ENW Project No. 495-10001-01.

- Sub-slab vapor samples were collected from five locations.
- A risk screening to provide a preliminary assessment of the impacts and to develop a preliminary conceptual site model of potential exposures to hazardous substances.

Based on the Phase II ESA results, ENW recommended the following:

1. *All impacts need to be further delineated and should be further characterized to provide better resolution in areas of concern.*
2. *The dry well/cistern provides an avenue by which ground water may be impacted. The dry well/cistern needs to be appropriately decommissioned according to State requirements.*
3. *The underground storage tank under the south sidewalk is no longer in service, and should be decommissioned according to State and municipal standards.*
4. *Risk screening has indicated that vapor intrusion risk to occupational workers from potential exposure to tetrachloroethene (PCE) and naphthalene should be addressed.*

4.1.3 Additional Assessment

ENW conducted additional work to further delineate areas of concern from December 2011 through February 2012. This work included:

- Completion of additional onsite and offsite borings.
- Collection and analysis of select soil samples from the borings.
- Collection and analysis of reconnaissance ground water samples from select borings.
- Collection of five soil gas samples from the perimeters of the property.

The methods and procedures used to conduct this work is described in detail in ENW's March 2012 *Independent Cleanup Report - Remedial Action Plan*[6].

4.2 Findings

The current known nature and extent of petroleum-related constituents and chlorinated solvents in the subsurface is described below. Table 4-1 summarizes sampling locations and depth for all media, for all sampling events conducted to date. Tables 1, 2 and 3 (behind Tables Tab) present all analytical data generated to date for soil, ground water, and soil gas / sub-slab vapor, respectively. Figures 4, 5 and 6 show soil, ground water, and soil gas / sub-slab vapor locations, respectively.

[6] ENW, March 30, 2012, *Independent Cleanup Report – Remedial Action Plan*, Former Salvation Army Property, 139 SE Martin Luther King Jr. Boulevard, Portland, Oregon 97214: Prepared for J&R Group, c/o Morgan Zhang, 107 SE Washington Street, Suite 535, Portland, Oregon, 97201, ENW Project No. 774-11001-01.

Table 4-1. Summary of Sampling Locations

Medium	Boring/ Sampling Location Designation	Sample ID	Date Sampled	Depth Sampled (feet)	Location
Soil	B1	B1-10	12/7/10	10	Northwest corner of site, outside building on SE Ankeny
		B1-15	12/7/10	15	
	B2	B2-5	12/7/10	5	Northwest corner, inside northern portion of building
		B2-15	12/7/10	15	
		B2-17.5	12/7/10	17.5	
	B3	B3-2	12/7/10	2	Next to catch basin in southern part of northern section of building
	B4	B4-2	12/7/10	2	Old benzene room
	B5b	B5b-2	12/7/10	2.5	Next to catch basin in southern portion of building
	B6	[samples not analyzed]	12/7/10	---	Former dry room, adjacent to historical carpet washing and offsite metal plating areas
	B7	B7-2	12/7/10	2	Former carpet cleaning area
		B7-10	12/7/10	10	
	B8	B8-7	12/7/10	7	In possible boiler room, southern portion of building
	B9	B9-0.5	12/7/10	0.5	Hazmat room
	B10	B10-0.5	12/7/10	0.5	Basement next to catch basin
	B11	[samples not analyzed]	12/7/10	---	Adjacent to catch basin in loading dock
	B12	B12-IF-18	12/16/10	18	North side of dry well/cistern
		B12-27	12/16/10	27	
	B13	B13-IF-18	12/16/10	18	South side of dry well/cistern
		B13-30	12/16/10	30	
	B14	B14-9-10	12/16/10	9-10	East side of outside UST
		B14-15	12/16/10	15	
	B15	B15-9	12/16/10	9	West side of outside UST
	B17	B17-14	12/22/11	14	See Figure 3
		B17-18	12/22/11	18	
		B17-22	12/22/11	22	
	B18	B18-25	12/22/11	25	
	B21	B21-5	12/22/11	5	
	B22	B22-5	12/22/11	5	
	B23	B23-5	12/22/11	5	
	B24	B24-5	12/22/11	5	
	B25	B25-5	12/22/11	5	
	B26	B26-5	12/22/11	5	
	B27	B27-5	12/22/11	5	
	B28	B28-5	12/22/11	5	
	B29	B29-5	12/22/11	5	
	B30	B30-5	12/22/11	5	
	B31	B31-10	2/3/12	10	NW corner of SE 3rd & SE Ash
		B31-SW1-17	2/3/12	17	
	B32	B32-10	2/3/12	10	Sidewalk of W side of SE 3rd btwn Ankeny & Ash
		B32-SW1-16	2/3/12	16	
	B33	B33-10	2/3/12	10	Sidewalk of W side of SE 3rd btwn Ankeny & Ash, northmost
		B33-SW1-19	2/3/12	19	

Table 4-1. Summary of Sampling Locations, *continued*

Medium	Boring/ Sampling Location Designation	Sample ID	Date Sampled	Depth Sampled (feet)	Location
Ground Water	MH01	MH01-101207	12/7/10	---	Dry well/cistern inside building
	B16	B16-GW-23	12/22/11	23	NW corner of building - on sidewalk
	B17	B17-GW-23	12/22/11	23	Central west side of building
	B18	B18-GW-20	12/22/11	20	SW corner of building - outside on sidewalk
	B19b	B19b-GW-23	12/22/11	23	30' east of sidewalk on south side of building
	B20	B20-GW-23	12/22/11	23	Just west of wall/cistern
	B31	B31-GW	2/3/12	17	West of SW coner of building, across SE 3rd
	B32	B32-GW	2/3/12	16	West of building across SE 3rd, central boring
	B33	B33-GW	2/3/12	19	West of building across SE 3rd north boring
Sub-Slab Vapor	SUB01	SUB01-101202	12/2/10	0.5	Northwest corner of the property, near fuel pump
	SUB02	SUB02-101202	12/2/10	0.5	Central west portion of the building, adjacent to "old benzene room"
	SUB03	SUB03-101202	12/2/10	0.5	Central portion of the building (former dry cleaning room
	SUB04	SUB04-101202	12/2/10	0.5	Basement, adjacent to sump
	SUB05	SUB05-101202	12/2/10	0.5	South-central portion of the building, "hazmat room"
Soil Gas	SG01	SG01-120103-8	1/3/12	8	4 feet of curb, southwest corner of site, in street
	SG02	SG02-120103-8	1/3/12	8	4 feet of curb, cental-south portion of site, in street
	SG03	SG03-120103-8	1/3/12	8	4 feet of curb, central-west portion of site, in street
	SG04	SG04-120103-8	1/3/12	8	4 feet of curb, northwest corner of site, in street
	SG05	SG05-120202-8	2/2/12	8	West side of 3rd Ave, on sidewalk

4.2.1 Floor Drain Investigation

A floor drain investigation was performed under the supervision of ENW. Three of four catch basins, eight floor drains, and the inlet pipe to the cistern were assessed. The loading dock catch basin was inaccessible due to its metal grate set in concrete and was filled with debris. All other catch basins were tied into the main sanitary sewer line, with only Catch Basin CB01 in the southeast corner of the northern portion of the building having a possible break in the line.

Many of the floor drains were inaccessible due to debris or other blockage. The lateral inlet pipe to the dry well/cistern terminated 10 feet from the dry well, and could not be traced further. Where blockages, mud, or other debris were encountered that would indicate a break in the line, that location was sited for a future soil boring. In some cases a boring had already been completed in the vicinity.

4.2.2 Soil Assessment by Area

4.2.2.1 Former UST and Fuel Dispenser, Northwest Corner of Building

Previous Work by Others. In 1996, Hahn and Associates decommissioned a diesel UST located on the north side of the northwest corner of the Salvation Army building. The 6,000-gallon diesel tank at that location was originally supposed to be decommissioned in place, but during the decommissioning activities, the tank buoyantly shifted when storm water intruded into the excavation. On communication with and consent of ODEQ, it was decided that the tank should be removed.

A mixture of diesel and water were pumped from the tank prior to decommissioning. The bottom of the tank was reportedly at 10.5 feet bgs. The Hahn and Associates report4 and subsequent ODEQ closure letter state that confirmatory sampling of soils under the ends of the tank contained no higher than 47-millilgrams per Kilogram (mg/Kg) total petroleum hydrocarbons (TPH) by analytical method TPH-418.1 (a method that is no longer accepted by ODEQ regulators; the soil samples were initially analyzed by TPH-HCID, which indicated diesel-range impacts). Ground water was not encountered in the excavation.

The Hahn and Associates report indicated that a fuel dispenser was located immediately inside the nearby door of the building, approximately 15 feet from the UST. No visible indications of impacts were observed along the product lines between the tank and the dispenser. One soil sample was also collected from below the tank piping leading to the dispenser, and analytical results for the sample were below the analytical method detection limits.

Work by ENW. Boring B1 was sited at the former location of the diesel UST, and boring B2 was located at the former fuel dispenser location. Two samples from boring B1 were both “non-detect” for TPH by NWTPH-HCID. However, boring B2 encountered gasoline impacts at up to 1,100 mg/kg at 5 feet bgs, exceeding the Soil Matrix Cleanup Level 2 standard for gasoline-range organics (GRO) of 80 mg/kg. Samples collected from B2 at 15 and 17.5 feet bgs were both “non-detect” by NWTPH-HCID.

Sample B2-5 was further analyzed for lead and volatile organic constituents (VOCs). Lead was detected at 23.5 mg/kg, below its screening-level risk-based concentration (SLRBC) of 30 mg/kg. VOCs benzene (0.085 mg/kg), ethylbenzene (62 mg/kg), naphthalene (67 mg/kg), 1,2,4-trimethylbenzene (1,2,4-TMB; 280 mg/kg), 1,3,5-trimethylbenzene (1,3,5-TMB; 81 mg/kg), and xylenes (390 mg/kg) all exceeded their SLRBCs.

The data suggests that the former diesel tank may have also been used as a gasoline tank at one time, or alternatively, gasoline may have been dispensed from an above-ground storage tank or another UST at this location.

Borings B21 and B22 were sited east and south of B2, respectively, in order to laterally delineate the impacts found at B2. Samples collected at 5 feet bgs from each boring were both "non-detect" by NWTPH-Dx and -Gx.

4.2.2.2 Central Building

Former Dry Cleaning and Carpet Cleaning Areas. Borings B3, B4, and B7 were all sited in the former dry cleaning and carpet cleaning areas. Boring B3, sited next to a catch basin adjacent to the former carpet washing room, and B4, sited adjacent to the "old benzene room" indicated on the Sanborn fire maps, were sampled at 2 feet bgs. Boring B7 was sampled at 2 and 10 feet bgs. No petroleum hydrocarbons or VOCs were detected in any of these borings. The 10-foot sample from boring B7 was also analyzed for RCRA[7] metals because of proximity of that location to historical plating activities further to the north on the same city block. No exceedances of SLRBCs were present except for arsenic. Arsenic exceeded its SLRBC, but only narrowly exceeded its default background concentration. Based on information provided by ODEQ[8], the maximum detected concentrations of arsenic is well within the range of background arsenic concentrations used in calculating the default background concentration in the Willamette Valley; therefore, arsenic is not considered a constituent of concern at this location.

Borings B23 and B30 were sited adjacent to the catch basin and floor drain, respectively, in the north-central portion of the building. Boring B24 was sited in the approximate center of the "old benzene room" and boring B28 was sited southwest of the B24 location. All four borings were sampled at 5 feet bgs and were "non-detect" by NWTPH-Dx and -Gx.

Former "Dry Room". The former "dry room" was located adjacent to the historical carpet washing and offsite metal plating areas. Boring B6 was completed at 10 feet bgs, and penetrated light brown micaceous silt to clayey silt from just below the concrete to the bottom. No odor, staining, or PID (photoionization detector) responses were noted, and therefore no samples were analyzed from the boring.

Former Boiler Room, Hazmat Room, Maintenance Room and Dry Well/Cistern. Borings B8 (former boiler room), B9 (hazmat room), B27 (maintenance room), and B12, B13 and B29 (dry

[7] Resource Conservation and Recovery Act.

[8] Data transmittal from Annette Dietz regarding background concentrations of metals in Oregon.

well/cistern) were also associated with the historical dry cleaning and carpet cleaning facilities, but are addressed separately in this section.

Boring B8 was sampled at 7 feet bgs (sample B8-7). B8-7 contained 3,300-mg/Kg diesel-range organics (DRO) and 640-mg/kg residual (oil)-range organics (RRO), and also a trace detection of naphthalene at 0.087 mg/Kg. Sample B9-0.5 from below the hazmat room contained 1,100-mg/kg DRO. Therefore both the B8 and B9 locations encountered soils exceeding Soil Matrix Level 2 cleanup standards. Sample B9-0.5 contained naphthalene at 0.16 mg/kg, exceeding naphthalene's SLRBC. 1,2,4- and 1,3,5-TMB were also detected in B9-0.5 but were below their SLRBCs.

Boring B27 was sampled at 5 feet bgs and was “non-detect” by NWTPH-Dx and -Gx.

The dry well was determined to be 27 feet deep. B12 and B13 were completed at 29 and 30 feet refusal depths respectively, with samples collected at 18 feet (soil-water interface) and 27 feet (in B12) and 30 feet (in B13). No VOCs or TPH were detected in either boring.

Boring B29 was sited adjacent to a soil floor drain in the vicinity of the dry well. The boring was sampled at 5 feet bgs and was “non-detect” by NWTPH-Dx and -Gx.

Catch Basin, Loading Dock Area. The loading dock on the west side of the building served the historical dry cleaning and rug cleaning companies that occupied the site. A catch basin is located in the base of the loading dock. Therefore boring B11 was sited adjacent to the catch basin. Boring B11 was completed at 10 feet bgs, and penetrated light brown micaceous silt to clayey silt from just below the concrete to the bottom. No odor, staining, or significant PID responses were noted, and therefore no samples were analyzed from the boring.

4.2.2.3 Southwest Building

Borings B5b and B10 were sited adjacent to floor sumps. Boring B5b was sampled at 2.5 feet bgs. B5b-2 contained 11,000-mg/kg DRO, 620-mg/kg RRO, 0.4-mg/kg Arochlor 1254, 12.7-mg/kg arsenic, and 4.3-mg/kg naphthalene, all exceeding their respective Soil Matrix Level 2 cleanup standard and/or SLRBC. Tetrachloroethene (PCE) was detected at 0.26-mg/kg, below its SLRBC. Boring B27 was sited southwest of B5 in order to delineate the impacts. B27 was cored to 5 feet bgs and sampled. No obvious impacts were observed visually or by PID and the sample was “non-detect” by NWTPH-Dx and -Gx.

Boring B10 was sampled at 0.5 feet bgs. No TPH or VOCs were detected in the sample.

4.2.2.4 UST Under South Sidewalk

The UST discovered under the south sidewalk was estimated to have a capacity of 675 gallon and is no longer in service. The top of the tank was determined to be 42 inches below sidewalk grade, and the bottom of the tank was at 87 inches below sidewalk grade. There was approximately 2-inches of oily water in the bottom of the tank. Borings B14 and B15 were sited at the east and west ends of the tank, respectively. Samples B14-9-10, B14-15, and B15-9 were

all "non-detect" by NWTPH-HCID, indicating that it was unlikely that the tank had any significant leaks to the subsurface at time of sampling (December 2010).

4.2.2.5 Property Line and Offsite Soil Sampling

Borings B17 and B18 were sited at the center of the west property line and southwest corner of the property boundary, respectively, on the sidewalk. B17 was sampled at 14, 18, and 22 feet bgs. B17-14 contained ethylbenzene at 1.0 mg/kg, naphthalene at 1.7 mg/kg, 1,2,4-TMB at 73 at mg/kg, 1,3,5-TMB at 3.9 mg/kg, GRO at 6300 mg/kg, and DRO as analyzed against the Stoddard Solvent standard at 11,000 mg/kg, all exceeding their respective Soil Matrix Level 2 cleanup standard and/or SLRBC. B17-18 contained dichloromethane at 0.69 mg/kg, although the lab flagged its presence as likely lab contamination, and GRO at 300 mg/kg, both exceeding their respective SLRBCs. B17-22 contained GRO at 5,600 mg/kg, and DRO as analyzed against the Stoddard solvent standard at 4,200 mg/kg, both exceeding their respective Soil Matrix Level 2 cleanup standard and/or SLRBC.

B18 was sampled at 25 feet bgs. Sample B18-25 contained GRO at 1,200 mg/kg and Stoddard solvent at 1,600 mg/kg, exceeding their respective Soil Matrix Level 2 cleanup standard and/or SLRBC.

Borings B31, B32, and B33 were sited along the west side of SE 3rd Avenue in order to delineate the impacts from B17 and B18. B31 was sampled at 10 feet bgs and at the soil-water interface at 17 feet bgs. B32 was sampled at 10 feet bgs and at the soil-water interface at 16 feet bgs. B33 was sampled at 10 feet bgs and at the soil-water interface at 19 feet bgs. All samples were "non-detect' by NWTPH-DX and -Gx.

4.2.3 Water Sampling

4.2.3.1 Dry Well/Cistern

As previously indicated, the dry well/cistern was completed at 27 feet below floor grade. No soil impacts were detected in the two (2) borings sited immediately to its north and south. Boring B20 was sited just west of the dry well/cistern; ground water was encountered at 23 feet bgs.

Water samples from both boring B20 and the dry well/cistern (see Figure 5) were analyzed for petroleum-hydrocarbon impacts by NWTPH-HCID (dry well/cistern sample designated MH01-101207) or by NWTPH-Gx and -Dx (for B20-GW-23) and for VOCs. Water sample analytical results are presented in Table 2. No petroleum hydrocarbons or VOCs were detected above the analytical method detection limits for either of the samples.

4.2.3.2 Reconnaissance Ground Water Samples

Reconnaissance ground water samples were collected from borings B16 and B17 along the western property line, B18 at the southwest corner of the building, B19b at the central southern property line, and B31, B32, and B33 west of the property across of SE 3rd Avenue

GRO was detected in B17-GW-23, B18-GW-20, and B32-GW at 1,100 micrograms per Liter (µg/L), 710 µg/L, and 1,100 µg/L, respectively. Each detection exceeds the SLRBC for GRO.

DRO was detected in B17-GW-23, B18-GW-20, and B32-GW at 1,500 µg/L, 800 µg/L, and 1,100 µg/L, respectively. Each detection exceeds the SLRBC for DRO, however, the detections were flagged that the chromatogram pattern did not match that of the standard used in the analysis. However, since soil impacts from the same borings had detections for Stoddard solvent, it can be inferred that the DRO impacts are Stoddard solvent impacts.

B17-GW-23 also contained ethylbenzene at 1.8 µg/L, naphthalene at 1.4 µg/L, and 1,2,4-TBM at 63 µg/L, all of which exceed their SLRBCs.

B18-GW-20 contained vinyl chloride at 0.28 µg/L, which exceeds its SLRBC. The lab noted that the sample was received with incorrect preservations and the value should be considered an estimate.

4.2.4 Sub-Slab Vapor Sampling

The sub-slab vapor assessment was performed to determine if there are impacts from VOCs to soil gas, particularly from the petroleum hydrocarbons and chlorinated solvents that may have been used in historical dry cleaning applications. Table 3 and Figure 6 present results.

- Five sub-slab vapor samples (SUB01 through SUB05) were collected from under the warehouse.
- All five samples had detections of **DRO**; however only the sample collected at SUB01 contained DRO (43,000 micrograms per cubic meter [$\mu g/m^3$]) above the ODEQ SLRBC of 21,000 $\mu g/m^3$.
- **GRO** was not detected in any of the sub-slab vapor samples.
- All five samples had detections of **benzene**, but only SUB01 and SUB05 (with detected concentrations of 74 and 82 $\mu g/m^3$, respectively) contained benzene above the ODEQ SLRBC (62 $\mu g/m^3$).
- **Ethylbenzene** (600 $\mu g/m^3$) only exceeded the ODEQ SLRBC (190 $\mu g/m^3$) at SUB05.
- **Naphthalene** was detected in all five samples, but only exceeded the ODEQ SLRBC (14 $\mu g/m^3$) at SUB01 (180 $\mu g/m^3$), SUB03 (110 $\mu g/m^3$), SUB04 (17 $\mu g/m^3$), and SUB05 (600 $\mu g/m^3$).
- **PCE** was detected in all five samples, but only exceeded the ODEQ SLRBC at SUB04 (2,200 $\mu g/m^3$) and SUB05 (2,600 $\mu g/m^3$).
- **Trichloroethene (TCE)** was only detected at SUB04 (13 $\mu g/m^3$); however, below its ODEQ SLRBC of 86 $\mu g/m^3$.
- **1,2,4-TMB** was detected in two of the samples; however, only exceeded its ODEQ SLRBC (1,500 $\mu g/m^3$) at SUB05 (16,000 $\mu g/m^3$).

Isopropyl alcohol (or 2-Propanol), used for leak detection purposes, was detected in three of the samples above laboratory reporting limits. However all the detections were below 5,000 $\mu g/m^3$.

Generally, if concentrations of isopropyl alcohol are below 5,000-µg/m^3 it is assumed that the leak will not have a significant effect on the results.[9]

4.2.5 Soil Gas Sampling

The soil gas assessment was performed at locations under and/or adjacent to the sidewalk west and south of the subject property to determine if there are impacts from VOCs to soil gas, particularly from the petroleum hydrocarbons and chlorinated solvents that may have been used in historical dry cleaning applications. Table 3 and Figure 6 present results.

- **DRO** was only detected at SG03; however, did not exceed the most-conservative ODEQ RBC.
- **GRO** was detected at all five (5) sample locations**;** however, only SG03 (with detected concentration of 17,000,000 μg/m^3) contained benzene above the most-conservative ODEQ RBC (79,000 μg/m^3).
- **PCE** was detected in four of the five sample locations, of which none exceeded its screening level RBC.
- **Cis-1,2-dichloroethene** was detected in only SG03, but at a concentration below its screening concentration.

SG03 was the most impacted of the five soil gas sampling locations. In addition to the constituents listed above, at SG03 benzene was detected at 4100-μg/m^3, ethylbenzene at 23,000-μg/m^3, TCE at 430-μg/m^3, 1,2,4-TMB at 9,500-μg/m^3, 1,3,5-TMB at 6,600-μg/m^3, total xylenes at 29,000-μg/m^3.

[9] ODEQ, March 25, 2010, *Guidance for Assessing and Remediating Vapor Intrusion in Buildings*.

5.0 RISK ASSESSMENT

Where impacts to soil are present, the State of Oregon requires that the impacts are evaluated using a risk-based approach described in ODEQ's Risk-Based Decision Making for the Remediation of Petroleum Contaminated Sites (RBDM) guidance document, 2003 revision. The RBDM guidance document and its periodic updates provide pre-calculated risk-based concentrations (RBCs) which were developed as screening levels for suspect sites, based on Oregon's unacceptable additional risk criteria for cancer occurrence and for non-carcinogenic health impacts. The State of Oregon considers acceptable additional risk of cancer from contact with carcinogenic constituents at less than one in one million incidences, or for non-carcinogenic constituents, the constituent threshold concentration at which health impacts would occur.

ENW previously conducted a risk assessment6 for impacted media at the site, based on all analytical data collected at the site by ENW as well as earlier consultants. The risk assessment is included below.

5.1 Identification of Constituents of Interest

Constituents of interest (COIs) associated with the known impacts at the site are as follows:

- Diesel-range organics (DRO, reported as Stoddard Solvent)
- Gasoline-range organics (GRO)
- Residual (oil)-range organics (RRO)
- Volatile organic constituents (VOCs; dry cleaning chemicals and gasoline-related volatiles)
- Polynuclear aromatic hydrocarbons (PAHs)
- Polychlorinated biphenyls (PCBs)
- Metals

This risk assessment follows the conservative approach of using the highest detected concentration of each constituent.

5.2 Identification of Constituents of Potential Concern

COIs were compared to SLRBCs to identify constituents of potential concern (COPCs) in each medium. The June 7, 2012 residential screening-level concentrations of ODEQ are used since this approach is the most conservative method in assessing potential risk to human health, regardless of whether a pathway is complete or not. Many constituents were not detected above their respective analytical method detection limits. ODEQ guidance states that in general, if a contaminant is not detected by the department-specified analytical methods and if standard method detection limits are met, that this is considered acceptable proof that the contaminant is not present in that medium. Therefore, these constituents will not be further addressed in the risk screening.

5.2.1 Soil

Table 1 summarizes the risk screening of soil samples collected during ENW's sampling at the site; COPCs in soil are identified below by surface (up to 3 feet bgs) and subsurface soil (greater than 3 feet bgs).

As previously described (Section 4.2.2.2), the concentration of arsenic detected in the samples analyzed is considered within the range of background concentration expected in the Willamette Valley and therefore is not considered a COPC.

Currently, ODEQ does not provide RBCs for RRO (except for mineral oil) because of the wide variation in oil formulations, and therefore the agency regulates RRO impacts to soil by analyses of associated constituents. Therefore, impacts from associated constituents typically found in RRO were further assessed instead of RRO itself.

5.2.1.1 Surface Soil

Table 1 identifies the following COPCs in surface soil: naphthalene, PCE, PCBs (Arochlor 1254), and DRO.

5.2.1.2 Subsurface Soil

Table 1 identifies the following COPCs in subsurface soil: benzene, ethylbenzene, naphthalene, 1,2,4-TMB, xylenes, GRO and DRO.

5.2.2 Ground Water

Table 2 summarizes the risk screening of reconnaissance ground water samples collected during ENW's sampling at the site. Ethylbenzene, naphthalene, 1,2,4-TMB, vinyl chloride, GRO, and DRO were identified as COPCs.

Note however that analytical data generated for the water samples collected from temporary borings should be considered conservative, in that the samples were not collected from properly constructed and developed monitoring wells. Constituents may be absorbed on particulate surfaces as well as dissolved in solution; therefore reported constituent concentrations may be inflated compared to that of dissolved concentrations obtained from a monitoring well. Also note that the dry well/cistern was also sampled, but all constituents were below laboratory method reporting limits in the sample.

5.2.3 Sub-Slab Vapor and Soil Gas

Table 3 summarizes the risk screening of sub-slab vapor and soil gas samples collected during ENW's sampling at the site. Benzene, ethylbenzene, naphthalene, PCE, 1,2,4-TMB, and DRO were identified as COPCs in sub-slab vapor under the warehouse, and benzene, ethylbenzene, TCE, 1,2,4-TMB, xylenes, and GRO were identified as COPCs in soil gas west of the building at the site.

5.3 Conceptual Site Model

5.3.1 Media of Concern

COPCs have been detected in surface soils, subsurface soils, ground water, and sub-slab vapor and soil gas at the site.

5.3.2 Land Use and Ground Water Use – Potential Receptors

The site is currently zoned both General Industrial 1 (IG1) and Central Employment design (EXd) by the City of Portland, described as follows:

> The General Industrial zones are two of the three zones that implement the Industrial Sanctuary map designation of the Comprehensive Plan. The zones provide areas where most industrial uses may locate, while other uses are restricted to prevent potential conflicts and to preserve land for industry. The development standards for each zone are intended to allow new development which is similar in character to existing development. The intent is to promote viable and attractive industrial areas. **IG1** areas generally have smaller lots and a grid block pattern. The area is mostly developed, with sites having high building coverages and buildings which are usually close to the street. IG1 areas tend to be the City's older industrial areas.
>
> The Central Employment zone implements the Central Employment map designation of the Comprehensive Plan. The zone allows mixed-uses and is intended for areas in the center of the City that have predominantly industrial type development. The intent of the zone is to allow industrial, business, and service uses which need a central location. Residential uses are allowed, but are not intended to predominate or set development standards for other uses in the area. The development standards are intended to allow new development which is similar in character to existing development.
>
> The Design Overlay Zone promotes the conservation, enhancement, and continued vitality of areas of the City with special scenic, architectural, or cultural value. This is achieved through the creation of design districts and applying the Design Overlay Zone as part of community planning projects, development of design guidelines for each district, and by requiring design review or compliance with the Community Design Standards. In addition, design review or compliance with the Community Design Standards ensures that certain types of infill development will be compatible with the neighborhood and enhance the area.

Residential uses are permitted in the EXd zone as long as they comply with the development standards; therefore, the urban residential receptor scenario was included in this assessment, consistent with the site being entirely zoned EXd.

The site is currently developed with a commercial warehouse building and occupational workers are currently present at the site; however, site redevelopment is anticipated in the future. Construction and excavation workers will therefore be present at the site.

Therefore, the receptors at the site include future urban residents, future occupational workers and future construction and excavation workers. It is assumed that these receptors are conservative with respect to consideration of the occasional site visitor.

No beneficial use of ground water was indicated onsite or in the adjacent areas to the site. There are no water wells on the property, and based on an online well log search there is no use of ground water as a drinking water source in the immediate vicinity of the subject property.

According to the US Geological Survey's online depth to water application[10] ground water at the site is approximately 24 feet bgs, suggesting that the regional ground water table is impacted. Water is supplied by the City of Portland to the subject property and essentially all of its residents and businesses from its Bull Run Watershed and Columbia South Shore Well Field. Ground water does not directly support vegetation, wetlands, springs or seeps or wildlife on or in the immediate vicinity of the site.

5.3.3 Pathways of Concern

An exposure pathway is the course a constituent takes from a source to an exposed population. Exposure pathways include four elements: (1) the source of contamination; (2) the means by which a constituent will be released, retained, or travel in a given medium (e.g., air or ground water); (3) a point of potential contact with a receptor; and (4) the means by which contact will occur (e.g., inhalation, ingestion). If any of these elements are missing, the pathway is considered incomplete. The table below presents a summary of the pathway analysis for human receptors.

Table 5-1. Summary of Pathway Analysis for Human Receptors

Potentially Exposed Population	Exposure Route, Medium and Exposure Point	Pathway Considered	Reason for Selection or Exclusion
Surface Soil			
Future Urban Resident	Direct ingestion, inhalation of volatiles and dermal contact with soil	YES	Site zoning permits redevelopment with residential occupancy in the future.
	Inhalation of volatiles from impacted soil (outdoor air)	YES	Site zoning permits redeveloped with residential occupancy in the future and soils contain volatile constituents.
	Inhalation of volatiles from impacted soil intruding into building (indoor air)	YES	Site zoning permits redeveloped with residential occupancy in the future and soils contain volatile constituents.
	Leaching to ground water with subsequent ingestion	No	Ground water is not used as a drinking water source in the vicinity of the site; additionally, ground water is assessed directly in this risk assessment..
Future Occupational Worker	Direct ingestion, inhalation of volatiles and dermal contact with soil	YES	COPCs are present in surface soils.
	Inhalation of volatiles from impacted soil (outdoor air)	YES	Soils contain volatile constituents.
	Inhalation of volatiles from impacted soil intruding into building (indoor air)	YES	Soils contain volatile constituents.
	Leaching to ground water with subsequent ingestion	No	Ground water is not used as a drinking water source in the vicinity of the site.
Future Construction Worker	Direct ingestion, inhalation of volatiles and dermal contact with soil	YES	COPCs are present in surface soils.
Future Excavation Worker	Direct ingestion, inhalation of volatiles and dermal contact with soil	YES	COPCs are present in surface soils.

[10] USGS *Estimated Depth to Groundwater in the Portland, Oregon Area,* http://or.water.usgs.gov/projs_dir/puz/, accessed 2/14/2012 by ENW Staff

Table 5-1. Summary of Pathway Analysis for Human Receptors, *continued*

Potentially Exposed Population	Exposure Route, Medium and Exposure Point	Pathway Considered	Reason for Selection or Exclusion
Subsurface Soils			
Future Urban Resident	Direct ingestion, inhalation of volatiles and dermal contact with soil	No	Site zoning permits residential use, however a future resident is unlikely to come into direct contact with subsurface soils.
	Inhalation of volatiles from impacted soil (outdoor air)	YES	Site zoning permits residential use and soils contain volatile constituents.
	Inhalation of volatiles from impacted soil intruding into building (indoor air)	YES	Site zoning permits residential use and soils contain volatile constituents.
	Leaching to ground water with subsequent ingestion	No	Ground water is not used as a drinking water source in the vicinity of the site.
Future Occupational Worker	Direct ingestion, inhalation of volatiles and dermal contact with soil	No	Occupational workers are unlikely to come into direct contact with subsurface soils.
	Inhalation of volatiles from impacted soil (outdoor air)	YES	Soils contain volatile constituents.
	Inhalation of volatiles from impacted soil intruding into building (indoor air)	YES	Soils contain volatile constituents.
	Leaching to ground water with subsequent ingestion	No	Ground water is not used as a drinking water source in the vicinity of the site.
Future Construction Worker	Direct ingestion, inhalation of volatiles and dermal contact with soil	YES	Construction workers may come into direct contact with subsurface soils, since basement level activities may involve subsurface soils.
Future Excavation Worker	Direct ingestion, inhalation of volatiles and dermal contact with soil	YES	COPCs are present in subsurface soils.
Ground Water			
Future Urban Resident	Direct ingestion, inhalation of volatiles and dermal contact with perched ground water	No	Residents are unlikely to come into contact with ground water.
	Inhalation of volatiles from impacted ground water (outdoor air)	YES	Ground water is impacted with hazardous volatile constituents
	Inhalation of volatiles from impacted ground water intruding into building (indoor air)	YES	Ground water is impacted with hazardous volatile constituents
	Direct ingestion	No	Ground water is not used as a drinking water source in the vicinity of the site.
Future Occupational Worker	Direct ingestion, inhalation of volatiles and dermal contact with ground water	No	Occupational workers are unlikely to come into contact with ground water.
	Inhalation of volatiles from impacted ground water (outdoor air)	YES	Ground water is impacted with hazardous volatile constituents
	Inhalation of volatiles from impacted ground water intruding into building (indoor air)	YES	Ground water is impacted with hazardous volatile constituents
	Direct ingestion of perched impacted ground water	No	Ground water is not used as a drinking water source in the vicinity of the site.
Future Construction Worker	Direct ingestion, inhalation of volatiles and dermal contact with perched impacted ground water	No	Construction workers are unlikely to come into direct contact with perched impacted ground water.
Future Excavation Worker	Direct ingestion, inhalation of volatiles and dermal contact with perched impacted ground water	No	Ground water is impacted with hazardous volatile constituents, but is generally too deep for contact with excavation workers

5.3.4 Conceptual Model

Based on the above discussion, the conceptual site model presented in Figure 7 has been developed for the site.

5.4 Further Evaluation of COPCs

5.4.1 Further Evaluation of Shallow Soil COPCs

Table 4 further evaluates the COPCs in surface soil based on the identified complete exposure pathways for surface soil (to three feet bgs). Only DRO may present an unacceptable health risk, by the dermal contact of a future urban resident. DRO exceeded the RBC for a complete exposure pathway (dermal contact) only at the B5b sample location, near the catch basin in the southern portion of the building. The other constituents on the table are not considered COCs in surface soils.

5.4.2 Further Evaluation of Subsurface Soil COPCs

Table 5 further evaluates the COPCs in subsurface soil based on the identified complete exposure pathways for subsurface soil (greater than three feet bgs). The table identifies the following COCs in subsurface soil: GRO, ethylbenzene, naphthalene, 1,2,4,-TMB, and total xylenes.

GRO exceeds its RBC for the volatilization to outdoor air and vapor intrusion into interior air of an urban resident. The exceedances of the vapor intrusion pathway occur in the northwest portion of the building near the former refueling facility, and near B17 and B18 on the west side and southwest corner of the building, respectively. The exceedance of the volatilization to exterior air RBC occurs only in the vicinity of B17, on the west side of the warehouse.

DRO exceeds its RBC for dermal contact by a construction worker (but not an excavation worker). Only one sample collected from B17 at 14 feet bgs exceeded the RBC. It is unlikely that an excavation worker will come in contact with soil at this depth, however it will be retained as a COC to be conservative.

Ethylbenzene exceeds its RBC for vapor intrusion into interior air of both urban residents and occupational workers in the northwest corner of the building, near the former fuel dispenser.

Naphthalene and 1,2,4-TMB exceed their RBCs for the volatilization to outdoor air and vapor intrusion into interior air of an urban resident only in the northwest corner of the building, near the former fuel dispenser.

Xylenes exceed their RBCs for intrusion into interior air of an urban resident in the northwest corner of the building, near the former fuel dispenser.

5.4.3 Further Evaluation of Ground Water COPCs

Table 6 evaluates the COPCs identified in ground water with the RBCs for complete exposure pathways. The identified COPCs do not present an unacceptable health risk and therefore are not considered COCs.

5.4.4 Further Evaluation of Sub-Slab Vapor and Soil Gas COPCs

Table 7 evaluates the COPCs in onsite sub-slab vapors and off-site soil gas. The table identifies:

- Naphthalene as a COC for vapor intrusion into buildings for onsite occupational workers.
- Ethylbenzene, naphthalene, 1,2,4-TMB, and DRO as COCs for vapor intrusion into buildings for onsite future urban residential receptors.

- Benzene, ethylbenzene, and GRO as COCs for vapor intrusion into buildings for off-site occupational workers. However, offsite delineation of impacts, including soil gas, demonstrated that offsite properties are not impacted at concentrations indicative of unacceptable risk, since the exceedences observed in the SG03 soil gas sample location did not extend across SE 3rd Avenue to SG05 soil gas sample location.
- Benzene, ethylbenzene, TCE, 1,2,4-TMB, xylenes, and GRO for vapor intrusion into buildings for off-site urban residential receptors. However, offsite delineation of impacts, including soil gas, demonstrated that offsite properties are not impacted at concentrations indicative of unacceptable risk, since the exceedences observed in the SG03 soil gas sample location did not extend across SE 3rd Avenue to SG05 soil gas sample location.

Therefore, only a potential onsite vapor intrusion risk exists at this time.

6.0 REMEDIAL ACTION OBJECTIVES AND MEASURES

The risk assessment identified COCs in surface soil, subsurface soil, soil gas and sub-slab vapor as described in the following tables.

Table 6-1. Summary of COC in Surface Soil

COC	Max	RBC	Units	Receptor	Exposure Pathway	Discussion *(specific to exceedances)*	Proposed Measure
DRO	11,000	2,200	mg/Kg	Future Urban Resident	Dermal Contact	One sample only from 2.5 feet bgs collected from boring adjacent to the catch basin in the southern portion of the building.	Removal of soil

Table 6-2. Summary of COCs in Subsurface Soil

COC	Max	RBC	Units	Receptor	Exposure Pathway	Discussion *(specific to exceedances)*	Proposed Measure
GRO	6,300	94	mg/Kg	Future Urban Resident	Vapor Intrusion into Buildings	Samples B2-5 (at former fuel dispenser location), and B17 (-14, -18, -22) and B18-25 (borings located on the west-central and southwest perimeters of the site).	Removal of soil (B2) and vapor control / mitigation (B17 and B18)
DRO	11,000	4,600	mg/Kg	Construction Worker	Dermal Contact	One sample only from 14 feet bgs collected from boring B17; construction workers are unlikely to be present at this depth	Control risk through Soil Management Plan
Ethylbenzene	62	2.2	mg/Kg	Future Urban Resident	Vapor Intrusion into Buildings	One sample only (B2-5), at former fuel dispenser location	Removal of soil
		12	mg/Kg	Occupational Worker			
Naphthalene	67	15	mg/Kg	Future Urban Resident	Volatilization to Outdoor Air	One sample only (B2-5), at former fuel dispenser location	Removal of soil
		15	mg/Kg		Vapor Intrusion into Buildings		
1,2,4-TMB	280	230	mg/Kg	Future Urban Resident	Volatilization to Outdoor Air	One sample only (B2-5), at former fuel dispenser location	Removal of soil
		82	mg/Kg		Vapor Intrusion into Buildings		
Xylenes	390	100	mg/Kg	Future Urban Resident	Vapor Intrusion into Buildings	One sample only (B2-5), at former fuel dispenser location	Removal of soil

Table 6-3. Summary of COCs in Sub-Slab Vapor (Onsite Receptors)

COC	Max	RBC	Units	Receptor	Exposure Pathway	Discussion *(specific to exceedances)*	Proposed Measure
Ethylbenzene	600	530	µg/m^3	Future Urban Resident	Vapor Intrusion into Buildings	SUB05 only (south-central portion of building)	Vapor control / mitigation
Naphthalene	600	39	µg/m^3	Future Urban Resident	Vapor Intrusion into Buildings	SUB01 (NW corner of building, near former fuel pump), SUB03 (central portion of building), SUB05 (south-central portion of building)	Soil removal (SUB01) and vapor control / mitigation (SUB03 and SUB05)
		360	µg/m^3	Occupational Worker		SUB05 only (south-central portion of building)	Vapor control / mitigation
1,2,4-TMB	16,000	1,500	µg/m^3	Future Urban Resident	Vapor Intrusion into Buildings	SUB05 only (south-central portion of building)	Vapor control / mitigation

Table 6-4. Summary of COCs in Soil Gas (Off-Site Receptors)

COC	Max	RBC	Units	Receptor	Exposure Pathway	Discussion *(specific to exceedances)*
GRO	17,000,000	79,000	µg/m^3	Future Urban Resident	Vapor Intrusion into Buildings	SG03 only - This sample was collected from under the side walk on the west side of the subject site. The results from SG05 confirm that migration to potential offsite receptors has not occurred, and onsite risks will be addressed by vapor control / mitigation. Sub-slab vapor samples are a better assessment of potential risk to on-site receptors. SUB02 and SUB04 were collected east and southeast of the SG03 location and did not contain any COCs.
		1,700,000	µg/m^3	Occupational Worker		
Benzene	4,100	170	µg/m^3	Future Urban Resident	Vapor Intrusion into Buildings	
		1,600	µg/m^3	Occupational Worker		
Ethylbenzene	23,000	530	µg/m^3	Future Urban Resident	Vapor Intrusion into Buildings	
		4,900	µg/m^3	Occupational Worker		
TCE	430	200	µg/m^3	Future Urban Resident	Vapor Intrusion into Buildings	
1,2,4-TMB	9,500	1,500	µg/m^3	Future Urban Resident	Vapor Intrusion into Buildings	
Xylenes	29,000	21,000	µg/m^3	Future Urban Resident	Vapor Intrusion into Buildings	

6.1 Evaluation of Hot Spots of Contamination

Hot spots of contamination (as defined in OAR 340-122-0115), were evaluated. One hot spot was identified in the former fuel dispenser location in the northwest corner of the building:

- Sample B2-5, collected from 5 feet bgs contained GRO and ethylbenzene at concentrations exceeding their respective hot spot concentrations for vapor intrusion into a building for a future urban resident.

When a hot spot is present, remedial actions must treat or excavate the hot spot to the extent feasible. As described below, the soil removal action proposed for this area will address the hot

spot in subsurface soil. *It should also be noted that risk was further assessed at this location through collection of sub-slab vapor sample SUB01; neither GRO or ethylbenzene were identified as COCs in the sample collected from SUB01.*

No other hot spots of contamination were identified.

6.2 Remedial Action Objectives

Remedial action objectives (RAOs) are medium-specific goals for protecting human health and the environment.[11] The following RAOs have been developed for the subject site. Note that in all cases proposed site-specific cleanup concentrations are consistent with the lowest applicable RBC identified in Tables 6-1 through 6-4.

Table 6-5. Remedial Action Objectives

Medium	Remedial Action Objectives
Surface Soil	Prevent future residents exposure to soil containing DRO at concentrations exceeding the dermal contact RBC of 2,200 mg/Kg.
Subsurface Soil	Remediate hot spots to the extent feasible. Prevent construction worker exposure to soil containing DRO at concentrations exceeding the dermal contact RBC of 4,600 mg/Kg. Prevent future residents and occupational worker exposure to COCs volatilizing to outdoor air or intruding into buildings.
Sub-Slab Vapor	Prevent future residents and occupational worker exposure to sub-slab vapor COCs at concentrations exceeding the RBCs presented in Table 6-3.

6.3 Remedial Action Measures

The following remedial action measures are proposed to meet the RAOs. Methods and procedures of implementation are described in Section 7.

6.3.1 Impacted Soil Excavation and Off-Site Disposal

Two areas of soil removal are planned:

- At the former fuel dispenser location in the northwest corner of the existing building. Soil removal will be conducted to both eliminate the hot spot and attempt to remove all subsurface soil impacts above cleanup RBCs (see Table 6-2) at this location. The plan is that, once complete, the only subsurface soil remaining above cleanup RBCs would be at borings B17 and B18.
- At the catch basin in the southern portion of the building. Soil removal will be conducted with the plan being to eliminate all soil above cleanup RBCs (see Tables 6-1 and 6-2) at this location so that COCs would no longer be present in surface soil beneath the building.

[11] ODEQ, August 12, 2008 update, *Guidance for Conducting Feasibility Studies*, document DEQ-08-LQ-088.

6.3.2 Vapor Mitigation Measures

The following work proposed by ENW combines both remedial measures and engineering controls to (1) immediately eliminate exposure pathways, while (2) actively reducing VOC concentrations over time.

- **Installation and operation of a sub-slab depressurization (SSD) system.** This system would extract sub-slab vapors and discharge them at a safe location above the building. This action both reduces the likelihood of VOC volatilization into interior (and exterior areas) and reduces concentrations in the subsurface.
- **Install a vapor barrier to prevent migration of subsurface vapors into the building.** A 60-mil sheet of high-density polyethylene overlain with a 4-ounce woven geotextile will be placed prior to pouring the concrete floor over the sub-slab depressurization trenches.

6.3.3 Additional Measures

Institutional controls (Easement and Equitable Servitude), a Soil Management Plan (SMP); an Erosion and Sediment Control Plan (to be prepared as part of future development), a SSD Operation and Maintenance (O&M) Plan and effectiveness monitoring complete the proposed remedial action measures.

6.4 Additional Work Recommendations

While not necessary to meet RAOs, the following work will also be completed to resolve the Phase II ESA findings as part of the subject site redevelopment:

- Proper decommissioning by removal the abandoned UST located beneath the side walk on the south side of the building.
- Proper decommissioning of the abandoned dry well / cistern in the south-central building, *in compliance with all underground injection control device (UIC)* requirements.

7.0 PROPOSED SCOPE OF WORK

This section describes the proposed general methods and procedures of implementing the remedial action measures and additional work described in Section 6. The follow table summarizes proposed tasks.

Table 7-1. Summary of Tasks

Prior to Site Work	
Task 1	Obtain approval from ODEQ for Remedial Action Plan
Site Preparation / Subsurface Work	
Task 2	Removal and Off-Site Disposal of Petroleum-Impacted Soil
Task 3	Decommission by Removal Abandoned UST
Task 4	Decommission Abandoned UIC Device
Site Construction	
Task 5	Finalize site erosion control plan, consistent with SMP
Task 6	Install SSD System
Task 7	Install Vapor Barrier
Post Construction	
Task 8	Prepare SSD System O&M Plan
Task 9	Conduct SSD System Testing, Monitoring and Reporting
Long Term	
Task 10	Conduct Off-Site Soil Gas Monitoring
Task 11	Conduct SSD System Monitoring according to O&M Plan

7.1 Prior to Site Work

Prior to site work beginning, the ODEQ must approve the Remedial Action Plan for the subject site. Additionally, a Soil Management Plan will be prepared that includes an Erosion and Sediment Control Plan.

This Soil Management Plan will provide guidance and requirements for managing petroleum hydrocarbon- and chlorinated solvent-impacted soil during future development of the subject site. The Soil Management Plan will contain an Erosion and Sediment Control Plan that will cover prevention of offsite migration of contaminants during demolition, construction, and post-construction (i.e., operation and maintenance) stages. All contractors and field personnel involved in any subsurface work at this site will be required to review, understand, and follow the Soil Management Plan.

7.2 Site Preparation / Subsurface Work

7.2.1 Removal and Off-Site Disposal of Petroleum-Impacted Soil

Two areas of petroleum-impacted soil will be excavated and disposed off site following demolition of the warehouse building. All work will be conducted according to the Soil Management Plan and a scope-specific Health and Safety Plan.

Prior to Site Work. In preparation for the soil removal action, public utility locates will be called for the public right-of-way at the southeast corner of the intersection of SE Ankeny Street and SE 3rd Avenue. Sidewalk closure permits will be obtained, as needed, along with any needed traffic control measures. Finally, erosion controls such as silt fences, straw wattles, and storm drain inlet filters and traps will be installed to prevent surface water from entering the excavations and sediments from leaving the site and entering the storm water system.

Soil Excavation Procedures. Figure 4 depicts the proposed excavation areas. An excavator will be used to remove the impacted soil. Any clean overburden encountered will be stockpiled for possible on-site re-use. The clean overburden will need to be characterized to confirm that it is not impacted with site COCs. Impacted soil will be separately stockpiled in a lined and bermed area, or direct loaded onto dump trucks and transported to Waste Management's Subtitle D landfill in Hillsboro, Oregon, for disposal. Temporary impacted soil stock piles will be underlain by polyethylene (PE) sheeting, bermed around its edges, and covered with weighted PE sheeting until the impacted soil is loaded onto trucks and transported to the landfill for disposal.

A PID will be used to screen removed soils, and the screening results will be recorded in a field notebook. The purposes of screening soils are to: justify removal or non-removal (e.g., soil is impacted or "clean"); justify completion of removal (e.g., soil is no longer impacted); and to screen all assessment, delineation, confirmation and characterization samples.

Reporting. Once data is available a brief technical memo will be prepared documenting soil removal actions and laboratory analytical results.

7.2.1.1 Near Catch Basin in Southern Portion of Existing Building

Estimated Volume of Diesel-Impacted Soil. One sample (B5b-2) collected at this location at 2.5 feet bgs contained DRO exceeding the RBC (see Table 6-1). It is anticipated that soil impacts at this location are relatively localized.

Confirmation Sampling. Removal will be conducted under the oversight of ENW; professional judgment will be used regarding the number and location of confirmation samples based on field observations and monitoring. At a minimum one excavation floor sample will be collected from under the location of prior sample B5b-2, and labeled in a manner similar to that described for the northwest corner excavation (Section 7.2.1.2, below).

The soil removal action objective is to removal DRO-impacted soil at this location to below the cleanup RBC (Table 6-1) of 2,200 mg/Kg.

Analytical Plan. The following analytical program was developed to confirm removal of DRO-impacted soil in the soil removal confirmation sample(s).

Table 7-2. Analytical Plan for DRO-Impacted Soil Removal

Analytical Method	Constituents	Soil Samples
NWTPH-Dx	DRO	All

7.2.1.2 Northwest Corner (Former Fuel Dispenser Location)

Estimated Volume of Gasoline-Impacted Soil. Based on data and boring logs, it appears impacted soil starts at approximately 1.5 feet bgs and extends to approximately 11 feet bgs. A volume of 3,310 cubic feet (122 cubic yards) of impacted soil was estimated based on an excavation model of a truncated cone that has an lower radius of 14 feet, an upper radius of 6 feet, and a height of 10 feet.

Confirmation Sampling. Removal will be conducted under the oversight of ENW; professional judgment will be used regarding the number and location of confirmation samples based on field observations and monitoring. At a minimum, the following confirmation samples will be collected: at least one floor sample and four sidewall samples (from ¾ depth to bottom). Samples will be labeled GSX-<<DATE>>-F or -(Q)W]-D; where X is a sequential number starting with 01, F is for floor samples and (Q)W is for sidewall samples, where Q is the cardinal direction (N, E, S, W) and D is depth in feet. Additional floor samples will be collected if the excavation is very large (one floor sample for every 150 square feet of floor area) and additional sidewall samples will be collected if wall length greater than 20 linear feet (one additional side wall sample for every 20 linear feet of side wall).

The soil removal action objective is to not leave any residual contaminated soil, within the following parameters:

- Any constituents of potential concern detected in soil confirmation samples are below SLRBCs.
- Residual impacts may only be left to avoid excessive excavation. Specifically, the excavation will not be extended beyond the sidewalk or deeper than 12 feet bgs.
- If residual impacts above SLRBCs are left in place, characterization sample(s) will be collected (in duplicate, one jar, one VOC syringe kit).

If hand auger samples are collected, they will be labeled as follows: EBX-[directional, if applicable]-D; where X is a sequential number starting with 11 and D is depth in feet. If horizontal borings are used, prefix samples with HBX-.

Analytical Plan. The following analytical program was developed to confirm removal of GRO-impacted soil in the soil removal confirmation samples.

Table 7-3. Analytical Plan for GRO-Impacted Soil Removal

Analytical Method	Constituents	Subsurface Soil Samples
NWTPH-Gx	GRO	All
EPA 6020/200.8	Lead	For characterization only if residual concentrations of GRO remain. (Only sample with highest concentration of GRO.)
EPA 8260B	GRO-related VOCs, specifically: Benzene, toluene, ethylbenzene total xylenes, naphthalene, iso-propylbenzene, n-propylbenzene, 1,2,4-Trimethylbenzene, 1,3,5-Trimethylbenzene, Ethylene dibromide (EDB), 1,2-dichloroethane (EDC), Methyl t-butyl ether (MTBE)	

7.2.2 Abandoned UST Decommissioning by Removal

The abandoned UST located beneath the side walk on the south side of the building will be decommissioned by removal. Proper agency notifications will be made, and any necessary permits obtained and the work will be conducted according to national standards of practice and Oregon Administrative Rules pertaining to UST decommissioning. The decommissioning will include reassessment of adjacent soils and regulatory closure. Once data is available a brief technical memo will be prepared documenting removal and laboratory analytical results.

7.2.3 Abandoned Dry Well / Cistern Decommissioning

The abandoned UIC device referred to during assessment as a dry well / cistern feature in the south-central building will be decommissioned. Proper agency notifications will be made and a work plan will be drafted for ODEQ approval through the State's UIC Program. Once work is complete a brief technical memo will be prepared documenting decommissioning.

7.3 Site Construction

7.3.1 Installation of the SSD System

An active sub-slab depressurization system will be installed, capable of sustaining 0.02-inch water differential pressure relative to the ambient air in the building's interior. The layout and specifications for the depressurization system are attached as Figures 8 through 11, which show installation beneath all basement/lower floor areas of the building that will be occupied in the future (office areas, living areas, etc.). The depressurization system will be equipped with sampling ports to enable monitoring during operation (the proposed monitoring plan is discussed further below). The vent pipe will extend at least three feet above the roof line of the commercial building to allow adequate, safe dispersion to the atmosphere. The depressurization system will

initially be powered by an explosion-proof in-line fan; however, if monitoring in the future shows that the required depressurization can be maintained by a passive venting system, or when concentrations decline to acceptable values, the system may be converted to a passive venting system. A letter requesting approval for system modification will be submitted to the ODEQ Project Manager. Advanced Remediation Technologies, Inc. (ART) has been consulted regarding the design and layout of the proposed SSD system.

Based on conversations with ART, and specifications in Figures 8 through 11, specifics regarding the depressurization trenches, collection manifold, vent line, and fan follow:

1. Three east-west trending parallel collection pipes will be installed in 1-foot deep trenches on approximately 12-foot centers beneath the lower lobby and management office level (southwest part). Similarly three north-south trending collection pipes will be installed beneath the lower retail/office level (northwest part) of the development. Each collection pipe ranges in length from approximately 70 to 100 feet long and is composed of perforated, 4-inch inside diameter (ID) polyvinyl chloride (PVC) pipe. The trenches will be lined with filter fabric (4-ounce non-woven geotextile of sufficient length to overlap the trench backfill), backfilled with 3/8-inch pea rock, and the remaining filter fabric liner will be used to overlap the pea rock.
2. At the southwest part of the development, the east end of the collection pipes will manifold to a single, north-south trending solid 4-inch ID PVC pipe that is approximately 35 feet long. At the northwest part of the development, the south end of the collection pipes will manifold to a single, solid 4-inch ID PVC pipe that is composed of an approximately 80 feet long section from west to east, and 50 feet long from north to south where it connects at the valve box. The perforated pipe section within each depressurization trench will be sloped away from the collection manifold to facilitate drainage so water does not accumulate in the lines.
3. A valve box will be installed at the north end of the southwest collection manifold, and south end of the northwest collection manifold, with 4-inch ball valves to regulate flow to the two sets of trenches, and sampling ports to assist in monitoring soil vapor from the two sets of trenches.
4. The upstream end of the 4-inch ball valves will be piped to a 4-inch ID solid PVC vent riser that will run vertically through the interior of the building.
5. An explosion-proof fan will be installed in line on the exterior of the building, and the vent riser pipe shall discharge above the roofline.
6. Vent exhaust will be located away from heating, ventilation, and air conditioning intakes, windows, etc. to the extent possible.
7. The vent will terminate at least 3 feet above the surface of the roof.
8. The vent pipe shall be installed in a configuration and supported in a manner that ensures that any rain water or condensation accumulating within the pipes drains away from the valve box where they can be drained as needed.

9. The size and air movement capacity of the vent pipe fan shall be sufficient to create and maintain a pressure field beneath the slab that is lower than the ambient pressure above the slab (0.02-inch water differential pressure).
10. A sampling port will be installed in the solid portion of the vent line such that compliance sampling and routine monitoring can be conducted.
11. The vent will be located at least 10 feet away from any window or other opening into the conditioned spaces of the building.

Granulated Activated Charcoal (GAC) may be used at system startup, if concentrations at the vent line exceed allowable concentrations, as determined referencing ODEQ's guidance document[12] which specifies calculation of permissible concentration increases. If GAC is needed at system startup, a temporary trailer-mounted blower system may be used until concentrations beneath the slab equilibrate and GAC is no longer needed.

7.3.2 Installation of the Vapor Barrier

A 60-mil polyethylene vapor barrier overlain with a 4-ounce woven geotextile will be placed beneath all basement/lower floor areas of the building that will be occupied in the future (office areas, living areas, etc.) prior to pouring the concrete floor over the SSD system trenches. All seams and edges will be sealed by a certified landfill liner installer, and inspected.

7.4 Post Construction

7.4.1 Prepare SSD System O&M Plan

A SSD system O&M Plan will be prepared that describes SSD system operations, maintenance, and monitoring from system start-up, through long-term monitoring, and ending in closure monitoring and system decommissioning. The elements of SSD system startup testing and monitoring are described below.

7.4.2 SSD System Startup Testing and Monitoring

Testing of the sub-slab depressurization system will be conducted to ensure:

- A minimum of 0.02 inches of water pressure differential between the sub-slab environment and the ambient air within the building is maintained.
- Concentrations of VOCs in the system exhaust do not exceed ODEQ-allowed concentrations.

Typically, the concentration of VOCs vented from a depressurization system is initially very high and then declines asymptotically over time. It is our intention to operate the system in a manner that maintains the desired pressure differential while reducing VOC concentrations. It is anticipated that vented VOC concentrations will be below levels requiring an air permit; however, if initial test concentrations indicate a GAC filter is needed in-line with the system, it will be inserted

[12] ODEQ, January 2006, *Guidance for Managing Hazardous Substance Air Discharges from Remedial Systems*.

into the depressurization system as previously described. Therefore we anticipate the initial startup period to require additional monitoring to ensure system exhaust meets State standards. To ensure effective monitoring:

- Several permanent penetrations, each fitted with a valve within a sealed flush-to-grade monument, will be installed in the floor of the lobby and management office, and the floor of the retail office spaces, that will allow measurements to be made of pressure differential between the sub-slab environment and ambient air during system startup. These installations will be installed at the same time as the SSD system, with termination located in the SSD system vault located in the parking garage. At least two installations are anticipated for each SSD system trunk (southwest portion and northwest portion). Pressure gauges/flow meters will be attached via polyethylene tubing to the valves when making measurements.
- As previously stated, the vent line for the depressurization system will be equipped with sampling ports (at vent and at the valve box). To conduct measurements required to meet air quality standards, one sampling port will be located before the filtration treatment (if used) and one port will be located after the vented air stream is treated. Additionally, an air-velocity port will be installed in the exhaust stack so that volumetric quantities of volatiles expelled into the atmosphere can be calculated.
- All monitoring equipment will be calibrated per manufacturer's recommendations prior to use.

The following schedule is a general outline we intend to use for monitoring the depressurization system. Based on site conditions, the schedule may be modified for the purposes of ensuring effective operation of the system and compliance with ODEQ regulations.

Prior to system startup: For comparison, prior to system start up sub-slab pressure measurements relative to ambient indoor air pressures and PID measurements from beneath the slab will be collected from select communication test locations.

System Start Up – Verify Sub-Slab Communication and Initial Effluent Test: At a minimum, field measurements of relative pressures in sub-slab and ambient air space will be collected upon system startup following one hour of operation as well as PID measurements at each sub-slab monitoring location. Initial effluent screenings will be performed with a PID on an hourly basis for the first six hours of operation to yield a semi-quantitative estimate of system emissions. Additionally, an air discharge sample will be collected during the first hour of operation to yield baseline venting concentrations and the air discharge rate will be determined. The air discharge sample will be analyzed by AirToxics Inc. for VOCs using EPA Method TO-15. Based on the initial analysis, a decision will be made regarding the necessity to install a GAC system in the venting system and whether an ODEQ air permit will be required using EPA's Screen 3 Model, and if modifications to this monitoring schedule are needed.

Following One Month of System Operation: Verification of operation following one month of operation will consist of sub-slab pressure measurements relative to ambient indoor air pressures

and PID measurements at all sub-slab monitoring locations and PID screening of exhaust. Emissions testing will be rechecked if a GAC system is installed; however, regardless another emissions sample will be collected and discharge rate determinations will be made and evaluated.

Reporting. A technical memorandum documenting the SSD system operation, field PID readings, and air sampling analytical results will be prepared following one month of operation and submitted to ODEQ. The technical memorandum will contain as-built system description and startup procedures, as well as include an assessment of system performance based on pressure differential, requirement for filtration, PID screening measurements, air discharge volumes, and estimates of removed contaminant volumes. This performance assessment will provide the data to confirm that the system is continuing to provide the required protection of site occupants.

7.5 Long Term

7.5.1 Offsite Soil Gas Monitoring

As requested by ODEQ, off site soil gas monitoring will be conducted at the previous SG05 soil gas sample location (see Figure 6) for a period of one year following the completion of the SSD system installation. Two samples will be collected, at six months intervals, at this location at five (5) feet depth following similar protocol as was utilized during the collection of the SG05 sample. The samples will be analyzed as shown in the table below. A single report will be prepared following collection of both samples after one year to document this offsite monitoring, detailing sampling protocol and results. Laboratory results will be compared to both urban residential and occupational RBCs.

The following analytical program was developed to confirm offsite soil gas concentrations over a period of one year west (down-gradient) of the subject site.

Table 7-4. Analytical Plan for Off-Site Soil Gas Monitoring

Analytical Method	Constituents	Soil Gas
TO-15	benzene ethylbenzene naphthalene PCE TCE 1,2,4-TMB total xylenes GRO	All

7.5.2 Continued SSD System Monitoring and Reporting

Continued system monitoring and reporting beyond one month will be outlined in the SSD System O&M Plan.

8.0 LIMITATIONS

The scope of this report is limited to observations made during on-site work; interviews with knowledgeable sources; and review of readily available published and unpublished reports and literature. As a result, these conclusions are based on information supplied by others as well as interpretations by qualified parties.

The focus of the site closure does not extend to the presence of the following conditions unless they were the express concerns of contacted personnel, report and literature authors or the work scope.

1. Naturally occurring toxic or hazardous substances in the subsurface soils, geology and water,
2. Toxicity of substances common in current habitable environments, such as stored chemicals, products, building materials and consumables,
3. Contaminants or contaminant concentrations that are not a concern now but may be under future regulatory standards,
4. Unpredictable events that may occur after ENW's site work, such as illegal dumping or accidental spillage.

There is no practice that is thorough enough to absolutely identify the presence of all hazardous substances that may be present at a given site. ENW's investigation has been focused only on the potential for contamination that was specifically identified in the SOW. Therefore, if contamination other than that specifically mentioned is present and not identified as part of a limited SOW, ENW's environmental investigation shall not be construed as a guaranteed absence of such materials. ENW has endeavored to collect representative analytical samples for the locations and depths indicated in this report. However, no sampling program can thoroughly identify all variations in contaminant distribution.

We have performed our services for this project in accordance with our agreement and understanding with the client. This document and the information contained herein have been prepared solely for the use of the client.

ENW performed this study under a limited scope of services per our agreement. It is possible, despite the use of reasonable care and interpretation, that ENW may have failed to identify regulation violations related to the presence of hazardous substances other than those specifically mentioned at the closure site. ENW assumes no responsibility for conditions that we did not specifically evaluate or conditions that were not generally recognized as environmentally unacceptable at the time this report was prepared.

TABLES

Table 1. Summary of Analytical Data, Soil

Sample ID		B1-10	B1-15	B2-5	B2-15	B2-17.5	B3-2	B4-2	B5b-2	B7-2	B7-10	B8-7	B9-0.5	B10-0.5	B12-IF-18	B12-27	B13-IF-18
Date Sampled		12/7/10	12/7/10	12/7/10	12/7/10	12/7/10	12/7/10	12/7/10	12/7/10	12/7/10	12/7/10	12/7/10	12/7/10	12/7/10	12/16/10	12/16/10	12/16/10
Depth Sampled (feet)		10	15	5	15	17.5	2	2	2.5	2	10	7	0.5	0.5	18	27	18
Sampled By		ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW
Location		Northwest corner of site, outside building on SE Ankeny, near former tank location		Northwest corner, inside northern portion of building, near former fuel dispenser			Next to catch basin in southern part of northern section of building, adjacent to former carpet washing room	Adjacent to "Old benzene room"	Next to catch basin in southern portion of building	Former carpet cleaning area		In possible former boiler room, southern portion of building	"Hazmat Room"	Basement next to sump	North side of dry well/cistern		South side of c
Constituent of Interest	Note	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)
Volatile Organic Constituents																	
Benzene	c, v	---	---	**0.085**	---	---	<0.03 (ND)	<0.03 (ND)	<0.03 (ND)	<0.03 (ND)	<0.03 (ND)	<0.03 (ND)	<0.03 (ND)	<0.03 (ND)	<0.03 (ND)	<0.03 (ND)	<0.03 (ND)
Bromodichloromethane	c, v	---	---	<0.05 (ND)	---	---	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---	---	---
Bromoform	c, nv	---	---	<0.05 (ND)	---	---	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---	---	---
Bromomethane	nc, v	---	---	<0.5 (ND)	---	---	<0.5 (ND)	<0.5 (ND)	<0.5 (ND)	<0.5 (ND)	<0.5 (ND)	<0.5 (ND)	<0.5 (ND)	<0.5 (ND)	---	---	---
Carbon tetrachloride	c, v	---	---	<0.05 (ND)	---	---	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---	---	---
Chlorobenzene	nc, v	---	---	<0.05 (ND)	---	---	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---	---	---
Chlorodibromomethane	c, nv	---	---	<0.05 (ND)	---	---	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---	---	---
Chloroethane	nc, v	---	---	<0.5 (ND; ca)	---	---	<0.05 (ND)	<0.05 (ND)	<0.5 (ND; ca)	<0.5 (ND; ca)	<0.5 (ND; ca)	<0.5 (ND; ca)	<0.5 (ND; ca)	<0.5 (ND; ca)	---	---	---
Chloroform	c, v	---	---	<0.05 (ND)	---	---	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---	---	---
Chloromethane	nc, v	---	---	<0.5 (ND)	---	---	<0.5 (ND)	<0.5 (ND)	<0.5 (ND)	<0.5 (ND)	<0.5 (ND)	<0.5 (ND)	<0.5 (ND)	<0.5 (ND)	---	---	---
Dichlorobenzene, 1,2-	nc, v	---	---	<0.05 (ND)	---	---	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---	---	---
Dichlorobenzene, 1,4-	c, v	---	---	<0.05 (ND)	---	---	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---	---	---
Dichloroethane, 1,1-	c, v	---	---	<0.05 (ND)	---	---	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---	---	---
Dichloroethene, 1,1-	nc, v	---	---	<0.05 (ND)	---	---	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---	---	---
Dichloroethene, cis-1,2-	nc, v	---	---	<0.05 (ND)	---	---	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---	---	---
Dichloroethene, trans-1,2-	nc, v	---	---	<0.05 (ND)	---	---	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---	---	---
Dichloromethane	c, v	---	---	<0.5 (ND)	---	---	<0.5 (ND)	<0.5 (ND)	<0.5 (ND)	<0.5 (ND)	<0.5 (ND)	<0.5 (ND)	<0.5 (ND)	<0.5 (ND)	---	---	---
EDB (1,2-dibromoethane)	c, v	---	---	<0.05 (ND)	---	---	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)
EDC (1,2-dichloroethane)	c, v	---	---	<0.05 (ND)	---	---	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)
Ethylbenzene	c, v	---	---	**62**	---	---	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)
MTBE (methyl t-butyl ether)	c, v	---	---	<0.05 (ND)	---	---	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)
Naphthalene	c, v	---	---	**67**	---	---	<0.05 (ND)	<0.05 (ND)	**4.3**	<0.05 (ND)	<0.05 (ND)	0.087	**0.16**	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)
Propylbenzene, iso	nc, v	---	---	7.3	---	---	<0.05 (ND)	<0.05 (ND)	0.088	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)
Tetrachloroethene (PCE)	c, v	---	---	<0.025 (ND)	---	---	<0.025 (ND)	<0.025 (ND)	**0.26**	<0.025 (ND)	<0.025 (ND)	<0.025 (ND)	<0.025 (ND)	<0.025 (ND)	---	---	---
Toluene	nc, v	---	---	28	---	---	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)
Trichloroethane, 1,1,1-	nc, v	---	---	<0.05 (ND)	---	---	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---	---	---
Trichloroethane, 1,1,2- Ψ	c, v	---	---	<0.05 (ND)	---	---	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---	---	---
Trichloroethene	c, v	---	---	<0.03 (ND)	---	---	<0.03 (ND)	<0.03 (ND)	<0.03 (ND)	<0.03 (ND)	<0.03 (ND)	<0.03 (ND)	<0.03 (ND)	<0.03 (ND)	---	---	---
Trichlorofluoromethane (Freon 11)	nc, v	---	---	<0.5 (ND; ca)	---	---	<0.05 (ND)	<0.05 (ND)	<0.5 (ND; ca)	<0.05 (ND; ca)	<0.05 (ND; ca)	<0.05 (ND; ca)	<0.05 (ND; ca)	<0.05 (ND; ca)	---	---	---
Trimethylbenzene, 1,2,4-	nc, v	---	---	**280**	---	---	<0.05 (ND)	<0.05 (ND)	3.7	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	0.39	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)
Trimethylbenzene, 1,3,5-	nc, v	---	---	**81**	---	---	<0.05 (ND)	<0.05 (ND)	0.92	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	0.20	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)
Vinyl chloride	c, v	---	---	<0.05 (ND)	---	---	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---	---	---
Xylenes	nc, v	---	---	**390**	---	---	<0.1 (ND)	<0.1 (ND)	<0.1 (ND)	<0.1 (ND)	<0.1 (ND)	<0.1 (ND)	<0.1 (ND)	<0.1 (ND)	<0.15 (ND)	<0.15 (ND)	<0.15 (ND)
Metals																	
Arsenic	c, nv	---	---	---	---	---	---	---	**12.7**	---	**8.71**	---	---	---	---	---	---
Barium	nc, nv	---	---	---	---	---	---	---	185	---	147	---	---	---	---	---	---
Cadmium Ψ	c, nv	---	---	---	---	---	---	---	1.16	---	1.08	---	---	---	---	---	---
Chromium (III)	nc, nv	---	---	---	---	---	---	---	15.3	---	10.9	---	---	---	---	---	---
Lead	NA, nv	---	---	23.5	---	---	---	---	14.9	---	9.84	---	---	---	---	---	---
Mercury	nc, nv	---	---	---	---	---	---	---	<0.2 (ND)	---	<0.2 (ND)	---	---	---	---	---	---
Nickel	c, nv	---	---	---	---	---	---	---	---	---	13.5	---	---	---	---	---	---
Silver	nc, nv	---	---	---	---	---	---	---	<1 (ND)	---	<1 (ND)	---	---	---	---	---	---

Table 1. Summary of Analytical Data, Soil

Sample ID		B1-10	B1-15	B2-5	B2-15	B2-17.5	B3-2	B4-2	B5b-2	B7-2	B7-10	B8-7	B9-0.5	B10-0.5	B12-IF-18	B12-27	B13-IF-18
Date Sampled		12/7/10	12/7/10	12/7/10	12/7/10	12/7/10	12/7/10	12/7/10	12/7/10	12/7/10	12/7/10	12/7/10	12/7/10	12/7/10	12/16/10	12/16/10	12/16/10
Depth Sampled (feet)		10	15	5	15	17.5	2	2	2.5	2	10	7	0.5	0.5	18	27	18
Sampled By		ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW
Location		Northwest corner of site, outside building on SE Ankeny, near former tank location		Northwest corner, inside northern portion of building, near former fuel dispenser			Next to catch basin in southern part of northern section of building, adjacent to former carpet washing room	Adjacent to "Old benzene room"	Next to catch basin in southern portion of building	Former carpet cleaning area		In possible former boiler room, southern portion of building	"Hazmat Room"	Basement next to sump	North side of dry well/cistern		South side of c
Constituent of Interest	Note	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)
Semivolatile Organic Constituents																	
Polychlorinated biphenyls (PCBs) Ψ	c, nv	---	---	---	---	---	---	---	**0.4**	---	---	---	---	---	---	---	---
Polycyclic Aromatic Hydrocarbons																	
Acenaphthene	nc, v	---	---	---	---	---	---	---	0.99	---	---	---	---	---	---	---	---
Anthracene	nc, v	---	---	---	---	---	---	---	<0.05 (ND)	---	---	---	---	---	---	---	---
Benz[a]anthracene	c, nv	---	---	---	---	---	---	---	<0.05 (ND)	---	---	---	---	---	---	---	---
Benzo[a]pyrene	c, nv	---	---	---	---	---	---	---	<0.05 (ND)	---	---	---	---	---	---	---	---
Benzo[b]fluoranthene	c, nv	---	---	---	---	---	---	---	<0.05 (ND)	---	---	---	---	---	---	---	---
Benzo[k]fluoranthene	c, nv	---	---	---	---	---	---	---	<0.05 (ND)	---	---	---	---	---	---	---	---
Chrysene	c, nv	---	---	---	---	---	---	---	<0.05 (ND)	---	---	---	---	---	---	---	---
Dibenz[a,h]anthracene	c, nv	---	---	---	---	---	---	---	<0.05 (ND)	---	---	---	---	---	---	---	---
Fluoranthene	nc, nv	---	---	---	---	---	---	---	<0.076 (ND)	---	---	---	---	---	---	---	---
Fluorene	nc, v	---	---	---	---	---	---	---	<4.4 (ND)	---	---	---	---	---	---	---	---
Indeno[1,2,3-cd]pyrene	c, nv	---	---	---	---	---	---	---	<0.05 (ND)	---	---	---	---	---	---	---	---
Pyrene	nc, nv	---	---	---	---	---	---	---	0.086	---	---	---	---	---	---	---	---
Total Petroleum Hydrocarbons																	
GRO	nc, nv	<20 (NP)	<20 (NP)	**1100**	<20 (NP)	<20 (NP)	---	---	<20 (NP)	---	---	<20 (NP)	<20 (NP)	<20 (NP)	<20 (NP)	<20 (NP)	<20 (NP)
DRO	nc, nv	<50 (NP)	<50 (NP)	<50 (NP)	<50 (NP)	<50 (NP)	---	---	**11000**	---	---	**3300**	**1100**	<50 (NP)	<50 (NP)	<50 (NP)	<50 (NP)
RRO	nc, nv	<250 (NP)	<250 (NP)	<250 (NP)	<250 (NP)	<250 (NP)	---	---	**620**	---	---	**640**	<250 (ND)	<250 (NP)	<250 (NP)	<250 (NP)	<250 (NP)

Notes:

mg/Kg = milligram per kilogram or parts per million.

<# (ND) = not detected at or above the laboratory method reporting limit shown.

NE = not established

NP = not present at or above the laboratory method reporting limit shown (HCID analysis).

— = not analyzed or not applicable.

c = carcinogenic

nc = noncarcinogenic

v = volatile

nv = nonvolatile

GRO = gasoline-range organics.

DRO = diesel-range organics.

RRO = residual-range organics.

Bolded concentrations exceed either Soil Matrix Cleanup Standards or screening level risk-based concentrations and background concentrations, as applicable.

[1] Lowest Risk-Based Concentration for soil (screening level).

(Y) indicates analyte not detected, but detection limit is above screening concentration.

lc = reported concentration is most likely a laboratory contaminant and is probably not present in the sample.

Table 1. Summary of Analytical Data, Soil

Sample ID		B13-30	B14-9-10	B14-15	B15-9	B17-14	B17-18	B17-22	B18-25	B21-5	B22-5	B23-5	B24-5	B25-5	B26-5	B27-5	B28-5
Date Sampled		12/16/10	12/16/10	12/16/10	12/16/10	12/22/11	12/22/11	12/22/11	12/22/11	12/22/11	12/22/11	12/22/11	12/22/11	12/22/11	12/22/11	12/22/11	12/22/11
Depth Sampled (feet)		30	9-10	15	9	14	18	22	25	5	5	5	5	5	5	5	5
Sampled By		ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW
Location		dry well/cistern	East side of outside UST		West side of outside UST	In sidewalk, central-weest side of property			In sidewalk, SW corner of property	Delineation boring, impacts in NW corner of property	Delineation boring, impacts in NW corner of property	Assessment boring along sewer line	Assessment boring along sewer line	Assessment boring along product lnes	Assessment boring along product lnes	Assessment boring along sewer line	Assessment boring along sewer line
Constituent of Interest	Note	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)
Volatile Organic Constituents																	
Benzene	c, v	<0.03 (ND)	---	---	---	<0.03 (ND)	<0.03 (ND)	<0.03 (ND)	<0.03 (ND)	---	---	---	---	---	---	---	---
Bromodichloromethane	c, v	---	---	---	---	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---	---	---	---	---	---	---	---
Bromoform	c, nv	---	---	---	---	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---	---	---	---	---	---	---	---
Bromomethane	nc, v	---	---	---	---	<0.5 (ND)	<0.5 (ND)	<0.5 (ND)	<0.5 (ND)	---	---	---	---	---	---	---	---
Carbon tetrachloride	c, v	---	---	---	---	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---	---	---	---	---	---	---	---
Chlorobenzene	nc, v	---	---	---	---	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---	---	---	---	---	---	---	---
Chlorodibromomethane	c, nv	---	---	---	---	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---	---	---	---	---	---	---	---
Chloroethane	nc, v	---	---	---	---	<0.5 (ND)	<0.5 (ND)	<0.5 (ND)	<0.5 (ND)	---	---	---	---	---	---	---	---
Chloroform	c, v	---	---	---	---	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---	---	---	---	---	---	---	---
Chloromethane	nc, v	---	---	---	---	<0.5 (ND)	<0.5 (ND)	<0.5 (ND)	<0.5 (ND)	---	---	---	---	---	---	---	---
Dichlorobenzene, 1,2-	nc, v	---	---	---	---	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---	---	---	---	---	---	---	---
Dichlorobenzene, 1,4-	c, v	---	---	---	---	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---	---	---	---	---	---	---	---
Dichloroethane, 1,1-	c, v	---	---	---	---	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---	---	---	---	---	---	---	---
Dichloroethene, 1,1-	nc, v	---	---	---	---	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---	---	---	---	---	---	---	---
Dichloroethene, cis-1,2-	nc, v	---	---	---	---	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---	---	---	---	---	---	---	---
Dichloroethene, trans-1,2-	nc, v	---	---	---	---	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---	---	---	---	---	---	---	---
Dichloromethane	c, v	---	---	---	---	<0.5 (ND)	**0.69 lc**	<0.5 (ND)	<0.5 (ND)	---	---	---	---	---	---	---	---
EDB (1,2-dibromoethane)	c, v	<0.05 (ND)	---	---	---	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---	---	---	---	---	---	---	---
EDC (1,2-dichloroethane)	c, v	<0.05 (ND)	---	---	---	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---	---	---	---	---	---	---	---
Ethylbenzene	c, v	<0.05 (ND)	---	---	---	**1.0**	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---	---	---	---	---	---	---	---
MTBE (methyl t-butyl ether)	c, v	<0.05 (ND)	---	---	---	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---	---	---	---	---	---	---	---
Naphthalene	c, v	<0.05 (ND)	---	---	---	**1.7**	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---	---	---	---	---	---	---	---
Propylbenzene, iso	nc, v	<0.05 (ND)	---	---	---	4.3	0.059	0.26	<0.05 (ND)	---	---	---	---	---	---	---	---
Tetrachloroethene (PCE)	c, v	---	---	---	---	<0.025 (ND)	<0.025 (ND)	<0.025 (ND)	<0.025 (ND)	---	---	---	---	---	---	---	---
Toluene	nc, v	<0.05 (ND)	---	---	---	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---	---	---	---	---	---	---	---
Trichloroethane, 1,1,1-	nc, v	---	---	---	---	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---	---	---	---	---	---	---	---
Trichloroethane, 1,1,2- Ψ	c, v	---	---	---	---	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---	---	---	---	---	---	---	---
Trichloroethene	c, v	---	---	---	---	<0.03 (ND)	<0.03 (ND)	<0.03 (ND)	<0.03 (ND)	---	---	---	---	---	---	---	---
Trichlorofluoromethane (Freon 11)	nc, v	---	---	---	---	<0.5 (ND)	<0.5 (ND)	<0.5 (ND)	<0.5 (ND)	---	---	---	---	---	---	---	---
Trimethylbenzene, 1,2,4-	nc, v	<0.05 (ND)	---	---	---	**73**	0.36	0.15	<0.05 (ND)	---	---	---	---	---	---	---	---
Trimethylbenzene, 1,3,5-	nc, v	<0.05 (ND)	---	---	---	**3.9**	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---	---	---	---	---	---	---	---
Vinyl chloride	c, v	---	---	---	---	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	<0.05 (ND)	---	---	---	---	---	---	---	---
Xylenes	nc, v	<0.15 (ND)	---	---	---	<0.15 (ND)	<0.15 (ND)	<0.15 (ND)	<0.15 (ND)	---	---	---	---	---	---	---	---
Metals																	
Arsenic	c, nv	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Barium	nc, nv	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Cadmium Ψ	c, nv	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Chromium (III)	nc, nv	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Lead	NA, nv	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mercury	nc, nv	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Nickel	c, nv	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Silver	nc, nv	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Table 1. Summary of Analytical Data, Soil

Sample ID		B13-30	B14-9-10	B14-15	B15-9	B17-14	B17-18	B17-22	B18-25	B21-5	B22-5	B23-5	B24-5	B25-5	B26-5	B27-5	B28-5
Date Sampled		12/16/10	12/16/10	12/16/10	12/16/10	12/22/11	12/22/11	12/22/11	12/22/11	12/22/11	12/22/11	12/22/11	12/22/11	12/22/11	12/22/11	12/22/11	12/22/11
Depth Sampled (feet)		30	9-10	15	9	14	18	22	25	5	5	5	5	5	5	5	5
Sampled By		ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW
Location		dry well/cistern	East side of outside UST		West side of outside UST	In sidewalk, central-weest side of property			In sidewalk, SW corner of property	Delineation boring, impacts in NW corner of property	Delineation boring, impacts in NW corner of property	Assessment boring along sewer line	Assessment boring along sewer line	Assessment boring along product lnes	Assessment boring along product lnes	Assessment boring along sewer line	Assessment boring along sewer line
Constituent of Interest	Note	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)
Semivolatile Organic Constituents																	
Polychlorinated biphenyls (PCBs) Ψ	c, nv	---	---	---	---												
Polycyclic Aromatic Hydrocarbons																	
Acenaphthene	nc, v	---	---	---	---	<0.05 (ND)	---	<0.05 (ND)	<0.05 (ND)	---	---	---	---	---	---	---	---
Anthracene	nc, v	---	---	---	---	<0.05 (ND)	---	<0.05 (ND)	<0.05 (ND)	---	---	---	---	---	---	---	---
Benz[a]anthracene	c, nv	---	---	---	---	<0.05 (ND)	---	<0.05 (ND)	<0.05 (ND)	---	---	---	---	---	---	---	---
Benzo[a]pyrene	c, nv	---	---	---	---	<0.05 (ND)	---	<0.05 (ND)	<0.05 (ND)	---	---	---	---	---	---	---	---
Benzo[b]fluoranthene	c, nv	---	---	---	---	<0.05 (ND)	---	<0.05 (ND)	<0.05 (ND)	---	---	---	---	---	---	---	---
Benzo[k]fluoranthene	c, nv	---	---	---	---	<0.05 (ND)	---	<0.05 (ND)	<0.05 (ND)	---	---	---	---	---	---	---	---
Chrysene	c, nv	---	---	---	---	<0.05 (ND)	---	<0.05 (ND)	<0.05 (ND)	---	---	---	---	---	---	---	---
Dibenz[a,h]anthracene	c, nv	---	---	---	---	<0.05 (ND)	---	<0.05 (ND)	<0.05 (ND)	---	---	---	---	---	---	---	---
Fluoranthene	nc, nv	---	---	---	---	<0.05 (ND)	---	<0.05 (ND)	<0.05 (ND)	---	---	---	---	---	---	---	---
Fluorene	nc, v	---	---	---	---	<0.05 (ND)	---	<0.05 (ND)	<0.05 (ND)	---	---	---	---	---	---	---	---
Indeno[1,2,3-cd]pyrene	c, nv	---	---	---	---	<0.05 (ND)	---	<0.05 (ND)	<0.05 (ND)	---	---	---	---	---	---	---	---
Pyrene	nc, nv	---	---	---	---	<0.05 (ND)	---	<0.05 (ND)	<0.05 (ND)	---	---	---	---	---	---	---	---
Total Petroleum Hydrocarbons																	
GRO	nc, nv	<20 (NP)	<20 (NP)	<20 (NP)	<20 (NP)	**6300**	**300**	**5600**	**1200**	<2 (ND)	<2 (ND)	<2 (ND)	<2 (ND)	<2 (ND)	<2 (ND)	<2 (ND)	<2 (ND)
DRO	nc, nv	<50 (NP)	<50 (NP)	<50 (NP)	<50 (NP)	**11000 ss**	390 ss	**4200 ss**	**1600 ss**	<50 (ND)	<50 (ND)	<50 (ND)	<50 (ND)	<50 (ND)	<50 (ND)	<50 (ND)	<50 (ND)
RRO	nc, nv	<250 (NP)	<250 (NP)	<250 (NP)	<250 (NP)	<250 (ND)	<250 (ND)	<250 (ND)	<250 (ND)	<250 (ND)	<250 (ND)	<250 (ND)	<250 (ND)	<250 (ND)	<250 (ND)	<250 (ND)	<250 (ND)

Notes:

mg/Kg = milligram per kilogram or parts per million.

<# (ND) = not detected at or above the laboratory method reporting limit shown.

NE = not established

NP = not present at or above the laboratory method reporting limit shown (HCID analysis).

— = not analyzed or not applicable.

c = carcinogenic

nc = noncarcinogenic

v = volatile

nv = nonvolatile

GRO = gasoline-range organics.

DRO = diesel-range organics.

RRO = residual-range organics.

Bolded concentrations exceed either Soil Matrix Cleanup Standards or screening level risk-based concentrations and background concentrations, as applicable.

[1] Lowest Risk-Based Concentration for soil (screening level).

(Y) indicates analyte not detected, but detection limit is above screening concentration.

lc = reported concentration is most likely a laboratory contaminant and is probably not present in the sample.

Table 1. Summary of Analytical Data, Soil

Sample ID		B29-5	B30-5	B31-10	B31-SW1-17	B32-10	B32-SW1-16	B33-10	B33-SW1-19	Maximum Soil Concentration (remaining soil)	Soil Matrix Cleanup Level	ODEQs Screening-level RBCs (Soil)	Background Concentrations (metals)	Constituent of Potential Concern
Date Sampled		12/22/11	12/22/11	2/3/12	2/3/12	2/3/12	2/3/12	2/3/12	2/3/12					
Depth Sampled (feet)		5	5	10	17	10	16	10	19					
Sampled By		ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW					
Location		Assessment boring along sewer line	Assessment boring along sewer line	NW corner of SE 3rd & SE Ash		Sidewalk of W side of SE 3rd btwn Ankeny & Ash		Sidewalk of W side of SE 3rd btwn Ankeny & Ash, northmost						TRUE OR Y FALSE OR N
Constituent of Interest	Note	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)				
Volatile Organic Constituents														
Benzene	c, v	---	---	---	---	---	---	---	---	**0.085**	NE	0.0093	NE	Y
Bromodichloromethane	c, v	---	---	---	---	---	---	---	---	<0.05 (ND)	NE	0.0025	NE	(Y)
Bromoform	c, nv	---	---	---	---	---	---	---	---	<0.05 (ND)	NE	0.084	NE	N
Bromomethane	nc, v	---	---	---	---	---	---	---	---	<0.5 (ND)	NE	0.098	NE	(Y)
Carbon tetrachloride	c, v	---	---	---	---	---	---	---	---	<0.05 (ND)	NE	0.028	NE	(Y)
Chlorobenzene	nc, v	---	---	---	---	---	---	---	---	<0.05 (ND)	NE	6.5	NE	N
Chlorodibromomethane	c, nv	---	---	---	---	---	---	---	---	<0.05 (ND)	NE	0.0033	NE	(Y)
Chloroethane	nc, v	---	---	---	---	---	---	---	---	<0.5 (ND)	NE	320	NE	N
Chloroform	c, v	---	---	---	---	---	---	---	---	<0.05 (ND)	NE	0.0033	NE	(Y)
Chloromethane	nc, v	---	---	---	---	---	---	---	---	<0.5 (ND)	NE	2.2	NE	N
Dichlorobenzene, 1,2-	nc, v	---	---	---	---	---	---	---	---	<0.05 (ND)	NE	70	NE	N
Dichlorobenzene, 1,4-	c, v	---	---	---	---	---	---	---	---	<0.05 (ND)	NE	0.081	NE	N
Dichloroethane, 1,1-	c, v	---	---	---	---	---	---	---	---	<0.05 (ND)	NE	0.037	NE	(Y)
Dichloroethene, 1,1-	nc, v	---	---	---	---	---	---	---	---	<0.05 (ND)	NE	11	NE	N
Dichloroethene, cis-1,2-	nc, v	---	---	---	---	---	---	---	---	<0.05 (ND)	NE	1.2	NE	N
Dichloroethene, trans-1,2-	nc, v	---	---	---	---	---	---	---	---	<0.05 (ND)	NE	2.5	NE	N
Dichloromethane	c, v	---	---	---	---	---	---	---	---	**0.69 Ic**	NE	0.038	NE	(Y)
EDB (1,2-dibromoethane)	c, v	---	---	---	---	---	---	---	---	<0.05 (ND)	NE	0.000081	NE	(Y)
EDC (1,2-dichloroethane)	c, v	---	---	---	---	---	---	---	---	<0.05 (ND)	NE	0.0014	NE	(Y)
Ethylbenzene	c, v	---	---	---	---	---	---	---	---	**62**	NE	0.16	NE	Y
MTBE (methyl t-butyl ether)	c, v	---	---	---	---	---	---	---	---	<0.05 (ND)	NE	0.092	NE	N
Naphthalene	c, v	---	---	---	---	---	---	---	---	**67**	NE	0.087	NE	Y
Propylbenzene, iso	nc, v	---	---	---	---	---	---	---	---	7.3	NE	3500	NE	N
Tetrachloroethene (PCE)	c, v	---	---	---	---	---	---	---	---	0.26	NE	0.0054	NE	Y
Toluene	nc, v	---	---	---	---	---	---	---	---	28	NE	140	NE	N
Trichloroethane, 1,1,1-	nc, v	---	---	---	---	---	---	---	---	<0.05 (ND)	NE	400	NE	N
Trichloroethane, 1,1,2- Ψ	c, v	---	---	---	---	---	---	---	---	<0.05 (ND)	NE	0.0046	NE	(Y)
Trichloroethene	c, v	---	---	---	---	---	---	---	---	<0.03 (ND)	NE	0.02	NE	(Y)
Trichlorofluoromethane (Freon 11)	nc, v	---	---	---	---	---	---	---	---	<0.5 (ND)	NE	72	NE	N
Trimethylbenzene, 1,2,4-	nc, v	---	---	---	---	---	---	---	---	**280**	NE	16	NE	Y
Trimethylbenzene, 1,3,5-	nc, v	---	---	---	---	---	---	---	---	81	NE	92	NE	N
Vinyl chloride	c, v	---	---	---	---	---	---	---	---	<0.05 (ND)	NE	0.00051	NE	(Y)
Xylenes	nc, v	---	---	---	---	---	---	---	---	**390**	NE	25	NE	Y
Metals														
Arsenic	c, nv	---	---	---	---	---	---	---	---	**12.7**	NE	0.39	8.8	Y
Barium	nc, nv	---	---	---	---	---	---	---	---	185	NE	15000	790	N
Cadmium Ψ	c, nv	---	---	---	---	---	---	---	---	1.16	NE	39	0.63	N
Chromium (III)	nc, nv	---	---	---	---	---	---	---	---	15.3	NE	120000	76	N
Lead	NA, nv	---	---	---	---	---	---	---	---	23.5	NE	30	33.75	N
Mercury	nc, nv	---	---	---	---	---	---	---	---	<0.2 (ND)	NE	23	0.23	N
Nickel	c, nv	---	---	---	---	---	---	---	---	13.5	NE	1500	38	N
Silver	nc, nv	---	---	---	---	---	---	---	---	<1 (ND)	NE	390	0.82	N

Table 1. Summary of Analytical Data, Soil

Sample ID		B29-5	B30-5	B31-10	B31-SW1-17	B32-10	B32-SW1-16	B33-10	B33-SW1-19	Maximum Soil Concentration (remaining soil)	Soil Matrix Cleanup Level	ODEQs Screening-level RBCs (Soil)	Background Concentrations (metals)	Constituent of Potential Concern
Date Sampled		12/22/11	12/22/11	2/3/12	2/3/12	2/3/12	2/3/12	2/3/12	2/3/12					
Depth Sampled (feet)		5	5	10	17	10	16	10	19					
Sampled By		ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW					
Location		Assessment boring along sewer line	Assessment boring along sewer line	NW corner of SE 3rd & SE Ash		Sidewalk of W side of SE 3rd btwn Ankeny & Ash		Sidewalk of W side of SE 3rd btwn Ankeny & Ash, northmost						TRUE OR Y FALSE OR N
Constituent of Interest	Note	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)	mg/Kg (ppm)				
Semivolatile Organic Constituents														
Polychlorinated biphenyls (PCBs) Ψ	c, nv									**0.4**	NE	0.22	NE	Y
Polycyclic Aromatic Hydrocarbons														
Acenaphthene	nc, v	---	---	---	---	---	---	---	---	0.99	NE	4700	NE	N
Anthracene	nc, v	---	---	---	---	---	---	---	---	<0.05 (ND)	NE	23000	NE	N
Benz[a]anthracene	c, nv	---	---	---	---	---	---	---	---	<0.05 (ND)	NE	0.15	NE	N
Benzo[a]pyrene	c, nv	---	---	---	---	---	---	---	---	<0.05 (ND)	NE	0.015	NE	(Y)
Benzo[b]fluoranthene	c, nv	---	---	---	---	---	---	---	---	<0.05 (ND)	NE	0.15	NE	N
Benzo[k]fluoranthene	c, nv	---	---	---	---	---	---	---	---	<0.05 (ND)	NE	1.5	NE	N
Chrysene	c, nv	---	---	---	---	---	---	---	---	<0.05 (ND)	NE	14	NE	N
Dibenz[a,h]anthracene	c, nv	---	---	---	---	---	---	---	---	<0.05 (ND)	NE	0.015	NE	(Y)
Fluoranthene	nc, nv	---	---	---	---	---	---	---	---	<0.076 (ND)	NE	2300	NE	N
Fluorene	nc, v	---	---	---	---	---	---	---	---	<4.4 (ND)	NE	3100	NE	N
Indeno[1,2,3-cd]pyrene	c, nv	---	---	---	---	---	---	---	---	<0.05 (ND)	NE	0.15	NE	N
Pyrene	nc, nv	---	---	---	---	---	---	---	---	0.086	NE	1700	NE	N
Total Petroleum Hydrocarbons														
GRO	nc, nv	<2 (ND)	<2 (ND)	<2 (ND)	<2 (ND)	<2 (ND)	<2 (ND)	<2 (ND)	<2 (ND)	**6300**	80	31	NE	Y
DRO	nc, nv	<50 (ND)	<50 (ND)	<50 (ND)	<50 (ND)	<50 (ND)	<50 (ND)	<50 (ND)	<50 (ND)	**11000**	500	1100	NE	Y
RRO	nc, nv	<250 (ND)	<250 (ND)	<250 (ND)	<250 (ND)	<250 (ND)	<250 (ND)	<250 (ND)	<250 (ND)	640	500	2800	NE	N

Notes:

mg/Kg = milligram per kilogram or parts per million.

<# (ND) = not detected at or above the laboratory method reporting limit shown.

NE = not established

NP = not present at or above the laboratory method reporting limit shown (HCID analysis).

— = not analyzed or not applicable.

c = carcinogenic

nc = noncarcinogenic

v = volatile

nv = nonvolatile

GRO = gasoline-range organics.

DRO = diesel-range organics.

RRO = residual-range organics.

Bolded concentrations exceed either Soil Matrix Cleanup Standards or screening level risk-based concentrations and background concentrations, as applicable.

[1] Lowest Risk-Based Concentration for soil (screening level).

(Y) indicates analyte not detected, but detection limit is above screening concentration.

lc = reported concentration is most likely a laboratory contaminant and is probably not present in the sample.

Table 2. Summary of Analytical Data, Reconnaissance Ground Water

Sample ID		MH01-101207	B16-GW-23	B17-GW-23	B18-GW-20	B19b-GW-23	B20-GW-23	B31-GW	B32-GW	B33-GW	Maximum Ground Water Concentration	ODEQs Screening-level RBCs	Background Concentrations (metals)	COPC?
Date Sampled		12/7/10	12/22/11	12/22/11	12/22/11	12/22/11	12/22/11	2/3/12	2/3/12	2/3/12				
Depth Sampled (feet)			23	23	20	23	23	17	16	19				
Sampled By		ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW				
Location		Dry well/cistern inside building	NW corner of building - on sidewalk	Central west side of building	SW corner of building - outside on sidewalk	30' east of sidewalk on south side of building	Just west of wall/cistern	Offsite, southeast corner of adjacent block to the west	Offsite, center-east side of adjacent block to the west	Offsite, northeast corner of adjacent block to the west				TRUE OR Y FALSE OR N
Constituent of Interest	Note	µg/L (ppb)	µg/L (ppb)								µg/L (ppb)			
Volatile Organic Constituents														
Benzene	c, v	<0.35 (ND)	<0.35 (ND)	<0.35 (ND)	<0.35 (ND)	<0.35 (ND)	<0.35 (ND)	<0.35 (ND)	<0.35 (ND)	<0.35 (ND)	<0.35 (ND)	0.39	NE	N
Bromodichloromethane	c, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	0.12	NE	(Y)
Bromoform	c, nv	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	2.7	NE	N
Bromomethane	nc, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	8.7	NE	N
Carbon tetrachloride	c, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	0.41	NE	(Y)
Chlorobenzene	nc, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	91	NE	N
Chlorodibromomethane	c, nv	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	0.14	NE	(Y)
Chloroethane	nc, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	21000	NE	N
Chloroform	c, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	0.19	NE	(Y)
Chloromethane	nc, v	<10 (ND)	<10 (ND)	<10 (ND)	<10 (ND)	<10 (ND)	<10 (ND)	<10 (ND)	<10 (ND)	<10 (ND)	<10 (ND)	190	NE	N
Dichlorobenzene, 1,2-	nc, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	370	NE	N
Dichlorobenzene, 1,4-	c, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	0.42	NE	(Y)
Dichloroethane, 1,1-	c, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	2.3	NE	N
Dichloroethene, 1,1-	nc, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	340	NE	N
Dichloroethene, cis-1,2-	nc, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	73	NE	N
Dichloroethene, trans-1,2-	nc, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	110	NE	N
Dichloroethylether	c, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	0.011	NE	(Y)
Dichloromethane	c, v	<5 (ND)	<5 (ND)	<5 (ND)	<5 (ND)	<5 (ND)	<5 (ND)	<5 (ND)	<5 (ND)	<5 (ND)	<5 (ND)	4.4	NE	(Y)
EDB (1,2-dibromoethane)	c, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	0.0063	NE	(Y)
EDC (1,2-dichloroethane)	c, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	0.14	NE	(Y)
Ethylbenzene	c, v	<1 (ND)	<1 (ND)	**1.8**	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	**1.8**	1.4	NE	**Y**
MTBE (methyl t-butyl ether)	c, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	12	NE	N
Naphthalene	c, v	<1 (ND)	<1 (ND)	**1.4**	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	0.12	<1 (ND)	**1.4**	0.14	NE	**Y**
Propylbenzene, iso	nc, v	<1 (ND)	<1 (ND)	5.3	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	20	<1 (ND)	20	680	NE	N
Tetrachloroethene (PCE)	c, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	0.093	NE	(Y)
Toluene	nc, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	2300	NE	N
Trichloro-1,2,2-trifluoroethane, 1,1,2- (Freon 113)	nc, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	59000	NE	N
Trichloroethane, 1,1,1-	nc, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	9100	NE	N
Trichloroethane, 1,1,2- Ψ	c, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	0.23	NE	(Y)
Trichloroethene	c, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	0.43	NE	(Y)
Trichlorofluoromethane (Freon 11)	nc, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	1300	NE	N
Trichlorophenol, 2,4,6- Ψ	c, nv	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	5.2	NE	N
Trimethylbenzene, 1,2,4-	nc, v	<1 (ND)	<1 (ND)	**63**	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	**63**	15	NE	**Y**
Trimethylbenzene, 1,3,5-	nc, v	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	<1 (ND)	360	NE	N
Vinyl chloride	c, v	<0.2 (ND)	<0.2 (ND) pr	<0.2 (ND) pr	**0.28 pr**	<0.2 (ND) pr	<0.2 (ND) pr	<0.2 (ND) pr	<0.2 (ND) pr	<0.2 (ND) pr	**0.28 pr**	0.025	NE	**Y**
Xylenes	nc, v	<2 (ND)	<3 (ND)	1.5	<3 (ND)	<3 (ND)	<3 (ND)	<3 (ND)	<3 (ND)	<3 (ND)	1.5	200	NE	N

Table 2. Summary of Analytical Data, Reconnaissance Ground Water

Sample ID		MH01-101207	B16-GW-23	B17-GW-23	B18-GW-20	B19b-GW-23	B20-GW-23	B31-GW	B32-GW	B33-GW	Maximum Ground Water Concentration	ODEQs Screening-level RBCs	Background Concentrations (metals)	COPC?
Date Sampled		12/7/10	12/22/11	12/22/11	12/22/11	12/22/11	12/22/11	2/3/12	2/3/12	2/3/12				
Depth Sampled (feet)			23	23	20	23	23	17	16	19				
Sampled By		ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW				
Location		Dry well/cistern inside building	NW corner of building - on sidewalk	Central west side of building	SW corner of building - outside on sidewalk	30' east of sidewalk on south side of building	Just west of wall/cistern	Offsite, southeast corner of adjacent block to the west	Offsite, center-east side of adjacent block to the west	Offsite, northeast corner of adjacent block to the west				TRUE OR Y FALSE OR N
Constituent of Interest	Note	µg/L (ppb)	µg/L (ppb)								µg/L (ppb)			
Semivolatile Organic Constituents														
Polycyclic Aromatic Hydrocarbons														
Acenaphthene	nc, v	---	---	---	---	---	---	---	<0.05 (ND)	---	<0.05 (ND)	2200	NE	N
Anthracene	nc, v	---	---	---	---	---	---	---	<0.05 (ND)	---	<0.05 (ND)	>S	NE	N
Benz[a]anthracene	c, nv	---	---	---	---	---	---	---	<0.05 (ND)	---	<0.05 (ND)	0.029	NE	(Y)
Benzo[a]pyrene	c, nv	---	---	---	---	---	---	---	<0.05 (ND)	---	<0.05 (ND)	0.0029	NE	(Y)
Benzo[b]fluoranthene	c, nv	---	---	---	---	---	---	---	<0.05 (ND)	---	<0.05 (ND)	0.011	NE	(Y)
Benzo[k]fluoranthene	c, nv	---	---	---	---	---	---	---	<0.05 (ND)	---	<0.05 (ND)	0.29	NE	N
Chrysene	c, nv	---	---	---	---	---	---	---	<0.05 (ND)	---	<0.05 (ND)	>S	NE	N
Dibenz[a,h]anthracene	c, nv	---	---	---	---	---	---	---	<0.05 (ND)	---	<0.05 (ND)	0.0029	NE	(Y)
Fluoranthene	nc, nv	---	---	---	---	---	---	---	<0.05 (ND)	---	<0.05 (ND)	>S	NE	N
Fluorene	nc, v	---	---	---	---	---	---	---	<0.05 (ND)	---	<0.05 (ND)	1500	NE	N
Indeno[1,2,3-cd]pyrene	c, nv	---	---	---	---	---	---	---	<0.05 (ND)	---	<0.05 (ND)	>S	NE	N
Pyrene	nc, nv	---	---	---	---	---	---	---	<0.05 (ND)	---	<0.05 (ND)	>S	NE	N
Total Petroleum Hydrocarbons														
GRO	nc, nv	<200 (NP)	<100 (ND)	**1100**	**710**	<100 (ND)	<100 (ND)	<100 (ND)	**1100**	<100 (ND)	**1100**	110	NE	Y
DRO	nc, nv	<500 (NP)	<50 (ND)	**1500 x**	**800 x**	<50 (ND)	<50 (ND)	<50 (ND)	**1100 x**	<50 (ND)	**1500 x**	100	NE	Y
RRO	nc, nv	<500 (NP)	<250 (ND)	<250 (ND)	<250 (ND)	<250 (ND)	<250 (ND)	<250 (ND)	<250 (ND)	<250 (ND)	<500 (NP)	300	NE	(Y)

Notes:

NP = not present based on NWTPH-HCID analysis

ND = not detected at or above laboratory method reporting limits

--- = not analyzed or not applicable.
< = not detected above method reporting limit shown.
NE = not established.
ug/L = micrograms per Liter or parts per billion (ppb).
c = carcinogenic
nc = noncarcinogenic
v = volatile
nv = nonvolatile
GRO = gasoline-range organics.
DRO = diesel-range organics.
RRO = residual-range organics.
Bolded concentrations exceed screening level risk-based concentrations and background concentrations, as applicable.
[1] Lowest Risk-Based Concentration for groundwater (screening level).
(Y) indicates analyte not detected, but detection limit is above screening concentration.
x = the pattern of peaks is not indicative of the fuel standard used for quantitation.
pr = The sample was received with incorrect preservation. The value reported should be considered an estimate.

Table 3. Summary of Analytical Data, Sub-Slab Vapor and Soil Gas

Sample ID		SUB01-101202	SUB02-101202	SUB03-101202	SUB04-101202	SUB05-101202	SG01-120103-8	SG02-120103-8	SG03-120103-8	SG04-120103-8	SG05-120202-8
Date Sampled		12/2/10	12/2/10	12/2/10	12/2/10	12/2/10	1/3/12	1/3/12	1/3/12	1/3/12	2/2/12
Depth Sampled (feet)		0.5	0.5	0.5	0.5	0.5	8	8	8	8	8
Sampled By		ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW	ENW
Location		Northwest corner of the property, near fuel pump	Central west portion of the building, adjacent to "old benzene room"	Central portion of the building (former dry cleaning room	Basement, adjacent to sump	South-central portion of the building, "hazmat room"	4 feet of curb, southwest corner of site, in street	4 feet of curb, cental-south portion of site, in street	4 feet of curb, central-west portion of site, in street	4 feet of curb, northwest corner of site, in street	West side of 3rd Ave, on sidewalk
Constituent of Interest	Note	$\mu g/m^3$									
Volatile Organic Constituents											
Benzene	c, v	**74**	20	15	7.7	**82**	2 J	0.95 J	**4100**	2.4 J	2.2
Dichloroethene, cis-1,2-	nc, v	<4 (ND)	<4 (ND)	<4 (ND)	<4 (ND)	<4 (ND)	<4.7 (ND)	<3.6 (ND)	260	<3.5 (ND)	<0.6 (ND)
Ethylbenzene	c, v	50	10	44	<4.3 (ND)	**600**	10	6.5	**23000**	9.5	3.2
Naphthalene	c, v	**180 E**	9.1	**110 E**	**17**	**600 E**	2.4 J	2.4 J	<370 (ND)	3.0 J	<4 (ND)
Tetrachloroethene (PCE)	c, v	16	120	26	**2200 E**	**2600 E**	150	23	480	19	<1 (ND)
Toluene	nc, v	120	53	40	9.6	210	32	18	420	28	7.5
Trichloroethene	c, v	<5.4 (ND)	<5.4 (ND)	<5.4 (ND)	13	<5.4 (ND)	<6.3 (ND)	<4.9 (ND)	**430**	<4.7 (ND)	<0.82 (ND)
Trimethylbenzene, 1,2,4-	nc, v	440	<29 (ND)	<29 (ND)	<29 (ND)	**16000**	23	21	**9500**	27	12
Trimethylbenzene, 1,3,5-	nc, v	150	5.2	13	<4.9 (ND)	11000	6.9	5	6600	7.1	3.6
Vinyl chloride	c, v	<2.6 (ND)	<2.6 (ND)	<2.6 (ND)	<2.6 (ND)	<2.6 (ND)	<3 (ND)	<2.3 (ND)	<46 (ND)	<2.2 (ND)	<0.39 (ND)
Xylenes	nc, v	400	28.7	119	8.8	16900	60	42	**29000**	63	20.7
Total Petroleum Hydrocarbons											
GRO	nc, nv	<1000 (ND)	<1000 (ND)	<1000 (ND)	<1000 (ND)	<1000 (ND)	26000	17000	**17000000**	8200	17000
DRO	nc, nv	**43000 E**	3600	4700	1200	8200	<1300 (ND)	<1300 (ND)	8600	<1300 (ND)	---
Leak Detection											
2-Propanol		220	57	<49 (ND)	<49 (ND)	1200 E	<12 (ND)	<8.9 (ND)	56 J	5.2 J	18

Notes:
ND = not detected at or above laboratory method reporting limits
< = not detected above method reporting limit shown.
ug/m^3 = micrograms per cubic meter of air
c = carcinogenic
nc = noncarcinogenic
v = volatile
nv = nonvolatile
GRO = gasoline-range organics.
DRO = diesel-range organics.
>Pv = indicates this constituent cannot present an unacceptable health risk by the vapor intrusion pathway
E = Exceeds instrument calibration range

Table 3. Summary of Analytical Data, Sub-Slab Vapor and Soil Gas

Sample ID / Date Sampled / Depth Sampled (feet) / Sampled By / Location	Note	Maximum Soil Gas Concentration (sub-slab)	Maximum Soil Gas Concentration (offsite soil gas)	ODEQs Residentail RBCs (Soil Gas)	ODEQs Occupational RBCs (Soil Gas)	COPC (onsite residentail) TRUE OR Y FALSE OR N	COPC (offiste residential) TRUE OR Y FALSE OR N
Constituent of Interest		µg/m^3	µg/m^3	µg/m^3			
Volatile Organic Constituents							
Benzene	c, v	**82**	**4100**	62	1600	Y	Y
Dichloroethene, cis-1,2-	nc, v	<4 (ND)	260	>Pv	>Pv	N	N
Ethylbenzene	c, v	**600**	**23000**	190	4900	Y	Y
Naphthalene	c, v	**600**	<370 (ND)	14	360	Y	(Y)
Tetrachloroethene (PCE)	c, v	**2600**	480	**82**	4700	Y	Y
Toluene	nc, v	210	420	1000000	22000000	N	N
Trichloroethene	c, v	86	**430**	86	2900	N	Y
Trimethylbenzene, 1,2,4-	nc, v	**16000**	**9500**	1500	31000	Y	Y
Trimethylbenzene, 1,3,5-	nc, v	11000	6600	>Pv	>Pv	N	N
Vinyl chloride	c, v	<2.6 (ND)	<46 (ND)	33	2800	N	(Y)
Xylenes	nc, v	**16900**	**29000**	21000	440000	N	Y
Total Petroleum Hydrocarbons							
GRO	nc, nv	1000	**17000000**	79000	1700000	N	Y
DRO	nc, nv	**43000**	**8600**	21000	440000	Y	N
Leak Detection							
2-Propanol		1200	56	5000	5000		

Notes:
ND = not detected at or above laboratory method reporting limits
< = not detected above method reporting limit shown.
ug/m^3 = micrograms per cubic meter of air
c = carcinogenic
nc = noncarcinogenic
v = volatile
nv = nonvolatile
GRO = gasoline-range organics.
DRO = diesel-range organics.
>Pv = indicates this constituent cannot present an unacceptable hea
E = Exceeds instrument calibration range

Table 4. Evaluation of COPCs in Surface Soil

Contaminated Medium		SURFACE SOIL mg/Kg (ppm)								SURFACE SOIL mg/Kg (ppm)				SURFACE SOIL mg/Kg (ppm)				Maximum Detected Concentration	Lowest Applicable RBC (Soil) [1]	COC?
Exposure Pathway		Soil Ingestion, Dermal Contact, and Inhalation RBC_{ss}								Volatilization to Outdoor Air RBC_{so}				Vapor Intrusion into Buildings RBC_{si}						
Receptor Scenario		Urban Residential		Occupational		Construction Worker		Excavation Worker		Urban Residential		Occupational		Urban Residential		Occupational				
Direct or Indirect Pathway (see notes)		DCS		DCS		DCS		DCS		IVS		IVS		IVS		IVS				
Contaminant of Concern	Note		Note		Note		Note		Note		Note		Note		Note		Note	mg/Kg (ppm)	mg/Kg (ppm)	Y/N
Volatile Organic Constituents																				
Naphthalene	c, v	25		23		580	>Csat	16,000	>Csat	15		27		15		99		4.3	15	N
Semivolatile Organic Constituents																				
Polychlorinated biphenyls (PCBs) Ψ	c, nv	0.60		0.98		7.6	>Csat	210	>Csat	-	NV	-	NV	-	NV	-	NV	0.4	0.60	N
DRO	nc, nv	**2200**		70000		23000		-	>Max	-	>Max	-	>Max	20000		-	>Max	11000	2,200	**Y**

Notes:
— = not analyzed or not applicable.
mg/Kg = milligrams per Kilogram or parts per million (ppm).
c = carcinogenic
nc = noncarcinogenic
v = volatile
nv = nonvolatile
DRO = diesel-range organics.

Table 5. Evaluation of COPCs in Subsurface Soil

Contaminated Medium		SOIL mg/Kg (ppm)				SOIL mg/Kg (ppm)				SOIL mg/Kg (ppm)				Maximum Detected Concentration	Lowest Applicable RBC (Soil)	COC?
Exposure Pathway		Soil Ingestion, Dermal Contact, and Inhalation RBC_{ss}				Volatilization to Outdoor Air RBC_{so}				Vapor Intrusion into Buildings RBC_{si}						
Receptor Scenario		Construction Worker		Excavation Worker		Urban Residential		Occupational		Urban Residential		Occupational				
Direct or Indirect Pathway (see notes)		DCS		DCS		IVS		IVS		IVS		IVS				
Contaminant of Concern	Note		Note		Note		Note		Note		Note		Note	mg/Kg (ppm)	mg/Kg (ppm)	Y/N
Volatile Organic Constituents																
Benzene	c, v	340		9,500	>Csat	27		50		0.22		1.2		0.085	0.22	N
Ethylbenzene	c, v	1,600	>Csat	44,000	>Csat	85		160		**2.2**		**12**		**62**	2.2	**Y**
Naphthalene	c, v	580	>Csat	16,000	>Csat	**15**		99		**15**		99		**67**	15	**Y**
Trimethylbenzene, 1,2,4-	nc, v	2,000	>Csat	54,000	>Csat	**230**		1,000		**82**		1,000		**280**	82	**Y**
Xylenes	nc, v	19,000	>Csat	-	>Max	-	>Csat	-	>Csat	**100**		-	>Csat	**390**	100	**Y**
Total Petroleum Hydrocarbons																
GRO	nc, nv	9700		-	>Max	4500		-	>Max	**94**		-	>Max	**6300**	94	**Y**
DRO	**nc, nv**	**4600**		-	>Max	-	>Max	-	>Max		>Max	-	>Max	**11000**	4600	**Y**

Notes:
— = not applicable.
mg/Kg = milligrams per Kilogram or parts per million (ppm).
c = carcinogenic
nc = noncarcinogenic
v = volatile
nv = nonvolatile
GRO = gasoline-range organics.
DRO = diesel-range organics.

Table 6. Evaluation of COPCs in Reconnaissance Ground Water

Contaminated Medium		GROUND WATER µg/L (ppb)								Maximum Detected Concentration	Lowest Applicable RBC	COC?
Exposure Pathway		Volatilization to Outdoor Air RBC_{wo}				Vapor Intrusion into Buildings RBC_{wi}						
Receptor Scenario		Urban Residential		Occupational		Urban Residential		Occupational				
Direct or Indirect Pathway (see notes)		IVW		IVW		IVW		IVW				
Contaminant of Concern	Note		Note		Note		Note		Note	µg/L (ppb)	µg/L (ppb)	Y/N
Volatile Organic Constituents												
Ethylbenzene	c, v	22,000		41,000		1,300		7,400		1.8	1,300	N
Naphthalene	c, v	8,400		16,000		1,800		10,000		1.4	1,800	N
Trimethylbenzene, 1,2,4-	nc, v	-	>S	-	>S	5,000		-	>S	63	5,000	N
Vinyl chloride	c, v	500		6,800		22		910		0.28	22	N
Total Petroleum Hydrocarbons												
GRO	nc, nv	-	<S	-	<S	22000		-	<S	1100	22,000	N
DRO	nc, nv	-	>S	-	>S	-	>S	-	>S	1500	-	N

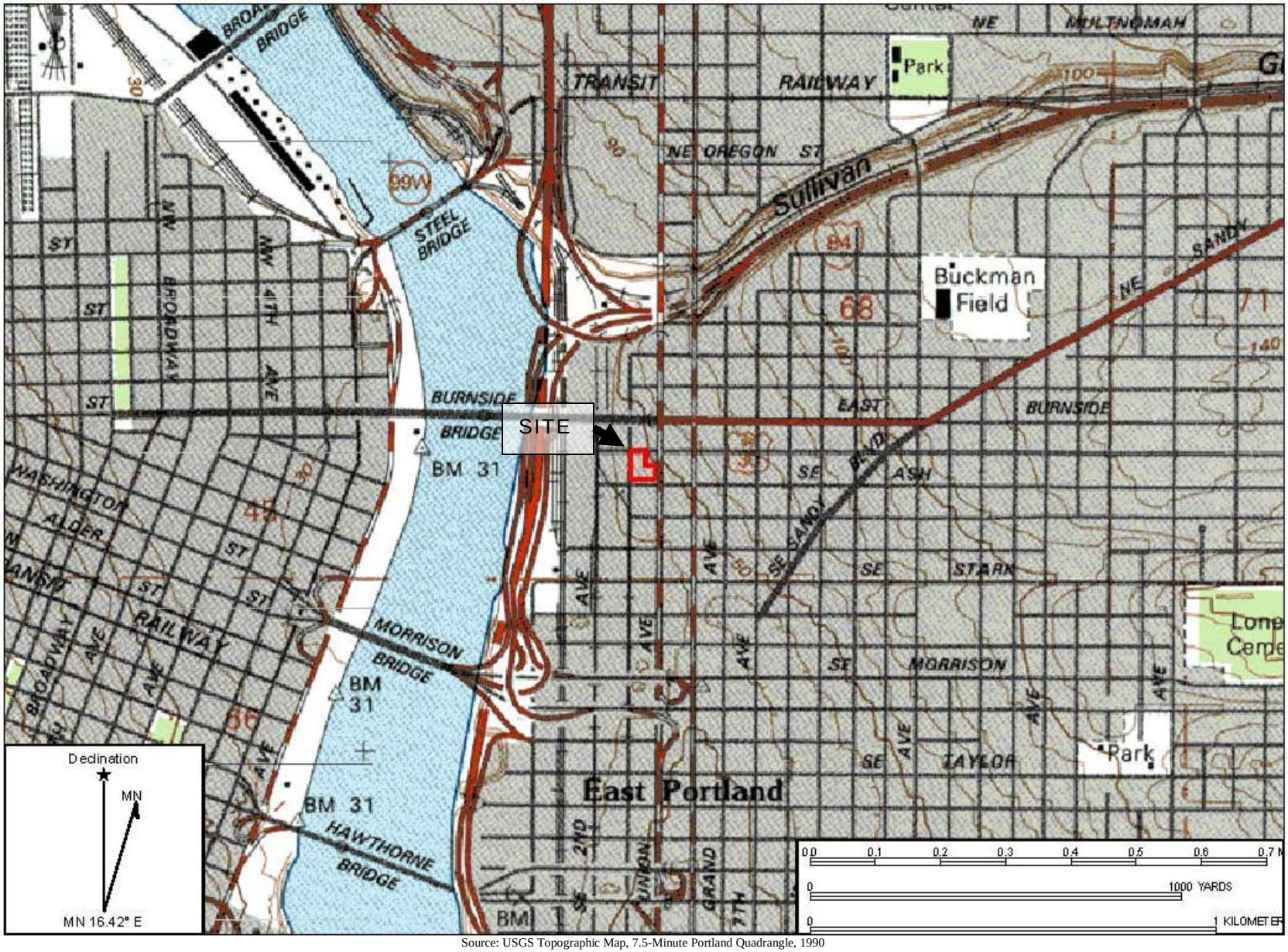
Notes:
— = not analyzed or not applicable.
ug/L = micrograms per Liter or parts per billion (ppb).
c = carcinogenic
nc = noncarcinogenic
v = volatile
nv = nonvolatile
GRO = gasoline-range organics.
DRO = diesel-range organics.

Table 7. Evaluation of COPCs in Sub-Slab Vapor and Soil Gas

Contaminated Medium		SOIL GAS µg/m^3				Maximum Detected Concentration (sub-slab)	Maximum Detected Concentration (offsite soil gas)	Onsite Urban Residential COC?	Onsite Occupational COC?	Offsite Urban Residential COC?	Offsite Occupational COC?
Exposure Pathway		Vapor Intrusion into Buildings RBC$_{sv}$									
Receptor Scenario		Urban Residential		Occupational							
Direct or Indirect Pathway (see notes)		ICA		ICA							
Contaminant of Concern	Note	1	Note	1	Note	µg/m^3		Y/N	Y/N	Y/N	Y/N
Volatile Organic Constituents											
Benzene	c, v	170		1,600		82	**4100**	N	N	**Y**	**Y**
Ethylbenzene	c, v	530		4,900		**600**	**23000**	**Y**	N	**Y**	**Y**
Naphthalene	c, v	39		360		**600**	<370 (ND)	**Y**	**Y**	(Y)	(Y)
Tetrachloroethene (PCE)	c, v	5,100		47,000		2,600	480	N	N	N	N
Trichloroethene	c, v	200		2,900		86	**430**	N	N	**Y**	N
Trimethylbenzene, 1,2,4-	nc, v	1,500		31,000		**16,000**	**9500**	**Y**	N	**Y**	N
Xylenes	nc, v	21,000		440,000		16,900	**29000**	N	N	**Y**	N
Total Petroleum Hydrocarbons											
GRO	nc, nv	79000		1,700,000		1,000	**17000000**	N	N	**Y**	**Y**
DRO	nc, nv	21000		440,000		43,000	8600	**Y**	N	N	N

Notes:
ND = not detected at or above laboratory method
— = not analyzed or not applicable.
< = not detected above method reporting limit
ug/m^3 = micrograms per cubic meter of air or parts
c = carcinogenic
nc = noncarcinogenic
v = volatile
nv = nonvolatile
DRO = diesel-range organics.
Bolded concentrations exceed risk-based concentrations.

FIGURES



Source: USGS Topographic Map, 7.5-Minute Portland Quadrangle, 1990

EVREN NORTHWEST environmental / natural resource consultants	Date Drawn: 6/17/2013 CAD File Name: 847-12001svmap Drawn By: LDG Approved By: NMW	**Former Salvation Army** 139 SE Martin Luther King Jr. Boulevard Portland, Oregon	**Site Vicinity Map**	Project No. 847-12001-01 Figure No. **1**

DRAWING NUMBER 847-12001(v06)

APPROVED BY N. WHOLLER 10/31/2013

CHECKED BY L.GREEN 10/31/2013

DRAWN BY K. CLINE 10/31/2013

OWNE BUILDING
17

FISHELS
5

SE ANKENY ST

FORMER FUEL DISPENSER

NORTHERN

CENTRAL

LOADING DOCK

DRY WELL/CISTERN

HAZMAT ROOM

OFFICES

POSSIBLE BOILER ROOM?

SUMP

BASEMENT

SOUTHERN

MAINTENANCE ROOM

SE 3RD AVE

PORTLAND STREET CAR LINE (SOUTH-BOUND)

COSTAL INC.
110

POLE MOUNTED TRANSFORMER

WENTWORTH CHEVY

SE ASH ST

WIRE BUILDING
306

COLUMBIA SCOOTERS

SALVATION ARMY
406

K BLVD

LEGEND:

- BUILDING LOCATIONS
- PROPERTY BOUNDARIES
- SUBJECT PROPERTY BOUNDARIES
- LOCATION OF ABANDONED UST
- LOCATION OF PREVIOUSLY DECOMMISSIONED (REMOVED) UST
- PROPOSED NEW BUILDING FOOTPRINT

UST UNDERGROUND STORAGE TANK

NOTES:

1. BASE MAP DEVELOPED FROM AN AERIAL PHOTOGRAPH MAP DATED 2009 AND ENW FIELD NOTES.
2. ALL BUILDING, ROAD, FEATURE, AND SAMPLE LOCATIONS ARE APPROXIMATE.
3. PROPOSED INTERIOR FOOTPRINT HAS BEEN OVERLAIN ON THE CURRENT FLOOR PLAN.

APPROXIMATE SCALE

0 50 100 FEET

N

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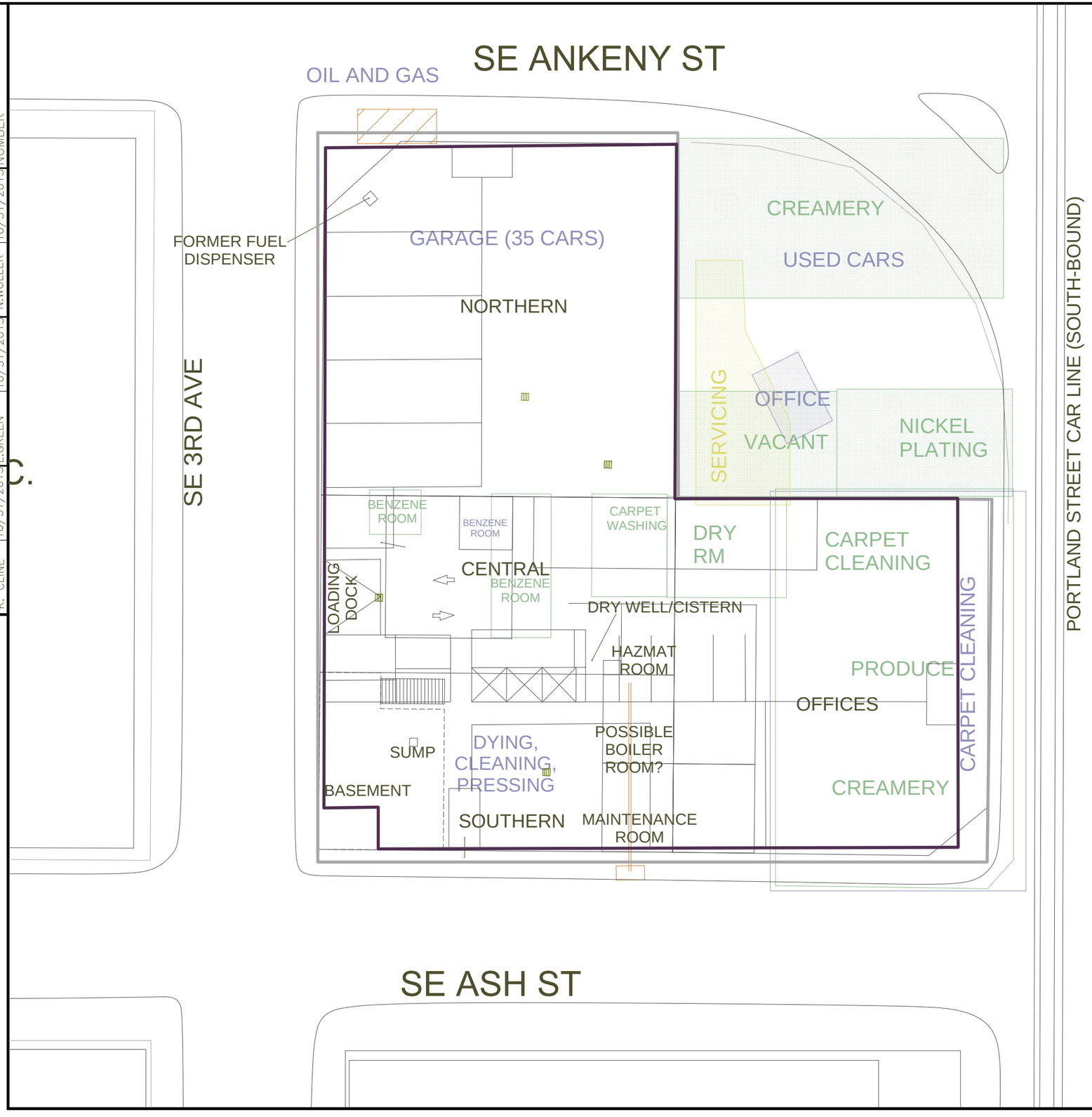
(503)452-5561 Fax(503)452-7669

FIGURE 2
SITE PLAN
(PREVIOUS USE V. PROPOSED USE OVERLAY)
FORMER SALVATION ARMY
139 SE MARTIN LUTHER KING JR BLVD
PORTLAND, OREGON

DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
K. CLINE 10/31/2013	L.GREEN 10/31/2013	N.WOLLER 10/31/2013	847-12001(v06)



LEGEND:

- APPROXIMATE BUILDING LOCATIONS
- APPROXIMATE PROPERTY BOUNDARIES
- APPROXIMATE SUBJECT PROPERTY BOUNDARIES
- APPROXIMATE LOCATION OF ABANDONED UST
- APPROXIMATE LOCATION OF PREVIOUSLY DECOMMISSIONED (REMOVED) UST
- CATCH BASIN & FLOOR DRAIN

OFFICE FEATURES FROM 1924 SANBORN MAP

OFFICE FEATURES FROM 1950 SANBORN MAP

OFFICE FEATURES FROM 1969 SANBORN MAP

- PROPOSED NEW BUILDING FOOTPRINT

UST UNDERGROUND STORAGE TANK

NOTES:

1. BASE MAP DEVELOPED FROM AN AERIAL PHOTOGRAPH MAP DATED 2009 AND ENW FIELD NOTES.
2. HISTORICAL FEATURES OF INTEREST BASED ON INTERPRETATION OF SANBORN FIRE INSURANCE MAPS WITH THE DATES INDICATED RELATED TO THE PUBLISHED DATE OF THOSE MAPS ON WHICH THE FEATURE IS SHOWN.

APPROXIMATE SCALE

0 30 60 FEET

N

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FIGURE 3

HISTORICAL PROPERTY USE/DEVELOPMENT

FORMER SALVATION ARMY
139 SE MARTIN LUTHER KING JR BLVD
PORTLAND, OREGON

DRAWING 847-12001(v06)
APPROVED BY N. WHOLLER 10/31/2013
CHECKED BY L.GREEN 10/31/2013
DRAWN BY K. CLINE 10/31/2013

Sample ID	B1-10
Depth (ft)	10
GRO	<20
DRO	<50
RRO	<250
UNITS	mg/Kg
Sample ID	B1-15
Depth (ft)	15
GRO	<20
DRO	<50
RRO	<250
UNITS	mg/Kg

Sample ID	B2-5
Depth (ft)	5
GRO	1100
DRO	<50
RRO	<250
BENZENE	0.085
ETHYLBENZENE	62
NAPHTHALENE	67
PROPYLBENZENE	7.3
TOLUENE	28
TRIMETHYLBENZENE 1,2,4	280
TRIMETHYLBENZENE 1,3,5	81
XYLENES	390
LEAD	23.5
UNITS	mg/Kg
Sample ID	B2-15
Depth (ft)	15
GRO	<20
DRO	<50
RRO	<250
UNITS	mg/Kg
Sample ID	B2-17.5
Depth (ft)	17.5
GRO	<20
DRO	<50
RRO	<250
UNITS	mg/Kg

Sample ID	B21-5
Depth (ft)	5
GRO	<2
DRO	<50
RRO	<250
UNITS	mg/Kg

Sample ID	B22-5
Depth (ft)	5
GRO	<2
DRO	<50
RRO	<250
UNITS	mg/Kg

Sample ID	B23-5
Depth (ft)	5
GRO	<2
DRO	<50
RRO	<250
UNITS	mg/Kg

Sample ID	B30-5
Depth (ft)	5
GRO	<2
DRO	<50
RRO	<250
UNITS	mg/Kg

Sample ID	B33-10
Depth (ft)	10
GRO	<2
DRO	<50
RRO	<250
Sample ID	B33-SWI-19
Depth (ft)	19
GRO	<2
DRO	<50
RRO	<250
UNITS	mg/Kg

Sample ID	B17-14
Depth (ft)	14
ETHYLBENZENE	1
NAPHTHALENE	1.7
TRIMETHYLBENZENE 1,2,4	73
GRO	6300
DRO	11000
RRO	<250
Sample ID	B17-18
Depth (ft)	18
GRO	300
DRO	390
RRO	<250
Sample ID	B17-22
Depth (ft)	22
GRO	5600
DRO	4200
RRO	<250
UNITS	mg/Kg

Sample ID	B24-5
Depth (ft)	5
GRO	<2
DRO	<50
RRO	<250
UNITS	mg/Kg

Sample ID	B7-2
Depth (ft)	2
GRO	--
DRO	--
RRO	--
UNITS	mg/Kg
Sample ID	B7-10
Depth (ft)	10
ARSENIC	8.7
BARIUM	147
CADMIUM	1.08
CHROMIUM	10.9
LEAD	9.84
NICKEL	13.5
UNITS	mg/Kg

Sample ID	B32-10
Depth (ft)	10
GRO	<2
DRO	<50
RRO	<250
Sample ID	B32-SWI-16
Depth (ft)	16
GRO	<2
DRO	<50
RRO	<250
UNITS	mg/Kg

Sample ID	B12-IF-18
Depth (ft)	18
GRO	<20
DRO	<50
RRO	<250
UNITS	mg/Kg
Sample ID	B12-27
Depth (ft)	27
GRO	<20
DRO	<50
RRO	<250
UNITS	mg/Kg

Sample ID	B28-5
Depth (ft)	5
GRO	<2
DRO	<50
RRO	<250
UNITS	mg/Kg

Sample ID	B9-0.5
Depth (ft)	0.5
GRO	<20
DRO	1100
RRO	<250
NAPHTHALENE	0.16
TRIMETHYLBENZENE 1,2,4	0.39
TRIMETHYLBENZENE 1,3,5	0.2
UNITS	mg/Kg

Sample ID	B25-5
Depth (ft)	5
GRO	<2
DRO	<50
RRO	<250
UNITS	mg/Kg

Sample ID	B29-5
Depth (ft)	5
GRO	<2
DRO	<50
RRO	<250
UNITS	mg/Kg

Sample ID	B13-IF-18
Depth (ft)	18
GRO	<20
DRO	<50
RRO	<250
UNITS	mg/Kg
Sample ID	B13-30
Depth (ft)	30
GRO	<20
DRO	<50
RRO	<250
UNITS	mg/Kg

Sample ID	B10-0.5
Depth (ft)	0.5
GRO	<20
DRO	<50
RRO	<250
UNITS	mg/Kg

Sample ID	B27-5
Depth (ft)	5
GRO	<2
DRO	<50
RRO	<250
UNITS	mg/Kg

Sample ID	B26-5
Depth (ft)	5
GRO	<2
DRO	<50
RRO	<250
UNITS	mg/Kg

Sample ID	B8-7
Depth (ft)	7
GRO	<20
DRO	3300
RRO	640
NAPHTHALENE	0.087
UNITS	mg/Kg

Sample ID	B31-10
Depth (ft)	10
GRO	<2
DRO	<50
RRO	<250
Sample ID	B31-SWI-17
Depth (ft)	17
GRO	<2
DRO	<50
RRO	<250
UNITS	mg/Kg

Sample ID	B18-25
Depth (ft)	25
GRO	1200
DRO	1600
RRO	<250
UNITS	mg/Kg

Sample ID	B5b-2
Depth (ft)	2
GRO	<20
DRO	11000
RRO	620
ARSENIC	12.7
NAPHTHALENE	4.3
PROPYLBENZENE	0.088
TETRACHLOROETHENE	0.26
TRIMETHYLBENZENE 1,2,4	3.7
TRIMETHYLBENZENE 1,3,5	0.92
PCB'S	0.4
UNITS	mg/Kg

Sample ID	B15-9
Depth (ft)	9
GRO	<20
DRO	<50
RRO	<250
UNITS	mg/Kg

Sample ID	B14-9-10
Depth (ft)	9-10
GRO	<20
DRO	<50
RRO	<250
UNITS	mg/Kg
Sample ID	B14-15
Depth (ft)	15
GRO	<20
DRO	<50
RRO	<250
UNITS	mg/Kg

B1 B2 B21 B22 B23 B30 B33 B17 B32 B4 B24 B6 B7 B28 B11 CB04 B12 B9 B29 B13 B25 B8 B10 FD07 FD04a CB02 B35 B27 B26 FD05 B31 B18 B15 B14 B3 FD01 FD02 FD03 FD08

LEGEND:

- APPROXIMATE BUILDING LOCATIONS
- APPROXIMATE PROPERTY BOUNDARIES
- APPROXIMATE SUBJECT PROPERTY BOUNDARIES
- PROPSOED NEW BUILDING FOOTPRINT
- PROPOSED SOIL REMOVAL AREAS
- APPROXIMATE LOCATION OF ABANDONED UST
- APPROXIMATE LOCATION OF PREVIOUSLY DECOMMISSIONED (REMOVED) UST
- CATCH BASINS & FLOOR DRAINS
- B1 ENW SOIL SAMPLE LOCATION (2010)
- INDICATES SOIL AT LOCATION EXCEEDS APPLICABLE RISK-BASED CONCENTRATIONS
- B21 ENW SOIL SAMPLE LOCATION (2011)
- B17 ENW SOIL SAMPLE LOCATION (2012)

GRO: GASOLINE-RANGE HYDROCARBONS
DRO: DIESEL-RANGE HYDROCARBONS
RRO: RESIDUAL(OIL)-RANGE HYDROCARBONS
MG/KG: MILLIGRAMS PER KILOGRAM
<#: NOT DETECTED AT OR ABOVE ANALYTICAL METHOD REPORTING LIMIT (#).
UST: UNDERGROUND STORAGE TANK

NOTES:

1. BASE MAP DEVELOPED FROM AN AERIAL PHOTOGRAPH MAP DATED 2009 AND ENW FIELD NOTES.

APPROXIMATE SCALE

0 30 60 FEET

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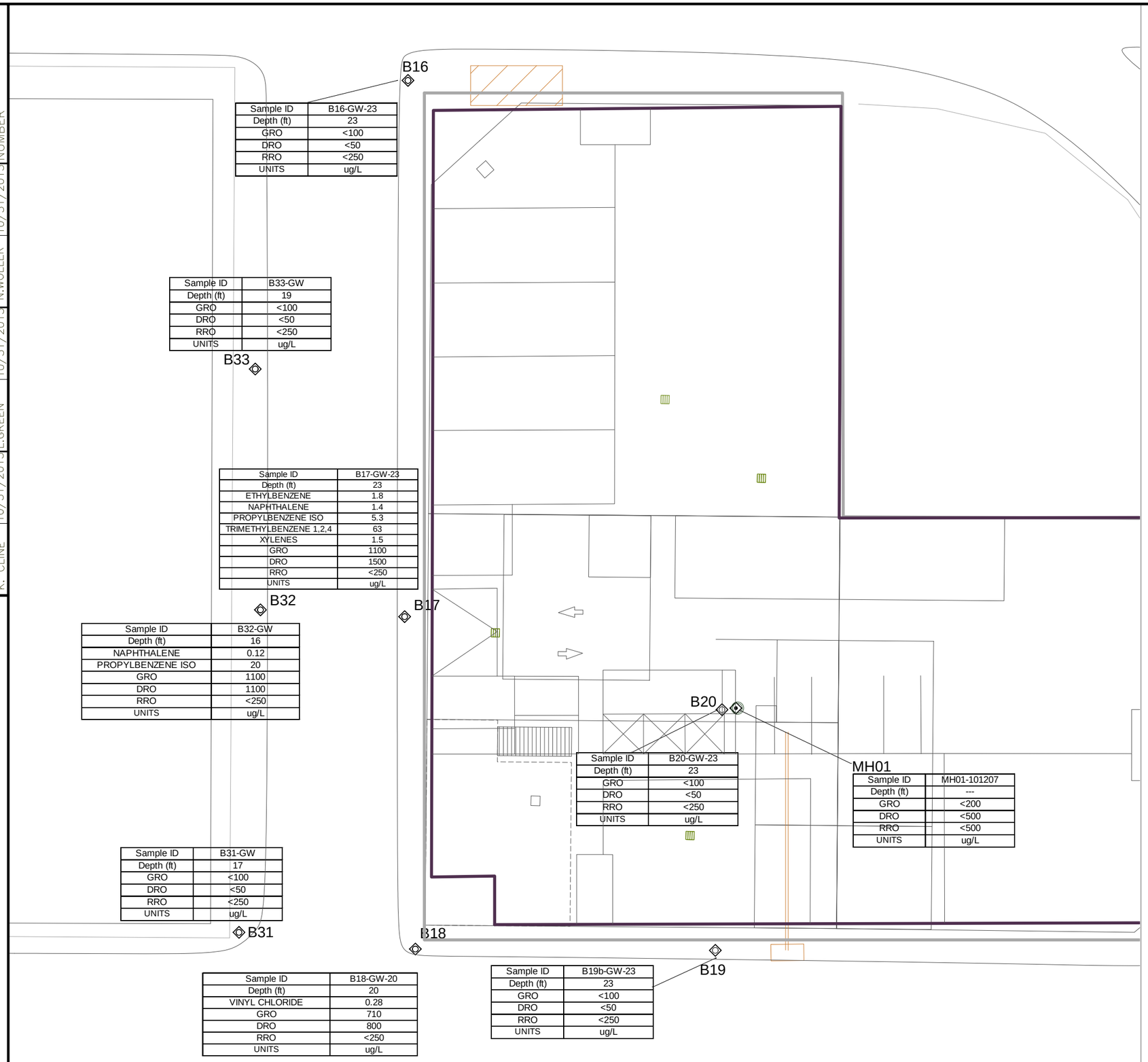
FIGURE 4

SOIL SAMPLE LOCATION DIAGRAM

FORMER SALVATION ARMY
139 SE MARTIN LUTHER KING JR BLVD
PORTLAND, OREGON

DRAWING NUMBER 847-12001(v06)
APPROVED BY N.WOLLER 10/31/2013
CHECKED BY L.GREEN 10/31/2013
DRAWN BY K. CLINE 10/31/2013



LEGEND:

- APPROXIMATE PROPERTY BOUNDARIES
- APPROXIMATE SUBJECT PROPERTY BOUNDARIES
- APPROXIMATE SUBJECT BUILDINGS
- PROPOSED NEW BUILDING FOOTPRINT
- APPROXIMATE LOCATION OF ABANDONED UST
- APPROXIMATE LOCATION OF PREVIOUSLY DECOMMISSIONED (REMOVED) UST
- CATCH BASIN
- MANHOLE
- MH01 — ENW RECONNAISSANCE GROUND WATER SAMPLE LOCATION (2010)
- B16 — ENW RECONNAISSANCE GROUND-WATER SAMPLE LOCATION (2012)

GRO: GASOLINE-RANGE HYDROCARBONS
DRO: DIESEL-RANGE HYDROCARBONS
RRO: RESIDUAL(OIL)-RANGE HYDROCARBONS
UG/L: MICROGRAMS PER LITER
<#: NOT DETECTED AT OR ABOVE ANALYTICAL METHOD REPORTING LIMIT (#).
UST: UNDERGROND STORAGE TANK

NOTES:

1. BASE MAP DEVELOPED FROM AN AERIAL PHOTOGRAPH MAP DATED 2009 AND ENW FIELD NOTES.

APPROXIMATE SCALE

0 25 50 FEET

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FIGURE 5

RECONNAISSANCE GROUND WATER SAMPLE LOCATION DIAGRAM

FORMER SALVATION ARMY
139 SE MARTIN LUTHER KING JR BLVD
PORTLAND, OREGON

DRAWING 847-12001(V02)
APPROVED BY N. WHOLLER 10/31/2013
CHECKED BY L.GREEN 10/31/2013
DRAWN BY K. CLINE 10/31/2013

SG04

Sample ID	SG04-120103-8
Depth (ft)	8
GRO	8200
DRO	<1300
BENZENE	2.4
ETHYLBENZENE	9.5
NAPHTHALENE	3
TETRACHLOROETHENE	19
TOLUENE	28
TRICHLOROETHENE	<4.7
TRIMETHYLBENZENE 1,2,4	27
TRIMETHYLBENZENE 1,3,5	7.1
XYLENES	63
PROPANOL	5.2
UNITS	ug/m3

SUB01

Sample ID	SUB01-101202
Depth (ft)	SUB
GRO	<1000
DRO	43000
BENZENE	74
ETHYLBENZENE	50
NAPHTHALENE	180
TETRACHLOROETHENE	16
TOLUENE	120
TRICHLOROETHENE	<5.4
TRIMETHYLBENZENE 1,2,4	440
TRIMETHYLBENZENE 1,3,5	150
XYLENES	400
PROPANOL	220
UNITS	ug/m3

Sample ID	SUB02-101202
Depth (ft)	SUB
GRO	<1000
DRO	3600
BENZENE	20
ETHYLBENZENE	10
NAPHTHALENE	9.1
TETRACHLOROETHENE	120
TOLUENE	53
TRICHLOROETHENE	<5.4
TRIMETHYLBENZENE 1,2,4	<29
TRIMETHYLBENZENE 1,3,5	5.2
XYLENES	28.7
PROPANOL	57
UNITS	ug/m3

SUB02

Sample ID	SUB03-101202
Depth (ft)	SUB
GRO	<1000
DRO	4700
BENZENE	15
ETHYLBENZENE	44
NAPHTHALENE	110
TETRACHLOROETHENE	26
TOLUENE	40
TRICHLOROETHENE	<5.4
TRIMETHYLBENZENE 1,2,4	<29
TRIMETHYLBENZENE 1,3,5	13
XYLENES	119
PROPANOL	<49
UNITS	ug/m3

SUB03

Sample ID	SUB05-101202
Depth (ft)	SUB
GRO	<1000
DRO	8200
BENZENE	82
ETHYLBENZENE	600
NAPHTHALENE	600
TETRACHLOROETHENE	2600
TOLUENE	210
TRICHLOROETHENE	<5.4
TRIMETHYLBENZENE 1,2,4	16000
TRIMETHYLBENZENE 1,3,5	11000
XYLENES	16000
PROPANOL	1200
UNITS	ug/m3

SUB05

SG05

Sample ID	SG05-120202-8
GRO	17000
DRO	<1000
BENZENE	2.2
ETHYLBENZENE	3.2
NAPHTHALENE	<4
TETRACHLOROETHENE	<1
TOLUENE	7.5
TRICHLOROETHENE	<0.82
TRIMETHYLBENZENE 1,2,4	12
TRIMETHYLBENZENE 1,3,5	3.6
TOTAL XYLENES	20.7
PROPANOL	18
UNITS	ug/m3

SG03

Sample ID	SG03-120103-8
Depth (ft)	8
GRO	17000000
DRO	3600
BENZENE	4100
ETHYLBENZENE	3000
NAPHTHALENE	<370
TETRACHLOROETHENE	480
TOLUENE	420
TRICHLOROETHENE	430
TRIMETHYLBENZENE 1,2,4	9500
TRIMETHYLBENZENE 1,3,5	3600
XYLENES	29000
PROPANOL	56
UNITS	ug/m3

SUB04

Sample ID	SUB04-101202
Depth (ft)	SUB
GRO	<1000
DRO	1200
BENZENE	7.7
ETHYLBENZENE	<4.3
NAPHTHALENE	17
TETRACHLOROETHENE	2200
TOLUENE	9.6
TRICHLOROETHENE	13
TRIMETHYLBENZENE 1,2,4	<29
TRIMETHYLBENZENE 1,3,5	<4.9
XYLENES	8.8
PROPANOL	<49
UNITS	ug/m3

SG01

Sample ID	SG01-120103-8
Depth (ft)	8
GRO	26000
DRO	<1300
BENZENE	2
ETHYLBENZENE	10
NAPHTHALENE	2.4
TETRACHLOROETHENE	150
TOLUENE	32
TRICHLOROETHENE	<6.3
TRIMETHYLBENZENE 1,2,4	23
TRIMETHYLBENZENE 1,3,5	6.9
XYLENES	60
PROPANOL	<12
UNITS	ug/m3

SG02

Sample ID	SG02-120103-8
Depth (ft)	8
GRO	17000
DRO	<1300
BENZENE	0.95
ETHYLBENZENE	6.5
NAPHTHALENE	2.4
TETRACHLOROETHENE	23
TOLUENE	18
TRICHLOROETHENE	<4.9
TRIMETHYLBENZENE 1,2,4	21
TRIMETHYLBENZENE 1,3,5	5
XYLENES	42
PROPANOL	<8.9
UNITS	ug/m3

LEGEND:

- APPROXIMATE BUILDING LOCATIONS
- APPROXIMATE PROPERTY BOUNDARIES
- APPROXIMATE SUBJECT PROPERTY BOUNDARIES
- PROPOSED NEW BUILDING FOOTPRINT
- APPROXIMATE LOCATION OF ABANDONED UST
- APPROXIMATE LOCATION OF PREVIOUSLY DECOMMISSIONED (REMOVED) UST
- CATCH BASIN
- SUB01 ENW SUB-SLAB VAPOR SAMPLE LOCATION (2010)
- INDICATES SUB-SLAB VAPOR AND SOIL GAS LOCATION THAT EXCEED APPLICABLE RISK-BASED CONCENTRATIONS
- SG01 ENW SOIL GAS SAMPLE LOCATION (2012)

GRO: GASOLINE-RANGE HYDROCARBONS
DRO: DIESEL-RANGE HYDROCARBONS
ug/m3; MICROGRAMS PER CUBIC METER
<#: NOT DETECTED AT OR ABOVE ANALYTICAL METHOD REPORTING LIMIT (#).
UST: UNDERGROUND STORAGE TANK

NOTES:

1. BASE MAP DEVELOPED FROM AN AERIAL PHOTOGRAPH MAP DATED 2009 AND ENW FIELD NOTES.

APPROXIMATE SCALE

0 30 60 FEET

N

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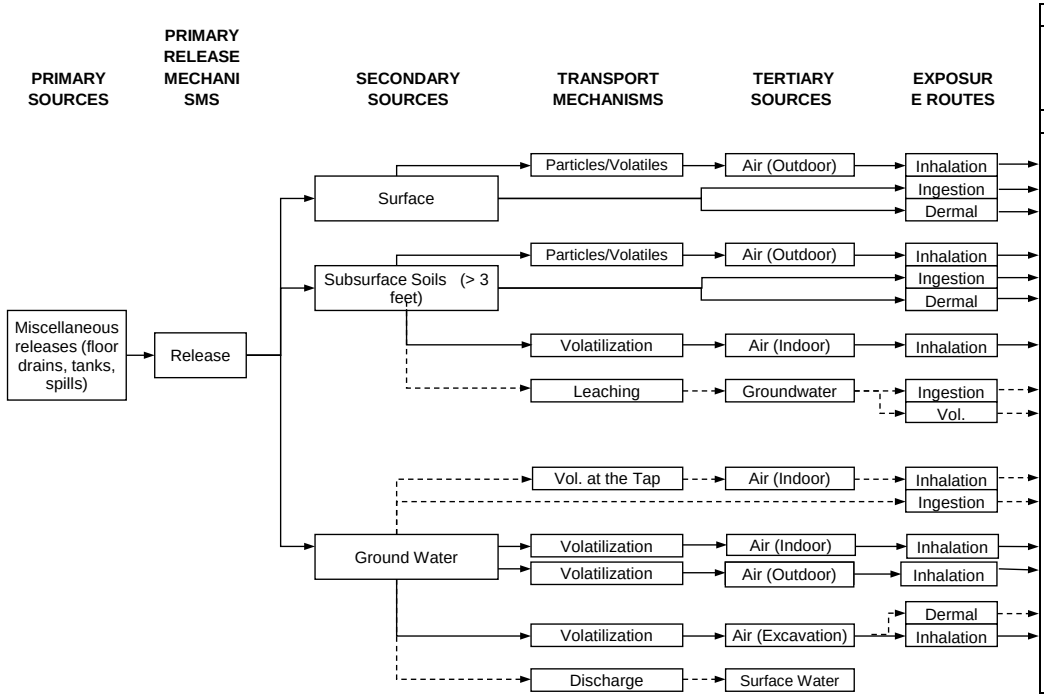
FIGURE 6
SOIL GAS AND SUB-SLAB VAPOR SAMPLE LOCATION DIAGRAM
FORMER SALVATION ARMY
139 SE MARTIN LUTHER KING JR BLVD
PORTLAND, OREGON

Figure 7. Conceptual Site Model (Human Health)



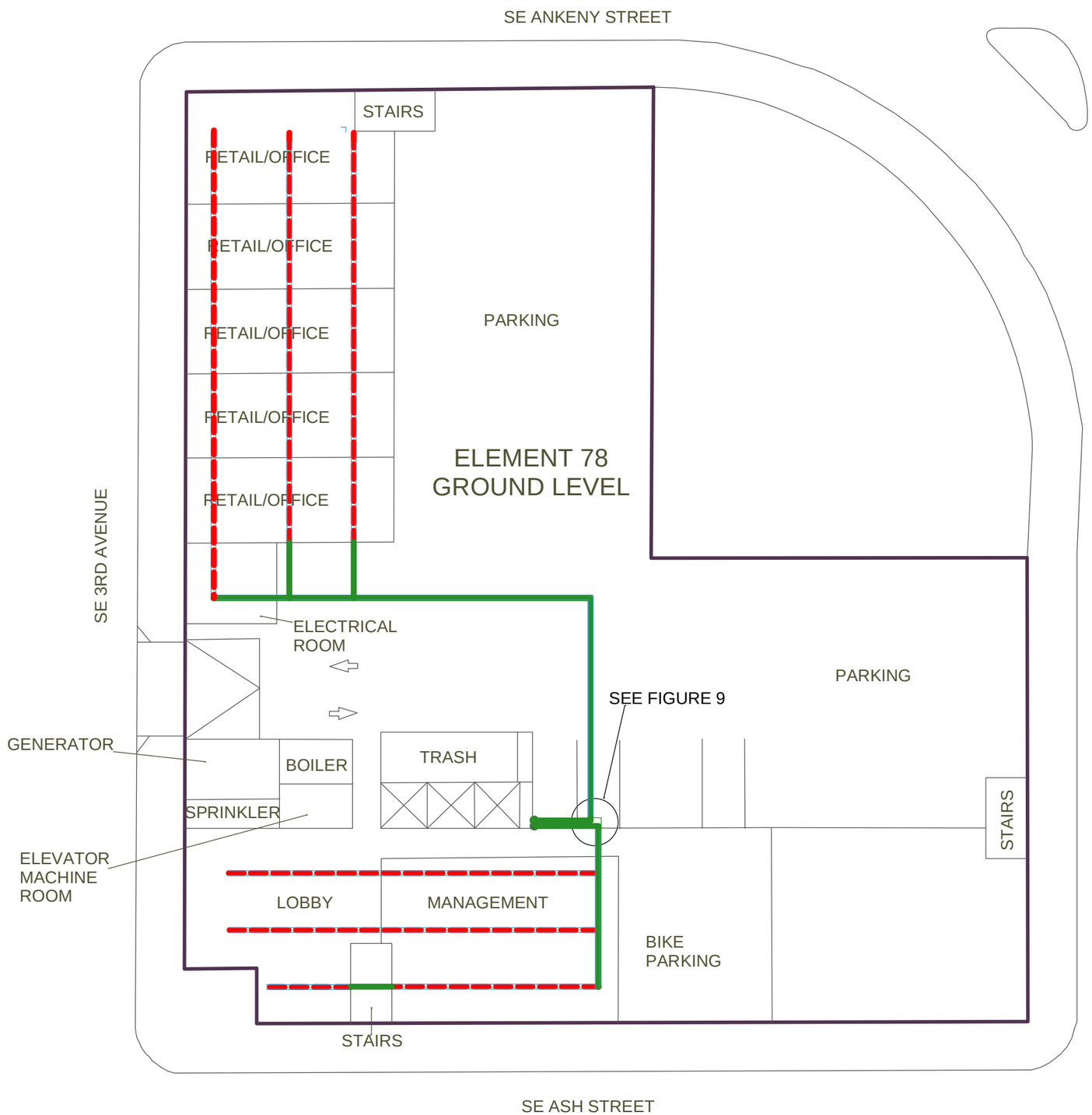
POTENTIAL RECEPTORS							
Residential		Urban Residential		Occupational		Construction & Excavation	
Current	Future	Current	Future	Current	Future	Current	Future
-	-	-	+	+	+	-	+
-	-	-	+	+	+	-	+
-	-	-	+	+	+	-	+
-	-	-	+	+	+	-	+
-	-	-	-	-	-	-	+
-	-	-	-	-	-	-	+
-	-	-	+	+	+	-	+
-	-	-	-	-	-	-	-
-	-	-	+	+	+	-	+
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	+	+	+	-	+
-	-	-	+	+	+	-	+
-	-	-	-	-	-	-	-
-	-	-	+	+	+	-	+

Notes:

+ This route is a primary source of exposure.

- There is no exposure by this route.

DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
K. CLINE 10/31/13	L.GREEN 10/31/2013	N. WHOLLER 10/31/2013	847-12001(v06)



LEGEND:

- PROPOSED NEW BUILIDNG LOCATION
- PIPE TRENCH
- PERFORATED PVC PIPING
- NON-PERFORATED PVC PIPING

NOTES:

1. BASE MAP DEVELOPED FROM STACK ARCHITECTURE ELEMENT 78 LOWER PARKING / LOBBY PLANS.
2. OREGON LAW REQUIRES YOU TO FOLLOW RULES ADOPTED BY THE OREGON UTILITY NOTIFICATION CENTER. THOSE RULES ARE SET FORTH IN OAR 952-001-0010 THROUGH OAR 952-001-0090. YOU MAY OBTAIN COPIES OF THESE RULES FROM THE CENTER BY CALLING 503-232-1987. IF YOU HAVE ANY QUESTIONS ABOUT THE RULES, YOU MAY CONTACT THE CENTER. YOU MUST NOTIFY THE CENTER AT LEAST TWO (2) BUSINESS DAYS, BEFORE COMMENCING AN EXCAVATION BUT NOT MORE THAN 10 BUSINESS DAYS. CALL 811 OR 1-800-332-2344.
3. ALL DIMENSIONS AND DETAIL SHALL BE VERIFIED IN THE FIELD MEASUREMENTS BY THE CONTRACTOR PRIOR TO FABRICATION, INSTALLATION, AND CONSTRUCTION.
4. ANY UTILITIES SHOWN ON THESE DRAWINGS DO NOT REPRESENT ALL UTILITIES IN THIS AREA. FOR A COMPLETE REPRESENTATION OF ALL KNOWN UTILITIES IN THIS AREA, CONTACT A LICENSED UTILITY LOCATE SERVICE.
5. THE LOCATION OF EXISTING UNDERGROUND UTILITIES FOUNDATIONS SHOWN ON THE PLANS ARE FOR INFORMATION ONLY AND ARE NOT GUARANTEED TO BE COMPLETE OF ACCURATE. CONTRACTOR SHALL VERIFY ELEVATIONS, DIMENSIONS, SIZES, AND MATERIAL TYPES OF ALL UNDERGROUND UTILITIES AND FOUNDATIONS PRIOR TO COMMENCING WITH CONSTRUCTION AND SHALL BRING ANY DISCREPANCIES TO THE ATTENTION OF THE ENGINEER, AT LEAST 72 HOURS PRIOR TO START OF CONSTRUCTION TO PREVENT GRADE AND ALIGNMENT CONFLICTS.
6. THE ENGINEER HAS NOT BEEN RETAINED OR COMPENSATED TO PROVIDE DESIGN AND CONSTRUCTION REVIEW SERVICES RELATING TO THE CONTRACTOR S SAFETY PRECAUTIONS OR TO MEANS, METHODS, TECHNIQUES, SEQUENCES OR PROCEDURES REQUIRED FOR CONTRACTOR TO PERFORM HIS/HER WORK.
7. FIELD CHANGES MAY OCCUR SINCE THERE IS NO ACCURATE INFORMATION ON THE FOUNDATIONS DESIGN OR DIMENSIONS FOR THE BUILDING. SAWCUT AND/OR TRENCHES ARE NOT TO BE MADE THROUGH OR ACROSS ANY FOUNDATION WITH BEARING CAPACITIES (E.G. BEARING WALLS, PERIMETER WALLS, ETC.)

REGISTERED PROFESSIONAL ENGINEER 18510PE OREGON JULY 10, 1996 LANCE ARLEN DOWNS

Renewal 12/31/15

APPROXIMATE SCALE

0 25 50 FEET

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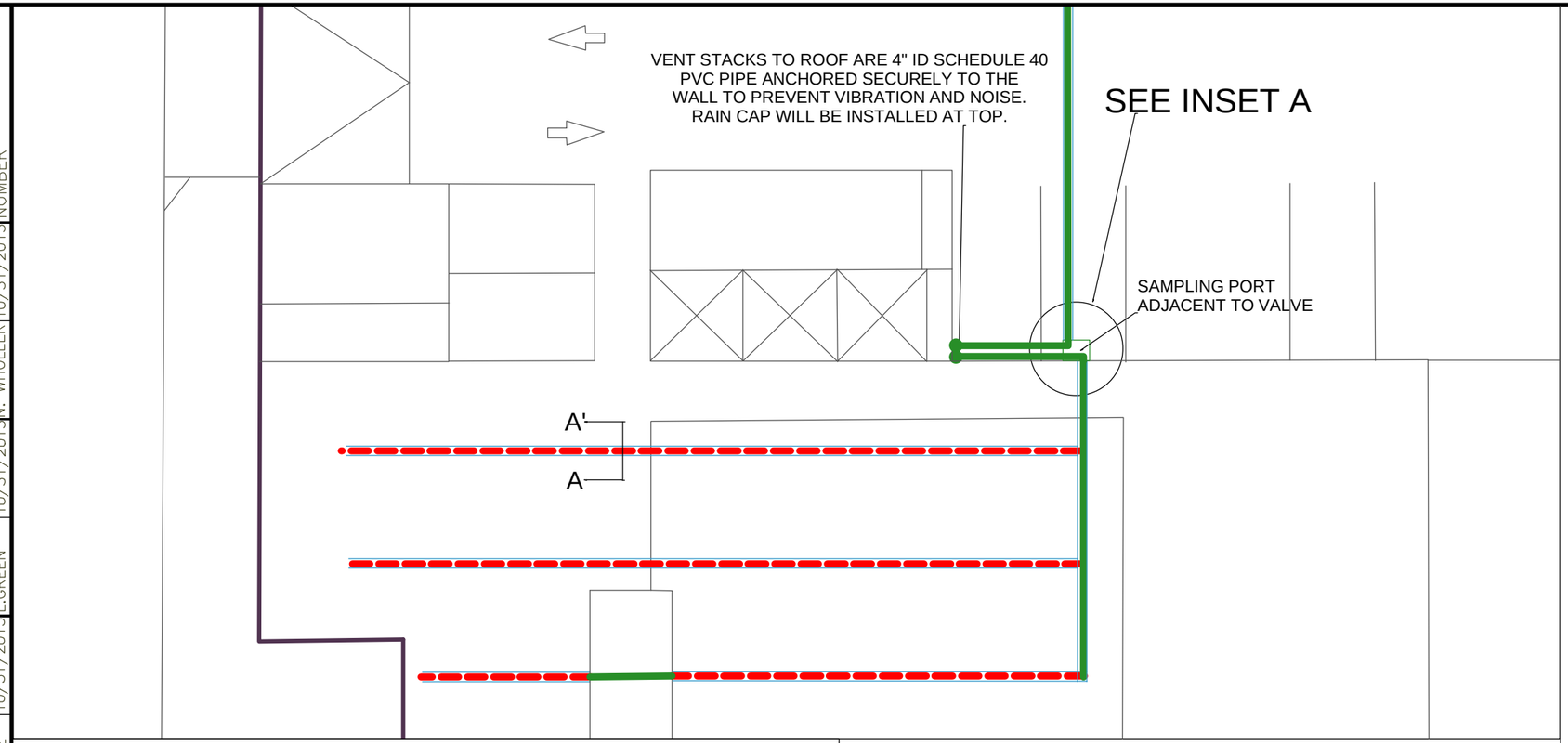
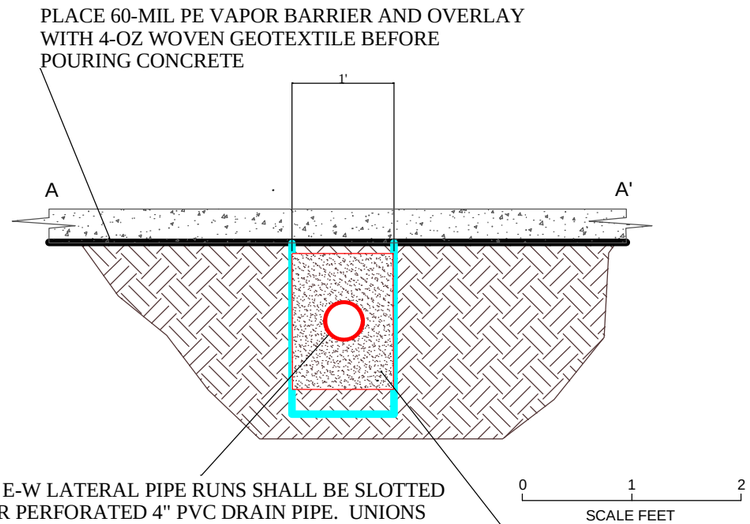
FIGURE 8
SUB-SLAB DEPRESSURIZATION SYSTEM (OVERVIEW)

FORMER SALVATION ARMY
139 SE MARTIN LUTHER KING JR BLVD
PORTLAND, OREGON

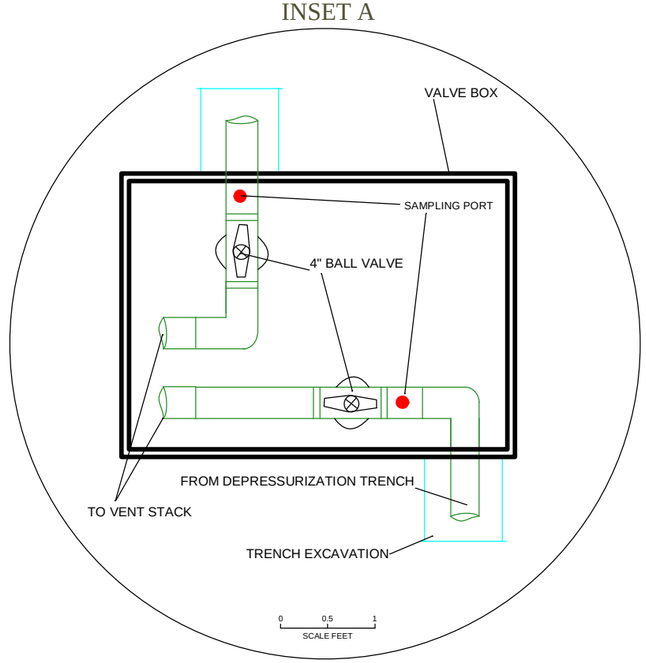
DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
K. CLINE 10/31/2013	L.GREEN 10/31/2013	N. WHOLLER 10/31/2013	847-12001(v06)



SSD SYSTEM CROSS SECTION IN FLOOR SECTION A - A'



SSD SYSTEM VALVE BOX DETAIL INSET A



LEGEND:

- PROPOSED NEW BUILDING FOOTPRINT
- PIPE TRENCH
- PERFORATED PVC PIPING
- NON-PERFORATED PVC PIPING

NOTES:

1. BASE MAP DEVELOPED FROM STACK ARCHITECTURE ELEMENT 78 LOWER PARKING / LOBBY PLANS.
2. OREGON LAW REQUIRES YOU TO FOLLOW RULES ADOPTED BY THE OREGON UTILITY NOTIFICATION CENTER. THOSE RULES ARE SET FORTH IN OAR 952-001-0010 THROUGH OAR 952-001-0090. YOU MAY OBTAIN COPIES OF THESE RULES FROM THE CENTER BY CALLING 503-232-1987. IF YOU HAVE ANY QUESTIONS ABOUT THE RULES, YOU MAY CONTACT THE CENTER. YOU MUST NOTIFY THE CENTER AT LEAST TWO (2) BUSINESS DAYS, BEFORE COMMENCING AN EXCAVATION BUT NOT MORE THAN 10 BUSINESS DAYS. CALL 811 OR 1-800-332-2344.
3. ALL DIMENSIONS AND DETAIL SHALL BE VERIFIED IN THE FIELD MEASUREMENTS BY THE CONTRACTOR PRIOR TO FABRICATION, INSTALLATION, AND CONSTRUCTION.
4. ANY UTILITIES SHOWN ON THESE DRAWINGS DO NOT REPRESENT ALL UTILITIES IN THIS AREA. FOR A COMPLETE REPRESENTATION OF ALL KNOWN UTILITIES IN THIS AREA, CONTACT A LICENSED UTILITY LOCATE SERVICE.
5. THE LOCATION OF EXISTING UNDERGROUND UTILITIES FOUNDATIONS SHOWN ON THE PLANS ARE FOR INFORMATION ONLY AND ARE NOT GUARANTEED TO BE COMPLETE OF ACCURATE. CONTRACTOR SHALL VERIFY ELEVATIONS, DIMENSIONS, SIZES, AND MATERIAL TYPES OF ALL UNDERGROUND UTILITIES AND FOUNDATIONS PRIOR TO COMMENCING WITH CONSTRUCTION AND SHALL BRING ANY DISCREPANCIES TO THE ATTENTION OF THE ENGINEER, AT LEAST 72 HOURS PRIOR TO START OF CONSTRUCTION TO PREVENT GRADE AND ALIGNMENT CONFLICTS.
6. THE ENGINEER HAS NOT BEEN RETAINED OR COMPENSATED TO PROVIDE DESIGN AND CONSTRUCTION REVIEW SERVICES RELATING TO THE CONTRACTOR S SAFETY PRECAUTIONS OR TO MEANS, METHODS, TECHNIQUES, SEQUENCES OR PROCEDURES REQUIRED FOR CONTRACTOR TO PERFORM HIS/HER WORK.
7. FIELD CHANGES MAY OCCUR SINCE THERE IS NO ACCURATE INFORMATION ON THE FOUNDATIONS DESIGN OR DIMENSIONS FOR THE BUILDING. SAWCUT AND/OR TRENCHES ARE NOT TO BE MADE THROUGH OR ACROSS ANY FOUNDATION WITH BEARING CAPACITIES (E.G. BEARING WALLS, PERIMETER WALLS, ETC.)

APPROXIMATE SCALE

0 15 30 FEET

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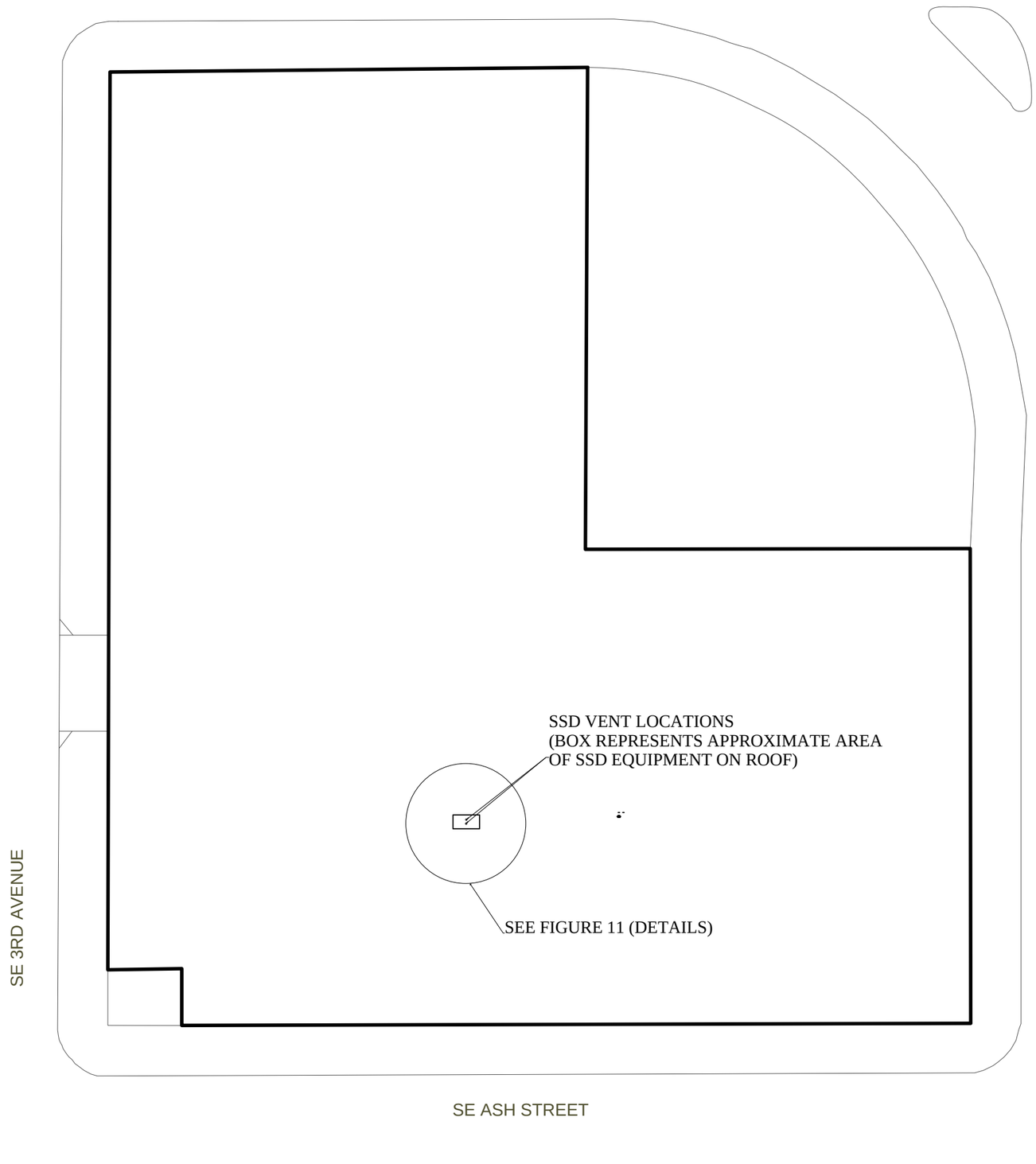
FIGURE 9
SUB-SLAB DEPRESSURIZATION SYSTEM (DETAIL)

FORMER SALVATION ARMY
139 SE MARTIN LUTHER KING JR BLVD
PORTLAND, OREGON

DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
K. CLINE 06/14/2013	L.GREEN 06/14/2013	P. TRONE 06/14/2013	847-12001(v04)



LEGEND:

PROPOSED NEW BUILIDNG ROOF OUTLINE

NOTES:

1. BASE MAP DEVELOPED FROM STACK ARCHITECTURE ELEMENT 78 LOWER PARKING / LOBBY PLANS

APPROXIMATE SCALE

0 10 20 FEET

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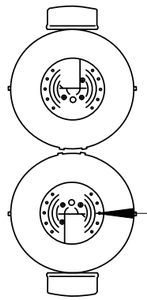
FIGURE 10

SUB-SLAB DEPRESSURIZATION SYSTEM (ROOF PLAN)

FORMER SALVATION ARMY
139 SE MARTIN LUTHER KING JR BLVD
PORTLAND, OREGON

DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
K. CLINE 06/14/2013	L.GREEN 06/14/2013	P. TRONE 06/14/2013	847-12001(v04)

ROOF DETAIL - PLAN VIEW



Ø0.33 ft

FANTEC FG4XL INLINE FAN

A

SEE PROFILE A - A'

A'

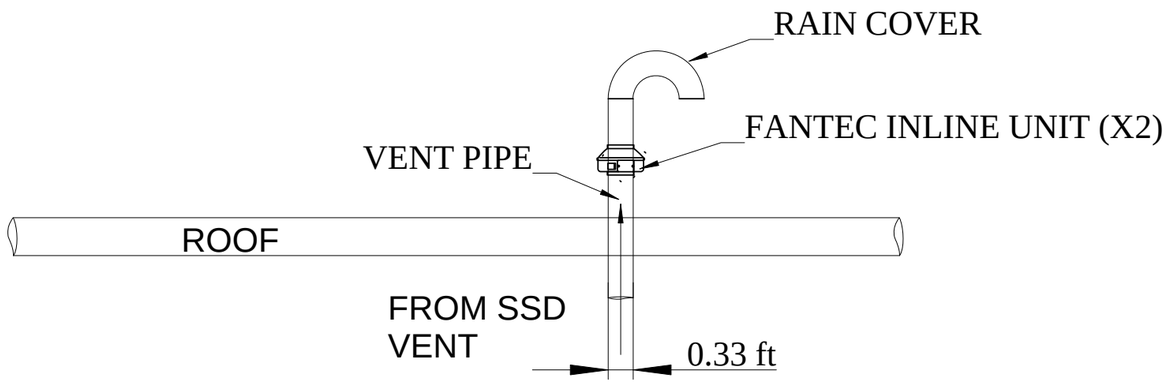
APPROXIMATE SCALE

0 1 2 FEET

LEGEND:

SCHEDULE 40 PVC PIPING

ROOF DETAIL - PROFILE A - A'



APPROXIMATE SCALE

0 2 4 FEET

NOTES:

1. BASE MAP DEVELOPED FROM STACK ARCHITECTURE ELEMENT 78 LOWER PARKING / LOBBY PLANS

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FIGURE 11
SUB-SLAB DEPRESSURIZATION SYSTEM
(ROOF DETAIL)

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