EXXON COMPANY, U S A
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ENVIRONMENTAL ENGINEERING
R D HICKS
SENIOR MARKETING ENGINEER
(510) 246-8768
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November 15, 1996

Mr Ben Forson
Washington State Department of Ecology
Northwest Regional Office
3190 160th Ave S E
Bellevue, WA 98008-5022

3012

RE: FORMER EXXON RAS #7-3535/8408 AURORA AVENUE NORTH, SEATTLE, WASHINGTON

Dear Mr Forson

Attached for your review and comment, please find a copy of the ***Remediation System Installation Report*** for the above referenced former Exxon site The report was prepared by Delta Environmental Consultants, Inc. of Bellevue, Washington and summarizes the system installation and start-up activities

Should you have any questions or concerns, please feel free to contact me at (510) 246-8768

Sincerely

R D Hicks
Senior Marketing Engineer

RDH/tjm

attachment Delta Report dated November 4, 1996

cc w/attachment
Mr Scott Hooton - BP Oil
Mr Tim Johnson - TOSCO

w/o attachment
Mr Jim Coppernoll - Delta, Bellevue

Delta
Environmental
Consultants, Inc.

1756-114th Avenue S E
Suite 110
Bellevue, WA 98004
206/450-7726
FAX 206/450 6837

November 4, 1996

Exxon Company, U.S.A.
2300 Clayton Road, Suite 640
Concord, California 94520-4032

Attention: Mr. Roger Hicks
Senior Marketing Engineer

Subject: Remediation System Installation
Former Exxon R/S No. 7-3535
8408 Aurora Avenue North
Seattle, Washington
Delta Project No. M091-807

Dear Mr. Hicks:

Delta Environmental Consultants (Delta) was authorized by Exxon Company, U S A (Exxon) to provide coordination, observation, and documentation services for the installation of an air sparging/soil vapor extraction (AS/SVE) system at Former Exxon R/S No. 7-3535 in Seattle, Washington (Figure 1). The system was installed in accordance with Delta's design plans, dated April 24, 1995. The design plans were updated to reflect as-built site conditions and are included as Attachment A. Delta contracted Cascade Drilling Inc. (Cascade) of Woodinville, Washington, and Custom Backhoe and Dumptruck Service (Custom Backhoe) of Bellevue, Washington to install air sparging wells and the AS/SVE system Environmental Instruments Company (EI) provided an AS/SVE system control panel. This report, in conjunction with the attached as-built drawings, laboratory reports, boring logs, Operations Integrity Management System (OIMS) documentation, and summary of field and laboratory procedures, summarizes the AS/SVE system installation and start-up activities

Delta's scope of work for the installation and start-up of the AS/SVE system consisted of the following:

- Fulfilling the requirements of and coordinating installation activities with the Seattle Department of Construction and Land Use, Puget Sound Air Pollution Control Agency (NOC#6163), Seattle City Light, and U S West Communications for the installation and permitting of the AS/SVE system.

- Preparing a Health and Safety Plan for the installation and start-up of the AS/SVE system.

- Executing and documenting Operations Integrity Management System (OIMS) procedures, and presenting the associated forms in this report as Attachment E.

- Coordinating, observing, and documenting the activities of Cascade during the advancement of six soil borings and installation of six air sparging wells
- Coordinating, observing, and documenting the activities of Custom Backhoe during the installation of the AS/SVE system.
- Preparing an Operation and Maintenance Manual and placing it on site.
- Preparing as-built drawings and this letter report

Installation of Air Sparging Wells

Seven air sparging wells were installed at this site to facilitate remediation of petroleum hydrocarbon-impacted soil and ground water. Well AS-1 was previously installed by Cascade on January 19, 1995 prior to feasibility testing. Wells AS-2 through AS-7 were advanced by Cascade on April 22 and May 1, 1996.

Borings AS-2 through AS-7 were advanced using a 4.25-inch inside diameter hollow-stem auger driven by a truck-mounted CME-75 drill rig. The hollow-stem augers, drilling equipment, and sampling tools were steam cleaned before advancing each soil boring. The drilling process was continuously observed and logged, and discrete soil samples were collected at five-foot intervals. Soil samples from the borings were field screened for volatile organic compounds with a photoionization detector (PID) to facilitate selecting representative soil samples for laboratory analyses. The field sampling and quality assurance procedures followed during these activities are summarized in Attachment B. The boring logs, which describe sample recovery, soil horizons, well construction details, and PID screening values, are presented in Attachment C.

Soil samples were submitted to North Creek Analytical, Inc. (North Creek) of Bothell, Washington for analysis of gasoline-range total petroleum hydrocarbons by Washington Department of Ecology (Ecology) method WTPH-G, and benzene, toluene, ethylbenzene, and xylenes (BTEX) by United States Environmental Protection Agency (EPA) method 8020. Results of the soil samples collected from the borings indicated that samples from AS-2 and AS-3 contained WTPH-G concentrations of 930 milligrams per kilogram (mg/kg) (AS-2-10) and 620 mg/kg (AS-3-5), exceeding Washington State Model Toxics Control Act (MTCA) Method A cleanup levels. Samples from boring AS-2 yielded concentrations of BTEX (benzene at 4 2 mg/kg and xylenes at 39 mg/kg) above MTCA Method A cleanup levels. The laboratory reports for these soil samples are included in Attachment D and results are summarized in Table 1.

Subsurface Installation

The subsurface piping was installed by Custom Backhoe during the month of May, 1996 Trenches were excavated between the well locations and the remediation compound. Two-inch diameter schedule 80 polyvinyl chloride (PVC) lateral pipes were installed approximately two feet below grade connecting the air sparging wells and the compound. Two-inch diameter schedule 40 PVC lateral pipes were installed approximately two feet below grade connecting the 40-foot screened horizontal SVE pipe sections and the compound The 40-foot screened horizontal SVE

pipe sections were constructed of schedule 40 PVC and were installed at a depth of 4.33 feet Valves were installed in each AS and SVE line inside the compound for system adjustment capability. The trenches were backfilled, compacted, and repaved with asphalt or concrete to match the existing surface. Subsurface installation details are presented in Attachment A

Above-Grade Installation

The remediation compound was constructed by Custom Backhoe during the month of June, 1996. The compound is located in the southeast corner of the site, as shown on Drawing G-3, Site Layout, in Attachment A, As-Built Drawings.

The remediation compound is 11-feet wide by 21-feet long and is enclosed by a six-foot high concrete block wall. A concrete block wall already existed along the east and part of the north and south sides of the compound, to enclose a trash dumpster. That wall was extended to enclose the entire compound and the trash dumpster, as shown in the design plans. A three-inch thick concrete pad was constructed within the compound for mounting the remediation system. The remediation equipment was connected to the subsurface AS/SVE piping system at PVC pipe ends that stubbed up from the concrete pad.

The remediation unit was constructed on a skid by Custom Backhoe and was installed at the site during the month of July, 1996. The skid-mounted unit consists of an EG&G Rotron EN454 blower with a 1.5-horsepower motor and 55-gallon moisture knockout with a level switch, a GAST Model 7HDD-69DTA-M700X compressor with two 1.5-horsepower motors, an Environmental Instruments control panel with a Modicon 512 PLC telemetry system, and associated instruments and controls. Two 500-pound Aquatec MX500-V carbon vessels and the AS and SVE manifolds were connected to the skid-mounted unit

Telephone service was installed at the remediation compound on June 3, 1996. An above-grade electrical line was brought from a power pole on North 84th Street to a meter on a pole immediately outside the compound. Power is brought to a breaker panel inside the compound via an electrical line from the meter. The service power is 120/240 volts AC, single-phase, three-wire, 100-ampere service.

System Start-Up Activities

Inspection of the remediation equipment following installation resulted in discovery of deficiencies that required correction during July, August, and September. The SVE system was started and calibrated for operation by Delta on October 9, 1996. The blower has no recirculation or dilution valving, and produced a vacuum of seven inches of water at the moisture knockout drum and a total flow of 122 standard cubic feet per minute (scfm) with all SVE valves fully open.

The AS system was started and calibrated for operation by Delta on October 22, 1996 The compressor was initially operated at 20 pounds per square inch (psi). AS wells AS-1, AS-2, and AS-3 are currently being sparged at approximately 15 psi for 19 hours per day at an average total flow of six scfm.

Samples of the influent soil vapors were collected by Delta on October 22, 1996, and submitted to North Creek for analysis. The soil vapor samples were analyzed for WTPH-G and BTEX. Results indicated the influent vapor samples contained concentrations of 20 ppmv WTPH-G, < 0.627 ppmv benzene, 0.31 ppmv toluene, 1.20 ppmv ethylbenzene, and 1.43 ppmv xylenes. The laboratory report is included in Attachment D.

System Operation Status

The SVE system is currently operating at nine inches of water vacuum and is extracting 122 scfm. The AS system is currently operating at 20 psi and is supplying an approximate total of six scfm in a continuous 19-hours on, 5-hours off cycle Delta will monitor system flows, pressures, vacuums, and concentrations on a weekly basis for the first month of operation. Subsequent system monitoring will be conducted on a semi-monthly basis. Ground water monitoring is being conducted on a monthly basis, and consists of measuring monitoring well water levels and dissolved oxygen (DO) levels. Additional operation and maintenance activities include: documenting vapor concentrations measured with a PID, updating on-site O&M documentation, performing regular blower and compressor maintenance, performing system adjustments and repairs, collecting soil vapor samples for laboratory analysis, evaluating system data, and preparing quarterly O&M reports. Ground water sampling will be conducted on a quarterly basis.

If you have any questions regarding this report or the status of this project, please contact James Coppernoll or me at (206) 450-7726.

Sincerely,

DELTA ENVIRONMENTAL CONSULTANTS, INC.

Paul E. Kalina
Project Engineer

Reviewed by.

James D. Coppernoll
Project Manager

PEK/JDC/naf

Table 1 Summary of Soil Chemical Analyses
Figure 1 Site Location Map
Attachment A: As-Built Drawings
Attachment B: Summary of Field and Laboratory Procedures
Attachment C Boring Logs
Attachment D: Laboratory Reports
Attachment E: Operations Integrity Management System Documentation

TABLE 1
SUMMARY OF SOIL CHEMICAL ANALYSES
FORMER EXXON R/S NO. 7-3535
8408 AURORA AVENUE NORTH
SEATTLE, WASHINGTON
DELTA PROJECT NO. M091-807

SAMPLE ID	DATE	SAMPLE DEPTH (feet)	BENZENE (mg/kg)	TOLUENE (mg/kg)	ETHYL-BENZENE (mg/kg)	XYLENES (mg/kg)	GASOLINE-RANGE HYDROCARBONS (mg/kg)
AS-2-10	05/01/96	10	4 2	17	12	39	930
AS-3-5	05/01/96	5	0 13	0.28	1.3	4.3	620
AS-4-10	04/22/96	10	<0.050	<0 050	<0.050	<0.10	<1.0
AS-5-10	04/22/96	10	<0 050	<0.050	<0 050	<0 10	5.5
AS-6-5	04/22/96	5	<0 050	<0.050	<0.050	<0.10	1.8
AS-6-20	04/22/96	20	<0 050	<0.050	<0.050	<0.10	2 9
AS-7-5	04/22/96	5	<0.050	<0 050	<0 050	<0 10	<1.0
Laboratory Methods			8020A	8020A	8020A	8020A	WTPH-G
MTCA Method A Clean-up Levels			**0.5**	**40.0**	**20.0**	**20.0**	**100.0**

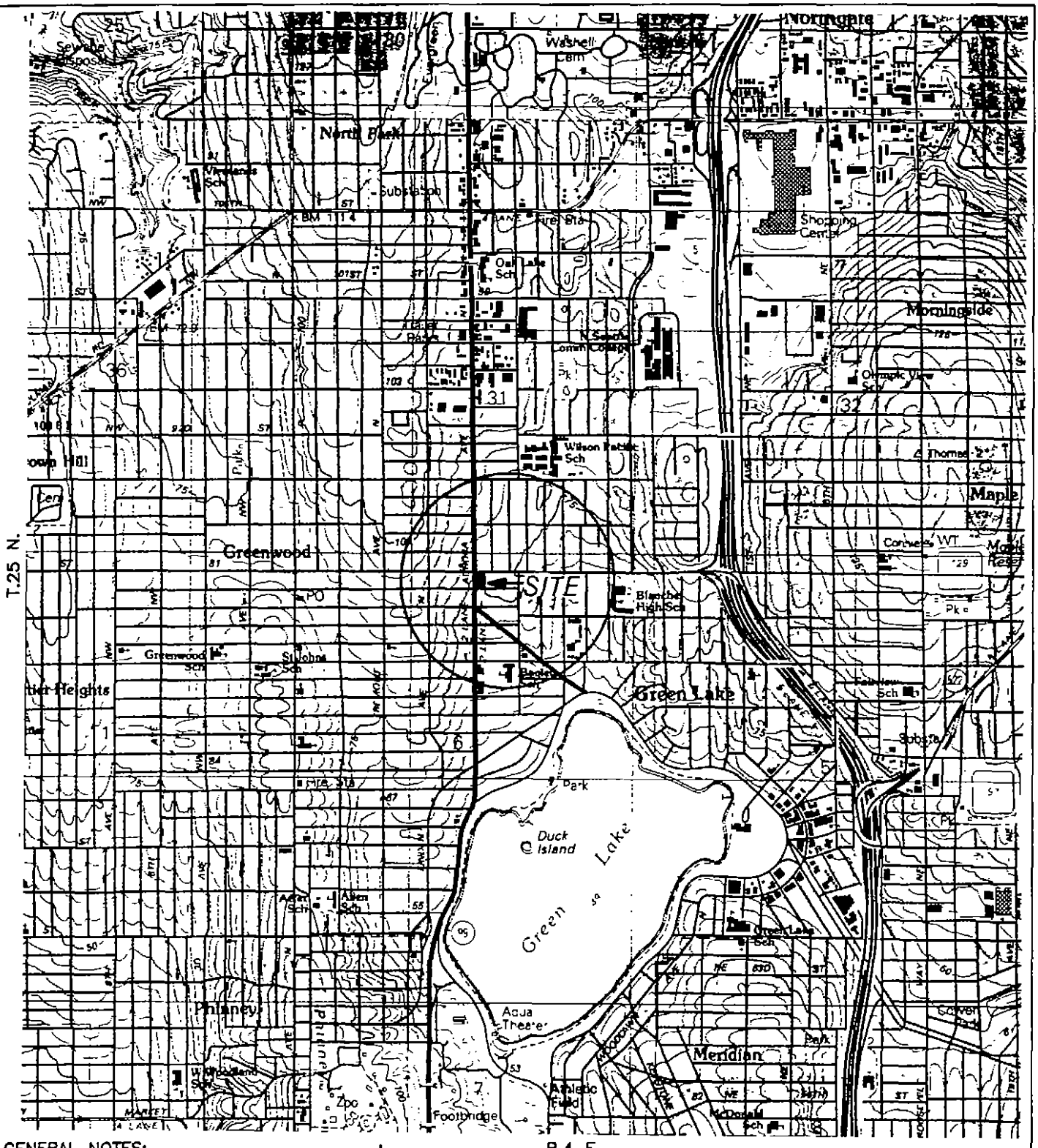
8020A = EPA Method for volatile aromatic hydrocarbons.

WTPH-G = Washington State Department of Ecology (Ecology) Method for gasoline range petroleum hydrocarbons.

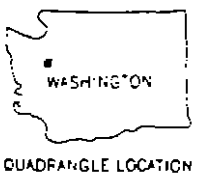
MTCA = Washington State Department of Ecology Model Toxics Control Act.

mg/kg = Milligrams per kilogram

AS_SOIL.WQ2
10/25/96.PK



GENERAL NOTES:
BASE MAPS FROM U.S G.S.
SEATTLE NORTH, WA.
7.5 x 15 TOPOGRAPHIC
PRINTED 1983



QUADRANGLE LOCATION

0 2000 FT

SCALE 1 : 25,000

FIGURE 1
SITE LOCATION MAP
FORMER EXXON STATION NO 7-3535
8408 AURORA AVENUE NORTH
SEATTLE, WA.

PROJECT NO. 43-91-807	DRAWN BY LH 1/19/94
FILE NO	PREPARED BY L D
REVISION NO. 2	REVIEWED BY

Delta Environmental Consultants, Inc.

ATTACHMENT A

As-Built Drawings

AIR SPARGING AND SOIL VAPOR EXTRACTION SYSTEM DRAWINGS

DRAWING LIST

SECTION	DRAWING NUMBER	DRAWING TITLE
GENERAL	G-1	SYMBOL & LEGEND SHEET
	G-2	SPECIFICATIONS
	G-3	SITE LAYOUT
	G-4	CONSTRUCTION DETAILS
	G-5	CONSTRUCTION DETAILS
PIPING	P-1	PROCESS & INSTRUMENTATION DIAGRAM
	P-2	EQUIPMENT LAYOUT AND PIPING PLAN
	P-3	PIPING & EQUIPMENT VIEWS
ELECTRICAL	E-1	EQUIPMENT SCHEDULE AND ELECTRICAL LINE DIAGRAM

REVISION NO.	REVISION	BY	DATE

TITLE SHEET
AIR SPARGING AND SOIL VAPOR EXTRACTION SYSTEM
EXXON STATION NO 7-3535
8408 AURORA AVENUE NORTH
SEATTLE, WA

DRAWING TS

PROJECT NO.	DRAWN BY
60081-807	ML 8/28/96
FILE NO.	PREPARED BY
60081807A	PDX

NOT TO SCALE

EXXON

Delta Environmental Consultants, Inc.

SYMBOL SPECIFICATION

INSTRUMENT TYPE

PS	PRESSURE SWITCH
PI	PRESSURE INDICATOR
FI	FLOW INDICATOR
FQI	FLOW METER (TOTALIZING)
CI	CAPACITIVE SENSOR
TI	TEMPERATURE INDICATOR
TT	TEMPERATURE TRANSDUCER
TS	TEMPERATURE SENSOR
LEL	EXPLOSIVITY METER
SL	STATUS LAMP
PC	PRESSURE CONTROL
SP	SAMPLE POINT
VG	VACUUM GAUGE
FS	FLOW SWITCH
LS	LEVEL SWITCH

LINE DESIGNATION

2 – VP – 01 – PV

SIZE IN INCHES | PROCESS | LINE NUMBER | MATERIAL SPECIFICATION

PROCESS

V	VACUUM
VR	VAPOR REMOVAL
AS	AIR SUPPLY
AIR	AIR SPARGE
WD	WATER DISCHARGE
WR	WATER RECOVERY
EC	ELECTRICAL CONDUIT

MATERIAL SPECIFICATION

PV	POLYVINYL CHLORIDE
GM	GALVANIZED
RC	RIGID COPPER

EQUIPMENT

CT	CONDENSATE TRAP
CV	CONTROL VALVE
DS	DISCHARGE SILENCER
FC	FLEXIBLE CONNECTOR
SV	SOIL VENT
VB	VACUUM BLOWER
PF	PARTICULATE FILTER
C	COMPRESSOR
B	BLOWER
CP	CONTROL PANEL
PRV	PRESSURE RELIEF VALVE
SVES	SOIL VAPOR EXTRACTION SYSTEM
S	SOLENOID VALVE

INSTRUMENTATION, CONTROLS, & EQUIPMENT

- PI — PRESSURE INDICATOR
- TI — TEMPERATURE INDICATOR
- FI — FLOW INDICATOR
- VI — VACUUM INDICATOR
- BLOWER
- FILTER WITH DRAIN
- SILENCER
- TURBINE FLOWMETER W/ELECTRIC OUTPUT

VALVES, FITTINGS & PIPING

- HAND CONTROL
- BLOWDOWN
- GATE
- GLOBE
- CHECK
- PLUG
- BALL
- SP SAMPLE POINT
- BUTTERFLY OR DAMPER
- NEEDLE
- THREE WAY
- ELECTRIC CONTROL GATE
- ELECTRIC BUTTERFLY OR DAMPER
- BLEED OR PURGE CONNECTION
- AIR RELEASE
- SOLENOID
- VACUUM RELIEF VALVE
- PRESSURE RELIEF VALVE
- FOOT VALVE
- FLEXIBLE PIPE
- CROSSOVER
- FLANGED CONNECTION
- SCREWED CONNECTION
- UNION
- COUPLING
- REGULATOR
- EXPANSION JOINT/SLEEVE
- HOSE CONNECTION
- INLINE TRAP
- INLINE FILTER
- STRAINER (BASKET TYPE)
- PLUG
- PIPE CAP
- SLIP UPDRAFT VENT CAP
- ELBOW – TURNED UP
- ELBOW – TURNED DOWN
- ELBOW – 90°
- ELBOW – 45°
- ELBOW ONE RADIUS
- REDUCING ELBOW
- QUICK CONNECT COUPLING
- BUSHING
- REDUCER (CONCENTRIC)
- TEE REDUCING
- TEE (OUTLET UP)
- TEE (OUTLET DOWN)
- TEE

INSTRUMENTATION

- INSTRUMENT TYPE / IDENTIFICATION NUMBER — INSTRUMENTS WITH LOCAL DISPLAYS NO REMOTE INPUT OR OUTPUT
- SENSOR TYPE & NUMBER — INSTRUMENTS WITH INPUTS OR OUTPUTS AT THE SITE CONTROL PANEL

(SENSOR DESIGNATION)

D — D=DISCRETE, A=ANALOG, H=HI SPEED

O — O=OUTPUT, I=INPUT

1 — SENSOR NUMBER

- INSTRUMENT IS CONTROLLED OFFSITE BY SCADA INTERFACE
- INSTRUMENT WITH INPUTS OR OUTPUTS LOCATED AT A LOCAL CONTROL PANEL OTHER THAN THE SITE CONTROL PANEL

SITE SYMBOLS

- MONITORING WELL
- PROPOSED MONITORING WELL
- SOIL BORING
- RECOVERY WELL
- VENT WELL
- SPARGE WELL
- SPARGE AND VENT WELL
- UTILITY POLE
- LIGHT POLE
- MANHOLE
- CATCH BASIN
- TREE/SHRUB
- TREE LINE
- HYDRANT
- TBM — TEMPORARY BENCHMARK
- SURVEY MONUMENT
- FENCE LINE
- RAILROAD TRACKS
- R/W — RIGHT OF WAY
- PROPERTY LINE
- OVERHEAD ELECTRIC LINE
- UNDERGROUND ELECTRIC LINE
- GAS LINE
- OVERHEAD TELEPHONE LINE
- UNDERGROUND TELEPHONE LINE
- WATER LINE
- SS — SANITARY SEWER LINE
- S — STORM SEWER LINE
- PROCESS LINES ABOVE GRADE
- PROCESS LINES BELOW GRADE
- PNEUMATIC LINES ABOVE GRADE
- PNEUMATIC LINES BELOW GRADE
- LINES FOR FUTURE USE

ELECTRICAL SYMBOLS

- ELECTRICALLY OPERATED SOLENOID
- SEALOFF
- 120 V RECEPTACLE – WEATHER PROOF
- JUNCTION BOX
- MAGNETIC MOTOR STARTER
- THERMAL OVERLOAD SWITCHES
- LAMP
- LIMIT SWITCH
- LEVEL SWITCH
- PRESSURE SWITCH
- TEMPERATURE SWITCH
- SOLENOID
- CR — CONTROL RELAY
- OR — THERMOSTAT

ARCHITECTURAL SYMBOL DESIGNATIONS

- OBJECT IDENTIFICATION
- REVISION REFERENCE NUMBER
- ROOM/SPACE IDENTIFICATION
- VERTICAL GRID REFERENCE LINE
- HORIZONTAL GRID REFERENCE LINE
- INDICATES SECTION/DETAIL NUMBER
- INDICATES DRAWING SHEET ON WHICH SECTION/DETAIL IS SHOWN
- INDICATES SECTION/DETAIL NUMBER
- INDICATES DRAWING SHEET ON WHICH SECTION/DETAIL IS SHOWN
- INDICATES AREA SHOWN IN REFERENCED DETAIL
- ELEVATION REFERENCE DRAWING NUMBER
- INDICATES SECTION NUMBER
- INDICATES DRAWING SHEET ON WHICH SECTION IS SHOWN
- SECTION CUT
- TITLE / SCALE

REVISION NO.	REVISION	BY	DATE

SYMBOL AND LEGEND SHEET
AIR SPARGING AND SOIL VAPOR EXTRACTION SYSTEM
EXXON STATION NO 7-3535
5408 AURORA AVENUE NORTH
SEATTLE, WA

DRAWING G-1		
PROJECT NO M091-607	DRAWN BY MR 9/28/95	NOT TO SCALE
FILE NO M091607B	PREPARED BY PEK	

EXXON

Delta Environmental Consultants, Inc.

1.0 INTRODUCTION

The enclosed drawings and specifications contain information for the construction and installation of the entire Air Sparging and Soil Vapor Extraction (AS/SVE) system. The following drawings depicting the AS/SVE system are required for construction and installation.

Drawing No.	Revision	Title
G-1	1	Symbol and Legend Sheet
G-2	1	Specifications
G-3	1	Site Layout
C-1	1	Construction Details
C-2	1	Construction Details
P-1	1	Process and Instrumentation Diagram
P-2	1	Equipment Layout and Piping Plan
P-3	1	Piping & Equipment Views
E-1	1	Equipment Schedule and Electrical Line Diagram

2.0 SPECIFICATIONS

2.1 General

1. The selected contractor shall verify all dimensions and all conditions before starting work. The consultant's Project Manager shall be notified of any discrepancy.
2. All materials used for construction of the system shall be new.
3. Equipment and instruments within the system that are specifically defined and for which manufacturer's information sheets have been supplied, shall be provided by the Consultant or EXXON for installation by the contractor. Other materials shall be provided by the contractor.
4. All necessary construction permits and inspections shall be obtained and paid for by the contractor including permits for electrical, mechanical and civil construction. Consultant is to obtain the required ADAQ permit to construct/operate the soil vapor abatement unit.
5. The contractor will restore all excavated areas to original condition.
6. All construction areas shall be clearly marked with barricades, cones, plates or other approved safety markers to restrict access and provide a safe work environment for the contractor and station customers.
7. A pre-construction meeting between the contractor and the consultant will be required before any work begins. The meeting will be held at the site.
8. The contractor shall provide an electrician for one day during start-up of the equipment.
9. The contractor shall warranty all materials and construction for a period of one year. All defects shall be corrected at no expense to the owner.
10. All work shall be conducted during weekday daylight hours unless approved by EXXON.

2.2 Excavation

1. All excavated soil shall be stock piled in an area designated by the consultant and covered with plastic sheeting. The consultant will sample the excavated soil for hydrocarbons. The consultant will be responsible for the disposal of soils at an Exxon approved facility. The contractor shall dispose of all construction debris off-site including any pavement removed during trenching.
2. Where piping is installed below ground, the pipe shall be buried in a trench or excavation at a minimum depth of 24-inches to the top of the pipe, unless otherwise stated. The excavations shall be saw cut to provide a square vertical wall for repaving. If excavations must remain open after normal work hours they shall be covered with metal capable of supporting vehicular traffic. Excavations shall not remain open over a weekend.
3. Process piping trenches and excavations shall be backfilled with imported clean sandy material from 4-inches below the piping to 4-inches above the piping. Upon approval by the consultant, native soil may be used as backfill material from 4-inches above the piping to the bottom of the concrete or asphalt base material. The backfill material shall be compacted to approx. 90% of the relative dry density. Pavement removed for trenches or other excavations shall be replaced with new materials to match existing. When resurfacing with asphalt, a minimum of 4-inches of asphaltic base material shall be used. Base material shall be compacted to approx. 95% of the relative dry density. The asphalt mix shall be designed and installed to allow for normal service station traffic including fuel delivery trucks. When resurfacing with concrete, a minimum of 6-inch thick, 2500 psi reinforced concrete shall be used. Reinforcing shall be No. 4 rebar tied to existing pad, staggered on each side of the trench on 24-inch centers placed at mid-height.
4. Contractor shall pay special attention to areas where trenches cross vent pipes or product pipes and shall be fully responsible for crossing them undisturbed.

2.3 Piping

1. All underground SVE process piping shall be schedule 40 PVC (AS process piping shall be schedule 80 PVC) with glued slip fittings, all above ground process piping shall be glued- schedule 80 PVC or copper or steel as indicated on the drawings.
   Unless otherwise stated, all valves shall be PVC slip fitted as indicated in the drawings.
2. When connecting to existing underground piping, the contractor shall first verify the existing piping path. Existing piping paths where shown on drawings are approximate.
3. Where piping is routed above ground, inside the equipment enclosure, the piping shall be supported by unistrut pipe supports and clamps. The unistrut supports shall be fastened to the wall or mounted on a base that is secured to the ground surface at 3-foot intervals.
4. All process piping shall be pressure tested with air at 5 psi above normal operating pressure and held for one hour and witnessed by a consultant's representative. Do not test through instruments or equipment.

2.4 Electrical

1. The contractor shall furnish and install all necessary equipment to connect the electric service and route the appropriate electrical service to the CP-1 Air Sparging Soil Vapor Extraction control panel, compressor blowers, and control devices.
2. Contractor shall ensure all mechanical and electrical connections are made to soil vapor extraction blower (B-2), the soil vapor extraction control panel, and control devices.
3. The contractor shall acquire all necessary permits and pay all associated fees.
4. All electrical work shall be completed in accordance with the most recent edition of the N.E.C., the local building department and the local fire department. Any drawings required for permits other than those presented herein will be the responsibility of the contractor and shall be reviewed by the consultant prior to use.
5. All installation within the equipment enclosure shall be considered a NEMA 4 environment. All wiring, connectors, conduit, and contractor supplied equipment shall comply with NEMA 4 requirements.
6. All wiring shall be contained in conduits and conduits shall be securely fastened to the enclosure walls as allowed by local code. No conduits shall be installed on the enclosure floor. Conduits may be buried as allowed by local code.

2.5 Equipment

The following equipment will be provided to the contractor for installation.

Item	Quantity	Provided by:	Item Description
PI	10	Consultant	Pressure Indicator
FI	1	Consultant	Flow Indicator
CP-1	1	Consultant	Air Sparging and Soil Vapor Extraction Control Panel
B-1	1	Exxon	Air Compressor
B-2	1	Exxon	Soil Vapor Extraction Blower
S	7	Consultant	Solenoid Valves
PR	1	Consultant	Pressure Regulator
AST	1	Consultant	Air Sparge Timer
TI	3	Consultant	Temperature Indicator
F	1	Consultant	Inline Filter
FS	1	Consultant	Flow Switch
VSC	2	Exxon	Vapor Carbon

Pressure Indicator (PI)
McMaster Carr #3848K3 (0-30 psig)

Flow Indicator - Rotameter (FI)
Dwyer Vis-float order No. 127
Model VFC 5 Scale
Scale Range 2.5 to 25 SCFM

Air Sparging and Soil Vapor Extraction Control Panel (CP-1) - UL Approved
To be Developed by CJ
Equipped with B-1 and B-2 motor starter & timer

Air Compressor (B-1)
Gast Corporation - Model NO. 7HDD 6BOTA-M700X
230 V Single Phase, 1.5 hp

Soil Vapor Extraction Blower (B-2)
Rotron EN464 230 V Single Phase, 1.5 hp

Solenoid Valves (S)
ASCO Red Hat

Pressure Regulator (PR)
Grainger #42T548 1 # Inlet NPT

Temperature Indicator (TI)
Ashcroft Grainger Thermometer #2A811

Inline Filter (F)
Rotron Inline Air Filter
2-inch diameter inlet and outlet ports.

Flow Switch (FS)
Fluxtrol #4-2-U (Dwyer)

Vapor Carbon Columns (VSC)
Aquasec 400 VSC
Activated Carbon Columns

2.6 Construction Schedule

The contractor shall confirm a construction schedule with the consultant's Project Manager at least 72-hours prior to any work at the site.

The proposed schedule shall be presented in a time line format showing estimated start date, duration and completion times for each activity. Changes are to be communicated with the Project Manager within 24-hours.

3.0 SAFETY/CLEAN-UP

3.1 General

The contractor must read, sign, and abide by the consultant's Site Specific Health and Safety Plan before working.

The contractor shall contain loose debris and store construction materials on a daily basis prior to departure from the site to provide a clean and orderly work area.

REVISION NO.	REVISION	BY	DATE

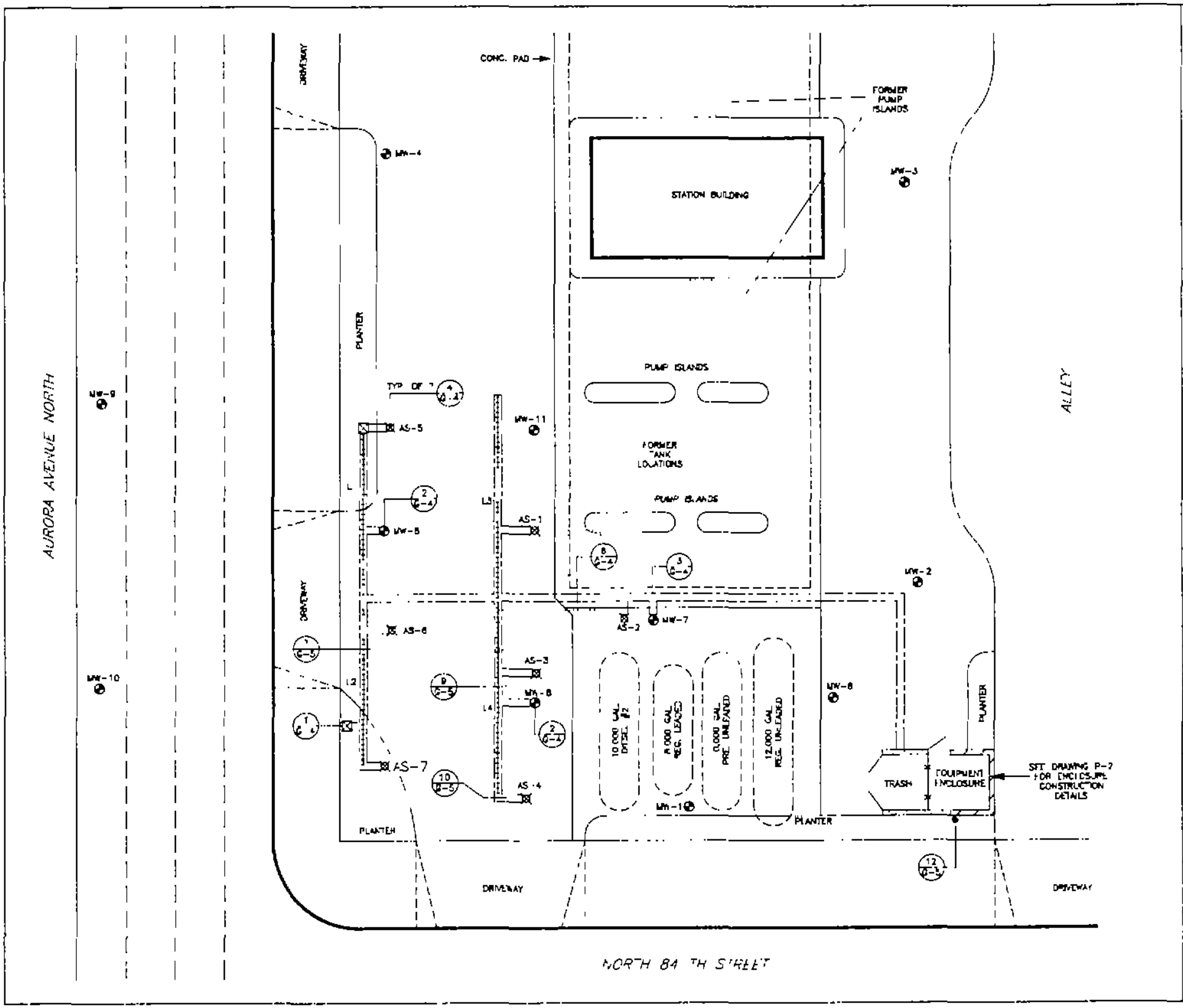
SPECIFICATIONS
AIR SPARGING AND SOIL VAPOR EXTRACTION SYSTEM
EXXON STATION NO 7-3535
8408 AURORA AVENUE NORTH
SEATTLE, WA.

DRAWING G-2

PROJECT NO.	DRAWN BY	NOT TO SCALE
M091-807	ML 9, 28/98	
FILE NO. M091807C	PREPARED BY PDK	

EXXON

Delta Environmental Consultants, Inc.



LEGEND:

- AS-1 AIR SPARGE WELL LOCATION
- MW-1 MONITORING WELL LOCATION
- TRENCHING LAYOUT
- HORIZONTAL SOIL VAPOR EXTRACTION PIPING LAYOUT

REVISION NO.	REVISION	BY	DATE

SITE LAYOUT
AIR SPARGING AND SOIL VAPOR EXTRACTION SYSTEM
EXXON STATION NO 7-3535
8408 AURORA AVENUE NORTH
SEATTLE, WA

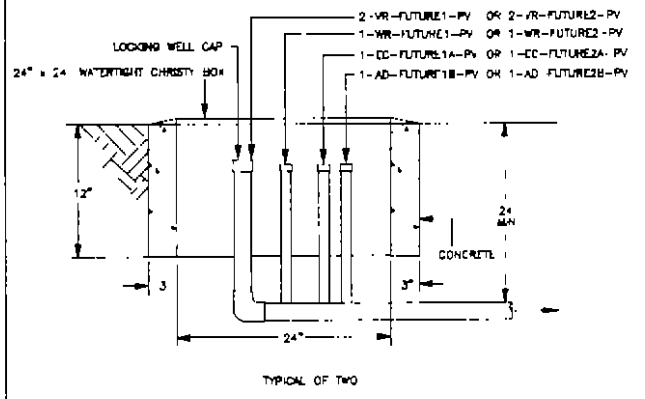
DRAWING G-3

PROJECT NO. WU81-RC7	DRAWN BY ML 9 29 96
FILE NO. WO91807D	PREPARED BY PEK

SCALE 0 — 20 FT

EXXON

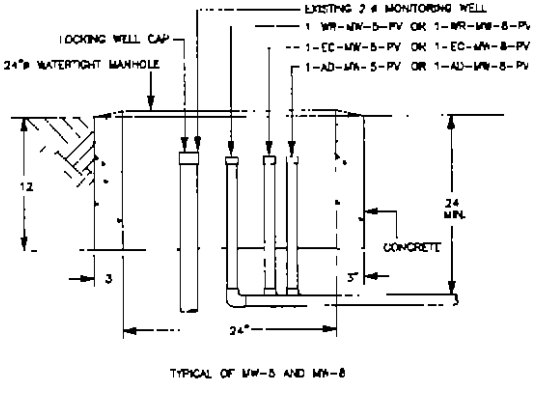
Delta Environmental Consultants, Inc.



TYPICAL OF TWO

1 G-4 FUTURE PIPING WELL HEAD DETAIL

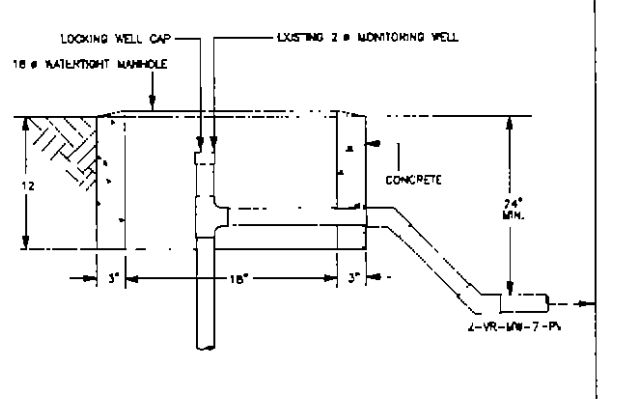
NOT TO SCALE



TYPICAL OF MW-5 AND MW-8

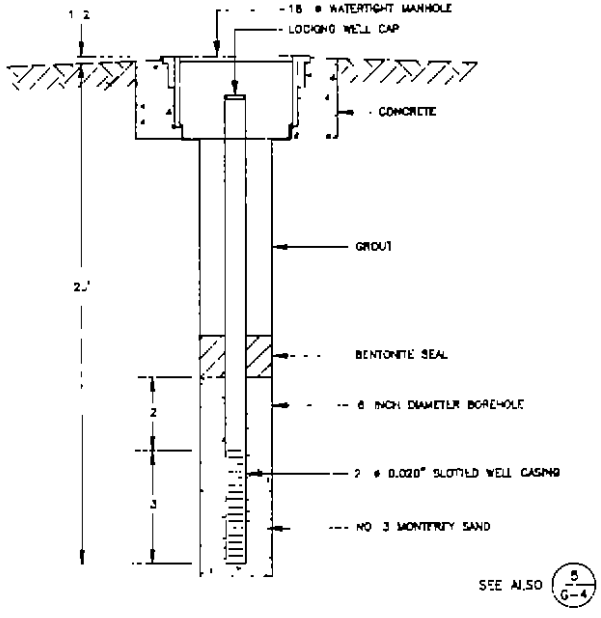
2 G-4 MONITORING WELL HEAD DETAIL (FUTURE USE)

NOT TO SCALE



3 G-4 MW-7 WELL HEAD DETAIL

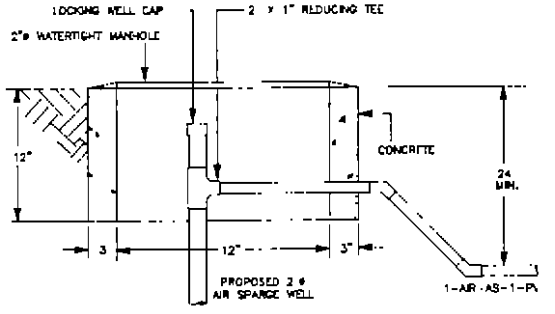
NOT TO SCALE



NOTE: AS-1 IS EXISTING 2"ø AIR SPARGE WELL
AS-2 - AS-7 ARE PROPOSED 2 ø AIR
SPARGE WELLS.

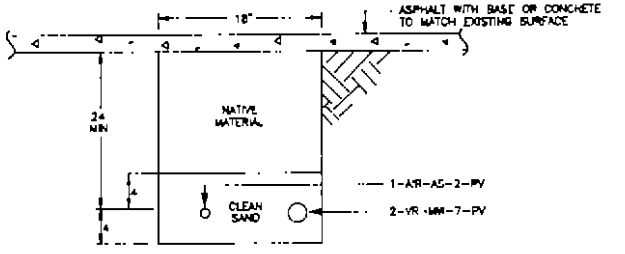
4 G-4 AIR SPARGE WELL DETAIL (AS-1 - AS-7)

NOT TO SCALE



5 G-4 AIR SPARGE WELL HEAD CONNECTION DETAIL (AS-1 - AS-7)

NOT TO SCALE



6 G-4 AIR SPARGE AND SOIL VAPOR EXTRACTION PIPING TRENCH DETAIL

NOT TO SCALE

REVISION NO.	REVISION	BY	DATE

CONSTRUCTION DETAILS

AIR SPARGING AND SOIL VAPOR EXTRACTION SYSTEM

EXXON STATION NO 7-3535

8408 AURORA AVENUE NORTH

SEATTLE, WA

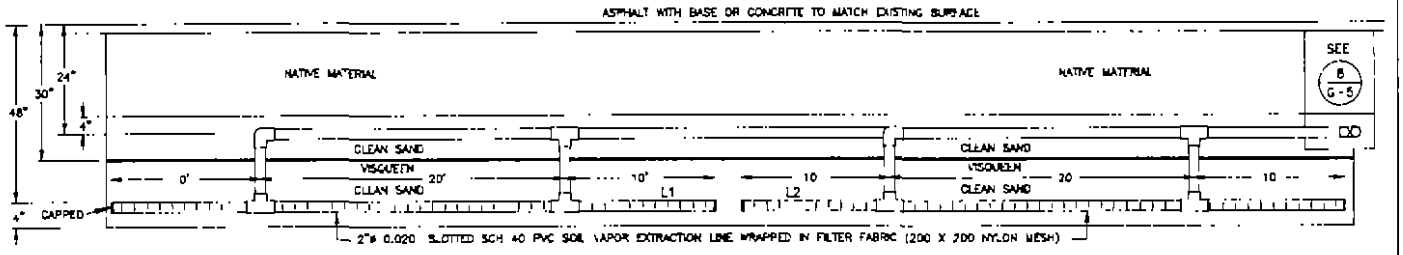
DRAWING G-4

PROJECT NO	DRAWN BY
M091-807	ML 9 29/98
FILE NO	PREPARED BY
M08180TE	PEK

NOT TO SCALE

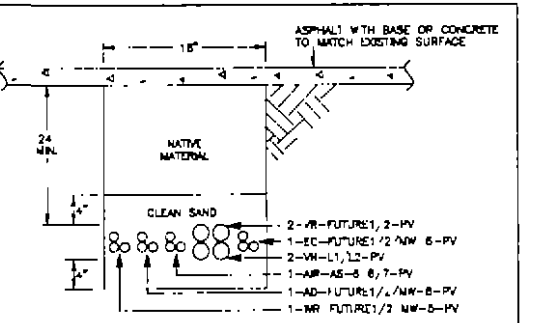
EXXON

Delta Environmental Consultants, Inc.



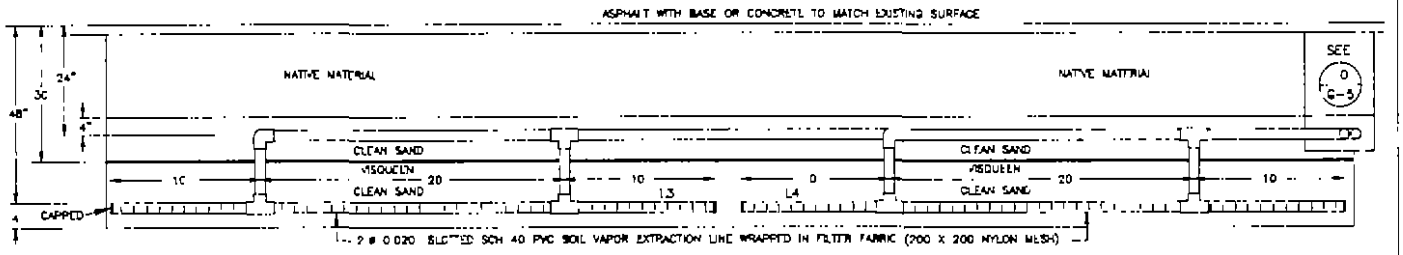
7 C-5 HORIZONTAL SOIL VAPOR EXTRACTION LINES L1 AND L2

NOT TO SCALE



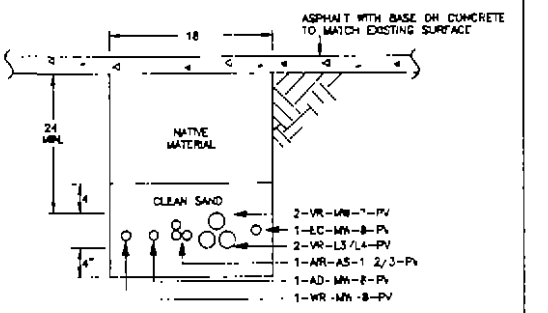
8 G-5 AIR SPARGE & SOIL VAPOR EXTRACTION PIPING TRENCH DETAIL

NOT TO SCALE



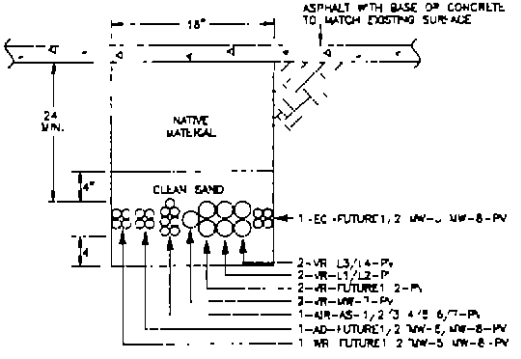
9 G-5 HORIZONTAL SOIL VAPOR EXTRACTION LINES L3 AND L4

NOT TO SCALE



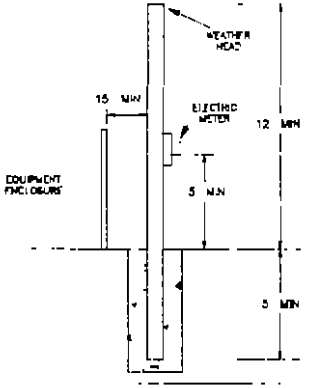
10 G-5 AIR SPARGE & SOIL VAPOR EXTRACTION PIPING TRENCH DETAIL

NOT TO SCALE



11 G-5 AIR SPARGE & SOIL VAPOR EXTRACTION PIPING TRENCH DETAIL

NOT TO SCALE



CONTRACTOR TO EFECT 12 FT ELECTRIC SERVICE POLE (AS PER LOCAL CODE) WITH METER BASE AND WEATHER HEAD FOR OVERHEAD 1 PHASE 120/240 SERVICE AND ARRANGE SERVICE HOOKUP AND PERMIT

CONTRACTOR TO PROVIDE ONE ADDITIONAL CONDUIT WITH SHIELDED PHONE WIRE FROM SERVICE POLE TO CONTROL PANEL

7 G-5 TEMPORARY SERVICE POLE DETAIL

NOT TO SCALE

REVISION NO.	REVISION	BY	DATE

CONSTRUCTION DETAILS
AIR SPARGING AND SOIL VAPOR EXTRACTION SYSTEM
EXXON STATION NO 7-3535
8408 AURORA AVENUE NORTH
SEATTLE, WA

DRAWING G-5

PROJECT NO	DRAWN BY
M091-807	ML 9/29/98
FILE NO	PREPARED BY
M091807F	PEK

NOT TO SCALE

EXXON

Delta Environmental Consultants, Inc.

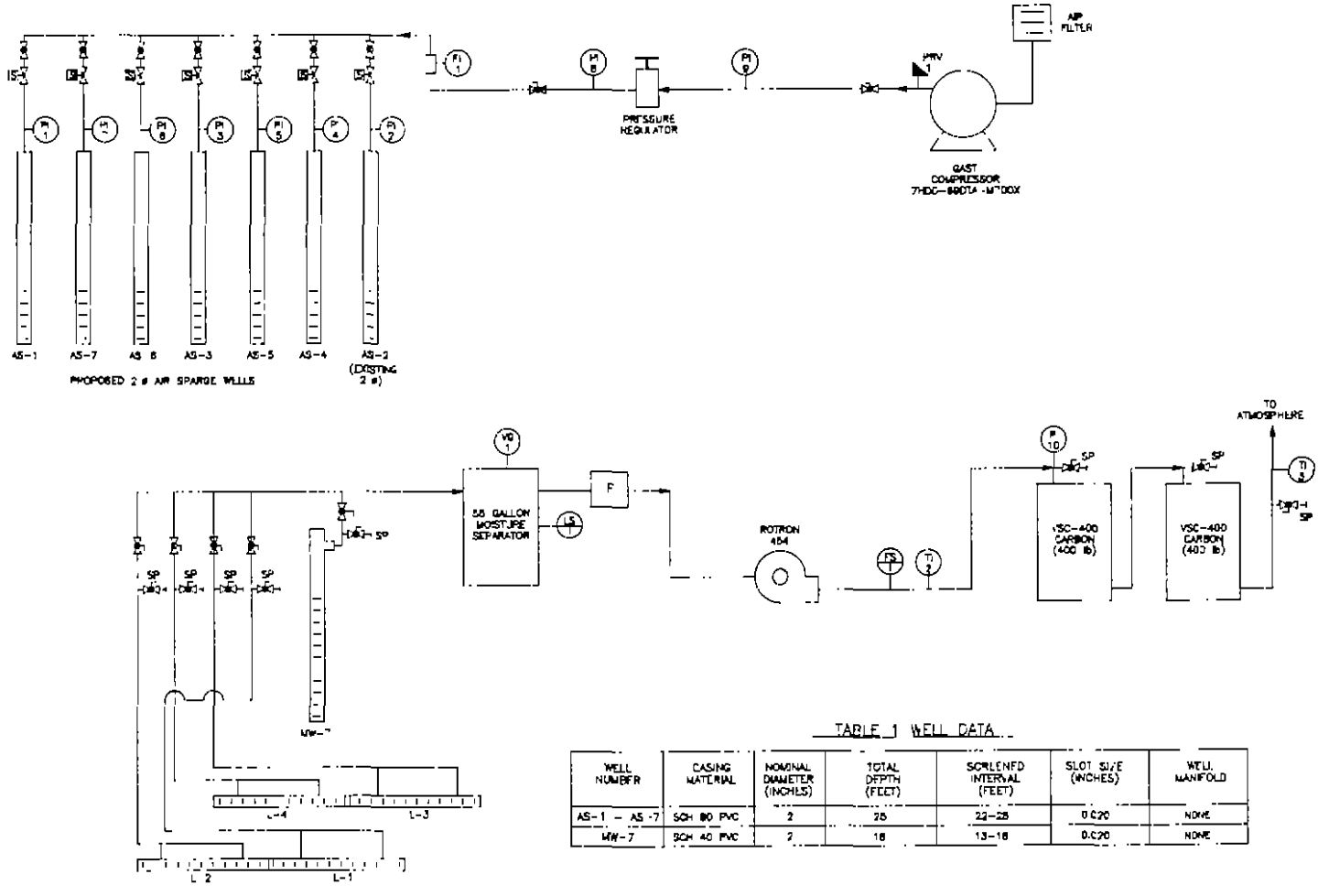


TABLE 1 WELL DATA

WELL NUMBER	CASING MATERIAL	NOMINAL DIAMETER (INCHES)	TOTAL DEPTH (FEET)	SCREENED INTERVAL (FEET)	SLOT SIZE (INCHES)	WELL MANIFOLD
AS-1 – AS-7	SCH 80 PVC	2	25	22–25	0.020	NONE
MW-7	SCH 40 PVC	2	18	13–18	0.020	NONE

TABLE 2 HORIZONTAL SOIL VAPOR EXTRACTION LINE DATA

HSVE NUMBER	CASING MATERIAL	NOMINAL DIAMETER (INCHES)	TOTAL DEPTH (FEET)	SCREENED INTERVAL (FEET)	SLOT SIZE (INCHES)	WELL MANIFOLD
L1 – L4	SCH 40 PVC	2	APPROX. 4 FT	40	0.020	NONE

CONTROL	FUNCTION
FS	SHUTS SOIL VAPOR EXTRACTION SYSTEM OFF IF FLOW IS NOT PRESENT
LS	SHUTS SOIL VAPOR EXTRACTION SYSTEM OFF ON HIGH WATER LEVEL IN MOISTURE SEPARATOR.

REVISION NO.	REVISION	BY:	DATE:

PROCESS & INSTRUMENTATION DIAGRAM
AIR SPARGING AND SOIL VAPOR EXTRACTION SYSTEM
EXXON STATION NO 7-3535
8408 AURORA AVENUE NORTH
SEATTLE, WA

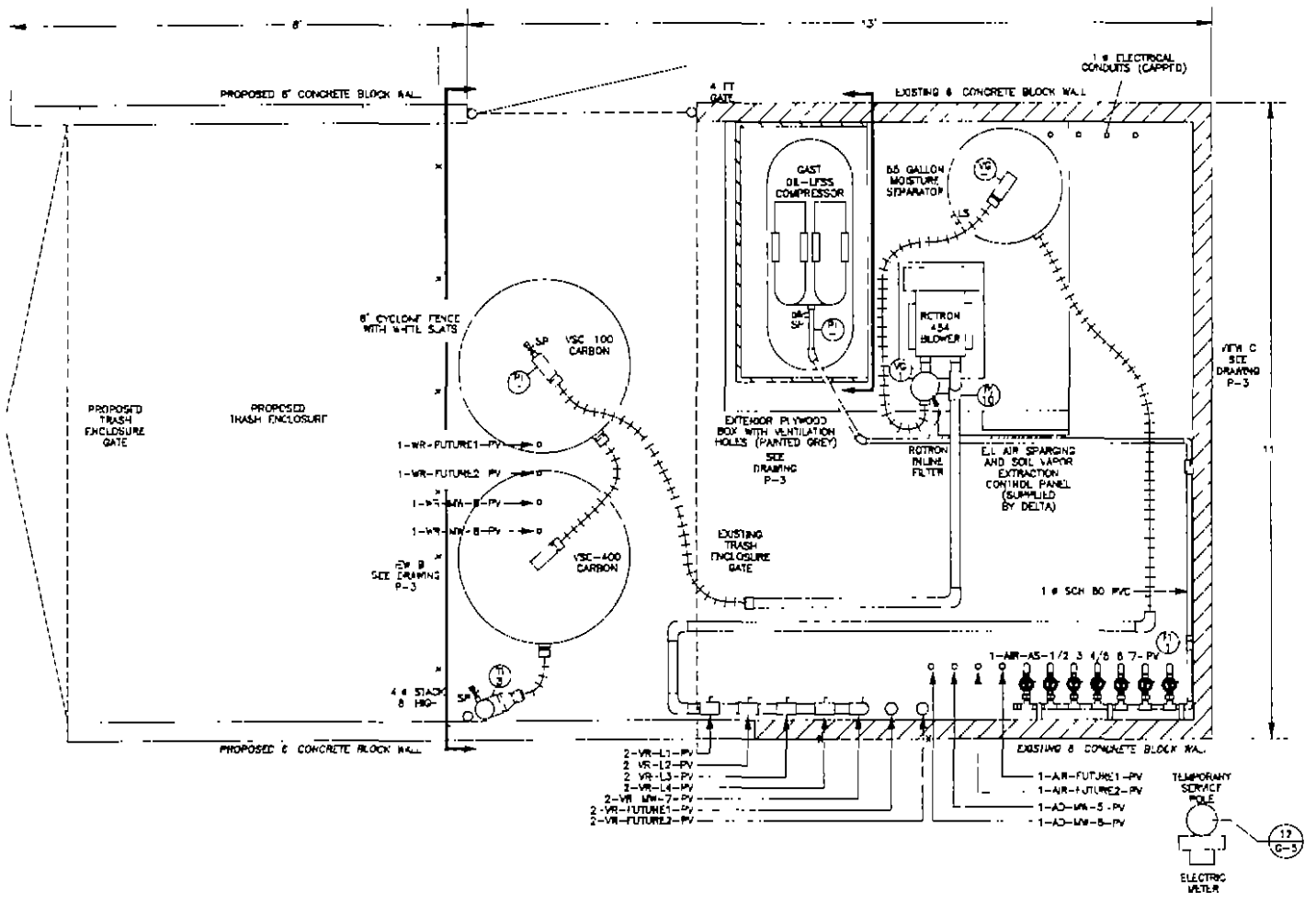
DRAWING P-1

PROJECT NO.	DRAWN BY
20081-007	ML 8/29/96
FILE NO.	PREPARED BY
20818C79	PEK

NOT TO SCALE

EXXON

Delta Environmental Consultants, Inc.



NOTES

1) DIMENSIONS OF EXTERIOR PLYWOOD BOX TO BE DETERMINED IN THE FIELD BASED UPON SIZE OF COMPRESSOR UNIT THE WEATHER ENCLOSURE IS TO CONSTRUCTED OF EXTERIOR PLYWOOD ON 3 SIDES AND THE LID, ON ROLLERS, WITH VENTILATION HOLES ON ALL 3 SIDES AND THE LID

REVISION NO	REVISION	BY	DATE

EQUIPMENT LAYOUT AND PIPING PLAN
AIR SPARGING AND SOIL VAPOR EXTRACTION SYSTEM
EXXON STATION NO 7-3535
8408 AURORA AVENUE NORTH
SEATTLE, WA.

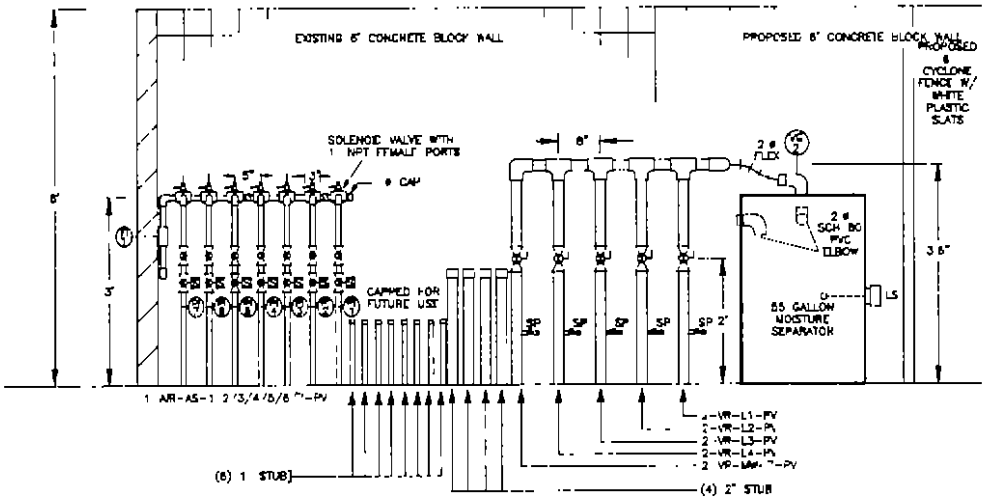
DRAWING P-2

PROJECT NO	DRAWN BY
M081 807	ML 8/28/98
FILE NO	PREPARED BY
M08180 H	RDK

0 2 FT
SCALE

EXXON

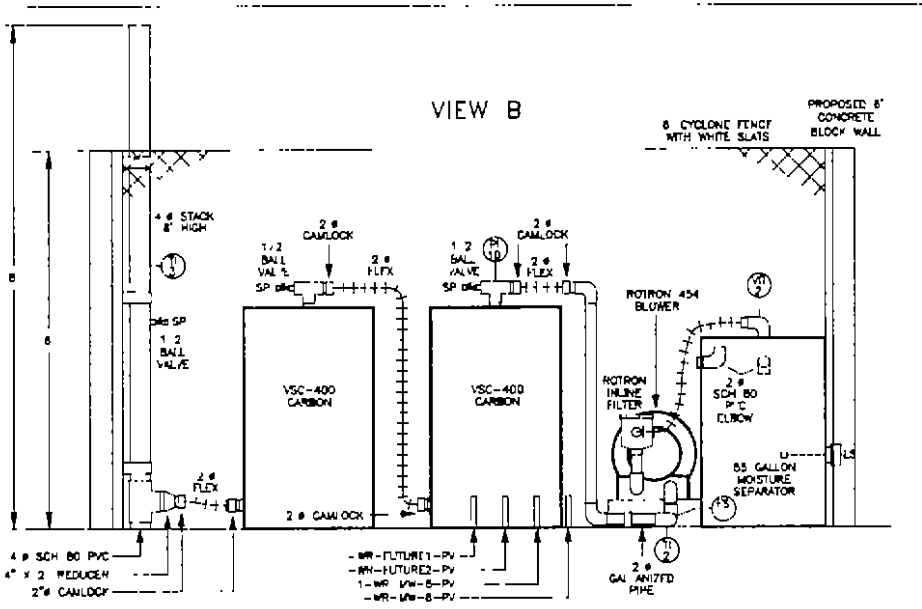
Delta Environmental Consultants, Inc.

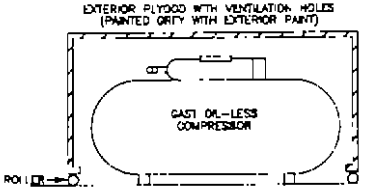


VIEW A

NOTES:

1) DIMENSIONS OF EXTERIOR PLYWOOD BOX TO BE DETERMINED IN THE FIELD BASED UPON SIZE OF COMPRESSOR UNIT. THE WEATHER ENCLOSURE IS TO CONSTRUCTED OF EXTERIOR PLYWOOD ON 3 SIDES AND THE LID ON ROLLERS, WITH VENTILATION HOLES ON ALL 3 SIDES AND THE LID





VIEW C SEE NOTE 1

REVISION NO.	REVISION	BY	DATE

PIPING AND EQUIPMENT VIEWS
AIR SPARGING AND SOIL VAPOR EXTRACTION SYSTEM
EXXON STATION NO 7-3535
8408 AURORA AVENUE NORTH
SEATTLE, WA

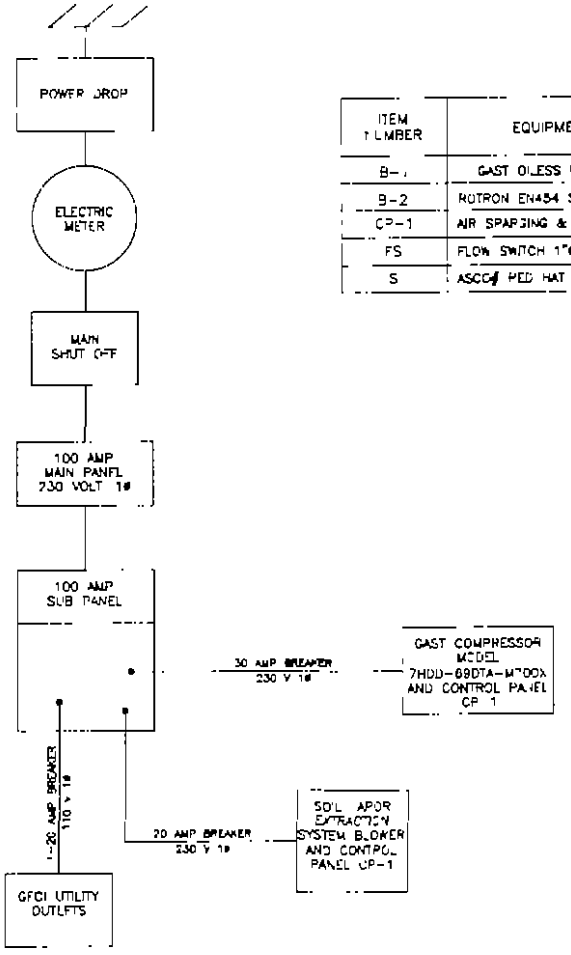
DRAWING P-3

PROJECT NO.	DRAWN BY
4091 807	ML 9 30/98
FILE NO.	PREPARED BY
M091807J	PEY

0 2 FT
SCALE

EXXON

Delta Environmental Consultants, Inc.



EQUIPMENT SCHEDULE

ITEM NUMBER	EQUIPMENT DESCRIPTION	LOAD OR H P	VOLTS	PHASE	SUPPLIER
B-1	GAST OILESS PISTON AIR COMPRESSOR MODEL NO 7HDD-69DTA-M100X	2X 1 5 hp	230	1	EXXON
B-2	ROTRON EN454 SOIL VAPOR EXTRACTION BLOWER	1 5 hp 20 AMP	230	1	EXXON
CP-1	AIR SPARGING & SOIL VAPOR EXTRACTION CONTROL PANEL (E1)	FRACT	230		EXXON
FS	FLOW SWITCH 1"ø FLOWTECT W C. ANDERSON V4	5 AMP	230	1	CONSULTANT
S	ASCO 4 PED HAT SOLENOID VALVES (")	0 24 AMP	24 VAC	-	CONSULTANT

REVISION NO.	REVISION	BY	DATE

EQUIPMENT SCHEDULE AND ELECTRICAL LINE DIAGRAM
AIR SPARGING AND SOIL VAPOR EXTRACTION SYSTEM
EXXON STATION NO 7-3535
8408 AURORA AVENUE NORTH
SEATTLE, WA

DRAWING E-1

PROJECT NO	DRAWN BY	NOT TO SCALE
M091-807	ML 9 JO/98	
FILE NO M091807K	PREPARED BY PDY	

EXXON

Delta Environmental Consultants, Inc.

ATTACHMENT B

Summary of Field and Laboratory Procedures

FIELD PROCEDURES

Soil Sampling

Discrete soil samples were collected from each boring at five-foot intervals to characterize site soils with respect to petroleum hydrocarbon impacts All samples were obtained by driving a split spoon sampler 18 inches ahead of the auger into undisturbed soils with a 140 pound hammer. The split spoon was removed from the boring and the soil sample retrieved Soil samples were then divided between laboratory prepared glass jars and plastic bags The glass jars were labeled, and immediately placed in cold storage until they could be submitted to the laboratory for analysis

The soil samples collected in plastic bags were screened using a photoionization detector (PID) The PID utilized was an organic vapor meter by Thermo, Inc , Model 580 B equipped with a 10 2 eV ultraviolet lamp and calibrated with an isobutylene standard for direct reading of benzene concentrations in parts per million by volume (ppmv) The operating range of the detector is from 0 to 2,000 ppmv with a minimum detection limit of 0 1 ppmv Detected concentrations are considered semi-quantitative data as PID's are sensitive to a wide range of chemicals and do not provide compound specific measurements or identification Soil samples in plastic bags were sealed and allowed to reach ambient air temperature The PID probe was inserted into an opening of the plastic bag and the soil within the bag was agitated during the reading process to aid in mobilization of volatile organic vapors The reading measured with the PID was recorded, and is documented on boring logs Samples yielding the highest PID measurements were submitted for laboratory analysis

Air Sampling

Air samples were collected in Tedlar bags from sampling ports located in the influent and effluent piping connected to each carbon drum Air samples were obtained by connecting Tygon tubing to in-line sampling ports and allowing the Tedlar bags to fill under positive pressure The bags were then labeled and immediately placed in cold storage until they could be submitted to the laboratory for analysis.

LABORATORY PROCEDURES

General Sample Handling Procedures

Proper handling is essential to ensure the integrity of the sample All samples were labeled with a unique sample number and placed in a 4°C plastic cooler immediately following collection Chain-of-custody information was recorded, and samples were then delivered to a laboratory and analyzed within the recommended holding time using standard analytical methods

Sample Identification and Chain-of-Custody Procedures

Sample identification and chain-of-custody procedures ensure sample integrity and document sample possession from the time of collection to the time of arrival at the laboratory. Each sample was collected by Delta and labeled and identified with the project number, the date and time of sample collection, the name of the sampler and a sample number unique to the sample. This information, in addition to any field measurements noted, names of on-site personnel, and any other pertinent field observations were recorded by Delta in field notes.

Upon arrival at the laboratory, the sample control personnel at the laboratory verified sample integrity and confirmed that the sample was collected in the proper container, packaged correctly, and that there was adequate volume of sample for the required analyses. The laboratory assigned a unique log number for identification of each sample throughout analysis and reporting. The log number was recorded on the chain-of-custody form and in the legally required log book maintained in the laboratory. The sample description, date received, client name, and any other relevant information was recorded.

Analytical Quality Assurance

In addition to routine calibration of the analytical instruments with standards and blanks, the analyst is required to run duplicates and spikes on 10 percent of the analyses to ensure precision and accuracy. Accuracy is also verified through the following:

1. U S. Environmental Protection Agency (EPA) and Washington Department of Ecology (Ecology) certification programs.
2. Participation in an inter-laboratory or "round-robin" quality assurance program.
3. Verification of results with an alternative method. For example, calcium may be determined by atomic absorption, ion chromatography, or titrimetric methods. Volatile organics may be determined through either purge and trap or liquid extraction methods.

Analytical Methods

The analyses performed for this evaluation were chosen based upon standard guidelines issued by Ecology Samples collected during this investigation were analyzed by the following methods

1. Gasoline-range total petroleum hydrocarbons by Ecology method WTPH-G.
2. Benzene, toluene, ethylbenzene, and xylenes (BTEX) by EPA method 8020A.

All samples were analyzed by North Creek Analytical, Inc. in Bothell, Washington

ATTACHMENT C

Boring Logs

Delta Environmental Consultants, Inc

Sheet AS-02	Purpose Air Injection Well
Consulting Firm Delta Environmental	Logged By Ron Bruce
Contractor Cascade Drilling Inc	Drilling Method 4.25" ID Hollow Stem Auger, CME-75
Location 8408 Aurora Ave N Seattle WA	Date(s) 05/01/96 - 05/01/96
Project Name Former Exxon R/S No 7-3535	Elevation 0.00'
Project Number M991-807	Datum
Permit No	Blank Casing Type PVC dia 2.00in fm 0.0 to 22.50
Permit Date 05/01/96	Screens Type SS size 0.020in dia 2.00in fm 22.50' to 24.50
Remarks	Annular Fill Type Fill fm 0.50' to 2.50' Type Bentonite Pellets fm 2.50 to 21.00 Type Sand Filter fm 21.00 to 25.00'

Depth (ft)	Recovery	Sample No	Blow Count	Graphic Log	Material Description	Well Construction MP EL 0.00 ft	PID
0					CEMENT &		
5		AS-2-5	30 35 45		SILTY SAND WITH GRAVEL (SM) grey, wet, very dense		1.4 ppm
10		AS-2-10	61 R/6"		Bentonites saturated		1.9 ppm
15		AS-2-15	99 R/6"				5.0 ppm
20		AS-2-20	99 R/6"		POORLY GRADED SAND WITH SILT (SP-SM), grey, saturated, very dense		50 ppm
25		AS-2-25	99 R/6"		SILTY SAND WITH GRAVEL (SM), grey, saturated, very dense		1.2 ppm

Delta Environmental Consultants, Inc

Site Id AS-03	Purpose Air Injection Well
Consulting Firm Delta Environmental	Logged By Ron Bruce
Contractor Cascade Drilling, Inc	Drilling Method 4.25" ID Hollow Stem Auger, CME-75
Location 8408 Aurora Ave N Seattle WA	Date(s) 05/01/96 - 05/01/96
Project Name Former Exxon R/S No 7-0535	Elevation 0.00
Project Number M091-807	Datum
Permit No	Blank Casing Type PVC dia 2.00in fm 0.0' to 22.50'
Permit Date 05/01/96	Screens Type SS size 0.020in dia 2.00in fm 22.50' to 25.00'
Remarks	Annular Fill Type Fill fm 0.50' to 1.50' Type Bentonite Pellets fm 1.50 to 21.00 Type Sand Filter fm 21.00 to 25.50'

Depth (ft)	Recovery	Sample No.	Blow Count	Graphic Log	Material Description	Well Construction MP EL 0.00	PID
0					CEMENT 6"		
5		AS-3-5	15 17 19		SILTY GRAVEL WITH SAND (GM), tan, wet to saturated, dense		120 ppm
10		AS-3-10	20 24 27		POORLY GRADED GRAVEL WITH SAND (GP), grey, saturated, dense		120 ppm
15		AS-3-15	99 R/3"		SILTY SAND WITH GRAVEL (SM), grey, saturated, very dense		17 ppm
20		AS-3-20	99 R/3"				75 ppm
25		AS-3-25	99 R/5"				3 ppm

Delta Environmental Consultants, Inc

Site Id AS-04	Purpose Air Injection Well
Consultnt Firm Delta Environmental	Logged By Ron Bruce
Contractor Cascade Drilling Inc	Drilling Method 4.25" ID Hollow stem Auger, CME-75
Location 8409 Aurora Ave N Seattle, WA	Date(s) 04/22/96 - 04/22/96
Project Name Former Exxon S/S No 7-3535	Elevation 0.00'
Project Number 7091-807	Datum
Permit No	Blank Casing type PVC dia 2.00in fm 0.0 to 22.50'
Permit Date 04/22/96	Screens type SS size 0.020inch 2.00in fm 22.50' to 24.50'
Remarks	Annular Fill type Fill fm 0.00 to 0.50' type Bentonite Pellets fm 0.50 to 21.00 type Sand Filter fm 21.00 to 25.50'

Depth (ft)	Recovery	Sample No	Blow Count	Graphic Log		Material Description
					0	CEMENT 6"
		AS-4-5	15 33 50/5		5	SILT WITH SAND (ML) brown, wet, dense, some organics
10		AS-4-10	60 P		10	SILTY SAND WITH GRAVEL (SM), grey, wet to saturated, very dense
		AS-4-10	80 P		15	
20		AS-4-20	80 P		20	POORLY GRADED SAND WITH SILT (SP-SM) grey, saturated, very dense
		AS-4-25	99 P		25	SILTY SAND WITH GRAVEL (SM), grey, saturated, very dense

Well Construction
MP EL 0.00
ft/D

Delta Environmental Consultants, Inc

Site Id AS-05	Purpose Air Injection Well
Consulting Firm Delta Environmental	Logged By William Connor
Contractor Cascade Drilling Inc	Drilling Method 4.25" ID Hollow Stem Auger CME-75
Location 8408 Aurora Ave N Seattle WA	Date(s) 04/22/96 - 04/22/96
Project Name Former Exxon R/S No 7-3505	Elevation 0.00'
Project Number M091-807	Datum
Permit No	Blank Casing Type PVC dia 2.00 in fm 0.5' to 22.50
Permit Date 04/22/96	Screens Type S S size 0.020 dia 2.00 in fm 22.50' to 24.50
Remarks	Annular Fill Type FI fm 0.50' to 2.50 Type Bentonite Pellets fm 2.50' to 21.00 Type Sand Filter fm 21.00' to 25.00'

Depth (ft)	Recovery	Sample No	Blow Count	Graphic Log	Material Description	Well Construction MP EL 0.00	PID
0					CEMENT 6"		
5		AS-5-5	7		SILTY SAND WITH GRAVEL (SM), grey, wet, medium dense		0 ppm
10		AS-5-10	50 .65 R/6"				21 ppm
15		AS-5-15	75 R/6"		Becomes brown-grey		0 ppm
20		AS-5-20	99 R/6"				2 ppm
25		AS-5-25	80 R/6"				0 ppm

Delta Environmental Consultants, Inc

Site Id AS-06	Purpose Air Injection Well
Consulting Firm Delta Environmental	Logged By Ron Bruce
Contractor Cascade Drilling Inc	Drilling Method 4.25" ID Hollow Stem Auger, CME-75
Location 5408 Aurora Ave N Seattle, WA	Date(s) 04/22/96 - 04/22/96
Project Name Former Exxon R/S No 7-3535	Elevation 0.00'
Project Number 4091-007	Datum Mean Sea Level
Permit No	Blank Casing Type PVC dia 2.00in fm 0.2' to 22.50
Permit Date 04/22/96	Screens Type SS size 0.020in dia 2.00in fm 22.50 to 24.50'
Remarks	Annular Fill Type Fill fm 0.50' to 2.50 Type Bentonite Pellets fm 2.50 to 21.00 Type Sand Filter fm 21.00 to 25.00

Depth (ft)	Recovery	Sample No	Blow Count	Graphic Log	Material Description	Well Construction MP EL 0.00	PID
0					CEMENT 6"		
5	60	AS-6-5			SILTY SAND WITH GRAVEL (SM), grey, wet, very dense		2 ppm
10	80	AS-6-10			Becomes saturated		0 ppm
15	99	AS-6-15					8 ppm
20	85	AS-6-20					20 ppm
25	99	AS-6-25					0 ppm

Delta Environmental Consultants, Inc

Site Id AS-07	Purpose Air Injection Well
Consulting Firm Delta Environmental	Logged By Ron Bruce
Contractor Cascade Drilling Inc	Drilling Method 4.25" ID Hollow Stem Auger, CME-75
Location 8408 Aurora Ave N Seattle WA	Date(s) 04/22/96 - 04/22/96
Project Name Former Exxon R/S No 7-3535	Elevation 0.00
Project Number M09*-807	Datum Mean Sea Level
Permit No	Blank Casing Type PVC dia 2.00in fm 0.2 to 22.50
Permit Date 04/22/96	Screens Type SS size 0.020inch dia 2.00in fm 22.50' to 24.50'
Remarks	Annular Fill Type Fill fm 0.50' to 2.50 Type Bentonite Pellets fm 2.50' to 21.00 Type Sand Filter fm 21.00 to 25.00'

Depth (ft)	Recovery	Sample No	Blow Count	Graphic Log	Material Description	Well Construction MP EL 0.00	PID
0					CEMENT 6"		
5		AS-7-5	6		SILTY SAND WITH GRAVEL (SM), brown, wet, very dense		0 ppm
10		AS-7-10	99	R			ppm
15		AS-7-15	60		Becomes grey and saturated		0 ppm
20		AS-7-20	70	R			ppm
25		AS-7-25	70				0 ppm

ATTACHMENT D

Laboratory Reports

NORTH CREEK ANALYTICAL
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PORTLAND ■ (503) 643-9200 ■ FAX 644-2202

Delta Environmental
1756 114th Avenue SE, #110
Bellevue, WA 98004
Attention Jim Coppernoll

Project Name EXXON #7-3535, #19525906
Client Project #M091-807

NCA Project # B604426

Received Apr 24, 1996
Reported Apr 29, 1996

PROJECT SUMMARY PAGE

Laboratory Sample Number	Sample Description	Sample Matrix	Date Sampled
B604426-01	91-807-AS 7-5	Soil	4/22/96
B604426-05	91-807-AS-5-10	Soil	4/22/96
B604426-09	91-807-AS 6-5	Soil	4/22/96
B604426-12	91-807-AS-6-20	Soil	4/22/96
B604426-15	91-807-AS-4-10	Soil	4/22/96

NORTH CREEK ANALYTICAL Inc.

Laura Dutton

Laura Dutton
Project Manager

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Delta Environmental
1756 114th Avenue SE, #110
Bellevue, WA 98004
Attention Jim Coppernoll

Client Project ID EXXON #7-3535, #19525906
Sample Matrix Soil
First Sample #. B604426-01

Received Apr 24, 1996
Reported Apr 29, 1996

TOTAL SOLIDS & MOISTURE CONTENT REPORT

Sample Number	Sample Description	Total Solids %	Moisture Content %
B604426-01	91-807-AS-7-5	87	13
B604426-05	91-807-AS-5-10	90	10
B604426-09	91-807-AS-6-5	89	11
B604426-12	91-807-AS-6-20	93	7 0
B604426-15	91-807-AS-4-10	91	9 0

The enclosed analytical results for soils, sediments and sludges have been converted to a DRY WEIGHT reporting basis
To attain the wet weight "as received" equivalent, multiply the dry weight result by the decimal fraction of percent Total Solids

NORTH CREEK ANALYTICAL Inc.

Laura Dutton
Project Manager

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

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PORTLAND ■ (503) 643-9200 ■ FAX 644-2202

Delta Environmental	Client Project ID	EXXON #7-3535, #19525906	Sampled	Apr 22, 1996
1756 114th Avenue SE, #110	Sample Matrix	Soil	Received	Apr 24, 1996
Bellevue, WA 98004	Analysis Method	WTPH-G	Analyzed	Apr 26, 1996
Attention Jim Coppernoll	First Sample #	B604426-01	Reported	Apr 29, 1996

TOTAL PETROLEUM HYDROCARBONS-GASOLINE RANGE

Sample Number	Sample Description	Sample Result mg/kg (ppm)	Surrogate Recovery %
B604426-01	91-807 AS-7-5	N D	86
B604426-05	91-807-AS 5-10	5 5	83
B604426-09	91-807-AS-6-5	1 8	85
B604426-12	91-807-AS 6 20	2 9	77
B604426-15	91-807-AS-4-10	N D	83
BLK042696	Method Blank	N D	91

Reporting Limits	1 0

4-Bromofluorobenzene surrogate recovery control limits are 50 - 150 %
Volatile Total Petroleum Hydrocarbons are quantitated as Gasoline Range Organics (toluene - dodecane)
Analytes reported as N D were not detected above the stated Reporting Limit The results reported above are on a dry weight basis

NORTH CREEK ANALYTICAL Inc.

Laura Dutton
Project Manager

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

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Delta Environmental
1756 114th Avenue SE, #110
Bellevue, WA 98004
Attention Jim Coppernoll

Client Project ID EXXON #7-3535, #19525906
Sample Matrix Soil
Analysis Method WTPH-G
Units mg/kg (ppm)

Analyzed Apr 26, 1996
Reported Apr 29, 1996

HYDROCARBON QUALITY CONTROL DATA REPORT

ACCURACY ASSESSMENT
Laboratory Control Sample

Gasoline

Spike Conc. Added:	100
Spike Result.	100
% Recovery:	100
Upper Control Limit %:	115
Lower Control Limit %:	33

PRECISION ASSESSMENT
Sample Duplicate

Gasoline Range Hydrocarbons

Sample Number:	B604468-04
Original Result.	N D
Duplicate Result:	N D
Relative % Difference:	Relative Percent Difference values are not reported at sample concentration levels less than 10 times the Detection Limit
Maximum RPD:	67

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Laura Dutton
Project Manager

% Recovery = $\frac{\text{Spike Result}}{\text{Spike Concentration Added}} \times 100$

Relative % Difference = $\frac{\text{Original Result - Duplicate Result}}{(\text{Original Result + Duplicate Result}) / 2} \times 100$

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PORTLAND ■ (503) 643-9200 ■ FAX 644-2202

Delta Environmental	Client Project ID	EXXON #7-3535, #19525906	Sampled	Apr 22, 1996
1756 114th Avenue SE, #110	Sample Matrix	Soil	Received	Apr 24, 1996
Bellevue, WA 98004	Analysis Method	EPA 8020	Analyzed	Apr 26, 1996
Attention Jim Coppernoll	First Sample #	B604426-01	Reported	Apr 29, 1996

BTEX DISTINCTION

Sample Number	Sample Description	Benzene mg/kg (ppm)	Toluene mg/kg (ppm)	Ethyl Benzene mg/kg (ppm)	Xylenes mg/kg (ppm)	Surrogate Recovery %
B604426-01	91-807-AS-7-5	N D	N D	N D	N D	92
B604426-05	91-807-AS-5-10	N D	N D	N D	N D	85
B604426-09	91-807-AS-6-5	N D	N D	N D	N D	91
B604426-12	91-807-AS-6-20	N D	N D	N D	N D	86
B604426-15	91-807-AS-4-10	N D	N D	N D	N D	90
BLK042696	Method Blank	N D	N D	N D	N D	90

Reporting Limits:	0 050	0 050	0 050	0 10	

4-Bromofluorobenzene surrogate recovery control limits are 34 - 166 %
Analytes reported as N D were not detected above the stated Reporting Limit
The results reported above are on a dry weight basis

NORTH CREEK ANALYTICAL Inc.

Laura Dutton

Laura Dutton
Project Manager

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Environmental Laboratory Services

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Delta Environmental
1756 114th Avenue SE, #110
Bellevue, WA 98004
Attention Jim Coppernoll

Client Project ID EXXON #7-3535, #19525906
Sample Matrix Soil
Analysis Method EPA 8020
Units mg/kg (ppm)
QC Sample # B604461-01

Analyzed Apr 25, 1996
Reported Apr 29, 1996

MATRIX SPIKE QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl Benzene	Xylenes
Sample Result.	N D	N D	N D	N D
Spike Conc. Added:	0 58	0 58	0 58	1 73
Spike Result:	0 53	0 51	0 51	1 55
Spike % Recovery:	91%	88%	88%	90%
Spike Dup. Result	0 53	0 50	0 51	1 53
Spike Duplicate % Recovery:	91%	86%	88%	88%
Upper Control Limit %:	111	118	120	128
Lower Control Limit %.	59	55	61	55
Relative % Difference·	0 0%	2 0%	0 0%	1 3%
Maximum RPD:	17	16	17	17

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Project Manager

% Recovery·	Spike Result - Sample Result / Spike Conc Added	x 100
Relative % Difference	Sp·ke Result - Spike Dup Result / (Spike Result + Spike Dup Result) / 2	x 100

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EXXON COMPANY U.S.A. CHAIN OF CUSTODY REPORT

B604426 p1

EXXON INFORMATION

EXXON RAS # 7-3535
Site Address 8408 Aurora Ave North
City, State, ZIP Seattle Wa
EXXON Engineer Roger Hicks
Laboratory WR#

CONSULTANT INFORMATION

Name Delta Environmental Cons. Consultant WR # 19525906
Address 1756 - 114th AVE SE #110
Bellevue Wa 98004
Phone 450-7726 Fax -8837
Project Manager Jim Coppernoll Consultant Project # 191807
Sample Collection by RB/BC Airbill #

Turnaround Times

All TPH, Volatiles & BTEX
10 Calendar Days
Pest, TCLP, Metals, PP, Etc
14 Calendar Days
RUSH Analyses (HOURS)
24 48 72 96
Air Analysis
72 Hours

O Oregon ⊗ Washington O Montana Hydrocarbon Methods

SAMPLE IDENTIFICATION	SAMPLING DATE / TIME	MATRIX (W,S O)	# OF CONTAINERS	TPH HCID	TPH-Gas	BTEX (EPA 8020 Mod.)	TPH-Gas - BTEX	TPH Diesel	TPH-Diesel Extended	TPH-181	Halogen Volatiles (EPA 8010)	Aromatic Volatiles (EPA 8020)	Pesticides PCBs or PCBs Only	GCMS Volatiles (EPA 8240 8260)	GCMS Semi Vols (EPA 8270)	PAHs by HPLC (EPA 8310)	Lead	Total or Dissolved	TCLP Metals (8)	NCA SAMPLE NUMBER
191807 AS-7-5	4/22/96 850	S	1				X													B604426-01
2 AS-7-15	900	S	1																	-02
3 AS-7-25	908	S	1																	-03
4 AS-5-5	1017	S	1																	-04
5 AS-5-10	1023	S	1				X													-05
6 AS-5-15	1028	S	1																	-06
7 AS-5-20	1033	S	1																	-07
8 AS-5-25	1037	S	1																	-08
9 AS-6-5	1120	S	1				X													-09
10 AS-6-10	1133	S	1																	-10

Relinquished by	Firm	Date & Time	Received by	Firm	Date & Time
1 W Reference	Delta	4/24/96 130	Shara Hurley	NCA	4-24-96 16.30
2					
3					

Comments

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EXXON COMPANY U.S.A. CHAIN OF CUSTODY REPORT

B604426 p2

EXXON INFORMATION

EXXON RAS # 7-3535
Site Address 8408 Aurora Ave North
City, State, ZIP Seattle WA
EXXON Engineer Roger Hicks
Laboratory WR#

CONSULTANT INFORMATION

Name Delta Environmental Consultant WR # 19529906
Address 1756-114th Ave SE #110
Bellevue Wa 98004
Phone 450-7726 Fax -8837
Project Manager Jim Coppernoll Consultant Project # m091-807
Sample Collection by BB / BC Airbill #

Turnaround Times

All TPH, ~~Volatiles & BTEX~~
10 Calendar Days
~~Pest, TCLP, Metals, PP, Etc~~
14 Calendar Days
RUSH Analyses (HOURS)
24 48 72 96
Air Analysis
72 Hours

O Oregon ● Washington O Montana Hydrocarbon Methods

SAMPLE IDENTIFICATION	SAMPLING DATE / TIME	MATRIX (W,S O)	# OF CONTAINERS	TPH-HCID	TPH-Gas	BTEX (EPA 8020 Mod.)	TPH Gas + BTEX	TPH-Diesel	TPH-Diesel Extended	TPH-418.1	Halogen. Volatiles (EPA 8010)	Aromatic Volatiles (EPA 8020)	Pesticides PCBs or PCBs Only	GCMS Volatiles (EPA 8240/8260)	GCMS SemiVols. (EPA 8270)	PAHs by HPLC (EPA 8310)	Lead. Total or Dissolved	TCLP Metals (8)	NCA SAMPLE NUMBER
1 91807 AS-6-15	4/22/96 1137	S	1																B604426-11
2 AS-6-20	1141	S	1				X												-12
3 AS-6-25	1150	S	1																-13
4 AS-4-5	115	S	1																-14
5 AS-4-10	120	S	1				X												-15
6 AS-4-15	130	S	1																-16
7 AS-4-20	135	S	1																-17
8 AS-4-25	140	S	1																-18
9																			
10																			

	Relinquished by	Firm	Date & Time	Received by	Firm	Date & Time
1	W. Ron Brown	Delta	4/24/96 130	Lisa Hurley	NCA	4-24-96 16:30
2						
3						

Comments

Rev 1 0 1/95

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Environmental Laboratory Services

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PORTLAND ■ (503) 643-9200 ■ FAX 644-2202

Delta Environmental
1756 114th Avenue SE, #110
Bellevue, WA 98004
Attention Jim Coppernoll

Project Name EXXON #7-3535, #19525906
Client Project #M091-807

NCA Project # B605065

Received May 3, 1996
Reported May 7, 1996

PROJECT SUMMARY PAGE

Laboratory Sample Number	Sample Description	Sample Matrix	Date Sampled
B605065-02	AS-2-10	Soil	5/1/96
B605065-06	AS-3-5	Soil	5/1/96

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety

NORTH CREEK ANALYTICAL Inc.

Laura Dutton

Laura Dutton
Project Manager

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

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PORTLAND ■ (503) 643 9200 ■ FAX 644-2202

Delta Environmental
1756 114th Avenue SE, #110
Bellevue, WA 98004
Attention Jim Coppernoll

Client Project ID EXXON #7-3535, #19525906
Sample Matrix Soil
First Sample # B605065-02

Received May 3, 1996
Reported May 7, 1996

TOTAL SOLIDS & MOISTURE CONTENT REPORT

Sample Number	Sample Description	Total Solids %	Moisture Content %
B605065-02	AS-2-10	91	9 0
B605065-06	AS-3-5	92	8 0

The enclosed analytical results for soils, sediments and sludges have been converted to a DRY WEIGHT reporting basis
To attain the wet weight "as received" equivalent, multiply the dry weight result by the decimal fraction of percent Total Solids

NORTH CREEK ANALYTICAL Inc.

Laura Dutton
Project Manager

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

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Delta Environmental	Client Project ID	EXXON #7-3535, #19525906	Sampled	May 2, 1996
1756 114th Avenue SE, #110	Sample Matrix	Soil	Received	May 3, 1996
Bellevue, WA 98004	Analysis Method	WTPH-G	Analyzed	May 6-7, 1996
Attention Jim Coppernoll	First Sample #	B605065-02	Reported	May 7, 1996

TOTAL PETROLEUM HYDROCARBONS-GASOLINE RANGE

Sample Number	Sample Description	Sample Result mg/kg (ppm)	Surrogate Recovery %
B605065-02	AS-2-10	930	S-2
B605065-06	AS-3-5	620	137
BLK050696	Method Blank	N D	110

Reporting Limits	10

4-Bromofluorobenzene surrogate recovery control limits are 50 - 150 %
Volatile Total Petroleum Hydrocarbons are quantitated as Gasoline Range Organics (toluene - dodecane)
Analytes reported as N D were not detected above the stated Reporting Limit The results reported above are on a dry weight basis

NORTH CREEK ANALYTICAL In

Laura Dutton

Laura Dutton
Project Manager

Please Note
S-2 = The Surrogate Recovery for this sample cannot be accurately quantified due to interference from coeluting organic compounds present in the sample

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Delta Environmental
1756 114th Avenue SE, #110
Bellevue, WA 98004
Attention Jim Coppernoll

Client Project ID EXXON #7-3535, #19525906
Sample Matrix Soil
Analysis Method WTPH-G
Units mg/kg (ppm)

Analyzed May 6, 1996
Reported May 7, 1996

HYDROCARBON QUALITY CONTROL DATA REPORT

ACCURACY ASSESSMENT
Laboratory Control Sample

Gasoline

Spike Conc. Added: 25 0

Spike Result: 26 7

% Recovery: 107

Upper Control Limit %: 115

Lower Control Limit %: 33

PRECISION ASSESSMENT
Sample Duplicate

Gasoline Range *Hydrocarbons*

Sample Number: B605051-01

Original Result: N D

Duplicate Result: N D

Relative % Difference Relative Percent Difference values are not *reported at sample concentration levels* less than 10 times the Detection Limit.

Maximum RPD: 67

NORTH CREEK ANALYTICAL In

Laura Dutton

Laura Dutton
Project Manager

$$\% \text{ Recovery} = \frac{\text{Spike Result}}{\text{Spike Concentration Added}} \times 100$$

$$\text{Relative \% Difference} = \frac{\text{Original Result - Duplicate Result}}{(\text{Original Result + Duplicate Result}) / 2} \times 100$$

NORTH CREEK ANALYTICAL
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Delta Environmental	Client Project ID	EXXON #7-3535, #19525906	Sampled	May 1, 1996
1756 114th Avenue SE, #110	Sample Matrix	Soil	Received	May 3, 1996
Bellevue, WA 98004	Analysis Method	EPA 8020	Analyzed	May 6-7, 1996
Attention Jim Coppernoll	First Sample #	B605065-02	Reported	May 7, 1996

BTEX DISTINCTION

Sample Number	Sample Description	Benzene mg/kg (ppm)	Toluene mg/kg (ppm)	Ethyl Benzene mg/kg (ppm)	Xylenes mg/kg (ppm)	Surrogate Recovery %
B605065-02	AS-2-10	4 2	17	12	39	133
B605065-06	AS-3-5	0 13	0 28	1 3	4 3	108
BLK050696	Method Blank	N D	N D	N D	N D	91

Reporting Limits:	*0 050*	*0.050*	*0.050*	*0.10*	

4-Bromofluorobenzene surrogate recovery control limits are 34 - 166 %
Analytes reported as N D were not detected above the stated Reporting Limit
The results reported above are on a dry weight basis

NORTH CREEK ANALYTICAL Inc.

Laura Dutton
Project Manager

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

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SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 643-9200 ■ FAX 644-2202

Delta Environmental
1756 114th Avenue SE, #110
Bellevue, WA 98004
Attention Jim Coppernoll

Client Project ID EXXON #7-3535, #19525906
Sample Matrix Soil
Analysis Method EPA 8020
Units mg/kg (ppm)
QC Sample # B605051-01

Analyzed May 6, 1996
Reported May 7, 1996

MATRIX SPIKE QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl Benzene	Xylenes
Sample Result:	N D	N D	N D	N D
Spike Conc. Added.	0 64	0 64	0 64	1 93
Spike Result:	0 62	0 52	0 54	1 73
Spike % Recovery:	97%	81%	84%	90%
Spike Dup. Result:	0 64	0 53	0 56	1 74
Spike Duplicate % Recovery	100%	83%	88%	90%
Upper Control Limit %:	111	118	120	128
Lower Control Limit %:	59	55	61	55
Relative % Difference.	3 2%	1 9%	3 6%	<1 0%
Maximum RPD:	17	16	17	17

NORTH CREEK ANALYTICAL In

Laura Dutton
Project Manager

% Recovery	$\frac{\text{Spike Result - Sample Result}}{\text{Spike Conc Added}}$	x 100
Relative % Difference	$\frac{\text{Spike Result - Spike Dup Result}}{\text{(Spike Result + Spike Dup Result) / 2}}$	x 100

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EXXON COMPANY U.S.A. CHAIN OF CUSTODY REPORT B605065

EXXON INFORMATION

EXXON RAS # 7-3535
Site Address 8408 Aurora Ave N
City, State, ZIP Seattle Wa
EXXON Engineer Roger Hicks
Laboratory WR#

CONSULTANT INFORMATION

Name Delta Environmental Consultant WR # 19525906
Address 1756 - 114th AVE SE #110
Bellevue Wa 98004
Phone 451-7726 Fax -9837
Project Manager Jim Coppernoll Consultant Project # M891-807
Sample Collection by R Bruce Airbill #

Turnaround Times

All TPH, Volatiles & BTEX
[X] 10 Calendar Days
Pest, TCLP, Metals, PP, Etc
[ ] 14 Calendar Days
RUSH Analyses (HOURS)
[ ] 24 [ ] 48 [ ] 72 [ ] 96
Air Analysis
[ ] 72 Hours

O Oregon O Washington O Montana Hydrocarbon Methods

SAMPLE IDENTIFICATION	SAMPLING DATE / TIME	MATRIX (W,S,O)	# OF CONTAINERS	TPH HCID	TPH-Gas	BTEX (EPA 8020 Mod.)	TPH-Gas - BTEX	TPH-Diesel	TPH Diesel Extended	TPH-418.1	Halogen Volatiles (EPA 8010)	Aromatic Volatiles (EPA 8020)	Pesticides PCBs or PCBs Only	GC/MS Volatiles (EPA 8240/8260)	GC/MS Semi Vols (EPA 8270)	PAHs by HPLC (EPA 8310)	Lead Total or Dissolved	TCLP Metals (8)	NCA SAMPLE NUMBER
1 AS-2-5	5/1/96 1050	S	1																B605065 - 01
2 AS2-10	1055	S	1				X												-02
3 AS 2-15	1110	S	1																-03
4 AS 2-20	1115	S	1																-04
5 AS-2-25	1120	S	1																-05
6 AS-3-5	1215	S	1				X												-06
7 AS-3 10	1220	S	1																-07
8 AS3-15	1225	S	1																-08
9 AS3 20	215	S	1																-09
10 AS 325	230	S	1																-10

	Relinquished by	Firm	Date & Time	Received by	Firm	Date & Time
1	Ron Bruce	Delta	5/3/96 1:05pm	Mara G.	NCA	5-3-96 1:25pm
2						
3						

Comments

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NORTH CREEK ANALYTICAL
Environmental Laboratory Services

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Delta Environmental	Client Project ID	EXXON #7-3535, #19525906	Sampled	Oct 22, 1996
1756 114th Avenue SE, #110	Sample Descript	Air, CT-1 INFLUENT	Received	Oct 22, 1996
Bellevue, WA 98004	Analysis Method	EPA 8020 Modified	Analyzed	Oct 24, 1996
Attention Jim Coppernoll	Sample Number	B610451-01	Reported	Oct 25, 1996

AROMATIC VOLATILE ORGANICS in AIR

Analyte	Reporting Limits		Sample Results	
	mg/cubic meter	ppmv Air	mg/cubic meter	ppmv Air
Benzene	2 0	0 627	N D	N D
Ethyl Benzene	0 250	0 058	5 20	1 20
Toluene	0 250	0 066	1 15	0 31
Xylenes	0 250	0 058	6 20	1 43

The Reporting Limits shown are based on an injection volume of 25 mLs of sample

4-Bromofluorobenzene Surrogate Recovery, % 81 9
Surrogate Recovery Control Limits are 56 - 136 %
Analytes reported as N D were not detected above the stated Reporting Limit

NORTH CREEK ANALYTICAL Inc

Laura Dutton

Laura Dutton
Project Manager

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

BOTHELL ■ (206) 481-9200 ■ FAX 485-2992
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 643-9200 ■ FAX 644-2202

Delta Environmental	Client Project ID	EXXON #7-3535, #19525906	Sampled	Oct 22, 1996
1756 114th Avenue SE, #110	Sample Matrix	Air	Received	Oct 22, 1996
Bellevue, WA 98004	Analysis Method	TPH-G in Air	Analyzed	Oct 24, 1996
Attention Jim Coppernoll	First Sample #	B610451-01	Reported	Oct 25, 1996

TOTAL PETROLEUM HYDROCARBONS-GASOLINE RANGE

Sample Number	Sample Description	Sample Result mg/ cubic meter	Sample Result ppm-V *	Surrogate Recovery %
B610451-01	CT-1, INFLUENT	86 3	20	83 7
BLK102496	Method Blank	N D	N D	66 3

Reporting Limit:	4 0	0.94

*Estimated value assuming an average molecular weight of 102
4-Bromofluorobenzene surrogate recovery control limits are 50 - 150 %
Volatile Total Petroleum Hydrocarbons are quantitated as Gasoline Range Organics (toluene - dodecane)
Analytes reported as N D were not detected above the stated Reporting Limit.

NORTH CREEK ANALYTICAL Inc.

Laura Dutton
Project Manager

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

BOTHELL ■ (206) 481-9200 ■ FAX 485-2992
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 643-9200 ■ FAX 644-2202

Delta Environmental
1756 114th Avenue SE, #110
Bellevue, WA 98004
Attention Jim Coppernoll

Client Project ID	EXXON #7-3535, #19525906		
Sample Descript	Method Blank		
Analysis Method	EPA 8020 Modified	Analyzed	Oct 24, 1996
Sample Number	BLK102496	Reported	Oct 25, 1996

AROMATIC VOLATILE ORGANICS in AIR

Analyte	Reporting Limits		Sample Results	
	mg/cubic meter	ppmv Air	mg/cubic meter	ppmv Air
Benzene	0 10	0 031	N D	N D
Ethyl Benzene	0 10	0 023	N D	N D
Toluene	0 10	0 027	N D	N D
Xylenes	0 20	0 046	N D	N D

The Reporting Limits shown are based on an injection volume of 25 mLs of sample

4-Bromofluorobenzene Surrogate Recovery, % 68 1
Surrogate Recovery Control Limits are 56 - 136 %
Analytes reported as N D were not detected above the stated Reporting Limit

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PORTLAND ■ (503) 643 9200 ■ FAX 644-2202

Correspondence to: 18939 - 120th Ave. NE, #101, Bothell, WA 98011

Delta Environmental	Project	EXXON #7-3535, #19525906	Sampled	10/22/96
1756 114th Ave SE Ste 110	Project Number	M091-807	Received	10/22/96
Bellevue, WA 98004	Project Manager	Jim Coppernoll	Reported	10/25/96 14 29

ANALYTICAL REPORT FOR SAMPLES:

Sample Description	Laboratory Sample Number	Sample Matrix	Date Sampled
CT-1 INFLUENT	B610451-01	Air	10/22/96

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Delta Environmental	Project:	EXXON #7-3535, #19525906	Sampled	10/22/96
1756 114th Ave SE Ste 110	Project Number	M091-807	Received	10/22/96
Bellevue, WA 98004	Project Manager	Jim Coppernoll	Reported	10/25/96 14:29

Gasoline Hydrocarbons (Toluene to Dodecane) and BTEX in Air by WTPH-G and EPA 8020A
North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
CT-1 INFLUENT			**B610451-01**				**Air**	
Gasoline Range Hydrocarbons	1060691	10/23/96	10/24/96		10.0	86.3	ug/l Air	
Benzene	"	"	"		2.00	ND	"	
Toluene	"	"	"		0.250	5.20	"	
Ethylbenzene	"	"	"		0.250	1.15	"	
Xylenes (total)	"	"	"		0.500	6.20	"	
Surrogate: 4-BFB (FID)	"	"	"	*50.0-150*		*83.7*	*%*	
Surrogate: 4-BFB (PID)	"	"	"	*56.0-136*		*81.9*	"	

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

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SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 643 9200 ■ FAX 644-2202

Correspondence to. 18939 - 120th Ave. NE, #101, Bothell, WA 98011

Delta Environmental	Project	EXXON #7-3535, #19525906	Sampled	10/22/96
1756 114th Ave SE Ste 110	Project Number	M091-807	Received	10/22/96
Bellevue, WA 98004	Project Manager	Jim Coppernoll	Reported	10/25/96 14 29

Gasoline Hydrocarbons (Toluene to Dodecane) and BTEX in Air by WTPH-G and EPA 8020A/Quality Control
North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov Limits	Recov %	RPD Limit	RPD %	Notes*
Batch 1060691	**Date Prepared 10/23/96**					**Extraction Method: EPA 5030**				
Blank	**1060691-BLK1**									
Gasoline Range Hydrocarbons	10/23/96			ND	ug/l Air	4 00				
Benzene	"			ND	"	0 100				
Toluene	"			ND	"	0.100				
Ethylbenzene	"			ND	"	0.100				
Xylenes (total)	"			ND	"	0.200				
Surrogate 4-BFB (FID)	"	*16 0*		*10 6*	"	*50 0-150*	*66 3*			
Surrogate 4-BFB (PID)	"	*16 0*		*10 9*	"	*56 0-136*	*68 1*			
Blank Spike	**1060691-BS1**									
Benzene	10/23/96	10 0		9 58	ug/l Air	44 0-118	93 8			
Toluene	"	10 0		8 97	"	45 0-117	89 7			
Ethylbenzene	"	10 0		8 96	"	45 0-116	89 6			
Xylenes (total)	"	30 0		26 6	"	46 0-116	88.7			
Surrogate 4-BFB (PID)	"	*16 0*		*12 3*	"	*56 0-136*	*76 9*			
Blank Spike	**1060691-BS2**									
Gasoline Range Hydrocarbons	10/23/96	250		149	ug/l Air	26 0-108	59 6			
Surrogate 4-BFB (FID)	"	*16 0*		*10 2*	"	*50 0-150*	*63 7*			
Blank Spike Dup	**1060691-BSD1**									
Benzene	10/23/96	10 0		9 61	ug/l Air	44 0-118	96 1	21 0	2 42	
Toluene	"	10 0		9 16	"	45 0-117	91 6	25 4	2 10	
Ethylbenzene	"	10 0		9 27	"	45 0-116	92 7	24 4	3 40	
Xylenes (total)	"	30 0		27 3	"	46 0-116	91 0	26 0	2 56	
Surrogate 4-BFB (PID)	"	*16 0*		*11 7*	"	*56 0-136*	*73 1*			
Duplicate	**1060691-DUP1**		**B610412-01**							
Gasoline Range Hydrocarbons	10/24/96		730	606	ug/l Air			45 0	18 6	
Surrogate 4-BFB (FID)	"	*16 0*		*14 2*	"	*50 0-150*	*88 7*			

North Creek Analytical, Inc

*Refer to end of report for text of notes and definitions

Laura Dutton

Laura L Dutton, Project Manager

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Environmental Laboratory Services

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Delta Environmental	Project	EXXON #7-3535, #19525906	Sampled	10/22/96
1756 114th Ave SE Ste 110	Project Number	M091-807	Received	10/22/96
Bellevue, WA 98004	Project Manager	Jim Coppernoll	Reported	10/25/96 14:29

Notes and Definitions

#	Note
ND	Analyte NOT DETECTED at or above the reporting limit
DET	Analyte DETECTED
dry	Sample results reported on a dry weight basis
Recov	Recovery
RPD	Relative Percent Difference

North Creek Analytical, Inc

Laura L Dutton, Project Manager

NORTH CREEK ANALYTICAL

18939 120th Avenue N E , Suite 101, Bothell, WA 98011 9508 (206) 481-9200 FAX 485 2992
East 11115 Montgomery, Suite B, Spokane, WA 99206-4779 (509) 924-9200 FAX 924-9290
9405 S W Nimbus Avenue, Beaverton, OR 97008-7132 (503) 643-9200 FAX 644-2202

B610451

EXXON COMPANY U.S.A. CHAIN OF CUSTODY REPORT

EXXON INFORMATION

EXXON RAS # 7-3535
Site Address 8408 AURORA AVENUE NORTH
City, State, ZIP SEATTLE, WA 98103
EXXON Engineer ROGER HICKS
Laboratory WR#

CONSULTANT INFORMATION

Name DELTA Consultant WR # 91137817
Address 1756 114TH AVENUE SOUTHEAST
BELLEVUE, WA 98004
Phone 450-7726 Fax 450-5837
Project Manager JIM CUPPERNOLL Consultant Project # M091-807
Sample Collection by [illegible] Airbill #

Turnaround Times

All TPH, Volatiles & BTEX
10 Calendar Days
Pest, TCLP, Metals, PP, Etc
14 Calendar Days
RUSH Analyses (HOURS)
24 | 48 | 72 | 96
Air Analysis
[X] 72 Hours

O Oregon ☒ Washington O Montana Hydrocarbon Methods

	SAMPLE IDENTIFICATION	SAMPLING DATE / TIME	MATRIX (W,S,O)	# OF CONTAINERS	TPH-HCID	TPH-Gas	BTEX (EPA 8020 Mod.)	TPH-Gas + BTEX	TPH-Diesel	TPH Diesel Extended	TPH-418.1	Halogen Volatiles (EPA 8010)	Aromatic Volatiles (EPA 8020)	Pesticides/PCBs or PCBs Only	GCMS Volatiles (EPA 8240/8260)	GCMS SemiVols (EPA 8270)	PAHs by HPLC (EPA 8310)	Lead Total or Dissolved	TCLP Metals (8)					NCA SAMPLE NUMBER
1	CT-1 INFLUENT	10-22-96 / 1140	AIR	1				X																B610451-01
2																								
3																								
4																								
5																								
6																								
7																								
8																								
9																								
10																								

	Relinquished by	Firm	Date & Time	Received by	Firm	Date & Time
1	Erin Kalschke	Delta	10/22/96 4:15pm	Marco G	NCA	10/22/96 4:15pm
2	Marco G.	NCA	10/22/96 5:35pm	Lisa Hurley	NCA	10-22-96 17:35
3						

Comments.

Page 1 of 1

Rev 1 0 1/95

Distribution White Laboratory Yellow - Consultant Photocopy - EXXON

ATTACHMENT E

Operations Integrity Management System Documentation

Notification Date: April 3, 1996

FORMER EXXON SERVICE STATION ACCESS REQUEST	
Site Address:	8408 Aurora Avenue North, Seattle, Washington
Former Exxon RAS #:	7-3535
BP Oil Facility # (if known)	
Consultant.	Delta Environmental Consultants, Inc.
Work Activity Description.	Installation of air sparge/soil vapor extraction system Involves drilling, trenching, installation of subsurface piping, and installation of remediation compound and equipment.
Possible Impact to Operations.	Possible temporary restriction of access to dispenser islands during trenching and permanent restriction of approximately 1 - 2 parking spaces in southeast side of site
Anticipated Start/Finish Dates	Anticipated drilling start date is April 22, 1996 Trenching and subsurface end date anticipated by June, 1996 Above ground installation to begin June, 1996 and end Mid-June, 1996
Comments	
Notification Sent To	Scott Hooten BP Oil Company, 295 SW 41st St, Bldg 13, Suite N Renton WA 98055 FAX 206-251-0736 Tim Johnson Tosco Northwest, 601 Union St, Suite 2500 Seattle, WA 98101 FAX 206-442-7159 Roger Hicks Exxon Company, U S A , 2300 Clayton Road, Suite 490 Concord, CA 94520-4032 FAX 510-246-8798 Station Mngr 8408 Aurora Avenue North, Seattle, Washington

Attach Site Plan Showing Activity Location

H:\USERS\RON\EXXON\NOTICICA\NOTIFICN.FRM

Environmental Engineering
Pre-Construction Safety Agreement

Exxon Location #: 7-3535
Address. 8408 Aurora Ave North
Seattle, WA

Project Description Install AS/SVE remediation system. Includes subsurface and above ground piping, equipment, wells, electrical service, enclosure

We the undersigned agree that all activities conducted during and for the completion of this project will be performed in accordance with all OSHA health and safety standards, with all Exxon Environmental Engineering safety requirements attached hereto, and with the following common safety objectives.

- The first and foremost priority during this project is to maintain a safe and healthy work environment.
- No work should be performed until every necessary safety precaution has been taken
- No project objectives will knowingly be allowed to put at risk human health and the environment.
- If at any time during the performance of activities on this project, there is an unsafe condition, then we will immediately take action to alleviate the unsafe condition. If we are unable to cause the cessation of the unsafe condition, then we will immediately contact the Exxon Engineer/Geologist listed below

Exxon Environmental Engineer/Geologist Roger Hicks

Office Phone # 510/246-8768

Mobile Phone # 707/486-8801

Home Phone # _____

Consultant	Date 4/30/96
Contractor	Date 4-22-96
Contractor	Date 4/30/96
Facility Operator	Date
Attested to	Date 5/1/96
Exxon Environmental Engineer	Date 4/30/96

POST ON SITE

CLASS III PETROLEUM SITE HEALTH AND SAFETY PLAN

Prior to initiating field activities, the Site Safety Officer (SSO) or Project Manager must review the Site Health and Safety Plan (SHSP) with all members of the field crew, including Delta employees and subcontractors All field team members working in the contamination zone, or who may be exposed during the course of their work, shall have completed OSHA 40-hour HAZWOPER and annual refresher training (29 CFR 1910 120), CPR and First Aid training When required by the local regulatory authority, copies of training certificates, CPR/First Aid cards, and respirator fit-test documentation shall be maintained on-site Each Delta team member must review the SHSP and sign and date the Acknowledgement Agreement on page 16 of the plan *Each subcontractor employee and visitor must review the SHSP and sign, date, and describe their affiliation on page 17 of* the plan The signed plan is to be kept in the field for the duration of the project and returned to the project file upon completion of field activities

SHSPs may be revised or rewritten for different phases of a project, if site activities are distinctly different, if areas of differing hazard are involved, or as information about contaminants and hazards changes Changing conditions may justify either increasing or decreasing SHSP restrictions and action levels, depending upon the additional information generated

DELTA PROJECT NUMBER **M091-807**

I. GENERAL INFORMATION

Client	Exxon Company, U S A	Site Owner	Tosco ~~British Petroleum~~
Site Name	Exxon R/S No 7-3535	Client Claim/PO Number	
Site Address	8408 Aurora Ave N , Seattle, WA		
Project Manager	James D Coppernoll		
Plan Prepared by	Nancie Foley	Date	09/27/95
Approved by		Date	10/06/95
Revised by	Kelly Kempf	Date	04/22/96
Revision Approved by		Date	4/24/96

Objectives Quarterly monitoring and ground water sampling, system installation, system operation and maintenance

Installation to include saw cutting, shallow trench excavation, installation of piping and wells,

installation of above-ground treatment compound with blower, panel and compressor, compaction of trench

backfilling and surface patching Electrical hookup to be done by a subcontracted licensed electrician

Place date(s) in appropriate box(es) for current phase(s) of site activities

Site Activities	Soil Borings	Monitoring Well Installation	Tank Removal	Soil Excavation	Recovery Well Installation	Pilot Tests	Treatment System Construction	Soil and Ground Water Sampling	O&M
Site Assessment	1991	1991	1991	1991				Ongoing	
Remedial Investigation						1995		Ongoing	
Site Remediation Activities							1996	Ongoing	1996

II. EMERGENCY CONTINGENCY PLAN

A. LOCAL EMERGENCY TELEPHONE NUMBERS (provide area code):

Ambulance	911
Hospital Emergency Room	911
Poison Control Center	911
Fire Department	911
Police Department	911
Hazardous Materials Response Unit	911

Note If you list 911, check to be sure it is activated in the site area and determine whether it is enhanced

Is 911 enhanced? Yes [X] No [ ]

B. EMERGENCY ROUTES:

Hospital* Name Northwest Hospital Phone number (206) 364-0500

Hospital Address 1550 N 115th St , Seattle, Washington 98133

Directions to nearest hospital Go north on Aurora to 115th, turn right for 1/4 mile Turn left into hospital

Estimated driving distance 2 5 miles

Estimated driving time Five minutes

Does hospital accept chemically contaminated patients? Yes [X] No [ ]

*** Hospital should be notified immediately if an injury occurs which requires medical attention.**

INSERT MAP OF HOSPITAL ROUTE(S) AS LAST PAGE OF SITE HEALTH & SAFETY PLAN.

C. SITE RESOURCES:

Water supply available on site	Yes	X	No		
Telephone available on site	Yes	X	No		
Bathrooms available on site	Yes	X	No		
Electricity available on site	Yes	X	No		
Other resources available on site	Yes		No		If "yes", identify

For each "no", identify the closest available resource and provide directions

D. EMERGENCY CONTACTS:

			PHONE NUMBER (provide area codes)	
			Work	Home
1	Project Manager	Jim Coppernoll	(206) 450-7726	(206) 831-6290
2	Unit Manager	Markham Hurd	(206) 450-7726	(206) 248-0765
3	District Health and Safety Officer	Jim Coppernoll	(206) 450-7726	(206) 831-6290
4	Site Contact			
5	Regulatory Consultant			
6	Health and Safety Director	Valora Putnam	(800) 888-1331	(612) 757-3234
7	Health and Safety Specialist	Dorothy Bughone	(612) 486-5911	(612) 588-5431
8				
9				
10				

E. PROJECT HEALTH AND SAFETY TEAM:

Team Members (list)

Project Manager	Jim Coppernoll
Public Information	Markham Hurd
Delta on-site Personnel (On-site personnel are responsible for Delta site health and safety)	Steve Thompson Geoff McCarthy Ron Bruce
	Jim Coppernoll Paul Kalina
	Matt Dahl
Delta Site Safety Officer	

F. PERIMETER ESTABLISHMENT:

Map/Sketch attached Yes [X] No [ ] Site secured Yes [ ] No [X]

Perimeter identified Yes [X] No [ ] Zone(s) of Contamination identified Yes [X] No [ ]

Prevailing wind direction, if known Unknown

In the event of an emergency incident, the site project team will meet at

The northeast corner of the property

Evacuation routes & procedures, if applicable See attached map

G. WORK ZONES:

An exclusion zone, contamination reduction zone and support zone will be identified for each site or site activity Zones will be marked with yellow **CAUTION** tape or cones, as needed No person will be allowed in the exclusion zone or contamination reduction zone without approval from the Delta Site Safety Officer

H. SITE SECURITY:

When work scheduling requires that an excavation be left open overnight, security fencing will be erected to restrict access to the site or work zones described in Section II G

I. SITE MAP: attach in front of Hospital Route Map at end of completed Site Health and Safety Plan.

III. SITE CHARACTERIZATION

A. Summary of Previous Site Investigation(s): Petroleum hydrocarbon impacted soil and ground water which is located in southwest 1/4 of site extending into street to west

B. Source of Previous Site Investigation Information: Delta hydrogeologic and subsurface investigations

C. General Facility Description:

Gasoline Service Station [X] Refinery [ ] Bulk Terminal [ ] Other

Description Active [X] Closed/Abandoned [ ]

Site Activities (operations on-site, products, raw materials used, etc)

Ground water monitoring and system installation

How many years has the site been operating? Unknown

Was the site used by previous owners? Yes [X] No [ ]

Describe previous site activity Gasoline service station

Surface cover on-site includes

[ ]	Soil/bare ground	[ ]	Clay caps	[ ]	Plastic cover
[ ]	Grass	[X]	Paving/asphalt	[ ]	Water bodies
[ ]	Woods	[ ]	Swamp	[ ]	Brush/scrub
[X]	Buildings	[ ]	Unpaved roads	[ ]	Other

Approximate site surface area 30,000 sq ft *or* _____ *acres*

Percentage of surface area

paved	95	%
vegetated	5	%
bare soil		%
under water		%

Potential for dust generation on-site High [ ] Medium [ ] Low [X]

Any site access restrictions Yes [ ] No [X]

Fenced/locked [ ] Posting (signs) [ ] Security guards [ ]

Is there evidence of public access to the site? Yes [X] No [ ]

If "yes," describe Active service station

D. Regulatory Contacts:

Are regulatory agencies involved with the site? Yes [ ] No [X]

If "yes," are they federal? [ ] state? [ ] local? [ ]

Name	Agency	Phone (incl area code)

IV. WASTE CHARACTERIZATION

A. Waste/Contaminant Type(s) Liquid [X] Soil [X] Solid [ ] Sludge [ ] Gas [ ]

Characteristic(s)

[ ]	Corrosive	[X]	Ignitable	[ ]	Radioactive	[X]	Explosive
[X]	Volatile	[X]	Toxic	[ ]	Reactive	[X]	Flammable
[ ]	Unknown	[ ]	Other (describe)				

B. *Major Spills/Releases:*

Type	Date	Chemical	Quantity	Contaminated Media*
UST leak	1991	Gasoline	Unknown	Soil and Ground Water

(* air, surface water, soil, or ground water)

Free Product Yes [ ] No [X] Dissolved Yes [X] No [ ]

Have removal actions occurred? Yes [ ] No [X]

If "yes," describe

Is there evidence that contaminants present could cause vapor problems in structures on-site?

Yes [ ] No [X] If "yes," is building mechanically ventilated? Yes [ ] No [X]

Exhaust Ventilation

General Building Ventilation

C. Chemicals/Waste Stored On-site (including petroleum products):

		How Many?	Size?	Chemical?
[ ]	Drums			
[X]	Tanks	4	8k to 12k gal	Gasoline, Diesel
[ ]	Vats			
[ ]	Surface impoundments			
[ ]	Pits/landfills			
[ ]	Other			

Identify all chemical products Delta will use or store on site

None

Material Safety Data Sheets (MSDSs) are **required** for site chemicals Please indicate where MSDSs can be found for this site

[ ] MSDS Log/Binder [X] Attached

V. REMEDIATION SYSTEM INFORMATION (complete when applicable)

Has system been installed? Yes [ ] No [X]

Describe

Enclosed per codes?	Yes	[ ]	No	[ ]
Ventilated?	Yes	[ ]	No	[ ]
If "Yes," Explosion-proof?	Yes	[ ]	No	[ ]
Blower systems on a timer?	Yes	[ ]	No	[ ]

Have sound level surveys been conducted on site? Yes [ ] No [ ]

If "Yes," record range of survey results and approximate distance from source

dBA	Source	Distance from Source	Date

Check all energy sources on the remediation site

[X]	Electrical	[ ]	Mechanical	[ ]	Other (describe)
[ ]	Thermal	[ ]	Hydraulic		
[ ]	Chemical	[ ]	Pneumatic		

NOTE: If there is more than **1** energy source on site, ***written, equipment-specific Lockout/Tagout Procedures are required!***

Written Lockout/Tagout Procedure required? Yes [ ] No [ ] Where is it located?

VI. HAZARD EVALUATION

Identify all chemicals that are present or are suspected of being present on site and list their maximum concentrations in soil/water Information on hazardous properties is listed in **Appendix A.** For chemicals not shown in **Appendix A**, enter the hazardous property information in the spaces provided and attach a Material Safety Data Sheet

Chemical Name	*TLV*/PEL (*1995-96* /1993)	Maximum Concentration in Soil (*P*)	Maximum Concentration in Water (*P*)	Health Hazards/ Comments
Gasoline	300 ppm	1200 mg/kg	200,000 ug/l (ppb)	Irritant (skin, eye, mucous membranes), CNS narcotic
Toluene	*50 ppm* 100 ppm	6 1 mg/kg	18,000 ug/l (ppb)	Severe irritant (skin, eye), reproductive toxin, CNS narcotic
Xylene	*100 ppm* 100 ppm	77 mg/kg	37,000 ug/l (ppb)	Irritant (skin, eye, nose, throat), reproductive toxin, CNS narcotic
Benzene	*10 ppm* 1 ppm	1 5 mg/kg	3,800 ug/l (ppb)	Severe irritant (skin, eye), reproductive toxin, CNS narcotic, carcinogen
Ethylbenzene	*100 ppm* 100 ppm	9 3 mg/kg	4,500 ug/l (ppb)	Irritant (eye, skin, mucous membranes), mutagenic, acute CNS effects
Total BTEX	None Estab	mg/kg	ug/l (ppb)	
Total Lead	*0 15 mg/m³* 0 05 mg/m³	15 mg/kg	46 ug/l (ppb)	Carcinogen, neurotoxic
MTBE	40 ppm	mg/kg	ug/l (ppb)	Irritant
Naphthalene	10 ppm *10 ppm*	mg/kg	ug/l (ppb)	Irritant (eye, skin)
Kerosene	None Estab	N/A mg/kg	N/A ug/l (ppb)	Irritant, CNS narcotic
Diesel Fuel	None Estab	200 mg/kg	31,000 ug/l (ppb)	Possible carcinogen, possible mutagen

(*P*) = results pending

Potenual Hazards (check boxes that apply to the site)

	corroded containers		visible leachate	X	underground tanks
	overhead electric lines		underground utilities		surface tanks
X	visible soil contamination	X	odors		observed tanks
	observed free product		dust		confined spaces
	open lagoons		open pits		

	air stack emissions		on-site surface water contamination
X	visible on-site releases		off-site surface water contamination
	visible off-site releases		interior building contamination
	visible on-site erosion		no obvious hazards

VII. PERSONAL PROTECTION & MONITORING EQUIPMENT GUIDELINES

A. PERSONAL PROTECTION:

Level of Protection B [ ] C [ ] D [X] (with modifications)

Modifications

1 All personnel working in the exclusion zone must wear hardhat, safety shoes, safety glasses and/or face shield

2 Nitrile gloves and tyvek/saranex suit should be worn if contact with contaminated water or soil is likely

3 Hearing protection must be worn if noise levels prevent normal conversation at a distance of three feet

4 No smoking, eating, or drinking is allowed in the exclusion or contamination reduction zones

5 No personnel are to enter or approach any excavation area where there is a danger of wall collapse or confined space entry

6 Respiratory protection is dependent on conditions listed in Section VII B 3, page 10

B. SURVEILLANCE EQUIPMENT AND MATERIALS:

1 Calibration

The photoionization detector (PID) or flame ionization detector (FID) will be calibrated before and after field activities by a qualified individual

2 Frequency

The breathing zone of Delta employees on-site will be monitored every hour (at a minimum) and recorded in the Delta fieldbook Monitoring should be conducted during tasks which may result in exposure to vapors

3 Instrumentation

Instrument	Reading	Action Taken
Photoionization detector (HNu) or Flame ionization detector (OVA)	Total Org Vapors Bkgrd - 2 ppm 2 - 10 ppm 10 - 500 ppm > 500 ppm	**Level D.** Work may continue **Level D.** Collect benzene detector tubes **Level C.** Air-purifying respirator with organic vapor canisters Collect benzene detector tubes Leave area Contact District Health & Safety Officer
Benzene colorimetric detector tubes	0 - 0 5 ppm 0 5 - 10 ppm > 10 ppm	**Level D.** Work may continue **Level C.** Air-purifying respirator with organic vapor canisters **Leave area.** Contact District Health & Safety Officer
Explosion Meter	< 10% of LEL 10 - 20% of LEL > 20% of LEL	**Work may continue.** Evaluate inhalation potential **Work may continue.** Eliminate all ignition sources, increase monitoring frequency, consider use of ventilation **Work must stop!**
Oxygen Meter	< 19 5% O_2 19 5% to 23 5% O_2 >23 5% O_2	**Leave area.** Reenter only with SCBA **Work may continue.** Investigate causes of changes above/below 21% **Work must stop.** Ventilate before returning and retest atmosphere O_2-rich atmospheres pose explosion hazards
Hydrogen Sulfide (H_2S) Colorimetric Tubes or Monitors-- Some states with high regional H_2S have special, local monitoring requirements	0-5 ppm 5-10 ppm > 10 ppm	**Continue working.** **Requires Level B** including supplied air respirator or SCBA Increase monitoring frequency Supplied air respirator required due to poor warning properties and toxicity
Sound Level Meter	< 85 dBA 85 - 90 dBA > 90 dBA	Suggest wearing hearing protection when it is necessary to raise voice to be heard at distance of 3 feet **Hearing protection required.** Install warning signs for fixed noise sources **Hearing protection required.** Employer must have Hearing Conservation Program

C. FIRST AID EQUIPMENT AND PROCEDURES:

1 First Aid Equipment

Standard first aid kit (sized for number of individuals on-site)

Portable eye wash (appropriate for number of individuals on-site)

2 First Aid Procedures

Ingestion	Follow instructions from Poison Control Center or the MSDS
Inhalation	Move victim to fresh air Seek medical attention if needed
Dermal Exposure	Remove contaminated clothing Wash thoroughly with soap and water

A first aid kit will be provided on-site for use in case of minor injuries A portable eye wash will also be provided, and if a worker suffers a chemical splash in the eye, the field team will be instructed to flush the eye for 15 minutes and arrange for off-site medical treatment immediately Workers will also be instructed to thoroughly wash with soap and water any unprotected skin which comes in direct contact with contaminated soil or water

Workers providing CPR or First Aid should use Universal Precautions to control possible exposure to bloodborne and infectious agents Report all CPR or First Aid assistance to the District Health and Safety Officer immediately

3 Site Emergencies

In the event of a fire or explosion, evacuate the site immediately and call the appropriate emergency phone numbers listed in Section II A, page 2

In case of a spill, try to contain with clean dirt, if feasible, and call the local fire department or hazardous materials response (HAZMAT) unit Phone numbers are listed in Section II A, page 2

Have procedures for remediation system shutdown or emergency procedures been provided to site owner or manager?

☐ Yes ☐ No (Applies to sites with remediation systems in place)

VIII. SAFETY STANDARD OPERATING PROCEDURES

A. CHEMICAL HAZARDS:

A photoionization detector (PID) or flame ionization detector (FID) will be used to measure the relative concentration of hydrocarbon vapors Monitoring for exposure to benzene vapors may be done using activated charcoal tubes and vacuum pumps, vapor badges, or benzene colorimetric tubes in the breathing zone when working with heavily contaminated soil or water Action limits for use of respiratory protective equipment are outlined in Section VI B above All respiratory protection equipment shall be NIOSH/MSHA-approved and use shall conform to OSHA 29 CFR 1910 134 A written Respiratory Protection Program detailing selection, use, cleaning, storage, medical monitoring, training and fit-testing of respiratory protective equipment is maintained at the Delta district office

In addition to being inhalation hazards, hydrocarbon compounds can also be absorbed through the skin Skin contact with liquid hydrocarbons or fuel hydrocarbon-bearing soil should be prevented In situations where sampling would result in direct skin contact with hydrocarbon liquids, saturated soil or contaminated equipment, nitrile gloves will be worn

Drilling or digging may also liberate pockets of hydrogen sulfide (H_2S) While the characteristic "rotten egg" odor of H_2S is detectable at levels as low as 0 0005 ppm, prolonged detection is unreliable due to its olfactory fatigue properties In open air on a typical petroleum remediation site, risk from exposure to H_2S is minimal However, should H_2S be encountered, workers shall be instructed to stop drilling/digging and move to an upwind location until the vapors have dissipated, as measured by H_2S colorimetric detector tubes or other direct-reading instruments The bore hole or excavation will be immediately backfilled

A combination explosimeter/oxygen (O_2) meter will be available on-site to monitor the levels of flammable gases, such as petroleum vapors and methane An explosimeter should also be used by a subcontractor to verify that the atmosphere inside an underground storage tank has been inserted prior to allowing the tank to be removed

B. PHYSICAL HAZARDS:

1 Mechanical hazards cuts, abrasions, contusions, slips, trips, falls, being struck or entrapped by moving parts of heavy equipment or falling objects Such hazards will be minimized by keeping the work area free of equipment and debris that could cause slips, trips or falls and maintaining a safe distance from heavy equipment and moving machinery parts

2 Electrical hazards possible excavation of unanticipated electrical cables and potential contact by heavy equipment with overhead power lines during drilling and excavation Maintain at least 20 feet clearance from overhead power lines If unavoidably close to overhead or buried power lines, turn power off and lock out circuit breaker All equipment will be properly locked/tagged out when required by the Delta Electrical Safety Program Avoid standing in water when operating electrical equipment

3 Traffic hazards Petroleum site work frequently necessitates working in parking lots, streets or other areas with vehicular traffic In such instances, the work team will be issued neon traffic safety vests and will use traffic cones and/or barricades as necessary to prevent collisions between pedestrians and motor vehicles

4 Open excavations When scheduling or work conditions necessitate leaving excavations open overnight, security fencing will be erected to restrict access to the site or work zones described in Section II G, page 4, will be erected

C. UTILITIES:

A minimum of 48 hours prior to excavating, Underground Service Alert or the state equivalent

[Name] Utility Underground Locate Center

[Phone #] 1-800-424-5555

will be contacted and informed of the scheduled field activities The underground service locator company will identify which underground utilities (e g electrical, gas, sewer, water, telephone, cable TV) are present and will notify their respective owners The utilities will be located by their owners Prior to drilling, post holes or probing to a depth of 5 feet will be done where feasible to ensure no utilities, lines or tanks are in the way

Has the utility service locator company been notified? Yes [X] No [ ]

Confirmation #, if applicable 961602837

D. WORK LIMITATIONS (time of day, weather, heat/cold stress):

In high ambient temperatures (especially in conjunction with high humidity), follow heat-stress precautions Drink plenty of cool water and/or electrolyte-replacement beverages (e g , Gatorade) Take frequent breaks in areas out of direct sunlight and remove protective clothing during breaks Check the resting pulse and increase the number of breaks if the pulse does not return to normal during work breaks If possible, alter work schedules so that work may be conducted during cooler parts of the day (i e , early morning or evening) Work may only progress during daylight hours or under conditions of adequate lighting

Symptoms of heat exhaustion and heat stress include

- Profuse sweating or complete cessation of sweating,
- Changes in skin color,
- Increased respiration,
- Vision problems, confusion,
- Body temperatures in excess of 100°F, and
- Increased heart rate

Any member of the work team who exhibits these symptoms should immediately be removed from the area and observed while resting in a shaded area after removal of impervious or restrictive clothing and after consumption of cool water or electrolyte fluid If symptoms persist, immediate medical attention shall be sought

In cold temperatures, especially when combined with high wind, follow hypothermia precautions

- Take frequent work breaks in a wind-sheltered area,
- Dress in removable layers of insulated clothing to prevent sweating,
- Carry protective water-proof gear and use it before getting wet,
- Drink warm liquids, and
- Monitor co-workers for signs of shivering, incoordination, or confusion Workers exhibiting these signs should be removed from the work area and placed in a heated warming shelter
- Frost-bite (superficial or deep tissue) can occur on any exposed skin at temperatures of 30 2°F or colder
- If available clothing does not give adequate protection to prevent hypothermia or frostbite (which can occur on any exposed skin), work should be modified or suspended until adequate clothing is made available or until weather conditions improve

If extreme cold conditions are encountered, follow the ACGIH TLV booklet's "work-warming regime" recommendations, taking an appropriate number of breaks in a heated warming shelter

E. FIRE AND EXPLOSION HAZARDS:

During the course of underground storage tank removal, drilling, or remediation of petroleum impacted soil or ground water, the potential for fire and explosion of flammable vapors exists Extreme caution should be taken to monitor for the presence of flammable vapors or conditions which could create flammable conditions Explosimeters are available for this monitoring and action levels are defined in Section VII B page 10 Fire extinguishers must be available on all sites with the potential for flammable vapors or electrical fires (i e , systems, control panels) Use of fire extinguishers by employees trained in their use is limited to employee rescue or extinguishing relatively small, controllable fires Delta does not expect or require its employees to fight fires

In the event of a fire or explosion, the following action plan should be followed

Shut down equipment and shut off all supply lines immediately if this can be done safely

Evacuate the immediate area At this point you may not know if a soil vapor fire has started or if a supply line, natural gas line, etc has been hit Tank, supply line, or remediation system fires are extremely hazardous and precautions must be taken to evacuate the area immediately

Call 911 to notify the fire department Delta employees are not trained fire brigades Every fire should be treated as an emergency Even if the fire is extinguished by site personnel, professional fire departments should evaluate the situation to ensure that the danger is over and that a fire will not reoccur

Evaluate the situation to identify the source of the flammable vapors and to assess the danger to employees, the public and property From a safe distance, try to determine if the fire is due to a ruptured supply line, ignited soil vapors or methane, or is electrical This information should be communicated to the fire department Small fires from known sources (i e , engine fires, electrical panel fires, etc) may be extinguished if the employee can do it without high risk A soil vapor fire may eventually burn itself out Soil stockpiles must be placed away from nearby structures and property lines Extinguishing fires in fuel vapor-laden soils with clean soil may be possible **Employees or subcontractors shall not enter an excavation to attempt to extinguish a fire.**

F. NOISE/HEARING PROTECTION:

Workers shall be instructed in the recognition of noise hazards and shall be provided, and trained in the use of, hearing protective devices Hearing protective devices shall be worn when working around heavy equipment, particularly drill rigs, or when background noise is so high that a worker has to shout to be heard at a distance of 3 feet

G. LEVELS OF PROTECTION:

Work on typical petroleum remediation sites can usually be performed in Level D protection hard hat, steel-toed work shoes/boots, cotton coveralls or long-sleeved shirts and long pants, eye protection, hearing protection, and gloves if needed

If monitoring equipment or site conditions indicate the need to upgrade the level of protection to Level C, air-purifying respirators with organic vapor canisters (or other appropriate cartridges), Tyvek coveralls with hoods, chemical resistant inner and outer gloves, and disposable boot covers will be donned

At no time will a Delta employee conduct work on any site requiring Level A protection On worksites requiring Level B protection, workers will be provided with additional training and equipment A health & safety professional must be on-site at all times while Level B work is being conducted

H. DECONTAMINATION PROCEDURE·

Level B [ ] C [ ] D [X]

Contamination may result from walking through contaminated soils or liquids, splashing liquids during sampling, use of or contact with contaminated equipment, or contact with air contaminants Due to the volatile nature of petroleum hydrocarbons that may be encountered during drilling, hand-augering and sample collection procedures, the need to decontaminate equipment and vehicles will be minimal Field team workers will be instructed to observe the following precautions to assure contaminants will not remain in contact with their skin

- Tools, equipment and personnel will be decontaminated using procedures appropriate for the level of personal protection worn

- All contaminated, disposable clothing (e g , Tyvek suits, gloves and disposable boot covers) will be properly bagged for disposal and left on site
- All personnel will be instructed to wash hands, face, neck and forearms at the end of the work shift and to shower at the end of the workday
- **No eating or drinking will be permitted in the immediate vicinity of heavy equipment and/or drilling and excavating activities.**
- **No smoking is permitted on any Delta site at any time.**

Special decontamination requirements None

I. CONFINED SPACES:

If entry into a confined space is necessary, a Confined Space Entry Permit must be completed and authorized, and confined space entry procedures followed Detailed information on Delta's Confined Space Entry classification system, entry procedures and permitting system can be found in the Delta Health & Safety Manual

Does this site have any permit-required confined spaces? Yes [ ] No [X]

J. INVESTIGATION-DERIVED MATERIAL DISPOSAL:

Soil cuttings and well development or sampling water shall be placed in 55-gallon drums on-site Disposal methods of drummed soil and water will be determined based on laboratory analytical data Proper disposal is the responsibility of the responsible party

K. EXCAVATIONS:

All soil excavation and utility trenching is to be undertaken in strict conformance with all applicable local, state, and federal regulations

Entry into excavated areas or trenches is allowed only when

1) shoring, sloping and spoil pile placement is in conformance with 29 CFR 1926 Subpart P, and
2) personal protection and monitoring, as detailed in this Site Health and Safety Plan, has been implemented

IX. ACKNOWLEDGMENT AGREEMENT

DELTA EMPLOYEE
SITE HEALTH AND SAFETY PLAN REVIEW RECORD

I acknowledge that I have read and understood the contents of this Site Health and Safety Plan and I agree to abide by all provisions as set forth.

Signature	Date
[signature]	4/22/96
[signature]	4/30/96
[signature]	4/30/96
[signature]	5/1/96

SUBCONTRACTOR & VISITOR
SITE HEALTH AND SAFETY PLAN REVIEW RECORD

SITE: EXXON R/S No 7-3535, 5408 AURORA AVE N. SEATTLE WA

I have read the Site Health and Safety Plan for this site and have been briefed on the nature of the contaminants and the level and degree of exposure likely as a result of participation in this project. I agree to conform to all the requirements of this plan. I also acknowledge that this plan is specific for this Delta Environmental Consultants, Inc. site and may not address unforseen hazards not included in the Site Health and Safety Plan.

Name	Signature	Affiliation	Date
Scott		CDT	4-2 96
Brian		CDT	4/22/96
Tom		CDT	4-2-96

APPENDIX A

PETROLEUM CLASS III SHSP--HAZARDOUS PROPERTY INFORMATION

Material	Water Solubility [A & B]	Specific Gravity[C]	Vapor Density[D]	Flash Point °F[B]	Vapor Pressure mm/Hg[F]	%LEL/ %UEL[G]	LD 50 mg/kg[H]	TLV-TWA *PEL*[I]	IDLH Level[J]	Recommended Respiratory Protection/Max. Use Concentration *Odor Threshold*[K]	Hazard Property[L]	Dermal Toxicity[M]	Acute Exposure Symptoms[N]
Benzene	0 18%	0 877	2 8	12	75 (20 °C)	1 2/7 8	930	10 ppm *1 ppm*	3000 ppm	½/OV/10 ppm FF/OV/50 ppm PAPR/OV 100 ppm *4 68 ppm*	BCDGI	CGI	BCDFHIKLM NOQR
Diesel Fuel	Insoluble	0 81-0 90	NA	130	NA	0 6-1 3 6-7 5	None Estab	None Estab	None Estab	*0 7 ppm*	BCD	CI	BCDFHIKLM NP
Ethylbenzene	0 014%	0 867	4 45	70	10 (26 °C)	0 8/6 7	3500	100 ppm *100 ppm*	2000 ppm	½/OV/1000 ppm *140 ppm*	BCDI	CFI	ABFHIKLMN PQR
Gasoline	Insoluble	0 72-0 76	3-4	-50	Var	1 4/7 6	None Estab	300 ppm	None Estab	½/OV/1000 ppm *25 ppm*	BCD	CI	BCEFHIKLM NP
Kerosene	Insoluble	0 83-1 0	4 5	100-165	5	0 7/5 0	None Estab	None Estab	None Estab	*1 ppm*	CD	CI	BCDFHIKLM NP
Lead (elemental)	Insoluble[B]	11 34	NA	NA	NA	NA	Varies by Cmpd	0 15 mg/m³ *0 05 mg/m³*	700 mg/m³	½/HEPA/0 5 mg/m³ FF/HEPA/2 5 mg/m³	C		ACDFGHOR
MTBE (methyl tertiary butyl ether)	Moderate	0 74	Unavlbl	-16	245 (25 °C)	1 6/8 4	2 96 g/kg	None Estab *None Estab*	None Estab	Unavailable	BD	A	BFK
Naphthalene	Insoluble	1 145	4 42	190	23 (25 °C)	9/5 9	490	10 ppm *10 ppm*	500 ppm	½/OV/100 ppm FF/OV/< 500 ppm	C	CGI	BKLNQ

Material	Water Solubility[A▲B]	Specific Gravity[C]	Vapor Density[D]	Flash Point °F[E]	Vapor Pressure mm/Hg[F]	%LEL/ %UEL[G]	LD 50 mg/kg[H]	TLV-TWA *PEL*[J]	IDLH Level[I]	Recommended Respiratory Protection/Max Use Concentration *Odor Threshold*[K]	Hazard Property[L]	Dermal Toxicity[M]	Acute Exposure Symptoms[N]
Tetraethyl lead	Insoluble[B]	1 653	8 6	199	0 2 mm (20 °C)	1 8/ Unkn	12 3	0 10 mg/m³ (Skin) *0 075 mg/m³ (Skin)*	40 mg/m³	Supplied Air Warning Unknown	CG	CFI	N
Tetramethyl lead	Insoluble[B]	1 999	6 5	100	22 5 mm (20 °C)	Unkn/ Unkn	105	0 15 mg/m³ (Skin) *0 075 mg/m³ (Skin)*	40 mg/m³	Supplied Air Poor Warning	CG	CFI	N
Toluene	0 05	0 866	3 2	39	21 (20 °C)	1 27/7	2000	50 ppm (Skin) *200 ppm*	2000 ppm	½/OV/500 ppm TF/OV/1000 ppm *0 17-40 ppm (300-400 ppm)--Olfactory Fatigue*	BCI	BHE	BEFHIKLMN OPQ
Xylenes	Insoluble	0 868	3 68	63 81	9 mm (20 °C)	1 1/6 6 7 0	5000	100 ppm *100 ppm*	1000 ppm	½/OV/< 1000 ppm	BCI	CFI	BEFHIKLMN P

APPENDIX A

PETROLEUM CLASS III SHSP–HAZARDOUS PROPERTY INFORMATION

Explanations and Footnotes

A Water solubility expressed as 0 2 g means 0 2 grams per 100 grams of water at 20 °C Water solubility is expressed in different terms in different references Many references use the term "insoluble" for materials that will not readily mix with water, such as gasoline However, most of these materials are water soluble at the part per million or part per billion level Gasoline, for example, is nearly insoluble and will be found as a discrete layer on top of the ground water But certain gasoline constituents, such as benzene, toluene, and xylene, will also be found in solution in the ground water at the part per million or part per billion level

B Solubility of metals depends on the compound in which they are present

C Specific gravity is the ratio of the density of a substance to the density of a reference substance For solids and liquids the reference substance is water; for gases, the reference substance is air Specific gravity is expressed in units of g/cc (for solids and liquids) or g/l (at 0 °C and 760 mm Hg) for gases

D Vapor density is the weight/unit volume expressed as grams/cubic centimeter liquids

E Flash point is the temperature at which a liquid or volatile solid gives off sufficient vapor to form an ignitable mixture with the air Flash points may be determined by the open cup method or closed cup method Several chlorinated hydrocarbons exhibit no flash point in the conventional sense, but will burn in the presence of high energy ignition sources or will form explosive mixtures at temperatures above 200 °F

F Vapor pressure is the pressure at a given temperature of a vapor in equilibrium with its liquid or solid form It is expressed as mm Hg at 1 atm Temperatures vary see chart

G Lower explosive limit (LEL) and Upper explosive limit (UEL) are the minimum and maximum concentrations of a gas or vapor in air which will support flame LEL and UEL are expressed as % in air at ambient or room temperature

H LD_{50} is the quantity of a substance administered by ingestion that is necessary to kill 50% of the test animals exposed to it within a specified time

I Threshold limit value as a time weighted average (TLV-TWA) is the concentration for a normal 8 hr workday and 40-hr work week to which nearly all workers may be repeatedly exposed, day after day, without adverse effect Values reported are the current ACGIH Threshold Limit Value-Time Weighted Average (TLV-TWA) and OSHA Permissible Exposure Limit (PEL) All PELs are based on pre-1989 values, per OSHA's 1993 decision to vacate the 1989 PELs

J Immediately Dangerous to Life and Health (IDLH) concentrations represent the maximum concentrations from which, in the event of a respirator failure, one could escape within 30 minutes without a respirator and without experiencing any escape-impairing or irreversible health effects

K Recommended Respiratory Protection/Max Use Concentration is used to show the limits for respirator style and contaminant concentration The codes in the table refer to the following

½ = Half-face, air-purifying respirator
FF = Full-face air-purifying respirator
OV = Organic vapor canisters
HEPA = High Efficiency Particulate Air canisters
PAPR = Powered Air-purifying Respirator

The Odor Threshold is the lowest concentration at which one may detect an odor or experience a warning effect such as taste, eye irritation, etc , which varies with individual susceptibility

Appendix A
PETROLEUM CLASS III SHSP--
HAZARDOUS PROPERTY INFORMATION
Explanations and Footnotes
Continued

L. Hazard Property

A - Corrosive	E - Reactive	I - Reproductive Toxin
B - Flammable	F - Radioactive	
C - Toxic	G - Carcinogen	
D - Volatile	H - Infectious	

Note A reproductive toxin is a compound (chemical) that affects the reproductive organs (generally the sperm and eggs but sometimes the physical structure of the testes or ovaries, too) It can affect the reproductive organs of males, females, or both, it can affect the reproductive organs of an adult or child, it can affect the reproductive organs of a developing fetus with or without affecting the mother

M Dermal toxicity data is summarized in the following three categories

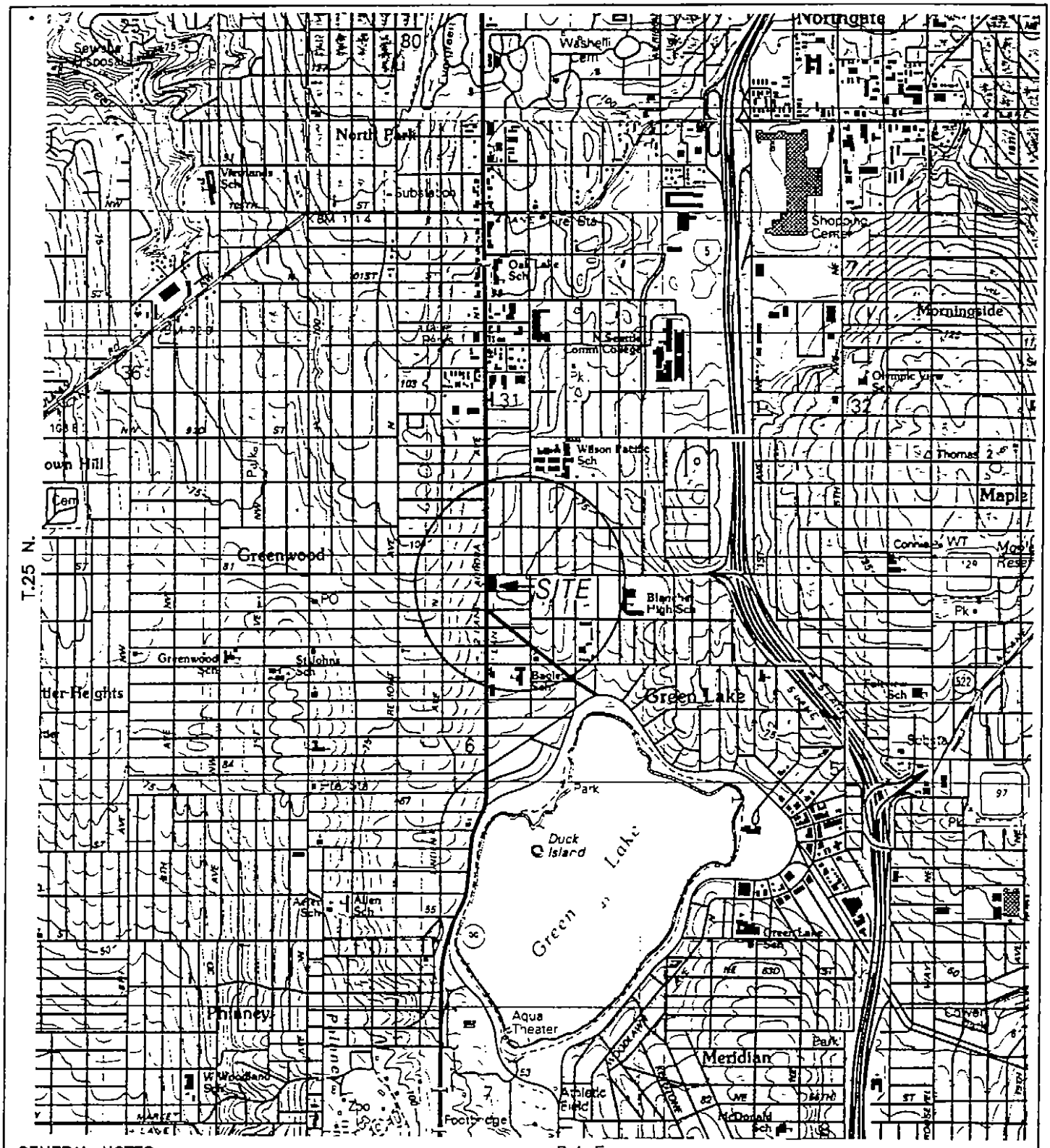
1 **Skin Penetration**
- A negligible penetration (solid-polar)
- \+ B - slight penetration (solid-nonpolar)
- ++ C - moderate penetration (liquid/solid-nonpolar)
- +++ D high penetration (gas/liquid-nonpolar)

2 **Systemic Potency**
- E Slightly Toxic (LD50 = 5 - 15 g/kg)
  Lethal dose for 70 kg adult = 1 pint to 1 quart
- F - Moderately Toxic (LD50 = 0 5 - 5 g/kg)
  Lethal dose for 70 kg adult = 1 ounce to 1 pint
- G Extremely toxic (LD50 = 5 - 50 mg/kg)
  Lethal dose for 70 kg adult = 7 drops to 1 teaspoon

3 **Local Potency**
- H - slight - reddening of the skin
- I - moderate - irritation/inflammation of skin
- J - extreme - tissue destruction/necrosis

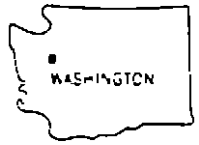
N Acute Exposure Symptoms

A - abdominal pains	B - central nervous system depression	O - tremors	
C - comatose	D - convulsions		P - unconsciousness
E - confusion	F dizziness		Q vomiting
G - diarrhea	H - drowsiness		R - weakness
I - dyspnea	J fever		
K - headache	L - nausea		
M - respiratory irritation	N - skin		



GENERAL NOTES:
BASE MAPS FROM U.S.G.S.
SEATTLE NORTH, WA.
7 5 x 15 TOPOGRAPHIC
PRINTED 1983

North



QUADRANGLE LOCATION

0 2000 FT

SCALE 1 : 25,000

FIGURE 1
SITE LOCATION MAP
FORMER EXXON STATION NO 7-3535
8408 AURORA AVENUE NORTH
SEATTLE, WA.

PROJECT NO. 43-91-807	DRAWN BY LH 1/19/94
FILE NO ——	PREPARED BY LD
REVISION NO. 2	REVIEWED BY

Delta Environmental Consultants, Inc.

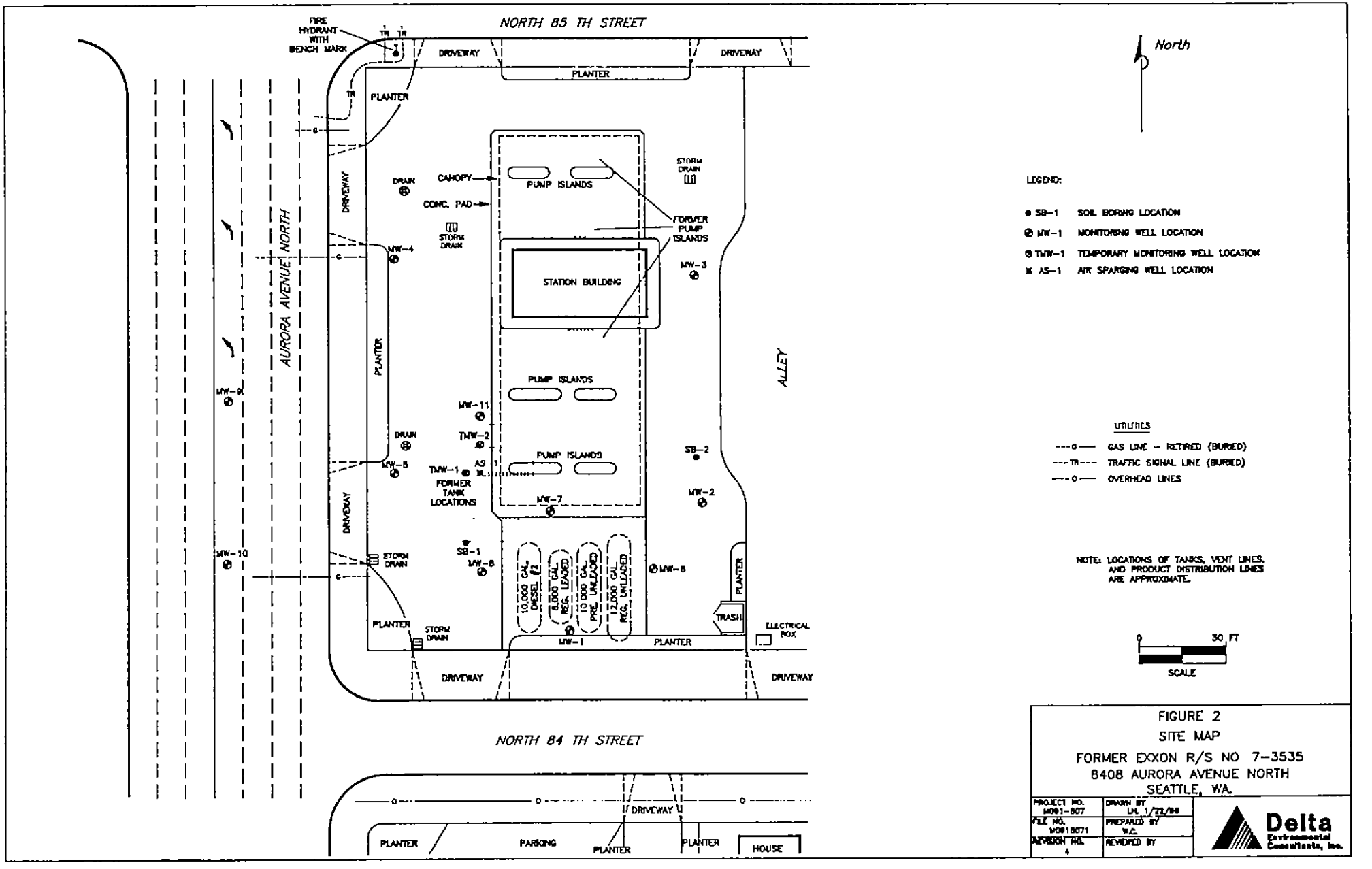
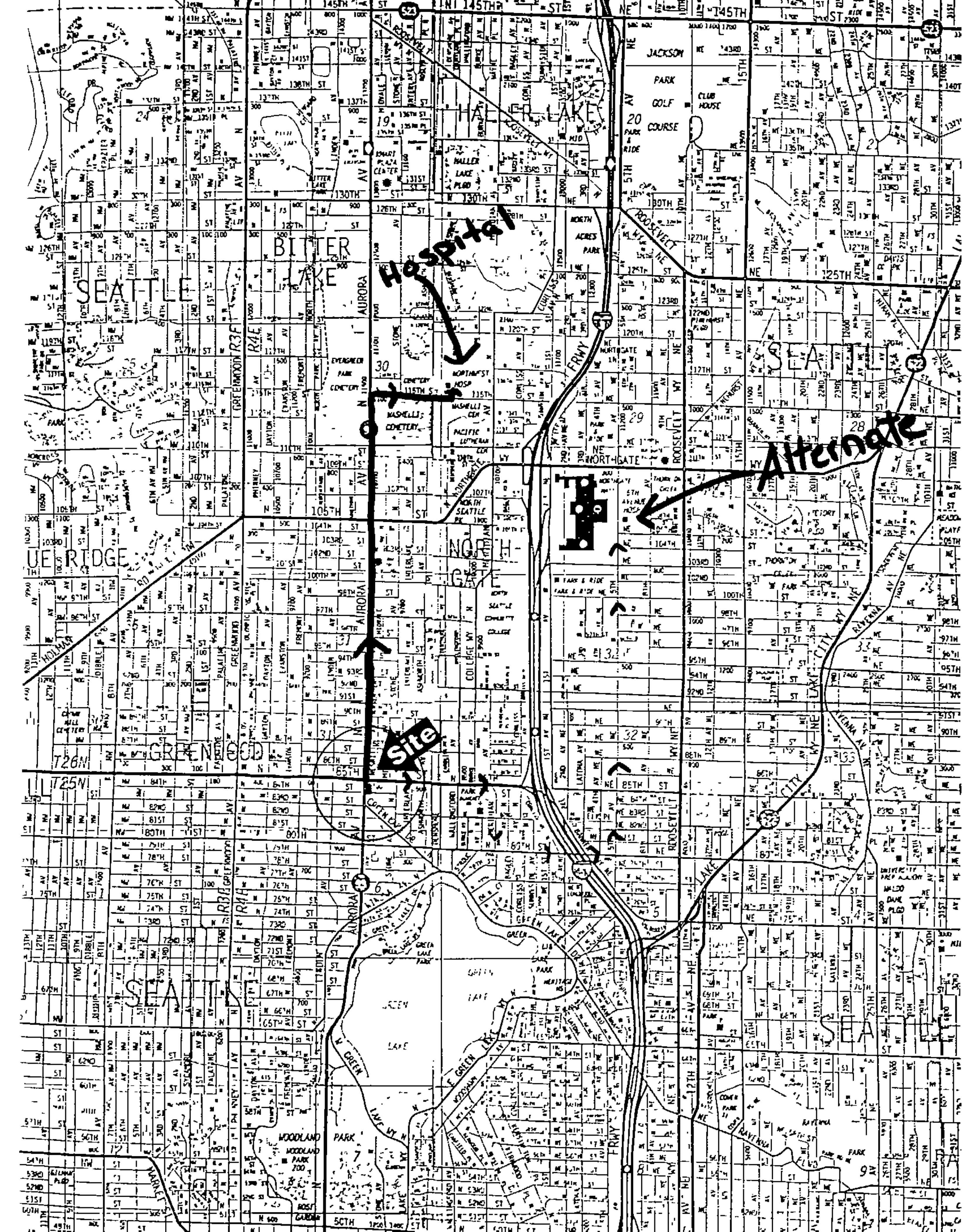


FIGURE 2
SITE MAP
FORMER EXXON R/S NO 7-3535
8408 AURORA AVENUE NORTH
SEATTLE, WA.

PROJECT NO. M091-807	DRAWN BY LHL 1/23/96
FILE NO. M091807I	PREPARED BY W.C.
REVISION NO. 4	REVIEWED BY

Delta Environmental Consultants, Inc.



Hospital
Alternate
Site
SEATTLE
BITTER LAKE
HALLER LAKE
NORTH GATE
GREENWOOD
JACKSON PARK GOLF COURSE
AURORA
NORTHWEST HOSP
GREEN LAKE
WOODLAND PARK
ROOSEVELT

Notification Date April 3, 1996

FORMER EXXON SERVICE STATION ACCESS REQUEST	
Site Address:	8408 Aurora Avenue North, Seattle, Washington
Former Exxon RAS #	7-3535
BP Oil Facility # (if known)	
Consultant	Delta Environmental Consultants, Inc
Work Activity Description	Installation of air sparge/soil vapor extraction system Involves drilling, trenching, installation of subsurface piping, and installation of remediation compound and equipment
Possible Impact to Operations	Possible temporary restriction of access to dispenser islands during trenching and permanent restriction of approximately 1 - 2 parking spaces in southeast side of site
Anticipated Start/Finish Dates	Anticipated drilling start date is April 22, 1996 Trenching and subsurface end date anticipated by June, 1996 Above ground installation to begin June, 1996 and end Mid-June, 1996
Comments	
Notification Sent To	Scott Hooten BP Oil Company, 295 SW 41st St, Bldg 13, Suite N Renton WA 98055 FAX 206-251-0736 Tim Johnson Tosco Northwest, 601 Union St, Suite 2500 Seattle, WA 98101 FAX 206-442-7159 Roger Hicks Exxon Company, U S A , 2300 Clayton Road, Suite 490 Concord, CA 94520-4032 FAX 510-246-8798 Station Mngr 8408 Aurora Avenue North, Seattle, Washington

Attach Site Plan Showing Activity Location

Environmental Engineering
Daily Site Safety Checklist

Exxon Location #: 7-3535
Address: 5465 AURORA AVENUE NORTH
SEATTLE, WA 98103

Consultant/Contractor: DELTA/CUSTOM BACKHOE

This checklist is to be completed on a daily basis. The date should be noted in the space provided Each item should be verified and initialed

Date	5/1/96	5/2/96	5/3/96	5/5/96	5/6/96 AM	5/6/96 AM
1 Excavations are properly barricaded	NA	PK	PK	PK	PK	PK
2. Traffic cones and ribbon are visibly placed around work area	PK	PK	PK	PK	PK	PK
3 Excavated soils are properly covered and bermed	NA	PK	PK	PK	PK	PK
4 Any potential tripping hazards have been removed from site	PK	PK	PK	PK	PK	PK
5 Fire extinguishers are available for use and are fully charged	PK	PK	PK	PK	PK	PK
6 All vessels containing flammable materials are properly labeled	PK	PK	PK	PK	PK	PK
7. No smoking signs are visibly posted in the area of potentially flammable vapors	PK	PK	PK	PK	PK	PK
8. Proper safety equipment is being used for present conditions (e g hard hat, safety glasses, respirator, etc)	PK	PK	PK	NO ONE ON SITE NA	PK	NO ONE ON SITE NA
9. All emergency telephone numbers are legibly posted in a visible location	PK	PK	PK		PK	
10 Equipment on-site is in safe working order	PK	PK	PK		PK	
11 No person on site has the appearance of being under the influence of motor skill altering substances	PK	PK	PK		PK	
12 A first aid kit is readily available	PK	PK	PK		PK	
13 All workers on site are clothed in an appropriate manner	PK	PK	PK		PK	↓
14. The daily site safety meeting has been conducted	PK	PK	PK	↓	PK	PK

15 Comments and exceptions

Environmental Engineering
Daily Site Safety Checklist

Exxon Location # 7-3535
Address : 8408 AURORA AVENUE NORTH
SEATTLE WA 98103

Consultant/Contractor DELTA / CUSTOM BACKHOE

This checklist is to be completed on a daily basis. The date should be noted in the space provided Each item should be verified and initialed

Date	5/7/96	5/8/96	5/9/96	5/10/96	5/13/96	7/2/96
1 Excavations are properly barricaded	PK	PK	NA PK EC	NA PK EC	NA	NA
2 Traffic cones and ribbon are visibly placed around work area	PK	PK	PK	PK	NA	NA
3 Excavated soils are properly covered and bermed	PK	PK	PK	PK	PK	NA
4 Any potential tripping hazards have been removed from site	PK	PK	PK	PK	PK	PK
5 Fire extinguishers are available for use and are fully charged	PK	PK	PK	PK	PK	PK
6. All vessels containing flammable materials are properly labeled	PK	PK	PK	PK	PK	PK
7. No smoking signs are visibly posted in the area of potentially flammable vapors	PK	PK	PK	PK	PK	PK
8. Proper safety equipment is being used for present conditions (e g hard hat, safety glasses, respirator, etc)	PK	PK	NO ONE ONSITE NA	NO ONE ONSITE NA	NO ONE ONSITE NA	PK
9 All emergency telephone numbers are legibly posted in a visible location	PK	PK	↓	↓	↓	PK
10 Equipment on-site is in safe working order	PK	PK	↓	↓	↓	PK
11. No person on site has the appearance of being under the influence of motor skill altering substances	PK	PK	↓	↓	↓	PK
12. A first aid kit is readily available	PK	PK	↓	↓	↓	PK
13 All workers on site are clothed in an appropriate manner	PK	PK	↓	↓	↓	PK
14. The daily site safety meeting has been conducted	PK	PK	↓	↓	↓	PK

15 Comments and exceptions

Environmental Engineering
Daily Site Safety Checklist

Exxon Location # 7-3535
Address : 8408 Aurora Ave. N.
Seattle, WA

Consultant/Contractor Delta / Custom Backhoe and Dumptruck

This checklist is to be completed on a daily basis. The date should be noted in the space provided Each item should be verified and initialed

Date	MAY 1ST	MAY 2ND	MAY 3RD	MAY 4TH	MAY 6TH	MAY 7TH
1 Excavations are properly barricaded	GG	GG	GG	GG	GG	GG
2. Traffic cones and ribbon are visibly placed around work area	GG	GG	GG	GG	GG	GG
3. Excavated soils are properly covered and bermed	GG	GG	GG	GG	GG	GG
4. Any potential tripping hazards have been removed from site	GG	GG	GG	GG	GG	GG
5. Fire extinguishers are available for use and are fully charged	GG	GG	GG	GG	GG	GG
6. All vessels containing flammable materials are properly labeled	GG	GG	GG	GG	GG	GG
7. No smoking signs are visibly posted in the area of potentially flammable vapors	GG	GG	GG	GG	GG	GG
8. Proper safety equipment is being used for present conditions (e.g. hard hat, safety glasses, respirator, etc.)	GG	GG	GG	GG	GG	GG
9. All emergency telephone numbers are legibly posted in a visible location	GG	GG	GG	GG	GG	GG
10. Equipment on-site is in safe working order	GG	GG	GG	GG	GG	GG
11 No person on site has the appearance of being under the influence of motor skill altering substances	GG	GG	GG	GG	GG	GG
12. A first aid kit is readily available	GG	GG	GG	GG	GG	GG
13. All workers on site are dressed in an appropriate manner	GG	GG	GG	GG	GG	GG
14. The daily site safety meeting has been conducted	GG	GG	GG	GG	GG	GG

15 Comments and exceptions

Environmental Engineering
Daily Site Safety Checklist

Exxon Location #: 7-3535
Address : 8408 Aurora Ave N.
Seattle, WA

Consultant/Contractor: Delta / Custom Backhoe and Dumptruck

This checklist is to be completed on a daily basis. The date should be noted in the space provided. Each item should be verified and initialed.

		SITE VISIT				
Date	5-8-98	5-9-98				
1. Excavations are properly barricaded	[illegible]	[illegible]				
2. Traffic cones and ribbon are visibly placed around work area		[illegible]				
3. Excavated soils are properly covered and bermed	[illegible]	[illegible]				
4. Any potential tripping hazards have been removed from site	[illegible]	[illegible]				
5 Fire extinguishers are available for use and are fully charged	[illegible]	[illegible]				
6 All vessels containing flammable materials are properly labeled		[illegible]				
7. No smoking signs are visibly posted in the area of potentially flammable vapors	[illegible]	[illegible]				
8. Proper safety equipment is being used for present conditions (e g hard hat, safety glasses, respirator, etc)	[illegible]	[illegible]				
9. All emergency telephone numbers are legibly posted in a visible location	[illegible]	[illegible]				
10. Equipment on-site is in safe working order	[illegible]	[illegible]				
11. No person on site has the appearance of being under the influence of motor skill altering substances	[illegible]	[illegible]				
12. A first aid kit is readily available	[illegible]	[illegible]				
13 All workers on site are clothed in an appropriate manner	[illegible]	[illegible]				
14. The daily site safety meeting has been conducted	[illegible]	[illegible]				

15. Comments and exceptions

May 8th Resurfaced EXCAVATED AREAS with Concrete
May 9th B P TRUCK DROVE over LARGE AREA of new
Concrete [illegible] no Visual damage at this Time,
but we Think TRENCHES will displace somewhat.

Exxon Location #: 7-3535 Date: PK 8/29/96

Status Sat.	Unsat.		
		VI	ELECTRICAL
✓			1 Consultant/contractor has received approval from electrical inspector
✓			2 Electrical panel is properly sized and mounted in an accessible location
✓			3 In non-explosion proof area, all wiring is in good condition (all wiring is properly insulated)
			4 Explosion proof area
✓			a. All wiring is contained in rigid conduit
✓			b All electrical boxes and control panels are explosion proof
✓			c All potential sources of ignition are properly isolated from the area
		VII.	PIPING
✓			1 Piping is in good condition (no visible leaks, cracks, defects, etc)
✓			2 Piping is of the proper size and material specified in the design
✓			3 Influent and effluent piping are either wholly contained in the equipment compound or are protected from breakage (e g buried, fenced in, etc)
✓			4 Underground piping checked per integrity prior to backfilling
✓			a Piping trenches backfilled with washed #57 stone or as per design specifications.
✓			b. Backfill compacted to 95 percent Standard Proctor prior to re-paving
		VIII.	MONITORING/RECOVERY/INJECTION WELLS
✓			1 All wells are properly located on the site as per the design
✓			2 Well vaults per specifications
✓			3 Well vaults are placed flush with the existing pavement/ground surface
✓			4 Existing pavement was saw cut prior to placement of concrete pads around well vaults
✓			5 Concrete pads around well vaults are in good condition (free from cracks or settling)
			6. Monitoring wells are capped and locked
		IX.	WASTE STORAGE AREA
NA			1 Automated LPH recovery storage vessel is sized and designed per specifications and local ordinances
			2 If manual LPH recovery
NA			a. Storage vessels are sealed
NA			b Storage vessels are labeled
NA			c Storage area is secured
			3 Stockpiled/drummed soils
NA			a Are located in an area of reduced visibility and do not interfere with operations)
NA			b Drums are properly labeled
NA			c Stockpiled soils are covered and bermed
NA			d Samples of soils have been taken to obtain analytical for disposal purposes
		X.	SAFETY PRECAUTIONS
✓			1. Appropriate locations have no smoking signs visibly posted
NA			2 If system is operational, there are no strong hydrocarbon odors
✓			3 Emergency contact information has been provided to facility operator or is visibly posted on the outside of the equipment compound
✓			4. No tripping hazards exist as a result of installation of the system

Environmental Engineering
Post-Construction QA/QC Punchlist/Checklist

Exxon Location # 7-3535 Date

COMMENTS: (Explanation of all items checked "Unsatisfactory")

Note Questions concerning the correctness of any items should be confirmed by the system design specifications, Environmental Enginee
Standards, or appropriate supervisors