Appendix A

Carlile Storm Drain Drawings and Storm Drain System Camera Survey

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Memorandum

To: *Mr. Nizar Hindi*

From: *Pam Morrill*

Date: *September 29, 2015*

Subject: *Storm Drain System Camera Survey*
Carlile Facility
2301 Taylor Way
Tacoma, Washington

On September 10, 2015 CDM Smith Inc. (CDM Smith) conducted a camera survey of a portion of the storm drain line at the Carlile facility. Applied Professional Services, Inc. (APS) was subcontracted to conduct the camera survey. The purpose of this investigation was to evaluate the source(s) of dry weather flow into the system. In 1998 and 1999 CDM Smith (previously AGI Technologies) replaced the entire stormwater system. High Density Polyethylene (HDPE) and SDR 35 PVC pipe were used for stormwater conveyance. The stormwater runoff was captured by Type 2 sediment control and Type 1 catch basins and conveyed to new concrete manholes. Monitoring following the replacement indicated these efforts were largely successful in eliminating dry weather flow.

In 2005 the property was redeveloped with the Carlile facility. Drawings for the new facility indicate that upgradient of the stormwater treatment system all the piping was to be replaced, several additional catch basins were to be installed, and many of the existing manholes were to be reused. It is our understanding that there are no as-built drawings of the system. In its comments regarding the Determination of Nonsignificance for the Carlile facility, the Department of Ecology (Ecology) noted that the storm system should be constructed such that infiltration of groundwater would be prevented and that the system should be pressure tested. Ecology files indicate that Ecology requested the system be tested but do not include confirmation that it was done.

An inspection for dry weather flow conducted on May 19, 2015 indicates there is dry weather flow from the system, the rate of which is on the order of 0.25 to 0.5 liter per minute. The following summarizes our observations during storm drain system inspection.

Findings

The attached figure shows the length of the pipe that was camera surveyed and the manhole ID's used during this survey. Initially, only the section between Manhole #2 (MH2) and MH3 was to be camera surveyed, but upon further inspection, the sections between MH2 and MH4 were also included. Note that the numbering of the manholes does not correspond to prior numbering schemes — it follows the numbering scheme shown on the videos.

Manholes

MH1, MH2, and manholes in-between have been converted to a dual use of being catch basins. In doing so, risers were added to the manholes. Seepage between the risers is quite evident at MH1 and the next downstream manhole, MH6, as shown on the following Photos #1 and #2.

Photo #1: MH1 Showing Seepage

Photo #2: MH6 Showing Seepage

Camera Survey between MH1 and MH2

The camera survey between MH1 and MH2 proceeded upstream beginning at MH2. The pipe lengths are 20 foot (ft) sections. However, between 80 ft and 84 ft, there is a four foot section. As shown in photographs #3 and #4 below, the gaskets at both connections appear to be not set correctly and pushed into the pipeline. The gasket at 80 ft may not have been set all the way. Groundwater may be seeping into these joints and around the gasket. These joints are a possible source of infiltration.

Mr. Nizar Hindi
September 29, 2015
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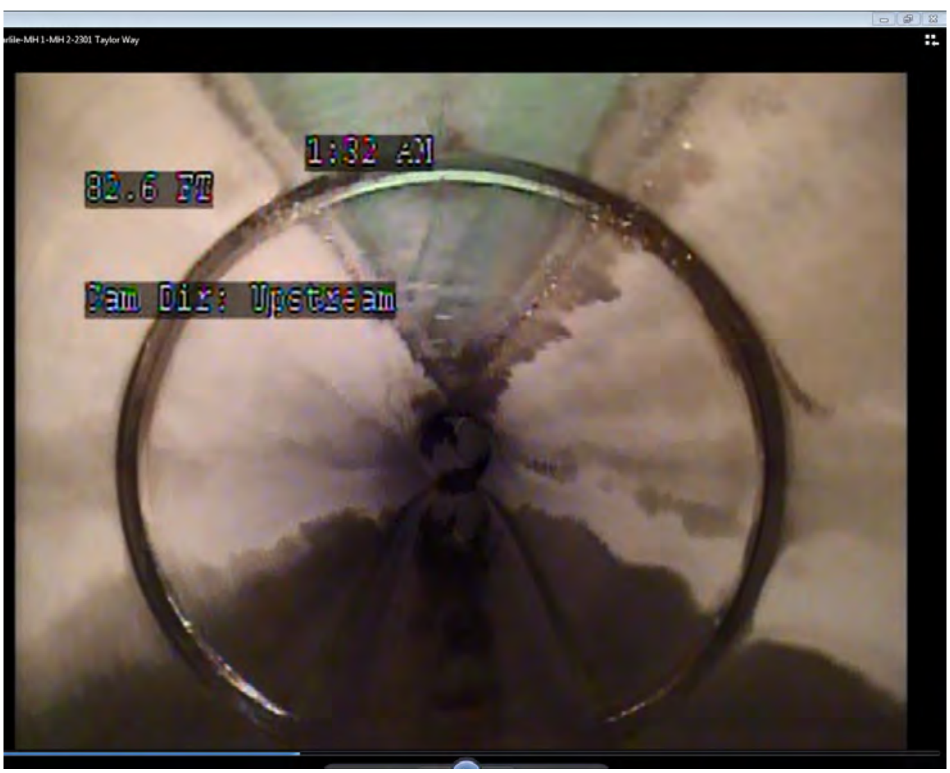
Photo #3 - 80 Feet Upstream of MH2 Showing Section of Pipe with an Incorrectly Set Gasket

Photo #4 - 84 Feet Upstream of MH2 Showing Section of Pipe with an Incorrectly Set Gasket



Beginning at 192 feet from MH2, at MH6, the pipe becomes increasingly full of water. MH6 also appears to have water seepage around the mortared pipe connection (Photo #5). By 225 feet the pipe is greater than 25 percent full of water. The pipe run from MH2 to MH1 is 302 feet long. It appears that the pipe was installed sloping to the southwest from MH6 towards MH1 instead of to the northeast from MH1 towards MH6. This may be causing water to collect in MH1, instead of draining from MH1 to MH6.

Photo #5 - MH6 with Seepage around the Mortared Pipe Connection

Camera Survey between MH2 and MH3

Two videos were needed to capture this entire run as there is a bag of oyster shells in a catch basin, which extends into the pipeline between MH2 and MH3. One video proceeded upstream 141 ft from MH3 toward MH2 where it ended at the oyster shell-filled catch basin. The other video proceeded downstream 117 ft from MH2 where it ended at the same catch basin.

Downstream from MH2

Beginning at 32 feet, accumulations of sediment are observed and the water level in the pipe begins to rise (Photos #6 and #7). Where the pipe section ends at the catch basin it is nearly 25 percent full of water. There are two possible reasons why water and sediments have accumulated in this pipe:

1. It is possible that the oyster shell filter has been plugged with sediment and is causing sediments and water to accumulate in the pipe

2. A sag in the pipe may be present near the location of the bag of oysters. The bag of oyster shells would need to be removed and the pipe cleaned in order to verify this condition.

Photo #6 – Accumulation of Sediment at 37 Feet Downstream of MH2

Photo #7 - Accumulation of Sediment at 43 Feet Downstream of MH2

Upstream from MH3

At 46 ft upstream of MH3 is MH5 (this is the manhole that was recently sampled) where we see an additional pipe that enters the manhole above the main line (Photo #8). It is difficult to ascertain whether there is any flow into the system from this pipe. But where this pipe originates and the purpose of it is unknown. Based on older storm drawings, it appears to be related to a short run and catch basin associated with the original storm drain system, which is now covered over by the existing building. If this is the case, it should have been plugged when the storm drain system was modified for the Carlile facility.

Photo #8 – MH5 Showing the Outfall of an Unknown Section of Storm Drain Line

Conclusions

As stated in the introductory section, the existing storm drain system was mostly replaced in 2005 when the Carlile facility was constructed. Several issues related to the improper construction of the most recent storm drain system were identified during this survey. Any or all of these could result in sources of infiltration of groundwater, resulting in the observed dry weather flows. These include:

1) Ground water seepage between catch basin grade risers. The mortar between the risers may be failing or improperly placed.
2) Improperly set gaskets at two joints between MH1 and MH6
3) Improperly sealed or failing mortar connection at MH6.
4) Storm drain line between MH1 and MH6 installed with a slope in the wrong direction.
5) Accumulation of water and sediments behind the bag of oyster shells between MH2 and MH3.
6) Not having abandoned and sealed an older line that may no longer be of use.

Attachments – Grading and Storm Drainage Plan, Carlile Trucking Facility
DVD of the Storm Drain System Camera Survey

cc: Ms. Joyce Mercuri, Department of Ecology
Mr. Scott Hooton, Port of Tacoma
Mr. Terry Hall, Foley & Mansfield

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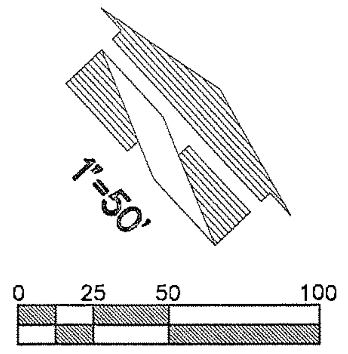
GRADING AND STORM DRAINAGE PLAN



EXISTING CATCH BASIN SCHEDULE

STORM CATCHBASIN #1532
RIM=9.88
I.E.=7.58, 8"PVC (NE)

STORM CATCHBASIN #1877
RIM=9.45
I.E.=7.95, 8"PVC (SE)

STORM CATCHBASIN #1878
RIM=9.52
I.E.=7.57, 8"PVC (NW)
I.E.=7.62, 8"PVC (SE)

STORM CATCHBASIN #1879
RIM=9.21
I.E.=6.81, 8"PVC (NW)
I.E.=6.91, 8"PVC (SW) *PLUGGED
I.E.=6.96, 8"PVC (SE)
EL=7.91, 12"PVC (NE)
*TOP OF PIPE AT 90°ELBOW

STORM CATCHBASIN #1880
RIM=8.89
I.E.=7.27, 8"PVC (NW)

STORM CATCHBASIN #1881
RIM=9.44
I.E.=7.19, 12"PVC (E)

STORM CATCHBASIN #1882
RIM=9.14
I.E.=5.14, 12" PVC (NW)
I.E.=VARIES, 2–6" PVC PIPES (SW)
W/ 90°ELBOWS
COMBINED STORM VAULT SYSTEM
WITH #1883

STORM MANHOLE #1883
RIM=9.19
I.E.=5.29, 12" D.I. (SE)
I.E.=VARIES, 2–6" PVC PIPES (NE)
COMBINED STORM VAULT SYSTEM
WITH #1882

STORM LIFT STATION #1884
RIM=9.10
I.E.=5.40, 12" D.I. (NW)
EL.=6.13, 8" D.I. (NW) *TAKEN AT
TOP OF PIPE
LIFT STATION ACCESS

STORM CATCHBASIN #1885
RIM=9.08
I.E.=7.98, 6" PVC (NW)

STORM CATCHBASIN #1886
RIM=9.57
I.E.=6.27, 6" PVC (NW)
I.E.=6.87, 6" PVC (SW)

STORM MANHOLE #1887
RIM=10.05
I.E.=5.80, 12" PVC (SW)
I.E.=5.80, 12" PVC (NE)
I.E.=5.55, 6" DPVC (SE)

STORM MANHOLE #1888
RIM=9.63
I.E.=5.43, 12" PVC (NE)
I.E.=5.43, 12" PVC (SW)
I.E.=4.93, 6" PVC (SE)

STORM MANHOLE #1889
RIM=9.97
I.E.=5.22, 12" D.I. (NE)
I.E.=5.32, 12" PVC (SW)

STORM CATCHBASIN #1890
RIM=9.26
I.E.=5.86, 6" PVC (NW)
I.E.=6.36, 6" PVC (SE)

STORM CATCHBASIN #1891
RIM=9.56
ABANDONED ***SEE UTILITY NOTE

STORM CATCHBASIN #1892
RIM=9.76
FULL OF WATER

STORM CATCHBASIN #1893
RIM=9.49
I.E.=8.29, 6" PVC (NW)

STORM CATCHBASIN #1894
RIM=9.64
FULL OF WATER

STORM CATCHBASIN #1895
RIM=9.62
EL.=8.77, 8" PVC (N) 90° ELBOW
*TAKEN AT TOP OF PIPE

STORM MANHOLE #1896
RIM=11.65
I.E.=4.80, 12" D.I. (NE)
I.E.=4.65, 12" D.I. (SW)
I.E.=7.53, 6" PVC (E)

STORM CATCHBASIN #1897
RIM=9.70
EL.=8.10, 8" PVC (N) 90° ELBOW
*TAKEN ON TOP OF PIPE

STORM CATCHBASIN #1898
RIM=11.32
I.E.=6.85, 8" PVC (S)
I.E.=VARIES, 4–6" PVC PIPES (NE)
W/ 90°ELBOWS
COMBINED STORM VAULT SYSTEM
WITH #2131

STORM CATCHBASIN #1920
RIM=9.63
I.E.=6.49, 12" PVC (NE)
I.E.=6.67, 12" PVC (SE)

STORM CATCHBASIN #1921
RIM=9.64
I.E.=6.59, 12" PVC (NW)
I.E.=6.59, 12" PVC (SW)

STORM CATCHBASIN #2082
RIM=9.93
I.E.=6.90, 8" PVC (SW)
I.E.=VARIES, 3–6" PVC PIPES
(NE)W/ 90°ELBOWS
COMBINED STORM VAULT SYSTEM
WITH #2132

STORM CATCHBASIN #2086
RIM=11.00
ABANDONED ***SEE UTILITY NOTE

STORM CATCHBASIN #2129
RIM=11.81
I.E.=VARIES, 4–6" PVC PIPES (S)
90°ELBOWS
I.E.=7.32, 12" PVC (NW)
COMBINED STORM VAULT SYSTEM
WITH #2130

STORM MANHOLE #2130
RIM=11.82
I.E.=VARIES, 3–6" PVC PIPES (N)
I.E.=7.07, 12" PVC (SW)
COMBINED STORM VAULT SYSTEM
WITH #2129

STORM MANHOLE #2131
RIM=11.40
I.E.=VARIES, 4–6" PVC PIPES (SW)
I.E.=6.68, 12" PVC (NE)
COMBINED STORM VAULT SYSTEM
WITH #1898

STORM MANHOLE #2132
RIM=9.93
I.E.=7.08, 12" PVC (NE)
I.E.=VARIES, 3–6" PVC PIPES (SW)
COMBINED STORM VAULT SYSTEM
WITH #2082

STORM CATCHBASIN #2135
RIM=10.93
I.E.=7.97, 12" PVC (SE)

STORM MANHOLE #2136
RIM=10.79
I.E.=4.04, 12" PVC (W)
I.E.=3.99, 18" D.I. (SW)
I.E.=3.74, 15" D.I. (SE)
I.E.=3.99, 24" D.I. (NE)

STORM MANHOLE #2137
RIM=10.59
I.E.=5.24, 15" D.I. (NW)
I.E.=5.14, 12" PVC (NE)
I.E.=5.14, 12" PVC (SE)
I.E.=6.29, 12" PVC (SW)

STORM MANHOLE #2138
RIM=10.61
I.E.=6.76, 12" PVC (NW)
I.E.=VARIES, 4–6" PVC PIPES (E)
COMBINED STORM VAULT SYSTEM
WITH #2139

STORM CATCHBASIN #2139
RIM=10.54
I.E.=VARIES, 3–6" PVC PIPES (W)
W/ 90°ELBOWS
COMBINED STORM VAULT SYSTEM
WITH #2138

STORM CATCH BASIN #2201
TYPE 1 RIM=15.99
I.E.=13.74, 8" PVC (NE)

STORM MANHOLE #2202
RIM=16.57
I.E.=5.59, 42" RCP (NW)
I.E.=5.63, 42" RCP (SE)
I.E.=10.62, 8" PVC (SW)
LADDER (S)

STORM CATCH BASIN #2210
TYPE 1 RIM=16.22
I.E.=13.84, 8" PVC (NE)

STORM CATCH BASIN #2213
TYPE 1 RIM=15.82
I.E.=13.20, 8" PVC (NE)

STORM CATCH BASIN #2223
TYPE 1 RIM=15.86
I.E.=13.39, 8" PVC (N,NW)

STORM CATCH BASIN #2239
TYPE 1 RIM=16.10
I.E.=12.99, 8" PVC (SW)

STORM CATCH BASIN #2240
TYPE 1 RIM=16.01
I.E.=13.04, 8" PVC (NE)
I.E.=13.11, 8" PVC (E)

STORM CATCH BASIN #2241
TYPE 1 RIM=15.41
I.E.=13.41, 8" PVC (W)

STORM MANHOLE #2341
RIM=16.43
I.E.=6.03, 42" RCP (NW)
I.E.=6.03, 30" RCP (SE)
TOP OF PIPE=7.18,
12" ? RUNS NE/SW LADDER (N)

STORM CATCH BASIN #2343
TYPE 1 RIM=15.98
I.E.=12.66, 8" PVC (SW)
I.E.=12.20, 10" PVC (NW)

STORM MANHOLE #2344
RIM=16.27
I.E.=6.82, 30" RCP (NW)
I.E.=6.82, 30" RCP (SE)
TOP OF PIPE=7.48,
6" PVC RUNS NE/SW
LADDER (N)

STORM CATCH BASIN #2346
TYPE 1 RIM=15.87
I.E.=13.35, 8" PVC (NW)

STORM CATCH BASIN #2352
TYPE 1 RIM=15.44
I.E.=12.27, 8" PVC (NE)
I.E.=11.74, 8" PVC (SW)

STORM MANHOLE #2353
RIM=15.57 I.E.=8.12, 30" RCP (NW)
I.E.=8.12, 30" RCP (SE)
I.E.=9.39, 8" PVC (NE)
I.E.=9.42, 8" PVC (SW)
LADDER (N)

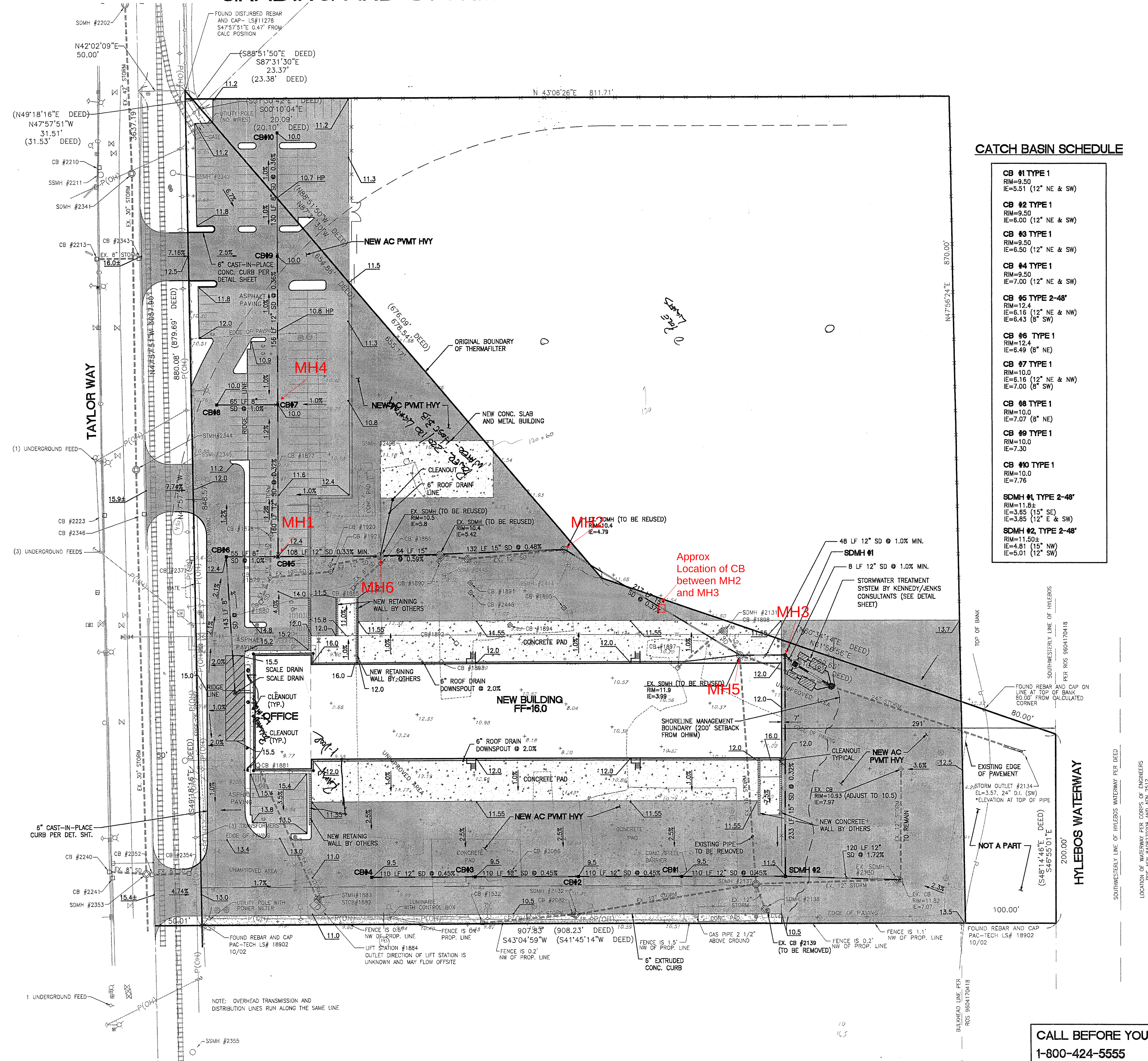
STORM CATCH BASIN #2354
22" DI ROUND RIM=15.55
I.E.=13.74, 8" PVC (SW)

STORM CATCH BASIN #2371
TYPE 1 RIM=15.71
UNABLE TO DIP/
FULL OF DIRT

STORM CATCH BASIN #2446
TYPE 1 RIM=15.60
UNABLE TO DIP/FULL OF DIRT

STORM CATCH BASIN #2522
TYPE 1 RIM=15.60
UNABLE TO DIP/FULL OF DIRT

STORM MANHOLE #2523
RIM=15.78
I.E.=11.48, 12" CMP (NW)
I.E.=6.06, 12" ? (NE)
LADDER (SE)
OUTFALL UNDER WATER



CATCH BASIN SCHEDULE

CB #1 TYPE 1
RIM=9.50
IE=5.51 (12" NE & SW)

CB #2 TYPE 1
RIM=9.50
IE=6.00 (12" NE & SW)

CB #3 TYPE 1
RIM=9.50
IE=6.50 (12" NE & SW)

CB #4 TYPE 1
RIM=9.50
IE=7.00 (12" NE & SW)

CB #5 TYPE 2-48"
RIM=12.4
IE=6.16 (12" NE & NW)
IE=6.43 (8" SW)

CB #6 TYPE 1
RIM=12.4
IE=6.49 (8" NE)

CB #7 TYPE 1
RIM=10.0
IE=6.16 (12" NE & NW)
IE=7.00 (8" SW)

CB #8 TYPE 1
RIM=10.0
IE=7.07 (8" NE)

CB #9 TYPE 1
RIM=10.0
IE=7.30

CB #10 TYPE 1
RIM=10.0
IE=7.76

SDMH #1, TYPE 2-48"
RIM=11.8±
IE=3.65 (15" SE)
IE=3.85 (12" E & SW)

SDMH #2, TYPE 2-48"
RIM=11.50±
IE=4.81 (15" NW)
IE=5.01 (12" SW)

CALL BEFORE YOU DIG:
1-800-424-5555

No.	Date	By	Ckd.	Appr.	Revision
1	12/23/04	BW	AS	AS	REVISED PER CLIENT REVIEW.

Title: GRADING AND STORM DRAINAGE PLAN
CARLILE TRUCKING FACILITY

For: DONAVON BROTHERS CONSTRUCTION
1801 WEST VALLEY HIGHWAY
AUBURN, WA 98001

DANIEL K. BALMELLI, STATE OF WASHINGTON, 25672, REGISTERED PROFESSIONAL ENGINEER
EXPIRES 9/23/05

Scale: Horizontal 1"=50' Vertical N/A

Designed AS
Drawn PRA
Checked AS
Approved DKB
Date 12/13/04

BARGHAUSEN CONSULTING ENGINEERS, INC.
18215 72ND AVENUE SOUTH
KENT, WA 98032
(425)251-6222
(425)251-8782 FAX
CIVIL ENGINEERING, LAND PLANNING, SURVEYING, ENVIRONMENTAL SERVICES

Job Number 11507
Sheet C2 of 4

File: P:\11000s\11507\engineering\11507-gm1.dwg Date/Time: 01/05/2005 17:31 Scale: 1=50 myork Xrefs: z11507-t,z11507-b,dan-b,z11507-t-pts,z11507-s-alt,

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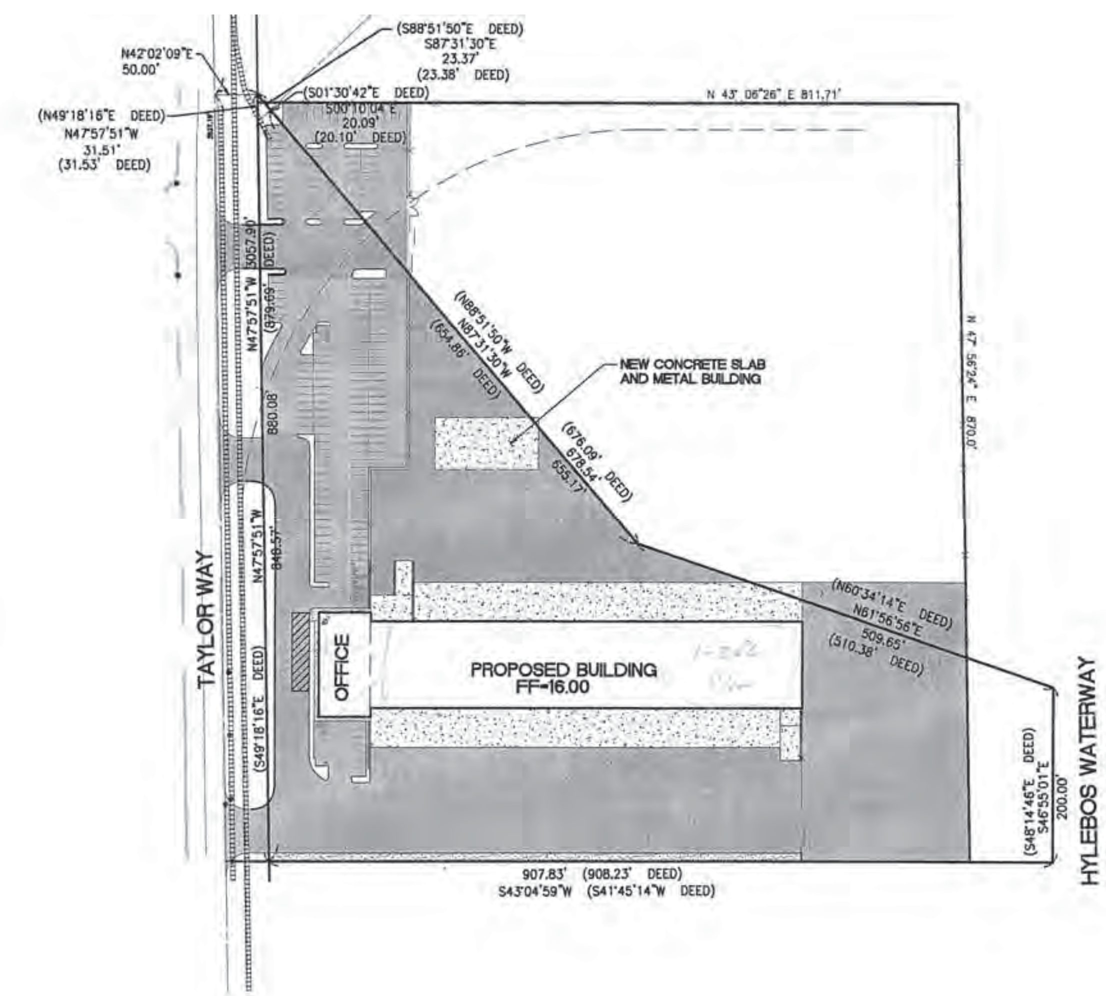
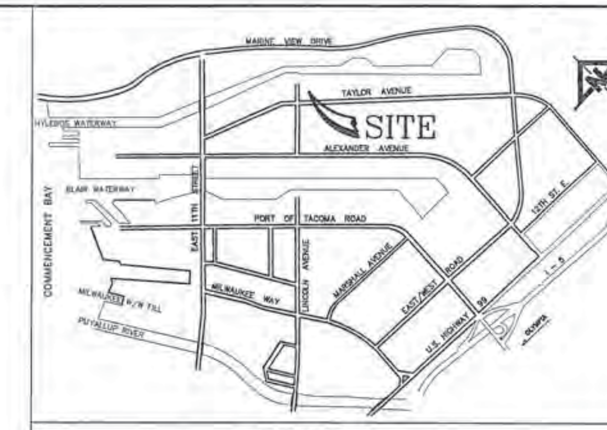
COVER SHEET

A PORTION OF THE N.E. 1/4 OF SECTON 35, TOWNSHIP 21 NORTH, RANGE 3 EAST, W.M.
PIERCE COUNTY, WASHINGTON

1"=100'

0 50 100 200





VICINITY MAP
N.T.S.

LEGEND:

- PROPOSED TYPE II CATCH BASIN
- PROPOSED TYPE I CATCH BASIN
- EXISTING TYPE II CATCH BASIN
- EXISTING TYPE I CATCH BASIN
- PROPOSED STORM DRAINAGE LINE
- EXISTING STORM DRAINAGE LINE
- PROPOSED SANITARY SEWER LINE
- PROPOSED SANITARY SEWER MANHOLE
- PROPOSED SANITARY SEWER CLEANOUT
- EXISTING SANITARY SEWER MANHOLE
- EXISTING SANITARY SEWER LINE
- EXISTING WATERMAIN
- EXISTING FIRE HYDRANT
- EXISTING WATER VALVE
- PROPOSED WATERMAIN
- PROPOSED FIRE HYDRANT
- PROPOSED WATER VALVE
- PROPOSED SPOT ELEVATIONS — 23.2
- EXISTING SPOT ELEVATIONS
- EXISTING CONTOURS — 20
- PROPOSED CONTOURS — 20
- PROPOSED PAVEMENT
- PROPOSED HEAVY DUTY PAVEMENT
- PROPOSED CONCRETE

CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR OBTAINING PERMITS FROM THE WASHINGTON STATE DEPARTMENT OF NATURAL RESOURCES FOR REMOVING AND REPLACING ALL SURVEY MONUMENTATION THAT MAY BE AFFECTED BY CONSTRUCTION ACTIVITY, PURSUANT TO WAC 332-120. APPLICATIONS MUST BE COMPLETED BY A REGISTERED LAND SURVEYOR. APPLICATIONS FOR PERMITS TO REMOVE MONUMENTS MAY BE OBTAINED FROM THE WASHINGTON STATE DEPARTMENT OF NATURAL RESOURCES, OR BY CONTACTING THEIR OFFICE BY TELEPHONE AT (206) 902-1190.

WASHINGTON STATE DEPARTMENT OF NATURAL RESOURCES
PUBLIC LAND SURVEY OFFICE
1111 WASHINGTON STREET S.E.
P.O. BOX 47060
OLYMPIA, WASHINGTON 98504-7060

UPON COMPLETION OF CONSTRUCTION, ALL MONUMENTS DISPLACED, REMOVED, OR DESTROYED SHALL BE REPLACED BY A REGISTERED LAND SURVEYOR, AT THE COST AND AT THE DIRECTION OF THE CONTRACTOR, PURSUANT TO THESE REGULATIONS. THE APPROPRIATE FORMS FOR REPLACEMENT OF SAID MONUMENTATION SHALL ALSO BE THE RESPONSIBILITY OF THE CONTRACTOR.

BASIS OF BEARING

N47°57'51"W – MONUMENTED CENTERLINE OF TAYLOR WAY
PER ROS A.F.N. 9909145004

VERTICAL DATUM

PORT OF TACOMA – TIDE 22 =
19.39' PER PORT OF TACOMA

DESCRIPTION:
A STANDARD DISC STAMPED "TIDE 22 1933" SET IN CONCRETE SIDEWALK ON NORTH SIDE OF AND AT EAST END OF EAST 11 TH STREET BRIDGE OVER PUYALLUP RIVER. IT IS LOCATED ABOUT 3.5 FEET NORTH OF LAMP POST WITH AMBER LIGHT IN TOP AND TWO RED LIGHTS IN BASE (LAMP POST AND LIGHTS PAINTED GREY WHEN VISITED SEPTEMBER 25, 1995).

LEGAL DESCRIPTION:

THAT PORTION OF THE NORTHEAST QUARTER OF THE NORTHEAST QUARTER OF SECTION 35, TOWNSHIP 21 NORTH, RANGE 3 EAST OF THE WILLAMETTE MERIDIAN, IN PIERCE COUNTY, WASHINGTON, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT A MONUMENT IN THE INTERSECTION OF LINCOLN AVENUE AND TAYLOR WAY; THENCE SOUTH 47° 56' 24" EAST FOR 1458.45 FEET;

THENCE NORTH 43° 06' 26" EAST FOR 50.01 FEET TO THE LEASE POINT OF BEGINNING;

THENCE NORTH 47° 56' 24" WEST FOR 870.00 FEET;

THENCE NORTH 43° 06' 26" EAST FOR 811.71 FEET;

THENCE SOUTH 47° 56' 24" EAST FOR 870.00 FEET;

THENCE SOUTH 43° 06' 26" WEST FOR 811.71 FEET TO THE LEASE POINT OF BEGINNING.

SAID AREA CONTAINS APPROXIMATELY 16.2 ACRES

INDEX TO SHEETS:

ENGINEER

BARGHAUSEN CONSULTING ENGINEERS, INC.
18215 72ND AVENUE SOUTH
KENT, WASHINGTON 98032
(425) 251-6222
FAX (425) 251-8782
CONTACT: DANIEL K. BALMELLI

SURVEYOR

HOLMVIG, DEWITT & ASSOCIATES, INC.
1036 COLE STREET
ENUMCLAW, WA 98022
(360) 825-6963

ARCHITECT

DAVID KEHLE ARCHITECT
12720 GATEWAY DRIVE, SUITE 116
TUKWILA, WASHINGTON 98178
(206) 433-8997

OWNER/ DEVELOPER

CARLILE TRANSPORTATION SYSTEMS
1800 EAST 1ST AVENUE
ANCHORAGE, ALASKA 99501
(253)779-8400

UTILITIES/SERVICES

WATER: CITY OF TACOMA
3628 S. 35TH STREET
TACOMA, WA 98409

SEWER: CITY OF TACOMA
3628 S. 35TH STREET
TACOMA, WA 98409

PROJECT ADDRESS:

2301 TAYLOR WAY
TACOMA, WASHINGTON 98406
PARCEL NO.: 388000-0512

CALL BEFORE YOU DIG:
1-800-424-5555

UTILITY CONFLICT NOTE:

CAUTION:
THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE LOCATION, DIMENSION, AND DEPTH OF ALL EXISTING UTILITIES WHETHER SHOWN ON THESE PLANS OR NOT BY POTHOLING THE UTILITIES AND SURVEYING THE HORIZONTAL AND VERTICAL LOCATION PRIOR TO CONSTRUCTION. THIS SHALL INCLUDE CALLING UTILITY LOCATE @ 1-800-424-5555 AND THEN POTHOLING ALL OF THE EXISTING UTILITIES AT LOCATIONS OF NEW UTILITY CROSSINGS TO PHYSICALLY VERIFY WHETHER OR NOT CONFLICTS EXIST. LOCATIONS OF SAID UTILITIES AS SHOWN ON THESE PLANS ARE BASED UPON THE UNVERIFIED PUBLIC INFORMATION AND ARE SUBJECT TO VARIATION. IF CONFLICTS SHOULD OCCUR, THE CONTRACTOR SHALL CONSULT BARGHAUSEN CONSULTING ENGINEERS, INC. TO RESOLVE ALL PROBLEMS PRIOR TO PROCEEDING WITH CONSTRUCTION.

RECEIVED
JAN - 6

No.	Date	By	Ckd.	Appr.	Revision
1	12/23/04	BW	AS	AS	REVISED PER CLIENT REVIEW.

Title: COVER SHEET
CARLILE TRUCKING FACILITY

For: DONAVON BROTHERS CONSTRUCTION
1801 WEST VALLEY HIGHWAY
AUBURN, WA 98001

Scale: Horizontal 1"=100'
Vertical N/A

Designed AS
Drawn PRA
Checked AS
Approved DKB
Date 12/13/04

BARGHAUSEN CONSULTING ENGINEERS, INC.
18215 72ND AVENUE SOUTH
KENT, WA 98032
(425)251-6222
(425)251-8782 FAX
CIVIL ENGINEERING, LAND PLANNING, SURVEYING, ENVIRONMENTAL SERVICES

Job Number 11507
Sheet C1 of 4

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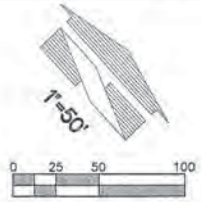
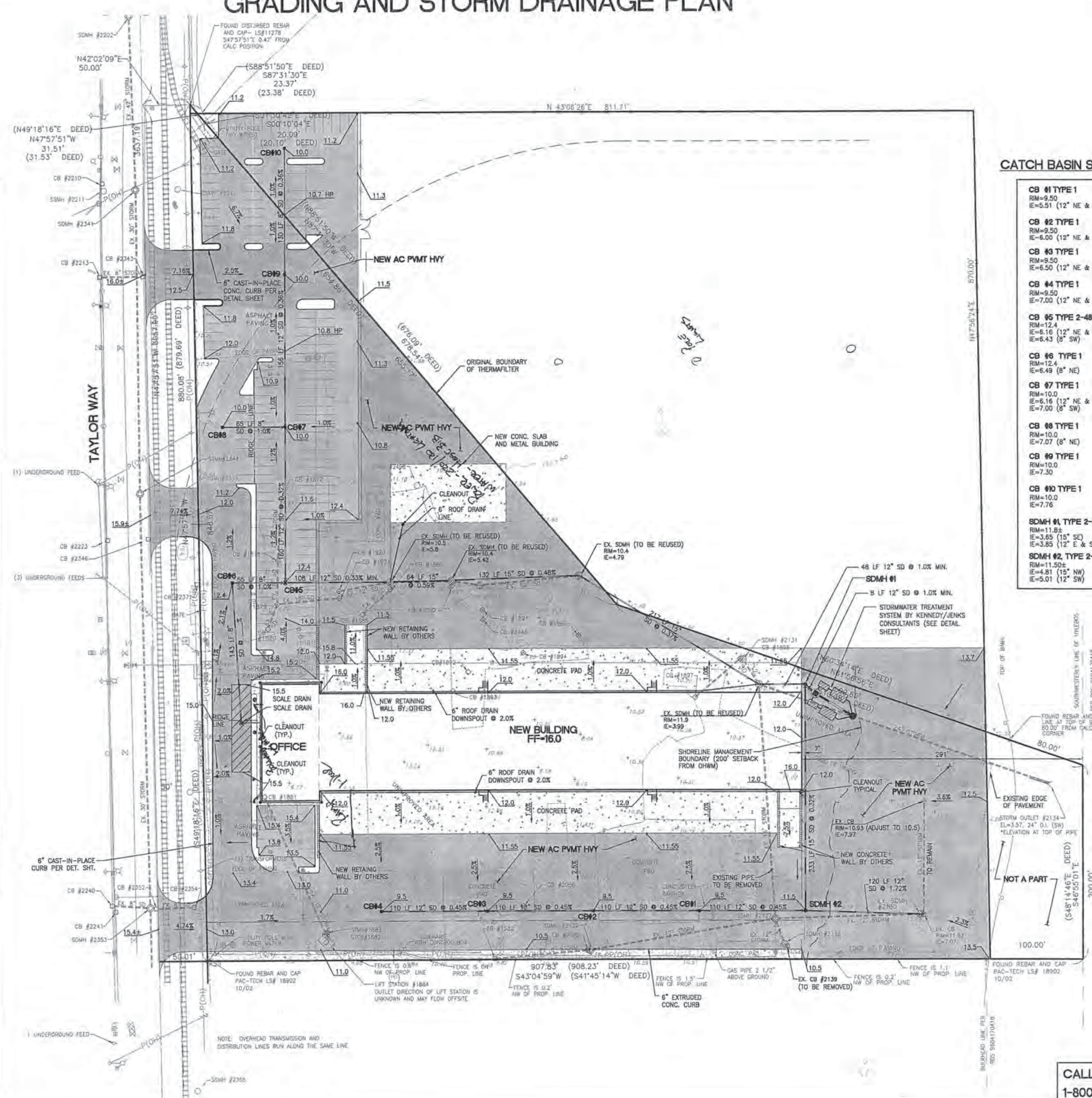
GRADING AND STORM DRAINAGE PLAN





EXISTING CATCH BASIN SCHEDULE

STORM CATCHBASIN #1532
RIM=9.88
I.E.=7.58, 8"PVC (NE)

STORM CATCHBASIN #1877
RIM=9.45
I.E.=7.95, 8"PVC (SE)

STORM CATCHBASIN #1878
RIM=9.52
I.E.=7.57, 8"PVC (NW)
I.E.=7.62, 8"PVC (SE)

STORM CATCHBASIN #1879
RIM=9.21
I.E.=6.81, 8"PVC (NW)
I.E.=6.91, 8"PVC (SW) *PLUGGED
I.E.=6.96, 8"PVC (SE)
EL=7.91, 12"PVC (NE)
*TOP OF PIPE AT 90'ELBOW

STORM CATCHBASIN #1880
RIM=8.89
I.E.=7.27, 8"PVC (NW)

STORM CATCHBASIN #1881
RIM=9.44
I.E.=7.19, 12"PVC (E)

STORM CATCHBASIN #1882
RIM=9.14
I.E.=5.14, 12" PVC (NW)
I.E.=VARIES, 2-6" PVC PIPES (SW)
W/ 90'ELBOWS
COMBINED STORM VAULT SYSTEM
WITH #1883

STORM MANHOLE #1883
RIM=9.19
I.E.=5.29, 12" D.I. (SE)
I.E.=VARIES, 2-6" PVC PIPES (NE)
COMBINED STORM VAULT SYSTEM
WITH #1882

STORM LIFT STATION #1884
RIM=9.10
I.E.=5.40, 12" D.I. (NW)
EL.=6.13, 8" D.I. (NW) *TAKEN AT
TOP OF PIPE
LIFT STATION ACCESS

STORM CATCHBASIN #1885
RIM=9.06
I.E.=7.98, 6" PVC (NW)

STORM CATCHBASIN #1886
RIM=9.57
I.E.=6.27, 6" PVC (NW)
I.E.=6.87, 6" PVC (SW)

STORM MANHOLE #1887
RIM=10.05
I.E.=5.80, 12" PVC (SW)
I.E.=5.80, 12" PVC (NE)
I.E.=5.55, 6" DPVC (SE)

STORM MANHOLE #1888
RIM=9.63
I.E.=5.43, 12" PVC (NE)
I.E.=5.43, 12" PVC (SW)
I.E.=4.93, 6" PVC (SE)

STORM MANHOLE #1889
RIM=9.97
I.E.=5.22, 12" D.I. (NE)
I.E.=5.32, 12" PVC (SW)

STORM CATCHBASIN #1890
RIM=9.26
I.E.=5.86, 6" PVC (NW)
I.E.=6.36, 6" PVC (SE)

STORM CATCHBASIN #1891
RIM=9.56
ABANDONED ***SEE UTILITY NOTE

STORM CATCHBASIN #1892
RIM=9.76
FULL OF WATER

STORM CATCHBASIN #1893
RIM=9.49
I.E.=8.29, 6" PVC (NW)

STORM CATCHBASIN #1894
RIM=9.64
FULL OF WATER

STORM CATCHBASIN #1895
RIM=9.62
EL.=8.77, 8" PVC (N) 90' ELBOW
*TAKEN AT TOP OF PIPE

STORM MANHOLE #1896
RIM=11.65
I.E.=4.80, 12" D.I. (NE)
I.E.=4.65, 12" D.I. (SW)
I.E.=7.53, 6" PVC (E)

STORM CATCHBASIN #1897
RIM=9.70
EL.=8.10, 8" PVC (N) 90' ELBOW
*TAKEN ON TOP OF PIPE

STORM CATCHBASIN #1898
RIM=11.32
I.E.=6.85, 8" PVC (S)
I.E.=VARIES, 4-6" PVC PIPES (NE)
W/ 90'ELBOWS
COMBINED STORM VAULT SYSTEM
WITH #2131

STORM CATCHBASIN #1920
RIM=9.63
I.E.=6.49, 12" PVC (NE)
I.E.=6.67, 12" PVC (SE)

STORM CATCHBASIN #1921
RIM=9.64
I.E.=6.59, 12" PVC (NW)
I.E.=6.59, 12" PVC (SW)

STORM CATCHBASIN #2082
RIM=9.93
I.E.=6.90, 8" PVC (SW)
I.E.=VARIES, 3-6" PVC PIPES
(NE)W/ 90'ELBOWS
COMBINED STORM VAULT SYSTEM
WITH #2132

STORM CATCHBASIN #2086
RIM=11.00
ABANDONED ***SEE UTILITY NOTE

STORM CATCHBASIN #2129
RIM=11.81
I.E.=VARIES, 4-6" PVC PIPES (S)
90'ELBOWS
I.E.=7.32, 12" PVC (NW)
COMBINED STORM VAULT SYSTEM
WITH #2130

STORM MANHOLE #2130
RIM=11.82
I.E.=VARIES, 3-6" PVC PIPES (N)
I.E.=7.07, 12" PVC (SW)
COMBINED STORM VAULT SYSTEM
WITH #2129

STORM MANHOLE #2131
RIM=11.40
I.E.=VARIES, 4-6" PVC PIPES (SW)
I.E.=6.68, 12" PVC (NE)
COMBINED STORM VAULT SYSTEM
WITH #1898

STORM MANHOLE #2132
RIM=9.93
I.E.=7.08, 12" PVC (NE)
I.E.=VARIES, 3-6" PVC PIPES (SW)
COMBINED STORM VAULT SYSTEM
WITH #2082

STORM CATCHBASIN #2135
RIM=10.93
I.E.=7.97, 12" PVC (SE)

STORM MANHOLE #2136
RIM=10.79
I.E.=4.04, 12" PVC (W)
I.E.=3.99, 18" D.I. (SW)
I.E.=3.74, 15" D.I. (SE)
I.E.=3.99, 24" D.I. (NE)

STORM MANHOLE #2137
RIM=10.59
I.E.=5.24, 15" D.I. (NW)
I.E.=5.14, 12" PVC (NE)
I.E.=5.14, 12" PVC (SE)
I.E.=6.29, 12" PVC (SW)

STORM MANHOLE #2138
RIM=10.61
I.E.=6.78, 12" PVC (NW)
I.E.=VARIES, 4-6" PVC PIPES (E)
COMBINED STORM VAULT SYSTEM
WITH #2139

STORM CATCHBASIN #2139
RIM=10.54
I.E.=VARIES, 3-6" PVC PIPES (W)
W/ 90'ELBOWS
COMBINED STORM VAULT SYSTEM
WITH #2138

STORM CATCH BASIN #2201
TYPE 1 RIM=15.99
I.E.=13.74, 8" PVC (NE)

STORM MANHOLE #2202
RIM=16.57
I.E.=5.59, 42" RCP (NW)
I.E.=5.63, 42" RCP (SE)
I.E.=10.62, 8" PVC (SW)
LADDER (S)

STORM CATCH BASIN #2210
TYPE 1 RIM=16.22
I.E.=13.84, 8" PVC (NE)

STORM CATCH BASIN #2213
TYPE 1 RIM=15.82
I.E.=13.20, 8" PVC (NE)

STORM CATCH BASIN #2223
TYPE 1 RIM=15.86
I.E.=13.39, 8" PVC (N,NW)

STORM CATCH BASIN #2239
TYPE 1 RIM=16.10
I.E.=12.99, 8" PVC (SW)

STORM CATCH BASIN #2240
TYPE 1 RIM=16.01
I.E.=13.04, 8" PVC (NE)
I.E.=13.11, 8" PVC (E)

STORM CATCH BASIN #2241
TYPE 1 RIM=15.41
I.E.=13.41, 8" PVC (W)

STORM MANHOLE #2341
RIM=16.43
I.E.=6.03, 42" RCP (NW)
I.E.=6.03, 30" RCP (SE)
TOP OF PIPE=7.18,
12" ? RUNS NE/SW LADDER (N)

STORM CATCH BASIN #2343
TYPE 1 RIM=15.98
I.E.=12.66, 8" PVC (SW)
I.E.=12.20, 10" PVC (NW)

STORM MANHOLE #2344
RIM=16.27
I.E.=6.82, 30" RCP (NW)
I.E.=6.82, 30" RCP (SE)
TOP OF PIPE=7.48,
6" PVC RUNS NE/SW
LADDER (N)

STORM CATCH BASIN #2346
TYPE 1 RIM=15.87
I.E.=13.35, 8" PVC (NW)

STORM CATCH BASIN #2352
TYPE 1 RIM=15.44
I.E.=12.27, 8" PVC (NE)
I.E.=11.74, 8" PVC (SW)

STORM MANHOLE #2353
RIM=15.57 I.E.=8.12, 30" RCP (NW)
I.E.=8.12, 30" RCP (SE)
I.E.=9.39, 8" PVC (NE)
I.E.=9.42, 8" PVC (SW)
LADDER (N)

STORM CATCH BASIN #2354
22" DI ROUND RIM=15.55
I.E.=13.74, 8" PVC (SW)

STORM CATCH BASIN #2371
TYPE 1 RIM=15.71
UNABLE TO DIP/
FULL OF DIRT

STORM CATCH BASIN #2446
TYPE 1 RIM=15.60
UNABLE TO DIP/FULL OF DIRT

STORM CATCH BASIN #2522
TYPE 1 RIM=15.60
UNABLE TO DIP/FULL OF DIRT

STORM MANHOLE #2523
RIM=15.78
I.E.=11.48, 12" CMP (NW)
I.E.=6.05, 12" ? (NE)
LADDER (SE)
OUTFALL UNDER WATER

CATCH BASIN SCHEDULE

CB #1 TYPE 1
RIM=9.50
IE=5.51 (12" NE & SW)

CB #2 TYPE 1
RIM=9.50
IE=6.00 (12" NE & SW)

CB #3 TYPE 1
RIM=9.50
IE=6.50 (12" NE & SW)

CB #4 TYPE 1
RIM=9.50
IE=7.00 (12" NE & SW)

CB #5 TYPE 2-48"
RIM=12.4
IE=6.16 (12" NE & NW)
IE=6.43 (8" SW)

CB #6 TYPE 1
RIM=12.4
IE=6.49 (8" NE)

CB #7 TYPE 1
RIM=10.0
IE=6.16 (12" NE & NW)
IE=7.00 (8" SW)

CB #8 TYPE 1
RIM=10.0
IE=7.07 (8" NE)

CB #9 TYPE 1
RIM=10.0
IE=7.30

CB #10 TYPE 1
RIM=10.0
IE=7.76

SDMH #1, TYPE 2-48"
RIM=11.8±
IE=3.65 (15" SE)
IE=3.85 (12" E & SW)

SDMH #2, TYPE 2-48"
RIM=11.50±
IE=4.81 (15" NW)
IE=5.01 (12" SW)

CALL BEFORE YOU DIG:
1-800-424-5555

No.	Date	By	Ckd.	Appr.	Revision
1	12/23/04	BW	AS	AS	REVISED PER CLIENT REVIEW.

Title:
GRADING AND STORM DRAINAGE PLAN
CARLILE TRUCKING FACILITY

For:
DONAVON BROTHERS CONSTRUCTION
1801 WEST VALLEY HIGHWAY
AUBURN, WA 98001

DANIEL K. BALMELLI, STATE OF WASHINGTON, 25672, REGISTERED PROFESSIONAL ENGINEER
EXPIRES 9/23/05

Scale: Horizontal 1"=50' Vertical N/A

Designed AS
Drawn PRA
Checked AS
Approved DKB
Date 12/13/04

BARGHAUSEN CONSULTING ENGINEERS, INC.
18215 72ND AVENUE SOUTH
KENT, WA 98032
(425)251-6222
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CIVIL ENGINEERING, LAND PLANNING, SURVEYING, ENVIRONMENTAL SERVICES

Job Number 11507
Sheet C2 of 4

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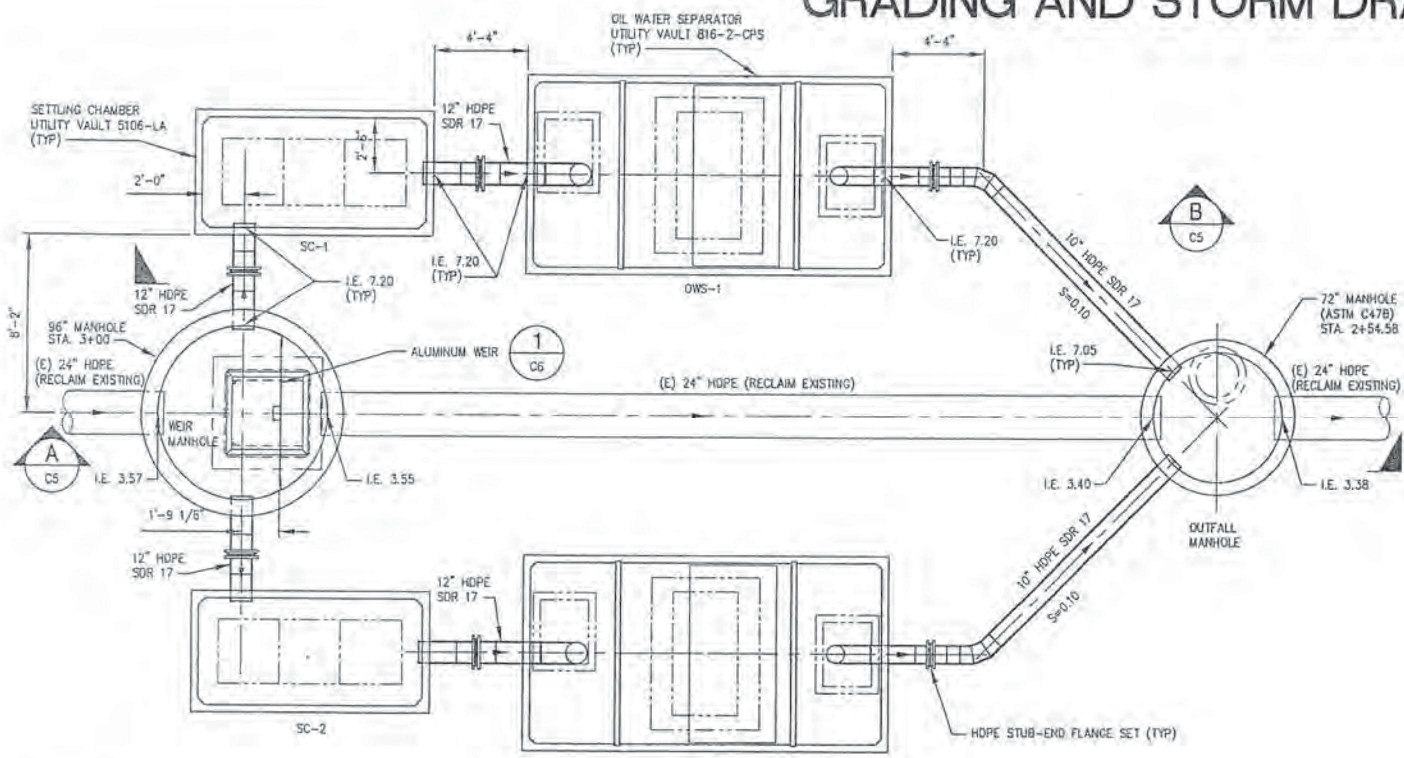
GRADING AND STORM DRAINAGE NOTES AND DETAILS

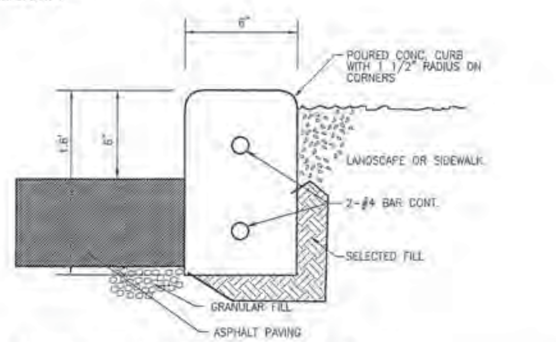


PLAN

SCALE: 1"=4' NOTE: SEE APPROVED WATER QUALITY TREATMENT PLANS BY KENNEDY/ JENKS CONSULTANTS.

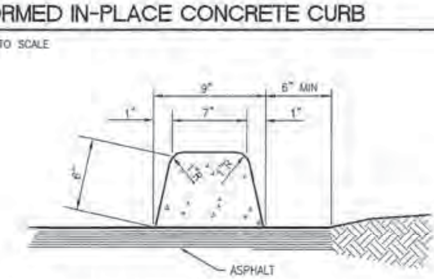
GENERAL NOTES

1. ALL MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE LATEST VERSION OF THE STATE OF WASHINGTON, DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION AND THE CITY OF TACOMA ROAD STANDARDS.
2. IT WILL BE THE APPLICANT'S OR HIS AGENT'S RESPONSIBILITY TO CONTACT ALL UTILITY COMPANIES TO COORDINATE CONSTRUCTION. ALL UTILITY RELOCATION WORK SHALL BE AT THE EXPENSE OF THE APPLICANT AND MUST BE IN ACCORDANCE WITH THE CITY OF TACOMA STANDARDS.
3. BURIED UTILITIES ARE SHOWN IN THEIR APPROXIMATE LOCATION. THE APPLICANT OR HIS CONTRACTOR SHALL HAVE THE UTILITIES VERIFIED ON THE GROUND PRIOR TO ANY CONSTRUCTION.
4. ANY REVISIONS TO THESE PLANS MUST BE REVIEWED AND APPROVED BY THE CITY OF TACOMA PUBLIC WORKS DEPT. PRIOR TO ANY IMPLEMENTATION IN THE FIELD.
5. THE CONTRACTOR SHALL NOTIFY THE APPLICANT'S ENGINEER IN THE EVENT OR DISCOVERY OF POOR SOILS, STANDING GROUNDWATER, OR DISCREPANCIES FROM PLANS IN EXISTING CONDITIONS.
6. ON-SITE EROSION CONTROL MEASURES SHALL BE THE RESPONSIBILITY OF THE DEVELOPER. ANY PROBLEMS OCCURRING BEFORE FINAL ACCEPTANCE BY THE ENGINEER SHALL BE CORRECTED BY THE DEVELOPER/OWNER/PROPONENT.
7. A COPY OF THESE APPROVED PLANS MUST BE ON THE JOB SITE WHENEVER CONSTRUCTION IS IN PROGRESS.
8. THE ENGINEER SHALL BE NOTIFIED 48 HOURS BEFORE CONSTRUCTION IS STARTED.
9. SLOPES ARE TO BE STABILIZED TO PREVENT EROSION. IN CASE EROSION OCCURS ON CUT OR FILL SLOPES OR IN DITCHES, LINING IS TO BE PROVIDED AS SPECIFIED ON THESE PLANS OR AS REQUESTED BY THE ENGINEER.
10. ALL CONSTRUCTION SHALL CONFORM TO THE REQUIREMENTS OF THE STANDARD SPECIFICATIONS AND THESE PLANS. WHERE CONFLICTS OCCUR, THE MORE STRINGENT REQUIREMENTS SHALL APPLY.
11. CONTRACTOR IS TO TAKE NECESSARY STEPS TO CONTROL DUST DURING CONSTRUCTION IN DRY MONTHS. DUST CONTROL MAY REQUIRE PERIODIC WATERING OF SITE.
12. BANK RUN GRAVEL FOR TRENCH BACKFILL SHALL MEET THE REQUIREMENTS OF SECTION 9.03.18 OF THE CITY OF TACOMA AMENDMENT TO THE STANDARD SPECIFICATIONS.
13. IF WORKERS ENTER ANY TRENCH OR OTHER EXCAVATION FOUR FEET OR MORE IN DEPTH, THAT DOES NOT MEET THE OPEN PIT REQUIREMENTS OF SECTION 2-09.3(3)B, IT SHALL BE SHORED AND CRIBBED. THE CONTRACTOR ALONE SHALL BE RESPONSIBLE FOR WORKER SAFETY. ALL TRENCH SAFETY SYSTEMS SHALL MEET THE REQUIREMENTS OF THE WASHINGTON INDUSTRIAL SAFETY AND HEALTH ACT, CHAPTER 49.17 RCW.
14. CONTRACTOR SHALL VISIT THE SITE PRIOR TO SUBMITTING A BID FOR WORK & VERIFY EXISTING CONDITIONS, WHICH WILL AFFECT THE CONTRACTOR'S COST FOR DOING THE WORK, AND INCLUDE THESE IN BID AMOUNT.
15. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR THE MEANS, METHODS AND SEQUENCES OF CONSTRUCTION AND FOR THE SAFETY OF WORKERS AND OTHERS ON THE CONSTRUCTION SITE. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO OBTAIN ANY AND ALL RELATED PERMITS PRIOR TO ANY CONSTRUCTION.
16. IT WILL BE THE DEVELOPER'S OR ITS AGENT'S RESPONSIBILITY TO CONTACT ALL UTILITY COMPANIES IN ORDER TO ASSURE THAT ALL LINES, PIPES, POLES AND OTHER APPURTENANCES ARE PROPERLY LOCATED AND THEIR INSTALLATION IS COORDINATED WITH THE ROAD CONSTRUCTION. ALL UTILITY RELOCATION WORK SHALL BE AT THE EXPENSE OF THE DEVELOPER AND MUST BE IN ACCORDANCE WITH STANDARDS ADOPTED BY THE CITY OF TACOMA PRIOR TO ROAD ACCEPTANCE. THE UNDERGROUND UTILITIES CENTER LOCATION NUMBER IS 1-800-424-5555.



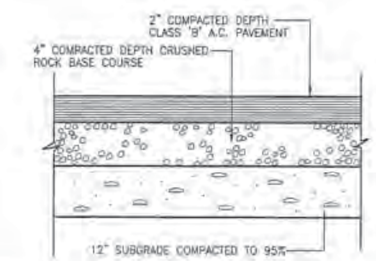
FORMED IN-PLACE CONCRETE CURB

NOT TO SCALE



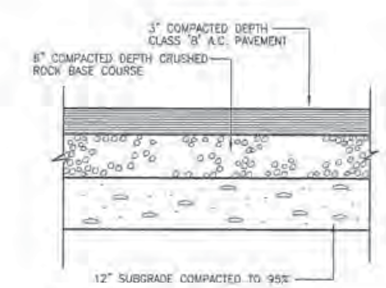
EXTRUDED CONCRETE CURB DETAIL

NOT TO SCALE



TYPICAL PAVING SECTION

(ALTERNATIVE: 3" ATB W/2" CLASS 'B' A.C. PAVEMENT) NOT TO SCALE



HEAVY DUTY PAVING SECTION

(ALTERNATIVE: 4" ATB W/3" CLASS 'B' A.C. PAVEMENT) NOT TO SCALE

DESIGN NOTES

1. WATER QUALITY FLOW RATE

   THE WATER QUALITY FLOW RATE USED IN DESIGN OF RUNOFF TREATMENT BMPS IS 91% OF 6 MONTH, 24 HOUR PEAK. FLOW RATE OF 2.64 CFS = 2.40 CFS.

2. 100 YEAR DESIGN

   THE PEAK 100 YEAR, 24 HOUR STORM FLOW RATE USED IN CAPACITY DESIGN OF RUNOFF TREATMENT BMPS IS 10.94 CFS REPRESENTING THE PEAK FLOW RATE FROM THE 100 YEAR, 24 HOUR STORM EVENT OF 9.03 CFS PLUS A FACTOR OF SAFETY OF 1.5 X THE FLOW FROM AREAS TRIBUTARY TO THE LIFT STATION IN MH 1884 TO COMPENSATE FOR SURGE FLOWS DURING PUMPING.

3. SETTLING CHAMBER DESIGN

   SC-1 AND SC-2 WERE DESIGNED TO EXCEED THE FOLLOWING GRIT CHAMBER DESIGN PARAMETERS:
   DETENTION TIME = >60 SEC
   HORIZONTAL VELOCITY = <1.0ft/sec
   SETTLING VELOCITY (100 MESH) = 2.5ft/min

4. OIL WATER SEPARATOR DESIGN

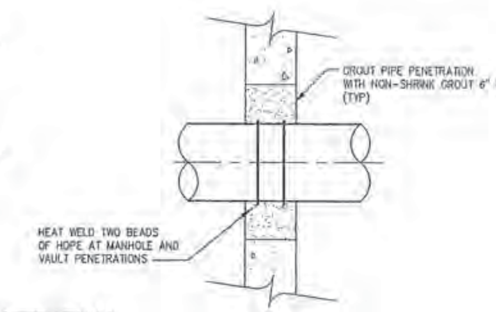
   OWS-1 AND OWS-2 HAVE RATED TREATMENT CAPACITY OF 1.30 CFS EACH. EACH LEG OF THE TREATMENT TRAIN IS DESIGNED TO BYPASS FLOWS IN EXCESS OF 2.04 X WATER QUALITY FLOW RATE OR 2.45 CFS.

5. WEIR DESIGN

   THE SYSTEM WEIR IS DESIGNED TO BEGIN TO BYPASS FLOWS ABOVE THE WATER QUALITY FLOW RATE. THE SYSTEM HAS BEEN DESIGNED TO BYPASS 6.04 CFS OVER THE WEIR WHEN THE MAXIMUM OWS CAPACITY IS REACHED TOTALLING THE PEAK FLOW RATE OF THE 100 YEAR, 24 HOUR STORM.

CONSTRUCTION NOTES

1. 18" COMPACTED BASE MATERIAL, 3/4" MINUS WASHED ROCK UNDER ALL NEW MANHOLES AND VAULTS.
2. ALL NEW STORM DRAIN PIPE TO BE INSTALLED SHALL BE FUSED HDPE SDR 17.
3. FILL STRUCTURES W/WATER PRIOR TO BACKFILL.
4. FOR ALL HDPE FLANGES PROVIDE 304SS BACKER FLANGES AND BOLTING.
5. FOR ALL MANHOLES AND VAULTS COAT EXTERIOR W/ 16 MILS OF COALTAR EPOXY.
6. DESIGN MANHOLE AND VAULT TOPS FOR H20 LOADING.
7. TAILWATER ELEVATION 7.26' REPRESENTS MEAN HIGHER HIGH WATER OF 6.26' NGVD 1929. (NEW TACOMA DATUM) + 1' OF HEAD ASSUMED TO BE REQUIRED TO OPEN OUTFALL FLAP GATE.



PIPE PENETRATION DETAIL

NOT TO SCALE NOTE: SEE APPROVED WATER QUALITY TREATMENT PLANS BY KENNEDY/ JENKS CONSULTANTS.

GRADING NOTES

1. THE CONTRACTOR SHALL STRIP THE SURFACE ORGANIC MATERIAL WITHIN THE BUILDING AND LOT AREAS TO BE FILLED AND DISPOSE OF THE UNSUITABLE MATERIAL AS DIRECTED BY THE OWNER.
2. PRIOR TO THE PLACEMENT OF STRUCTURAL FILL OR BASE ROCK FOR THE BUILDING SITES, PAVED AREAS AND CONCRETE FLATWORK CORRIDORS, THE CONTRACTORS SHALL SCARIFY THE AREAS TO BE FILLED OR ROCKED TO A DEPTH OF 6 INCHES (6") MINIMUM. ONCE SCARIFIED, THE SOILS SHALL BE CONDITIONED TO THE PROPER MOISTURE CONTENT FOR COMPACTION AND COMPACTED TO AT LEAST NINETY-FIVE (95%) OF THE MAXIMUM DRY DENSITY, AS DETERMINED BY THE ASTM COMPACTION TEST PROCEDURE D-1557-70, VERIFY WITH SOILS ENGINEERS' RECOMMENDATIONS.
3. THE CONTRACTOR SHALL PLACE THE STRUCTURAL FILL MATERIAL IN EIGHT INCH (8") LOOSE LIFTS CONDITIONED TO THE PROPER MOISTURE CONTENT FOR COMPACTION AND COMPACTED TO AT LEAST NINETY-FIVE (95%) OF THE MAXIMUM DRY DENSITY, AS DETERMINED BY THE ASTM COMPACTION TEST PROCEDURE D-1557-70.
4. DETRIMENTAL AMOUNTS OF ORGANIC MATERIAL SHALL NOT BE PERMITTED IN FILLS. ALL IMPORTED MATERIAL SHALL BE IMPORTED GRAVEL "CLASS B" BANKRUN OR BETTER.
5. EXCAVATION STANDARDS:

   CUT SLOPES:
   SLOPES SHALL NOT BE STEEPER THAN 2 HORIZONTAL TO 1 VERTICAL, OR AS RECOMMENDED BY A SOILS ENGINEER.

   THE CATCH POINT OF THE TOP OF THE SLOPE SHALL BE SETBACK FROM THE SITE BOUNDARY LINE IN ACCORDANCE WITH THE FOLLOWING TABLE UNLESS A RETAINING WALL IS DESIGNED BY THE ENGINEER AND CONSTRUCTED FOR THE PROJECT.

CUT DEPTH	SETBACK DISTANCE
UNDER 5 FEET	2 FEET
5-20 FEET	HEIGHT / 2
OVER 20 FEET	10 FEET

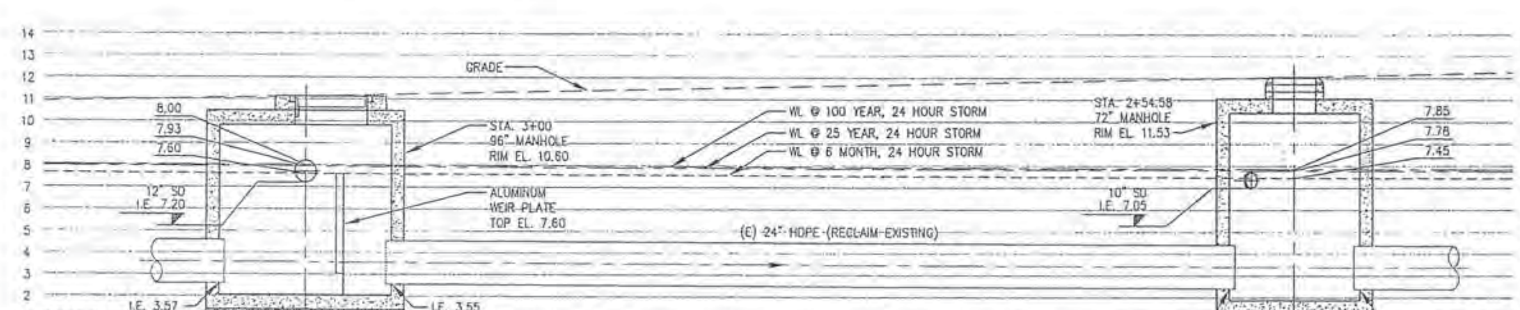
6. FILL STANDARDS:

   FILL LOCATION:
   SLOPES SHALL NOT BE STEEPER THAN 1-1/2 HORIZONTAL TO 1 VERTICAL, OR AS RECOMMENDED BY A SOILS ENGINEER. FILL SITES MUST BE APPROVED BY THE ENGINEER AS SUITABLE LOCATIONS FOR THE PROPOSED FILL.

   PREPARATION OF THE GROUND:
   THE GROUND SURFACE FOR FILLS OVER FIVE FEET IN HEIGHT SHALL BE PREPARED BY REMOVING VEGETATION, NON-COMPLYING FILL, TOPSOIL AND OTHER UNSUITABLE MATERIALS; SCARIFYING TO PROVIDE A BOND WITH THE NEW FILL; AND, WHERE EXISTING SLOPES ARE STEEPER THAN 5 HORIZONTAL TO 1 VERTICAL, BY BENCHING INTO COMPETENT MATERIAL AS DETERMINED BY THE ENGINEER. THE BENCH UNDER THE TOE OF A FILL ON A SLOPE STEEPER THAN 5 HORIZONTAL TO 1 VERTICAL SHALL BE AT LEAST 10 FEET WIDE, OR AS RECOMMENDED BY A SOILS ENGINEER.

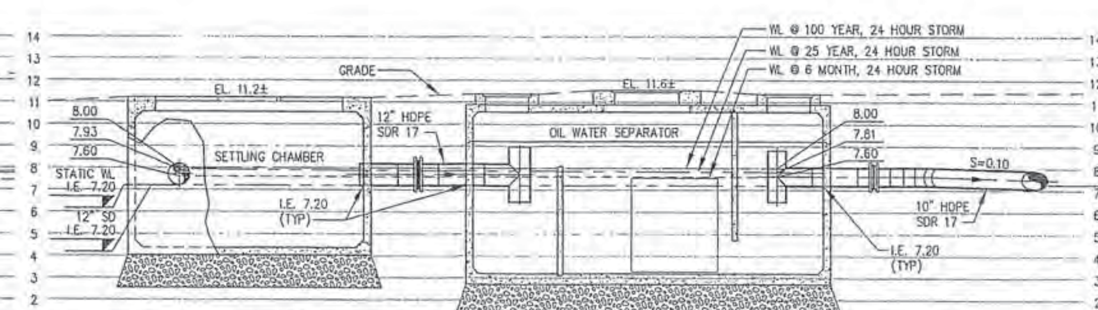
   SETBACK FROM PROPERTY LINES:
   THE TOE OR CATCH POINT OF FILL SLOPES SHALL BE SET BACK FROM THE SITE BOUNDARY LINE IN ACCORDANCE WITH THE FOLLOWING TABLE, UNLESS A RETAINING WALL IS DESIGNED BY THE ENGINEER AND CONSTRUCTED FOR THE PROJECT.

FILL DEPTH	SETBACK DISTANCE
UNDER 5 FEET	2 FEET
5-40 FEET	HEIGHT / 2
OVER 40 FEET	20 FEET



SECTION A

SCALE: 1"=4' NOTE: SEE APPROVED WATER QUALITY TREATMENT PLANS BY KENNEDY/ JENKS CONSULTANTS.



SECTION B

SCALE: 1"=4' NOTE: SEE APPROVED WATER QUALITY TREATMENT PLANS BY KENNEDY/ JENKS CONSULTANTS.

No.	Date	By	Ckd.	Appr.	Revision
1	12/23/04	BW	AS	AS	REVISED PER CLIENT REVIEW.

Title: GRADING AND STORM DRAINAGE NOTES AND DETAILS
CARLILE TRUCKING FACILITY

For: DONAVON BROTHERS CONSTRUCTION
1801 WEST VALLEY HIGHWAY
AUBURN, WA 98001

Scale: Horizontal AS SHOWN; Vertical AS SHOWN

Designed AS; Drawn PRA; Checked AS; Approved DKB; Date 12/10/04

BARGHAUSEN CONSULTING ENGINEERS, INC.
18215 72ND AVENUE SOUTH
KENT, WA 98032
(425)251-6222
(425)251-8782 FAX
CIVIL ENGINEERING, LAND PLANNING, SURVEYING, ENVIRONMENTAL SERVICES

Job Number 11507

Sheet C3 of 4

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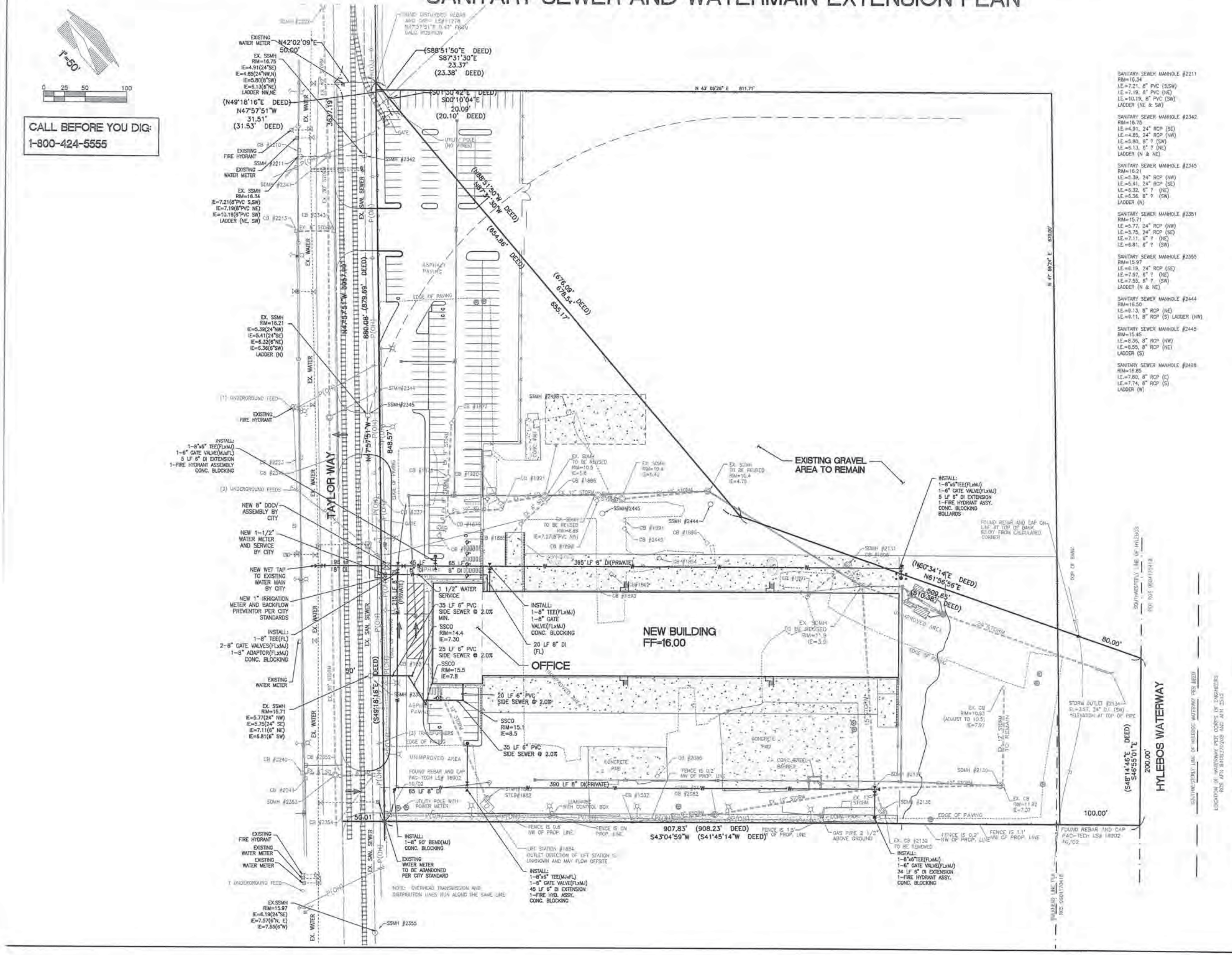
SANITARY SEWER AND WATERMAIN EXTENSION PLAN



No.	Date	By	Ckd.	Appr.	Revision
1	12/23/04	BW	AS	AS	REVISED PER CLIENT REVIEW.

Title: SANITARY SEWER AND WATERMAIN EXTENSION PLAN

CARLILE TRUCKING FACILITY

For: DONAVON BROTHERS CONSTRUCTION
1801 WEST VALLEY HIGHWAY
AUBURN, WA 98001

DANIEL K. BALMELLI, STATE OF WASHINGTON, REGISTERED PROFESSIONAL ENGINEER 25672
EXPIRES 9/23/05

Scale: Horizontal 1"=50' Vertical N/A

Designed AS
Drawn MDY
Checked AS
Approved DKB
Date 2/20/04

BARGHAUSEN CONSULTING ENGINEERS, INC.
18215 72ND AVENUE SOUTH
KENT, WA 98032
(425)251-6222
(425)251-8782 FAX
CIVIL ENGINEERING, LAND PLANNING, SURVEYING, ENVIRONMENTAL SERVICES

Job Number 11507
Sheet C4 of 4

File: P:\11000s\11507\engineering\11507-ws1.dwg Date/Time: 01/05/2005 13:11 Scale: 1=50 bwalosion Xrefs: ...

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Appendix B

Murray Pacific Post Remediation Documentation

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Approximate Date:
January 1996

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Approximate Date:
August 1996

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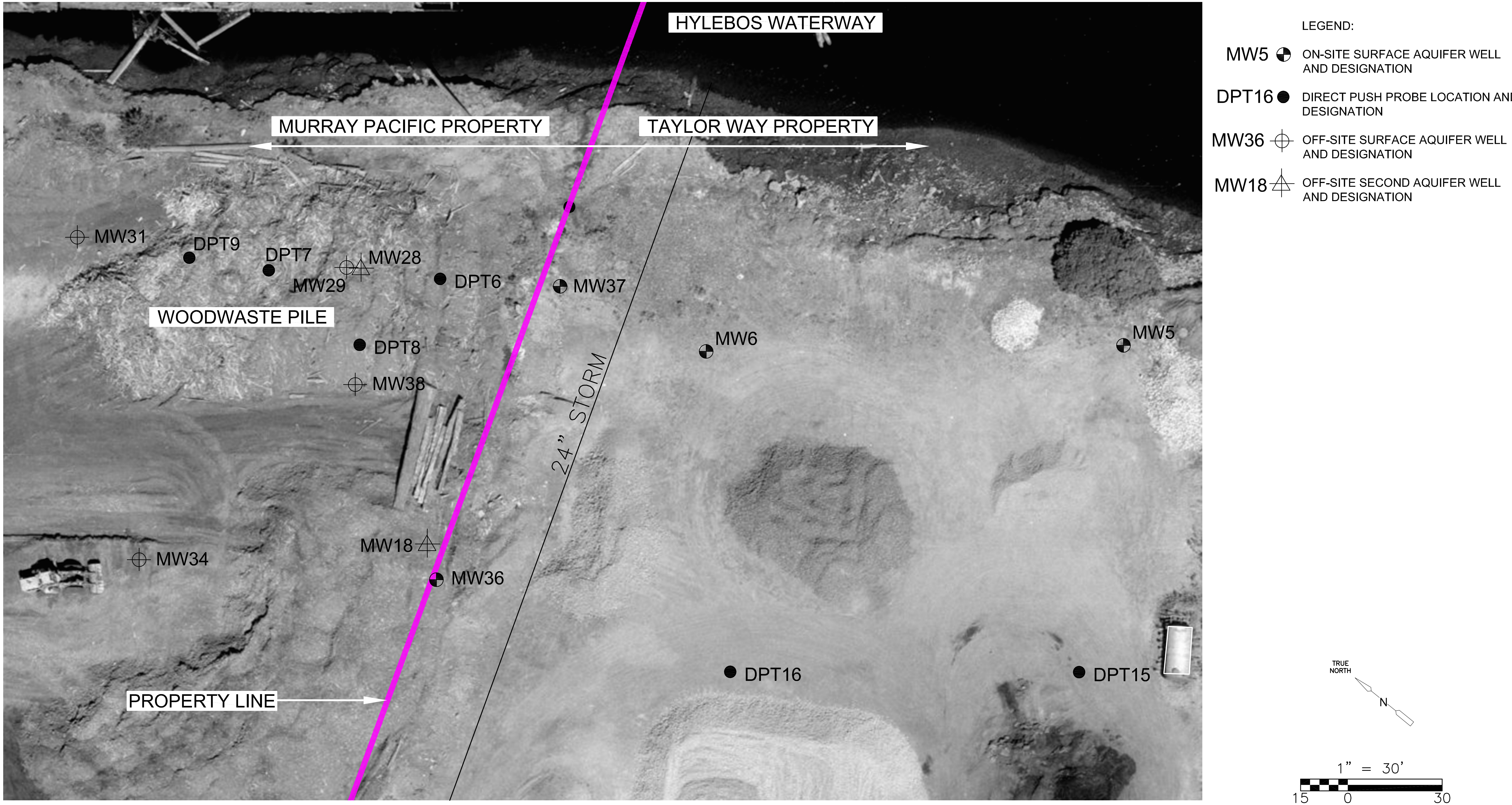

C:\pw_pl1\riehlepj\d0195280\ FIGURE B-1 03/09/15 07:35 riehlepj XREFS: GEO REF -SITE, S_1117 (2014 draft report), taylor00 (2014 draft report)
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AND ARE NOT TO BE USED, IN WHOLE OR PART, FOR ANY OTHER PROJECT WITHOUT THE WRITTEN AUTHORIZATION OF CDM SMITH.

CDM Smith

SUPPLEMENTAL REMEDIAL INVESTIGATION
2301 TAYLOR WAY
TACOMA, WASHINGTON

Figure No. B-1
1986 Aerial Photograph of the Murray Pacific and Taylor Way Property Boundary Line at the Hylebos Waterway

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Photograph 19

Backfilling Central Ditch

Photograph 20

Excavation Below High Water Line Along Waterway

Photograph 21

Looking up the Waterway at the Shoreline Excavation, Dark Material in Cut is Sawdust

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STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
P.O. Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300

January 16, 1997

Mr. Alexander Polson
Executive Vice President
Murray Pacific Corporation
1750 First Interstate Plaza
1201 Pacific Avenue
Tacoma, WA 98402

Dear Mr. Polson:

Re: Murray Pacific Log Sort Yard 1 Remediation, Tacoma, Washington; Consent Decree

By a submission dated December 30, 1996, we received from Hydrometrics, Inc., the Final Engineering Report, with all attachments, concerning this remedial action conducted under the Consent Decree in Pierce County Superior Court, Cause No. 95-2-12876-4, filed November 15, 1995.

By this letter, Ecology acknowledges that Tasks 1 through 4 of Exhibit E (Scope of Work) to the Consent Decree have been adequately completed at this Site in accordance with the requirements of the Decree. With completion of the remedial action, the only remaining actions required are associated with groundwater monitoring of the Site. This acknowledgment does not terminate the Decree, which can occur only when the groundwater monitoring has been completed.

Based on my position as site manager, my review of relevant documents and my site inspections during and after the remdial action work, I am satisfied that the remediation is substantially complete, with the exception of groundwater monitoring. The remedial actions taken at the property have resulted in the removal of all identified heavy metals contamination to residential cleanup standards. The construction phase of the cleanup action is complete. The only remaining activity is monitoring groundwater beneath the site. If successive semi-annual sampling determines that there is no increase in levels previously detected in the groundwater through November 1998, then no further groundwater monitoring will be required, the Decree can be terminated, and a no further action letter can be issued by Ecology.

Thank you for your cooperation in working with Ecology on this site. If I can be of further assistance, please contact me at (360) 407-6266.

Sincerely,

Dominick Reale

Dom Reale, P.E.
Toxics Cleanup Program
Southwest Regional Office

DR:jr

Shenk+
Associates LLC

Environmental
Management
Consulting

August 11, 1998

Dom Reale
Washington Department of Ecology
P.O. Box 47775
Olympia, WA 98504-7775

Re: Murray Pacific Yard #1 Monitoring Wells
Request for Termination of Semi-annual Monitoring

Dear Dom:

Hydrometrics has completed the fourth semi-annual sampling of groundwater monitoring wells at Murray Pacific's Yard #1 in Tacoma. I have included a table summarizing the data obtained from split samples taken during Hydrometrics' well sampling events, and a map showing the locations of the wells. Historically, the results of these splits have closely matched those obtained from samples Hydrometrics sent to Asarco's lab in Salt Lake City.

The Scope of Work for the Consent Decree under which the site was remediated states: "Groundwater monitoring and reporting will occur semi-annually for two years following substantial completion of construction. Additional semi-annual monitoring may be required if the concentration of arsenic, copper, lead, or zinc increases during the two years of semi-annual monitoring above concentrations of these constituents reported in the first semi-annual report."

The values for copper, lead, and zinc have all reduced dramatically over the monitoring period, as can readily be seen on the attached table. Source control has obviously had a major impact in the amount of these three Asarco slag constituents in the groundwater.

Arsenic concentrations have not followed this trend. The dominant trend in the arsenic concentrations is seasonal with lower concentrations in winter and higher concentrations in summer. Since virtually all source material was removed (the cleanup standard for soil was set at arsenic background of 20 mg/kg), and since the concentrations for the other metals have shown a marked decrease, we do not believe that the arsenic concentrations are influenced by remaining source materials. Rather, the problem is most likely that the arsenic in the shallow fill aquifer is unable to precipitate out due a lack of oxygen. This remaining arsenic is largely stagnant in the fill aquifer, especially since the low permeability cap reduced infiltration of oxygen-laden rainwater starting in the winter of 1996-1997. During winter when oxygenated groundwater recharges the fill aquifer from adjacent properties, the arsenic concentrations fall due to precipitation and dilution. In the summer, with seasonally low water and anoxic conditions, the

83 South King Street
Suite 616
Seattle WA 98104
Phone 206/447-2669
Fax 206/682-7867

arsenic concentrations climb as the arsenic precipitate redissolves. This cycling is aggravated by historical enrichment of the fill aquifer with arsenic, but would have occurred even if only native soils were present since they contain arsenic.

The primary concern regarding arsenic concentrations in the fill aquifer is discharge to Hylebos Waterway. Fortunately, the conditions that favor worst case concentrations (low volume and slow recharge from adjacent properties) should result in significantly reduced discharge to the waterway. Sediment samples collected by the HCC and Asarco along the waterfront indicate that arsenic is not elevated in front of the Murray Pacific site. Therefore, seepage from the bank is not resulting in accumulation of arsenic in the sediments. In addition, the seepage rate has likely been reduced dramatically by the compacted low permeability fill material placed over the site as part of the remediation process.

Given this scenario, continued well monitoring will not serve a practical purpose. As you are aware, virtually all source material was removed from the site down to background levels. Therefore, no further soil remediation is practical, nor would it likely change the arsenic levels found in the shallow well water samples. The dredge fill water is not potable, and there is no exposure to it. The small amount of arsenic that may seep into the Hylebos Waterway likely immediately precipitates out, but makes no significant impact on levels in the sediment.

Finally, I am bringing this issue to your attention at this time because Murray Pacific is in the final stages of selling the property. Groundwater monitoring will transition to the buyer at the time of the sale. However, if you agree that further monitoring of the wells serves no useful purpose and that the intent of the Consent Decree is met, then we can get the Consent Decree terminated, and have the cleanup of this site behind us. Please let me know what you think.

Sincerely,

Chuck

Chuck Shenk
Principal

CC: Alex Polson, Murray Pacific Corporation
Brad Jones, Gordon, Thomas, Honeywell, et al.
Tom Aldrich, ASARCO, Inc.
Jim Gillie, Hydrometrics, Inc.
Suzanne Dudziak, Port of Tacoma

Enclosures

MURRAY PACIFIC YARD #1
MONITORING WELL DATA

Total Arsenic (mg/L)

Well #	1/15/97	7/23/97	2/3/98	7/17/98
MW-16 (D)	<0.020	0.0012	<0.001	0.024
MW-17 (S)	0.28	1.1	0.75	0.97
MW-18 (D)	<0.020	0.0015	<0.001	0.0071
MW-19 (S)	0.065	0.15	0.17	0.28
MW-20 (S)	<0.020	0.024	0.092	0.04
MW-21 (D)	<0.020	<0.001	<0.001	0.065

Total Copper (mg/L)

Well #	1/15/97	7/23/97	2/3/98	7/17/98
MW-16 (D)	<0.020	0.0036	<0.001	<0.001
MW-17 (S)	0.16	0.01	0.0024	0.0014
MW-18 (D)	<0.020	0.0023	0.0011	<0.001
MW-19 (S)	<0.020	0.0058	0.0028	0.0055
MW-20 (S)	0.048	0.011	0.0013	0.015
MW-21 (D)	<0.020	0.0023	0.0037	0.0028

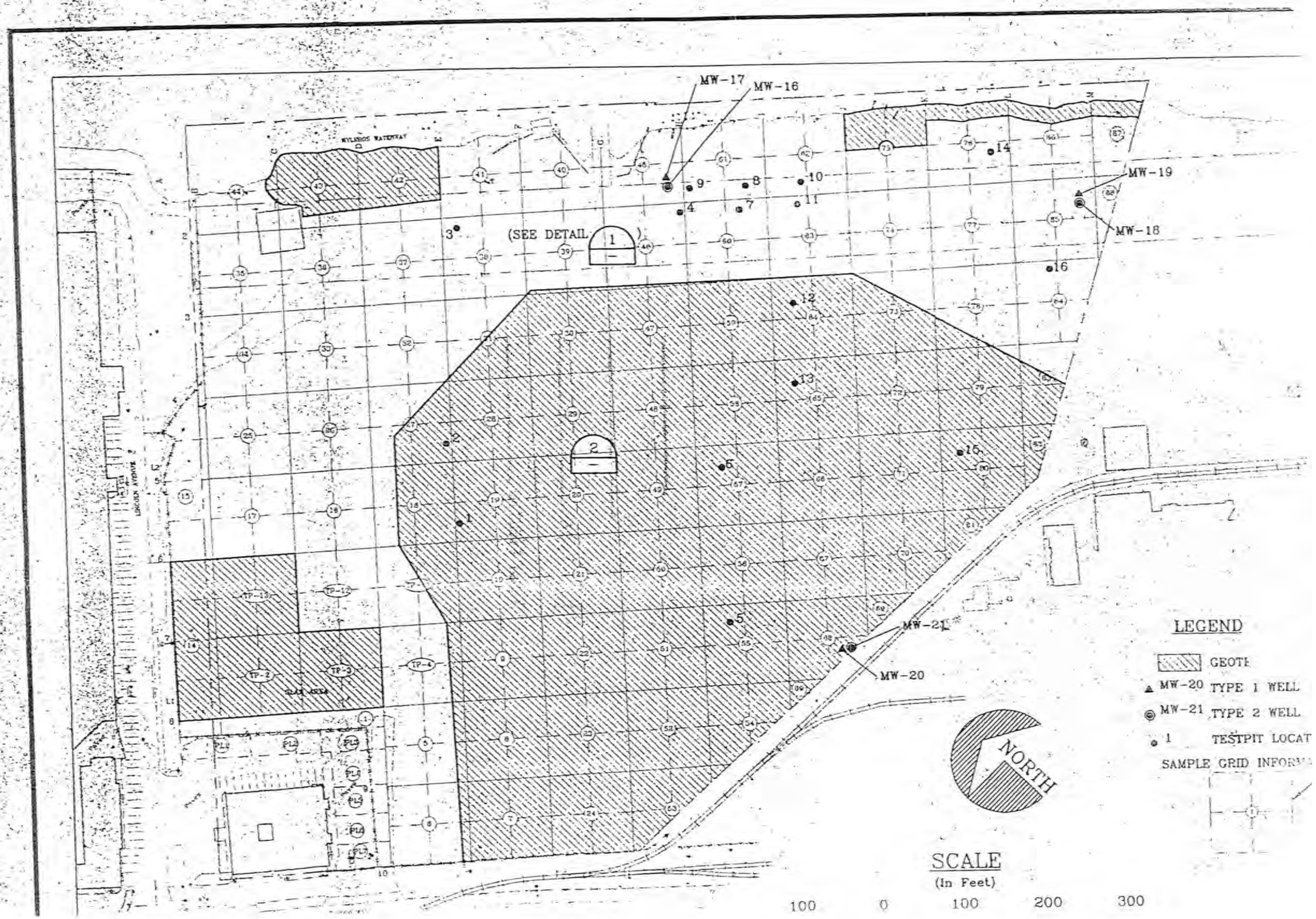
Total Lead (mg/L)

Well #	1/15/97	7/23/97	2/3/98	7/17/98
MW-16 (D)	<0.020	0.0011	<0.0005	<0.0005
MW-17 (S)	0.22	0.025	0.0051	0.0019
MW-18 (D)	<0.020	<0.0005	<0.0005	<0.0005
MW-19 (S)	<0.020	0.00057	<0.0005	<0.0005
MW-20 (S)	<0.020	0.0013	<0.0005	0.0023
MW-21 (D)	<0.020	<0.0005	<0.0005	<0.0005

Total Zinc (mg/L)

Well #	1/15/97	7/23/97	2/3/98	7/17/98
MW-16 (D)	<0.020	0.0079	<0.002	<0.002
MW-17 (S)	0.25	0.013	0.0051	0.0022
MW-18 (D)	<0.020	0.0027	<0.002	<0.002
MW-19 (S)	<0.020	0.0041	<0.002	<0.002
MW-20 (S)	0.34	0.024	0.0094	0.022
MW-21 (D)	<0.020	0.0033	<0.002	<0.002

Note: The data represents split samples analyzed for Murray Pacific Corp. at Sound Analytical Services, Inc. in Tacoma, WA.
The "<" symbol is used to denote the laboratory's detection limit in cases where the constituent was reported as Not Detected.
(D) = deep marine sediment well: MW-16 screened at 15-20 feet; MW-18 screened at 17.5-22.5 feet; MW-21 screened at 25-30 feet.
(S) = shallow dredge fill well: MW-17 screened at 7-11 feet; MW-19 screened at 5-10 feet; MW-20 screened at 5-9 feet.


MW-17
MW-16
MW-19
MW-18
MW-21
MW-20
(SEE DETAIL 1)
LINCOLN AVENUE
SLAG AREA
LEGEND
GEOTE
MW-20 TYPE 1 WELL
MW-21 TYPE 2 WELL
1 TESTPIT LOCAT
SAMPLE GRID INFORM
NORTH
SCALE
(In Feet)
100 0 100 200 300

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Shenk+ Associates LLC

'99 JAN 19 AM 1:02

Environmental Management Consulting

January 14, 1999

Dom Reale
Washington Department of Ecology
P.O. Box 47775
Olympia, WA 98504-7775

Re: Former Murray Pacific Yard #1

Dear Dom:

I am writing this letter to confirm our conversation on January 11, 1999 regarding the site referred to as Murray Pacific Yard #1. You indicated that you and your supervisor feel that Murray Pacific has made an adequate argument that the site is not likely contributing any significant metal loading to the Hylebos Waterway. However, one monitoring well is still showing levels of arsenic that have gone up slightly since monitoring began. The agreement reached between Murray Pacific, Asarco, and Ecology states that the MTCA action can be terminated if levels do not go up. Therefore, Ecology does not feel comfortable issuing a No Further Action (NFA) letter for the site at this time, and would like monitoring to continue

You indicated that monitoring was no longer necessary at five of the six monitoring wells, but is only required at the well showing elevated levels of arsenic. I interpret this to be MW-17. You also stated a willingness to reassess the data after a further year of monitoring to determine if an NFA letter is appropriate at that time. Responsibility for sampling the monitoring wells at the site passed on to the Port of Tacoma with their recent purchase of the site. The Port is fully aware of the remediation that took place at the site and of the continuing obligation to monitor groundwater

Please call me if I have misrepresented Ecology's position in this summary of our conversation.

Sincerely,

Chuck Shenk

Chuck Shenk
Principal

cc: Alex Polson, Murray Pacific Corp
Suzanne Dudziak, Port of Tacoma
Tom Aldrich, ASARCO Incorporated

83 South King Street
Suite 616
Seattle WA 98104
Phone 206/447-2669
Fax 206/682-7867

MURRAY PACIFIC CORPORATION

RECEIVED
MAY 1 6 2000
ENVIRONMENTAL DEP

May 15, 2000

Dom Reale
Washington Department of Ecology
P.O. Box 47775
Olympia, WA 98504-7775

Re: Murray Pacific Yard #1 Monitoring Wells
Request for Termination of Semi-annual Monitoring
and Issuance of No Further Action Letter

Dear Dom,

Now that Chuck Shenk has left the consulting business to take a job at the Portland, OR airport, I am filling the role as "point-person" in regards to Murray Pacific's involvement with Yard #1.

The Port of Tacoma has advised me that the results of the January 28, 2000 sampling of groundwater monitoring well #MW-17 show a total arsenic level of 0.31 mg/L (see attached table). In your message to Alex Polson on 1/19/00, you asked us to conduct one more round of sampling even though the results of our 7/16/99 sample came in at 0.27 mg/L, which was just below the level of the initial test taken on 1/15/97 (0.28 mg/L) before the site was disturbed by the remediation process.

The test results of the total arsenic levels in MW-17 are summarized as follows:

1/15/97	7/23/97	2/3/98	7/17/98	2/11/99	7/16/99	1/28/00
0.28 mg/L	1.10 mg/L	0.75 mg/L	0.97 mg/L	0.41 mg/L	0.27 mg/L	0.31 mg/L

We would still like to have the consent decree for remedial action at Murray Pacific's Yard #1 terminated, and to receive a "No Further Action" letter. Please let me know what needs to be done to achieve this objective.

Sincerely,

Doug Krueger
(253) 591-9896

CC: Brad Jones, Gordon, Thomas, Honeywell, et al,
Suzanne Dudziak, Port of Tacoma w/o enclosure
Tom Aldrich, ASARCO, Inc. w/o enclosure
Marcia Newlands, Heller Ehrman w/o enclosure
Chuck Shenk w/o enclosure
Alex Polson w/o enclosure

Enclosure

INDEX

Sample Type: Monitoring Wells

SITE CODE	MW-17	MW-17	MW-17	MW-17
SAMPLE DATE	02/11/99	02/11/99	07/16/99	07/16/99
SAMPLE TIME	10:50	11:00	11:30	11:35
LAB	TSC-SLC	TSC-SLC	TSC-SLC	TSC-SLC
LAB NUMBER	L990283-1	L990283-2	L991277-01	L991277-02
REMARKS		DUPLICATE		DUPLICATE
SAMPLE NUMBER	MPMC-9902-100	MPMC-9902-101	MPMC-9907-100	MPMC-9907-101
-- PHYSICAL PARAMETERS --				
DEPTH TO WATER LEVEL (FEET)	6.41	6.41	6.97	
OXYGEN (O) (FLD) DIS	12.55	12.55	0.06	
PH (FLD)	6.87	6.87	6.71	
SALINITY (G/KG) (FLD)			0.04	
SC (UMHOS/CM AT 25 C) (FLD)	415.0	415.0	1060.0	
TURBIDITY (NTU) (FLD)	18.0	18.0	591.0	
WATER TEMPERATURE (C) (FLD)	9.2	9.2	16.5	
-- MAJOR CONSTITUENTS --				
TOTAL HARDNESS AS CACO3			164.0	159.0
CALCIUM (CA) DIS	35.0	35.0	47.0	46.0
MAGNESIUM (MG) DIS	11.0	11.0	11.0	11.0
SODIUM (NA) DIS	42.0	42.0	85.0	37.0
POTASSIUM (K) DIS	8.4	8.5	11.0	10.0
TOTAL ALKALINITY AS CACO3	213.0	196.0		
TOTAL ACIDITY AS CACO3	40.0	65.0	36.0	50.0
BICARBONATE (HCO3)	260.0	235.0	105.0	100.0
CARBONATE AS CO3	<1.0	<1.0	<1.0	<1.0
SULFATE (SO4)	50.0	77.0	10.0	8.5
CHLORIDE (CL)	7.7	8.1	196.0	176.0
-- METALS & MINOR CONSTITUENTS --				
ARSENIC (AS) DIS	0.42	0.43	0.28	0.25
ARSENIC (AS) TOT	0.41	0.43	0.27	0.27
COPPER (CU) DIS	<0.01	<0.01	<0.01	<0.01
COPPER (CU) TOT	<0.01	<0.01	<0.01	<0.01
LEAD (PB) DIS	0.003	0.002	<0.002	<0.002
LEAD (PB) TOT	0.013	0.012	0.004	0.004
ZINC (ZN) DIS	<0.02	<0.02	<0.02	<0.02
ZINC (ZN) TOT	<0.02	<0.02	<0.02	<0.02

NOTES: All results in mg/L (Water) or mg/kg (Soil) unless noted and are laboratory (LAB) unless field (FLD) or calculated (CALC)
TOT:Total; DIS:Dissolved; TRC:Total Recoverable; E:Estimated; <:Less Than Detect. Blank: parameter not tested
Validation Flags: A:Anomalous; UJ1:Blank; J2,UJ2: Standard; J3:Hold Time; J4,UJ4:Duplicate, Spike, or Split Exceedance;
R:Rejected.

DRAFT

ASMP01 - ASARCO, Tacoma, WA

ANALYSES SUMMARY REPORT

INDEX

Page	Site Code	Site Name	Site Type	Elevation MP	Well Depth
1	MW-17	MW-17	Monitoring Wells		

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
P.O. Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300

September 1, 2000

Mr. Doug Krueger
Murray Pacific Corp.
1201 Pacific Avenue, Suite 1750
Tacoma, WA 98402

Mr. Robert DeWald
Port of Tacoma
P.O. Box 1837
Tacoma, WA 98401

Mr. Thomas Martin
Asarco, Incorporated
P.O. Box 1677
Tacoma, WA 98401

Re: Murray Pacific Sortyard No. 1

Dear Sirs:

I'm writing as a follow up to my telephone conversation with Mr. Krueger of August 31, 2000. At that time Mr. Krueger asked me if Ecology would be issuing a "no further action" letter for the Murray Pacific Log Sortyard No.1 site, in Tacoma. I told him that I would send notification per the site Consent Decree, as follows:

In conformance with Section XXV of Consent Decree No. 95-2-12876-4 issued on November 15, 1995, Ecology hereby finds that all requirements of said Consent Decree have been satisfactorily completed.

Ecology has also started the process of proposing the site for delisting. We will provide you all with notification when the delisting is completed.

Please feel free to call me at 360-407-6266 if you wish to discuss these matters further.

Sincerely,

Dom Reale

Dom Reale, P.E.
Site Manager
Toxics Cleanup Program
Southwest Regional Office

DR: mw

Appendix C

Historical Aerial Photographs

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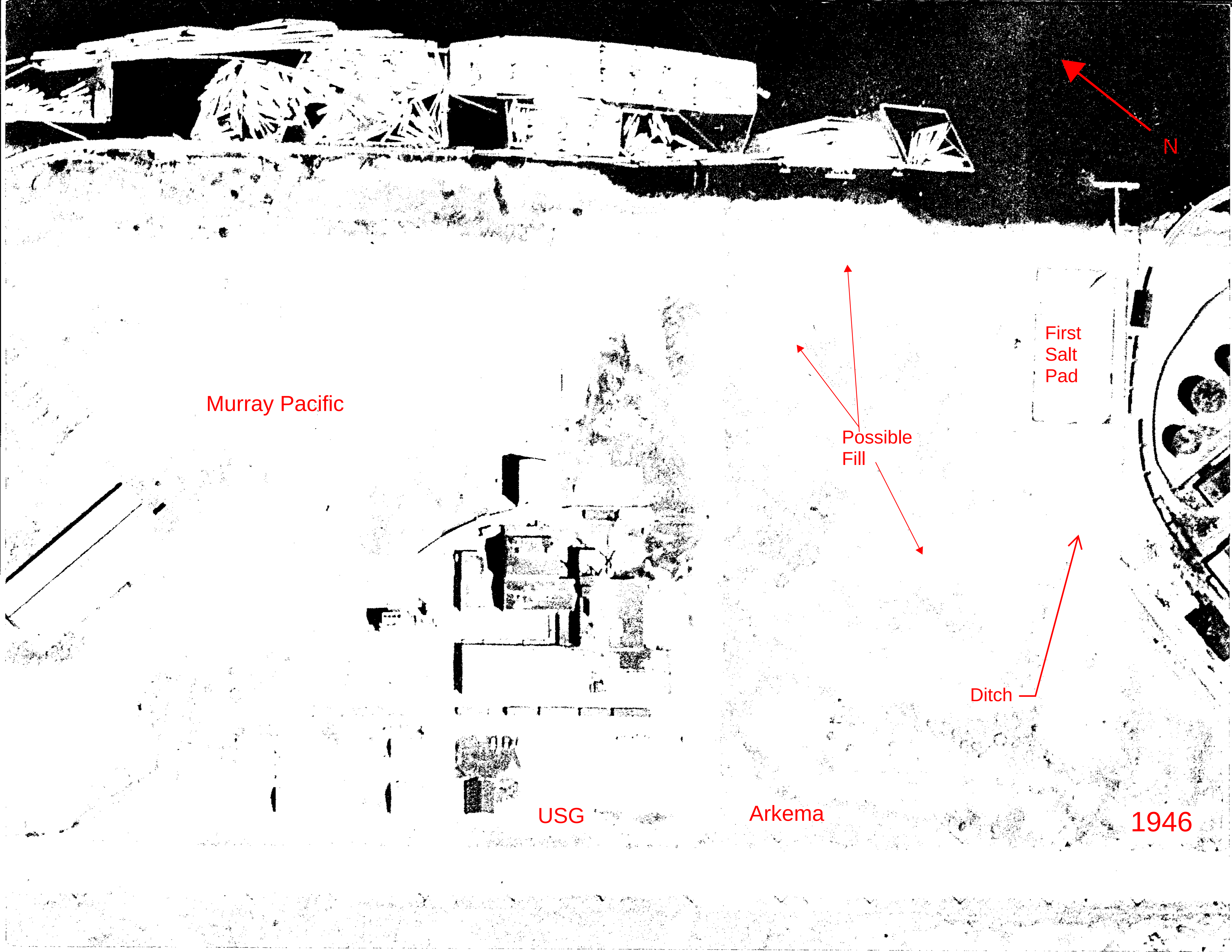
N
First
Salt
Pad
Murray Pacific
Possible
Fill
Ditch
USG
Arkema
1946

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N
Murray Pacific
Apparent Fill Piles
Salt Pads
USG
Ditch
1955
Arkema

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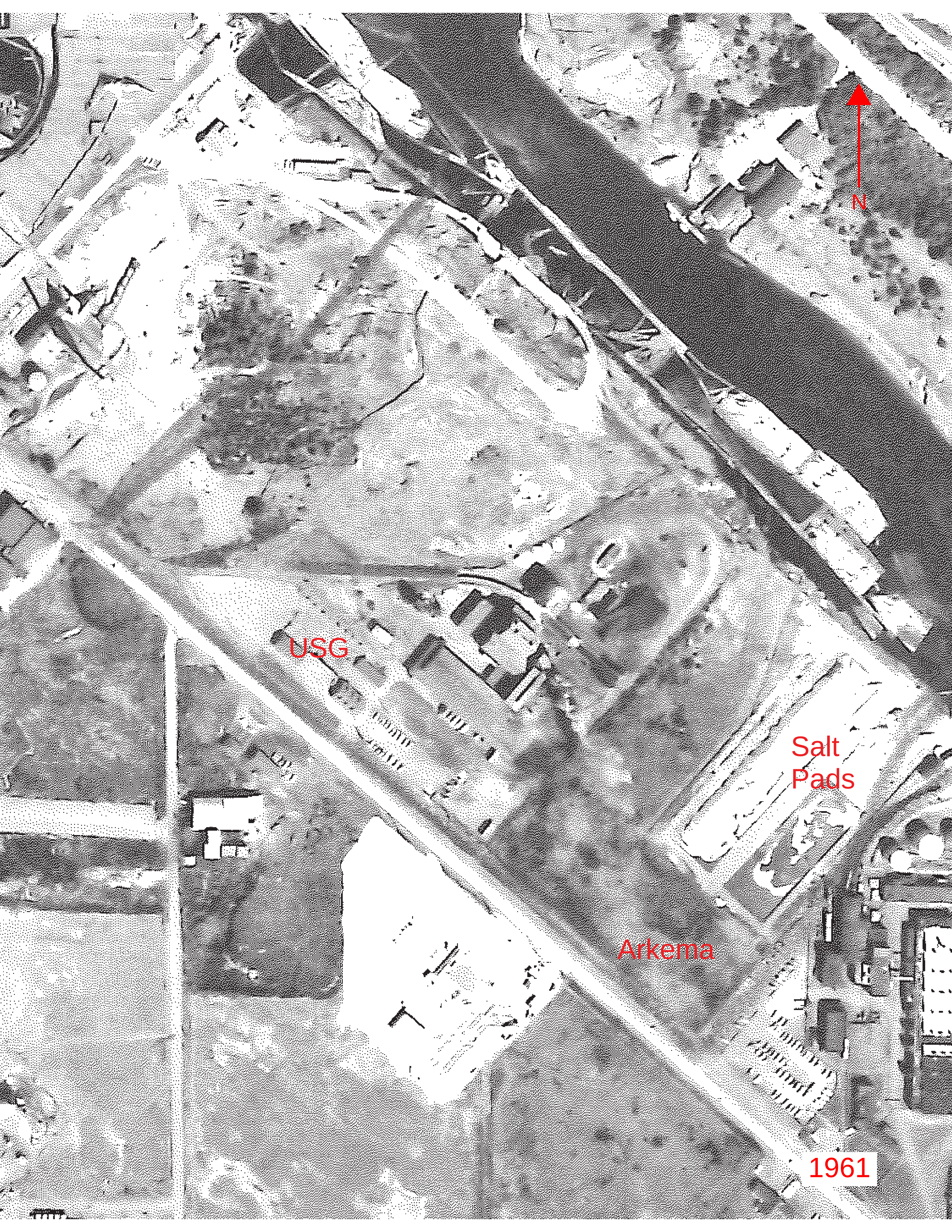
N
USG
Salt
Pads
Arkema
1961

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N
Murray Pacific
Fill
Piles
USG
Ditch
Salt Piles
Wet
Surface Water
Run-on?
Arkema
1965

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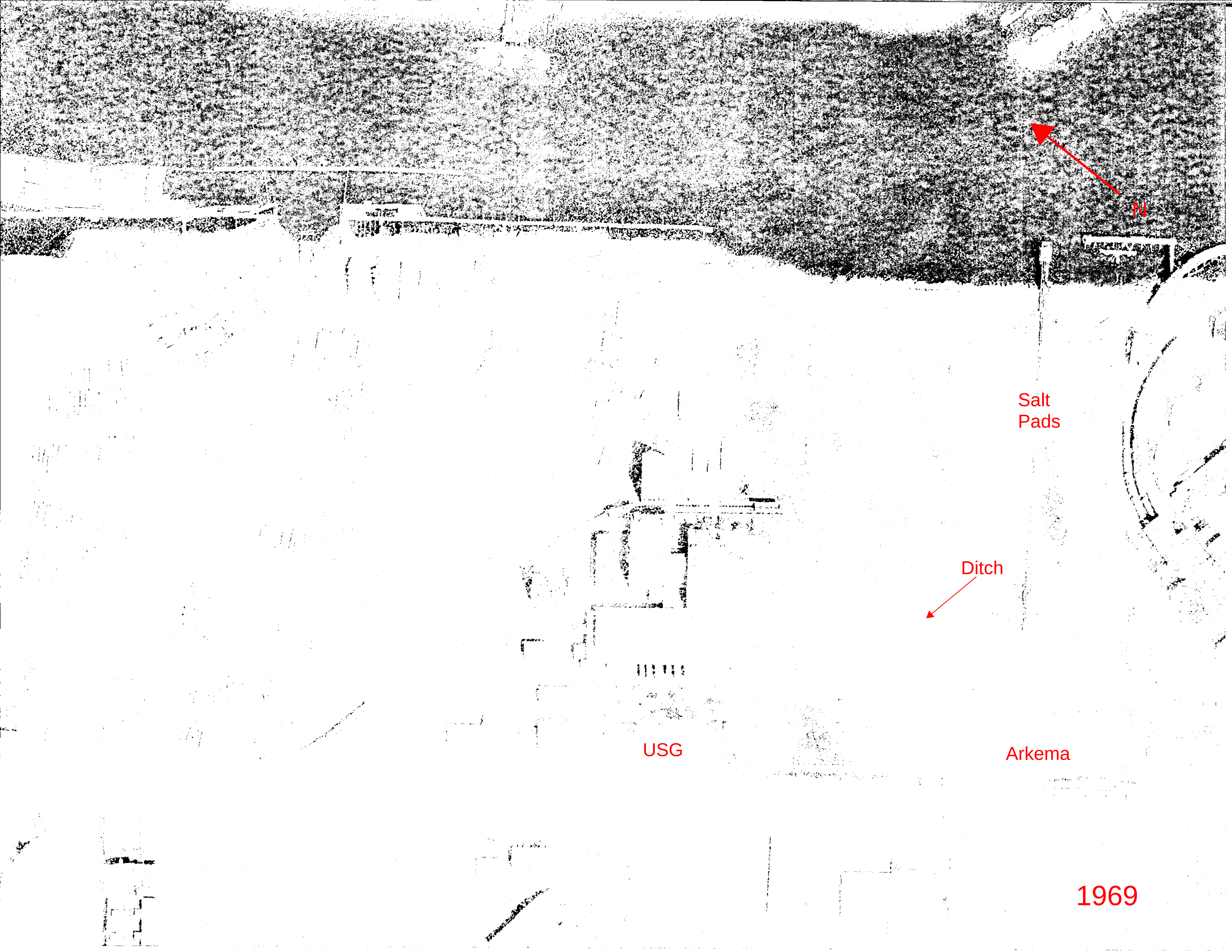
N
Salt
Pads
Ditch
USG
Arkema
1969

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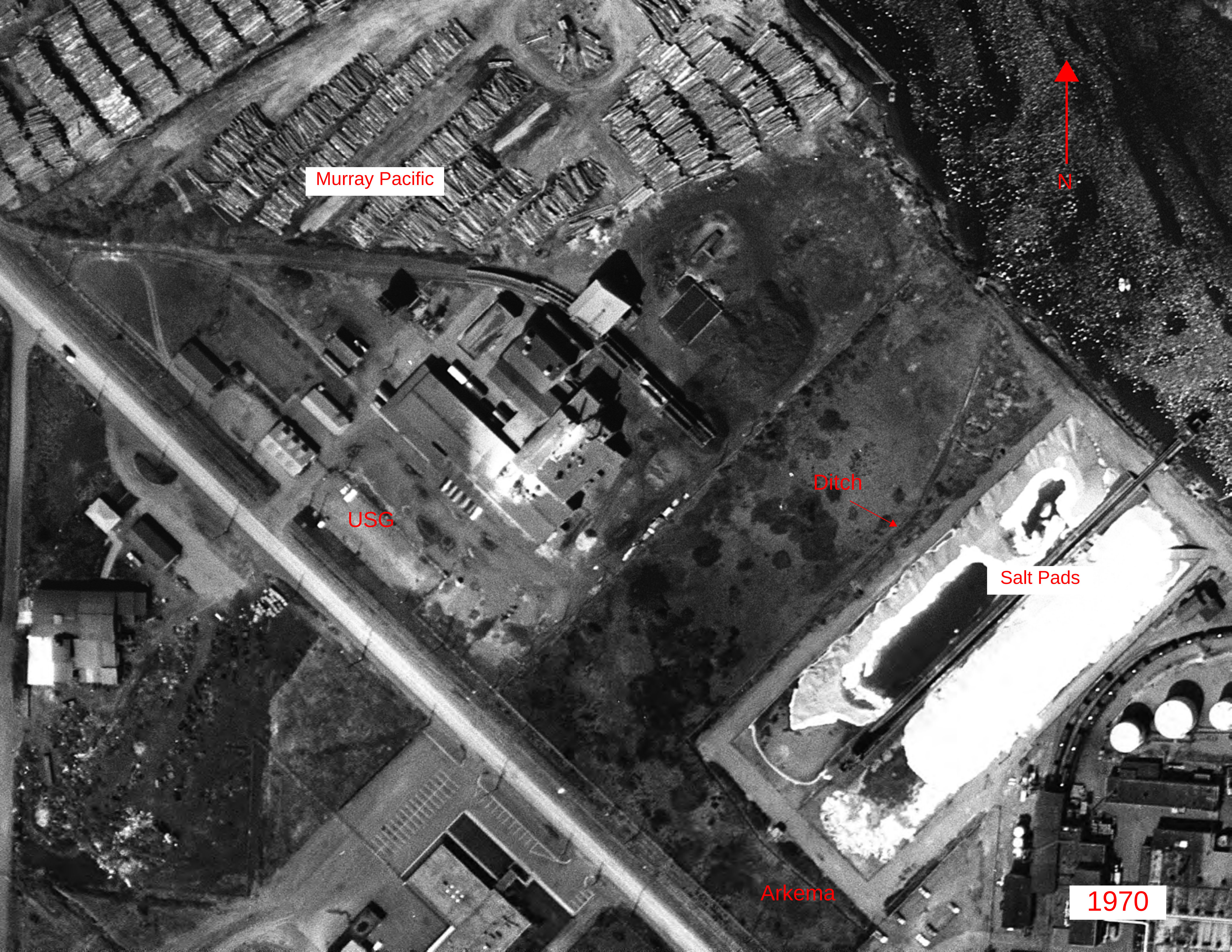

Murray Pacific
N
Ditch
USG
Salt Pads
Arkema
1970

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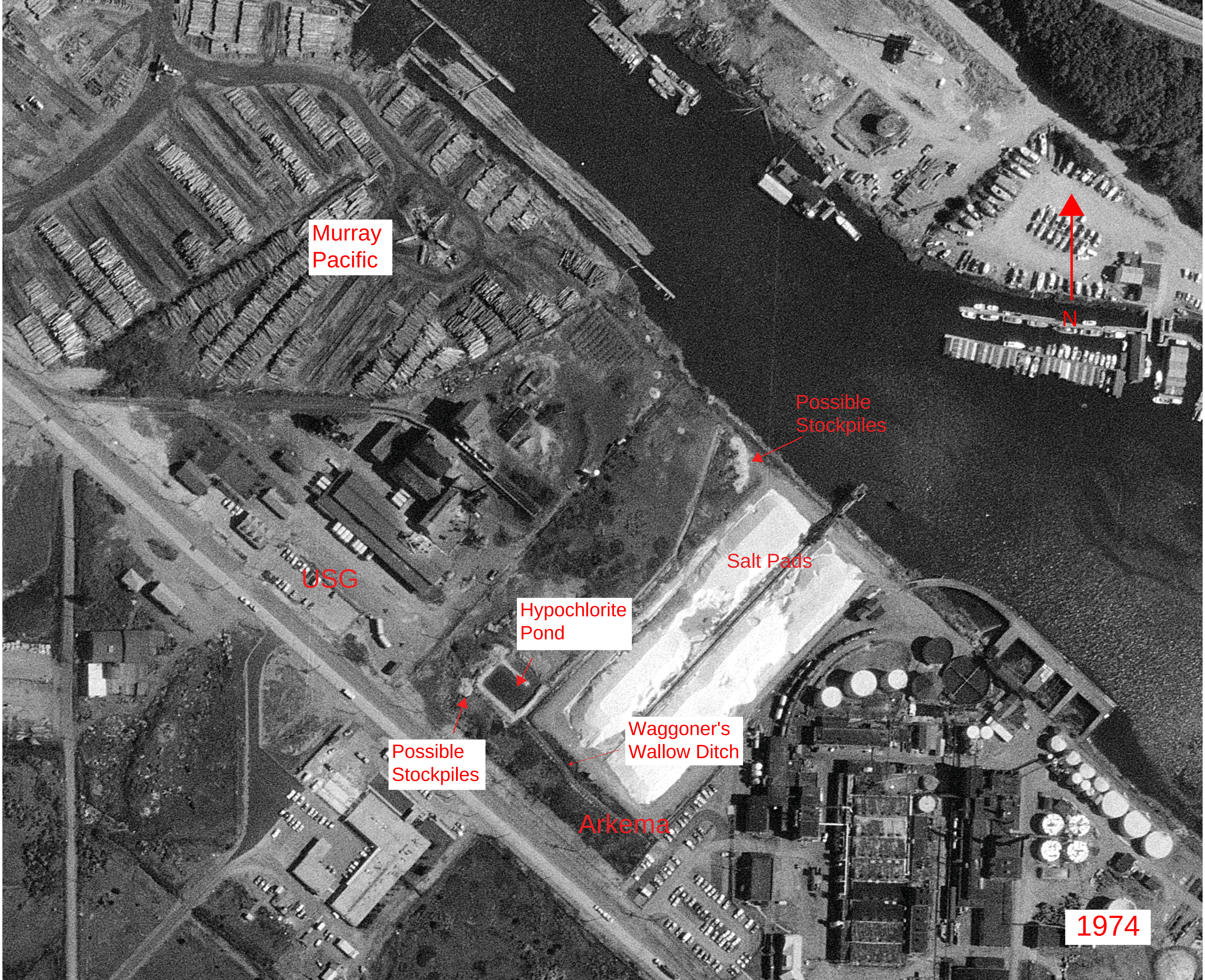

Murray Pacific
N
Possible Stockpiles
Salt Pads
USG
Hypochlorite Pond
Waggoner's Wallow Ditch
Possible Stockpiles
Arkema
1974

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Arkema
USG
Hypochlorite
Pond
Waggoner's
Wallow Ditch
N
Recent
Grading
Salt Pads
Fill piles, contains
debris
1977

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N
Murray Pacific
Soil
Stockpiles
USG
Standing Water
Salt Pads
Wet
Hypochlorite
Pond
Waggoner's
Wallow Ditch
Arkema
1978

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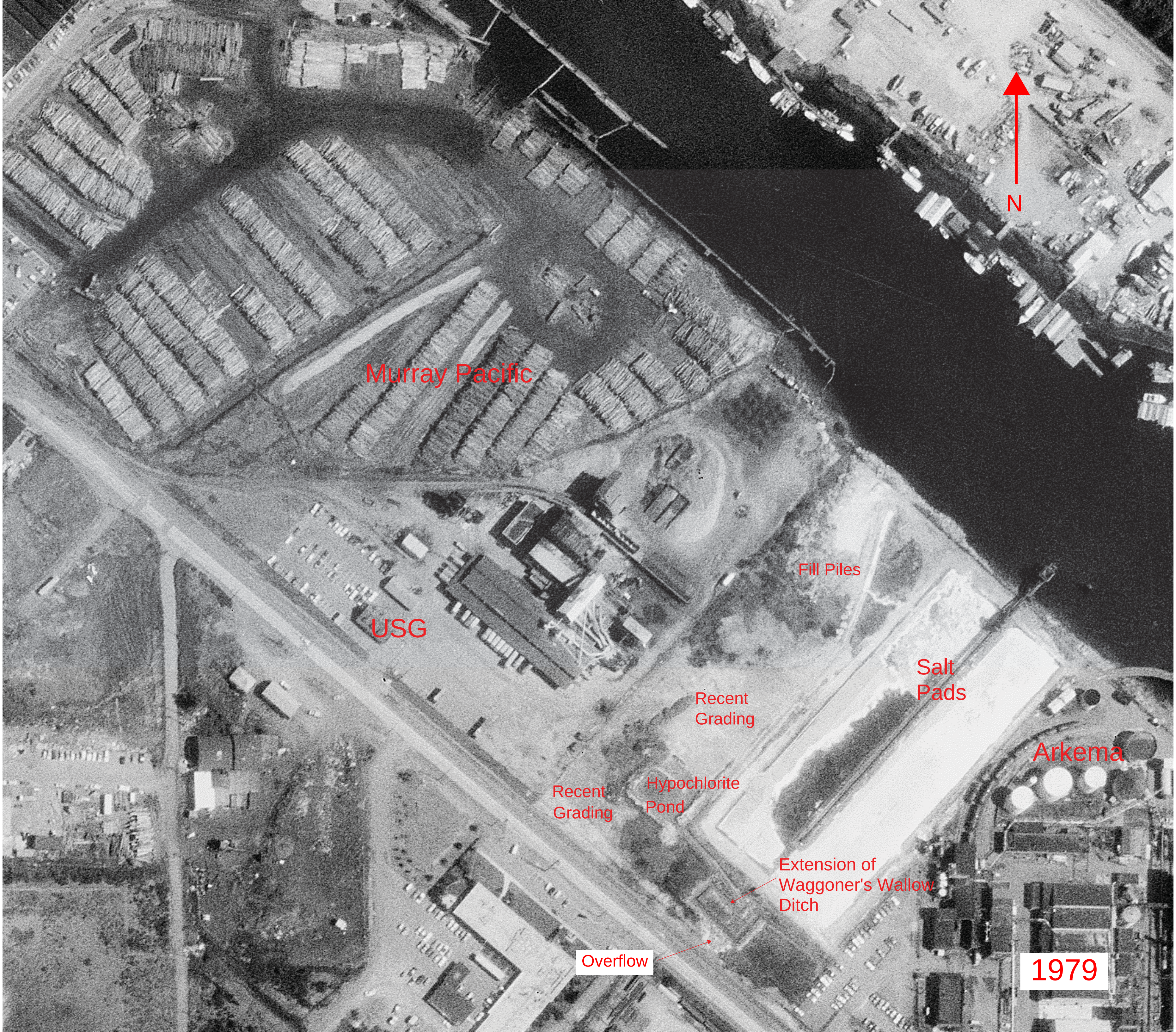
N
Murray Pacific
Fill Piles
USG
Salt
Pads
Recent
Grading
Arkema
Recent
Grading
Hypochlorite
Pond
Extension of
Waggoner's Wallow
Ditch
Overflow
1979

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N
Murray Pacific
Recent
Grading
USG
Apparent Fill
Pile
Salt Pads
Hypochlorite
Pond
Waggoner's
Wallow
Overflow
Arkema
1981

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N
Murray Pacific
Grading
and Fill
USG
Standing Water
Salt Pads
Hypochlorite
Pond
Standing
Water
Waggoner's Wallow
Overflow
Arkema
1985

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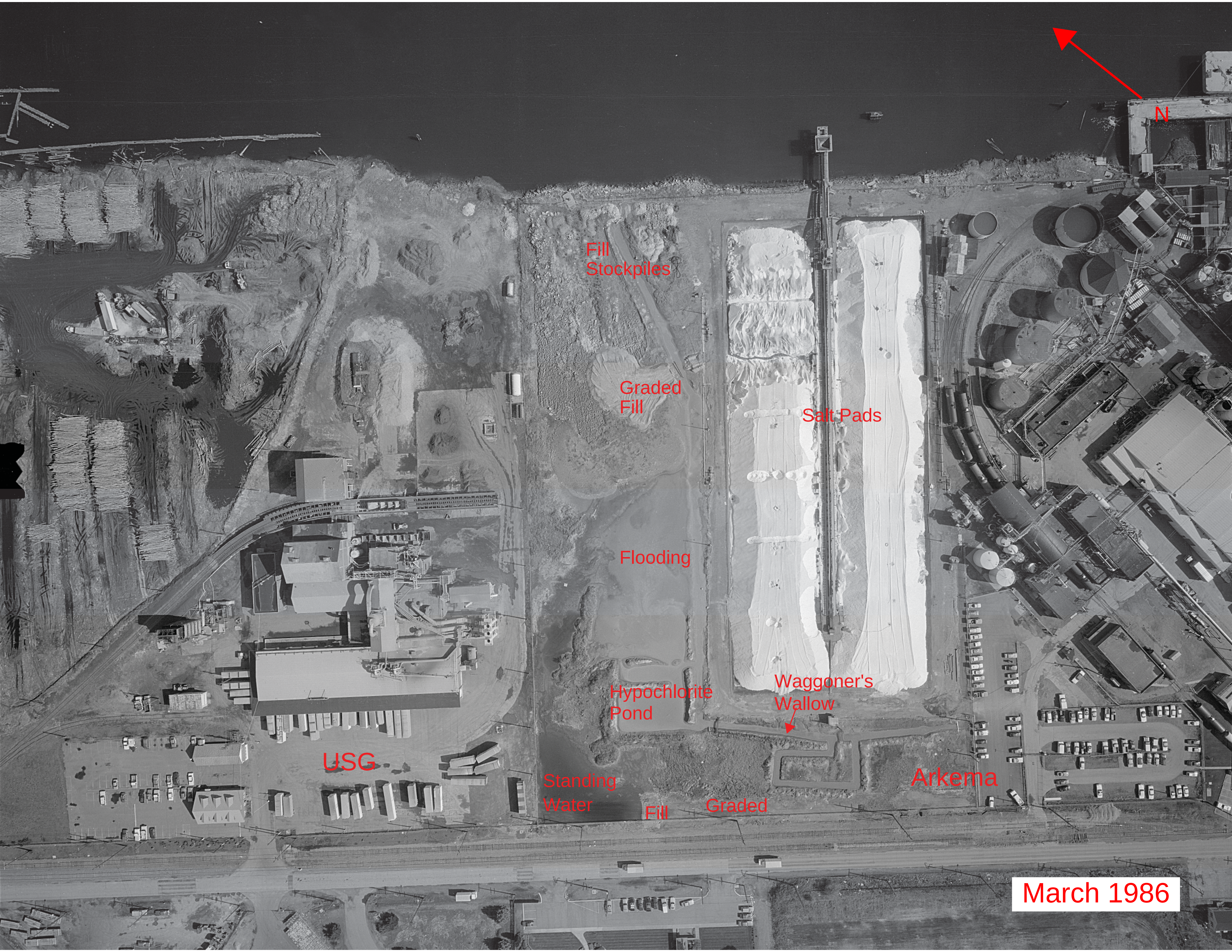
N
Fill
Stockpiles
Graded
Fill
Salt Pads
Flooding
Hypochlorite
Pond
Waggoner's
Wallow
USG
Standing
Water
Fill
Graded
Arkema
March 1986

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N
Fill Stockpiles, Contains Concrete, Wood Debris
Salt Pads
Fill and Grading
Murray Pacific
Remnant Waggoner's Wallow Ditch
Pallets
New Fill and Grading
USG
New Fill and Grading
Arkema
September 1986

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N
Murray Pacific
USG
Fill Piles
Fill Piles
Grading
Fill Piles
Salt Pads
Arkema
1989

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N
Arkema
USG
NBA
Filled/Graded
Salt Pads
1990

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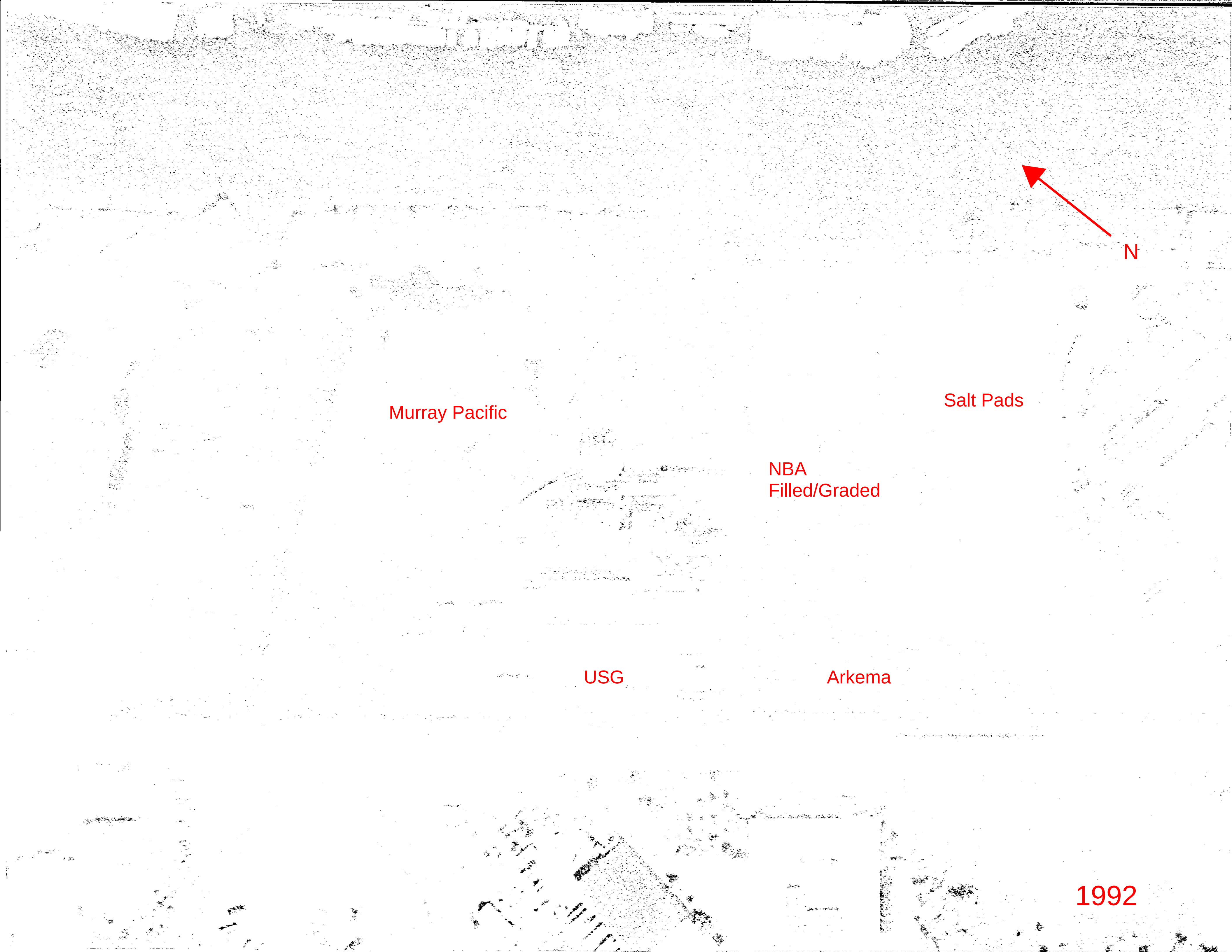
N
Murray Pacific
Salt Pads
NBA
Filled/Graded
USG
Arkema
1992

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Murray Pacific
N
USG
Recent Vehicle Activity
Salt Pads
Arkema
1995

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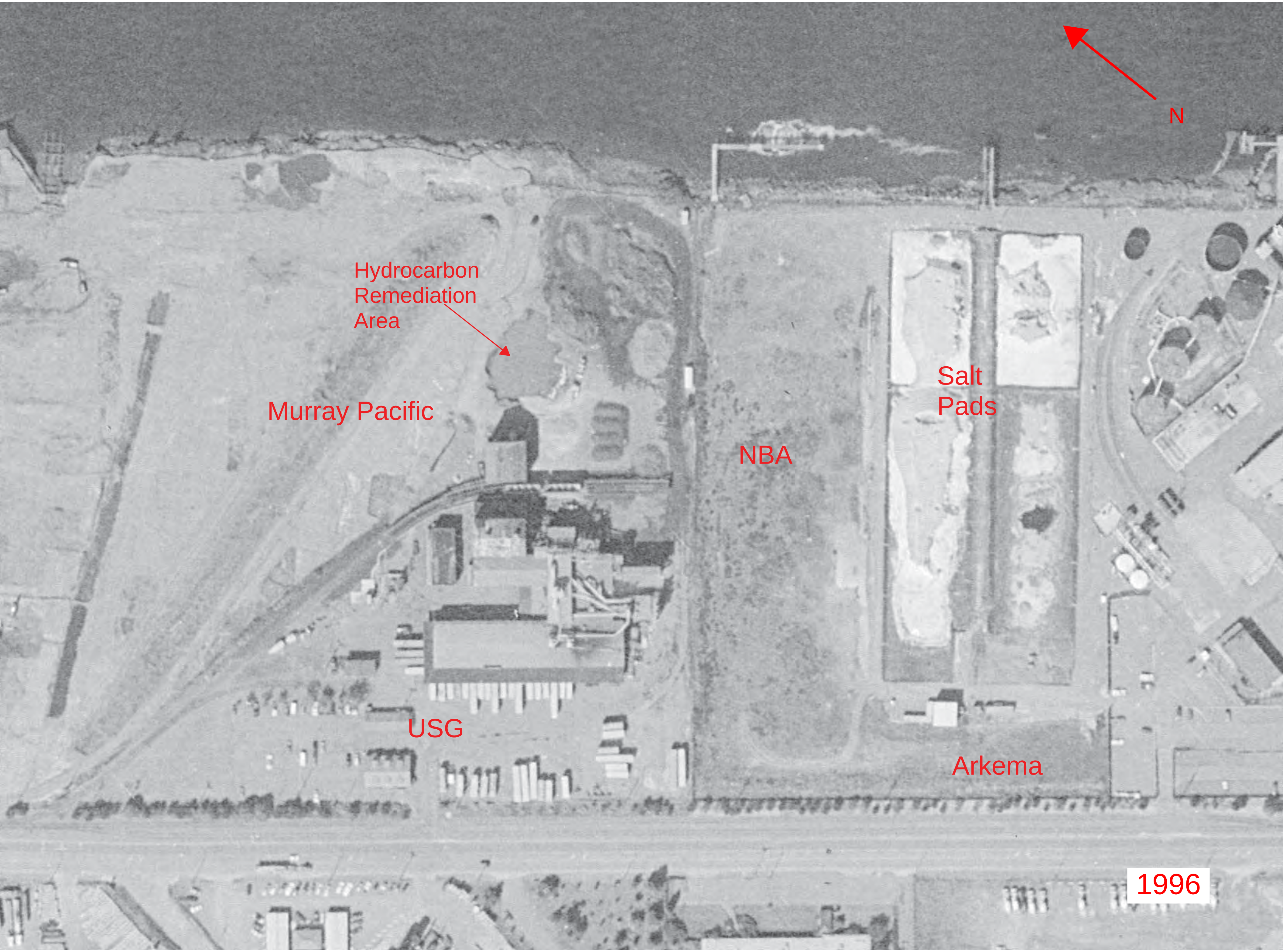

N
Hydrocarbon Remediation Area
Murray Pacific
NBA
Salt Pads
USG
Arkema
1996

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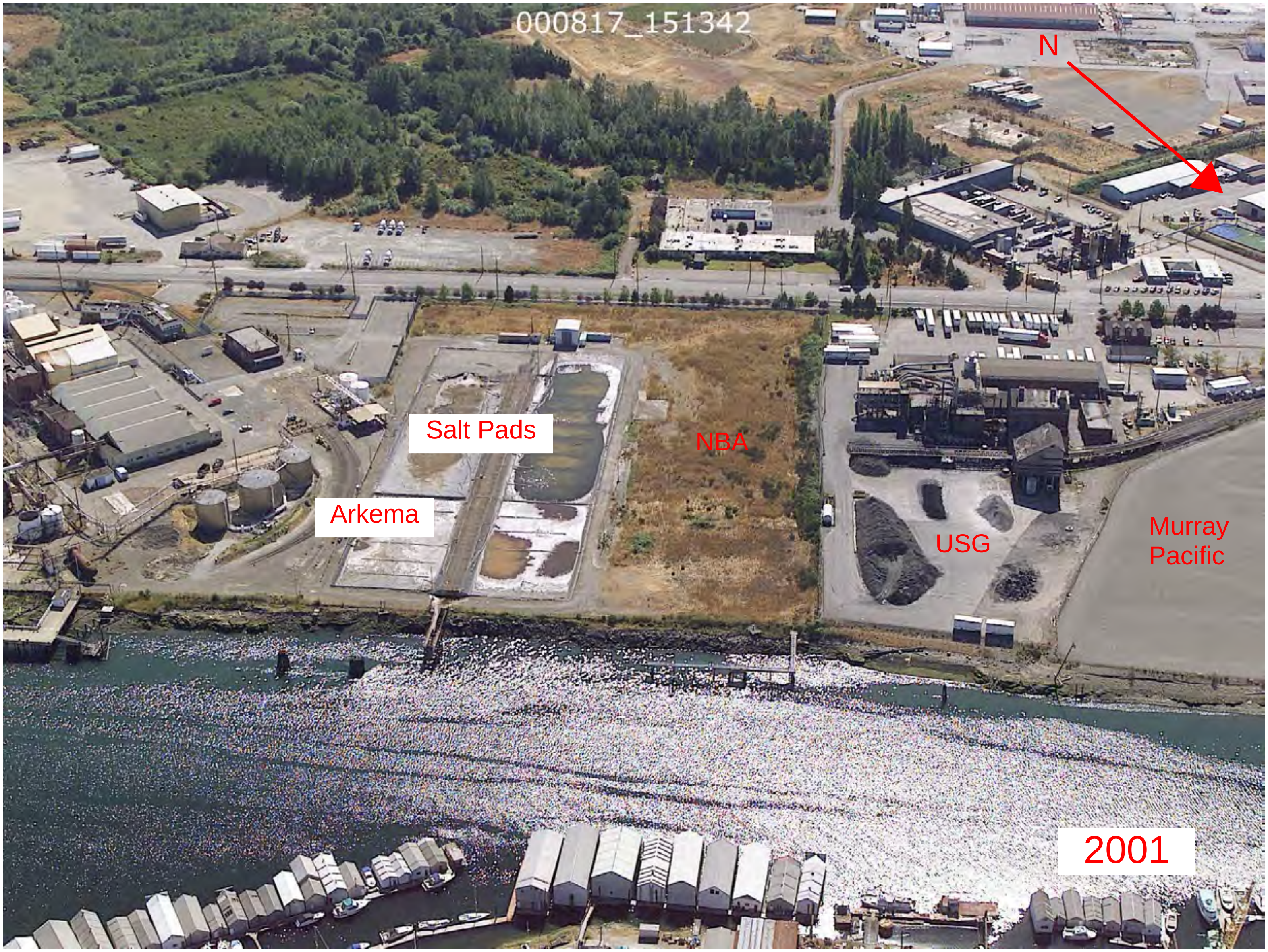
000817_151342
N
Salt Pads
NBA
Arkema
USG
Murray
Pacific
2001

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8/2003
N
2301 Taylor Way
Beginning of
constructed
salt marsh
USG
stockpile?
Excavation?
Salt Pads
Taylor Way
Arkema
Image © 2016 DigitalGlobe
2003
1990
Imagery Date: 8/9/2003 lat 47.269212° lon -122.377993° elev 10 ft

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5/2004
Constructed Salt Marsh
N
2301 Taylor Way
USG
Stockpiles
Salt Pads
disturbance
Taylor Way
Arkema
Image © 2016 DigitalGlobe
2004
1990
Imagery Date: 5/4/2004 lat 47.269212° lon -122.377993° elev 10 ft

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2006

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11/2007
USG
Soil Piles
NBA
Salt Pads
Arkema
N
Taylor Way
2007
1990
Imagery Date: 11/8/2007 lat 47.269253° lon -122.377501° elev 12 ft

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5/2009
USG
Soil Piles
NBA
Salt Pads
Soil Piles?
Arkema
N
Taylor Way
Image U.S. Geological Survey
2009
1990
Imagery Date: 4/30/2009 lat 47.269253° lon -122.377501° elev 12 ft

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Appendix D

North Boundary Area Investigation Data

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CDM Smith Data
From North Boundary Investigation

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Table 1
XRF Screening Data - Arsenic and Lead
Taylor Way Property/Supplemental Remedial Investigation
Tacoma, Washington

Sample ID	Sample Depth (ft bgs)	Arsenic Field Screened (mg/kg)	Arsenic Laboratory (mg/kg)	Lead Field Screened (mg/kg)	Lead Laboratory (mg/kg)
NB-2	0	13	13	<13	16
	1.5	<7	--	<12	--
	2	<9	<4	<14	10
	5	34	82	<12	6
	6.5	13	31	<11	5
	8	<8	--	22	--
	9	<7	<4	<11	11
NB-3	0	14	38	25	37
	1.5	<8	--	<14	--
	2	<8	<4	<13	12
	5	<8	<4	<13	13
	6	21	--	<12	--
	7	9	24	<9	10
	11	<8	10	<12	10
NB-4	0	49	30	40	29
	2	<9	<4	<14	13
	5	<8	6	<14	8
	6.5	<9	18	<14	14
	7	8	--	<14	--
	11	44	16	<12	8
NB-5	0	59	76	20	30
	2.5	<9	6	<15	7
	5	17	17	<10	14
	5.5	17	23	22	27
	8	17	13	<12	10
	10	14	17	<14	14
NB-6	0	19	27	46	34
	2.5	<8	5	<12	11
	5	31	96	18	39
	6	8	6	<12	10
	6.5	34	--	<8	--
	10	16	155	42	305
	11	<9	--	14	--
NB-7	0	16	41	50	52
	2.5	49	43	110	116
	5	34	55	<15	20
	6.5	<8	11	14	12
	10	20	22	<14	10
NB-8	0	22	24	27	28
	1.8	88	158	96	122
	2	101	72	109	95
	5	11	7	<12	13
	7	11	4	<12	6
	10	<9	<4	18	7

Table 1
XRF Screening Data - Arsenic and Lead
Taylor Way Property/Supplemental Remedial Investigation
Tacoma, Washington

Sample ID	Sample Depth (ft bgs)	Arsenic Field Screened (mg/kg)	Arsenic Laboratory (mg/kg)	Lead Field Screened (mg/kg)	Lead Laboratory (mg/kg)
NB-9	0	27	26	73	67
	1.5	30	--	<10	--
	2	13	8	<13	11
	5	<8	5	<13	7
	6.5	14	28	<13	7
	10.5	19	59	<12	8
NB-10	0	31	44	24	39
	3	9	11	<13	9
	5.2	<9	--	16	--
	5.5	2,682	3,512	9,184	8,276
	5.7	52	--	<12	--
	6	19	--	<12	--
	7	<7	10	<11	7
	8.5	<7	12	<11	21
	11	17	12	<11	9
NB-11	0	57	76	59	55
	5	16	19	36	42
	6.5	2,265/3,009 [a]	3525	5,287/10,474 [a]	9,317
	7	33	113	<12	9
	10	9	15	<11	16
	13	82	203	<10	9
NB-12	0	<10	11	16	19
	1	18	--	17	--
	2	10	10	<13	11
	5.5	<7	9	<12	15
	6.5	13	8	27	15
	7.5	8	<4	<10	6
NB-13	0	68	82	67	74
	1.5	<8	--	14	--
	5	9	6	<12	21
	6	628	2,662	731	4,884
	6.5	705	1,786	218	1,212
	8	62	131	<11	17
	11	57	--	<12	--
	12	86	184	<12	11
	14	15	--	<12	--
NB-14	0	58	87	65	66
	2	14	14	<14	27
	5	314	477	82	934
	6	<9	--	18	--
	6.5	151	256	14	24
	10	14	30	<13	8
NB-15	0	17	22	37	39
	2.5	12	8	11	13
	6.5	4,653	3,544	2,077	4,288
	8	3,148	1,932	29	17
	10	117	287	<12	17
	12	81	125	<12	9

Table 1

XRF Screening Data - Arsenic and Lead

Taylor Way Property/Supplemental Remedial Investigation

Tacoma, Washington

Sample ID	Sample Depth (ft bgs)	Arsenic Field Screened (mg/kg)	Arsenic Laboratory (mg/kg)	Lead Field Screened (mg/kg)	Lead Laboratory (mg/kg)
NB-16	0	13	21	24	26
	2	68	196	25	411
	5	30	--	79	--
	5.4	1,800	3,583	2,588	3,940
	6	433	1,525	<12	37
	7	97	--	16	--
	8	1,211	486	<12	22
	8.2	31	--	<13	--
	10	40	--	<13	--
	11	23	64	<11	7
NB-17	0	17	21	29	31
	2	24	57	27	43
	5	22	27	<13	12
	6	1,348	7,331	790	6,827
	7	706	960	37	18
	9	264	1,398	<14	20
	12	316	457	<12	9
NB-18	0	129	48	20	26
	1.5	57	--	46	--
	2	28	13	25	19
	5	135	258	20	36
	6.5	13	10	<11	7
	10	<8	10	<13	10
	11	17	18	<12	7
NB-19	0	26	34	41	38
	1	27	--	14	
	2	<9	7	14	21
	5	20	29	<11	9
	6	12	14	<11	8
	10	64	108	51	71
NB-20	0	43	56	16	25
	0.5	34	--	45	--
	1.5	<8	--	<13	--
	3	20	12	18	14
	5	39	60	13	21
	7	<8	18	<12	6
	10.5	11	13	<12	12
NB-21	0	46	45	56	48
	2	<8	--	<13	--
	3	23	37	<13	33
	5	30	21	27	24
	7	8	16	<10	15
	10	<7	10	<12	8

Table 1
XRF Screening Data - Arsenic and Lead
Taylor Way Property/Supplemental Remedial Investigation
Tacoma, Washington

Sample ID	Sample Depth (ft bgs)	Arsenic Field Screened (mg/kg)	Arsenic Laboratory (mg/kg)	Lead Field Screened (mg/kg)	Lead Laboratory (mg/kg)
NB-22	0	<12	18	32	28
	2	76	40	48	65
	5	62	49	19	64
	6.5	<8	<4	<13	8
	10	<7	5	<12	6
	11.5	<7	<4	<11	10
NB-23	0	17	18	32	21
	2.5	11	72	<13	44
	5	<8	<4	17	17
	6.5	<6	12	<10	9
	10.5	<6	<4	<10	8
NB-24	0	20	25	22	23
	2	57	61	22	67
	5	<7	5	<12	14
	7	<8	14	<12	11
	12	<6	<4	<10	8
NB-25	0	18	14	20	22
	3	<8	6	<13	14
	5	1,281	885	<13	20
	7.5	125	304	<11	14
	10	57	528	58	45
	12	116	2	<13	8
NB-26	0	13	27	31	28
	3	<7	13	<12	14
	6.5	2,717	5,192	13	5,615
	8	797	2,217	23	33
	10	1,234/2,603	2,269	19/16	40
NB-27	1	103/67	168	88/100	157
	2	27	22	16	8
	5	197	300	<12	16
	6.5	17	--	<11	--
	8	<7	7	12	10
	9	<6	14	<10	11
NB-29	1	10	22	<13	29
	2	17	--	22	--
	2.5	49	280	<13	11
	3	88	147	<12	13
	5	30	59	<12	12
	6.5	<7	--	12	--
	8.5	7	7	<11	14
	11	<7	<4	<12	13
NB-30	0	14	13	30	21
	1.5	42	16	25	20
	2.5	<8	<4	<13	7
	6.5	302	398	<13	10
	9	29	52	<12	13
	12	<7	7	<11	9

Table 1

XRF Screening Data - Arsenic and Lead

Taylor Way Property/Supplemental Remedial Investigation

Tacoma, Washington

Sample ID	Sample Depth (ft bgs)	Arsenic Field Screened (mg/kg)	Arsenic Laboratory (mg/kg)	Lead Field Screened (mg/kg)	Lead Laboratory (mg/kg)
NB-31	0	<11	20	32	30
	1	<8	--	14	--
	1.5	11	5	<11	9
	4.9	452	--	105	--
	5	1,647	3,161	2,973	3,626
	6	203	343	<11	11
	7	17	35	<12	13
	11.5	<7	5	<12	8
NB-32	0	26	21	16	28
	1.5	<8	<4	<12	10
	5	15	45	<13	14
	7	<7	6	14	21
NB-33	0	19	32	20	31
	2	12	47	<14	55
	3.5	12	8	<13	14
	6	27	34	<12	10
	9	<7	<4	<12	10
	12	<7	<4	<12	11
NB-34	0	13	21	35	36
	2	25	--	53	--
	2.5	73	53	105	62
	6	--	9	--	16
	7	<8	11	<12	15
	9	<8	6	<12	14
	11	<7	<4	<12	9
NB-35	0	<7	29	<11	37
	1	<20	--	240	--
	1.5	911	--	3,724	--
	2	--	432	--	939
	2.5	56	--	20	--
	4	10	13	<14	8
	6	<8	<4	<12	10
	7.5	12	--	15	--
	8	--	10	--	24
	10	<7	<4	<12	9
	12	<7	--	<11	--
NB-36	0	18	13	34	25
	2	124	85	307	131
	2.5	78	65	70	10
	5	--	61	--	14
	6	<8	14/13	<13	16/18
	11	<8	6	<12	8
NB-37	0	15	17	21	30
	2.5	1,288	--	5,975	--
	3	44	65	<13	11
	9	11	12	<11	11
	10.5	<8	10	17	14
	12	<7	6	<13	12

Table 1

XRF Screening Data - Arsenic and Lead

Taylor Way Property/Supplemental Remedial Investigation

Tacoma, Washington

Sample ID	Sample Depth (ft bgs)	Arsenic Field Screened (mg/kg)	Arsenic Laboratory (mg/kg)	Lead Field Screened (mg/kg)	Lead Laboratory (mg/kg)
NB-38	0	24	26	24	31
	1	37	--	33	--
	1.5	17	39	15	34
	3	40	58	<11	6
	6.5	10	16	17	14
	8	<7	<4	18	18
NB-40	1	14	18	18	25
	2	1,286	403	1,737	446
	2.5	110	--	160	--
	3	<8	65	<14	41
	5	14	21	<12	21
	6.5	<7	--	13	--
	8.5	<6	<4	<10	12
	10.5	<7	--	<12	--
	11	--	<4	--	11
NB-41	1	<9	15	15	17
	2	193	522	126	421
	2.5	152	315	48	221
	5	<6	9	<10	12
	6.5	<7	9	14	14
	8	34	47	<13	7
NB-42	0	37	47	43	30
	1.5	57	--	<12	--
	2	873	255	571	112
	3	<8	40	<13	19
	7	<7	6	<12	20
	9	--	5	--	24
	9.5	<9	--	30	--
	10	<9	--	<14	--
	12	<7	<4	17	10
NB-43	0	11	10	18	24
	1.5	55	--	25	--
	2	21	53	<14	46
	3	28	109	<12	168
	6	24	31	<12	9
	9.5	<6	--	<9	--
	12	<6	<4	<10	13
NB-44	0	29	39	<14	40
	1	28	52	45	53
NB-45	0	10	11	<13	12
	1	13	19	16	16
	2	61	178	40	156
	5	52	98	22	23
	7	34	111	<13	11

Table 1

XRF Screening Data - Arsenic and Lead

Taylor Way Property/Supplemental Remedial Investigation

Tacoma, Washington

Sample ID	Sample Depth (ft bgs)	Arsenic Field Screened (mg/kg)	Arsenic Laboratory (mg/kg)	Lead Field Screened (mg/kg)	Lead Laboratory (mg/kg)
NB-46	0	12	--	21	--
	1	37	33	73	105
	5	100	--	68	--
	6	141	419	48	81
	7	154	139	35	40
	10	569	215	31	63
	10.5	33	--	<13	--
	11	50	93	33	71
	12	<7	<4	<12	9
NB-47	0	37	77	76	127
	1.8	16	333	42	238
	4	123	--	24	--
	4.5	261	--	<11	--
	5	31	132	16	31
	6	28	63	<14	18
	8	<5	5	<8	13
	10	7	16	<10	10
	12	<8	<4	<13	9
NB-48	0	64	51	96	55
	1.5	40	--	18	--
	2	83	328	45	484
	5	53	8	66	14
	6	37	--	<11	--
	7	<8	11	<13	7
	10	<7	5	<13	8
NB-49	0	23	47	22	41
	0.8	12	--	<12	--
	1	686	898	1,592	1,452
	1.5	<8	--	<13	--
	5	<10	7	<16	10
	7	<7	7	<12	17
	8	13	7	21	24

Notes:

a) Data from same depth, different borings drilled side by side.

ft bgs - feet below ground surface.

mg/kg - milligrams per kilogram.

Table 2

XRF Field Screening Data - Secondary Metals

Taylor Way Property/Supplemental Remedial Investigation

Tacoma, Washington

Sample ID	Sample Depth (ft bgs)	Antimony		Copper		Iron		Nickel		Silver		Zinc	
		Field Screened	Laboratory	Field Screened	Laboratory	Field Screened	Laboratory	Field Screened	Laboratory	Field Screened	Laboratory	Field Screened	Laboratory
		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
NB-2	0	<110	<43	65	61	22,550	20,086	<67	<25	<52	<18	132	173
	1.5	<106	--	38	--	27,812	--	<65	--	<51	--	48	--
	2	<112	<43	<35	37	25,323	37,534	<69	<28	<53	<17	40	52
	5	<100	<45	<31	38	22,064	49,420	<57	<29	<48	<18	46	51
	6.5	<90	<42	<29	26	15,899	28,886	<49	<26	<44	<17	39	64
	8	<86	--	<26	--	9,314	--	<44	--	<44	--	<12	--
	9	<90	<42	<29	31	17,880	27,045	<52	<25	<44	<17	33	57
NB-3	0	<101	<43	55	61	34,840	32,543	<68	80	<49	<18	96	147
	1.5	<107	--	<35	--	30,952	--	<69	--	<51	--	43	--
	2	<107	<43	39	23	27,677	28,070	<61	<26	<51	<17	58	52
	5	<102	<43	<33	26	20,110	29,297	<57	<26	<48	<18	45	45
	6	<91	--	<29	--	18,707	--	<49	--	<44	--	30	--
	7	<82	<41	<27	31	13,942	36,173	<47	<27	<41	<18	156	191
	11	<99	<43	<31	21	25,296	27,655	<61	<26	<47	<19	54	58
NB-4	0	<105	<44	110	47	34,919	35,550	<74	47	49	<18	142	113
	2	<105	<43	37	31	29,876	31,078	<66	<27	<49	<18	62	56
	5	<114	<43	49	24	26,934	33,639	79	<27	<54	<18	36	60
	6.5	<103	<42	35	30	24,520	29,844	<62	<26	<49	<17	40	68
	7	<101	--	<33	--	22,235	--	<63	--	<49	--	56	--
	11	<99	<44	<32	22	24,009	32,240	<60	<27	<47	<18	143	87
NB-5	0	<101	<42	42	43	33,840	32,496	<66	<27	<48	<18	101	105
	2.5	<106	<44	<35	25	31,758	34,472	<67	<28	<51	<18	52	52
	5	<87	<43	36	49	17,067	31,393	<48	<26	<42	<18	48	61
	5.5	<99	--	47	--	23,961	--	<57	--	<48	--	45	--
	8	<99	<43	<32	31	25,429	32,295	<58	<26	<47	<18	43	63
	10	<109	<44	<35	26	26,366	32,996	<64	<27	<52	<18	47	70
NB-6	0	<106	<44	60	39	26,011	26,116	147	134	<51	<18	84	112
	2.5	<104	<44	<34	28	37,205	30,363	<70	<27	<49	<18	50	54
	5	<98	46	<31	52	26,285	31,458	<61	<27	<47	<18	80	128
	6	<101	<44	44	27	22,898	32,528	<61	<27	<48	<18	77	64
	6.5	<69	--	<23	--	9,938	--	<38	--	<37	--	<11	--
	10	<98	75	46	150	24,480	42,829	<60	42	<47	<18	58	393
	11	<100	--	33	--	22,065	--	<55	--	<47	--	51	--
NB-7	0	<100	<43	60	64	28,691	32,274	<69	136	<49	<18	178	208
	2.5	<96	<45	131	144	30,651	41,353	<66	45	<46	<18	149	138
	5	<108	45	<35	23	25,159	34,021	<62	<27	<52	<18	46	61
	6.5	<96	<44	34	24	23,346	34,684	<59	<27	<46	<18	44	71
	10	<102	<44	<33	29	25,231	31,546	<60	<27	<48	<18	57	64

Table 2
XRF Field Screening Data - Secondary Metals
Taylor Way Property/Supplemental Remedial Investigation
Tacoma, Washington

Sample ID	Sample Depth (ft bgs)	Antimony		Copper		Iron		Nickel		Silver		Zinc	
		Field Screened	Laboratory	Field Screened	Laboratory	Field Screened	Laboratory	Field Screened	Laboratory	Field Screened	Laboratory	Field Screened	Laboratory
		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
NB-8	0	<106	<46	<35	51	33,080	31,616	<73	<29	<51	<18	90	96
	1.8	<111	208	103	129	30,380	45,704	<70	<29	<52	<18	358	399
	2	<104	<42	57	37	28,952	29,963	<64	<26	<49	<17	62	64
	5	<92	<42	38	30	19,594	24,150	<54	<24	<45	<17	69	56
	7	<97	<43	<34	19	20,774	28,793	<59	<26	<47	<18	40	42
	10	<102	<45	45	23	29,196	40,111	<62	<29	<48	<'18	63	66
NB-9	0	<115	<44	244	85	34,357	35,649	<74	<29	<54	<18	150	129
	1.5	<68	--	<23	--	5,664	--	<39	--	<37	--	38	--
	2	<108	<44	<33	18	25,993	33,823	<66	<27	<52	<18	66	59
	5	<113	<41	42	23	24,416	23,193	<70	36	<54	<17	49	37
	6.5	<110	<43	<35	32	21,867	27,662	<64	<25	<52	<17	43	59
	10.5	<101	<44	<31	34	24,908	30,843	<58	<26	<48	<18	52	70
NB-10	0	<112	<44	67	78	33,510	31324	<70	76	31	<18	101	129
	3	<103	<44	66	49	28,100	33,256	<62	<27	9	<18	57	56
	5.2	<114	--	<37	--	28,845	--	<68	--	<9	--	134	--
	5.5	2,202	2,450	2,255	2,339	61,430	91,348	<101	<49	2,682	<21	4,241	6,045
	5.7	<94	--	<31	--	19,847	--	<54	--	52	--	53	--
	6	<95	--	32	--	19,018	--	<55	--	19	--	51	--
	7	<98	<44	<31	24	21,529	35,348	<57	<27	<7	<18	48	60
	8.5	<87	<42	38	61	22,425	33,922	<52	<26	<7	<18	39	60
	11	<98	<43	33	22	21,140	28,578	<57	<26	17	<17	50	56
NB-11	0	<104	<45	71	87	16,442	26,897	234	259	57	<19	183	207
	5	<103	<43	67	47	27,808	36,842	<66	<27	<50	<18	93	90
	6.5/6.5	1,074/2,179 [a]	2,586/2,577 [a]	1,257/2,126 [a]	2,015/1,978 [a]	26,397/63,325 [a]	63,705/62,352 [a]	79/<105 [a]	<46/50 [a]	<51/<55 [a]	<21/<21 [a]	5,692/7,590 [a]	8,230/8,131 [a]
	7	<96	<43	<32	31	18,142	28,104	<56	<25	<47	<17	46	53
	10	<90	<42	54	51	21,795	38,450	<52	<28	<44	<17	42	67
	13	<80	<41	<26	52	9,956	28,764	<40	<26	<41	<17	<12	46
NB-12	0	<113	<44	54	74	16,413	19,302	<61	<25	<54	<18	113	165
	1	<105	--	54	--	27,331	--	<65	--	<51	--	84	--
	2	<110	<42	49	41	28,889	33,305	<64	42	<51	<17	61	45
	5.5	<90	<43	45	47	24,654	36,399	<53	<27	<43	<18	34	62
	6.5	<92	<42	53	29	20,657	28,632	<55	<25	<44	<17	50	49
	7.5	<92	<43	<31	26	17,225	31,078	<56	<26	<45	<18	30	51
NB-13	0	<111	<46	194	88	39,880	36,296	<78	70	<52	<19	456	256
	1.5	<98	--	<33	--	23,982	--	<63	--	<47	--	43	--
	5	<98	<42	<33	37	22,922	34,199	<59	<26	<48	<17	39	63
	6	354	1568	88	1,262	10,998	55,961	<55	<40	<48	<20	721	4,920
	6.5	708	872	125	263	23,922	34,986	<64	<29	<48	<18	595	1,191
	8	<92	<43	33	44	21,063	33,203	<55	<27	<44	<18	54	70
	11	<92	--	31	--	21,540	--	<53	--	<44	--	40	--
	12	<95	<42	47	27	18,761	28,810	<55	<26	<45	<17	36	49
	14	<93	--	<30	--	19,500	--	<56	--	<44	--	52	--

Table 2
XRF Field Screening Data - Secondary Metals
Taylor Way Property/Supplemental Remedial Investigation
Tacoma, Washington

Sample ID	Sample Depth (ft bgs)	Antimony Field Screened	Antimony Laboratory	Copper Field Screened	Copper Laboratory	Iron Field Screened	Iron Laboratory	Nickel Field Screened	Nickel Laboratory	Silver Field Screened	Silver Laboratory	Zinc Field Screened	Zinc Laboratory
		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
NB-14	0	<104	<46	81	112	30,688	29,739	234	264	<50	<19	227	314
	2	<107	<43	<34	35	26,442	33,686	<62	<27	<51	<18	46	75
	5	<98	267	38	171	22,729	29,312	<60	<28	<47	<18	137	625
	6	<101	--	<33	--	24,252	--	<59	--	<48	--	77	--
	6.5	<90	<45	48	54	27,498	52,386	<56	<30	<44	<18	35	47
	10	<103	<44	<32	30	26,950	36,929	<63	<27	<48	<18	51	50
NB-15	0	<106	<44	50	32	38,716	38,994	<73	<29	<51	<18	154	141
	2.5	<81	<42	<27	35	15,450	31,650	<47	<26	<41	<17	19	60
	6.5	1,427	1,771	426	1,092	17,579	44,894	<68	<38	<50	<20	2,120	4,931
	8	262	--	53	--	26,455	--	<60	--	<47	--	87	--
	10	<92	<43	<29	41	20,570	33,135	<54	<26	<44	<18	36	57
	12	<100	<43	37	26	21,487	28,790	<58	<26	<48	<18	43	65
NB-16	0	<110	<44	46	47	34,046	35,601	<76	76	<53	<18	104	116
	2	<94	101	<33	116	15,929	31,051	135	<27	<46	<18	81	271
	5	<107	--	47	--	28,257	--	<65	--	<50	--	84	--
	5.4	498	1,204	267	703	27,351	56,160	<72	70	<49	<20	1,194	2810
	6	<91	45	<29	57	18,572	32,293	<51	<26	<44	<18	42	75
	7	<103	--	46	--	25,681	--	<58	--	<49	--	52	--
	8	<91	<42	<30	47	29,144	43,882	<59	<29	<46	<18	33	51
	8.2	<103	--	35	--	22,157	--	<60	--	<49	--	45	--
	10	<96	--	<31	--	18,911	--	<55	--	<46	--	45	--
	11	<100	<43	<30	27	20,635	26,645	<55	<25	<48	<17	42	51
NB-17	0	<106	<45	41	39	33,898	37,462	<73	<29	<51	<18	109	115
	2	<111	<45	58	92	26,488	29,600	106	150	<53	<18	101	162
	5	<98	<42	<31	32	25,730	31,875	<58	<27	<47	<17	48	54
	6	439	1,778	128	1,277	28,371	71,042	<61	<45	<47	<21	989	5,368
	7	<92	<43	<29	41	19,962	34,241	<53	<27	<44	<18	57	80
	9	<113	70	<35	62	20,864	25,724	<60	<25	<53	<17	108	211
	12	<98	<43	35	43	23,972	30,393	<54	<26	<46	<18	63	60
NB-18	0	<101	<42	49	34	32,537	32,958	<63	<27	<49	<17	91	88
	1.5	<102	--	106	--	17,240	--	199	--	<48	--	215	--
	2	<105	<43	50	39	30,595	29,565	<67	<26	<50	<17	110	70
	5	<87	<41	39	94	17,366	39,630	<48	<27	<43	<18	116	109
	6.5	<101	<44	<31	18	18,928	31,109	<57	<26	<48	<18	41	63
	10	<102	<44	<33	26	26,524	29,943	<59	<26	<48	<18	56	72
	11	<100	<43	<32	25	22,904	30,973	<60	<26	<47	<17	56	64
NB-19	0	<107	<45	65	62	32,964	32157	<77	73	<52	<18	145	142
	1	<74	--	<24	--	2,031	--	<35	--	<40	--	40	--
	2	<99	<44	<33	35	26,010	32,096	<64	<27	<47	<18	71	67
	5	<100	<43	<33	30	20,088	26,878	<59	<25	<47	<18	42	68
	6	<103	<43	<32	21	22,288	33,661	<61	<26	<49	<18	81	124
	10	108	56	98	99	22,817	35,267	<60	30	<49	<18	189	218

Table 2
XRF Field Screening Data - Secondary Metals
Taylor Way Property/Supplemental Remedial Investigation
Tacoma, Washington

Sample ID	Sample Depth (ft bgs)	Antimony Field Screened (mg/kg)	Antimony Laboratory (mg/kg)	Copper Field Screened (mg/kg)	Copper Laboratory (mg/kg)	Iron Field Screened (mg/kg)	Iron Laboratory (mg/kg)	Nickel Field Screened (mg/kg)	Nickel Laboratory (mg/kg)	Silver Field Screened (mg/kg)	Silver Laboratory (mg/kg)	Zinc Field Screened (mg/kg)	Zinc Laboratory (mg/kg)
NB-20	0	<103	<42	63	55	29,762	31,747	<67	56	<50	<17	102	117
	0.5	<76	--	53	--	7,721	--	112	--	<40	--	112	--
	1.5	<100	--	<32	--	24,015	--	<60	--	<47	--	41	--
	3	<108	<43	43	30	29,131	34,193	<68	<27	<51	<17	48	54
	5	<90	<43	32	52	21,843	38,005	<53	<28	<44	<18	50	76
	7	<103	<44	39	23	25,060	33,563	<59	<27	<49	<18	68	74
	10.5	<96	<44	<30	22	20,000	34,594	<53	<27	<46	<18	53	76
NB-21	0	<114	<44	95	64	28,890	30,039	316	106	<55	<18	206	161
	2	<105	--	37	--	27,174	--	<65	--	<49	--	50	--
	3	<103	62	<33	25	19,253	26,139	<61	<26	<48	<18	66	91
	5	<104	<44	73	59	22,845	47,194	103	<29	<49	<18	98	111
	7	<83	<41	<26	24	16,394	36,979	<47	<27	<40	<18	31	38
	10	<96	<44	42	21	22,209	31,989	<57	<27	<46	<18	43	52
NB-22	0	<109	<41	41	53	31,468	32,479	<73	<28	<53	<18	100	129
	2	<87	<42	35	47	19,495	30,338	<51	<26	<42	<17	96	142
	5	<108	<43	<35	54	26,966	31,554	<70	<27	<52	<17	66	134
	6.5	<104	<45	<33	14	31,144	37,094	<63	<28	<49	<19	56	53
	10	<97	<41	<30	27	22,098	38,523	<54	<28	<46	<18	46	51
	11.5	<92	<42	43	49	24,885	30,086	<56	<26	<44	<17	33	51
NB-23	0	<106	<45	<35	35	32,090	33,502	<72	<28	<51	,18	97	81
	2.5	<100	<41	34	65	13,533	27,626	<53	42	<47	<17	29	191
	5	<98	<44	<31	15	24,520	32,737	<60	<27	<47	<18	63	52
	6.5	<76	<41	26	28	12,786	39,280	<40	<27	<38	<18	25	36
	10.5	<84	<41	<27	39	12,366	29,873	<43	<26	<42	<17	20	53
NB-24	0	<104	<43	44	41	32,127	34,432	<68	<28	<50	<18	77	95
	2	<95	<44	<31	63	22,916	32,949	<60	<28	<45	<18	84	169
	5	<97	<43	36	37	23,246	34,584	<57	<27	<46	<17	65	62
	7	<103	<44	<34	33	18,018	29,087	<61	<26	<50	<18	33	56
	12	<83	<42	<28	25	18,332	28,891	<53	<26	<42	<17	25	50
NB-25	0	<107	<43	50	41	35,078	35,283	<72	<27	<51	<18	105	80
	3	<97	<43	38	38	23,632	28,921	<58	<25	<47	<17	30	55
	5	<95	<43	37	40	17,877	31,505	<54	<27	<45	<18	47	68
	7.5	<92	<43	31	38	18,638	29,527	<56	<26	<45	<18	48	52
	10	<99	<44	<32	37	22,089	29,162	<61	<27	<47	<18	89	84
	12	<102	<44	39	23	23,912	32,962	<62	<27	<49	<18	49	49
NB-26	0	105	<44	48	38	38,044	34,251	<69	<27	<50	<18	124	117
	3	98	<42	31	48	26,881	33,419	<62	<27	<47	<17	49	66
	6.5	82	1,556	<29	1,013	10,279	62,623	<44	<42	<42	<21	34	5,425
	8	102	49	33	39	19,282	32,169	<60	<27	<48	<18	52	81
	10	92/93 [a]	<42	<30/82 [a]	125	19,979/19,391 [a]	24,850	<53/<56 [a]	<26	<44/<45 [a]	<17	54/70 [a]	122

CDM Smith

Table 2
XRF Field Screening Data - Secondary Metals
Taylor Way Property/Supplemental Remedial Investigation
Tacoma, Washington

Sample ID	Sample Depth (ft bgs)	Antimony Field Screened	Antimony Laboratory	Copper Field Screened	Copper Laboratory	Iron Field Screened	Iron Laboratory	Nickel Field Screened	Nickel Laboratory	Silver Field Screened	Silver Laboratory	Zinc Field Screened	Zinc Laboratory
		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
NB-27	1	<119/<101 [a]	96	72/96 [a]	65	29,704/23,658 [a]	32,483	<77/<61 [a]	<26	<56/<48 [a]	<17	216/174	242
	2	<104	<42	<35	41	15,218	34,061	<60	<27	<50	<17	61	54
	5	<89	<42	51	55	21,163	35,430	<55	<27	<43	<18	47	79
	6.5	<89	--	35	--	21,551	--	<55	--	<43	--	43	--
	8	<91	<42	<29	41	16,910	26,913	<51	<25	<44	<17	42	49
	9	<80	<39	<24	37	12,487	30,269	52	34	<40	<17	48	142
NB-29	1	<100	<43	<32	52	28,558	26,785	<64	<26	<49	<18	72	109
	2	<100	--	35	--	24,637	--	<61	--	<48	--	62	--
	2.5	<105	<43	40	43	28,932	37,680	<66	<27	<51	<17	66	64
	3	<98	<41	<31	35	18,517	30,186	<56	<25	<47	<17	36	55
	5	<95	<43	51	40	22,084	33,866	<57	<27	<46	<18	54	62
	6.5	<91	--	<30	--	17,833	--	<53	--	<44	--	36	--
	8.5	<83	<40	<27	44	17,161	29,476	<47	<25	<41	<17	29	54
	11	<91	<43	<30	34	19,911	35,260	<52	<27	<44	<18	38	53
NB-30	0	<106	<42	59	38	36,411	34,530	<73	<26	<51	<18	93	93
	1.5	<116	<43	103	50	21,406	32,239	211	47	<56	<18	138	82
	2.5	<111	<42	<34	35	27,002	29,476	<69	<26	<52	<17	55	54
	6.5	<99	60	<33	32	23,083	30,734	<58	<26	<47	<18	46	68
	9	<92	<41	<29	31	17,712	27,119	<54	<25	<43	<17	35	45
	12	<89	<42	43	39	17,681	29,007	<49	<26	<43	<17	38	62
NB-31	0	<104	<44	74	61	30,290	35,481	<69	43	<50	<18	166	129
	1	<101	--	<32	--	24,036	--	<62	--	<48	--	51	--
	1.5	<101	<42	<33	25	22,713	28,072	<60	<25	<48	<17	42	44
	4.9	<78	--	100	--	9,707	--	75	--	<39	--	264	--
	5	1,501	1,366	703	627	39,924	51,358	113	<37	<50	<20	2,909	2,627
	6	<96	<43	43	28	21,121	31,246	<57	<26	<45	<18	47	57
	7	<93	<42	38	48	22,566	36,965	<54	<26	<45	<18	48	61
	11.5	<97	<42	<31	23	18,070	28,097	<54	<25	<46	<18	28	44
NB-32	0	<107	<43	72	35	29,252	33,522	86	<28	<51	<18	118	95
	1.5	<104	<43	42	25	27,921	30,152	<68	<26	<50	<17	51	50
	5	<104	<44	<33	27	25,914	29,018	<63	<26	<49	<18	49	72
	7	<88	<42	<28	31	18,037	33,725	<50	<27	<42	<18	337	90
NB-33	0	<108	<44	45	42	32,822	38,310	<71	<29	<52	<18	103	126
	2	<107	<44	<35	86	29,131	31,904	<66	48	<50	<18	59	192
	3.5	<108	<43	<36	36	29,312	30,352	<65	<25	<51	<18	54	52
	6	<96	<43	39	44	22,752	35,781	<55	<28	<46	<18	53	74
	9	<100	<43	40	25	20,004	27,304	<57	<25	<47	<18	40	41
	12	<98	<42	<27	30	20,852	30,035	<57	<26	<48	<17	37	52

Table 2

XRF Field Screening Data - Secondary Metals

Taylor Way Property/Supplemental Remedial Investigation

Tacoma, Washington

Sample ID	Sample Depth (ft bgs)	Antimony Field Screened	Antimony Laboratory	Copper Field Screened	Copper Laboratory	Iron Field Screened	Iron Laboratory	Nickel Field Screened	Nickel Laboratory	Silver Field Screened	Silver Laboratory	Zinc Field Screened	Zinc Laboratory
		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
NB-34	0	<106	<43	<36	54	33,378	34,802	<71	49	<51	<18	104	171
	2	123	--	36	--	24,485	--	<58	--	<47	--	91	--
	2.5	<95	<43	39	42	27,377	32,702	<56	<26	<45	<17	66	70
	6	--	<42	--	26	--	26,786	--	<25	--	<17	--	65
	7	<93	<42	38	37	20,685	35,983	<57	<27	<45	<18	44	59
	9	<93	<43	<30	18	18,299	28,164	<53	<25	<44	<18	33	45
	11	<98	<44	35	31	21,862	30,970	<56	<27	<46	<18	51	46
NB-35	0	<89	<43	<30	43	10,113	29,971	<50	68	<45	<18	39	127
	1	242	--	50	--	21,206	--	<64	--	<49	--	95	--
	1.5	481	--	691	--	31,032	--	94	--	<48	--	2,142	--
	2	--	122	--	239	--	35,589	--	<29	--	<18	--	909
	2.5	<110	--	44	--	34,456	--	<68	--	<52	--	237	--
	4	<113	45	42	28	27,918	35,675	<68	<27	<54	<18	38	55
	6	<98	<43	50	27	21,493	32,968	<59	<27	<47	<18	48	62
	7.5	<79	--	59	--	19,598	--	<50	--	<39	--	23	--
	8	--	<42	--	52	--	32,629	--	<26	--	<18	--	50
	10	<98	<43	<31	24	21,571	27,292	<53	<26	<46	<18	55	61
	12	<96	--	<31	--	20,191	--	<57	--	<45	--	48	--
NB-36	0	<108	<43	66	52	34,147	33,873	<72	<28	<51	<18	117	94
	2	<110	<45	145	59	33,940	34,399	<72	<27	<52	<18	267	98
	2.5	<111	<44	40	35	40,701	30,318	<78	<27	<52	<18	128	97
	6	<99	<43	<32	43	25,244	32,806	<59	<27	<47	<18	51	92
	11	<102	<44	35	25	23,416	36,273	<58	<27	<48	<18	52	62
NB-37	0	<109	<42	79	44	32,490	31,487	<70	27	<52	<17	81	104
	2.5	992	--	1,605	--	33,500	--	<82	--	<52	--	3,477	--
	3	<116	<45	66	48	31,298	28,660	<69	<26	<55	<18	162	230
	9	<97	<43	38	27	19,809	29,448	<59	<26	<46	<18	33	51
	10.5	<86	<43	<28	45	24,138	34,788	<54	<27	<42	<18	38	58
	12	<96	<44	<31	42	26,067	31,429	<59	<27	<46	22	38	69
NB-38	0	<99	<43	62	46	34,062	35,290	<68	<28	<49	<17	120	113
	1	<110	--	59	--	22,734	--	227	--	<53	--	130	--
	1.5	<107	<44	46	61	27,569	28,678	<70	103	<51	<18	88	119
	3	<106	<42	<35	22	26,417	27,189	<69	43	<51	<17	48	48
	6.5	<88	<44	43	48	22,694	34,936	<54	<27	<43	<17	72	88
	8	<89	<43	<29	35	18,979	26,496	<55	<25	<43	<17	25	54
NB-40	1	<104	<44	49	57	22,483	23,570	<63	93	<50	<18	94	134
	2	2,030	612	1,946	643	14,952	27,240	<171	<28	<77	<18	5,559	852
	2.5	<113	--	213	--	10,516	--	<53	--	<54	--	203	--
	3	<111	66	<37	49	29,829	38,536	<66	<28	<53	<18	64	328
	5	<94	<43	<30	56	20,574	35,557	<54	<27	<45	<18	54	82
	6.5	<89	--	<28	--	22,051	--	<52	--	<43	--	33	--
	8.5	<85	<42	32	41	13,449	29,043	<45	<25	<42	<18	29	57
	10.5	<93	--	32	--	17,914	--	<52	--	<45	--	58	--
	11	--	<43	--	31	--	27,461	--	<26	--	<18	--	62

Table 2
XRF Field Screening Data - Secondary Metals
Taylor Way Property/Supplemental Remedial Investigation
Tacoma, Washington

Sample ID	Sample Depth (ft bgs)	Antimony Field Screened	Antimony Laboratory	Copper Field Screened	Copper Laboratory	Iron Field Screened	Iron Laboratory	Nickel Field Screened	Nickel Laboratory	Silver Field Screened	Silver Laboratory	Zinc Field Screened	Zinc Laboratory
		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
NB-41	1	<102	<44	51	55	16,419	20,376	<53	<25	<49	<18	127	170
	2	118	678	529	719	28,102	47,034	<64	<33	<51	<19	367	1,076
	2.5	<119	179	70	141	59,120	47,952	<86	<30	<57	<18	163	405
	5	<92	<60	<29	47	18,005	29,836	<51	<36	<44	<25	34	49
	6.5	<86	<59	<28	26	17,895	32,475	<52	<37	<42	<24	36	69
	8	<110	<63	<35	<18	19,257	29,315	<56	<37	<53	<25	39	50
NB-42	0	<116	<44	106	47	20,752	28,509	227	81	<55	<18	115	113
	1.5	<100	--	41	--	27,261	--	<63	--	<47	--	41	--
	2	485	152	213	61	37,614	32,595	<67	<27	<46	<17	367	96
	3	<97	<43	<30	37	20,710	31,357	<58	<26	<46	<18	59	75
	7	<90	<43	<29	40	23,097	36,199	<58	41	<44	<18	101	227
	9	--	<41	--	29	--	29,648	--	<25	--	<17	--	49
	9.5	<88	--	33	--	17,749	--	<50	--	<43	--	33	--
	10	<113	--	<32	--	6,525	--	<57	--	<58	--	<18	--
	12	<91	<41	53	46	20,011	32,330	<52	<26	<44	<17	34	55
NB-43	0	<112	<43	55	35	34,815	34,320	<72	<27	<52	<18	88	88
	1.5	<108	--	54	--	15,249	--	279	--	<51	--	152	--
	2	<105	<45	54	55	21,438	24,837	77	187	<50	<19	59	148
	3	<98	59	34	46	23,440	25,930	<60	<24	<46	<17	48	153
	6	<98	<44	55	26	23,711	33,105	<64	<27	<46	<18	48	54
	9.5	<76	--	<23	--	4,924	--	<39	--	<40	--	27	--
	12	<81	<41	<25	31	11,617	31,401	<44	<25	<40	<18	25	56
NB-44	0	<103	<44	62	60	23,993	25,262	141	191	<49	<18	110	146
	1	<99	<45	82	72	12,054	27,859	275	178	<48	<18	125	151
NB-45	0	<104	<63	53	58	19,058	23,877	<60	<36	<52	<25	135	148
	1	<108	<59	<35	44	24,788	34,345	<63	<37	<52	<24	73	77
	2	85	92	93	230	13,552	33,438	<42	<37	<39	<24	123	323
	5	<94	<42	53	56	18,710	29,189	<53	<26	<46	<17	69	72
	7	<100	<44	39	31	21,116	40,936	<58	<29	<49	<18	35	106
NB-46	0	<103	<46	<33	68	27,231	47,592	<64	<30	<49	<19	77	136
	1	<115	--	67	--	42,441	--	<80	--	<54	--	130	--
	5	<99	--	69	--	21,847	--	<57	--	<46	--	128	--
	6	<94	<61	54	85	18,345	30,288	<50	<37	<45	<25	107	150
	7	<92	<42	<30	43	25,945	32,762	<59	<26	<45	<18	47	85
	10	<83	<42	<27	59	12,383	31,577	<48	<26	<41	<18	55	158
	10.5	<101	--	<32	--	17,392	--	<56	--	<48	--	43	--
	11	<92	<43	51	63	21,628	33,967	<56	<27	<44	<17	74	118
	12	<94	<45	<31	33	22,335	30,682	<57	<27	<46	<19	35	50

Table 2
XRF Field Screening Data - Secondary Metals
Taylor Way Property/Supplemental Remedial Investigation
Tacoma, Washington

Sample ID	Sample Depth (ft bgs)	Antimony		Copper		Iron		Nickel		Silver		Zinc	
		Field Screened	Laboratory	Field Screened	Laboratory	Field Screened	Laboratory	Field Screened	Laboratory	Field Screened	Laboratory	Field Screened	Laboratory
		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
NB-47	0	<111	<43	89	92	31,381	38,032	<70	60	<54	<17	149	197
	1.8	<105	137	42	107	24,444	35,386	<64	<27	<49	<18	65	189
	4	<93	--	41	--	24,743	--	<59	--	<45	--	78	--
	4.5	<90	--	46	--	25,439	--	<53	--	<44	--	46	--
	5	<107	<42	<33	60	25,402	34,921	<62	<28	<50	<18	67	178
	6	<105	<45	36	42	25,723	35,084	<63	<27	<50	<18	50	103
	8	<75	<34	<24	26	2,149	16,728	<36	<20	<40	<15	16	58
	10	<83	<42	37	39	13,256	28,601	<48	<26	<41	<18	35	62
	12	<96	<43	<31	37	22,561	31,181	<57	<26	<46	<18	40	57
NB-48	0	<109	<44	75	69	48,619	41,428	<82	56	<52	<18	377	303
	1.5	<94	--	50	--	9,185	--	81	--	<46	--	82	--
	2	169	296	59	114	24,750	38,613	<56	<29	<45	<18	87	405
	5	<97	<42	50	32	24,357	30,091	<59	<26	<46	<18	126	54
	6	<85	--	32	--	25,920	--	<53	<'--	<41	--	49	--
	7	<100	<63	<32	<18	21,501	29,623	<60	<37	<47	<25	44	55
	10	<100	<43	<32	22	21,447	29,599	<56	<26	<47	<18	37	52
NB-49	0	<113	<46	58	47	29,701	28,339	103	137	<54	<19	126	145
	0.8	<105	--	<33	--	20,488	--	<60	--	<50	--	50	--
	1	177	381	315	331	23,294	42,313	67	<33	<45	<19	972	1,021
	1.5	<96	--	<31	--	25,124	--	<58	--	<46	--	66	--
	5	<119	<45	<38	32	30,966	41,417	<71	<29	<56	<18	88	67
	7	<88	<43	<29	48	20,722	35,893	<53	<27	<43	<18	39	65
	8	<88	<42	47	56	21,093	31,758	<50	<26	<43	<17	32	57

Notes:
a) Data from same depth, different borings drilled side by side.
ft bgs - feet below ground surface.
mg/kg - milligrams per kilogram.

Table 3
Field XRF Replicate QC Results
Taylor Way Property/Supplemental Remedial Investigation
Tacoma, Washington

Sample ID	Arsenic mg/kg	Arsenic RSD	Lead mg/kg	Lead RSD
NB8-1.8	88	7%	96	5%
NB8-1.8	99		85	
NB8-1.8	101		86	
NB8-1.8	97		84	
NB8-1.8	98		91	
NB8-1.8	107		83	
NB8-1.8	86		87	
NB8-1.8	97		85	
NB-15-6.5	1,584	6%	3,281	2%
NB-15-6.5	1,516		3,155	
NB-15-6.5	1,575		3,246	
NB-15-6.5	1,529		3,314	
NB-15-6.5	1,670		3,352	
NB-15-6.5	1,714		3,171	
NB-15-6.5	1,800		3,156	
NB-17-7	706	6%	37	23%
NB-17-7	686		25	
NB-17-7	712		24	
NB-17-7	718		32	
NB-17-7	779		36	
NB-17-7	782		39	
NB-17-7	803		49	
NB-17-7	782		39	
NB27-5	197	8%	ND	#DIV/0!
NB27-5	191		ND	
NB27-5	176		ND	
NB27-5	194		ND	
NB27-5	191		ND	
NB27-5	180		ND	
NB27-5	154		12	
NB31-5	1,647	4%	2,973	5%
NB31-5	1,576		3,101	
NB31-5	1,734		3,351	
NB31-5	1,670		3,276	
NB31-5	1,611		3,307	
NB31-5	1,715		3,336	
NB31-5	1,780		3,412	

Table 3
Field XRF Replicate QC Results
Taylor Way Property/Supplemental Remedial Investigation
Tacoma, Washington

Sample ID	Arsenic		Lead	
	mg/kg	RSD	mg/kg	RSD
NB40-2	1,286	5%	1,737	6%
NB40-2	1,443		1,875	
NB40-2	1,454		1,804	
NB40-2	1,363		1,827	
NB40-2	1,474		1,723	
NB40-2	1,462		1,848	
NB40-2	1,511		2,000	
NB40-2	1,456		1,648	
NB44 -1	28	18%	45	16%
NB44 -1	33		45	
NB44 -1	34		50	
NB44 -1	37		38	
NB44 -1	20		57	
NB44 -1	33		42	
NB44 -1	32		37	

Table 4
XRF Laboratory QC Results
USG Interiors/Supplemental Remedial Investigation
Tacoma, Washington

Sample ID	Sample Depth (ft bgs)	Arsenic			Lead			Antimony		
		Initial	Duplicate	Replicate	Initial	Duplicate	Replicate	Initial	Duplicate	Replicate
		mg/kg			mg/kg			mg/kg		
NB-3	5	<4	5	<4	13	11	14	<43	<43	<43
NB-7	5	55	56	51	20	19	22	<45	68	63
NB-11b	6.5	3,525	3,412	3,226	9,317	9,186	8,362	2,586	2,577	2,471
NB-12	0	11	10	13	19	17	17	<44	<44	<44
NB-17	2	57	65	54	43	41	45	<45	<45	<45
NB-18	5	258	256	265	36	37	39	<41	<41	<42
NB-22	5	49	56	43	64	56	54	<43	<43	<42
NB-23	2.5	72	78	97	44	41	51	<41	71	84
NB-27	8	7	<4	<4	10	11	12	<42	<42	<42
NB-32	5	45	42	53	14	17	33	<44	<44	<43
NB-36	2.5	65	--	61	10	--	14	<44	--	<45
	6	14	13	10	16	18	19	<43	<43	<45
NB-37	0	17	21	20	30	31	33	<42	<49	<56
NB-42	2	255	249	247	112	120	111	152	128	164
NB-47	1.8	333	337	304	238	231	210	137	154	112
NB-48	5	8	11	9	14	16	15	<42	<42	<43

Table 4
XRF Laboratory QC Results
USG Interiors/Supplemental Remedial Investigation
Tacoma, Washington

Sample ID	Sample Depth (ft bgs)	Copper Initial	Copper Duplicate	Copper Replicate	Iron Initial	Iron Duplicate	Iron Replicate	Nickel Initial	Nickel Duplicate	Nickel Replicate
		mg/kg			mg/kg			mg/kg		
NB-3	5	26	28	26	29,297	29,471	30,879	<26	<26	<27
NB-7	5	23	25	31	34,021	34,123	31,973	<27	<27	<27
NB-11b	6.5	2,015	1,978	1,749	63,705	62,352	67,575	<46	50	<45
NB-12	0	74	57	63	19,302	20,943	21,110	<25	<24	<25
NB-17	2	92	85	70	29,600	29,606	29,610	150	136	182
NB-18	5	94	100	96	39,630	39,751	40,421	<27	<26	<26
NB-22	5	54	56	44	31,554	31,824	28,971	<27	<26	<26
NB-23	2.5	65	72	74	27,626	27,436	29,593	42	45	41
NB-27	8	41	37	36	26,913	27,317	28,538	<25	<24	<25
NB-32	5	27	21	31	29,018	28,866	28,104	<26	<26	<26
NB-36	2.5	35	--	37	30,318	--	37,240	<27	--	<28
	6	43	48	50	32,806	32,894	31,979	<27	<28	<28
NB-37	0	44	43	45	31,487	33,926	39,210	27	<40	<39
NB-42	2	61	58	58	32,595	31,645	31,281	<27	<27	<26
NB-47	1.8	107	95	84	35,386	34,890	34,533	<27	<28	<27
NB-48	5	32	37	40	30,091	30,531	30,481	<26	<26	<26

Table 4
XRF Laboratory QC Results
USG Interiors/Supplemental Remedial Investigation
Tacoma, Washington

Sample ID	Sample Depth (ft bgs)	Silver			Zinc		
		Initial	Duplicate	Replicate	Initial	Duplicate	Replicate
		mg/kg			mg/kg		
NB-3	5	<18	<18	<18	45	49	51
NB-7	5	<18	<18	<18	61	65	59
NB-11b	6.5	<21	<21	<21	8,230	8,131	7,258
NB-12	0	<18	<18	<18	165	169	174
NB-17	2	<18	<18	<18	162	160	185
NB-18	5	<18	<18	<18	109	123	126
NB-22	5	<17	<18	<17	134	124	117
NB-23	2.5	<17	<16	<16	191	184	237
NB-27	8	<17	<17	<18	49	47	50
NB-32	5	<18	<18	<17	72	72	77
NB-36	2.5	<18	--	<18	97	--	105
	6	<18	<18	<18	92	87	76
NB-37	0	<17	<22	<25	104	106	120
NB-42	2	<17	<18	<17	96	96	97
NB-47	1.8	<18	<18	<18	189	189	165
NB-48	5	<18	<18	<18	54	62	65

Notes:
ft bgs - feet below ground surface.
mg/kg - milligrams per kilogram.

November 6, 2012 Analytical Report for Service Request No: K1210438

Pamela Morrill
CDM Smith, Inc.
14432 SE Eastgate Way, Suite 100
Bellevue, WA 98007

RE: USG-Port of Tacoma

Dear Pamela:

Enclosed are the results of the samples submitted to our laboratory on October 16, 2012. For your reference, these analyses have been assigned our service request number K1210438.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.caslab.com. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please call if you have any questions. My extension is 3364. You may also contact me via Email at Howard.Holmes@alsglobal.com.

Respectfully submitted,

Columbia Analytical Services, Inc. dba ALS Environmental

Howard Holmes
Project Manager

HH/jw

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Environmental www.caslab.com ▪ www.alsglobal.com
RIGHT SOLUTIONS RIGHT PARTNER

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable. See case narrative.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

Columbia Analytical Services, Inc. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses

Agency	Web Site	Number
Alaska DEC UST	http://dec.alaska.gov/applications/eh/ehllabreports/USTLabs.aspx	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2286
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L12-28
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Georgia DNR	http://www.gaepd.org/Documents/techguide_pcb.html#cel	881
Hawaii DOH	Not available	-
Idaho DHW	http://www.healthandwelfare.idaho.gov/Health/Labs/CertificationDrinkingWaterLabs/tabid/1833/Default.aspx	-
Indiana DOH	http://www.in.gov/isdh/24859.htm	C-WA-01
ISO 17025	http://www.pjlabs.com/	L12-27
Louisiana DEQ	http://www.deq.louisiana.gov/portal/DIVISIONS/PublicParticipationandPermitSupport/LouisianaLaboratoryAccreditationProgram.aspx	3016
Louisiana DHH	Not available	LA110003
Maine DHS	Not available	WA0035
Michigan DEQ	http://www.michigan.gov/deq/0,1607,7-135-3307_4131_4156---,00.html	9949
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-368
Montana DPHHS	http://www.dphhs.mt.gov/publichealth/	CERT0047
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA35
New Jersey DEP	http://www.nj.gov/dep/oqa/	WA005
New Mexico ED	http://www.nmenv.state.nm.us/dwb/Index.htm	-
North Carolina DWQ	http://www.dwqlab.org/	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA200001
South Carolina DHEC	http://www.scdhec.gov/environment/envserv/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	4704427-08-TX
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C1203
Wisconsin DNR	http://dnr.wi.gov/	998386840
Wyoming (EPA Region 8)	http://www.epa.gov/region8/water/dwhome/wyomingdi.html	-
Kelso Laboratory Website	www.caslab.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.caslab.com or at the accreditation bodies web site

Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

ALS ENVIRONMENTAL

Client:	CDM Smith	**Service Request No.:**	K1210438
Project:	USG-Port of Tacoma	**Date Received:**	10/16/12
Sample Matrix:	Soil		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Additional quality control analyses reported herein include: Laboratory Duplicate (DUP), Matrix Spike (MS), and Laboratory Control Sample (LCS).

Sample Receipt

Sixteen soil samples were received for analysis at ALS Environmental on 10/16/12. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4ºC upon receipt at the laboratory.

Total Metals

Sample Notes
Cadmium by EPA 6020A was added to the analyte list per client request.

Matrix Spike Recovery Exceptions:
The control criteria for matrix spike recovery of Arsenic and Iron for sample NB16-6 were not applicable. The analyzed concentration in the sample was significantly higher than the added spike concentration, preventing accurate evaluation of the spike recovery.

No other anomalies associated with the analysis of these samples were observed.

Approved by____

CHAIN OF CUSTODY RECORD

K1210438

CDM	USG - Port of Tacoma	Analysis	Other Instructions and Notes

NOTES:results and invoice to Pam Morril invoice to (MorrillPJ@cdmsmith.com)
Result to Todd Burgesser (burgesserte@cdmsmith.com)

SAMPLE NUMBER	DATE	TIME	MATRIX	Preservative	Type & No. of Containers	*Metals EPA 6010/6020B 7471														Other Instructions and Notes
NB10-5.5	7/18/12	1015	Soil	none	1-bag	x														
NB16-6	7/18/12	1405	Soil	none	1-bag	x														
NB17-6	7/18/12	0850	Soil	none	1-bag	x														
NB18-5	7/18/12	1502	Soil	none	1-bag	x														
NB22-5	7/19/12	1009	Soil	none	1-bag	x														
NB23-2.5	7/17/12	1259	Soil	none	1-bag	x														
NB31-5	7/17/12	0959	Soil	none	1-bag	x														
NB35-2	7/16/12	0958	Soil	none	1-bag	x														
NB36-2	7/16/12	1559	Soil	none	1-bag	x														
NB4-0	7/18/12	1046	Soil	none	1-bag	x														
NB40-2	7/20/12	1301	Soil	none	1-bag	x														
NB41-2	7/20/12	1336	Soil	none	1-bag	x														
NB46-6	7/19/12	1622	Soil	none	1-bag	x														
NB49-1	7/19/12	1244	Soil	none	1-bag	x														
NB8-1.8	7/19/12	0922	Soil	none	1-bag	x														
NB8-5	7/19/12	0924	Soil	none	1-bag	x														

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)			Laboratory:
[signature]	10/15/2012	Kaila Smith 10/16/12 0900			ALS Environmental
Received by: (Signature)	Date/Time	Airbill No.(s) NA			

NBZ Surface

ALS

PC HD

Cooler Receipt and Preservation Form

Client / Project: CDM Service Request K12 10438

Received: 10/16/12 Opened: 10/16/12 By: KD Unloaded: 10/16/12 By: KD

1. Samples were received via? *Mail* *Fed Ex* *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) *Cooler* *Box* *Envelope* *Other* ________ *NA*
3. Were custody seals on coolers? NA Y N If yes, how many and where? ________

   If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Raw Temp	Corr. Temp	Raw Blank	Corr. Blank	Corr. Factor	Thermometer ID	Cooler/COC ID NA	Tracking Number	NA	Filed
—	—	—	—	—	—		7991 9405 3185		

7. Packing material: *Inserts* *Baggies* *Bubble Wrap* *Gel Packs* *Wet Ice* *Dry Ice* *Sleeves* ________
8. Were custody papers properly filled out (ink, signed, etc.)? NA Y N
9. Did all bottles arrive in good condition (unbroken)? *Indicate in the table below.* NA Y N
10. Were all sample labels complete (i.e analysis, preservation, etc.)? NA Y N
11. Did all sample labels and tags agree with custody papers? *Indicate major discrepancies in the table on page 2.* NA Y N
12. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y N
13. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA Y N
14. Were VOA vials received without headspace? *Indicate in the table below.* NA Y N
15. Was C12/Res negative? NA Y N

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Out of Temp	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, & Resolutions: ________

Analytical Results

Client:	CDM Smith, Inc.	**Service Request:**	K1210438
Project:	USG-Port of Tacoma		
Sample Matrix:	Soil		

Total Solids

Prep Method:	NONE	**Units:**	PERCENT
Analysis Method:	160.3M	**Basis:**	Wet
Test Notes:			

Sample Name	Lab Code	Date Collected	Date Received	Date Analyzed	Result	Result Notes
NB10-5.5	K1210438-001	07/18/2012	10/16/2012	10/17/2012	97.9	
NB16-6	K1210438-002	07/18/2012	10/16/2012	10/17/2012	98.6	
NB17-6	K1210438-003	07/18/2012	10/16/2012	10/17/2012	98.6	
NB18-5	K1210438-004	07/18/2012	10/16/2012	10/17/2012	98.1	
NB22-5	K1210438-005	07/19/2012	10/16/2012	10/17/2012	99.3	
NB23-2.5	K1210438-006	07/17/2012	10/16/2012	10/17/2012	99.6	
NB31-5	K1210438-007	07/17/2012	10/16/2012	10/17/2012	98.7	
NB35-2	K1210438-008	07/16/2012	10/16/2012	10/17/2012	99.6	
NB36-2	K1210438-009	07/16/2012	10/16/2012	10/17/2012	99.7	
NB4-0	K1210438-010	07/18/2012	10/16/2012	10/17/2012	99.3	
NB40-2	K1210438-011	07/20/2012	10/16/2012	10/17/2012	99.6	
NB41-2	K1210438-012	07/20/2012	10/16/2012	10/17/2012	99.2	
NB46-6	K1210438-013	07/19/2012	10/16/2012	10/17/2012	98.8	
NB49-1	K1210438-014	07/19/2012	10/16/2012	10/17/2012	99.5	
NB8-1.8	K1210438-015	07/19/2012	10/16/2012	10/17/2012	99.6	
NB8-5	K1210438-016	07/19/2012	10/16/2012	10/17/2012	99.3	

QA/QC Report

Client:	CDM Smith, Inc.	**Service Request:**	K1210438
Project:	USG-Port of Tacoma	**Date Collected:**	07/17/2012
Sample Matrix:	Soil	**Date Received:**	10/16/2012
		Date Analyzed:	10/17/2012

Duplicate Sample Summary
Total Solids

Prep Method:	NONE	**Units:**	PERCENT
Analysis Method:	160.3M	**Basis:**	Wet
Test Notes:			

Sample Name	Lab Code	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
NB23-2.5	K1210438-006	99.6	99.6	99.6	<1	

QA/QC Report

Client:	CDM Smith, Inc.	**Service Request:**	K1210438
Project:	USG-Port of Tacoma	**Date Collected:**	07/16/2012
Sample Matrix:	Soil	**Date Received:**	10/16/2012
		Date Analyzed:	10/17/2012

Duplicate Sample Summary

Total Solids

Prep Method:	NONE	**Units:**	PERCENT
Analysis Method:	160.3M	**Basis:**	Wet
Test Notes:			

Sample Name	Lab Code	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
NB36-2	K1210438-009	99.7	99.7	99.7	<1	

COLUMBIA ANALYTICAL SERVICES, INC.
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- Cover Page -
INORGANIC ANALYSIS DATA PACKAGE

Client: CDM Smith, Inc.
Project Name: USG-Port of Tacoma
Project No.:

Service Request: K1210438

Sample Name:	Lab Code:
NB10-5.5	K1210438-001
NB16-6	K1210438-002
NB16-6D	K1210438-002D
NB16-6S	K1210438-002S
NB17-6	K1210438-003
NB18-5	K1210438-004
NB22-5	K1210438-005
NB23-2.5	K1210438-006
NB31-5	K1210438-007
NB35-2	K1210438-008
NB36-2	K1210438-009
NB4-0	K1210438-010
NB40-2	K1210438-011
NB41-2	K1210438-012
NB46-6	K1210438-013
NB49-1	K1210438-014
NB8-1.8	K1210438-015
NB8-5	K1210438-016
Method Blank	K1210438-MB

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.
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Metals
- 1 -
INORGANIC ANALYSIS DATA PACKAGE

Client: CDM Smith, Inc.
Service Request: K1210438
Project No.: NA
Date Collected: 07/18/12
Project Name: USG-Port of Tacoma
Date Received: 10/16/12
Matrix: SOIL
Units: mg/Kg
Basis: DRY

Sample Name: NB10-5.5
Lab Code: K1210438-001

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	6010C	20	2.0	10/22/12	10/31/12	1870		
Cadmium	6020A	0.02	5.0	10/22/12	10/31/12	19.0		
Copper	6010C	2.0	2.0	10/22/12	10/31/12	1700		
Iron	6010C	4.0	2.0	10/22/12	10/31/12	39600		
Lead	6010C	200	20.0	10/22/12	11/01/12	7990		
Nickel	6020A	0.2	5.0	10/22/12	10/31/12	43.0		
Silver	6020A	0.04	10.0	10/22/12	10/25/12	11.4		
Zinc	6010C	20.0	20.0	10/22/12	11/01/12	4520		

% Solids: 97.9

Comments:

Metals
- 1 -
INORGANIC ANALYSIS DATA PACKAGE

Client: CDM Smith, Inc.
Project No.: NA
Project Name: USG-Port of Tacoma
Matrix: SOIL

Service Request: K1210438
Date Collected: 07/18/12
Date Received: 10/16/12
Units: mg/Kg
Basis: DRY

Sample Name: NB16-6
Lab Code: K1210438-002

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	6010C	20	2.0	10/22/12	10/31/12	1540		
Cadmium	6020A	0.02	5.0	10/22/12	10/31/12	0.09		
Copper	6010C	2.0	2.0	10/22/12	10/31/12	61.4		
Iron	6010C	4.0	2.0	10/22/12	10/31/12	20600		
Lead	6020A	0.05	5.0	10/22/12	10/31/12	29.8		
Nickel	6020A	0.2	5.0	10/22/12	10/31/12	13.2		
Silver	6020A	0.02	5.0	10/22/12	10/24/12	0.23		
Zinc	6010C	2.0	2.0	10/22/12	10/31/12	53.7		

% Solids: 98.6

Comments:

Metals
- 1 -
INORGANIC ANALYSIS DATA PACKAGE

Client: CDM Smith, Inc.
Project No.: NA
Project Name: USG-Port of Tacoma
Matrix: SOIL

Service Request: K1210438
Date Collected: 07/18/12
Date Received: 10/16/12
Units: mg/Kg
Basis: DRY

Sample Name: NB17-6
Lab Code: K1210438-003

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	6010C	20	2.0	10/22/12	10/31/12	4290		
Cadmium	6020A	0.02	5.0	10/22/12	10/31/12	9.91		
Copper	6010C	2.0	2.0	10/22/12	10/31/12	972		
Iron	6010C	4.0	2.0	10/22/12	10/31/12	33100		
Lead	6010C	199	20.0	10/22/12	11/01/12	5920		
Nickel	6020A	0.2	5.0	10/22/12	10/31/12	46.6		
Silver	6020A	0.04	10.0	10/22/12	10/25/12	2.66		
Zinc	6010C	19.9	20.0	10/22/12	11/01/12	3800		

% Solids: 98.6

Comments:

Metals
- 1 -
INORGANIC ANALYSIS DATA PACKAGE

Client: CDM Smith, Inc.
Project No.: NA
Project Name: USG-Port of Tacoma
Matrix: SOIL

Service Request: K1210438
Date Collected: 07/18/12
Date Received: 10/16/12
Units: mg/Kg
Basis: DRY

Sample Name: NB18-5
Lab Code: K1210438-004

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	6010C	20	2.0	10/22/12	10/31/12	228		
Cadmium	6020A	0.02	5.0	10/22/12	10/31/12	0.19		
Copper	6010C	2.0	2.0	10/22/12	10/31/12	78.6		
Iron	6010C	4.0	2.0	10/22/12	10/31/12	19700		
Lead	6020A	0.05	5.0	10/22/12	10/31/12	35.1		
Nickel	6020A	0.2	5.0	10/22/12	10/31/12	14.7		
Silver	6020A	0.02	5.0	10/22/12	10/24/12	0.73		
Zinc	6010C	2.0	2.0	10/22/12	10/31/12	89.1		

% Solids: 98.1

Comments:

Metals
- 1 -
INORGANIC ANALYSIS DATA PACKAGE

Client: CDM Smith, Inc.
Service Request: K1210438
Project No.: NA
Date Collected: 07/19/12
Project Name: USG-Port of Tacoma
Date Received: 10/16/12
Matrix: SOIL
Units: mg/Kg
Basis: DRY

Sample Name: NB22-5
Lab Code: K1210438-005

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	6010C	19	2.0	10/22/12	10/31/12	31		
Cadmium	6020A	0.02	5.0	10/22/12	10/31/12	0.09		
Copper	6010C	1.9	2.0	10/22/12	10/31/12	35.8		
Iron	6010C	3.9	2.0	10/22/12	10/31/12	17400		
Lead	6020A	0.05	5.0	10/22/12	10/31/12	47.8		
Nickel	6020A	0.2	5.0	10/22/12	10/31/12	20.0		
Silver	6020A	0.02	5.0	10/22/12	10/24/12	0.07		
Zinc	6010C	1.9	2.0	10/22/12	10/31/12	82.2		

% Solids: 99.3

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.
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Metals
- 1 -
INORGANIC ANALYSIS DATA PACKAGE

Client: CDM Smith, Inc.
Project No.: NA
Project Name: USG-Port of Tacoma
Matrix: SOIL

Service Request: K1210438
Date Collected: 07/17/12
Date Received: 10/16/12
Units: mg/Kg
Basis: DRY

Sample Name: NB23-2.5 **Lab Code:** K1210438-006

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	6010C	20	2.0	10/22/12	10/31/12	37		
Cadmium	6020A	0.02	5.0	10/22/12	10/31/12	0.09		
Copper	6010C	2.0	2.0	10/22/12	10/31/12	33.8		
Iron	6010C	4.0	2.0	10/22/12	10/31/12	14600		
Lead	6020A	0.05	5.0	10/22/12	10/31/12	27.1		
Nickel	6020A	0.2	5.0	10/22/12	10/31/12	27.9		
Silver	6020A	0.02	5.0	10/22/12	10/24/12	0.04		
Zinc	6010C	2.0	2.0	10/22/12	10/31/12	104		

% Solids: 99.6

Comments:

Metals
- 1 -
INORGANIC ANALYSIS DATA PACKAGE

Client: CDM Smith, Inc.
Project No.: NA
Project Name: USG-Port of Tacoma
Matrix: SOIL

Service Request: K1210438
Date Collected: 07/17/12
Date Received: 10/16/12
Units: mg/Kg
Basis: DRY

Sample Name: NB31-5 **Lab Code:** K1210438-007

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	6010C	20	2.0	10/22/12	10/31/12	2500		
Cadmium	6020A	0.02	5.0	10/22/12	10/31/12	5.49		
Copper	6010C	2.0	2.0	10/22/12	10/31/12	687		
Iron	6010C	4.0	2.0	10/22/12	10/31/12	24900		
Lead	6010C	19.9	2.0	10/22/12	10/31/12	3050		
Nickel	6020A	0.2	5.0	10/22/12	10/31/12	50.4		
Silver	6020A	0.08	20.0	10/22/12	10/25/12	1.50		
Zinc	6010C	2.0	2.0	10/22/12	10/31/12	2230		

% Solids: 98.7

Comments:

Metals
- 1 -
INORGANIC ANALYSIS DATA PACKAGE

Client: CDM Smith, Inc.
Service Request: K1210438
Project No.: NA
Date Collected: 07/16/12
Project Name: USG-Port of Tacoma
Date Received: 10/16/12
Matrix: SOIL
Units: mg/Kg
Basis: DRY

Sample Name: NB35-2
Lab Code: K1210438-008

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	6010C	19	2.0	10/22/12	10/31/12	128		
Cadmium	6020A	0.02	5.0	10/22/12	10/31/12	1.42		
Copper	6010C	1.9	2.0	10/22/12	10/31/12	84.0		
Iron	6010C	3.9	2.0	10/22/12	10/31/12	14300		
Lead	6010C	19.3	2.0	10/22/12	10/31/12	323		
Nickel	6020A	0.2	5.0	10/22/12	10/31/12	24.0		
Silver	6020A	0.08	20.0	10/22/12	10/25/12	0.66		
Zinc	6010C	1.9	2.0	10/22/12	10/31/12	377		

% Solids: 99.6

Comments:

Metals
- 1 -
INORGANIC ANALYSIS DATA PACKAGE

Client: CDM Smith, Inc.
Project No.: NA
Project Name: USG-Port of Tacoma
Matrix: SOIL

Service Request: K1210438
Date Collected: 07/16/12
Date Received: 10/16/12
Units: mg/Kg
Basis: DRY

Sample Name: NB36-2 **Lab Code:** K1210438-009

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	6010C	20	2.0	10/22/12	10/31/12	77		
Cadmium	6020A	0.02	5.0	10/22/12	10/31/12	0.14		
Copper	6010C	2.0	2.0	10/22/12	10/31/12	32.0		
Iron	6010C	4.0	2.0	10/22/12	10/31/12	10800		
Lead	6020A	0.05	5.0	10/22/12	10/31/12	124		
Nickel	6020A	0.2	5.0	10/22/12	10/31/12	6.6		
Silver	6020A	0.02	5.0	10/22/12	10/24/12	0.16		
Zinc	6010C	2.0	2.0	10/22/12	10/31/12	60.6		

% Solids: 99.7

Comments:

Metals
- 1 -
INORGANIC ANALYSIS DATA PACKAGE

Client: CDM Smith, Inc.
Project No.: NA
Project Name: USG-Port of Tacoma
Matrix: SOIL

Service Request: K1210438
Date Collected: 07/18/12
Date Received: 10/16/12
Units: mg/Kg
Basis: DRY

Sample Name: NB4-0
Lab Code: K1210438-010

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	6010C	20	2.0	10/22/12	10/31/12	23		
Cadmium	6020A	0.02	5.0	10/22/12	10/31/12	0.30		
Copper	6010C	2.0	2.0	10/22/12	10/31/12	37.8		
Iron	6010C	4.0	2.0	10/22/12	10/31/12	16100		
Lead	6020A	0.05	5.0	10/22/12	10/31/12	33.2		
Nickel	6020A	0.2	5.0	10/22/12	10/31/12	32.1		
Silver	6020A	0.02	5.0	10/22/12	10/24/12	0.38		
Zinc	6010C	2.0	2.0	10/22/12	10/31/12	70.0		

% Solids: 99.3

Comments:

Metals
- 1 -
INORGANIC ANALYSIS DATA PACKAGE

Client: CDM Smith, Inc.
Service Request: K1210438
Project No.: NA
Date Collected: 07/20/12
Project Name: USG-Port of Tacoma
Date Received: 10/16/12
Matrix: SOIL
Units: mg/Kg
Basis: DRY

Sample Name: NB40-2 **Lab Code:** K1210438-011

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	6010C	19	2.0	10/22/12	10/31/12	400		
Cadmium	6020A	0.02	5.0	10/22/12	10/31/12	1.86		
Copper	6010C	1.9	2.0	10/22/12	10/31/12	4300		
Iron	6010C	3.9	2.0	10/22/12	10/31/12	20700		
Lead	6010C	19.3	2.0	10/22/12	10/31/12	694		
Nickel	6020A	0.2	5.0	10/22/12	10/31/12	15.0		
Silver	6020A	0.08	20.0	10/22/12	10/25/12	19.4		
Zinc	6010C	1.9	2.0	10/22/12	10/31/12	1160		

% Solids: 99.6

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.
Now part of the ALS Group

Metals
- 1 -
INORGANIC ANALYSIS DATA PACKAGE

Client: CDM Smith, Inc.
Project No.: NA
Project Name: USG-Port of Tacoma
Matrix: SOIL

Service Request: K1210438
Date Collected: 07/20/12
Date Received: 10/16/12
Units: mg/Kg
Basis: DRY

Sample Name: NB41-2 **Lab Code:** K1210438-012

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	6010C	19	2.0	10/22/12	10/31/12	720		
Cadmium	6020A	0.02	5.0	10/22/12	10/31/12	0.84		
Copper	6010C	1.9	2.0	10/22/12	10/31/12	1050		
Iron	6010C	3.9	2.0	10/22/12	10/31/12	39800		
Lead	6010C	19.4	2.0	10/22/12	10/31/12	566		
Nickel	6020A	0.2	5.0	10/22/12	10/31/12	78.6		
Silver	6020A	0.08	20.0	10/22/12	10/25/12	3.85		
Zinc	6010C	1.9	2.0	10/22/12	10/31/12	2140		

% Solids: 99.2

Comments:

Metals
- 1 -
INORGANIC ANALYSIS DATA PACKAGE

Client: CDM Smith, Inc.
Service Request: K1210438
Project No.: NA
Date Collected: 07/19/12
Project Name: USG-Port of Tacoma
Date Received: 10/16/12
Matrix: SOIL
Units: mg/Kg
Basis: DRY

Sample Name: NB46-6
Lab Code: K1210438-013

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	6010C	20	2.0	10/22/12	10/31/12	357		
Cadmium	6020A	0.02	5.0	10/22/12	10/31/12	0.41		
Copper	6010C	2.0	2.0	10/22/12	10/31/12	59.3		
Iron	6010C	3.9	2.0	10/22/12	10/31/12	16800		
Lead	6020A	0.05	5.0	10/22/12	10/31/12	60.9		
Nickel	6020A	0.2	5.0	10/22/12	10/31/12	15.5		
Silver	6020A	0.02	5.0	10/22/12	10/24/12	0.23		
Zinc	6010C	2.0	2.0	10/22/12	10/31/12	98.4		

% Solids: 98.8

Comments:

Metals
- 1 -
INORGANIC ANALYSIS DATA PACKAGE

Client: CDM Smith, Inc.
Project No.: NA
Project Name: USG-Port of Tacoma
Matrix: SOIL

Service Request: K1210438
Date Collected: 07/19/12
Date Received: 10/16/12
Units: mg/Kg
Basis: DRY

Sample Name: NB49-1
Lab Code: K1210438-014

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	6010C	20	2.0	10/22/12	10/31/12	680		
Cadmium	6020A	0.02	5.0	10/22/12	10/31/12	2.18		
Copper	6010C	2.0	2.0	10/22/12	10/31/12	296		
Iron	6010C	4.0	2.0	10/22/12	10/31/12	14300		
Lead	6010C	19.9	2.0	10/22/12	10/31/12	1530		
Nickel	6020A	0.2	5.0	10/22/12	10/31/12	27.6		
Silver	6020A	0.08	20.0	10/22/12	10/25/12	1.25		
Zinc	6010C	2.0	2.0	10/22/12	10/31/12	820		

% Solids: 99.5

Comments:

Metals
- 1 -
INORGANIC ANALYSIS DATA PACKAGE

Client: CDM Smith, Inc.
Service Request: K1210438
Project No.: NA
Date Collected: 07/19/12
Project Name: USG-Port of Tacoma
Date Received: 10/16/12
Matrix: SOIL
Units: mg/Kg
Basis: DRY

Sample Name: NB8-1.8
Lab Code: K1210438-015

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	6010C	20	2.0	10/22/12	10/31/12	188		
Cadmium	6020A	0.02	5.0	10/22/12	10/31/12	0.47		
Copper	6010C	2.0	2.0	10/22/12	10/31/12	117		
Iron	6010C	4.0	2.0	10/22/12	10/31/12	27600		
Lead	6020A	0.05	5.0	10/22/12	10/31/12	127		
Nickel	6020A	0.2	5.0	10/22/12	10/31/12	29.3		
Silver	6020A	0.02	5.0	10/22/12	10/24/12	0.20		
Zinc	6010C	2.0	2.0	10/22/12	10/31/12	465		

% Solids: 99.6

Comments:

Metals
- 1 -
INORGANIC ANALYSIS DATA PACKAGE

Client: CDM Smith, Inc.
Service Request: K1210438
Project No.: NA
Date Collected: 07/19/12
Project Name: USG-Port of Tacoma
Date Received: 10/16/12
Matrix: SOIL
Units: mg/Kg
Basis: DRY

Sample Name: NB8-5
Lab Code: K1210438-016

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	6010C	20	2.0	10/22/12	10/31/12	20	U	
Cadmium	6020A	0.02	5.0	10/22/12	10/31/12	0.17		
Copper	6010C	2.0	2.0	10/22/12	10/31/12	27.8		
Iron	6010C	4.0	2.0	10/22/12	10/31/12	9980		
Lead	6020A	0.05	5.0	10/22/12	10/31/12	6.95		
Nickel	6020A	0.2	5.0	10/22/12	10/31/12	9.2		
Silver	6020A	0.02	5.0	10/22/12	10/24/12	0.10		
Zinc	6010C	2.0	2.0	10/22/12	10/31/12	39.2		

% Solids: 99.3

Comments:

Metals
- 1 -
INORGANIC ANALYSIS DATA PACKAGE

Client: CDM Smith, Inc.
Service Request: K1210438
Project No.: NA
Date Collected:
Project Name: USG-Port of Tacoma
Date Received:
Matrix: SOIL
Units: mg/Kg
Basis: DRY

Sample Name: Method Blank
Lab Code: K1210438-MB

Analyte	Analysis Method	MRL	Dilution Factor	Date Extracted	Date Analyzed	Result	C	Q
Arsenic	6010C	20	2.0	10/22/12	10/31/12	20	U	
Cadmium	6020A	0.02	5.0	10/22/12	10/31/12	0.02	U	
Copper	6010C	2.0	2.0	10/22/12	10/31/12	2.0	U	
Iron	6010C	4.0	2.0	10/22/12	10/31/12	4.0	U	
Lead	6010C	20.0	2.0	10/22/12	10/31/12	20.0	U	
Lead	6020A	0.05	5.0	10/22/12	10/31/12	0.05	U	
Nickel	6020A	0.2	5.0	10/22/12	10/31/12	0.2	U	
Silver	6020A	0.02	5.0	10/22/12	10/24/12	0.02	U	
Zinc	6010C	2.0	2.0	10/22/12	10/31/12	2.0	U	

% Solids: 100.0

Comments:

COLUMBIA ANALYTICAL SERVICES, INC.
Now part of the ALS Group

Metals

- 5A -

SPIKE SAMPLE RECOVERY

Client: CDM Smith, Inc.
Service Request: K1210438
Project No.: NA
Units: MG/KG
Project Name: USG-Port of Tacoma
Basis: DRY
Matrix: SOIL
% Solids: 98.6

Sample Name: **NB16-6S**
Lab Code: **K1210438-002S**

Analyte	Control Limit %R	Spike Result	C	Sample Result	C	Spike Added	%R	Q	Method
Arsenic		1710		1540		99.43	171.0		6010C
Cadmium	75 - 125	5.18		0.09		4.92	103.5		6020A
Copper	75 - 125	109		61.4		49.72	95.7		6010C
Iron		20900		20600		198.86	150.9		6010C
Lead	75 - 125	114		26.2		99.43	88.3		6010C
Lead	75 - 125	79.5		29.8		49.23	101.0		6020A
Nickel	75 - 125	59.1		13.2		49.23	93.2		6020A
Silver	75 - 125	10.1		0.23		9.94	99.3		6020A
Zinc	75 - 125	141		53.7		99.43	87.8		6010C

An empty field in the Control Limit column indicates the control limit is not applicable

Metals
- 6 -
DUPLICATES

Client: CDM Smith, Inc. **Service Request:** K1210438
Project No.: NA **Units:** MG/KG
Project Name: USG-Port of Tacoma **Basis:** DRY
Matrix: SOIL **% Solids:** 98.6

Sample Name: NB16-6D **Lab Code:** K1210438-002D

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	Method
Arsenic	20	1540		1550		0.6		6010C
Cadmium		0.09		0.07		25.0		6020A
Copper	20	61.4		58.5		4.8		6010C
Iron	20	20600		20500		0.5		6010C
Lead		26.2		25.1		4.3		6010C
Lead	20	29.8		24.7		18.7		6020A
Nickel	20	13.2		12.7		3.9		6020A
Silver	20	0.23		0.20		14.0		6020A
Zinc	20	53.7		50.6		5.9		6010C

An empty field in the Control Limit column indicates the control limit is not applicable.

Metals
-7-
LABORATORY CONTROL SAMPLE

Client: CDM Smith, Inc. **Service Request:** K1210438

Project No.: NA

Project Name: USG-Port of Tacoma

Aqueous LCS Source: **Solid LCS Source:** **ERA D076-540**

Analyte	Aqueous (ug/L) True	Found	%R	Solid (mg/kg) True	Found	C	Limits		%R
Arsenic				94.5	95		81	119	100.5
Cadmium				60.5	60.0		83	117	99.2
Copper				79.6	78.9		83	117	99.1
Iron				12500	10900		51	150	87.2
Lead				91.8	84.4		82	116	91.9
Lead				91.8	92.5		82	118	100.8
Nickel				57.6	55.0		83	117	95.5
Silver				34.4	34.6		66	134	100.6
Zinc				140	127		80	120	90.7

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Dalton Olmsted Fuglevand Data
From North Boundary Investigation

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North Boundary Area Probe Logs
July 2012
Former Arkema Manufacturing Plant RI/FS
Tacoma, Washington

Note: Probes NB-1, NB-28, and NB-39 were not sampled because of access issues.

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BORING - DESCRIPTION OF SAMPLES & DATA

NB2

Field Rep: DG Cooper	Location: N711707 E1174083 (NAD83)
Drilling Co.: Cascade	Elevation (Ft.): 16.0 (MLLW) — Ground Surface: Asphalt pavement
Driller: Keith	Date Completed: 07/20/12
Drill Type: Geoprobe 7720DT	Weather: Rain 60F
Size/Type Casing: 2" Rod	Hammer Type: Direct push — Sampler Type: 2" Macro w/ acrylic liner

Sample No.	Sample Depth (Ft.)	XRF* Depth (Ft.)	XRF* (ppm) As	XRF* (ppm) Pb	Spl Depth (Ft.) From - To	Sample Recovery (inches)	Time	Sample Description
A	1-2	0	12	<13	0-5	24	0930	0-0.3' Asphalt concrete
		1.5	<7	<12				0.3-2' Moist, mot gry, gravelly, SAND, w/some silt, trace brick
		2	<9	<12				soft clayey silty in shoe
B	5-6	5	34	<12	5-10	40	0930	5-6' Sat, gry, F-M SAND
C	6-7	6.5	13	<11			0930	6-7.3' Sat, gry, silty, F SAND, w/ F sandy silt interbeds, scattered organics
D	7.5-8.5	8	<8	22			0930	7.3-8.5' Wet, bwn-gry, organic, SILT, w/fiberous organics
		9	<7	<11				
					10-12	6		10-11' Sat, gry, F-M SAND, poor sample

LABORATORY SAMPLES:

Soil:
AKM-S-NB2-A-072012
AKM-S-NB2-B-072012
AKM-S-NB2-C-072012
AKM-S-NB2-D-072012

Notes: * XRF values were obtained in the field using an INNOV-X Model 4000.
* XRF values were obtained in the field using an INNOV-X Model 4000.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

SUMMARY LOG

Depth (ft.)	
0	-Asphalt concrete Moist, mottled gray, gravelly, SAND with some silt, trace brick
5	Saturated, gray, Fine to medium SAND grading to silty fine SAND with silt interbeds
7.3	Wet, brown-gray, organic, SILT with fiberous organics
8.5	Saturated, gray, Fine to Medium SAND
12	(Bottom of Boring)

NOTE: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

NB3

BORING - DESCRIPTION OF SAMPLES & DATA

Field Rep: DG Cooper	Location: N711698 E1174162 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 19.5 (MLLW)	Ground Surface: Grass
Driller: Keith	Date Completed: 07/18/12	
Drill Type: Geoprobe 7720DT	Weather: Coudy 70F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 2" Macro w/ acrylic liner

Sample		XRF*			Spl Depth (Ft.)	Sample	Time	Sample Description
No.	Depth (Ft.)	Depth (Ft.)	(ppm) As	(ppm) Pb	From - To	Recovery (inches)		
A	0-1	0	14	25	0-5	36	1215	0-1' Damp, mot bwn, silty, SAND, w/concrete, gravel
B	1-3	1.5	<8	<14			1215	1-3' Moist, gry, F-M SAND, w/some gravel, scattered organics
		2	<8	<13				
C	5-6	5	<8	<13	5-10	36	1215	5-5.5' As above
D	6-8	6	21	<12			1215	5.5-6' Sat gry, F SAND
		7	9	<9			1215	6-6.5' Wet, gry-blk, SILT
								6.5-7' Sat, gry, F SAND
								7-7.5' Wet, blk, fiberous organics, grading to silt
								7.5-8' Wet, gry, SILT
E	10-12	11	<8	<12	10-12	24	1215	10-12' Sat, gry, F-M SAND

LABORATORY SAMPLES:

Soil:
AKM-S-NB3-A-071812
AKM-S-NB3-B-071812
AKM-S-NB3-C-071812
AKM-S-NB3-D-071812
AKM-S-NB3-E-071812

Notes: * XRF values were obtained in the field using an INNOV-X Model 4000.
Direct readings of the soil core were made by a representative of CDM Smith.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

0 **SUMMARY LOG**

Damp, mottled brown, silty, SAND, with concrete

Moist to saturated, gray, Fine to Medium SAND
with some gravel, scattered organics
grading to Fine SAND

6 -Silt

7

Wet, black, fiberous organics, grading to
Wet, gray, SILT

8

Saturated, gray, Fine to Medium SAND

12

(Bottom of Boring)
NOTE: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

BORING - DESCRIPTION OF SAMPLES & DATA **NB4**

Field Rep: DG Cooper
Drilling Co.: Cascade
Driller: Keith
Drill Type: Geoprobe 7720DT
Size/Type Casing: 2" Rod

Location: N711665 E1174153 (NAD83)
Elevation (Ft.): 19.5 (MLLW)
Date Completed: 07/18/12
Weather: Cloudy 70F
Hammer Type: Direct push

Ground Surface: Grass
Sampler Type: 2" Macro w/ acrylic liner

Sample		XRF*			Spl Depth (Ft.)	Sample	Time	Sample Description
No.	Depth (Ft.)	Depth (Ft.)	(ppm) As	Pb	From - To	Recovery (inches)		
A	0-1	0	49	40	0-5	30	1100	0-0.5' Damp, bwn, silty, SAND
B	1-3	2	<9	<14			1100	0.5-3' Moist, gry, F-M SAND, w/scattered gravel
C	5-6	5	<8	<14	5-10	36	1100	5-6' Wet, gry, F-M SAND
D	6-8	6.5	<9	<12			1100	6-8' Wet, gry, SILT, w/silty F Sand interbeds, black organics, wood
		7	8	<12				
E	10-12	11	44	<20	10-12	24	1100	10-12' Sat, gry, F-M SAND

LABORATORY SAMPLES:

Soil:
AKM-S-NB4-A-071812
AKM-S-NB4-B-071812
AKM-S-NB4-C-071812
AKM-S-NB4-D-071812
AKM-S-NB4-E-071812

Notes: * XRF values were obtained in the field using an INNOVX Model 4000.
* XRF values were obtained in the field using an INNOV-X Model 4000.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

0 **SUMMARY LOG**

-Silty, Fine Sand

Moist to wet, gray Fine to Medium SAND

6

Wet, gray, SILT, with silty Fine Sand interbeds scattered black organics, wood

8

Saturated, gray, Fine to Medium SAND

12

(Bottom of Boring)
NOTE: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

BORING - DESCRIPTION OF SAMPLES & DATA **NB5**

Field Rep: DG Cooper	Location: N711606 E1174200 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 18.5 (MLLW)	Ground Surface: Grass
Driller: Keith	Date Completed: 07/18/12	
Drill Type: Geoprobe 7720DT	Weather: Cloudy 75F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 2" Macro w/ acrylic liner

Sample		XRF*			Spl Depth (Ft.)	Sample	Time	Sample Description
No.	Depth (Ft.)	Depth (Ft.)	(ppm) As	Pb	From - To	Recovery (inches)		
A	0-0.8	0	59	20	0-5	30	1620	0-0.8' Damp, bwn, silty, SAND, w/thin roots
B	1.5-2.5	2.5	<9	<15			1620	0.8-1.5' Wet, dk bwn, organic, silty, SAND, w/bark, wood chip
								1.5-2.5' Moist, gry, gravelly, SAND
C	5-5.6	5	17	<10	5-10	36	1620	5-5.3' Wet. Bwn, F-M SAND
D	6-8	5.5	17	22			1620	5.3-5.6' Wet, gry-blk, SILT, w/blk, F Sand layer
		8	17	<12				5.6-8' Sat, gry, F-M SAND
E	10-11	10	14	<14	10-12	12	1620	10-11' Sat, gry, F-M SAND

LABORATORY SAMPLES:

Soil:
AKM-S-NB5-A-071812
AKM-S-NB5-B-071812
AKM-S-NB5-C-071812
AKM-S-NB5-D-071812
AKM-S-NB5-E-071812

Notes: * XRF values were obtained in the field using an INNOVX Model 4000.
* XRF values were obtained in the field using an INNOV-X Model 4000.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

0 **SUMMARY LOG**

-Silty Fine Sand
-Organic silty, SAND , with bark, wood chip

Moist, gray, gravelly, SAND

Moist to wet, gray Fine to Medium SAND

5.3
5.6 Wet, gray-black, SILT

Saturated, gray, Fine to Medium SAND

12

(Bottom of Boring)
NOTE: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

BORING - DESCRIPTION OF SAMPLES & DATA **NB6**

Field Rep: DG Cooper	Location: N711586 E1174264 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 18.5 (MLLW)	Ground Surface: Grass
Driller: Keith	Date Completed: 07/19/12	
Drill Type: Geoprobe 7720DT	Weather: Cloudy 60F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 2" Macro w/ acrylic liner

Sample No.	Sample Depth (Ft.)	XRF* Depth (Ft.)	XRF* (ppm) As	XRF* (ppm) Pb	Spl Depth (Ft.) From - To	Sample Recovery (inches)	Time	Sample Description
A	0-1	0	19	46	0-5	40	0845	0-0.5' Damp, bwn, silty, SAND, w/thin roots
B	1-3	2.5	<8	<12			0845	0.5-1' Wet, dk bwn, organic, silty, SAND, w/some gravel, bark, wood chip
								1-3' Moist, bwn, silty, SAND, w/some gravel
C	5	5	31	18	5-10	24	0845	5-5.1' As above
D	5.5-6.5	6	34	<8			0845	5.1-6.5' Sat, gry, F-M SAND
		6.5	8	<12				6.5-7' Sat, Wood
E	10-11	10	16	42	10-12	24	0845	10-11' Wet, bwn, SILT, w/trace SAND
		11	<9	14				11-12' Sat, gry, F-M SAND

LABORATORY SAMPLES:

Soil:
AKM-S-NB6-A-071912
AKM-S-NB6-B-071912
AKM-S-NB6-C-071912
AKM-S-NB6-D-071912
AKM-S-NB6-E-071912

Notes: * XRF values were obtained in the field using an INNOVX Model 4000.
* XRF values were obtained in the field using an INNOV-X Model 4000.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

0 **SUMMARY LOG**

-Silty Fine Sand
-Organic silty, SAND , with bark, wood chip

Moist, brown, silty, SAND

5

7 -Wood

Saturated, gray, Fine to Medium SAND

10

Wet, brown, SILT

11

Saturated, gray, Fine SAND

12

(Bottom of Boring)
NOTE: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

BORING - DESCRIPTION OF SAMPLES & DATA

NB7

Field Rep: DG Cooper	Location: N711638 E1174235 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 18.5 (MLLW)	Ground Surface: Grass
Driller: Keith	Date Completed: 07/18/12	
Drill Type: Geoprobe 7720DT	Weather: Cloudy 75F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 2" Macro w/ acrylic liner

Sample		XRF*			Spl Depth (Ft.)	Sample	Time	Sample Description
No.	Depth (Ft.)	Depth (Ft.)	(ppm) As	Pb	From - To	Recovery (inches)		
A	0-1	0	16	50	0-5	40	1700	0-1' Damp, bwn, silty, SAND, w/thin roots, bark @ 1'
B	1-2						1700	1-2' Moist, mot gry-bwn, gravelly, silty, SAND, w/scattered wood
C	2-3.5	2.5	49	110			1700	2-3.5' Moist, mot gry, F-M SAND, w/silt clasts
D	5-7	5	34	<15	5-10	20	1700	5-7 Sat, gry, F-M SAND
		6.5	<8	14				
E	10-11	10	20	<14	10-12	12	1700	10-11' Sat, gry, F-M SAND

LABORATORY SAMPLES:

Soil:
AKM-S-NB7-A-071812
AKM-S-NB7-B-071812
AKM-S-NB7-C-071812
AKM-S-NB7-D-071812
AKM-S-NB7-E-071812

Notes: * XRF values were obtained in the field using an INNOVX Model 4000.
* XRF values were obtained in the field using an INNOV-X Model 4000.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

0 **SUMMARY LOG**

-Silty Sand, w/bark

Moist, mottled gray-brown, gravelly, silty, SAND with scattered wood

2

Moist to saturated, gray, Fine to Medium SAND

12

(Bottom of Boring)
NOTE: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

BORING - DESCRIPTION OF SAMPLES & DATA

NB8

Field Rep: DG Cooper	Location: N711581 E1174334 (NAD83)
Drilling Co.: Cascade	Elevation (Ft.): 18.5 (MLLW) — Ground Surface: Gravel Road
Driller: Keith	Date Completed: 07/19/12
Drill Type: Geoprobe 7720DT	Weather: Cloudy 60F
Size/Type Casing: 2" Rod	Hammer Type: Direct push — Sampler Type: 2" Macro w/ acrylic liner

Sample No.	Sample Depth (Ft.)	XRF* Depth (Ft.)	XRF* (ppm) As	XRF* (ppm) Pb	Spl Depth (Ft.) From - To	Sample Recovery (inches)	Time	Sample Description
A	0-1	0	22	27	0-5	40	0915	0-2' Moist, mot bwn-gry, gravelly, SAND, w/some silt
B	1-2	1.8	88	96			0915	Greenish colored zone @ 1.8'
C	2-3.5	2	101	109			0915	2-3.5' Wet, bwn, silty, F SAND
D	5-5.5	5	11	<12	5-10	30	0915	5-5.5' Wet, bwn/blk, clayey, SILT, w/trace organics
E	5.5-7.5	7	11	<12			0915	5.5-7.5' Sat, gry, F-M SAND
F	10-11	10	<9	<18	10-12	8	0915	10-11' Sat, gry, F-M SAND

LABORATORY SAMPLES:

Soil:
AKM-S-NB8-A-071912
AKM-S-NB8-B-071912
AKM-S-NB8-C-071912
AKM-S-NB8-D-071912
AKM-S-NB8-E-071912
AKM-S-NB8-F-071912

Notes: * XRF values were obtained in the field using an INNOVX Model 4000.
* XRF values were obtained in the field using an INNOV-X Model 4000.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

SUMMARY LOG

Depth (ft.)	
0–2	Moist, mottled gray-brown, gravelly, SAND with some silt
2–5	Wet, brown, silty, Fine SAND
5–5.5	Wet, brown-black, clayey, SILT
5.5–12	Saturated, gray, Fine to Medium SAND

12 (Bottom of Boring)

NOTE: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

BORING - DESCRIPTION OF SAMPLES & DATA

NB9

Field Rep: DG Cooper	Location: N711628 E1174172 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 19.0 (MLLW)	Ground Surface: Grass
Driller: Keith	Date Completed: 07/18/12	
Drill Type: Geoprobe 7720DT	Weather: Cloudy 65F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 2" Macro w/ acrylic liner

Sample		XRF*			Spl Depth (Ft.)	Sample	Time	Sample Description
No.	Depth (Ft.)	Depth (Ft.)	(ppm) As	Pb	From - To	Recovery (inches)		
A	0-1	0	27	73	0-5	36	1250	0-1' Damp, bwn, silty, SAND, w/thin roots
B	1-2	1.5	30	<10			1250	1-2' Wet, mot bwn, organic, silty, SAND, w/some gravel, bark, woodchip
C	2-3	2	13	<13			1250	2-3' Wet, gry, F-M SAND
D	6-7	5	<8	<13	5-10	30	1250	5-6' Moist, blk, asphalt concrete, w/crushed conrete
		6.5	14	<13				6-6.5' Wet, gry,-blk, SILT, w/trace organics
								6.5-7' Sat, gry, F-M SAND
E	10-12	10.5	19	<12	10-12	24	1250	10-12' Sat, gry, F-M SAND

LABORATORY SAMPLES:

Soil:
AKM-S-NB9-A-071812
AKM-S-NB9-B-071812
AKM-S-NB9-C-071812
AKM-S-NB9-D-071812
AKM-S-NB9-E-071812

Notes: * XRF values were obtained in the field using an INNOVX Model 4000.
* XRF values were obtained in the field using an INNOV-X Model 4000.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

0 **SUMMARY LOG**

-Silty Sand
Wet, mottled brown, organic, silty, SAND
with some gravel, wood chip, bark

2

Wet, gray, Fine to Medium SAND

5 -crushed asphalt, concrete

6

Wet, gray-black, SILT, with trace organics

Saturated, gray, Fine to Medium SAND

12

(Bottom of Boring)
NOTE: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

NB10

BORING - DESCRIPTION OF SAMPLES & DATA

Field Rep: DG Cooper	Location: N711637 E1174113 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 20.5 (MLLW)	Ground Surface: Grass
Driller: Keith	Date Completed: 07/18/12	
Drill Type: Geoprobe 7720DT	Weather: Cloudy 60F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 2" Macro w/ acrylic liner

Sample No.	Sample Depth (Ft.)	XRF* Depth (Ft.)	XRF* (ppm) As	XRF* (ppm) Pb	Spl Depth (Ft.) From - To	Sample Recovery (inches)	Time	Sample Description
A	0-1	0	31	24	0-5	40	1015	0-0.5' Damp, bwn, silty, SAND, w/trace gravel, thin roots
B	2-4	3	9	<13			1015	0.5-1' As above with bark, wood chips
								1-4' Moist, mot gry-bwn, F-M SAND, w/some gravel, silty sand layers
C	5-5.5	5.2	<9	16	5-10	50	1015	5-5.5' interlayered asphalt concrete and silty sand
CC	5.5-5.6	5.5	2682	9184			1015	5.5-5.6' Black F SAND, w/thin small organic fibers
D	5.6-6	5.7	52	<12			1015	5.6-9' Wet-sat, gray, silty, F SAND, interbedded w/silt, black organics
E	6-8	6	19	<12			1015	9-10' Wet, gry, clayey, SILT
F	9-10	7	<7	<5			1015	
G	10-12	8.5	<7	<11	10-12	24	1015	10-12' Sat, gry, F-M SAND
		11	17	<11				

LABORATORY SAMPLES:

Soil:
AKM-S-NB10-A-071812
AKM-S-NB10-B-071812
AKM-S-NB10-C-071812
AKM-S-NB10-D-071812
AKM-S-NB10-E-071812
AKM-S-NB10-F-071812
AKM-S-NB10-G-071812

Notes: * XRF values were obtained in the field using an INNOVX Model 4000.
* XRF values were obtained in the field using an INNOV-X Model 4000.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

SUMMARY LOG

Depth (ft.)	
0	-Silty Sand, w/ wood chip Moist, mottled gray-brown, Fine to Medium SAND with some gravel, silty sand layers
5	- asphalt and concrete
5.5-5.6	Thin black, organic, Fine SAND layer at base of fill
	Wet to saturated, silty Fine SAND with Silt interbeds, black organics
9	Wet, gray, clayey, SILT
10	Saturated, gray, Fine to Medium SAND
12	(Bottom of Boring)

NOTE: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

BORING - DESCRIPTION OF SAMPLES & DATA

NB11

Field Rep: DG Cooper	Location: N711628 E1174077 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 21.4 (MLLW)	Ground Surface: Berm
Driller: Keith	Date Completed: 07/17/12	
Drill Type: Geoprobe 7720DT	Weather: Cloudy 75F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 2" Macro w/ acrylic liner

Sample No.	Sample Depth (Ft.)	XRF* Depth (Ft.)	XRF* (ppm) As	XRF* (ppm) Pb	Spl Depth (Ft.) From - To	Sample Recovery (inches)	Time	Sample Description
A	0-1	0	57	59	0-5	24	1530	0-2' Moist, mot gry-bwn, gravelly, silty, SAND, w/scattered bark
B	1-2						1530	
C	5-6.5	5	16	36	5-10	36	1530	5-6.5' Wet, gry, silty, SAND, w/minor gravel, scattered wood
CC	6.5-7	6.5	3,009	10,474			1530	6.5-7' Wet, dk bwn, fibrous ORGANICS, grass-like fibers w/yellow trace inside
D	7-8	7	33	<12			1530	black sand matrix with slight sparkle
								7-8' Wet, gry, F SAND, w/black stringers
E	10-11	10	9	<11	10-15	40	1530	10-11' Wet, gry-blk, SILT, w/trace organics
F	11-13	13	82	<10			1530	11-14' Sat, gry, F-M SAND, w/organic interbeds, silt clasts
								14-15' Wet, mot bwn, organic, SILT

LABORATORY SAMPLES: **Soil:**
AKM-S-NB11-A-071712
AKM-S-NB11-B-071712
AKM-S-NB11-C-071712
AKM-S-NB11-CC-071712
AKM-S-NB11-D-071712
AKM-S-NB11-E-071712
AKM-S-NB11-F-071712

Notes: * XRF values were obtained in the field using an INNOV-X Model 4000.
Direct readings of the soil core were made by a representative of CDM Smith.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

SUMMARY LOG

Depth (ft.)	Description
0	Moist to wet, mottled gray-brown, silty, SAND with gravel, scattered wood
6.5	Wet dark brown, fibrous ORGANICS
7	Wet, gray, Fine SAND
10	Wet, gray-black SILT
11	Saturated, gray, Fine to Medium SAND with organic interbeds, silt clasts
14	Wet, mottled brown, organic, SILT
15	(Bottom of Boring)

NOTE: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

Dalton, Olmsted & Fuglevand, Inc.
Environmental Consultants

BORING - DESCRIPTION OF SAMPLES & DATA **NB12**

Field Rep: DG Cooper	Location: N711613 E1173997 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 16.0 (MLLW)	Ground Surface: Asphalt pavement
Driller: Keith	Date Completed: 07/20/12	
Drill Type: Geoprobe 7720DT	Weather: Rain 60F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 2" Macro w/ acrylic liner

Sample		XRF*			Spl Depth (Ft.)	Sample	Time	Sample Description
No.	Depth (Ft.)	Depth (Ft.)	(ppm) As	(ppm) Pb	From - To	Recovery (inches)		
A	0.3-1.3	0	<10	16	0-5	30	1015	0-0.3' Asphalt concrete
B	1.3-2.5	1	18	17			1015	0.3-1.3' Moist, mot bwn, gravelly, SAND, w/trace silt, red brick
		2	10	<13				1.3-2.5' Moist, tan, sandy, GRAVEL, w/trace silt
C	5-6	5.5	<7	<12	5-10	30	1015	5-7.5' Wet, gry, SILT, w/black organic layer @ 6.5'
D	7-8.5	6.5	13	27			1015	grading F Sandy at base
		7.5	8	<10				
					10-12	No recovery		

LABORATORY SAMPLES:

Soil:
AKM-S-NB12-A-072012
AKM-S-NB12-B-072012
AKM-S-NB12-C-072012
AKM-S-NB12-D-072012

Notes: * XRF values were obtained in the field using an INNOV-X Model 4000.
Direct readings of the soil core were made by a representative of CDM Smith.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

0 **SUMMARY LOG**

-Asphalt concrete
Moist, mottled brown, gravelly, SAND
with trace silt, red brick

1.3

Moist, tan, sandy, GRAVEL
with trace silt

5

Wet, gray, SILT
with black organic layer @ 6'
grading fine sandy

7.5

no recovery

12

(Bottom of Boring)
NOTE: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

Dalton, Olmsted & Fuglevand, Inc.
Environmental Consultants

Arkema North Boundary

BORING - DESCRIPTION OF SAMPLES & DATA

NB13

Field Rep: DG Cooper	Location: N711590 E1174041 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 21.1 (MLLW)	Ground Surface: Berm
Driller: Keith	Date Completed: 07/17/12	
Drill Type: Geoprobe 7720DT	Weather: Cloudy 75F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 2" Macro w/ acrylic liner

Sample		XRF*			Spl Depth (Ft.)	Sample	Time	Sample Description
No.	Depth (Ft.)	Depth (Ft.)	(ppm) As	Pb	From - To	Recovery (inches)		
A	0-1	0	68	67	0-5	24	1445	0-1' Damp, bwn, silty, SAND, w/some gravel, scattered bark
B	1-2	1.5	<8	14			1445	1-1.5' Damp, blk, asphalt, concrete rubble
								1.5-2' Wet, mot bwn, SILT, w/scattered gravel
C	5-6.2	5	9	<12	5-10	36	1445	5-6.2' Wet, mot bwn, SILT, scattered organics, crushed rock
CC	6.5	6	628	731			1445	6.2-6.8 Wet, dk bwn, fibrous ORGANICS, 2mm root-like, fuzzy organic matrix
D	7-8	6.5	705	218			1445	decomposed asphalt atop organics
		8	62	<11				6.8-8' Wet, gry, SILT, root casts with yellow trace in upper 2"
E	10-12	11	57	<12	10-15	60	1445	10-12' Wet, gry, SILT, w/trace organics, yellow trace in cast
F	12-14	12	86	12			1445	12-14' Wet, blk, ORGANICS, interbedded with F-M Sand, silt clasts
		14	15	<12				14-15' Sat, gry, F SAND, w/trace organics

LABORATORY SAMPLES: **Soil:**
AKM-S-NB13-A-071712
AKM-S-NB13-B-071712
AKM-S-NB13-C-071712
AKM-S-NB13-CC-071712
AKM-S-NB13-D-071712
AKM-S-NB13-E-071712
AKM-S-NB13-F-071712

Notes: * XRF values were obtained in the field using an INNOV-X Model 4000.
Direct readings of the soil core were made by a representative of CDM Smith.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

0 **SUMMARY LOG**

-Silty, SAND
-Asphalt and concrete rubble

Wet, mottled brown, SILT
with scattered gravel

6.2
6.8 Wet dark brown, fibrous ORGANICS

Wet, gray SILT
with trace organics
yellow trace in root casts

Wet, gray-black SILT

12
Wet, black ORGANICS
interbgedded with Fine to Medium Sand

14
Saturated, gray, Fine SAND, with trace oganics

15
(Bottom of Boring)
NOTE: The summary log is an
interpretation based on samples,
drill action, and interpolation.
Variations between what is shown
and actual conditions should
be anticipated.

BORING - DESCRIPTION OF SAMPLES & DATA

NB14

Field Rep: DG Cooper	Location: N711598 E1174102 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 19.5 (MLLW)	Ground Surface: Grass
Driller: Keith	Date Completed: 07/18/12	
Drill Type: Geoprobe 7720DT	Weather: Cloudy 60F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 2" Macro w/ acrylic liner

Sample		XRF*			Spl Depth (Ft.)	Sample	Time	Sample Description
No.	Depth (Ft.)	Depth (Ft.)	(ppm) As	Pb	From - To	Recovery (inches)		
A	0-1	0	58	65	0-5	36	0945	0-0.5' Damp, bwn, silty, SAND, w/thin roots
B	2-4	2	14	<14			0945	0.5-1' Damp, dk bwn, WOOD CHIP, BARK in silty sand matrix
								1-3' Moist, mot gry-bwn, gravelly, silty, SAND, interbedded w/F-M Sand
C	5-6	5	314	82	5-10	36	0945	5-8' Wet, gry-blk, SILT, w/scattered organics, thin F Sand interbeds
D	7-8	6	<9	18			0945	reduced-black stained, 6mm blk, F Sand layer @ 5'
		6.5	151	14				
E	10-11	10	14	<13	10-12	12	0945	10-11' Sat, gry, F-M SAND

LABORATORY SAMPLES:

Soil:
AKM-S-NB14-A-071812
AKM-S-NB14-B-071812
AKM-S-NB14-C-071812
AKM-S-NB14-D-071812
AKM-S-NB14-E-071812

Notes: * XRF values were obtained in the field using an INNOV-X Model 4000.
Direct readings of the soil core were made by a representative of CDM Smith.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

0 **SUMMARY LOG**

-Silty,SAND
-Wood Chip, Bark

Moist, mottled gray - brown, gravelly, silty, SAND
interbedded with Fine to Medium SAND

5

Wet, gray-black, SILT
with sand interbeds and scattered organics
6mm black Fine Sand layer @ 5'

10

Saturated, gray, Fine to Medium SAND

12

(Bottom of Boring)
NOTE: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

BORING - DESCRIPTION OF SAMPLES & DATA

NB15

Field Rep: DG Cooper	Location: N711583 E1174060 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 19.4 (MLLW)	Ground Surface: Grass
Driller: Keith	Date Completed: 07/17/12	
Drill Type: Geoprobe 7720DT	Weather: Cloudy 75F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 2" Macro w/ acrylic liner

Sample No.	Sample Depth (Ft.)	XRF* Depth (Ft.)	XRF* (ppm) As	XRF* (ppm) Pb	Spl Depth (Ft.) From - To	Sample Recovery (inches)	Time	Sample Description
A	0-1	0	17	37	0-5	48	1630	0-0.5' Damp, bwn, silty, SAND
B	2-4	2.5	12	11			1630	0.5-4' Moist, mot gry-bwn, gravelly, silty, SAND, w/bark @ 0.5-1'
C	5-6				5-10	60	1630	5-6' As above
CC	6-6.5	6.5	4,653	2,077			1630	6-6.5' Wet, blk, organic, SAND, w/grassy fibers, black sand matrix, yellow trace
D	7-9	8	3,148	29			1630	6.5-10' Wet, gry, SILT, w/trace organics, root casts
								Yellow trace in root casts to 9'
E	11-12	10	117	<12	10-12	24	1630	10-10.5' Wet, gry, SILT
		12	81	<12				10.5-12' Sat, gry, F-M SAND

LABORATORY SAMPLES:

Soil:
AKM-S-NB15-A-071712
AKM-S-NB15-B-071712
AKM-S-NB15-C-071712
AKM-S-NB15-CC-071712
AKM-S-NB15-D-071712
AKM-S-NB15-E-071712

Notes: * XRF values were obtained in the field using an INNOV-X Model 4000.
Direct readings of the soil core were made by a representative of CDM Smith.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

SUMMARY LOG

Depth(ft.)	
0	-Silty,SAND -Bark Moist, mottled gray - brown, gravelly, silty, SAND
6 – 6.5	Wet, black organic, SAND, black sand matrix
6.5 – 10.5	Wet, gray, SILT with trace organics, root casts yellow trace in root casts to 9'
10.5 – 12	Saturated, gray, Fine to Medium SAND

(Bottom of Boring)
NOTE: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

BORING - DESCRIPTION OF SAMPLES & DATA

NB16

Field Rep: DG Cooper	Location: N711560 E1174104 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 18.5 (MLLW)	Ground Surface: Grass
Driller: Keith	Date Completed: 07/18/12	
Drill Type: Geoprobe 7720DT	Weather: Cloudy 70F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 2" Macro w/ acrylic liner

Sample		XRF*			Spl Depth (Ft.)	Sample	Time	Sample Description
No.	Depth (Ft.)	Depth (Ft.)	(ppm) As	Pb	From - To	Recovery (inches)		
A	0-1	0	13	24	0-5	36	1415	0-1' Damp bwn, silty, SAND, w/scattered gravel, thin roots
B	2-3	2	68	25			1415	1-1.5' Moist, blk-bwn, organic silty, SAND, w/trace gravel, bark, wood chip
								1.5-2' Damp, blk, asphalt concrete debris
								2-3' Moist, gry, F sandy, SILT, w/some gravel
C	5-5.3	5	30	79	5-10	40	1415	5-5.3' Wet, gry, F-M SAND
CC	5.3-5.5	5.4	1,800	2,588			1415	5.3-5.5' Wet, gry-blk, F SAND, w/fine organic fibers, 12mm black, 12mm grey layers
D	5.5-6.5	6	433	<12			1415	5.5-6.5' Wet, bwn, SILT, w/some organics, yellow trace in root casts
E	7-8.5	7	97	16			1415	6.5-7' Sat, gry, silty, SAND
		8	1211	<12				7-8.5' Wet, gry-blk, SILT, w/black organics
F	10-12	8.2	31	<13	10-12	24	1415	10-12' Sat, gry, F-M SAND
		10	40	<13				
		11	23	<11				

LABORATORY SAMPLES:

Soil:
AKM-S-NB16-A-071812
AKM-S-NB16-B-071812
AKM-S-NB16-C-071812
AKM-S-NB16-CC-071812
AKM-S-NB16-D-071812
AKM-S-NB16-E-071812
AKM-S-NB16-F-071812

Notes: * XRF values were obtained in the field using an INNOV-X Model 4000.
Direct readings of the soil core were made by a representative of CDM Smith.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

0 **SUMMARY LOG**

-Silty,SAND
-Bark
2 -Asphalt, concrete debris

Moist, gray, fine sandy, SILT
3 with some gravel

Wet, gray, Fone to Medium SAND

5.5 Wet, black, Fine SAND, with fine organic fibers

Wet, brown, SILT
6.5 with some organics, yellow trace in root casts

-silty SAND

Wet, gray - black, SILT
8.5

Saturated, gray, Fine to Medium SAND

12

(Bottom of Boring)
NOTE: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

BORING - DESCRIPTION OF SAMPLES & DATA

NB17

Field Rep: DG Cooper	Location: N711554 E1174061 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 19.0 (MLLW)	Ground Surface: Grass
Driller: Keith	Date Completed: 07/18/12	
Drill Type: Geoprobe 7720DT	Weather: Cloudy 60F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 2" Macro w/ acrylic liner

Sample No.	Sample Depth (Ft.)	XRF* Depth (Ft.)	XRF* (ppm) As	XRF* (ppm) Pb	Spl Depth (Ft.) From - To	Sample Recovery (inches)	Time	Sample Description
A	0-1	0	17	29	0-5	48	0900	0-1' Damp, bwn, silty, SAND
B	2-4	2	24	27			0900	1-4' Moist, mot gry, gravelly, silty, SAND, w/scattered wood chip
C	5-6	5	22	<13	5-10	50	0900	5-6' Moist, mot gry, silty, F SAND
CC	6	6	1,348	790			0900	6' 12mm layer of blk, silty F SAND
D	6-8	7	706	37			0900	6-9.5' Wet, bwn-gry, SILT, w/ scattered organics, yellow trace in root casts
		9	264	<14				
E	10-12	12	316	<12	10-12	24	0900	10-12' Sat, gry, F-M SAND
								yellow trace around silt clast @ 11.5'

LABORATORY SAMPLES:

Soil:
AKM-S-NB17-A-071812
AKM-S-NB17-B-071812
AKM-S-NB17-C-071812
AKM-S-NB17-CC-071812
AKM-S-NB17-D-071812
AKM-S-NB17-E-071812

Notes: * XRF values were obtained in the field using an INNOV-X Model 4000.
Direct readings of the soil core were made by a representative of CDM Smith.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

0 **SUMMARY LOG**

-Silty,SAND
-Wood chip

Moist, mottled gray, gravelly, silty, SAND
with scattered wood chip

6 -12mm thick black, silty Fine Sand

Wet, brown to gray, SILT
with scattered organics 6-7.5'
yellow trace in root casts

10

Saturated, gray, Fine to Medium SAND

12

(Bottom of Boring)
NOTE: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

BORING - DESCRIPTION OF SAMPLES & DATA **NB18**

Field Rep: DG Cooper	Location: N711543 E1174142 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 18.5 (MLLW)	Ground Surface: Grass
Driller: Keith	Date Completed: 07/18/12	
Drill Type: Geoprobe 7720DT	Weather: Cloudy 60F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 2" Macro w/ acrylic liner

Sample		XRF*			Spl Depth (Ft.)	Sample	Time	Sample Description
No.	Depth (Ft.)	Depth (Ft.)	(ppm) As	(ppm) Pb	From - To	Recovery (inches)		
A	0-0.5	0	129	20	0-5	36	1500	0-0.5' Damp, bwn, silty, SAND
B	0.5-1.5	1.5	57	46			1500	0.5-1.5' Wet, mot bwn, organic, silty, SAND, w/wood chip, slag
C	1.5-3	2	28	25			1500	1.5-3' Wet, gry, gravelly, SAND, w/some silt
D	5-5.5	5	135	20	5-10	24	1500	5-5.3' Wet, gry-blk, silty, F SAND, w/black charred wood
E	5.5-7	6.5	13	<11			1500	5.3-7' Sat, gry, F-M SAND
F	10-12	10	<8	<13	10-12	24	1500	10-12' Sat, gry, F-M SAND
		11	17	<12				

LABORATORY SAMPLES:

Soil:
AKM-S-NB18-A-071812
AKM-S-NB18-B-071812
AKM-S-NB18-C-071812
AKM-S-NB18-D-071812
AKM-S-NB18-E-071812
AKM-S-NB18-F-071812

Notes: * XRF values were obtained in the field using an INNOV-X Model 4000.
Direct readings of the soil core were made by a representative of CDM Smith.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

0 **SUMMARY LOG**

-Silty,SAND
-Wood chip

Moist, mottled gray, gravelly, SAND
with some silt

5 -gray-black silty Fine SAND with charred wood

Saturated, gray, Fine to Medium SAND

12

(Bottom of Boring)
NOTE: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

NB19

BORING - DESCRIPTION OF SAMPLES & DATA

Field Rep: DG Cooper	Location: N711512 E1174181 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 17.5 (MLLW)	Ground Surface: Grass
Driller: Keith	Date Completed: 07/19/12	
Drill Type: Geoprobe 7720DT	Weather: Clear 70F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 2" Macro w/ acrylic liner

Sample		XRF*			Spl Depth (Ft.)	Sample	Time	Sample Description
No.	Depth (Ft.)	Depth (Ft.)	(ppm) As	Pb	From - To	Recovery (inches)		
A	0-1	0	26	41	0-5	30	1130	0-0.5' Damp, bwn, silty, SAND, w/thin roots
B	1-2	1	27	14			1130	0.5-1' Wet, mot bwn, mix of gravelly, SAND and Wood Chip/Bark
		2	<9	14				1-2' Moist, bwn, gravelly, SAND, w/some silt, scattered bark
								2-2.5' Wet, bwn, SILT, plastic
C	5-5.5	5	20	<11	5-10	12	1130	5-5.5' Wet, gry, SILT
D	5.5-6	6	12	<11			1130	5.5-6' Sat, gry, F SAND
E	10-11	10	64	51	10-12	10	1130	10-11' Wet, gry, clayey, SILT, poor sample recovery, carry-down

LABORATORY SAMPLES:

Soil:
AKM-S-NB19-A-071912
AKM-S-NB19-B-071912
AKM-S-NB19-C-071912
AKM-S-NB19-D-071912
AKM-S-NB19-E-071912

Notes: * XRF values were obtained in the field using an INNOV-X Model 4000.
Direct readings of the soil core were made by a representative of CDM Smith.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

0 **SUMMARY LOG**
-Silty,SAND
Moist, mottled gray, gravelly, SAND
with some silt, wood chip, bark
2
Wet gray to brown SILT
6 Saturated, gray, Fine SAND
10 Wet, gray, Clayey, SILT
12
(Bottom of Boring)
NOTE: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

BORING - DESCRIPTION OF SAMPLES & DATA **NB20**

Field Rep: DG Cooper	Location: N711567 E1174185 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 18.0 (MLLW)	Ground Surface: Grass
Driller: Keith	Date Completed: 07/18/12	
Drill Type: Geoprobe 7720DT	Weather: Cloudy 75F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 2" Macro w/ acrylic liner

Sample No.	Sample Depth (Ft.)	XRF* Depth (Ft.)	XRF* (ppm) As	XRF* (ppm) Pb	Spl Depth (Ft.) From - To	Sample Recovery (inches)	Time	Sample Description
A	0-1	0	43	16	0-5	40	1545	0-0.5' Damp, bwn, silty, SAND, w/thin roots
B	2-3.5	0.5	34	45			1545	0.5-1' Wet, mot bwn, organic, silty, SAND, w/wood chip, bark some sand
		1.5	<8	<13				1-3.5' Moist, mot gry, gravelly, SAND, w/minor silt, asphalt @ 1.5'
		3	20	18				
C	5-6	5	39	13	5-10	30	1545	5-6' Wet, gry, SILT, w/trace organics
D	6-7.5	7	<8	<12			1545	6-7.5' Sat, gry, F-M SAND
E	10-12	10.5	11	<12	10-12	24	1545	10-12' Sat, gry, F-M SAND

LABORATORY SAMPLES:

Soil:
AKM-S-NB20-A-071812
AKM-S-NB20-B-071812
AKM-S-NB20-C-071812
AKM-S-NB20-D-071812
AKM-S-NB20-E-071812

Notes: * XRF values were obtained in the field using an INNOV-X Model 4000.
Direct readings of the soil core were made by a representative of CDM Smith.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

0 **SUMMARY LOG**

-Silty,SAND
-Wood chip

Moist, mottled gray, gravelly, SAND
with minor silt

5

Wet, gray, SILT

6

Saturated, gray, Fine to Medium SAND

12

(Bottom of Boring)
NOTE: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

BORING - DESCRIPTION OF SAMPLES & DATA **NB21**

Field Rep: DG Cooper	Location: N711541 E1174230 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 18.0 (MLLW)	Ground Surface: Grass
Driller: Keith	Date Completed: 07/19/12	
Drill Type: Geoprobe 7720DT	Weather: Cloudy 60F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 2" Macro w/ acrylic liner

Sample		XRF*			Spl Depth (Ft.)	Sample	Time	Sample Description
No.	Depth (Ft.)	Depth (Ft.)	(ppm) As	Pb	From - To	Recovery (inches)		
A	0-1	0	46	56	0-5	40	1045	0-0.5' Damp, bwn, silty, SAND, w/trace gravel, 2' layer of bark at base
B	1-2.5	2	<8	<13			1045	1-2.5' Moist, bwn, gravelly, SAND, w/some silt, scattered wood
		3	23	13				2.5-3' Wet, gry, silty, F SAND
C	5-6	5	30	27	5-10	36	1045	5-6' Wet, gry, clayey, SILT, soft
D	6-7.5	7	8	<10			1045	6-7.5' Sat, gry, F-M SAND
								7.5-8' Wet, bwn, organic, SILT, w/fibrous organics
E	10-12	10	<7	<12	10-12	12	1045	10-12' Sat, gry, F-M SAND

LABORATORY SAMPLES:

Soil:
AKM-S-NB21-A-071912
AKM-S-NB21-B-071912
AKM-S-NB21-C-071912
AKM-S-NB21-D-071912
AKM-S-NB21-E-071912

Notes: * XRF values were obtained in the field using an INNOV-X Model 4000.
Direct readings of the soil core were made by a representative of CDM Smith.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

0 **SUMMARY LOG**

-Silty,SAND
-Wood chip

Moist, mottled gray, gravelly, SAND
with some silt, scattered wood

5

Wet, gray, clayey, SILT

6

Saturated, gray, Fine to Medium SAND

7.5

Wet, brown, organic, SILT

Saturated, gray, Fine to Medium SAND

12

(Bottom of Boring)
NOTE: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

NB22

BORING - DESCRIPTION OF SAMPLES & DATA

Field Rep: DG Cooper	Location: N711492 E1174255 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 17.9 (MLLW)	Ground Surface: Road gravel
Driller: Keith	Date Completed: 07/19/12	
Drill Type: Geoprobe 7720DT	Weather: Cloudy 60F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 2" Macro w/ acrylic liner

Sample		XRF*			Spl Depth (Ft.)	Sample	Time	Sample Description
No.	Depth (Ft.)	Depth (Ft.)	(ppm) As	Pb	From - To	Recovery (inches)		
A	0-1	0	<12	32	0-5	36	1030	0-2' Damp-moist, bwn, sandy, GRAVEL, w/some silt
B	2-3	2	76	48			1030	2-3' Wet, mot bwn, F sandy, SILT, w/scattered gravel, wood chip
C	5-6	5	62	19	5-10	36	1030	5-6' Wet, green-gry, sandy, GRAVEL, w/odor
D	6-8	6.5	<8	<13			1030	6-8' Sat, gry, F-M SAND, w/fibrous organics/silt in shoe
E	11-12	10	<7	<12	10-12	24	1030	10-11' Sat, gry, F-M SAND
		11.5	<7	<11				11-12' Wet, bwn, SILT,w/some organics

LABORATORY SAMPLES:

Soil:
AKM-S-NB22-A-071912
AKM-S-NB22-B-071912
AKM-S-NB22-C-071912
AKM-S-NB22-D-071912
AKM-S-NB22-E-071912

Notes: * XRF values were obtained in the field using an INNOV-X Model 4000.
Direct readings of the soil core were made by a representative of CDM Smith.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

0 **SUMMARY LOG**

Damp to moist, brown, sandy, GRAVEL
with some silt

2

Wet, mottled brown, Fine sandy, SILT
with scattered gravel, wood chip

5

Wet, green-gray, sandy, GRAVEL

6

Saturated, gray, Fine to Medium SAND

11

Wet, brown, SILT
with some organics

12

(Bottom of Boring)
NOTE: The summary log is an
interpretation based on samples,
drill action, and interpolation.
Variations between what is shown
and actual conditions should
be anticipated.

BORING - DESCRIPTION OF SAMPLES & DATA

NB23

Field Rep: DG Cooper	Location: N711408 E1174174 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 16.7 (MLLW)	Ground Surface: Road gravel
Driller: Keith	Date Completed: 07/17/12	
Drill Type: Geoprobe 7720DT	Weather: Cloudy 70F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 2" Macro w/ acrylic liner

Sample		XRF*			Spl Depth (Ft.)	Sample	Time	Sample Description
No.	Depth (Ft.)	Depth (Ft.)	(ppm) As	Pb	From - To	Recovery (inches)		
A	0-1	0	17	32	0-5	40	1315	0-0.5' Damp, bwn, silty, SAND
B	2-3.5	2.5	11	<13			1315	0.5-3.5' Moist, mot gry, sandy, GRAVEL, w/minor silt
C	5-6	5	<8	17	5-10	30	1315	5-6' Sat, gry, F-M SAND, grading finer
D	6-7	6.5	<6	<10			1315	6-7' Wet, gry-blk, SILT, w/organics
								7-7.5' Wet, bwn, PEAT
E	10-11.5	10.5	<6	<10	10-12	18	1315	10-11.5' Wet, gry-bwn, organic, SILT, w/fibrous organics

LABORATORY SAMPLES:

Soil:
AKM-S-NB23-A-071712
AKM-S-NB23-B-071712
AKM-S-NB23-C-071712
AKM-S-NB23-D-071712
AKM-S-NB23-E-071712

Notes: * XRF values were obtained in the field using an INNOV-X Model 4000.
Direct readings of the soil core were made by a representative of CDM Smith.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

SUMMARY LOG

Depth(ft.)	
0	Silty, SAND
	Moist, mottled gray, sandy, GRAVEL with minor silt
3.5	
	Saturated, gray, Fine to Medium SAND
6	
	Wet, gray-black, SILT with organics
7.5	-PEAT
	Wet, gray-brown, organic, SILT with fibrous orgaincs
12	

(Bottom of Boring)
NOTE: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

BORING - DESCRIPTION OF SAMPLES & DATA

NB24

Field Rep: DG Cooper	Location: N711485 E1174134 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 17.4 (MLLW)	Ground Surface: Grass
Driller: Keith	Date Completed: 07/17/12	
Drill Type: Geoprobe 7720DT	Weather: Cloudy 75F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 2" Macro w/ acrylic liner

Sample No.	Sample Depth (Ft.)	XRF* Depth (Ft.)	XRF* As (ppm)	XRF* Pb (ppm)	Spl Depth (Ft.) From - To	Sample Recovery (inches)	Time	Sample Description
A	0-0.5	0	20	22	0-5	40	1145	0-0.5' Damp, bwn, silty, SAND, w/roots
B	2-3.5	2	57	22			1145	0.5-1' Wood chip / Bark
								1-3' Moist, mot bwn, gravelly, silty, SAND, w/scattered crushed rock
								3-3.5' Wet, mot gry-wht, SILT, with white deposit @ contact w/upper fill
C	5-7	5	<7	<12	5-10	40	1145	5-7' Wet, gry, SILT, w/black organics @ 6.5-7'
D	7-8.5	7	<8	<12			1145	7-8.5' Sat, gry, F-M SAND
E	10-12	12	<6	<10	10-12	24	1145	10-12' Sat, gry, F-M SAND, trace organics @ 11'

LABORATORY SAMPLES:

Soil:
AKM-S-NB24-A-071712
AKM-S-NB24-B-071712
AKM-S-NB24-C-071712
AKM-S-NB24-D-071712
AKM-S-NB24-E-071712

Notes: * XRF values were obtained in the field using an INNOV-X Model 4000.
Direct readings of the soil core were made by a representative of CDM Smith.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

0 **SUMMARY LOG**

-Silty, SAND
-Wood Chip/bark

Moist, mottled brown, gravelly, silty, SAND
with scattered crushed rock

3

-white deposit

Wet, gray, SILT
with scattered organics

7

Saturated, gray, Fine to Medium SAND

-trace organics

12

(Bottom of Boring)
NOTE: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

BORING - DESCRIPTION OF SAMPLES & DATA

NB25

Field Rep: DG Cooper	Location: N711513 E1174066 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 18.5 (MLLW)	Ground Surface: Grass
Driller: Keith	Date Completed: 07/17/12	
Drill Type: Geoprobe 7720DT	Weather: Cloudy 70F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 2" Macro w/ acrylic liner

Sample No.	Sample Depth (Ft.)	XRF* Depth (Ft.)	XRF* (ppm) As	XRF* (ppm) Pb	Spl Depth (Ft.) From - To	Sample Recovery (inches)	Time	Sample Description
A	0-1	0	18	20	0-5	40	1100	0-1' Damp, bwn, silty, SAND, w/roots trace gravel
B	2-3.5	3	<8	<13			1100	1-3.5' Wet, mot bwn, gravelly, silty, SAND, w/crushed rock, wood, asphalt
C	5-6	5	1281	<13	5-10	40	1100	5-7' Wet, gry, SILT, w/yellow trace in root casts @ 5-6'
D	6-7.5	7.5	125	<11			1100	7-8.5' Sat, gry, F-M SAND
E	10-12	10	57**	58**	10-12	24	1100	10-12' Sat, gry, F-M SAND
		12	116**	<13				

LABORATORY SAMPLES:

Soil:
AKM-S-NB25-A-071712
AKM-S-NB25-B-071712
AKM-S-NB25-C-071712
AKM-S-NB25-D-071712
AKM-S-NB25-E-071712

Notes: * XRF values were obtained in the field using an INNOV-X Model 4000.
Direct readings of the soil core were made by a representative of CDM Smith.
** Possible carry-down due to rind in core barrel.
Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

SUMMARY LOG

Depth (ft.)	
0	-Silty, SAND Moist, mottled brown, gravelly, silty, SAND with scattered crushed rock, wood, asphalt
5	Wet, gray, SILT with yellow trace in root casts
7	Saturated, gray, Fine to Medium SAND
12	(Bottom of Boring)

NOTE: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

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Environmental Consultants

Arkema North Boundary

BORING - DESCRIPTION OF SAMPLES & DATA **NB26**

Field Rep: DG Cooper	Location: N711545 E1174021 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 19.4 (MLLW)	Ground Surface: Grass
Driller: Keith	Date Completed: 07/17/12	
Drill Type: Geoprobe 7720DT	Weather: Cloudy 70F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 2" Macro w/ acrylic liner

Sample		XRF*			Spl Depth (Ft.)	Sample	Time	Sample Description
No.	Depth (Ft.)	Depth (Ft.)	(ppm) As	Pb	From - To	Recovery (inches)		
A	0-1	0	13	31	0-5	40	1100	0-0.8' Damp, bwn, silty, SAND, w/roots, concrete
B	2-3.5	3	<7	<12			1100	0.8-2' Moist, mot bwn, silty, SAND, w/some gravel, wood chip, bark
								2-3.5' Wet, gry, gravelly, silty, SAND
C	5-6				5-10	48	1100	5-6' Wet, gry, SILT
CC	6.5	6.5	2,717	13			1100	6-6.2' Wet, dk bwn, fibrous, ORGANICS
D	8-9	8	797	23				6.2-7' Wet, gry, sandy, GRAVEL, bottom 3" mixed with organics, yellow trace
								7-9' Wet, bwn, SILT, w/scattered organics, grading clayey
E	10-11	10	1234	19	10-12	12	1100	10-11' Wet, gry, SILT, w/root casts, marsh grass, yellow trace 10-10.5'
		10	2603	16				

LABORATORY SAMPLES:

Soil:
AKM-S-NB26-A-071712
AKM-S-NB26-B-071712
AKM-S-NB26-C-071712
AKM-S-NB26-CC-071712
AKM-S-NB26-D-071712
AKM-S-NB26-E-071712

Notes: * XRF values were obtained in the field using an INNOV-X Model 4000.
Direct readings of the soil core were made by a representative of CDM Smith.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

0 **SUMMARY LOG**

-Silty, SAND, with roots

Moist, mottled brown to gray, gravelly, silty, SAND
with scattered crushed rock, wood, asphalt

5

Wet, gray, SILT

6

Wet, dark brown fibrous ORGANICS
7 with yellow trace, sandy gravel mixed in

Wet, brown to gray,SILT
with scattered organics, root casts

-Yellow trace

12

(Bottom of Boring)
NOTE: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

BORING - DESCRIPTION OF SAMPLES & DATA

NB27

Field Rep: DG Cooper
Drilling Co.: Cascade
Driller: Keith
Drill Type: Geoprobe 7720DT
Size/Type Casing: 2" Rod

Location: N711541 E1173953 (NAD83)
Elevation (Ft.): 16.8 (MLLW)
Date Completed: 07/20/12
Weather: Rain 60F
Hammer Type: Direct push

Ground Surface: Asphalt Pavement
Sampler Type: 2" Macro w/ acrylic liner

Sample No.	Sample Depth (Ft.)	XRF* Depth (Ft.)	XRF* (ppm) As	XRF* (ppm) Pb	Spl Depth (Ft.) From - To	Sample Recovery (inches)	Time	Sample Description
A	0.5-1.5	1	67	100	0-5	30	1130	0-0.3' Asphalt concrete
B	1.5-2.5	2	27	16			1130	0.3-1.5' Moist, mot bwn, gravelly, SAND, w/trace red brick, asphalt
								1.5-2.5' Moist, bwn, sandy, gravel, w/trace silt, fire brick
C	5-6	5	197	<12	5-10	48	1130	5-7' Wet, gry, clayey, SILT, w/trace fine organics
D	7-8	6.5	17	<11			1130	7-8' Wet, gry-blu, SILT, w/black organic interbeds
		8	<7	12				8-9' Wet, bwn, fibrous, PEAT
		9	<6	<10				
					10-12	0		
						no recovery		

LABORATORY SAMPLES:

Soil:
AKM-S-NB27-A-072012
AKM-S-NB27-B-072012
AKM-S-NB27-C-072012
AKM-S-NB27-D-072012

Notes: * XRF values were obtained in the field using an INNOV-X Model 4000.
Direct readings of the soil core were made by a representative of CDM Smith.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

0 **SUMMARY LOG**

-Asphalt concrete

Moist, mottled brown gravelly SAND or sandy, GRAVEL, with trace silt, brick

5

Wet, gray, clayey, SILT

Wet, gray-black SILT with organic interbeds

9 -Fibrous PEAT

no recovey

12

(Bottom of Boring)
NOTE: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

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Environmental Consultants

Arkema North Boundary

BORING - DESCRIPTION OF SAMPLES & DATA

NB29

Field Rep: DG Cooper	Location: N711508 E1173921 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 16.7 (MLLW)	Ground Surface: Asphalt Pavement
Driller: Keith	Date Completed: 07/20/12	
Drill Type: Geoprobe 7720DT	Weather: Rain 60F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 2" Macro w/ acrylic liner

Sample No.	Sample Depth (Ft.)	XRF* Depth (Ft.)	XRF* (ppm) As	XRF* (ppm) Pb	Spl Depth (Ft.) From - To	Sample Recovery (inches)	Time	Sample Description
A	0.5-1.5	1	10	<13	0-5	40	1215	0-0.3' Asphalt concrete
B	2-2.5	2	17	22			1215	0.3-2' Moist, mot bwn-blk, sandy, GRAVEL - recycled asphalt
C	2.5-3.5	2.5	49	<13			1215	2-2.5' Moist, tan-green, sandy, GRAVEL
		3	88	<12				2.5-3.5' Wet, gry-blk, SILT, w/trace black organics
D	5-6.5	5	30	<12	5-10	40	1215	5-6.5' Wet, gry, clayey, SILT, w/trace black organics
E	6.5-8	6.5	<7	12			1215	6.5-8' Wet, gry-blk, SILT, w/organic interbeds
		8.5	7	<11				8-8.5' Wet, bwn, fibrous PEAT
F	10-12	11	<7	<12	10-12	24	1215	10-12' Wet, gry, organic, SILT, w/fibrous organics, marsh grass

LABORATORY SAMPLES:

Soil:
AKM-S-NB29-A-072012
AKM-S-NB29-B-072012
AKM-S-NB29-C-072012
AKM-S-NB29-D-072012
AKM-S-NB29-E-072012
AKM-S-NB29-F-072012

Notes: * XRF values were obtained in the field using an INNOV-X Model 4000.
Direct readings of the soil core were made by a representative of CDM Smith.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

0 **SUMMARY LOG**

-Asphalt concrete
Moist, mottled brown gravelly SAND or sandy, GRAVEL, with trace silt, brick

2.5

Wet, gray-black, SILT with trace organics

5

8 -Fibrous PEAT

Wet, gray, organic SILT, with fibrous organics, marsh grass

12

(Bottom of Boring)
NOTE: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

Dalton, Olmsted & Fuglevand, Inc.
Environmental Consultants

Arkema North Boundary

NB30

BORING - DESCRIPTION OF SAMPLES & DATA

Field Rep: DG Cooper	Location: N711470 E1173952 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 18.2 (MLLW)	Ground Surface: Grass
Driller: Keith	Date Completed: 07/16/12	
Drill Type: Geoprobe 7720DT	Weather: Cloudy 70F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 2" Macro w/ acrylic liner

Sample		XRF*			Spl Depth (Ft.)	Sample	Time	Sample Description
No.	Depth (Ft.)	Depth (Ft.)	(ppm) As	Pb	From - To	Recovery (inches)		
A	0-1	0	14	30	0-5	36	1445	0-0.5' Damp, bwn, silty, SAND, w/roots
B	2-3	1.5	42	25			1445	0.5-2.5' Moist, mot bwn, silty, SAND, w/some gravel, asphalt @ 2.5'
		2.5	<8	<13				2.5-3' Wet, gry-blk, F-M SAND, w/organic and silt interbeds
C	6-8	6.5	302	<13	5-10	48	1445	6-9' Sat, gry, F-M SAND, w/silt interbed @ 7'
D	8-10	9	29	<12			1445	9-10' Wet, gry, SILT, w/black organics 9.5-10'
E	10-12	12	<7	<11	10-12	24	1445	10-12' Sat, gry,SILT, w/scattered organics

LABORATORY SAMPLES:

Soil:
AKM-S-NB30-A-071612
AKM-S-NB30-B-071612
AKM-S-NB30-C-071612
AKM-S-NB30-D-071612
AKM-S-NB30-E-071612

Notes: * XRF values were obtained in the field using an INNOV-X Model 4000.
Direct readings of the soil core were made by a representative of CDM Smith.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

0 **SUMMARY LOG**

-Silty, SAND

Moist, mottled brown, silty, SAND
with some gravel

2.5

Wet to saturated, gray, Fint to Medium SAND
with organic and silt interbeds

9

Wet, gray, SILT
with scattered organics

12

(Bottom of Boring)
NOTE: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

BORING - DESCRIPTION OF SAMPLES & DATA **NB31**

Field Rep: DG Cooper	Location: N711510 E1173990 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 18.5 (MLLW)	Ground Surface: Grass
Driller: Keith	Date Completed: 07/17/12	
Drill Type: Geoprobe 7720DT	Weather: Cloudy 65F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 2" Macro w/ acrylic liner

Sample No.	Sample Depth (Ft.)	XRF* Depth (Ft.)	XRF* (ppm) As	XRF* (ppm) Pb	Spl Depth (Ft.) From - To	Sample Recovery (inches)	Time	Sample Description
A	0-1	0	16	32	0-5	30	0950	Damp, bwn, silty, SAND, w/thin roots
B	1.5-2.5	1.5	11	<11			0950	0.5-1.5' Moist, mot bwn, gravelly, silty, SAND, w/asphalt
								1.5-2.5' Moist, gry, F-M SAND
CC	5.3	4.9	452	105	5-10	36	0950	5-5.3' Wet, bwn fibrous ORGANICS interbedded with fine sand
D	5.5-6	5	1,647	2,973			0950	5.3-5.4' Wet, gry, silty, F SAND, w/silver metallic flakes, yellow trace on organics
E	6-8	6	203	<11			0950	5.4-6' Wet, gry, SILT, w/yellow trace in root casts
		7	17	<12				6-7.5' Sat, gry, F-M SAND, w/some silt
								7.5-8' Wet, gry, SILT
F	10-11.5	11.5	<7	<12	10-12	18	0950	10-11.5' Wet, gry-blk, organic, SILT

LABORATORY SAMPLES:

Soil:
AKM-S-NB31-A-071712
AKM-S-NB31-B-071712
AKM-S-NB31-CC-071712
AKM-S-NB31-D-071712
AKM-S-NB31-E-071712
AKM-S-NB31-F-071712

Notes: * XRF values were obtained in the field using an INNOV-X Model 4000.
Direct readings of the soil core were made by a representative of CDM Smith.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

0 **SUMMARY LOG**

-Silty, SAND

Moist, mottled brown, gravelly, silty, SAND
with scattered crushed rock, asphalt

5

-Wet, brown Fibrous ORGANICS, yellow trace
-metallic flakes in underlying Fine SAND interbed
Wet, gray, SILT
with yellow trace in root casts

6

Saturated, gray, Fine to Medium SAND

7.5

Wet, gray, Silt

12 -organic SILT

(Bottom of Boring)
NOTE: The summary log is an
interpretation based on samples,
drill action, and interpolation.
Variations between what is shown
and actual conditions should
be anticipated.

Dalton, Olmsted & Fuglevand, Inc.
Environmental Consultants

BORING - DESCRIPTION OF SAMPLES & DATA

NB32

Field Rep: DG Cooper	Location: N711470 E1174027 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 18.4 (MLLW)	Ground Surface: Grass
Driller: Keith	Date Completed: 07/17/12	
Drill Type: Geoprobe 7720DT	Weather: Cloudy 70F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 2" Macro w/ acrylic liner

Sample		XRF*			Spl Depth (Ft.)	Sample	Time	Sample Description
No.	Depth (Ft.)	Depth (Ft.)	(ppm) As	(ppm) Pb	From - To	Recovery (inches)		
A	0-1	0	26	16	0-5	30	0930	0-0.5' Damp, bwn, silty, SAND, w/roots
B	1.5-2.5	1.5	<8	<12			0930	0.5-1.5' Moist, mot bwn, silty, SAND, w/some gravel, crushed rock
								1.5-2.5' Wet, gry, silty, SAND, w/some gravel
C	5-6	5	15	<13	5-10	36	0930	5-6' Wet-sat, gry, F-M SAND
D	6-7	7	<7	14			0930	6-7' Wet, gry, SILT, w/black organics
					10-12	0		
						no recovery		

LABORATORY SAMPLES:

Soil:
AKM-S-NB32-A-071712
AKM-S-NB32-B-071712
AKM-S-NB32-C-071712
AKM-S-NB32-D-071712

Notes: * XRF values were obtained in the field using an INNOV-X Model 4000.
Direct readings of the soil core were made by a representative of CDM Smith.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

0 **SUMMARY LOG**

-Silty, SAND

Moist, mottled brown, silty, SAND
with some gravel

5

Wet to saturated, gray, Fint to Medium SAND

7

Wet, gray, SILT

no recovery

12

(Bottom of Boring)
NOTE: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

Dalton, Olmsted & Fuglevand, Inc.
Environmental Consultants

BORING - DESCRIPTION OF SAMPLES & DATA

NB33

Field Rep: DG Cooper	Location: N711430 E1174072 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 17.7 (MLLW)	Ground Surface: Grass
Driller: Keith	Date Completed: 07/17/12	
Drill Type: Geoprobe 7720DT	Weather: Cloudy 65F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 2" Macro w/ acrylic liner

Sample		XRF*			Spl Depth (Ft.)	Sample	Time	Sample Description
No.	Depth (Ft.)	Depth (Ft.)	(ppm) As	Pb	From - To	Recovery (inches)		
A	0-1	0	19	20	0-5	48	0845	0-0.5' Damp, bwn, silty, SAND, w/roots
B	2-4	2	12	<14			0845	0.5-2.5' Moist, mot bwn, silty, SAND, w/some gravel, crushed rock, wood chip
		3.5	12	<13				2.5-4' Wet, mot bwn, F SAND, w/trace silt, oxidation
C	5-6	6	27	<12	5-10	50	0845	5-6' Sat, gry, F SAND, w/trace silt
D	6-8.5	9	<7	<12			0845	6-8.5' Wet, gry-blk, SILT, w/trace F sand, scattered organics
E	8.5-10						0845	8.5-10' Sat, gry, F-M SAND, w/silt clasts
F	10-12	12	<7	<12	10-12	24	0845	10-12' Sat, gry, F-M SAND, w/scattered gravel, silt clasts

LABORATORY SAMPLES:

Soil:
AKM-S-NB33-A-071712
AKM-S-NB33-B-071712
AKM-S-NB33-C-071712
AKM-S-NB33-D-071712
AKM-S-NB33-E-071712
AKM-S-NB33-F-071712

Notes: * XRF values were obtained in the field using an INNOV-X Model 4000.
Direct readings of the soil core were made by a representative of CDM Smith.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

0 **SUMMARY LOG**

-Silty, SAND
Moist, mottled brown, silty, SAND
with some gravel, crushed rock, wood chip

2.5

Wet to saturated, brown to gray, Fine SAND
with trace silt

6

Wet, gray-black SILT
with trace fine sand, scattered organics

8.5

Saturated, gray, Fine to Medium SAND

12

(Bottom of Boring)
NOTE: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

BORING - DESCRIPTION OF SAMPLES & DATA

NB34

Field Rep: DG Cooper	Location: N711378 E1174097 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 17.4 (MLLW)	Ground Surface: Grass
Driller: Keith	Date Completed: 07/16/12	
Drill Type: Geoprobe 7720DT	Weather: Clear 75F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 2" Macro w/ acrylic liner

Sample		XRF*			Spl Depth (Ft.)	Sample	Time	Sample Description
No.	Depth (Ft.)	Depth (Ft.)	(ppm) As	(ppm) Pb	From - To	Recovery (inches)		
A	0-1	0	13	35	0-5	30	1645	0-0.5' Damp, bwn, silty, SAND, w/roots
B	2-2.5	2	25	53			1645	0.5-2' Moist, mot bwn, silty, SAND, w/some gravel, brick, wood chip
		2.5	73	105				2-2.5' Wet, gry-blk, F SAND, w/organics
C	6-7	7	<8	<12	5-10	40	1645	6-7" Sat, gry, F-M SAND
D	7-9	9	<8	<12			1645	7-9' Wet, gry, SILT, w/trace black organics
								9-10' Sat, gry, F-M SAND
E	10-12	12	<7	<12	10-12	24	1645	10-12' Sat, gry, F-M SAND, w/scattered silt clasts

LABORATORY SAMPLES:

Soil:
AKM-S-NB34-A-071612
AKM-S-NB34-B-071612
AKM-S-NB34-C-071612
AKM-S-NB34-D-071612
AKM-S-NB34-E-071612

Notes: * XRF values were obtained in the field using an INNOV-X Model 4000.
Direct readings of the soil core were made by a representative of CDM Smith.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

0 **SUMMARY LOG**

-Silty, SAND
Moist, mottled brown, silty, SAND
with some gravel, brick, wood chip

2

Wet to saturated, brown to gray, Fine SAND
with trace silt

7

Wet, gray-black SILT
with trace black organics

9

Saturated, gray, Fine to Medium SAND

12

(Bottom of Boring)
NOTE: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

BORING - DESCRIPTION OF SAMPLES & DATA **NB35**

Field Rep: DG Cooper	Location: N711286 E1174008 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 17.5 (MLLW)	Ground Surface: Grass
Driller: Keith	Date Completed: 07/16/12	
Drill Type: Geoprobe 7720DT	Weather: Cloudy 65F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 1" dual-tube w/ acrylic liner

Sample		XRF*			Spl Depth (Ft.)	Sample	Time	Sample Description
No.	Depth (Ft.)	Depth (Ft.)	(ppm) As	Pb	From - To	Recovery (inches)		
A	0-1	0	<7	<11	0-4	36	1000	0-1' Damp, mot bwn gravelly, silty, SAND, w/wood chip
AA	1.5	1	<20	240			1000	1.5' Thin black layer of F SAND with thin organics-like fibers
B	2-4	1.5	911	3724			1000	1.5-4' Wet gry, F-M SAND
		2.5	56	20				
		4	10	<14				
C	4-6	6	<8	<12	4-8	36	1000	4-6' As above becoming saturated
D	6-8	7.5	12	15			1000	6-8' Wet, gry, SILT, w/black organics from 7-8'
E	8-10	8	<7	<12	8-12	24	1000	8-8.5' Wet, gry, SILT
F	10-12	10	<7	<11			1000	8.5-12' Sat, gry, F SAND, w/trace silt

LABORATORY SAMPLES:

Soil:
AKM-S-NB35-A-071612
AKM-S-NB35-AA-071612
AKM-S-NB35-B-071612
AKM-S-NB35-C-071612
AKM-S-NB35-D-071612
AKM-S-NB35-E-071612
AKM-S-NB35-F-071612

Notes: * XRF values were obtained in the field using an INNOV-X Model 4000.
Direct readings of the soil core were made by a representative of CDM Smith.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

0 **SUMMARY LOG**

Damp, mottled brown, gravelly, silty, SAND
with wood chip
1.5 -Thin black layer of Fine SAND with thin organic fibers

Wet to saturated, gray, Fine to medium SAND
with trace silt

6

Wet, gray-black SILT
with trace black organics

8.5

Saturated, gray, Fine SAND
with trace silt

12
(Bottom of Boring)
NOTE: The summary log is an
interpretation based on samples,
drill action, and interpolation.
Variations between what is shown
and actual conditions should
be anticipated.

BORING - DESCRIPTION OF SAMPLES & DATA

NB36

Field Rep: DG Cooper	Location: N711347 E1174022 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 17.5 (MLLW)	Ground Surface: Grass
Driller: Keith	Date Completed: 07/16/12	
Drill Type: Geoprobe 7720DT	Weather: Clear 75F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 1" dual-tube w/ acrylic liner

Sample		XRF*			Spl Depth (Ft.)	Sample	Time	Sample Description
No.	Depth (Ft.)	Depth (Ft.)	(ppm) As	(ppm) Pb	From - To	Recovery (inches)		
A	0-1	0	18	34	0-5	30	1600	0-1' Damp, bwn, silty, SAND, w/wood chip
AA	2	2	124	307			1600	1-2' Moist, mot bwn, gravellysilty, sand
B	2-2.5	2.5	78	70			1600	2' 1/2' layer of black F SAND
								2-2.5' Wet, gry, F-M SAND
C	9-10	6	<8	13	5-10	12	1600	5-6' Sat, gry, F-M SAND
D	10-12	11	8	<12	10-12	24	1600	10-12' Sat, gry, F-M SAND

LABORATORY SAMPLES:

Soil:
AKM-S-NB36-A-071612
AKM-S-NB36-AA-071612
AKM-S-NB36-B-071612
AKM-S-NB36-C-071612
AKM-S-NB36-D-071612

Notes: * XRF values were obtained in the field using an INNOV-X Model 4000.
Direct readings of the soil core were made by a representative of CDM Smith.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

0 **SUMMARY LOG**

Damp, mottled brown, gravelly, silty, SAND
with wood chip
2 -Thin black layer of Fine SAND

Wet to saturated, gray, Fine to medium SAND

-poor recovery

Saturated, gray, Fine to Medium SAND

12

(Bottom of Boring)
NOTE: The summary log is an
interpretation based on samples,
drill action, and interpolation.
Variations between what is shown
and actual conditions should
be anticipated.

BORING - DESCRIPTION OF SAMPLES & DATA

NB37

Field Rep: DG Cooper	Location: N711408 E1173983 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 18.4 (MLLW)	Ground Surface: Grass
Driller: Keith	Date Completed: 07/16/12	
Drill Type: Geoprobe 7720DT	Weather: Clear 70F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 2" Macro w/ acrylic liner

Sample No.	Sample Depth (Ft.)	XRF* Depth (Ft.)	XRF* (ppm) As	XRF* (ppm) Pb	Spl Depth (Ft.) From - To	Sample Recovery (inches)	Time	Sample Description
A	0-1	0	15	21	0-5	36	1530	0-0.5' Damp, bwn, silty, SAND,w/crushed rock
AA	2.5	2.5	1,288	5,975			1530	0.5-1' Moist, mot bwn, silty, SAND, w/wood chip
B	2.5-3	3	44	<13			1530	1-2.5' Moist, bwn, silty, SAND, w/trace gravel
								2.5' - 2" layer of black organics / F SAND
								2.5-3' Wet, gry-black, F-M SAND
C	6-8	6-8	<7	<13	5-10	48	1530	6-9.5' Wet-sat, gry, F-M SAND
D	8-9.5	9	11	<11				9.5-10' Wet, gry, F sandy, SILT
E	10-12	10.5	<8	17	10-12	24	1530	10-11' Wet, gry-blk, SILT, w/scattered organics
		12	<7	<13				11-12' Wet, gry-bwn, organic, SILT

LABORATORY SAMPLES:

Soil:
AKM-S-NB37-A-071612
AKM-S-NB37-AA-071612
AKM-S-NB37-B-071612
AKM-S-NB37-C-071612
AKM-S-NB37-D-071612
AKM-S-NB37-E-071612

Notes: * XRF values were obtained in the field using an INNOV-X Model 4000.
Direct readings of the soil core were made by a representative of CDM Smith.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

0 **SUMMARY LOG**

Damp to moist, brown, silty, SAND
wiht wood chip and trace gravel

2 -Thin black layer of Fine SAND

Wet to saturated, gray, Fine to medium SAND

9.5 -Fine sandy SILT

Wet, gray -black SILT
becoming
12 Wet, gray-brown, organic SILT

(Bottom of Boring)
NOTE: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

BORING - DESCRIPTION OF SAMPLES & DATA

NB38

Field Rep: DG Cooper	Location: N711416 E1173909 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 18.0 (MLLW)	Ground Surface: Grass
Driller: Keith	Date Completed: 07/16/12	
Drill Type: Geoprobe 7720DT	Weather: Clear 75F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 2" Macro w/ acrylic liner

Sample		XRF*			Spl Depth (Ft.)	Sample	Time	Sample Description
No.	Depth (Ft.)	Depth (Ft.)	(ppm) As	(ppm) Pb	From - To	Recovery (inches)		
A	0-1	0	24	24	0-5	36	1400	0-0.5' Damp, bwn, silty, SAND
B	2-3	1	37	33			1400	0.5-1.5' Moist, mot bwn, Wood chip
		1.5	17	15				1.5-3' Moist, bwn-gry, silty, SAND, w/some gravel
		3	40	<11				
C	5-7	6.5	10	17	5-10	36	1400	5-7' Wet-sat, gry, F SAND
D	7-8	8	<7	18			1400	7-8' Wet, gry, SILT, w/trace organics, root casts
					10-12	0		
						no recovery		
						2 attempts		

LABORATORY SAMPLES:

Soil:
AKM-S-NB38-A-071612
AKM-S-NB38-B-071612
AKM-S-NB38-C-071612
AKM-S-NB38-D-071612

Notes: * XRF values were obtained in the field using an INNOV-X Model 4000.
Direct readings of the soil core were made by a representative of CDM Smith.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

0 **SUMMARY LOG**

-silty, Sand
-wood chip
Moist, brown-gray, silty, SAND with some gravel

3

Wet to saturated, Fine SAND

7

Wet, gray, SILT with trace organics, root casts

-Poor recovery

12

(Bottom of Boring)
NOTE: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

BORING - DESCRIPTION OF SAMPLES & DATA

NB40

Field Rep: DG Cooper	Location: N711462 E1173879 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 17.0 (MLLW)	Ground Surface: Asphalt Pavement
Driller: Keith	Date Completed: 07/20/12	
Drill Type: Geoprobe 7720DT	Weather: Rain 60F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 2" Macro w/ acrylic liner

Sample		XRF*			Spl Depth (Ft.)	Sample	Time	Sample Description
No.	Depth (Ft.)	Depth (Ft.)	(ppm) As	Pb	From - To	Recovery (inches)		
A	0.5-1.5	1	14	18	0-5	36	1315	0-0.3' Asphalt concrete
AA	1.8-2.1	2	1286	1737			1315	0.3-1.8' Moist, mot bwn, gravelly, SAND, w/greenish gravel at base
B	2.1-3	2.5	110	160			1315	1.8-2.1' Damp, blk, SAND, w/slag-like fragments/matrix
		3	<8	<14				2.1-3' Moist, mot gry-blk, sandy, GRAVEL, w/recycled concrete
C	5-7	5	14	<12	5-10	48	1315	5-7' Wet, gry, clayey, SILT, w/trace organics, soft
D	7-8	6.5	<7	13			1315	7-8' Wet, gry, SILT, w/black organic interbed
		8.5	<6	<10				8-9' Wet, bwn, fibrous PEAT
E	10-11	10.5	<7	<12	10-12	24	1315	10-12' Wet, gry-bwn, organic, SILT, w/fibrous organics, marsh grass

LABORATORY SAMPLES:

Soil:
AKM-S-NB40-A-072012
AKM-S-NB40-AA-072012
AKM-S-NB40-B-072012
AKM-S-NB40-C-072012
AKM-S-NB40-D-072012
AKM-S-NB40-E-072012

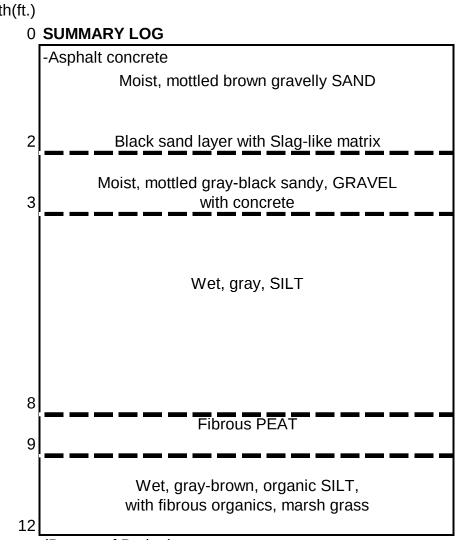
Notes: * XRF values were obtained in the field using an INNOV-X Model 4000.
Direct readings of the soil core were made by a representative of CDM Smith.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

SUMMARY LOG



(Bottom of Boring)
NOTE: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

BORING - DESCRIPTION OF SAMPLES & DATA **NB41**

Field Rep: DG Cooper	Location: N711427 E1173844 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 17.6 (MLLW)	Ground Surface: Asphalt Pavement
Driller: Keith	Date Completed: 07/20/12	
Drill Type: Geoprobe 7720DT	Weather: Rain 65F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 2" Macro w/ acrylic liner

Sample No.	Sample Depth (Ft.)	XRF* Depth (Ft.)	XRF* As (ppm)	XRF* Pb (ppm)	Spl Depth (Ft.) From - To	Sample Recovery (inches)	Time	Sample Description
A	0.3-1.3	1	<9	15	0-5	40	1400	0-0.3' Asphalt concrete
B	1.3-2.3	2	193	126			1400	0.3-1.3' Moist, mot bwn, gravelly, SAND, w/trace silt, red brick
BB	2.3-2.5	2.5	152	48			1400	1.3-2.3' Moist, bwn-blk, sandy, gravel, w/recycled asphalt
C	2.5-3.5						1400	2.3-2.5' Moist, blk, gravelly, SAND, no obvious slag but similar to NB40
								2.5-3.5' Moist, grn-bwn, sandy, GRAVEL
D	5-7	5	<6	<10	5-10	36	1400	5-7.5' Wet, gry, clayey, SILT, w/fibrous organic layer @ 6.5'
E	7.5-8	6.5	<7	14			1400	7.5-8' Wet, gry, F-M SAND, w/thin roots
		8	34	<13				
					10-12	0	1400	
						no recovery		

LABORATORY SAMPLES:

Soil:
AKM-S-NB41-A-072012
AKM-S-NB41-B-072012
AKM-S-NB41-BB-072012
AKM-S-NB41-C-072012
AKM-S-NB41-D-072012
AKM-S-NB41-E-072012

Notes: * XRF values were obtained in the field using an INNOV-X Model 4000.
Direct readings of the soil core were made by a representative of CDM Smith.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

0 **SUMMARY LOG**

-Asphalt concrete
Moist, mottled brown gravelly SAND

2.5 Black sand layer with Slag-like matrix

Moist, green-brown, sandy, GRAVEL

3.5

Wet, gray, clayey, SILT

6.5 -Fibrous organic layer

7.5

Wet, gray, Fine to Medium SAND

No Recovery

12

(Bottom of Boring)
NOTE: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

Dalton, Olmsted & Fuglevand, Inc.
Environmental Consultants

Arkema North Boundary

BORING - DESCRIPTION OF SAMPLES & DATA

NB42

Field Rep: DG Cooper	Location: N711309 E1173938 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 17.5 (MLLW)	Ground Surface: Grass
Driller: Keith	Date Completed: 07/16/12	
Drill Type: Geoprobe 7720DT	Weather: Clear 70F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 2" Macro w/ acrylic liner

Sample No.	Sample Depth (Ft.)	XRF* Depth (Ft.)	XRF* (ppm) As	XRF* (ppm) Pb	Spl Depth (Ft.) From - To	Sample Recovery (inches)	Time	Sample Description
		0	37	43	0-5	36		0-2' Damp, bwn, gravelly, silty, SAND
A	0.5-1.5	1.5	57	<12			1045	2-2.2' red-blk, F SAND, oxidized, w/thin fibers
AA	2	2	873	571			1045	2.2-3' Wet, mot gry-bwn, SILT. w/some F Sand
B	2.5-3	3	<8	<13			1045	
C	5-7	7	<7	<11	5-10	48	1045	5-8' Wet, gry, SILT
D	7-9	9	<9	30			1045	8-9' Wet, gry-blk, SILT, w/organics
E	10-12	10	<9	<14	10-12	24	1045	10-12' Wet, gry, organic, SILT, fibrous organics throughout
		12	<7	17				

LABORATORY SAMPLES:

Soil:
AKM-S-NB42-A-071612
AKM-S-NB42-AA-071612
AKM-S-NB42-B-071612
AKM-S-NB42-C-071612
AKM-S-NB42-D-071612
AKM-S-NB42-E-071612

Notes: * XRF values were obtained in the field using an INNOV-X Model 4000.
Direct readings of the soil core were made by a representative of CDM Smith.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

0 **SUMMARY LOG**

Damp, brown, gravelly, silty, SAND

2 -Red-brown layer of Fine SAND, oxidized, thin fibers

Wet, gry-bwn, SILT

10 Wet, gray, organic, SILT
fibrous organics throughout

12

(Bottom of Boring)
NOTE: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

BORING - DESCRIPTION OF SAMPLES & DATA

NB43

Field Rep: DG Cooper	Location: N711367 E1173916 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 17.5 (MLLW)	Ground Surface: Grass
Driller: Keith	Date Completed: 07/16/12	
Drill Type: Geoprobe 7720DT	Weather: Clear 70F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 2" Macro w/ acrylic liner

Sample		XRF*			Spl Depth (Ft.)	Sample	Time	Sample Description
No.	Depth (Ft.)	Depth (Ft.)	(ppm) As	(ppm) Pb	From - To	Recovery (inches)		
		0	11	18	0-5	36		0-1.5' Damp, mot bwn, silty, SAND, w/some gravel
A	0.5-1.5	1	<9	15			1145	1.5-2.5' Moist, mot bwn-blk, silty, SAND, w/some gravel, wood
B	2-3	1.5	55	25			1145	2.5-3' Wet, gry, gravelly, silty, SAND
		2	21	<14			1145	
		3	28	<12				
C	5-6	6	24	<12	5-10	24	1145	5-7' Sat, gry, F-M SAND, w/silt interbeds
D	10-12	9.5	<6	<9	10-12	24	1145	10-12' Wet, gry, SILT, very soft, with peat interbeds
		12	<8	15				

LABORATORY SAMPLES:

Soil:
AKM-S-NB43-A-071612
AKM-S-NB43-B-071612
AKM-S-NB43-C-071612
AKM-S-NB43-D-071612

Notes: * XRF values were obtained in the field using an INNOV-X Model 4000.
Direct readings of the soil core were made by a representative of CDM Smith.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

SUMMARY LOG

Depth (ft.)	
0	Damp, mottled brown, silty, SAND with some gravel
3	Saturated, gray, Fine to Medium SAND with silt interbeds
10	Wet, gray, SILT, very soft with peat interbeds
12	(Bottom of Boring)

NOTE: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

BORING - DESCRIPTION OF SAMPLES & DATA

NB44

Field Rep: DG Cooper	Location: N711363 E1173874 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 17.9 (MLLW)	Ground Surface: Grass
Driller: Keith	Date Completed: 07/16/12	
Drill Type: Geoprobe 7720DT	Weather: Clear 70F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 2" Macro and Dual-Tube w/ acrylic liner

Sample		XRF*			Spl Depth (Ft.)	Sample	Time	Sample Description
No.	Depth (Ft.)	Depth (Ft.)	(ppm) As	Pb	From - To	Recovery (inches)		
A	0-1	0	29	<14	0-5	24	1300	0-1' Damp, mot bwn, silty, SAND, w/some gravel, wood chip
B	1-2	1	28	45			1300	1-2' Moist, gry, gravelly, silty, SAND
					5-10	0		No Recovery - two attempts using both Macro and Dual-Tube samplers
						no recovery		Also tried insertion of drive tips and catchers.
								Poor recovery likely due to denser fill atop soft underlying soils
					10-15	0		
						no recovery		

LABORATORY SAMPLES:

Soil:
AKM-S-NB44-A-071612
AKM-S-NB44-B-071612

Notes: * XRF values were obtained in the field using an INNOV-X Model 4000.
Direct readings of the soil core were made by a representative of CDM Smith.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

0 **SUMMARY LOG**

Damp, mottled brown, silty, SAND
with some gravel. Wood chips

2 Moist, gray, gravelly, silty, SAND

No recovery

15

(Bottom of Boring)
NOTE: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

NB45

BORING - DESCRIPTION OF SAMPLES & DATA

Field Rep: DG Cooper	Location: N711390 E1173805 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 17.3 (MLLW)	Ground Surface: Asphalt Pavement
Driller: Keith	Date Completed: 07/20/12	
Drill Type: Geoprobe 7720DT	Weather: Rain 65F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 2" Macro w/ acrylic liner

Sample		XRF*			Spl Depth (Ft.)	Sample	Time	Sample Description
No.	Depth (Ft.)	Depth (Ft.)	(ppm) As	Pb	From - To	Recovery (inches)		
A	0.3-1	0	10	<13	0-5	30	1400	0-0.3' Asphalt concrete
B	1-2	1	13	16			1400	0.3-1' Moist, mot bwn, gravelly, SAND, w/trace red brick
BB	2-2.3	2	61	40			1400	1-2' Moist, bwn-blk, sandy, gravel, w/recycled asphalt
							1400	2.0-2.3' Moist, blk, silty, F SAND, w/fine organic fibers
								2.3-2.5' Wet, bwn, gravelly, silty, SAND
C	5-6	5	52	22	5-10	30	1400	5-6' Wet, gry, SILT, w/scattered organics, wood, yellow trace @ 5.5'
D	6-7	7	34	<13			1400	6-7.5' Sat, gry, F-M SAND
					10-12	0	1400	
						no recovery		

LABORATORY SAMPLES:

Soil:
AKM-S-NB45-A-072012
AKM-S-NB45-B-072012
AKM-S-NB45-BB-072012
AKM-S-NB45-C-072012
AKM-S-NB45-D-072012

Notes: * XRF values were obtained in the field using an INNOV-X Model 4000.
Direct readings of the soil core were made by a representative of CDM Smith.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

0 **SUMMARY LOG**

-Asphalt concrete
Moist, mottled brown gravelly SAND
with red brick

2 -Black silty Fine Sand layer with thin organic fibers
Wet, brown, gravelly, silty, SAND

Wet, gray, SILT
with scattered organics, yellow trace

6

Saturated, gray, Fine to Medium SAND

No Recovery

12

(Bottom of Boring)
NOTE: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

BORING - DESCRIPTION OF SAMPLES & DATA

NB46

Field Rep: DG Cooper	Location: N711311 E1173886 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 16.0 (MLLW)	Ground Surface: Railroad siding
Driller: Keith	Date Completed: 07/19/12	
Drill Type: Geoprobe 7720DT	Weather: Sunny, 75F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 2" Macro w/ acrylic liner

Sample		XRF*			Spl Depth (Ft.)	Sample	Time	Sample Description
No.	Depth (Ft.)	Depth (Ft.)	(ppm) As	(ppm) Pb	From - To	Recovery (inches)		
A	0-1	0	12	21	0-5	18	1630	0-1' Damp, bwn, silty, SAND,w/some gravel
		1	37	73				1-1.5' Wet, bwn, silty, SAND
B	5-7	5	100	68	5-10	30	1630	5-7.5' Wet, bwn, organic, SILT, fibrous organics throughout
		6	141	48				
		7	154	35				
C	10-11	10	569**	31	10-15	40	1630	10-11.5' Wet, gry, organic, SILT, decreasing organis with depth
D	11.5-12.5	10.5	33	<13			1630	11.5-13.5' Wet, gry, SILT, plastic
		11	50	33				
		12	<7	<12				

LABORATORY SAMPLES:

Soil:
AKM-S-NB46-A-071912
AKM-S-NB46-B-071912
AKM-S-NB46-C-071912
AKM-S-NB46-D-071912

Notes: * XRF values were obtained in the field using an INNOV-X Model 4000.
Direct readings of the soil core were made by a representative of CDM Smith.
** carry-down observed in sample
Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

SUMMARY LOG

Depth (ft.)	Description
0	
1.5	Damp to wet, brown, silty, SAND with some gravel
5	Wet, brown, organic, SILT with fibrous organics throughout
10	Wet, gry, organic, SILT
	Wet, gray, SILT, plastic
15	

(Bottom of Boring)
NOTE: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

BORING - DESCRIPTION OF SAMPLES & DATA

NB47

Field Rep: DG Cooper	Location: N711361 E1173835 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 16.1 (MLLW)	Ground Surface: Railroad siding
Driller: Keith	Date Completed: 07/19/12	
Drill Type: Geoprobe 7720DT	Weather: Sunny 75F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 2" Macro w/ acrylic liner

Sample		XRF*			Spl Depth (Ft.)	Sample	Time	Sample Description
No.	Depth (Ft.)	Depth (Ft.)	(ppm) As	Pb	From - To	Recovery (inches)		
A	0-1	0	37	76	0-5	18	1530	0-1' Damp, bwn, silty, SAND,w/some gravel, scattered wood
		1.8	16	42				1-1.5' Wet, bwn, F sandy, SILT
B	4-5	4	123	24	4-10	30	1530	4-5' Wet, gry-blk, SILT
C	5-6.5	4.5	261	<11			1530	5-6.5' Sat, gry, SAND
		5	31	16				6.5-6.7' wet, gry, clayey, SILT
		6	28	<14				6.7-7' Wet, bwn, fibrous, PEAT
		8	<5	<8				7-7.5' Wet, bwn, organic, SILT
D	10-12	10	7	<10	10-15	30	1530	10-12' Wet, gry, organic, SILT, w/marsh grass
		12	<8	<13				12-12.5' Wet, gry-bwn, clayey, SILT, w/trace organics

LABORATORY SAMPLES:

Soil:
AKM-S-NB47-A-071912
AKM-S-NB47-B-071912
AKM-S-NB47-C-071912
AKM-S-NB47-D-071912

Notes: * XRF values were obtained in the field using an INNOV-X Model 4000.
Direct readings of the soil core were made by a representative of CDM Smith.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

0 **SUMMARY LOG**

Damp, brown, silty, SAND
1 with some gravel, scattered wood

Wet, brown, Fine sandy, SILT

5

Saturated, gray, SAND

-Clayey, SILT
7 -Fibrous PEAT

Wet, brown, organic, SILT

10 -Marsh grass

15
(Bottom of Boring)

NOTE: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

BORING - DESCRIPTION OF SAMPLES & DATA

NB48

Field Rep: DG Cooper	Location: N711413 E1174127 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 17.0 (MLLW)	Ground Surface: grassy depression
Driller: Keith	Date Completed: 07/19/12	
Drill Type: Geoprobe 7720DT	Weather: Sunny 75F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 2" Macro w/ acrylic liner

Sample		XRF*			Spl Depth (Ft.)	Sample	Time	Sample Description
No.	Depth (Ft.)	Depth (Ft.)	(ppm) As	(ppm) Pb	From - To	Recovery (inches)		
A	0.5-1.5	0	64	96	0-5	30	1215	0-0.5' Damp, bwn, silty, SAND, w/trace gravel
B	1.5-2.5	1.5	40	18			1215	0.5'-1.5' Moist, mot blk, bwn, gravelly, SAND, w/bark, asphalt, concrete
		2	83	45				1.5-2.5' Wet, gry-blk, F sandy, SILT
C	5-6	5	53	66	4-10	30	1215	5-6' Wet, gry, SILT, w/some organics, soft
D	6-7.5	6	37	<11			1215	6-7.5' Sat, gry, F-M SAND
		7	<8	<13				
E	10-11	10	<7	<13	10-12	12	1215	10-11' Sat, gry, F-M SAND

LABORATORY SAMPLES:

Soil:
AKM-S-NB48-A-071912
AKM-S-NB48-B-071912
AKM-S-NB48-C-071912
AKM-S-NB48-D-071912
AKM-S-NB48-E-071912

Notes: * XRF values were obtained in the field using an INNOV-X Model 4000.
Direct readings of the soil core were made by a representative of CDM Smith.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

0 **SUMMARY LOG**

-silty SAND
Moist, mottled brown-black, gravelly, SAND
with bark, concrete, asphalt debris

Wet, gray-black, Fine sandy, SILT

Wet, gray, SILT
with some organics

6

Saturated, gray, Fine to Medium SAND

12

(Bottom of Boring)
NOTE: The summary log is an
interpretation based on samples,
drill action, and interpolation.
Variations between what is shown
and actual conditions should
be anticipated.

BORING - DESCRIPTION OF SAMPLES & DATA

NB49

Field Rep: DG Cooper	Location: N711329 E1173972 (NAD83)	
Drilling Co.: Cascade	Elevation (Ft.): 17.0 (MLLW)	Ground Surface: grassy depression
Driller: Keith	Date Completed: 07/19/12	
Drill Type: Geoprobe 7720DT	Weather: Sunny 75F	
Size/Type Casing: 2" Rod	Hammer Type: Direct push	Sampler Type: 2" Macro w/ acrylic liner

Sample		XRF*			Spl Depth (Ft.)	Sample	Time	Sample Description
No.	Depth (Ft.)	Depth (Ft.)	(ppm) As	Pb	From - To	Recovery (inches)		
A	0.5-1.5	0	23	22	0-5	24	1300	0-0.5' Damp, bwn, silty, SAND, mixed with wood chip
AA	1	0.8	12	<12			1300	0.5'-1' Moist, gry, gravelly, silty, SAND
B	1-2	1	686	1592			1300	1' - 1" thick layer of black F SAND, w/fine fibers
		1.5	<8	<13				1-2' Wet, gry, F-M SAND
C	5-6	5	<10	<6	4-10	48	1300	5-6' As above, sat
D	6-7	7	<7	<12			1300	6-7' Sat, gry, F SAND, w/some silt
E	7-9	8	13	21				7-9' Wet, gry, SILT, soft, black organics 8-9'
								fibrous PEAT in sampler shoe
					10-12	0		
						no recovery		
						two tries		

LABORATORY SAMPLES:

Soil:
AKM-S-NB48-A-071912
AKM-S-NB48-B-071912
AKM-S-NB48-C-071912
AKM-S-NB48-D-071912
AKM-S-NB48-E-071912

Notes: * XRF values were obtained in the field using an INNOV-X Model 4000.
Direct readings of the soil core were made by a representative of CDM Smith.

Completed boring backfilled with granular bentonite

F - fine
M - medium
Sat. - saturated

Depth(ft.)

SUMMARY LOG

Depth (ft.)	
0	-silty SAND with wood chip
	Moist, gray, gravelly, silty, SAND
1	-1' thick layer of black Fine SAND with fine fibers
	Wet to saturated, gray, Fine to Medium SAND
	-Fine SAND with some silt
7	
	Wet, gray, SILT
9	-Fibrous PEAT
	No recovery
12	

(Bottom of Boring)
NOTE: The summary log is an interpretation based on samples, drill action, and interpolation. Variations between what is shown and actual conditions should be anticipated.

TABLE 9 - North Boundary Soil Boring Analytical Data - 2012

Boring No.	Sample Interval (feet)	Date	Lab I.D.	Field XRF (mg/kg)			Solids (%)	TOC (%)	Sb (mg/kg)	As (mg/kg)	Cu (mg/kg)	Fe (mg/kg)	Pb (mg/kg)	Ni (mg/kg)	Ag (mg/kg)	Zn (mg/kg)
				Depth (ft)	As	Pb										
NB-2	-----	7/19/2012	-----	0	12	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	1-2'	7/19/2012	1214274-VD81AP	1.5	< 7	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/19/2012	-----	2	< 9	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-6'	7/19/2012	1214275-VD81AQ	5	34	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	6-7'	7/19/2012	1214276-VD81AR	6.5	13	< 11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	7.5-8.5'	7/19/2012	1214277-VD81AS	8	< 8	22	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/19/2012	-----	9	< 7	< 11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-3	0-1'	7/17/2012	1214196-VD80X	0	14	25	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	1-3'	7/17/2012	1214197-VD80Y	1.5	< 8	< 14	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/17/2012	-----	2	< 8	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-6'	7/17/2012	1214198-VD80Z	5	< 8	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/17/2012	-----	6	21	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	6-8'	7/17/2012	1214177-VD80E	7	9	< 9	74.5	**1.48**	6 U	**13**	**21.0**	**12,900**	**4**	**10**	0.4 U	**27**
	10-12'	7/17/2012	1214199-VD80AA	11	< 8	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-4	0-1'	7/17/2012	1214175-VD80C	0	49	40	93.5	**3.14**	5 U	**36**	**67.3**	**14,400**	**31**	**62**	0.3 U	**91**
	1-3'	7/17/2012	1214176-VD80D	2	< 9	< 14	91.2	**0.412**	5 U	5 U	**13.9**	**11,800**	**4**	**11**	0.3 U	**24**
	5-6'	7/17/2012	1214193-VD80U	5	< 8	< 14	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	6-8'	7/17/2012	1214194-VD80V	6.5	< 9	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/17/2012	-----	7	8	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-12'	7/17/2012	1214195-VD80W	11	44	< 20	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-5	0-0.8'	7/17/2012	1214185-VD80M	0	59	20	92.9	**4.59**	5 U	**44**	**38.5**	**16,800**	**24**	**75**	0.3 U	**85**
	1.5-2.5'	7/17/2012	1214216-VD80AR	2.5	< 9	< 15	94.3	**0.220**	5 U	5 U	**15.1**	**14,500**	**3**	**14**	0.3 U	**28**
	dup NB05-B	7/17/2012	1214186-VD80N	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-5.6'	7/17/2012	1214217-VD80AS	5	17	< 10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/17/2012	-----	5.5	17	22	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	6-8'	7/17/2012	1214218-VD80AT	8	17	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-11'	7/17/2012	1214219-VD80AU	10	14	< 14	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-6	0-1'	7/18/2012	1214224-VD80AZ	0	19	46	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	1-3'	7/18/2012	1214225-VD80BA	2.5	< 8	< 12	84.8	**0.867**	5 U	**6**	**19.9**	**14,000**	**6**	**12**	0.3 U	**26**
	dup NB06-B	7/18/2012	1214188-VD80P	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5'	7/18/2012	1214226-VD80BB	5	31	18	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5.5-6.5'	7/18/2012	1214227-VD80BC	6	34	< 8	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/18/2012	-----	6.5	8	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-11'	7/18/2012	1214228-VD80BD	10	16	42	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/18/2012	-----	11	< 9	14	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-7	0-1'	7/17/2012	1214220-VD80AV	0	16	50	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	1-2'	7/17/2012	1214221-VD80AW	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2-3.5'	7/17/2012	1214187-VD80O	2.5	49	110	87.6	**1.34**	5 U	**26**	**65.3**	**15,600**	**80**	**24**	0.3 U	**71**
	5-7'	7/17/2012	1214222-VD80AX	5	34	< 15	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/17/2012	-----	6.5	< 8	14	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-11'	7/17/2012	1214223-VD80AY	10	20	< 14	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-8	0-1'	7/18/2012	1214229-VD80BE	0	22	27	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	1-2'	7/18/2012	1214189-VD80Q	1.8	88	96	90.7	**0.867**	**15** J_R	**67**	**51.9**	**20,900**	**49**	**27**	0.3 U	**196**
	2-3.5'	7/18/2012	1214230-VD80BF	2	101	109	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-5.5'	7/18/2012	1214190-VD80R	5	11	< 12	71.6	**0.931**	7 U	**12**	**40.0**	**14,500**	**12**	**16**	0.4 U	**59**
	5.5-7.5'	7/18/2012	1214231-VD80BG	7	11	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-11'	7/18/2012	1214191-VD80S	10	< 9	< 18	83.7	**0.323**	6 U	6 U	**8.0**	**9070**	2 U	**6**	0.3 U	**21**
NB-9	0-1'	7/17/2012	1214200-VD80AB	0	27	73	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	1-2'	7/17/2012	1214201-VD80AC	1.5	30	< 10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2-3'	7/17/2012	1214202-VD80AD	2	13	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/17/2012	-----	5	< 8	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	6-7'	7/17/2012	1214203-VD80AE	6.5	14	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-12'	7/17/2012	1214204-VD80AF	10.5	19	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

TABLE 9 - North Boundary Soil Boring Analytical Data - 2012

Boring No.	Sample Interval (feet)	Date	Lab I.D.	Field XRF (mg/kg)			Solids (%)	TOC (%)	Sb (mg/kg)	As (mg/kg)	Cu (mg/kg)	Fe (mg/kg)	Pb (mg/kg)	Ni (mg/kg)	Ag (mg/kg)	Zn (mg/kg)
				Depth (ft)	As	Pb										
NB-10	0-1'	7/17/2012	1214168-VD79AT	0	31	24	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2-4'	7/17/2012	1214169-VD79AU	3	9	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-5.5'	7/17/2012	1214170-VD79AV	5.2	< 9	16	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5.5-5.6'	7/17/2012	1214174-VD80B	5.5	2682	9184	68.7	**4.60**	**136 J_R**	**754**	**566**	**22,600**	**2270**	**37**	**3.9**	**1770**
	5.6-6'	7/17/2012	1214141-VD79S	5.7	52	< 12	76.1	**0.381**	**41 J_R**	**66**	**14.7**	**8050**	**3**	**7**	0.4 U	**66**
	6-8'	7/17/2012	1214171-VD79AW	6	19	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/17/2012	-----	7	< 7	< 5	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/17/2012	-----	8.5	< 7	< 11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	9-10'	7/17/2012	1214172-VD79AX	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-12'	7/17/2012	1214173-VD80A	11	17	< 11	82.4	**0.255**	6 U	**10**	**8.9**	**8690**	2 U	**6**	0.3 U	**25**
NB-11	0-1'	7/16/2012	1214130-VD79H	0	57	59	92.8	**1.68**	5 U	**22**	**36.1**	**16,700**	**23**	**38**	0.3 U	**83**
	1-2'	7/16/2012	1214155-VD79AG				-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-6.5'	7/16/2012	1214156-VD79AH	5	16	36	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	6.5-7'	7/16/2012	1214132-VD79J	6.5	3009	10,474	57.1	**11.2**	**224 J_R**	**1660**	**683**	**29,100**	**2620**	**89**	**5.8**	**2950**
	7-8'	7/16/2012	1214131-VD79I	7	33	< 12	76.2	**0.238**	6 U	**52**	**13.1**	**9570**	**3**	**6**	0.4 U	**27**
	10-11'	7/16/2012	1214157-VD79AI	10	9	< 11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	11-13'	7/16/2012	1214158-VD79AJ	13	82	< 10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-12	-----	7/19/2012	-----	0	< 10	16	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	0.3-1.3'	7/19/2012	1214278-VD81AT	1	18	17	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	1.3-2.5'	7/19/2012	1214279-VD81AU	2	10	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-6'	7/19/2012	1214280-VD81AV	5.5	< 7	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/19/2012	-----	6.5	13	27	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	7-8.5'	7/19/2012	1214281-VD81AW	7.5	8	< 10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-13	0-1'	7/16/2012	1214150-VD79AB	0	68	67	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	1-2'	7/16/2012	1214151-VD79AC	1.5	< 8	14	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-6.2'	7/16/2012	1214152-VD79AD	5	9	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/16/2012	-----	6	628	731	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	6.5'	7/16/2012	1214129-VD79G	6.5	705	218	73.3	**3.74**	**121 J_R**	**805**	**278**	**16,100**	**901**	**16**	**1.5**	**767**
	7-8'	7/16/2012	1214128-VD79F	8	62	< 11	70.1	**0.579**	7 U	**198**	**37.4**	**16,500**	**6**	**12**	0.4 U	**45**
	10-12'	7/16/2012	1214153-VD79AE	11	57	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	12-14'	7/16/2012	1214154-VD79AF	12	86	12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/16/2012	-----	14	15	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-14	0-1'	7/17/2012	1214166-VD79AR	0	58	65	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2-4'	7/17/2012	1214138-VD79P	2	14	< 14	88.7	**0.324**	5 U	5 U	**16.0**	**12,800**	**6**	**14**	0.3 U	**30**
	5-6'	7/17/2012	1214139-VD79Q	5	314	82	72.3	**1.01**	**31 J_R**	**167**	**45.5**	**10,600**	**165**	**10**	**0.8**	**164**
	-----	7/17/2012	-----	6	< 9	18	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/17/2012	-----	6.5	151	14	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	7-8'	7/17/2012	1214140-VD79R	-----	-----	-----	67.8	**1.34**	7 U	**35**	**38.3**	**17,300**	**13**	**13**	0.4 U	**42**
	10-11'	7/17/2012	1214167-VD79AS	10	14	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-15	0-1'	7/16/2012	1214159-VD79AK	0	17	37	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2-4'	7/16/2012	1214160-VD79AL	2.5	12	11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-6'	7/16/2012	1214161-VD79AM	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	6-6.5'	7/16/2012	1214135-VD79M	6.5	4653	2077	71.3	**11.6**	**325 J_R**	**2890**	**617**	**24,100**	**2740**	**58**	**5.8**	**3490**
	7-9'	7/16/2012	1214133-VD79K	8	3148	29	72.7	**0.801**	**21 J_R**	**811**	**27.2**	**13,500**	**10**	**10**	0.4 U	**72**
	-----	7/16/2012	-----	10	117	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	11-12'	7/16/2012	1214134-VD79L	12	81	< 12	77.7	**0.654**	6 U	**117**	**11.7**	**8690**	**5**	**7**	0.4 U	**30**

TABLE 9 - North Boundary Soil Boring Analytical Data - 2012

Boring No.	Sample Interval (feet)	Date	Lab I.D.	Field XRF (mg/kg)			Solids (%)	TOC (%)	Sb (mg/kg)	As (mg/kg)	Cu (mg/kg)	Fe (mg/kg)	Pb (mg/kg)	Ni (mg/kg)	Ag (mg/kg)	Zn (mg/kg)
				Depth (ft)	As	Pb										
NB-16	0-1'	7/17/2012	1214205-VD80AG	0	13	24	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2-3'	7/17/2012	1214206-VD80AH	2	68	25	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-5.3'	7/17/2012	1214207-VD80AI	5	30	79	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5.3-5.5'	7/17/2012	1214179-VD80G	5.4	1800	2588	69.1	**2.69**	**88 J_R**	**1800**	**332**	**29,300**	**1440**	**58**	**0.4**	**1230**
	5.5-6.5'	7/17/2012	1214208-VD80AJ	6	433	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	7-8.5'	7/17/2012	1214178-VD80F	7	97	16	64.0	**1.41**	8 U	**82**	**44.2**	**21,900**	**13**	**15**	0.5 U	**40**
	-----	7/17/2012	-----	8	1211	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/17/2012	-----	8.2	31	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-12'	7/17/2012	1214209-VD80AK	10	40	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/17/2012	-----	11	23	< 11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-17	0-1'	7/17/2012	1214162-VD79AN	0	17	29	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2-4'	7/17/2012	1214163-VD79AO	2	24	27	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-6'	7/17/2012	1214164-VD79AP	5	22	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	6'	7/17/2012	1214137-VD79O	6	1348	790	70.9	**3.41**	**180 J_R**	**3770**	**590**	**33,900**	**4070**	**41**	**1**	**2650**
	6-8'	7/17/2012	1214165-VD79AQ	7	706	37	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/17/2012	-----	9	264	< 14	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-12'	7/17/2012	1214136-VD79N	12	316	< 12	75.7	**0.530**	6 U	**192**	**9.1**	**7270**	**3**	**8**	0.4 U	**43**
NB-18	0-0.5'	7/17/2012	1214210-VD80AL	0	129	20	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	0.5-1.5'	7/17/2012	1214211-VD80AM	1.5	57	46	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	1.5-3'	7/17/2012	1214212-VD80AN	2	28	25	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-5.5'	7/17/2012	1214180-VD80H	5	135	20	67.9	**3.11**	7 U	**170**	**47.7**	**16,500**	**42**	**14**	0.4 U	**75**
	5.5-7'	7/17/2012	1214181-VD80I	6.5	13	< 11	80.2	**0.242**	6 U	**11**	**7.6**	**8060**	2 U	**6**	0.4 U	**35**
	10-12'	7/17/2012	1214182-VD80J	10	< 8	< 13	77.6	**0.437**	6 U	**11**	**10.3**	**8180**	2 U	**7**	0.4 U	**36**
	-----	7/17/2012	-----	11	17	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-19	0-1'	7/18/2012	1214259-VD81AA	0	26	41	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	1-2'	7/18/2012	1214260-VD81AB	1	27	14	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/18/2012	-----	2	< 9	14	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-5.5'	7/18/2012	1214261-VD81AC	5	20	< 11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5.5-6'	7/18/2012	1214262-VD81AD	6	12	< 11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-11'	7/18/2012	1214263-VD81AE	10	64	51	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-20	0-1'	7/17/2012	1214183-VD80K	0	43	16	70.3	**4.86**	20 U	**90**	**86.8**	**15,900**	**57**	**195**	1 U	**172**
	-----	7/17/2012	-----	0.5	34	45	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/17/2012	-----	1.5	< 8	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2-3.5'	7/17/2012	1214213-VD80AO	3	20	18	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-6'	7/17/2012	1214184-VD80L	5	39	13	61.3	**2.03**	8 U	**69**	**63.1**	**26,100**	**13**	**25**	0.5 U	**89**
	6-7.5'	7/17/2012	1214214-VD80AP	7	< 8	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-12'	7/17/2012	1214215-VD80AQ	10.5	11	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-21	0-1'	7/18/2012	1214255-VD81W	0	46	56	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	1-2.5'	7/18/2012	1214256-VD81X	2	< 8	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/18/2012	-----	3	23	13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-6'	7/18/2012	1214233-VD81A	5	30	27	58.7	**2.03**	8 U	**16**	**55.7**	**30,300**	**15**	**26**	0.5 U	**78**
	6-7.5'	7/18/2012	1214257-VD81Y	7	8	< 10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-12'	7/18/2012	1214258-VD81Z	10	< 7	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-22	0-1'	7/18/2012	1214232-VD80BH	0	< 12	32	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2-3'	7/18/2012	1214192-VD80T	2	76	48	74.0	**1.39**	6 U	**34**	**42.3**	**21,200**	**39**	**24**	0.4 U	**110**
	5-6'	7/18/2012	1214252-VD81T	5	62	19	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	6-8'	7/18/2012	1214253-VD81U	6.5	< 8	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/18/2012	-----	10	< 7	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	11-12'	7/18/2012	1214254-VD81V	11.5	< 7	< 11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

TABLE 9 - North Boundary Soil Boring Analytical Data - 2012

Boring No.	Sample Interval (feet)	Date	Lab I.D.	Field XRF (mg/kg)			Solids (%)	TOC (%)	Sb (mg/kg)	As (mg/kg)	Cu (mg/kg)	Fe (mg/kg)	Pb (mg/kg)	Ni (mg/kg)	Ag (mg/kg)	Zn (mg/kg)
				Depth (ft)	As	Pb										
NB-23	0-1'	7/16/2012	1214123-VD79A	0	17	32	97.6	**0.667**	5 U	**17**	**23.4**	**14,200**	**18**	**19**	0.3 U	**53**
	2-3.5'	7/16/2012	1214144-VD79V	2.5	11	< 13										
	5-6'	7/16/2012	1214124-VD79B	5	< 8	17	74.2	**0.501**	7 U	7 U	**21.4**	**14,000**	**7**	**12**	0.4 U	**33**
	6-7'	7/16/2012	1214145-VD79W	6.5	< 6	< 10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-11.5'	7/16/2012	1214146-VD79X	10.5	< 6	< 10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-24	0-0.5'	7/16/2012	1214121-VD78BP	0	20	22	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2-3.5'	7/16/2012	1214072-VD78S	2	57	22	85.1	**0.418**	6 U	**19**	**29.0**	**16,500**	**32**	**23**	0.3 U	**82**
	5-7'	7/16/2012	1214122-VD78BQ	5	< 7	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	7-8.5'	7/16/2012	1214142-VD79T	7	< 8	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-12'	7/16/2012	1214143-VD79U	12	< 6	< 10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-25	0-1'	7/16/2012	1214117-VD78BL	0	18	20	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2-3.5'	7/16/2012	1214118-VD78BM	3	< 8	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-6'	7/16/2012	1214071-VD78R	5	1281	< 13	67.5	**0.959**	**9 J_R**	**1200**	**35.8**	**16,600**	**12**	**13**	0.4 U	**63**
	6-7.5'	7/16/2012	1214119-VD78BN	7.5	125	< 11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-12'	7/16/2012	1214120-VD78BO	10	57	58	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/16/2012	-----	12	116	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-26	0-1'	7/16/2012	1214125-VD79C	0	13	31	96.9	**1.33**	5 U	**12**	**19.0**	**12,800**	**17**	**18**	0.3 U	**67**
	2-3.5'	7/16/2012	1214147-VD79Y	3	< 7	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-6'	7/16/2012	1214148-VD79Z	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	6.5'	7/16/2012	1214127-VD79E	6.5	2717	13	73.9	**2.24**	**66 J_R**	**1700**	**269**	**23,400**	**1260**	**40**	0.4 U	**1350**
	8-9'	7/16/2012	1214149-VD79AA	8	797	23	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-11'	7/16/2012	1214126-VD79D	10	1234	19	71.1	**1.17**	**7 J_R**	**1150**	**42.7**	**12,900**	**16**	**18**	0.4 U	**85**
	-----	7/16/2012	-----	10	2603	16	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-27	0.5-1.5'	7/19/2012	1214243-VD81K	1	67	100	91.5	**3.42**	**6 J_R**	**43**	**40.4**	**19,200**	**39**	**30**	0.3 U	**112**
	1.5-2.5'	7/19/2012	1214282-VD81AX	2	27	16	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-6'	7/19/2012	1214244-VD81L	5	197	< 12	66.0	**1.63**	7 U	**276**	**42.5**	**21,900**	**11**	**27**	0.4 U	**54**
	-----	7/19/2012		6.5	17	< 11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	7-8'	7/19/2012	1214283-VD81AY	8	< 7	12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/19/2012	-----	9	< 6	< 10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-29	0.5-1.5'	7/19/2012	1214284-VD81AZ	1	10	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2-2.5'	7/19/2012	1214285-VD81BA	2	17	22	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2.5-3.5'	7/19/2012	1214245-VD81M	2.5	49	< 13	66.9	**1.60**	7 U	**239**	**33.6**	**17,800**	**7**	**14**	0.4 U	**37**
	-----	7/19/2012	-----	3	88	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-6.5'	7/19/2012	1214286-VD81BB	5	30	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	6.5-8'	7/19/2012	1214287-VD81BC	6.5	< 7	12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/19/2012	-----	8.5	7	< 11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-12'	7/19/2012	1214288-VD81BD	11	< 7	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-30	0-1'	7/15/2012	1214088-VD78AI	0	14	30	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/15/2012	-----	1.5	42	25	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2-3'	7/15/2012	1214089-VD78AJ	2.5	< 8	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	6-8'	7/15/2012	1214062-VD78I	6.5	302	< 13	81.1	**0.283**	**12 J_R**	**116**	**10.3**	**8470**	2 U	**6**	0.4 U	**27**
	8-10'	7/15/2012	1214090-VD78AK	9	29	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-12'	7/15/2012	1214091-VD78AL	12	< 7	< 11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-31	0-1'	7/16/2012	1214112-VD78BG	0	16	32	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	1.5-2.5'	7/16/2012	1214113-VD78BH	1.5	11	< 11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/16/2012	-----	4.9	452	105	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/16/2012	-----	5	1647	2973	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5.3'	7/16/2012	1214070-VD78Q	-----	-----	-----	62.7	**3.63**	**225 J_R**	**2210**	**614**	**29,400**	**3120**	**53**	**1.6**	**2230**
	5.5-6'	7/16/2012	1214114-VD78BI	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	6-8'	7/16/2012	1214115-VD78BJ	6	203	< 11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/16/2012	-----	7	17	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-11.5'	7/16/2012	1214116-VD78BK	11.5	< 7	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

TABLE 9 - North Boundary Soil Boring Analytical Data - 2012

Boring No.	Sample Interval (feet)	Date	Lab I.D.	Field XRF (mg/kg)			Solids (%)	TOC (%)	Sb (mg/kg)	As (mg/kg)	Cu (mg/kg)	Fe (mg/kg)	Pb (mg/kg)	Ni (mg/kg)	Ag (mg/kg)	Zn (mg/kg)
				Depth (ft)	As	Pb										
NB-32	0-1'	7/16/2012	1214110-VD78BE	0	26	16	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	1.5-2.5'	7/16/2012	1214068-VD78O	1.5	< 8	< 12	84.1	**0.944**	6 U	6 U	**23.6**	**18,300**	**4**	**23**	0.3 U	**36**
	5-6'	7/16/2012	1214069-VD78P	5	15	< 13	80.1	**1.25**	**11 J_R**	**58**	**24.8**	**10,100**	**85**	**9**	0.3 U	**94**
	6-7'	7/16/2012	1214111-VD78BF	7	< 7	14	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-33	0-1'	7/16/2012	1214104-VD78AY	0	19	20	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2-4'	7/16/2012	1214105-VD78AZ	2	12	< 14	82.9	**1.78**	6 U	**33**	**106**	**20,500**	**26**	**82**	0.3 U	**202**
	dup NB33-B	7/16/2012	1214067-VD78N	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/16/2012	-----	3.5	12	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-6'	7/16/2012	1214106-VD78BA	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	6-8.5'	7/16/2012	1214107-VD78BB	6	27	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	8.5-10'	7/16/2012	1214108-VD78BC	9	< 7	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-12'	7/16/2012	1214109-VD78BD	12	< 7	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-34	0-1'	7/15/2012	1214100-VD78AU	0	13	35	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2-2.5'	7/15/2012	1214066-VD78M	2	25	53	75.2	**1.49**	**37 J_R**	**456**	**87.6**	**18,000**	**610**	**16**	**0.5**	**248**
	-----	7/15/2012	-----	2.5	73	105	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	6-7'	7/15/2012	1214101-VD78AV	7	< 8	<12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	7-9'	7/15/2012	1214102-VD78AW	9	< 8	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-12'	7/15/2012	1214103-VD78AX	12	< 7	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-35	0-1'	7/15/2012	1214073-VD78T	0	< 7	< 11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/15/2012	-----	1	< 20	240	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	1.5'	7/15/2012	1214054-VD78A	1.5	911	3724	87.9	**3.11**	**33 J_R**	**261**	**170**	**16,400**	**884**	**32**	**1.1**	**797**
	2-4'	7/15/2012	1214055-VD78B	2.5	56	20	84.6	**0.376**	6 U	**13**	**10.4**	**10,100**	2 U	**6**	0.4 U	**23**
	4-6'	7/15/2012	1214074-VD78U	4	10	< 14	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	6-8'	7/15/2012	1214075-VD78V	6	< 8	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/15/2012	-----	7.5	12	15	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	8-10'	7/15/2012	1214076-VD78W	8	< 7	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-12'	7/15/2012	1214077-VD78X	10	< 7	< 11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-36	0-1'	7/15/2012	1214096-VD78AQ	0	18	34	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2'	7/15/2012	1214065-VD78L	2	124	307	83.3	**6.50**	**42 J_R**	**250**	**151**	**13,800**	**839**	**20**	**1.2**	**316**
	2-2.5'	7/15/2012	1214097-VD78AR	2.5	78	70	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/15/2012	-----	6	< 8	13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	9-10'	7/15/2012	1214098-VD78AS	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-12'	7/15/2012	1214099-VD78AT	11	8	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-37	0-1'	7/15/2012	1214063-VD78J	0	15	21	78.2	**3.07**	**7 J_R**	**59**	**63.9**	**17,800**	**53**	**133**	0.4 U	**134**
	2.5'	7/15/2012	1214064-VD78K	2.5	1288	5975	79.0	**10.5**	**73 J_R**	**281**	**204**	**14,100**	**1220**	**29**	**1.4**	**882**
	2.5-3'	7/15/2012	1214092-VD78AM	3	44	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	6-8'	7/15/2012	1214093-VD78AN	6-8	< 7	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	8-9.5'	7/15/2012	1214094-VD78AO	9	11	< 11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-12'	7/15/2012	1214095-VD78AP	10.5	< 8	17	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/15/2012	-----	12	< 7	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-38	0-1'	7/15/2012	1214060-VD78G	0	24	24	88.1	**2.92**	6 U	**40**	**53.6**	**17,400**	**37**	**105**	0.3 U	**115**
	-----	7/15/2012	-----	1	37	33	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/15/2012	-----	1.5	17	15	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2-3'	7/15/2012	1214086-VD78AG	3	40	< 11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-7'	7/15/2012	1214061-VD78H	6.5	10	17	75.6	**0.477**	6 U	**35**	**18.4**	**11,600**	3 U	**9**	0.4 U	**43**
	7-8'	7/15/2012	1214087-VD78AH	8	< 7	18	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

TABLE 9 - North Boundary Soil Boring Analytical Data - 2012

Boring No.	Sample Interval (feet)	Date	Lab I.D.	Field XRF (mg/kg)			Solids (%)	TOC (%)	Sb (mg/kg)	As (mg/kg)	Cu (mg/kg)	Fe (mg/kg)	Pb (mg/kg)	Ni (mg/kg)	Ag (mg/kg)	Zn (mg/kg)
				Depth (ft)	As	Pb										
NB-40	0.5-1.5'	7/19/2012	1214289-VD81BE	1	14	18	90.9	2.16	5 U	28	43.3	21,000	23	26	0.3 U	120
	dup NB40-A	7/19/2012	1214248-VD81P	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	1.8-2.1'	7/19/2012	1214247-VD81O	2	1286	1737	93.3	22.4	30 J_R	370	496	16,300	245	20	1.7	518
	2.1-3'	7/19/2012	1214246-VD81N	2.5	110	160	92.6	1.08	40 J_R	260	215	28,500	444	17	0.8 U	3250
	-----	7/19/2012	-----	3	< 8	< 14	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-7'	7/19/2012	1214290-VD81BF	5	14	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/19/2012	-----	6.5	< 7	13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	7-8'	7/19/2012	1214291-VD81BG	8.5	< 6	< 10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-11'	7/19/2012	1214292-VD81BH	10.5	< 7	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-41	0.3-1.3'	7/19/2012	1214293-VD81BI	1	< 9	15	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	1.3-2.3'	7/19/2012	1214294-VD81BJ	2	193	126	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2.3-2.5'	7/19/2012	1214249-VD81Q	2.5	152	48	88.5	1.94	200 J_R	600	821	59,700	605	48	2.2	2720
	2.5-3.5'	7/19/2012	1214295-VD81BK	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-7'	7/19/2012	1214296-VD81BL	5	< 6	< 10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/19/2012	-----	6.5	< 7	14	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	7.5-8'	7/19/2012	1214297-VD81BM	8	34	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-42	-----	7/15/2012	-----	0	37	43	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	0.5-1.5'	7/15/2012	1214078-VD78Y	1.5	57	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2'	7/15/2012	1214056-VD78C	2	873	571	69.2	7.02	174 J_R	1730	368	25,700	1840	35	1.5	900
	2.5-3'	7/15/2012	1214079-VD78Z	3	< 8	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-7'	7/15/2012	1214080-VD78AA	7	< 7	< 11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	7-9'	7/15/2012	1214081-VD78AB	9	< 9	30	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-12'	7/15/2012	1214082-VD78AC	10	< 9	< 14	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/15/2012	-----	12	< 7	17	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-43	-----	7/15/2012	-----	0	11	18	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	0.5-1.5'	7/15/2012	1214057-VD78D	1	< 9	15	89.9	0.272	5 U	9	22.1	20,100	6	31	0.3 U	48
	-----	7/15/2012	-----	1.5	55	25	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2-3'	7/15/2012	1214083-VD78AD	2	21	< 14	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/15/2012	-----	3	28	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-6'	7/15/2012	1214084-VD78AE	6	24	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-12'	7/15/2012	1214058-VD78E	9.5	< 6	< 9	64.7	2.11	8 U	11	39.6	21,900	11	18	0.5 U	53
	-----	7/15/2012	-----	12	< 8	15	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-44	0-1'	7/15/2012	1214085-VD78AF	0	29	< 14	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	1-2'	7/15/2012	1214059-VD78F	1	28	45	86.8	0.171	6 U	6	21.7	22,500	3	31	0.3 U	44
NB-45	0.3-1'	7/19/2012	1214298-VD81BN	0	10	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	1-2'	7/19/2012	1214299-VD81BO	1	13	16	87.0	2.87	5 U	9	23.6	21,500	10	25	0.3 U	51
	dup NB45-B	7/19/2012	1214251-VD81S	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	2-2.3'	7/19/2012	1214250-VD81R	2	61	40	58.6	10.3	25 J_R	160	138	25,900	91	26	0.5 U	257
	5-6'	7/19/2012	1214300-VD81BP	5	52	22	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	6-7'	7/19/2012	1214301-VD81BQ	7	34	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-46	0-1'	7/18/2012	1214273-VD81AO	0	12	21	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/18/2012	-----	1	37	73	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-7'	7/18/2012	1214240-VD81H	5	100	68	69.3	2.22	8 J_R	368	77.8	21,600	78	21	0.4 U	156
	-----	7/18/2012	-----	6	141	48	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/18/2012	-----	7	154	35	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-11'	7/18/2012	1214241-VD81I	10	569	31	69.6	1.97	7 U	19	30.9	17,500	3	13	0.4 U	34
	-----	7/18/2012	-----	10.5	33	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/18/2012	-----	11	50	33	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	11.5-12.5'	7/18/2012	1214242-VD81J	12	< 7	< 12	73.1	0.704	7 U	142	61.8	19,000	42	18	0.4 U	86

TABLE 9 - North Boundary Soil Boring Analytical Data - 2012

Boring No.	Sample Interval (feet)	Date	Lab I.D.	Field XRF (mg/kg)			Solids (%)	TOC (%)	Sb (mg/kg)	As (mg/kg)	Cu (mg/kg)	Fe (mg/kg)	Pb (mg/kg)	Ni (mg/kg)	Ag (mg/kg)	Zn (mg/kg)
				Depth (ft)	As	Pb										
NB-47	0-1'	7/18/2012	1214270-VD81AL	0	37	76	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/18/2012	-----	1.8	16	42	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	4-5'	7/18/2012	1214239-VD81G	4	123	24	62.2	**2.03**	**12 J_R**	**121**	**64.2**	**20,300**	**20**	**22**	0.4 U	**137**
	-----	7/18/2012	-----	4.5	261	< 11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-6.5'	7/18/2012	1214271-VD81AM	5	31	16	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/18/2012	-----	6	28	< 14	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/18/2012	-----	8	< 5	< 8	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-12'	7/18/2012	1214272-VD81AN	10	7	< 10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/18/2012	-----	12	< 8	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-48	0.5-1.5'	7/18/2012	1214264-VD81AF	0	64	96	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	1.5-2.5'	7/18/2012	1214234-VD81B	1.5	40	18	75.3	**1.37**	**24 J_R**	**199**	**83.6**	**20,700**	**305**	**50**	0.4 U	**378**
	-----	7/18/2012	-----	2	83	45	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	5-6'	7/18/2012	1214265-VD81AG	5	53	66	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	6-7.5'	7/18/2012	1214235-VD81C	6	37	< 11	79.7	**0.312**	6 U	6 U	**8.1**	**8610**	2 U	**5**	0.3 U	**16**
	-----	7/18/2012	-----	7	< 8	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	10-11'	7/18/2012	1214266-VD81AH	10	< 7	< 13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
NB-49	0.5-1.5'	7/18/2012	1214267-VD81AI	0	23	22	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	-----	7/18/2012	-----	0.8	12	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	1'	7/18/2012	1214238-VD81F	1	686	1592	70.8	**7.23**	**65 J_R**	**787**	**345**	**16,200**	**1850**	**40**	**1.3**	**896**
	1-2'	7/18/2012	1214236-VD81D	1.5	< 8	< 13	84.9	**0.093**	5 U	**15**	**10.5**	**9820**	**5**	**6**	0.3 U	**43**
	5-6'	7/18/2012	1214237-VD81E	5	< 10	< 6	78.4	**0.364**	6 U	**12**	**14.4**	**11,000**	2 U	**7**	0.4 U	**22**
	6-7'	7/18/2012	1214268-VD81AJ	7	< 7	< 12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
	7-9'	7/18/2012	1214269-VD81AK	8	13	21	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Notes: Blue highlighted values likely affected by observed carry-down into the sample during coring.
J_R = estimate; due to low matrix spike recovery. Value likely biased low.
U = nondetected at the associated lower reporting limit.

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Appendix E

Hydrologic Studies

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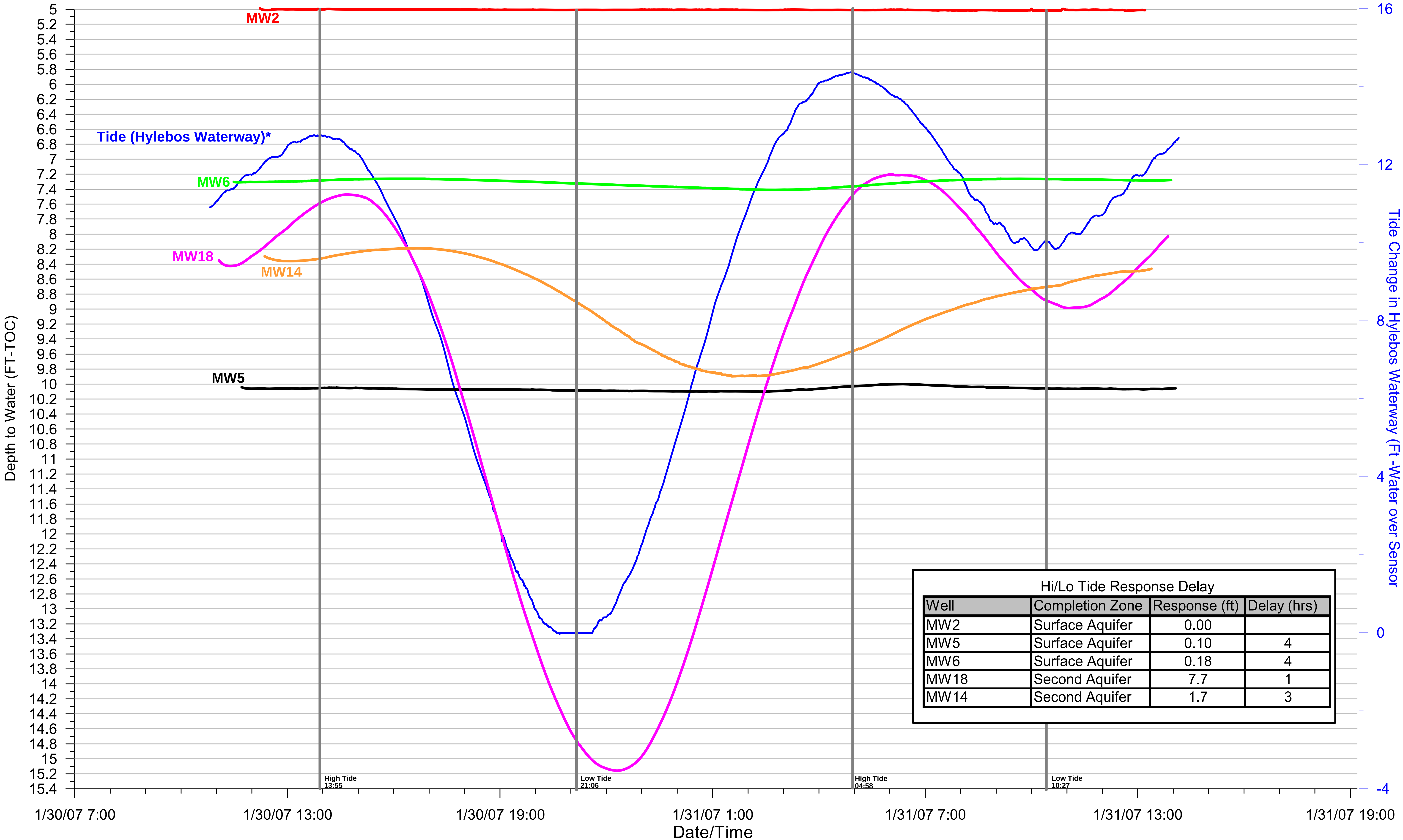

Hi/Lo Tide Response Delay

Well	Completion Zone	Response (ft)	Delay (hrs)
MW2	Surface Aquifer	0.00	
MW5	Surface Aquifer	0.10	4
MW6	Surface Aquifer	0.18	4
MW18	Second Aquifer	7.7	1
MW14	Second Aquifer	1.7	3

*Tide is water over sensor and not to a specific Datum

CDM Smith

Supplemental Remedial Investigation
2301 Taylor Way
Tacoma, Washington

Figure No. E-1
Continuous Water Level Measurements
January 30-31, 2007

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Table E-1
Hydraulic Conductivity Summary
USG Interiors/Supplemental Remedial Investigation
Tacoma, Washington

Well I.D.	Completion Zone	Soil Type [a]	Hydraulic Conductivity (k) ft/day			
			Graphical Solution	AQTESOLV Solution		
			Hvorslev Method (Manual)	Hvorslev Method (Automatic)	Bouwer-Rice Method (Automatic)	Mean
MW2	Surface Aquifer	Sand (SP-SM)	2.27	2.83	2.15	2.42
MW25	Surface Aquifer	Sand (SP)	1.39	1.98	1.36	1.58
MW29	Surface Aquifer	Silt (ML) and Sand (SP)	0.89	0.95	0.5	0.78
MW30	Surface Aquifer	Silt (ML), Clayey Silt (OL), and Sand (SP)	0.73	1.1	0.81	0.88

Note:
a) See geologic log for stratigraphy.

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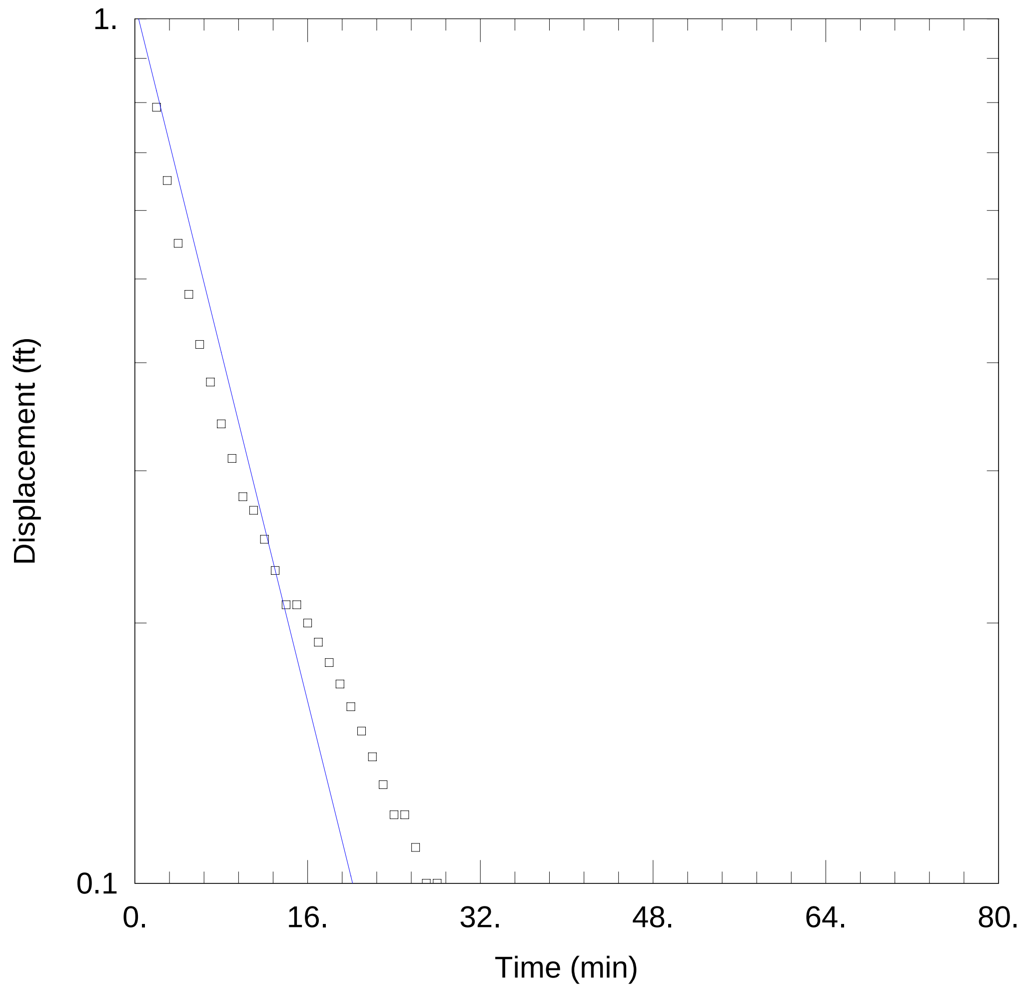


WELL TEST ANALYSIS

Data Set: C:\COFFEY\PAMMOR~1\USGTAC~1\MW2-SLUG.AQT
Date: 02/05/07 Time: 15:07:28

PROJECT INFORMATION

Company: CDM
Client: USG
Project: 19921-38072
Test Location: Tacoma
Test Well: MW-2
Test Date: 1-31-07

AQUIFER DATA

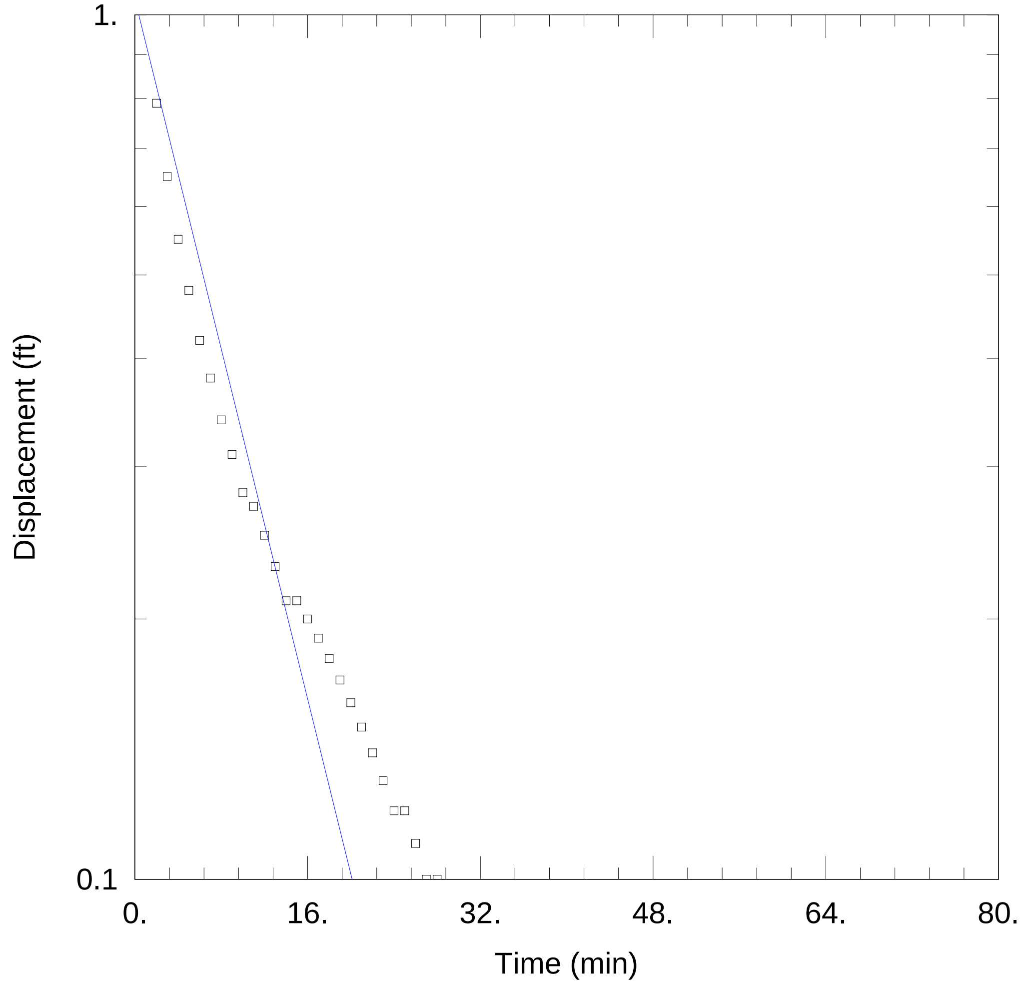
Saturated Thickness: 6. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 1.2 ft
Water Column Height: 6. ft
Casing Radius: 0.17 ft
Wellbore Radius: 0.5 ft
Screen Length: 5. ft
Gravel Pack Porosity: 0.2

SOLUTION

Aquifer Model: Unconfined
K = 2.829 ft/day
Solution Method: Hvorslev
y0 = 1.041 ft



WELL TEST ANALYSIS

Data Set: C:\COFFEY\PAMMOR~1\USGTAC~1\MW2-SLUG.AQT
Date: 02/05/07 Time: 15:08:39

PROJECT INFORMATION

Company: CDM
Client: USG
Project: 19921-38072
Test Location: Tacoma
Test Well: MW-2
Test Date: 1-31-07

AQUIFER DATA

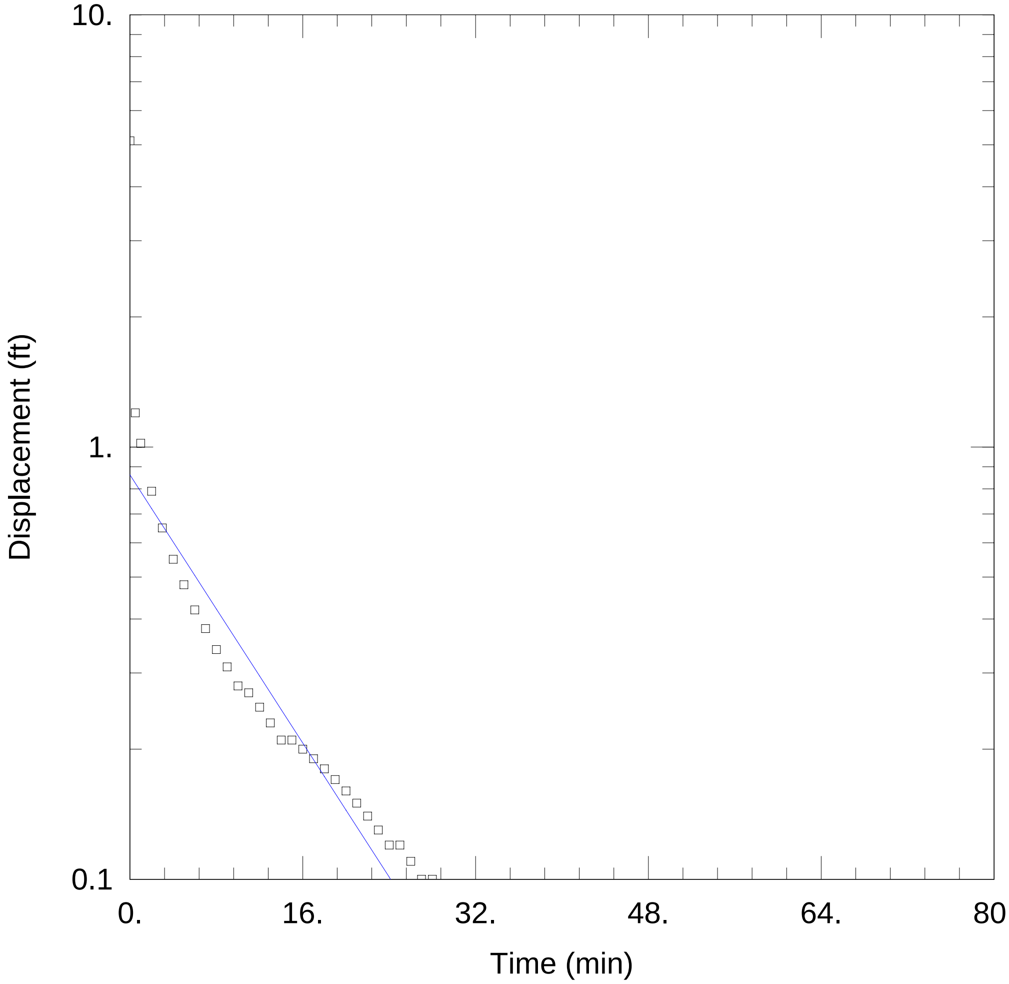
Saturated Thickness: 6. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 1.2 ft
Water Column Height: 6. ft
Casing Radius: 0.17 ft
Wellbore Radius: 0.5 ft
Screen Length: 5. ft
Gravel Pack Porosity: 0.2

SOLUTION

Aquifer Model: Unconfined
K = 2.149 ft/day
Solution Method: Bouwer-Rice
y0 = 1.043 ft



WELL TEST ANALYSIS

Data Set: C:\COFFEY\PAMMOR~1\USGTAC~1\MW-25S~1\MW25-SLG.AQT
Date: 02/05/07 Time: 17:30:00

PROJECT INFORMATION

Company: CDM
Client: USG
Project: 19921-38072
Test Location: Tacoma
Test Well: MW25
Test Date: 1-30-07

AQUIFER DATA

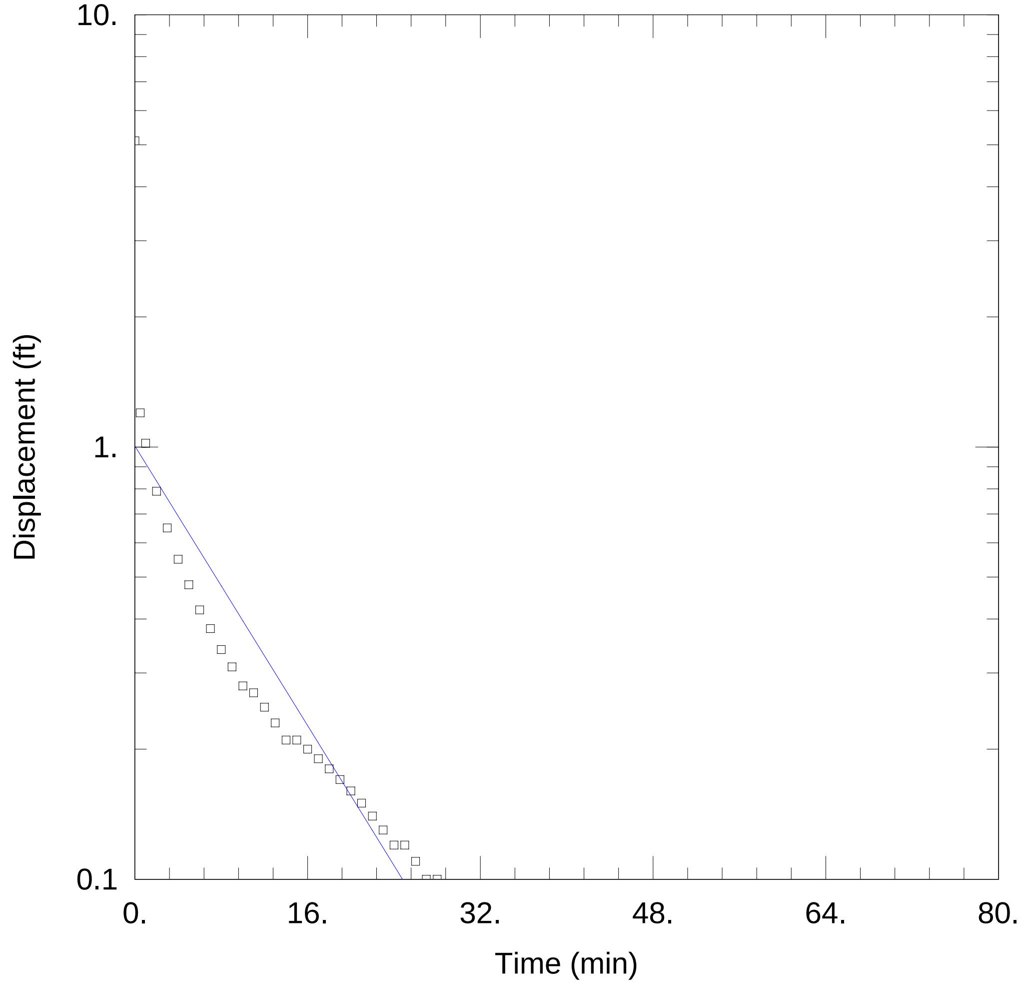
Saturated Thickness: 3.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 5.11 ft
Casing Radius: 0.17 ft
Screen Length: 5. ft
Water Column Height: 4. ft
Wellbore Radius: 0.5 ft
Gravel Pack Porosity: 0.17

SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev
K = 1.976 ft/day
y0 = 0.8614 ft



WELL TEST ANALYSIS

Data Set: C:\COFFEY\PAMMOR~1\USGTAC~1\MW-25S~1\MW25-SLG.AQT
Date: 02/05/07 Time: 17:28:31

PROJECT INFORMATION

Company: CDM
Client: USG
Project: 19921-38072
Test Location: Tacoma
Test Well: MW25
Test Date: 1-30-07

AQUIFER DATA

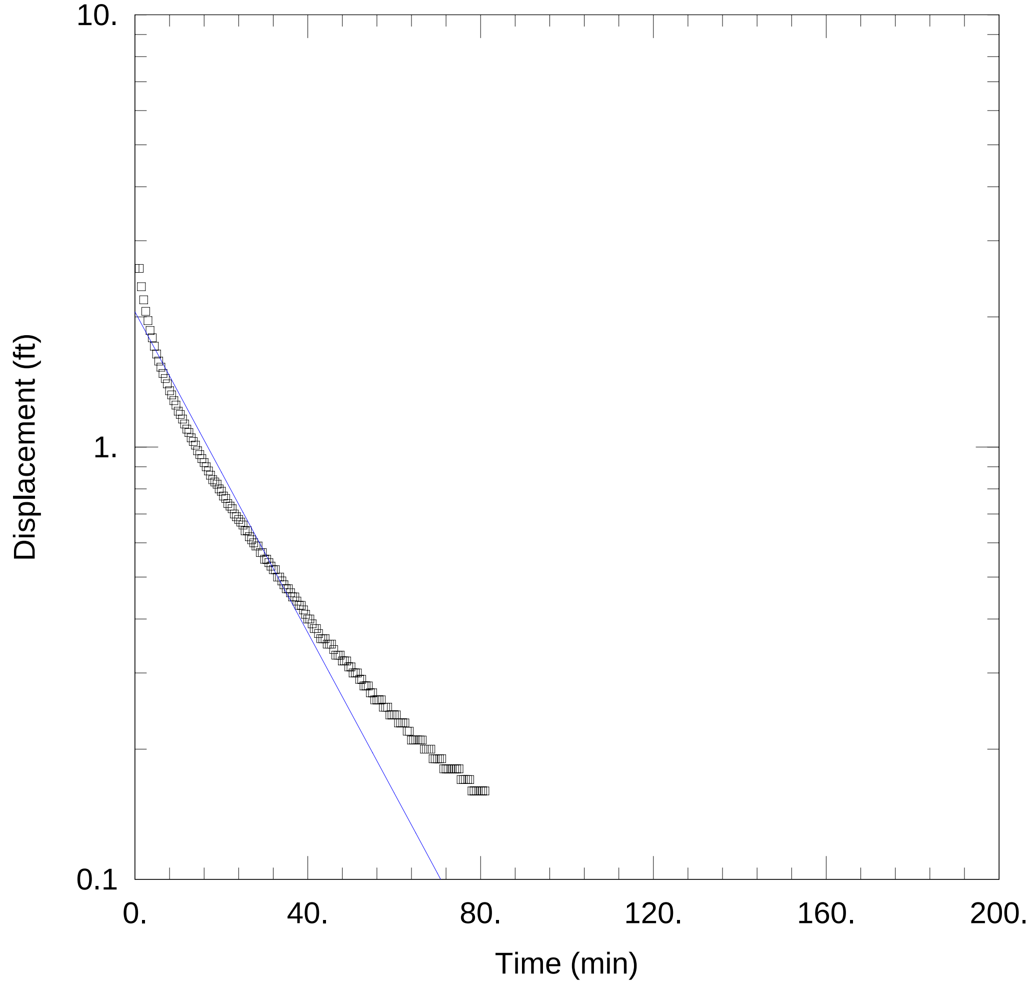
Saturated Thickness: 3.5 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 5.11 ft Water Column Height: 4. ft
Casing Radius: 0.17 ft Wellbore Radius: 0.5 ft
Screen Length: 5. ft Gravel Pack Porosity: 0.17

SOLUTION

Aquifer Model: Unconfined K = 1.356 ft/day
Solution Method: Bouwer-Rice y0 = 1.005 ft



WELL TEST ANALYSIS

Data Set: C:\COFFEY\PAMMOR~1\USGTAC~1\MW-29S~1\MW29-SLG.AQT
Date: 03/16/07 Time: 11:56:25

PROJECT INFORMATION

Company: CDM
Client: USG
Project: 19921-38072
Test Location: Tacoma
Test Well: MW29
Test Date: 1-30-07

AQUIFER DATA

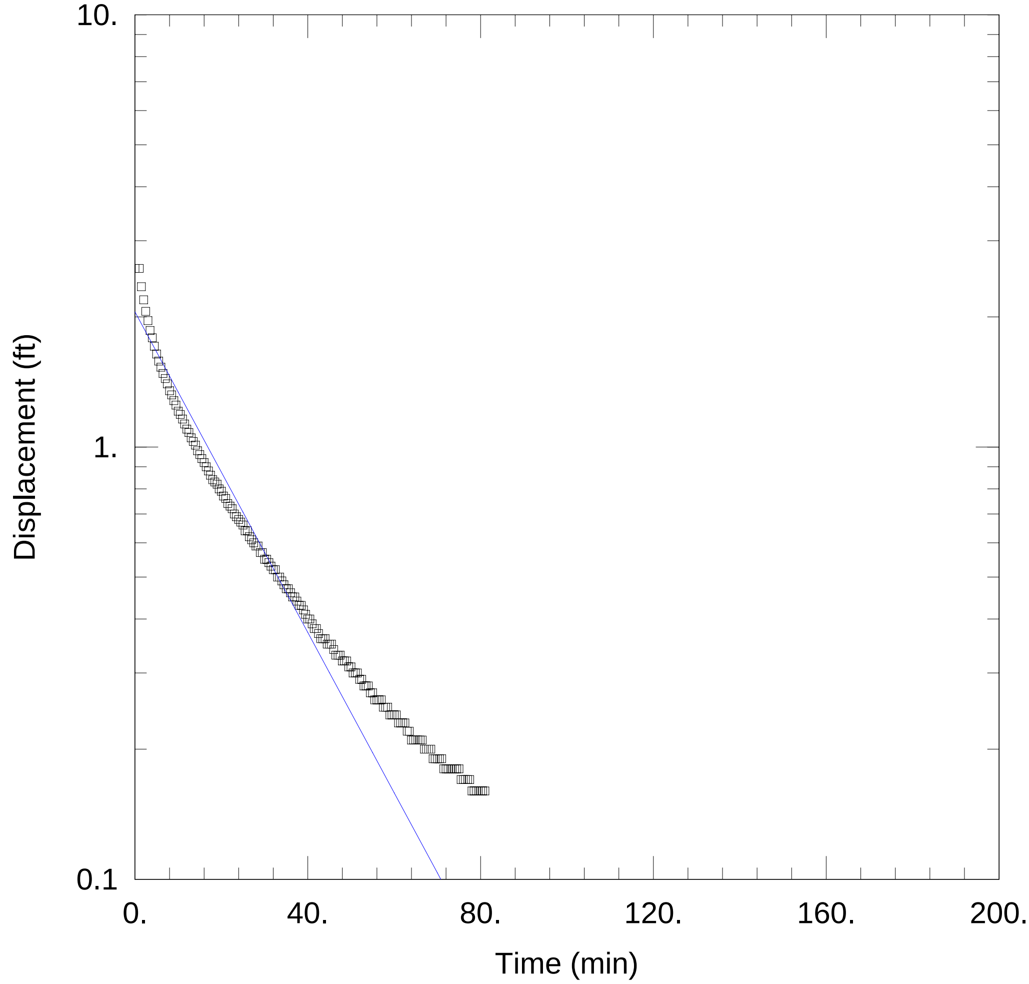
Saturated Thickness: 2.5 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 2.59 ft Water Column Height: 2.5 ft
Casing Radius: 0.17 ft Wellbore Radius: 0.5 ft
Screen Length: 5. ft Gravel Pack Porosity: 0.17

SOLUTION

Aquifer Model: Unconfined K = 0.9457 ft/day
Solution Method: Hvorslev y0 = 2.054 ft



WELL TEST ANALYSIS

Data Set: C:\COFFEY\PAMMOR~1\USGTAC~1\MW-29S~1\MW29-SLG.AQT
Date: 03/16/07 Time: 11:55:19

PROJECT INFORMATION

Company: CDM
Client: USG
Project: 19921-38072
Test Location: Tacoma
Test Well: MW29
Test Date: 1-30-07

AQUIFER DATA

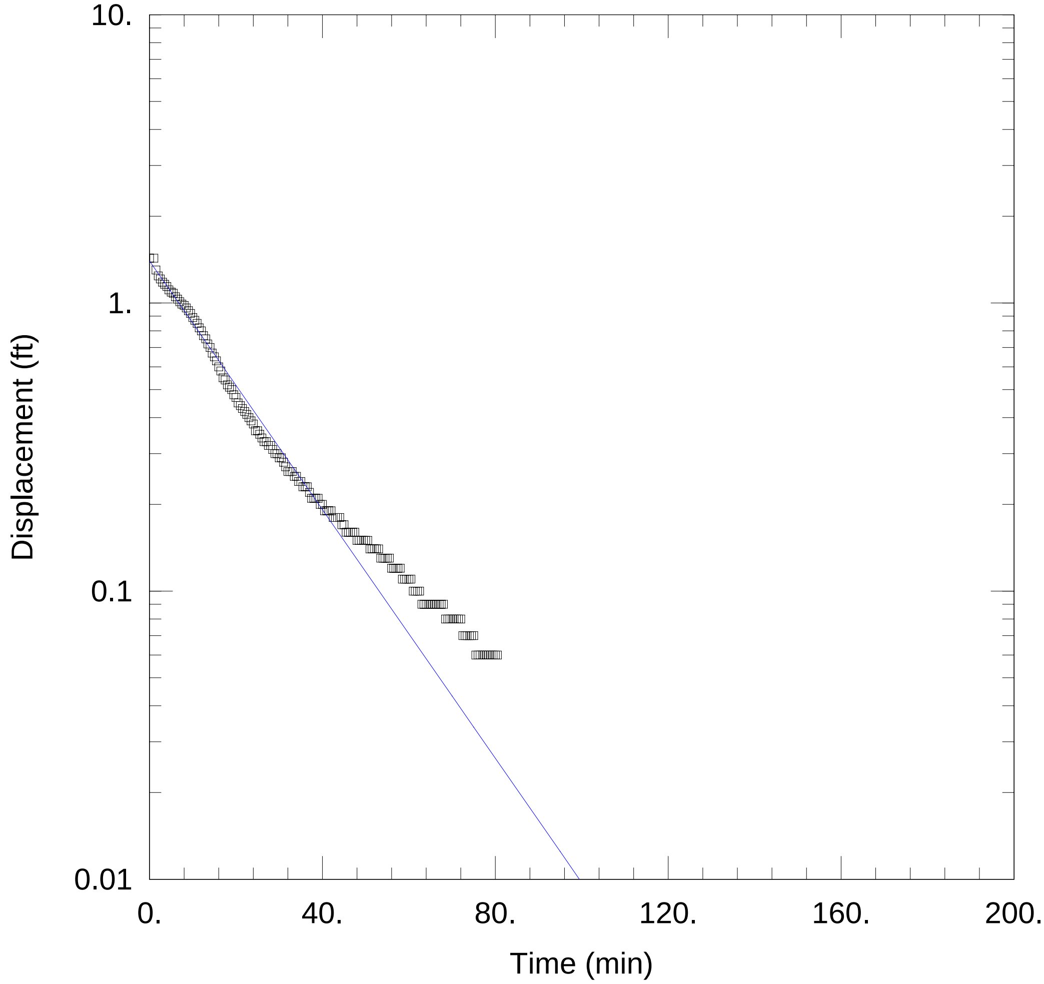
Saturated Thickness: 2.5 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 2.59 ft Water Column Height: 2.5 ft
Casing Radius: 0.17 ft Wellbore Radius: 0.5 ft
Screen Length: 5. ft Gravel Pack Porosity: 0.17

SOLUTION

Aquifer Model: Unconfined K = 0.5035 ft/day
Solution Method: Bouwer-Rice y0 = 2.053 ft



WELL TEST ANALYSIS

Data Set: C:\COFFEY\PAMMOR~1\USGTAC~1\MW-30S~1\MW30-SLG.AQT
Date: 03/16/07 Time: 11:58:42

PROJECT INFORMATION

Company: CDM
Client: USG
Project: 19921-38072
Test Location: Tacoma
Test Well: MW30
Test Date: 1-30-07

AQUIFER DATA

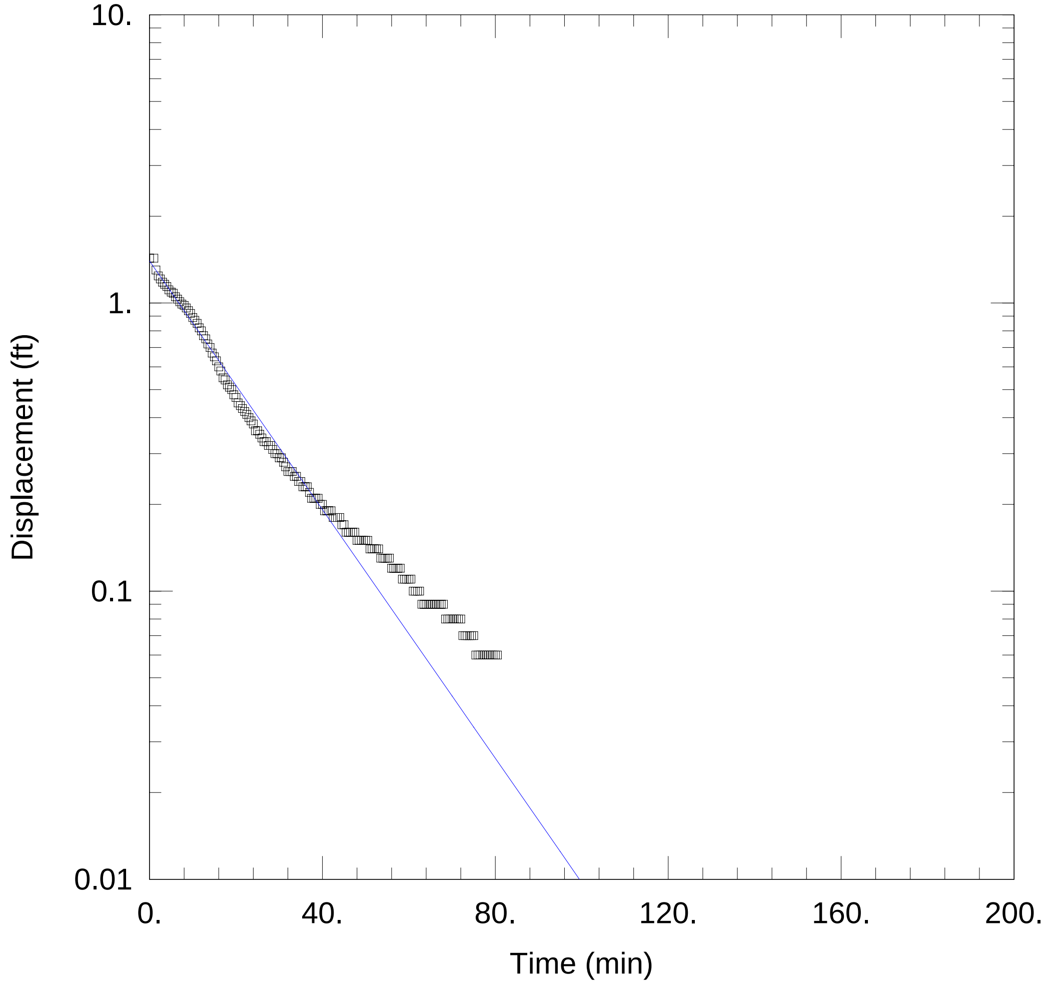
Saturated Thickness: 5.5 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 1.43 ft Water Column Height: 5.5 ft
Casing Radius: 0.17 ft Wellbore Radius: 0.5 ft
Screen Length: 5. ft Gravel Pack Porosity: 0.17

SOLUTION

Aquifer Model: Unconfined K = 1.099 ft/day
Solution Method: Hvorslev y0 = 1.397 ft



WELL TEST ANALYSIS

Data Set: C:\COFFEY\PAMMOR~1\USGTAC~1\MW-30S~1\MW30-SLG.AQT
Date: 03/16/07 Time: 12:00:16

PROJECT INFORMATION

Company: CDM
Client: USG
Project: 19921-38072
Test Location: Tacoma
Test Well: MW30
Test Date: 1-30-07

AQUIFER DATA

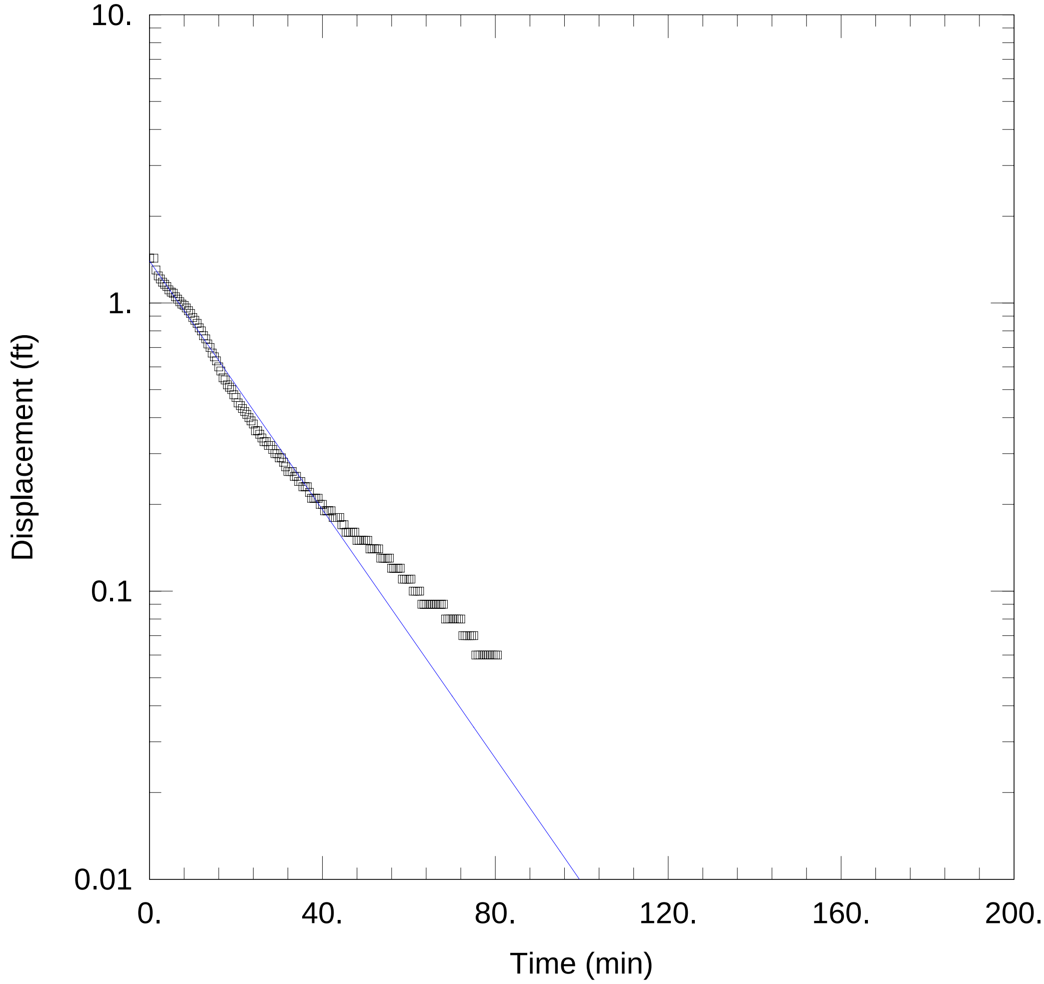
Saturated Thickness: 5.5 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 1.43 ft Water Column Height: 5.5 ft
Casing Radius: 0.17 ft Wellbore Radius: 0.5 ft
Screen Length: 5. ft Gravel Pack Porosity: 0.17

SOLUTION

Aquifer Model: Unconfined K = 0.8099 ft/day
Solution Method: Bouwer-Rice y0 = 1.397 ft



WELL TEST ANALYSIS

Data Set: C:\COFFEY\PAMMOR~1\USGTAC~1\MW-30S~1\MW30-SLG.AQT
Date: 03/16/07 Time: 12:00:16

PROJECT INFORMATION

Company: CDM
Client: USG
Project: 19921-38072
Test Location: Tacoma
Test Well: MW30
Test Date: 1-30-07

AQUIFER DATA

Saturated Thickness: 5.5 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Initial Displacement: 1.43 ft
Casing Radius: 0.17 ft
Screen Length: 5. ft
Water Column Height: 5.5 ft
Wellbore Radius: 0.5 ft
Gravel Pack Porosity: 0.17

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.8099 ft/day
y0 = 1.397 ft

Shallow Aquifer Hydraulic Conductivities derived from Slug-Test Data - January 30-31, 2007

Analysis Method		MW-2	MW-25	MW-29	MW-30
		ft/day	ft/day	ft/day	ft/day
Graphical	Hvorslev (manual)	2.27	1.39	0.89	0.73
AQTESOLV	Hvorslev (Automatic)	2.83	1.98	0.95	1.1
	Bouwer-Rice (Automatic)	2.15	1.36	0.5	0.81
Mean		**2.42**	**1.58**	**0.78**	**0.88**

Appendix F

Summary Tables and Figures from Interim Actions

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AGI
TECHNOLOGIES

Berm Evaluation and Disposal
USG Interiors, Inc.
2301 Taylor Way
Tacoma, Washington

October 23, 1996

Prepared For :

USG Corporation
125 South Franklin Street
Post Office Box 6721
Chicago, Illinois 60606

AGI Project No. 14,937.301

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AGI
TECHNOLOGIES

Table 7
Summary of Final Berm Footprint Analytical Results
USG Interiors/Berm Evaluation and Disposal
Tacoma, Washington

	Total Concentration			TCLP Concentration	Approximate Depth Below Initial
	Arsenic	Cadmium	Lead	Arsenic	(USG) Grade
Sample I.D.	mg/kg			mg/L	(feet)
FP-1	190	<0.33	8.3	NA	4
FP-2	120	<0.28	<1.7	NA	0
FP-3	150	<0.31	3.5	NA	4
FP-4	160	<0.30	<1.8	NA	3
FP-5	26	<0.36	<2.1	NA	4
FP-6	<7.7	<0.38	<2.3	NA	7
FP-7	160 [a]	<0.28	<1.7	NA	7
FP-8	150 [a]	<0.28	<1.7	NA	7
FP-9	180 [a]	<0.28	<1.7	NA	7
FP-10	11	0.38	2.3	NA	7
FP-11	<7.5	0.38	3.9	NA	7
FP-12	200	<0.30	<1.8	NA	7
FP-13	180	<0.27	22	NA	0
FP-14	160	0.63	150	NA	0
FP-15	210	0.88	220	0.25	0
FP-16	150	<0.26	29	NA	0
FP-17	64	<0.27	28	NA	0
FP-18	80	<0.26	27	NA	0
FP-19	140	0.84	160	NA	0

Notes:

a) These analytical results are from samples collected approximately one foot below the initial site grade. Additional excavation occurred through these segments thereafter to remove hydrocarbon-contaminated soils. Therefore, the final arsenic concentrations at the excavation base are likely to be similar to those observed in Samples FP-6, FP-10, and FP-11.

mg/kg - Milligrams per kilogram.
mg/L - Milligrams per liter.
NA - Not analyzed.

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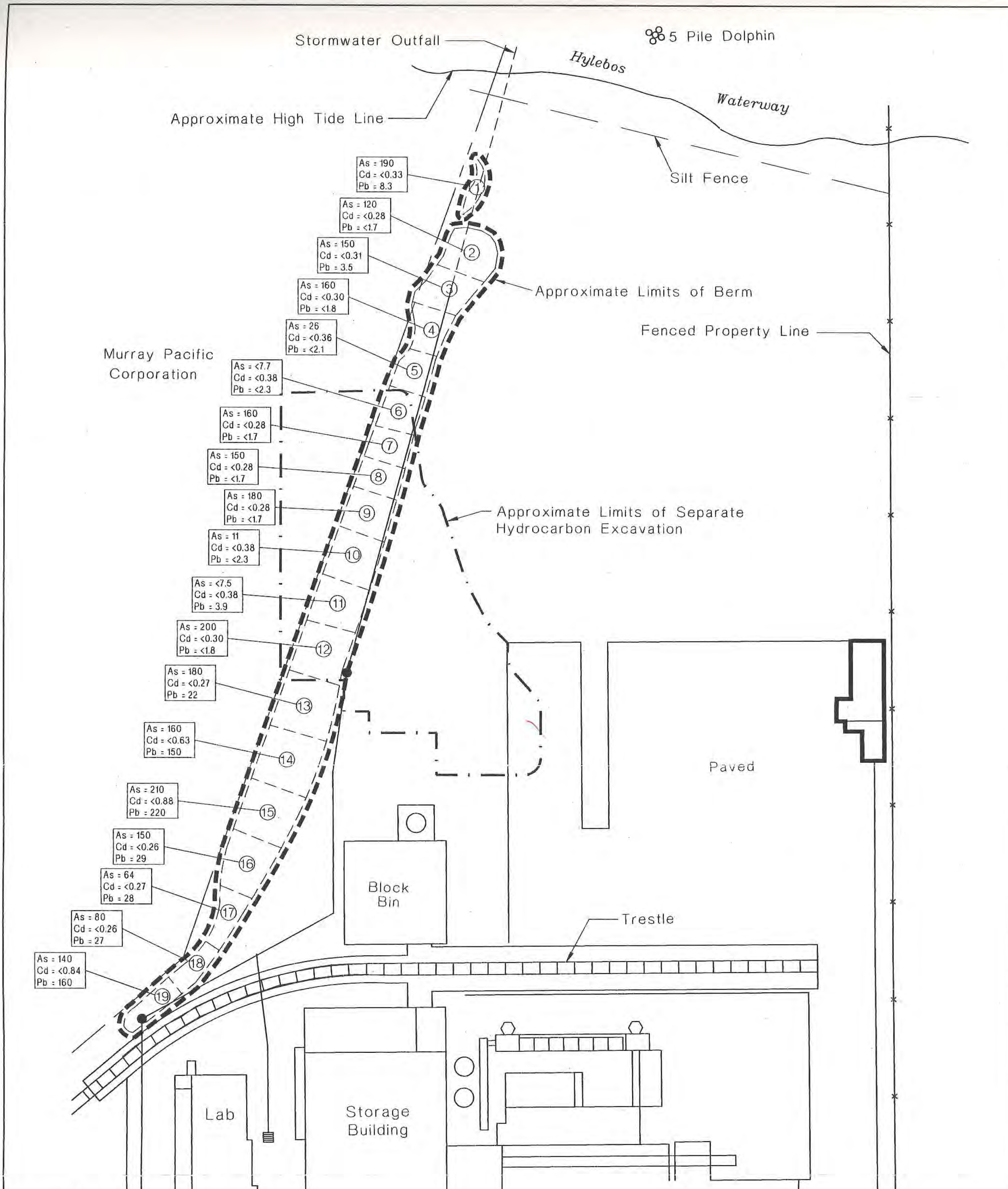

LEGEND

N

0 25 50

Approximate Scale in Feet

PROJECT NORTH

5 — Berm footprint segment within which a 5-point composite soil sample was collected. Sample number identified within segment.

Sample concentrations identified as follows:

As = 190	= Arsenic	Concentrations
Cd = <0.33	= Cadmium	in mg/kg
Pb = 8.3	= Chromium	(milligrams per kilogram)

Storm drain

Manhole

Reference:
Plant Property Layout,
Drawing No. C-1008-TAC,
United States Gypsum Co.,
8/27/85.

AGI TECHNOLOGIES

Berm Footprint Sample Locations and Analytical Summary

USG Interiors/Berm Evaluation and Disposal
Tacoma, Washington

FIGURE **4**

	PROJECT NO.	DRAWN	DATE	APPROVED	REVISED	DATE
footprnt.dwg	14,937.301	DFF	18 Aug 95	MEL	ALW	Aug 96

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Hydrocarbon Remediation

AGI TECHNOLOGIES

A Report Prepared For :

USG Interiors, Inc.
125 South Franklin Street
Post Office Box 6721
Chicago, Illinois 60680-6721

SUMMARY REPORT
HYDROCARBON REMEDIATION
USG INTERIORS, INC.
2301 TAYLOR WAY
TACOMA, WASHINGTON

March 19, 1997

Ross R. Stainsby, P.G.
Project Geologist

AGI Technologies
300 120th Avenue N.E.
Building 4
Bellevue, Washington 98005
206/453-8383

AGI Project No. 14,937.318

AGI TECHNOLOGIES

Table 2
Summary of Chemical Analyses - Excavation Soil
USG Interiors/Tacoma Hydrocarbon
Tacoma, Washington

Sample I.D.	Approx. Sample Depth (ft bgs)	Sample Location	Date Sampled	Washington State Test Method WTPH-D Diesel (mg/kg)	Motor Oil [a] (mg/kg)
EXC-1	5	Sidewall	06/12/96	ND	ND
EXC-2	6	Sidewall	06/12/96	ND	ND
EXC-3	7	Sidewall	06/12/96	ND	ND
EXC-4	4	Sidewall	06/12/96	ND	ND
EXC-5	5	Base	06/12/96	ND	ND
EXC-6	4	Sidewall	06/12/96	ND	ND
EXC-7	7	Base	06/12/96	ND	ND
EXC-8	5	Base	06/13/96	ND	ND
EXC-9	5	Sidewall	06/17/96	ND	ND
EXC-10	7	Base	06/18/96	ND	ND
EXC-11	5	Sidewall	06/19/96	ND	ND
EXC-12	4	Sidewall	06/26/96	ND	ND
EXC-13	3	Sidewall	06/26/96	ND	ND
EXC-14	3	Sidewall	06/27/96	21	98
EXC-15	3	Sidewall	06/28/96	ND	ND
Method Reporting Limit				10	40
Cleanup Levels [b]				200	200

Notes:

a) Quantitated using 30-weight motor oil as a standard.
b) Method A suggested cleanup level for residential soil promulgated under Washington Administrative Code Chapter 173-340, Washington Model Toxics Control Act Cleanup Regulation.

ft bgs - Feet below ground surface.
mg/kg - Milligrams per kilogram.
ND - Not detected.
TPH - Total petroleum hydrocarbons.

LEGEND

- Sand
- Silty Sand
- Sandy Silt
- Clayey Silt
- Organic Silt and Clay
- Water bearing zone

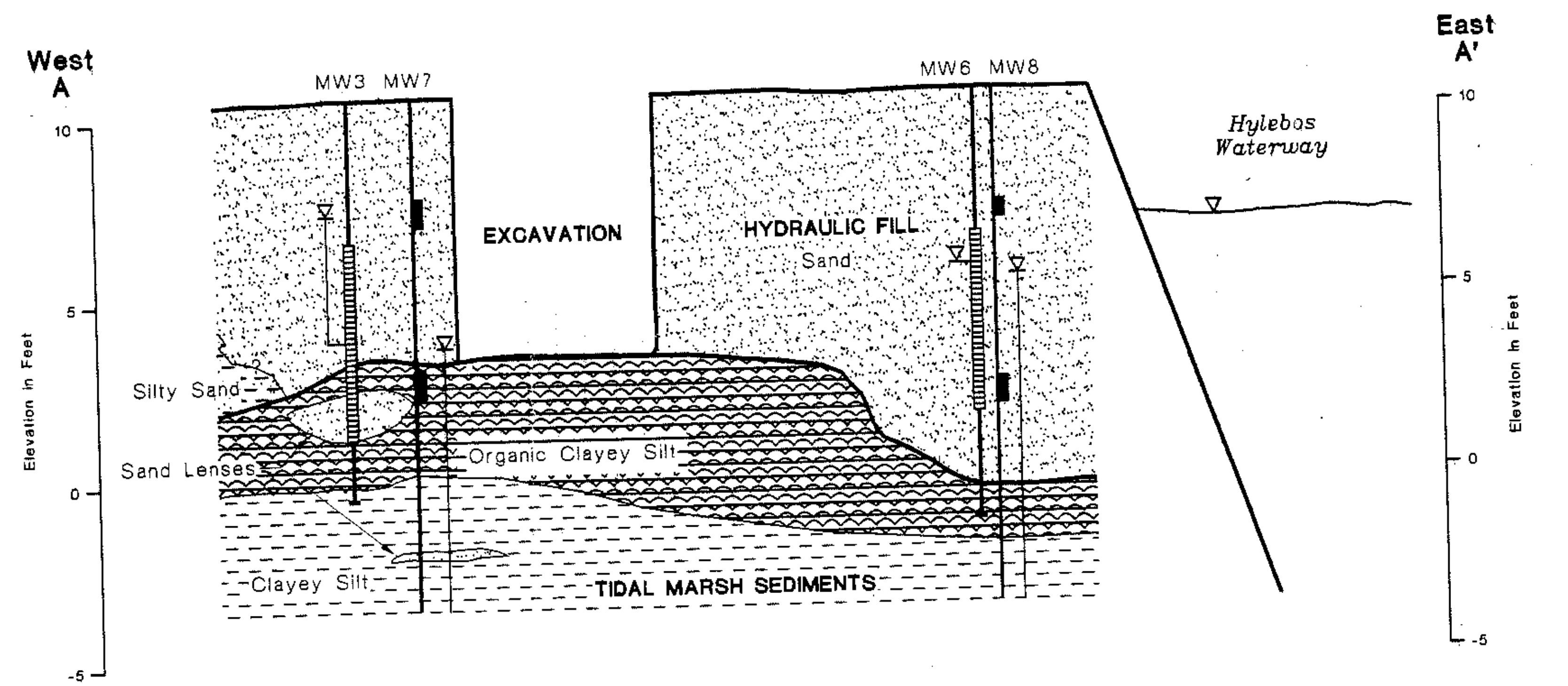
MW12 Exploration Number
Ground Surface
Lithologic Contact
Approximate Water Elevation 12/1/94
Screened Interval
Stratigraphic Contact
Sample Interval
Bottom of Boring

Note:

This cross section is a diagrammatic interpretation of subsurface conditions based on interpolation and extrapolation of data from borings and soil conditions encountered within the excavation. Actual conditions are substantially more complex than depicted and will vary between borings.

Water levels measured on 12/1/94 between 1440 and 1908 hours. High tide was at 1421 hours.

0 25 50 100
Horizontal Scale in Feet
Vertical Exaggeration 20x



AGI TECHNOLOGIES

Hydrogeologic Section A-A'

USG Interiors/Hydrocarbon Cleanup
Tacoma, Washington

FIGURE 3

xseca.dwg	PROJECT NO. 14,937.318	DRAWN JFL	DATE 3-19-97	APPROVED RRS	REVISED	DATE

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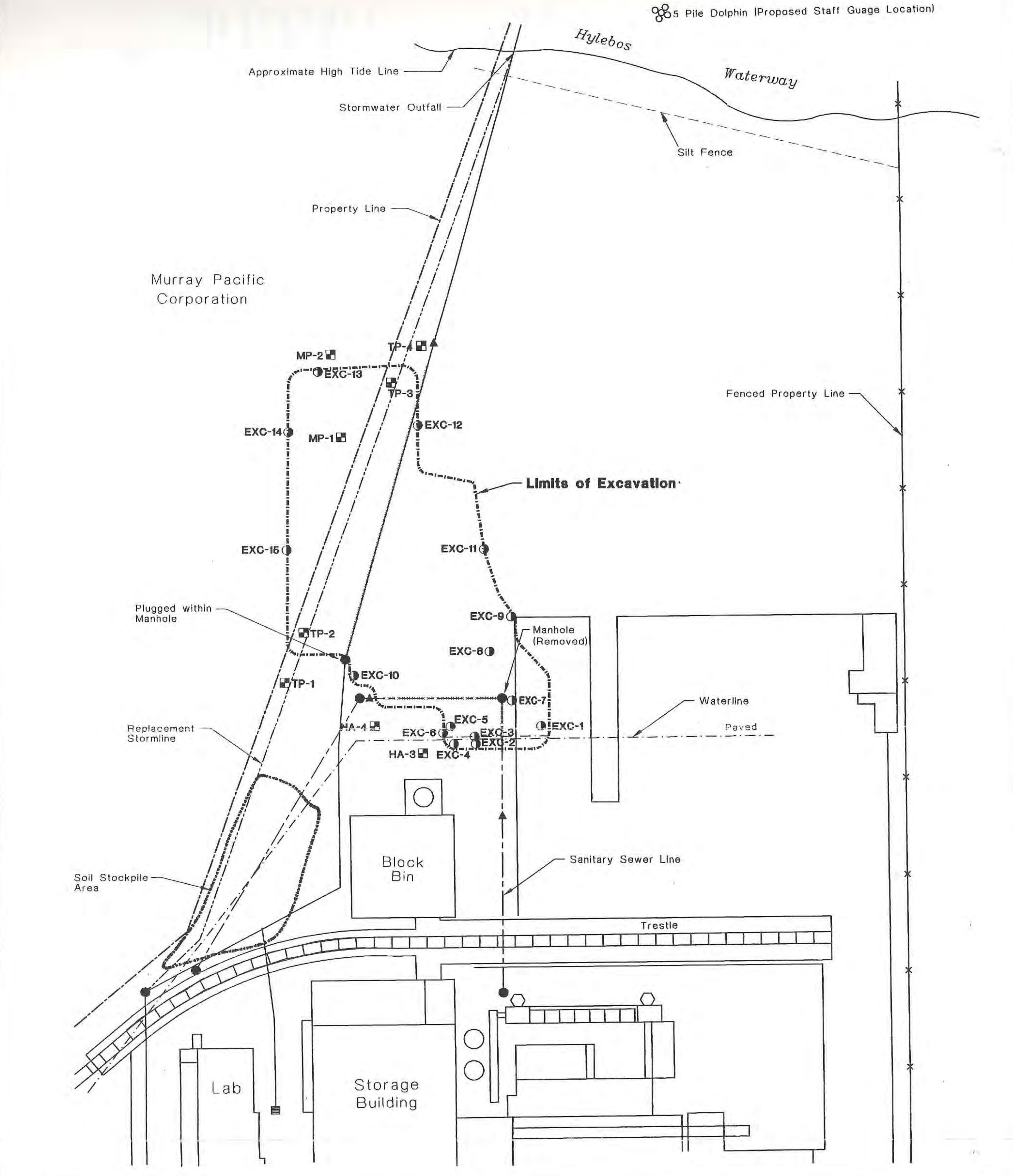

LEGEND

TP-4 Approximate test pit location and number
EXC-15 Approximate soil sample location and number
Storm drain
Manhole
Sanitary line plugged with concrete
Removed section of piping
Replacement stormline
Sanitary sewer line
6" water main
6" water main removed and replaced

N

0 25 50
Approximate Scale in Feet

PROJECT NORTH

Reference:
Plant Property Layout,
Drawing No. C-1008-TAC,
United States Gypsum Co.,
8/27/85.

AGI TECHNOLOGIES

Sampling Location Map
USG Interiors/Hydrocarbon Cleanup
Tacoma, Washington

FIGURE **5**

	PROJECT NO.	DRAWN	DATE	APPROVED	REVISED	DATE
berm2.dwg	14,937.318	DFF	18 Aug 95	RRS	ALW	Jul 96

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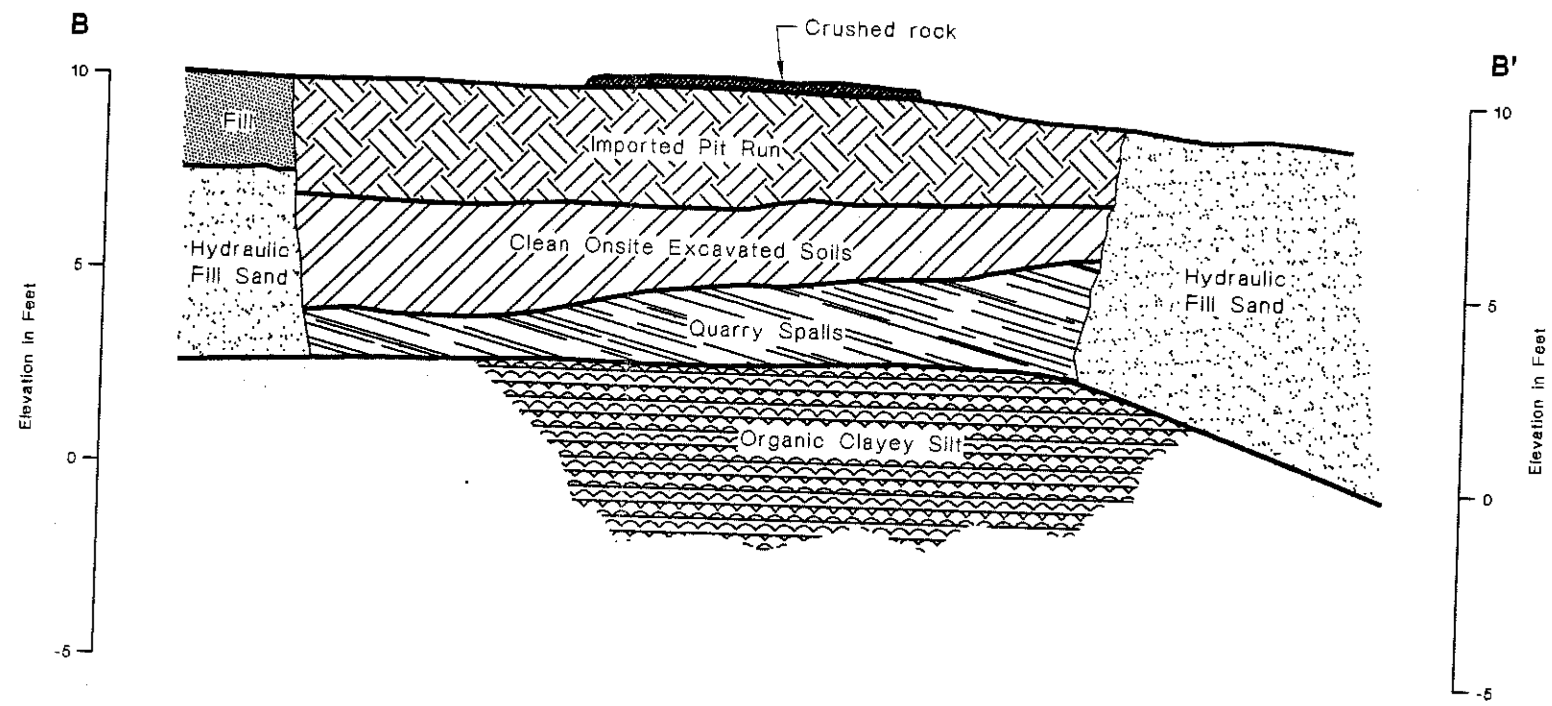
LEGEND

- Sand
- Silty Sand
- Sandy Silt
- Clayey Silt
- Organic Silt and Clay
- Water bearing zone

MW12 Exploration Number
Ground Surface
Lithologic Contact
Approximate Water Elevation 12/1/94
Screened Interval
Stratigraphic Contact
Sample Interval
Bottom of Boring



Note:

This cross section is a diagrammatic interpretation of subsurface conditions based on interpolation and extrapolation of data from borings and soil conditions encountered within the excavation. Actual conditions are substantially more complex than depicted and will vary between borings.

Water levels measured on 12/1/94 between 1440 and 1908 hours. High tide was at 1421 hours.

0 25 50
Horizontal Scale in Feet
Vertical Exaggeration 20x

AGI TECHNOLOGIES

xsecb.dwg

Backfilled Excavation Cross Section B-B'

USG Interiors/Hydrocarbon Cleanup
Tacoma, Washington

FIGURE 6

PROJECT NO. 14,937.318 | DRAWN JFL | DATE 3-19-97 | APPROVED | REVISED | DATE

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AGI
TECHNOLOGIES

A Report Prepared For :

USG Corporation
125 South Franklin Street
Post Office Box 6721
Chicago, Illinois 60606

BANK CLEANUP AND RESTORATION
USG INTERIORS, INC.
2301 TAYLOR WAY
TACOMA, WASHINGTON

December 18, 1997

Peter Sajer, P.E.
Project Engineer

AGI Technologies
11811 N.E. 1st Street, Suite 201
Bellevue, Washington 98005
425/453-8383

AGI Project No. 14,937.319

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AGI TECHNOLOGIES

Table 1
Metals Analysis - Soil (Upland)
USG Interiors, Inc./Bank Cleanup and Restoration
Tacoma, Washington

Sample I.D.	Excavation Cell Number	Average Excavation Depth (feet)	Arsenic	Copper	Lead	Zinc
			mg/kg			
UP-1-Gray Sand	1	6	84 *	42	30	130
UP-SW-1			860	790	1,100	4,400
UP-SW-1Ra			1,100	880	1,000	5,100
UP-SW-1Rb			6.7	17	5.4 (3.1)	41 (26)
UP-B-1			810	760	980	3,300
UP-B-1R			170	110	130	510
UP-B-1/2	1/2	6	100	100	100	640
UP-SW-2	2	6	29 * (82)	81 (141)	260	620
UP-B-2			3.9 *	15	4.0	24
UP-SW-3	3	7	410	460	680	3,800
UP-SW-3Ra			2,100 (1,210)	3,000 (2,140)	1,900	10,000
UP-SW-3Rb			8.1	16	9.2	43
UP-B-3			450	910	480	3,300
UP-B-3R			72	110	120	760
UP-SW-4	4	6	220	300	280	1,500
UP-B-4			35 *	25	10	87
UP-SW-5	5	5	31	18	11	45
UP-B-5			43	73	67	410
UP-SW-6	6	4	110	36	30	120
UP-B-6			52 *	28	19	62
UP-SW-7	7	3	54	42	32	120
UP-B-7			7.4 *	27	79	81
UP-B-8	8	2	13 *	14	4.5	47
UP-B-9	9	2	<30	20	<8.9	18
Cleanup Levels [a]			200	N/A [b]	1,000	N/A [b]

Notes:
* Analyzed by AA/GF.
Values in parentheses are laboratory duplicate results.
a) Method A suggested cleanup level for industrial soil promulgated under Washington Administrative Code Chapter 173-340-745, Model Toxics Control Act Cleanup Regulation.
b) Specific upland cleanup levels for copper and zinc were not set, but final sample results will meet sediment quality objectives which are typically more stringent than soil standards.
mg/kg - Milligrams per kilogram.
UP - Uplands.
B - Bank sample.
SW - Sidewall sample.
R - Repeat sample.

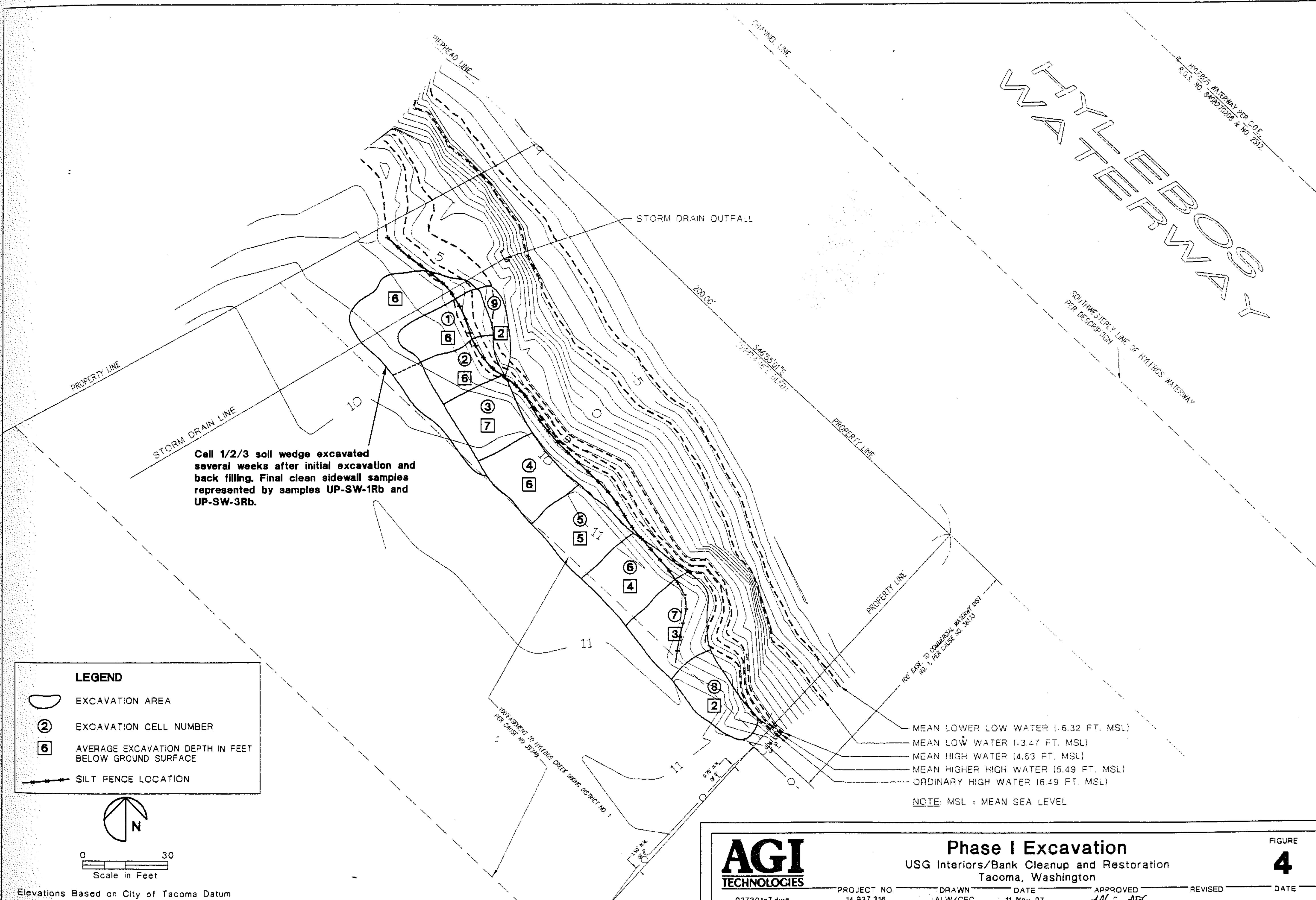
AGI TECHNOLOGIES

Table 2
Metals Analysis - Sediment (Intertidal Bank)
USG Interiors, Inc./Bank Cleanup and Restoration
Tacoma, Washington

Sample I.D.	Excavation Cell Number	Average Excavation Depth (feet)	Arsenic	Copper	Lead	Zinc
			mg/kg			
S1	S1	8	6.5	39	<3.0	28
S2	S2	8	5.0	30	3.1	29
S3	S3	6	<8.5	41	3.8	37
S4-B	S4	3	17 *	31	<4.2	31
S4-SW			<7.4	18	3.7	26
S5	S5	1	<6.3	19	3.0	25
S6	S6	6	<16	27	<4.8	28
S7	S7	4	19	46	15	95
S8	S8	6	14	40	13	80
S9	S9	2	<14	32	<4.2	26
S10	S10	2	16	39	8.9 (3.7)	86 (41)
S11-SW	S11	3	<9.7	39	7.8	64
S11			120	220	230	1,500
S11 R			9.6	19	3.6	31
S12	S12	2	<7.3	24	<2.2	27
S13	S13	4	<9.6	32	3.5	31
S14	S14	4	<7.3	26	3.3	28
S15	S15	2	9.1	29	3.1	33
S16	S16	2	<6.8	21	<2.1	24
S17	S17	2	<7.4	29	2.8	31
Sediment Quality Objectives [a]			57	390	450	410

Notes:

* Analyzed by AA/GF.
Values in parentheses are laboratory duplicate results.
a) Commencement Bay Nearshore/Tide Flats Record of Decision (9/89).
mg/kg - Milligrams per kilogram.
S - Slope sample.
B - Bank sample.
SW - Sidewall sample.
R - Repeat sample.



AGI TECHNOLOGIES

Phase I Excavation

USG Interiors/Bank Cleanup and Restoration
Tacoma, Washington

FIGURE **4**

	PROJECT NO.	DRAWN	DATE	APPROVED	REVISED	DATE
937301s7.dwg	14,937.316	ALW/CEC	11 Nov 97	JHL for MEC		

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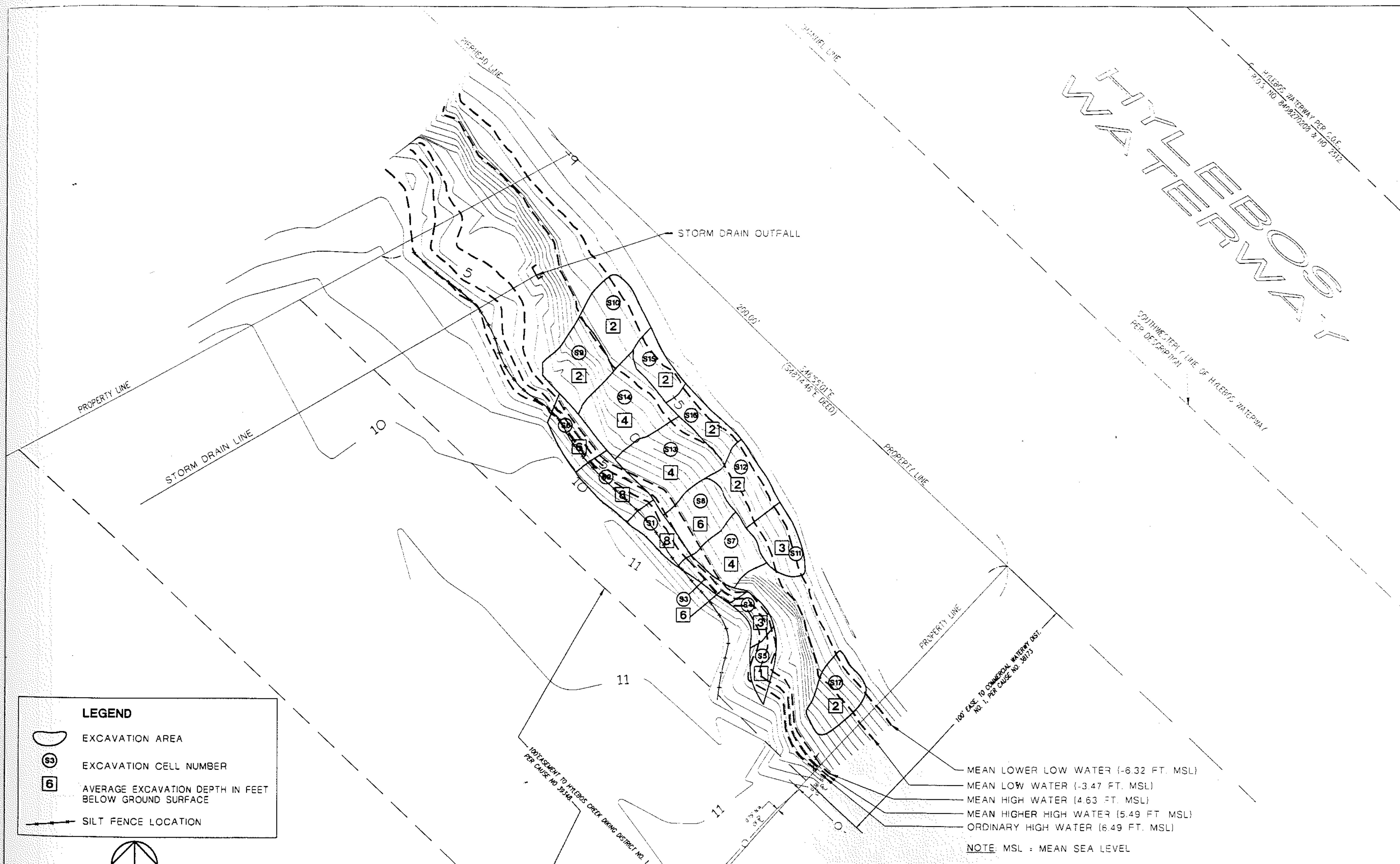

AGI TECHNOLOGIES

Phase II Excavation

USG Interiors/Bank Cleanup and Restoration
Tacoma, Washington

FIGURE **5**

	PROJECT NO.	DRAWN	DATE	APPROVED	REVISED	DATE
937301s7a.dwg	14,937.316	ALW/CEC	11 Nov 97			

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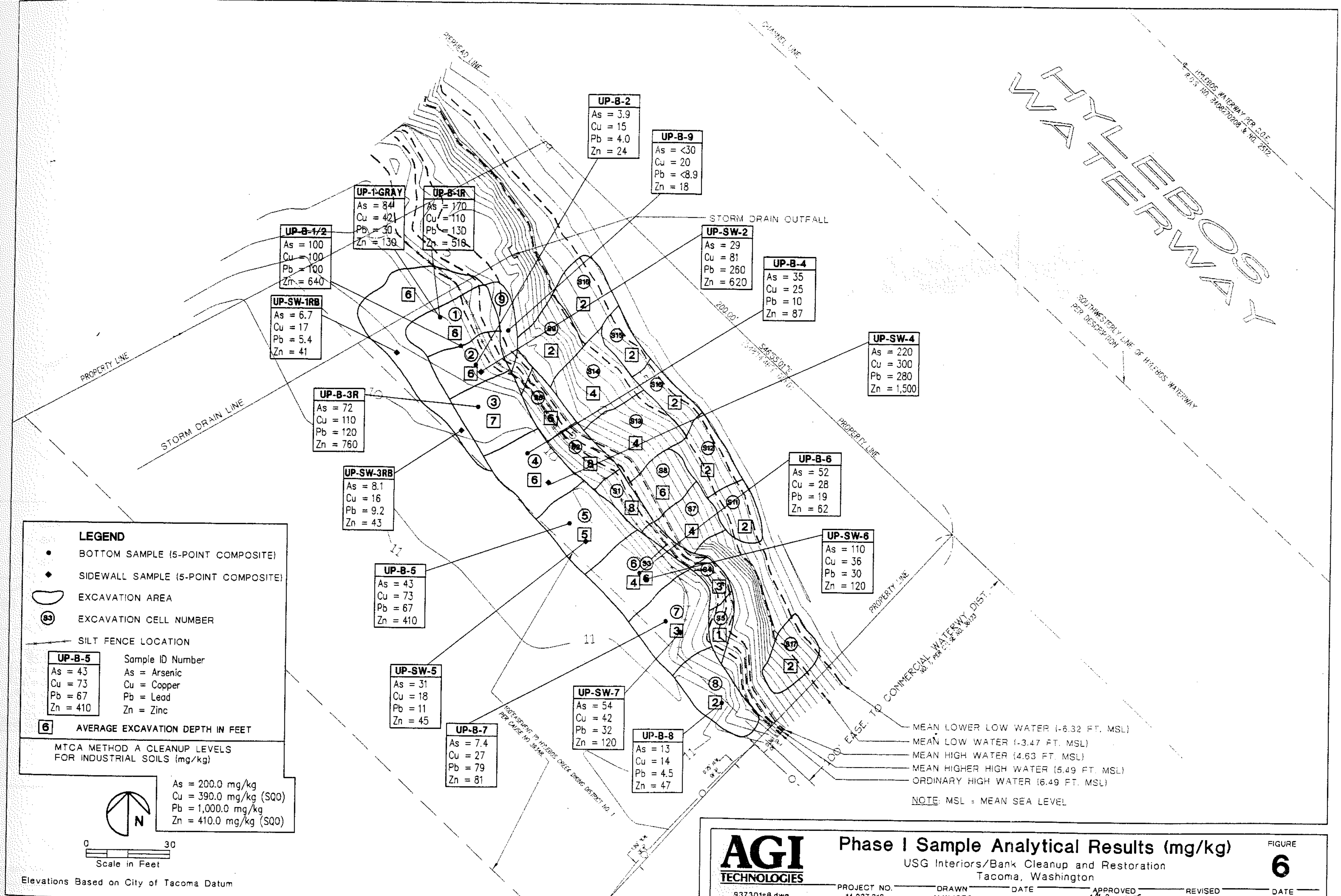

AGI TECHNOLOGIES

Phase I Sample Analytical Results (mg/kg)

USG Interiors/Bank Cleanup and Restoration
Tacoma, Washington

FIGURE 6

937301s8.dwg	PROJECT NO. 14,937.316	DRAWN ALW/CEC	DATE 11 Nov 97	APPROVED	REVISED	DATE

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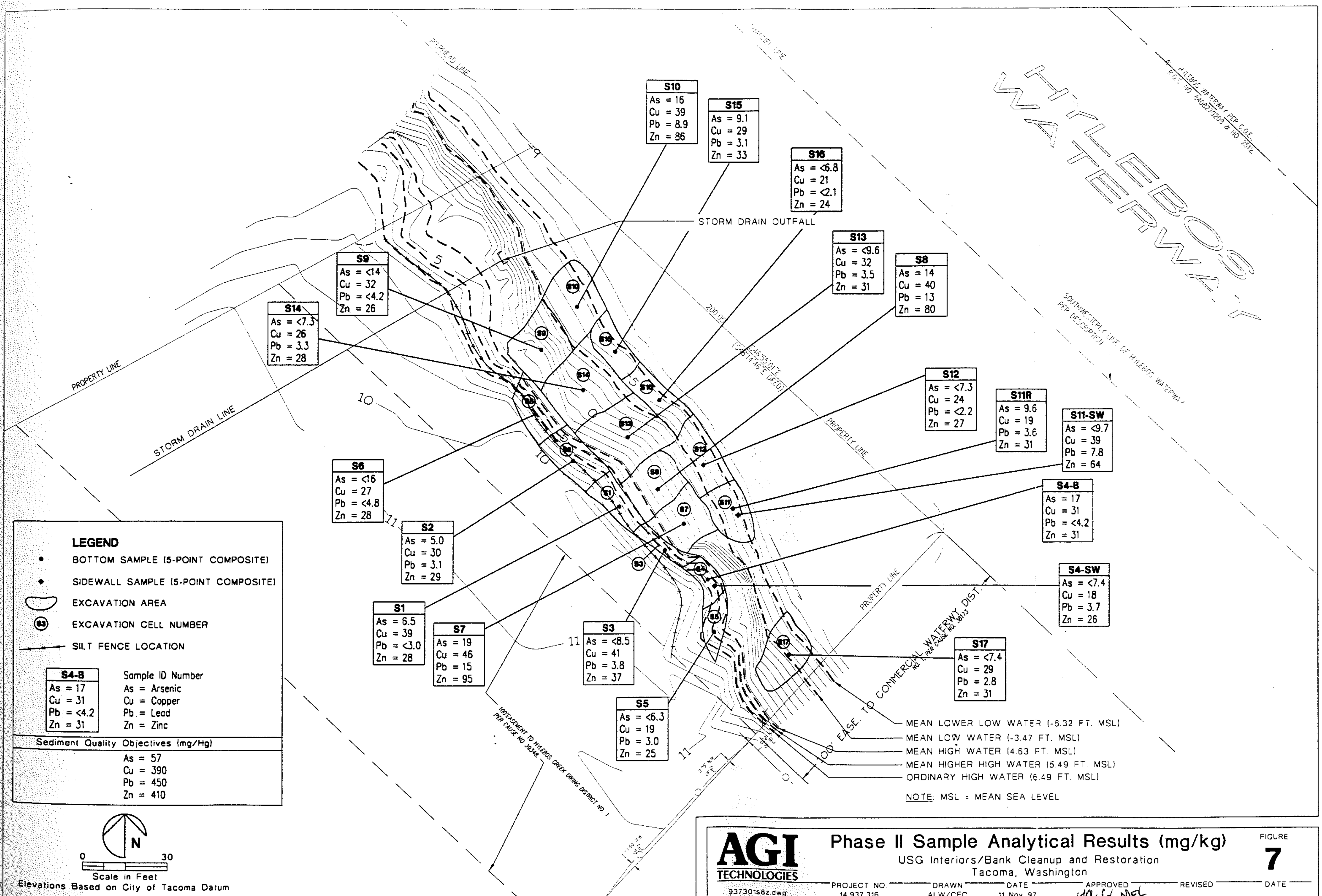
HYLEBOS WATERWAY
HYLEBOS WATERWAY PER C.O.E. R.O.S. NO. 8408270208 & NO. 2512
SOUTHWESTERLY LINE OF HYLEBOS WATERWAY PER DESCRIPTION
PIERHEAD LINE
CHANNEL LINE
PROPERTY LINE
STORM DRAIN LINE
STORM DRAIN OUTFALL
200.00'
S46°55'01"E
(S47°14'46"E DEED)
100' EASEMENT TO HYLEBOS CREEK DIKING DISTRICT NO. 1 PER CAUSE NO. 39348
100' EASE. TO COMMERCIAL WATERWY. DIST. NO. 1 PER CAUSE NO. 38173
S10
As = 16
Cu = 39
Pb = 8.9
Zn = 86
S15
As = 9.1
Cu = 29
Pb = 3.1
Zn = 33
S16
As = <6.8
Cu = 21
Pb = <2.1
Zn = 24
S13
As = <9.6
Cu = 32
Pb = 3.5
Zn = 31
S8
As = 14
Cu = 40
Pb = 13
Zn = 80
S9
As = <14
Cu = 32
Pb = <4.2
Zn = 26
S14
As = <7.3
Cu = 26
Pb = 3.3
Zn = 28
S12
As = <7.3
Cu = 24
Pb = <2.2
Zn = 27
S11R
As = 9.6
Cu = 19
Pb = 3.6
Zn = 31
S11-SW
As = <9.7
Cu = 39
Pb = 7.8
Zn = 64
S4-B
As = 17
Cu = 31
Pb = <4.2
Zn = 31
S4-SW
As = <7.4
Cu = 18
Pb = 3.7
Zn = 26
S6
As = <16
Cu = 27
Pb = <4.8
Zn = 28
S2
As = 5.0
Cu = 30
Pb = 3.1
Zn = 29
S1
As = 6.5
Cu = 39
Pb = <3.0
Zn = 28
S7
As = 19
Cu = 46
Pb = 15
Zn = 95
S3
As = <8.5
Cu = 41
Pb = 3.8
Zn = 37
S5
As = <6.3
Cu = 19
Pb = 3.0
Zn = 25
S17
As = <7.4
Cu = 29
Pb = 2.8
Zn = 31
MEAN LOWER LOW WATER (-6.32 FT. MSL)
MEAN LOW WATER (-3.47 FT. MSL)
MEAN HIGH WATER (4.63 FT. MSL)
MEAN HIGHER HIGH WATER (5.49 FT. MSL)
ORDINARY HIGH WATER (6.49 FT. MSL)
NOTE: MSL = MEAN SEA LEVEL
LEGEND
BOTTOM SAMPLE (5-POINT COMPOSITE)
SIDEWALL SAMPLE (5-POINT COMPOSITE)
EXCAVATION AREA
EXCAVATION CELL NUMBER
SILT FENCE LOCATION
S4-B
As = 17
Cu = 31
Pb = <4.2
Zn = 31
Sample ID Number
As = Arsenic
Cu = Copper
Pb = Lead
Zn = Zinc
Sediment Quality Objectives (mg/Hg)
As = 57
Cu = 390
Pb = 450
Zn = 410
N
0
30
Scale in Feet
Elevations Based on City of Tacoma Datum
AGI TECHNOLOGIES
9373015Bz.dwg
Phase II Sample Analytical Results (mg/kg)
USG Interiors/Bank Cleanup and Restoration
Tacoma, Washington
PROJECT NO. 14,937.316
DRAWN ALW/CEC
DATE 11 Nov 97
APPROVED
REVISED
DATE
FIGURE
7

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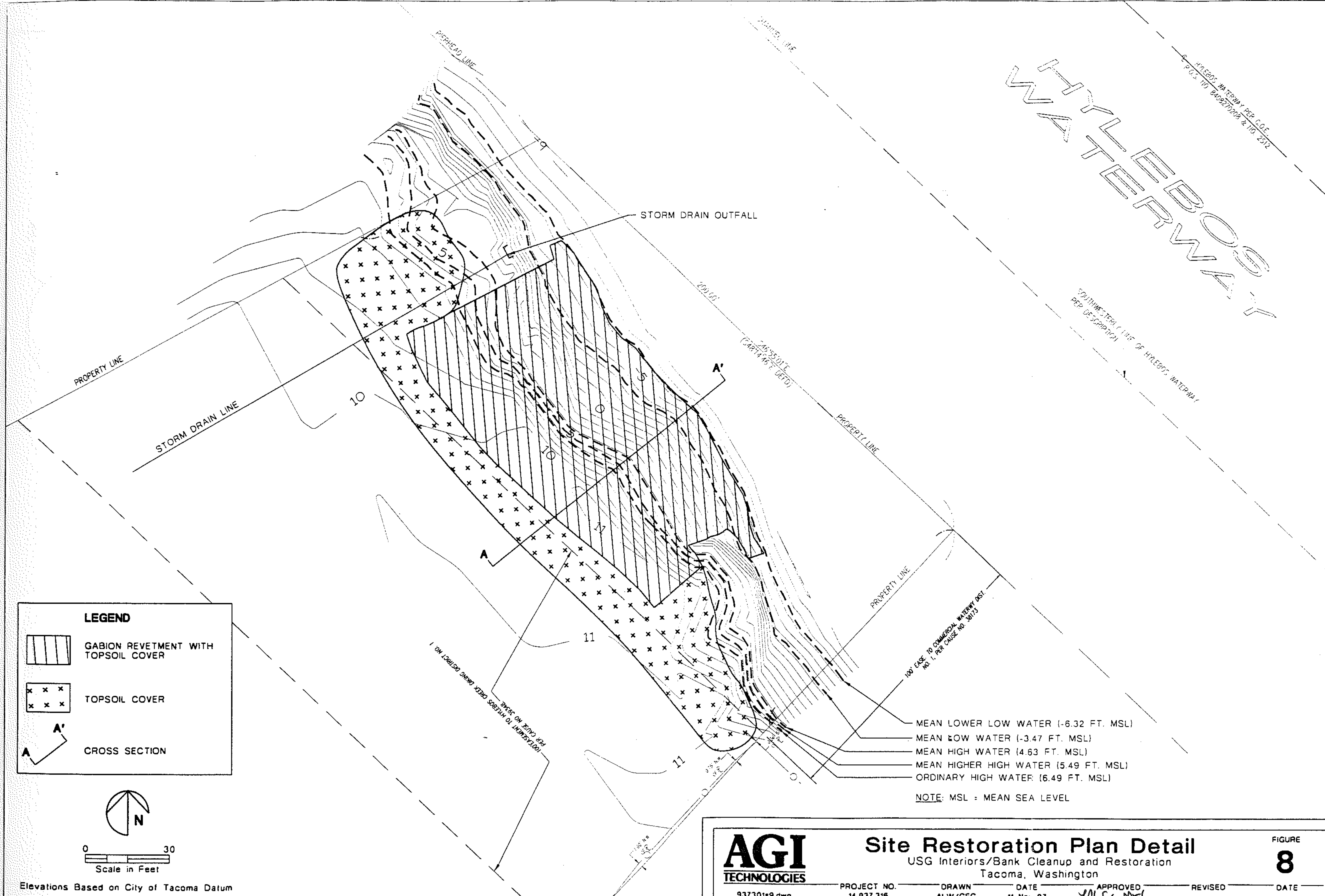

AGI TECHNOLOGIES

Site Restoration Plan Detail

USG Interiors/Bank Cleanup and Restoration
Tacoma, Washington

FIGURE 8

	PROJECT NO.	DRAWN	DATE	APPROVED	REVISED	DATE
93730ls9.dwg	14,937.316	ALW/CEC	11 Nov 97	YAL for MEC		

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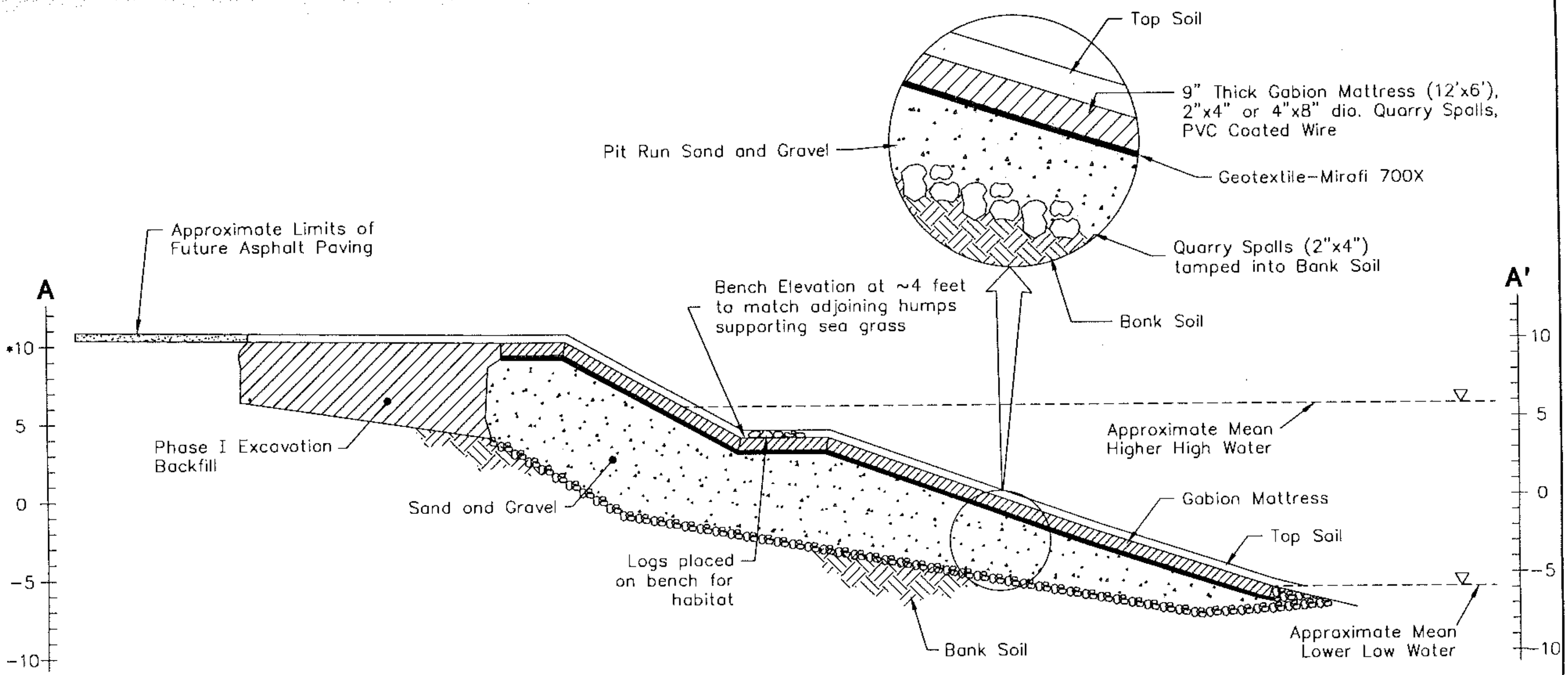

Horizontal and Vertical Scales: 1" = 10'

LEGEND

Ordinary High Water: 6.49 ft. msl

Mean Higher High Water: 5.49 ft. msl

Mean High Water: 4.63 ft. msl

Mean Low Water: −3.47 ft. msl

Mean Lower Low Water: −6.32 ft. msl

*Elevations based on City of Tacoma Datum

msl = Mean Sea Level

NOTES:

1) Quarry Spalls tamped into bank soil by Excavator bucket.

2) Sand and Gravel was placed at a 1' Drop Height (max.) with Final Grading/Compaction by Dozer or Excavator.

3) Gabion placed to match surface contour at slightly below adjoining undisturbed bank surface.

4) Gabion surface was covered with topsoil and tamped into place.

AGI TECHNOLOGIES

Cross Section A-A' - Bank Restoration

USG Interiors/Bank Cleanup and Restoration
Tacoma, Washington

FIGURE **9**

	PROJECT NO.	DRAWN	DATE	APPROVED	REVISED	DATE
bnkresl2.dwg	14,937.319	ALW	14 Jun 96	MEL		

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File copy

AGI TECHNOLOGIES

A Report Prepared For:

USG Corporation
125 South Franklin Street
Post Office Box 6721
Chicago, Illinois 60606

REVISED ADDENDUM NO. 1
BANK CLEANUP AND RESTORATION REPORT
USG INTERIORS, INC.
2301 TAYLOR WAY
TACOMA, WASHINGTON

March 25, 1999

Monica P. Beckman
Senior Engineer

AGI Technologies
11811 N.E. 1st Street, Suite 201
Bellevue, Washington 98005
425/453-8383

AGI Project No. 14,937.320

PERFORMANCE MONITORING

Composite soil samples were collected upon completion of excavation activities in the area of the supplemental cleanup. Samples were collected from the base and bank sides of the excavation.

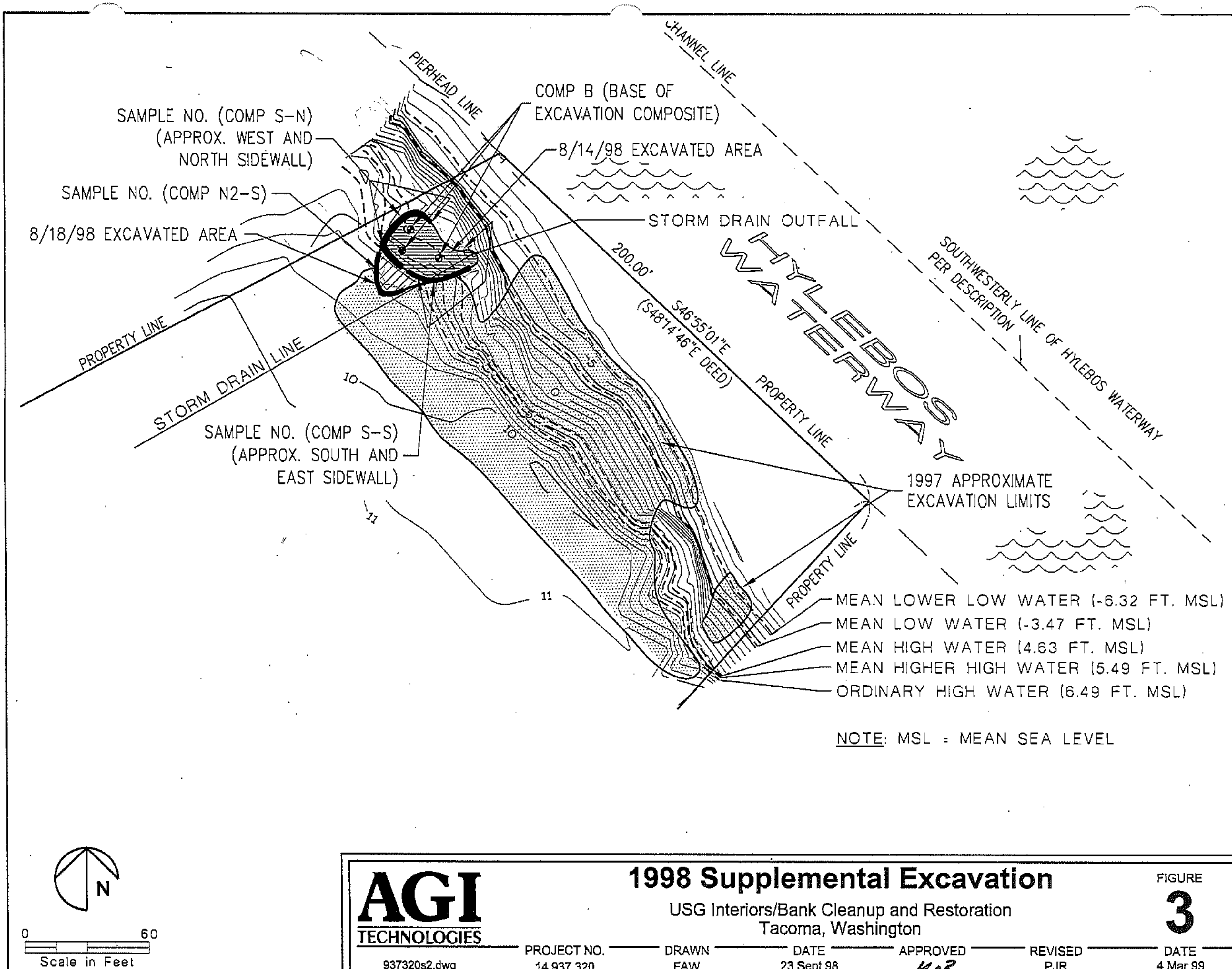
Soil samples were submitted to OnSite Environmental Inc. for analytical testing. Samples were analyzed for total metals (i.e., arsenic, copper, lead, and zinc) by EPA Method 6010 and percentage of moisture. Copies of analytical reports are included in **Appendix B** and results summarized as follows:

	Metals, Total (milligram per kilogram)				
Sample ID	Arsenic	Copper	Lead	Zinc	Percentage of Moisture
Comp-S-N	110*	33	15	56	27
Comp-N2-S	46	20	<6.9	34	28
Comp-S-S	<11	14	6.6	40	7.0
Comp-B	<16	28	<7.8	32	36
Sediment Quality Objective	57	390	450	410	NA

* Additional sediment was removed and cleanup confirmed by sample Comp-N2-S.

SUMMARY AND CONCLUSIONS

Supplemental bank cleanup was completed in substantial accordance with the original work plan. A total of approximately 70 cubic yards (i.e., 86.78 tons) of material were removed and appropriately disposed of offsite. Analytical results indicate that metal concentrations in intertidal sediment and soil remaining in the bank sidewalls and bottom were less than the SQOs established for the site. Based on these results and previous cleanup completed, no further action (i.e., cleanup of bank soils) is required.



AGI TECHNOLOGIES

1998 Supplemental Excavation

USG Interiors/Bank Cleanup and Restoration
Tacoma, Washington

FIGURE 3

	PROJECT NO.	DRAWN	DATE	APPROVED	REVISED	DATE
937320s2.dwg	14,937.320	FAW	23 Sept 98	MPB	PJR	4 Mar 99

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AGI
TECHNOLOGIES

Final Source Controls Implementation
USG Interiors, Inc.
2301 Taylor Way
Tacoma, Washington

June 7, 2000

Prepared For:

USG Corporation
125 South Franklin Street
Chicago, Illinois 60606

AGI Project No. 14,937.321

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AGI TECHNOLOGIES
A CDM COMPANY

Table 1
Soil Sample Analytical Results
USG Interiors, Inc. / Final Source Controls Implementation
Tacoma, Washington

Sample I.D.	Total Arsenic mg/kg	TCLP Arsenic mg/L	Total Copper mg/kg	TCLP Copper mg/L	Total Lead mg/kg	TCLP Lead mg/L	Total Zinc mg/kg	TCLP Zinc mg/L	Resample I.D.
B1@3'	90	-	50	-	45	-	150 J	-	
B2@2'-3'	140	-	17	-	ND	-	26 J	-	
B3@1'-2'	140	-	24	-	6	-	53	-	
B4@2'	66	-	19	-	ND	-	35	-	
B5@3'	11	-	20	-	11	-	45	-	
B6@5'	90	-	24	-	8	-	33	-	
B7@5.5'	ND	-	38	-	9	-	41	-	
B8@5'	ND	-	45	-	12	-	44	-	
B9@4'	21	-	36	-	ND	-	40	-	
B10@3'-4'	240 J	-	57	-	110	-	140 J	-	
B11@2'-3'	450 J	-	25	-	ND	-	32 J	-	B12@3.5'-4'
B12@3.5'-4'	170	-	42	-	9	-	50	-	
B13@2'	290	-	11	-	ND	-	14	-	
B14@2'	ND	-	9	-	ND	-	11	-	
B15@3'	52	-	1	-	ND	-	ND	-	
B16@3'	21	-	23	-	ND	-	27	-	
B17@3'	170	-	15	-	ND	-	18	-	
B18@4'	ND	-	21	-	ND	-	31	-	
B19@4'	14	-	17	-	ND	-	23	-	
B20@4'	60	-	16	-	ND	-	27	-	
B21@5'	ND	-	43	-	11	-	44	-	
B22@3'	29 J	-	16	-	ND	-	30	-	
B23@2'	54 J	-	23	-	9	-	54	-	
B24@4'	71 J	-	33	-	ND	-	37	-	
B25@3'-4'	140 J	-	30	-	ND	-	38	-	
B26@3'	ND J	-	21	-	ND	-	41	-	
B27@2'	40	-	11	-	ND	-	21 J	-	
SW1@0'-2.5'	190	-	35	-	40	-	140 J	-	
SW2@1'-1.5'	180	-	22	-	9	-	51	-	
SW3@1.5'	1,900	8	510	1	2,100	2	1,800	25	SW28@2'-3'
SW4@2'-3'	2,900	-	17	-	ND	-	29	-	SW28@2'-3'
SW5@0'-1.5'	2,800	-	1,100	-	2,000	-	3,700	-	SW29@2'-3'
SW6@2'-3'	1,200	-	16	-	ND	-	46	-	SW29@2'-3'
SW7@1'-2'	1,700 J	-	470	-	1,700	-	1,900 J	-	SW30@2'-3'
SW8@1'	330 J	-	17	-	ND	-	100 J	-	SW10@3
SW9@3'	120	-	39	-	10	-	69	-	
SW10@3'	120	-	27	-	ND	-	29	-	
SW11@1'-2'	74	-	9	-	ND	-	56	-	
SW12@1'-2'	ND	-	23	-	13	-	63	-	
SW13@1'-2'	33	-	21	-	8	-	47	-	
SW14@1'-2'	34	-	10	-	ND	-	13	-	
SW15@1'-2'	43	-	13	-	ND	-	17	-	
SW16@1'-2'	37	-	ND	-	ND	-	ND	-	
SW17@2'-3'	81	-	31	-	16	-	71	-	
SW18@3'	460	3	32	-	17	-	67	-	
SW19@3'-4'	170	-	34	-	9	-	41	-	
SW20@3'-4'	440	1	25	-	ND	-	38	-	
SW21@2'-3'	28 J	-	47	-	27	-	120	-	
SW22@3'-4'	36 J	-	17	-	ND	-	25	-	

14,937\14,937.321\Sample-Results.xls

Table 1
Soil Sample Analytical Results
USG Interiors, Inc. / Final Source Controls Implementation
Tacoma, Washington

Sample I.D.	Total Arsenic mg/kg	TCLP Arsenic mg/L	Total Copper mg/kg	TCLP Copper mg/L	Total Lead mg/kg	TCLP Lead mg/L	Total Zinc mg/kg	TCLP Zinc mg/L	Resample I.D.
SW23@3'-4'	70 J	-	21	-	8	-	50	-	
SW24@2'-3'	420	1	20	0	ND	ND	270 J	5	
SW25@1'-2'	430	ND	18	ND	ND	ND	37 J	2	
SW26@1'-2'	380	1	24	ND	13	ND	51 J	3	
SW27@2'-3'	250	ND	13	0	ND	ND	32	0	
SW28@2'-3'	530	2	21	0	15	ND	67	1	
SW29@2'-3'	490	1	38	0	32	ND	100	1	
SW30@2'-3'	640	3	21	0	14	ND	69	1	
Berm	330	ND	1,800	6	190	ND	340	3	
SP-1	2,000	11	1,400	2	1,100	0	2,700	9	
SP-2	520 J	0.47	840	ND	520	0.25	3,000	6.7	
SP-3	390 J	0.62	650	0.06	270	0.28	860	3.8	
Cleanup Levels [a]	200	5*	NA	NA	1,000	N/A	N/A	N/A	

Notes:

Shading indicates sample was retaken following additional excavation.
* Dangerous Waste Threshold Limit.
a) Method A suggested cleanup level for industrial soil promulgated under Washington Administrative Code Chapter 173-340-745, Model Toxics Control Act Cleanup Regulation.
J - estimated concentrations.
N/A - not available.
ND - not detected.
mg/kg - milligram per kilogram.
B1 @ 3' - Bottom Sample at Specified Depth.
SW1 @ 0-2.5' - Sidewall Sample at Specified Interval (Depth).
SP1 - Stockpile Sample.

AGI TECHNOLOGIES

937321_fig_3.dwg

MW-9 Area Delineation

USG Interiors/ Final Source Controls Implementation
Tacoma, Washington

FIGURE 3

PROJECT NO.	DRAWN	DATE	APPROVED	REVISED	DATE
14,937.321	PJR	7 Feb 00	MEC		

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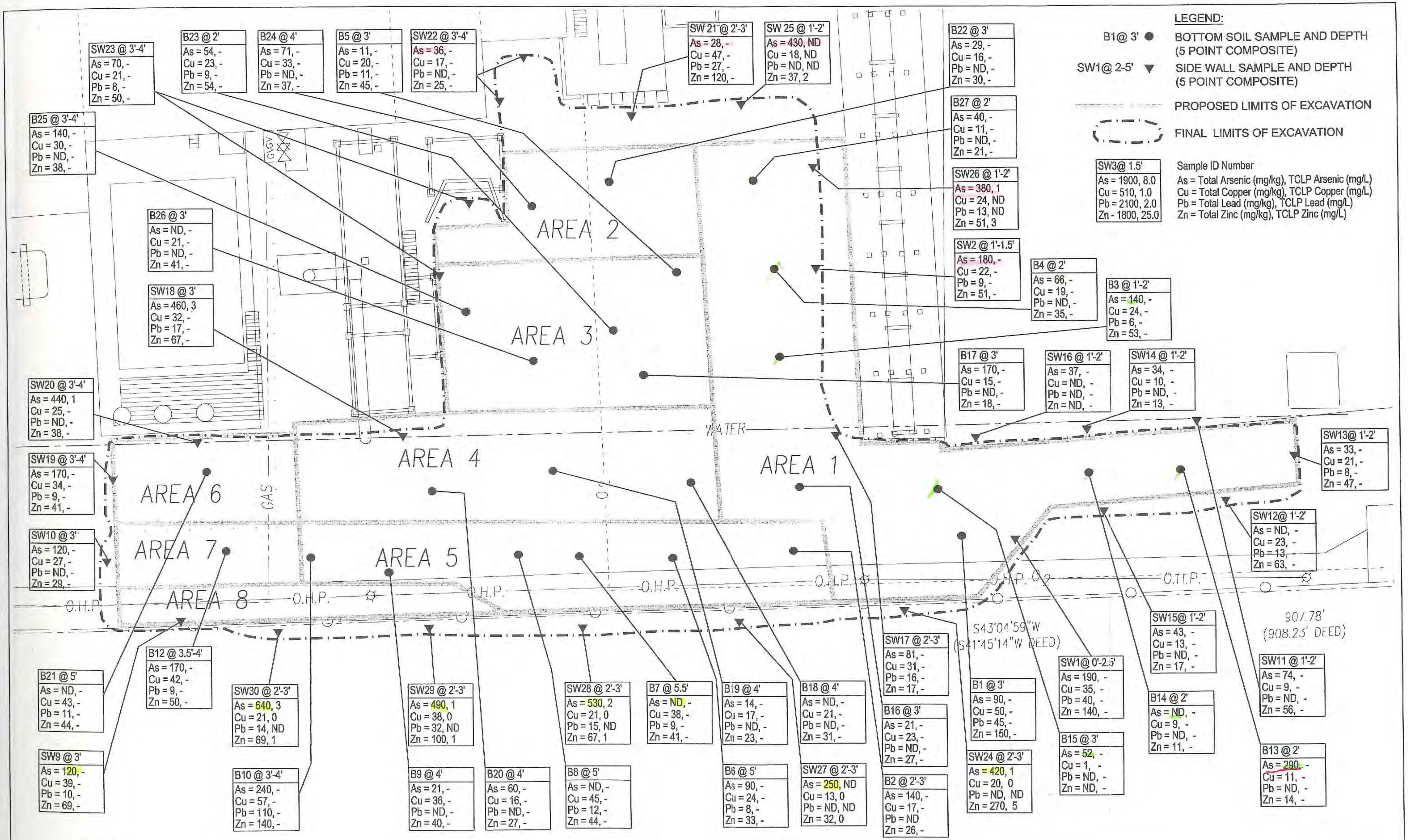

AGI TECHNOLOGIES

Sample Locations and Analytical Results

USG Interiors / Final Source Controls Implementation
Tacoma, Washington

FIGURE 4

937321_fig_4.dwg | PROJECT NO. 14,937.321 | DRAWN PJR | DATE 7 Feb 00 | APPROVED | REVISED | DATE

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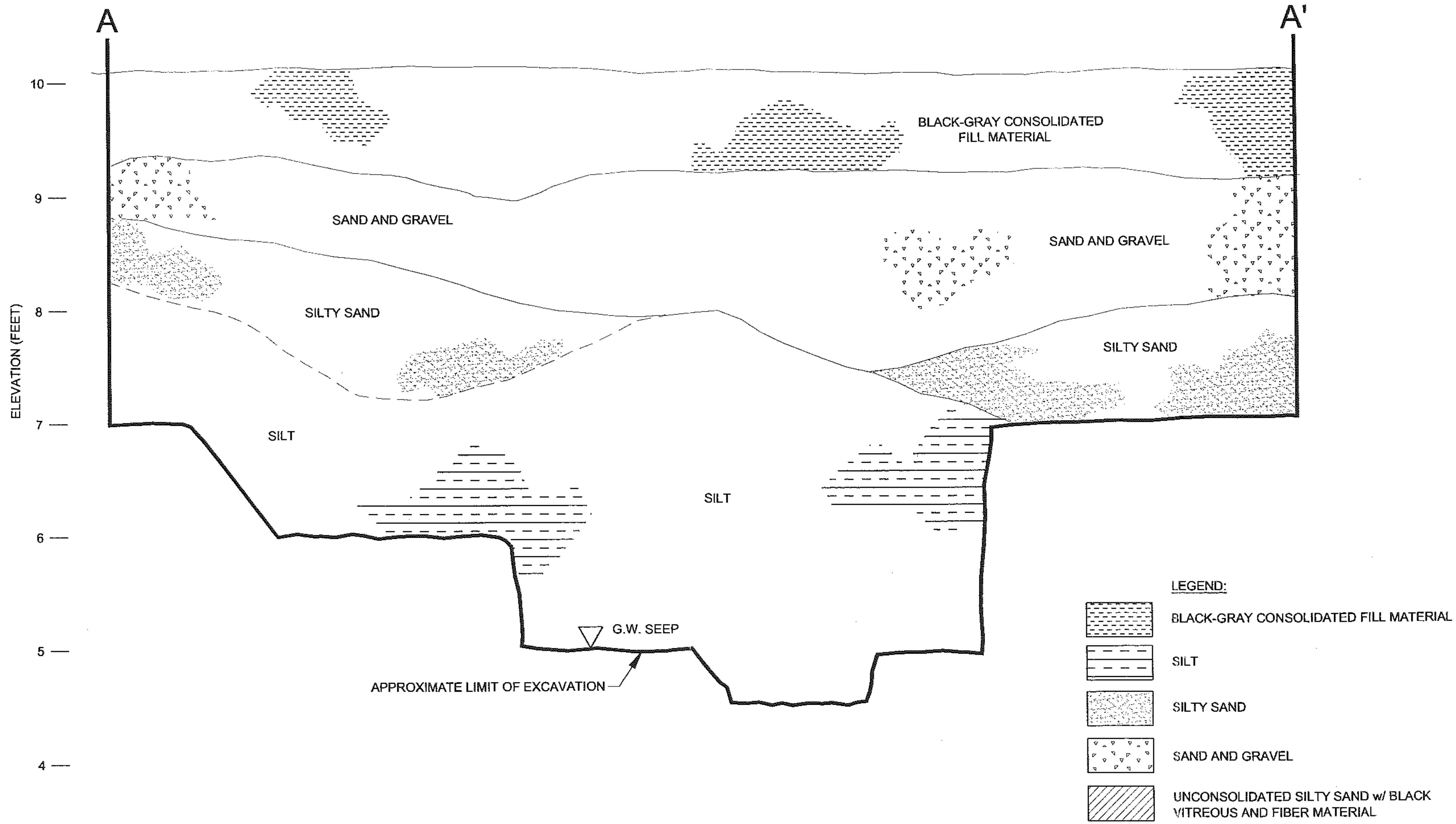
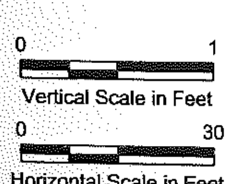


NOTE: CROSS SECTION IS GENERALIZED



AGI TECHNOLOGIES

937321-sxn-a.dwg

Cross Section A-A'

USG Interiors / Final Source Controls Implementation
Tacoma, Washington

FIGURE **5**

PROJECT NO.	DRAWN	DATE	APPROVED	REVISED	DATE
14,937.321	MDW	31 Jan 00	MEC	-	-

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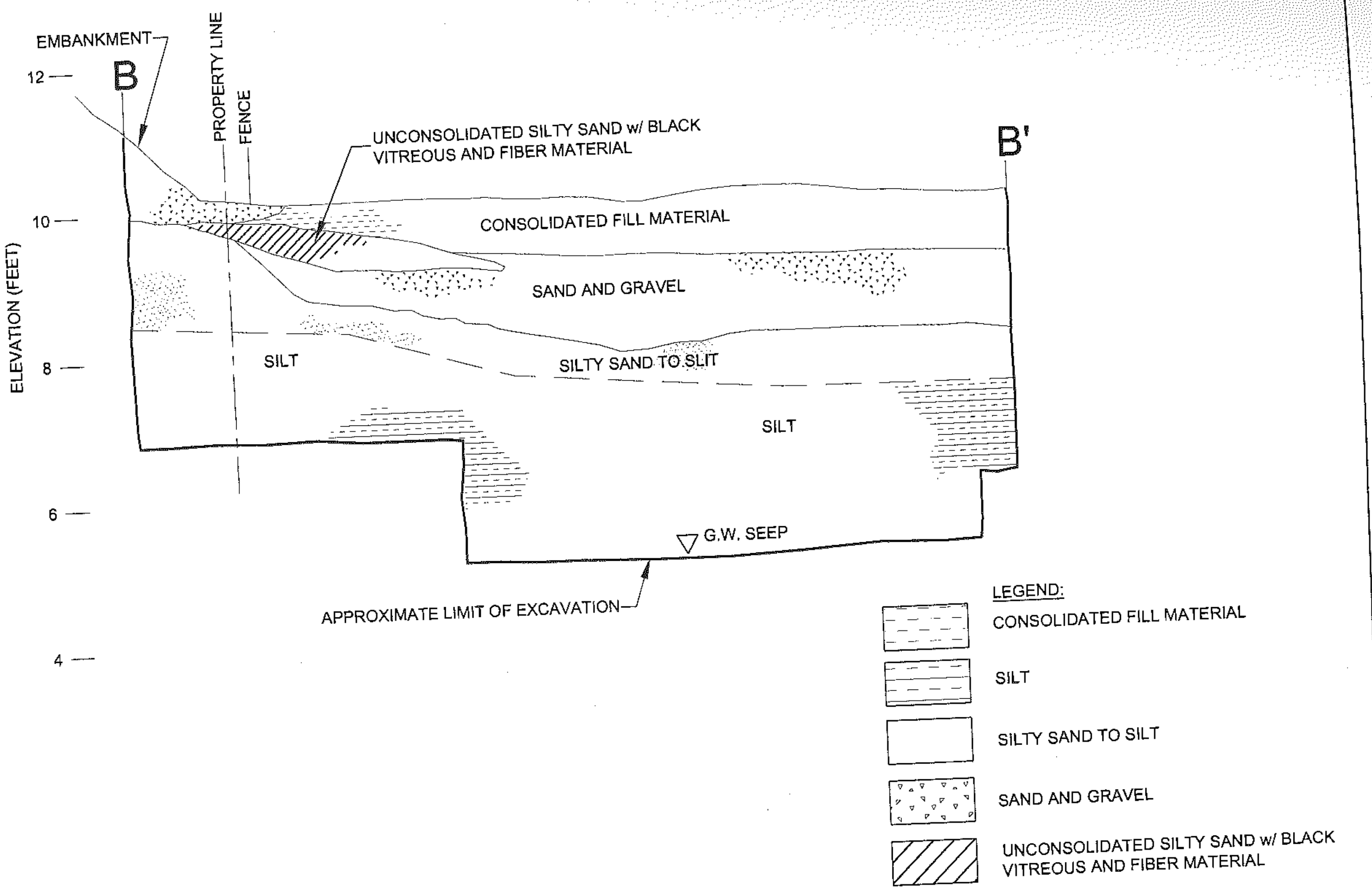
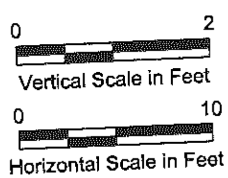


NOTE: CROSS SECTION IS GENERALIZED



AGI TECHNOLOGIES

Cross Section B-B'

USG Interiors / Final Source Controls Implementation
Tacoma, Washington

FIGURE 6

PROJECT NO.	DRAWN	DATE	APPROVED	REVISED	DATE
14,937.321	PJR	2 Feb 00	MEC		

937321-sxn-b.dwg

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CDM

June 2005 Interim Action Soil Excavation Summary Former USG Interiors Facility 2301 Taylor Way Tacoma, Washington

October 3, 2005

Prepared For:

USG Corporation
125 South Franklin Street
Post Office Box 6721
Chicago, Illinois 60680-6721

Prepared By:

CDM
11811 NE 1st Street, Suite 201
Bellevue, Washington 98005

CDM Project No. 19921.38072

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Table 4
B13 Excavation - Metals Summary
USGI/Soil Excavation Summary
Tacoma, Washington

Sample Location	Date Sampled	Sample Depth ft bgs	Total Metals (EPA 6010B) Arsenic Lab mg/kg	Arsenic XRF ppm	Lead Lab mg/kg	Lead XRF ppm
Excavation Bottom						
B13F-1	06/15/05	6	53	40	10	7 J
B13F-2	06/15/05	6	30	15 J	24	11 J
B13F-3	06/15/05	6	176	164	3	11 J
B13F3A [a]	06/21/05	8	16	11 J	--	9 J
B13F-4	06/15/05	6	9	8 J	12	16 J
B13F-5	06/15/05	6	<10	8 J	15	12 J
B13F-9	06/16/05	5	10	9 J	16	13 J
B13F-10	06/16/05	5	49	51	10	14 J
B13F-11	06/16/05	5	40	30	30	15 J
Sidewalls						
B13W-6	06/15/05	4	34	32	4	10 J
B13W-7	06/15/05	5	101	49	4	7 J
B13W7A	06/21/05	5	21	17	--	<7
B13W-8	06/15/05	5	23	15	9	<6
B13W-12	06/16/05	1	260	200	11	<7
B13W-13	06/16/05	3	<8	6 J	8	8 J
B13W-14	06/16/05	4	30	22 J	13	13 J
B13W-15	06/16/05	3	60	41	9	11 J
B13W-16	06/16/05	3	<9	12 J	7	9 J
B13W-17	06/16/05	3	106	87	3	9 J
B13W-18	06/16/05	3	21	23	4	<7
B13W-19	06/16/05	3	27	24	2	9 J
B13W-20	06/16/05	2	280	182	419	335
B13W-21	06/16/05	2	110	142	653	127
Pre-Excavation Samples						
B13W40	06/14/05	1	3,200	5,868	2,030	2,910
B13W41	06/14/05	1	2,580	3,015	1,570	1,699
B13F42	06/14/05	1	1,010	878	570	486

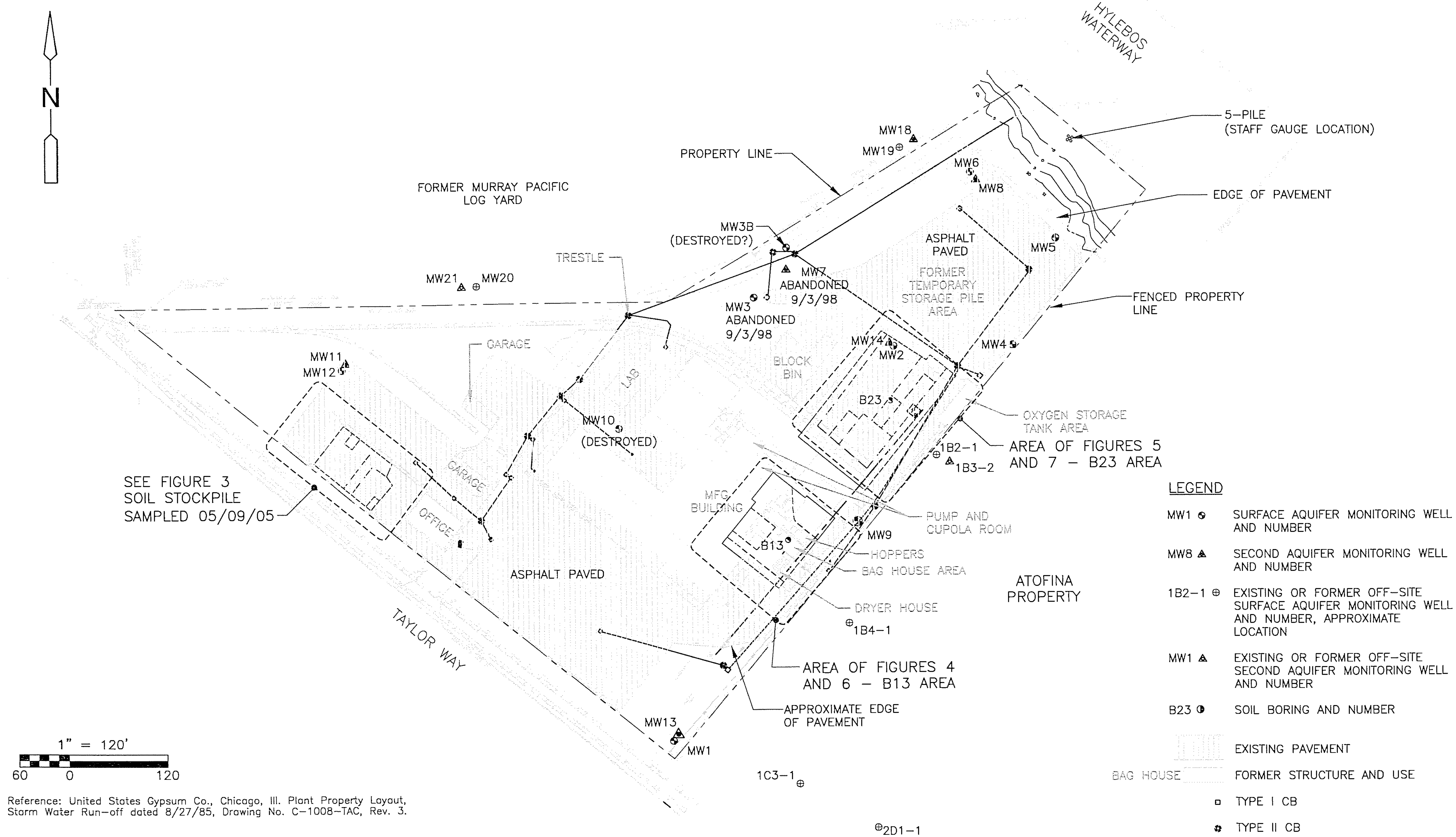
Notes:
Shaded area denotes soil in sampled areas excavated.
a) Sample ID (B23F3A-6/21/05) on the chain of custody is in error.
XRF - x-ray fluorescence spectrometer.
ft bgs - feet below ground surface.
mg/kg - milligrams per kilogram.
ppm - parts per million.
J - estimated.
-- not analyzed.
< - analyte not detected at or greater than the listed concentration.

CDM

Table 5
B23 Excavation - Metals Summary
USGI/Soil Excavation Summary
Tacoma, Washington

Sample Location	Date Sampled	Sample Depth ft bgs	Total Metals (EPA 6010B) Arsenic Lab mg/kg	Arsenic XRF ppm	Lead Lab mg/kg	Lead XRF ppm
Exavation Bottom						
B23-F-1	06/17/05	4	59	39	20	14 J
B23-F-2	06/17/05	5	<3	<5	2	<7
B23-F-3	06/17/05	4	54	39	7	7 J
B23F4	06/20/05	4	5	9 J	5	8 J
B23F5	06/20/05	3	7	<5	2	<7
B23F6	06/20/05	3	214	98	232	131
B23F6A	06/28/05	4	<9	9	--	<6
B23F7	06/20/05	3	92	57	103	55
B23F7A	06/28/05	4	10	5	--	<6
B23F8	06/20/05	3	46	31	4	7
Sidewalls						
B23W1	06/20/05	2.5	190	139	5	13 J
B23W2	06/20/05	2.5	131	72	2	10 J
B23W3	06/20/05	2.5	16	21 J	2	<8
B23W4	06/21/05	1	<7	6 J	--	<7
B23W5	06/21/05	1	103	71	--	103
B23W6	06/21/05	1	47	28	--	32
B23W7	06/21/05	1	10	22	--	8 J
B23W8	06/21/05	1	87	92	--	8 J
B23W9	06/21/05	1.5	475	415	--	12 J
B23W9A	06/28/05	1.5	290	125	--	<7
B23W10	06/21/05	1	491	537	--	241
B23W10A	06/28/05	1.5	86	59	--	<6

Notes:
Shaded area denotes soil in sampled areas overexcavated.
XRF - x-ray fluorescence spectrometer.
ft bgs - feet below ground surface.
mg/kg - milligrams per kilogram.
ppm - parts per million.
J - estimated.
-- not analyzed.
< - analyte not detected at or greater than the listed concentration.



P:\5000\46466\Rept\ Fig_2 07/28/05 16:20 moffatjh XREFS: NEW SITE, 11X17BDR

USG INTERIORS
SOIL EXCAVATION SUMMARY
TACOMA, WASHINGTON

Figure No. 2
Site Plan

CDM

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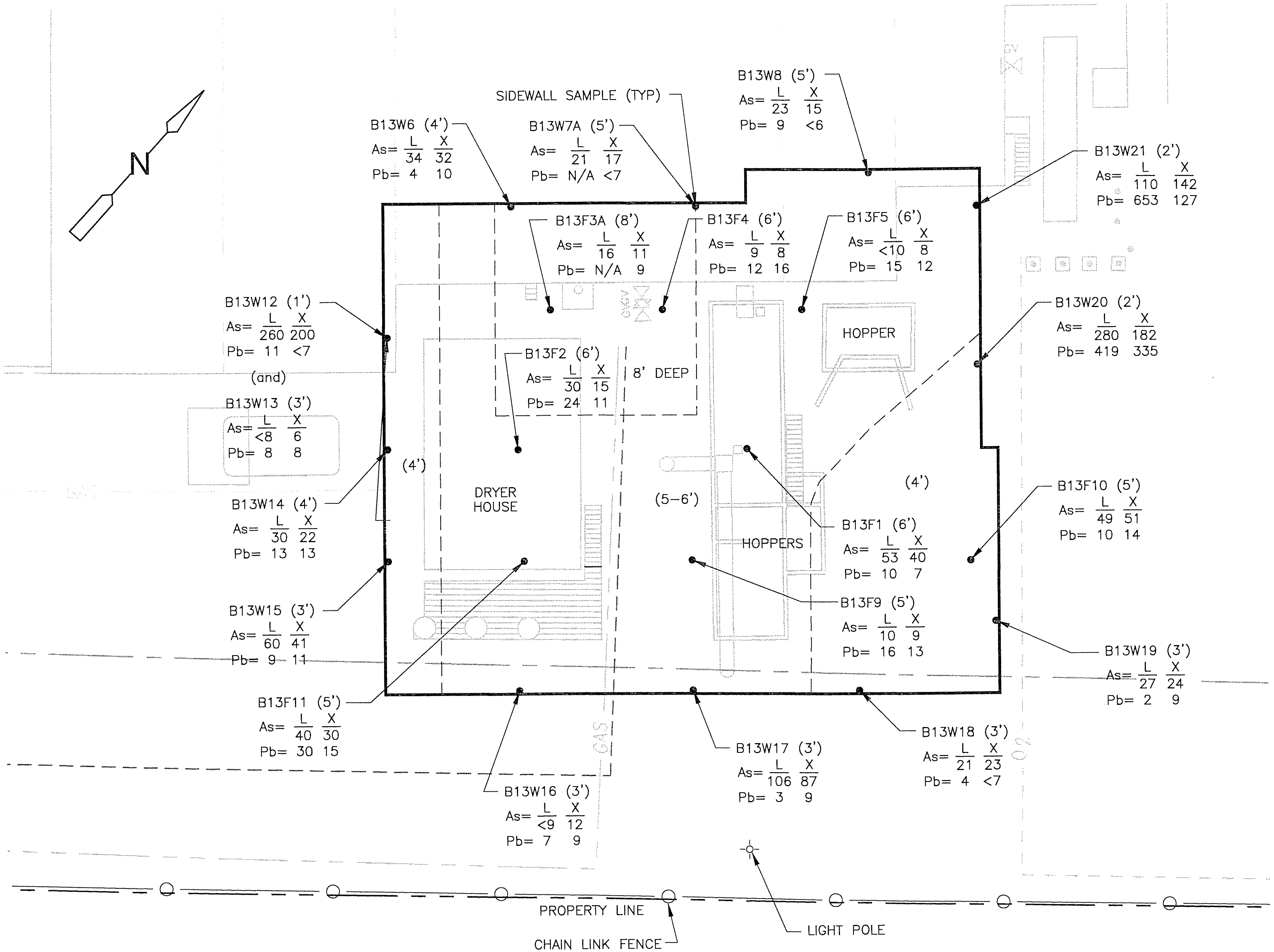

Reference: United States Gypsum Co., Chicago, Ill. Plant Property Layout, Storm Water Run–off dated 8/27/85, Drawing No. C–1008–TAC, Rev. 3.

P:\5000\46466\Rept\ Fig_6 07/28/05 17:06 moffatjh XREFS: 11X17BDR, NEW SITE

NOTES:

1. SHADED BACK LINES DENOTE HISTORICAL SITE FEATURES.
2. EXCAVATION LIMITS AND SAMPLE LOCATIONS MEASURED OFF THE LIGHT POLE ADJACENT TO THE PROPERTY LINE

LEGEND

B13W12 (1') ● SOIL SAMPLE LOCATION, DESIGNATION, AND DEPTH

As= L 10 X 9
Pb= 16 13
ARSENIC (As) AND LEAD (Pb) CONCENTRATIONS AS REPORTED BY THE LABORATORY (L) AND X–RAY FLUORESCENCE (XRF) SPECTROMETER. LAB ANALYTICAL REPORTED CONCENTRATIONS IN MILLIGRAMS PER KILOGRAM. XRF REPORTED CONCENTRATIONS IN PARTS PER MILLION. (NA = NOT ANALYZED)

EXCAVATION LIMITS

4' OVERALL DEPTH IN SUBAREAS OF EXCAVATION

1" = 20'
10 0 20

CDM

USG INTERIORS
SOIL EXCAVATION SUMMARY
TACOMA, WASHINGTON

Figure No. 6
B13 Excavation and Sample Locations

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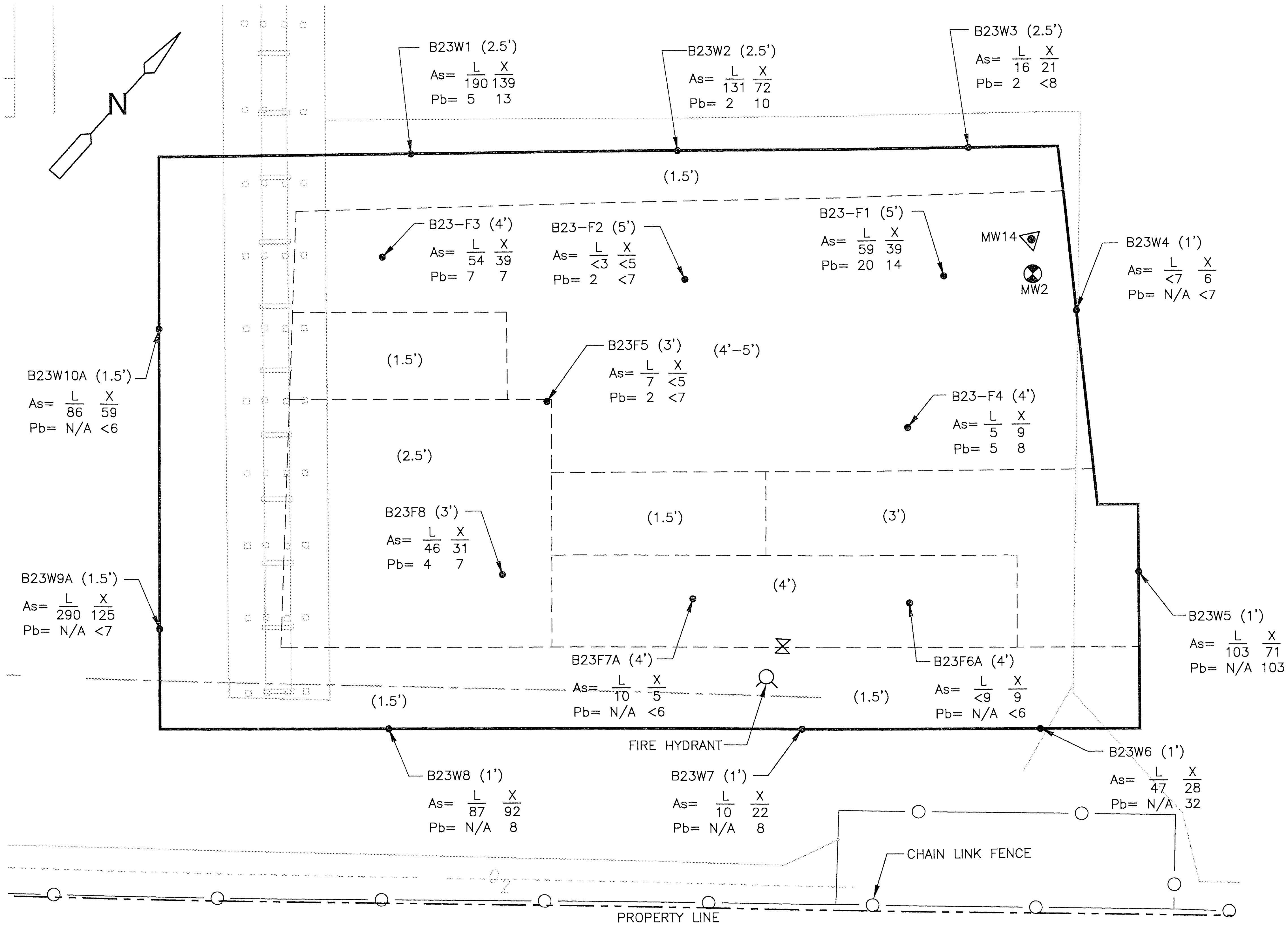

P:\5000\46466\Rept\ Fig_7 07/28/05 17:15 moffatjh XREFS: 11X17BDR, NEW SITE

NOTES:

1. SHADED BACK LINES DENOTE HISTORICAL SITE FEATURES.
2. EXCAVATION LIMITS AND SAMPLE LOCATIONS MEASURED OFF THE LIGHT POLE ADJACENT TO THE PROPERTY LINE

LEGEND

B13W12 (1') ● SOIL SAMPLE LOCATION, DESIGNATION, AND DEPTH

As= L 10 X 9
Pb= 16 13
ARSENIC (As) AND LEAD (Pb) CONCENTRATIONS AS REPORTED BY THE LABORATORY (L) AND X-RAY FLUORESCENCE (XRF) SPECTROMETER. LAB ANALYTICAL REPORTED CONCENTRATIONS IN MILLIGRAMS PER KILOGRAM. XRF REPORTED CONCENTRATIONS IN PARTS PER MILLION. (NA = NOT ANALYZED)

(3.5') OVERALL DEPTH IN SUBAREAS OF EXCAVATION.

EXCAVATION LIMITS

MW2 SURFACE AQUIFER MONITORING WELL AND NUMBER

MW14 SECOND AQUIFER MONITORING WELL AND NUMBER

1" = 20'
10 0 20

Reference: United States Gypsum Co., Chicago, Ill. Plant Property Layout, Storm Water Run-off dated 8/27/85, Drawing No. C-1008-TAC, Rev. 3.

USG INTERIORS
SOIL EXCAVATION SUMMARY
TACOMA, WASHINGTON

CDM

Figure No. 7
B23 Excavation and Sample Locations

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Kennedy/Jenks Consultants

32001 32nd Avenue South, Suite 100
Federal Way, Washington 98001
253-874-0555
253-952-3435 (Fax)

Former Thermafiber Site Soil Removal and Waste Disposal Report

November 2003

Prepared for

Thermafiber LLC
3711 West Mill Street
Wabash, Indiana 46992

K/J Project No. 026149.00

TABLE 2

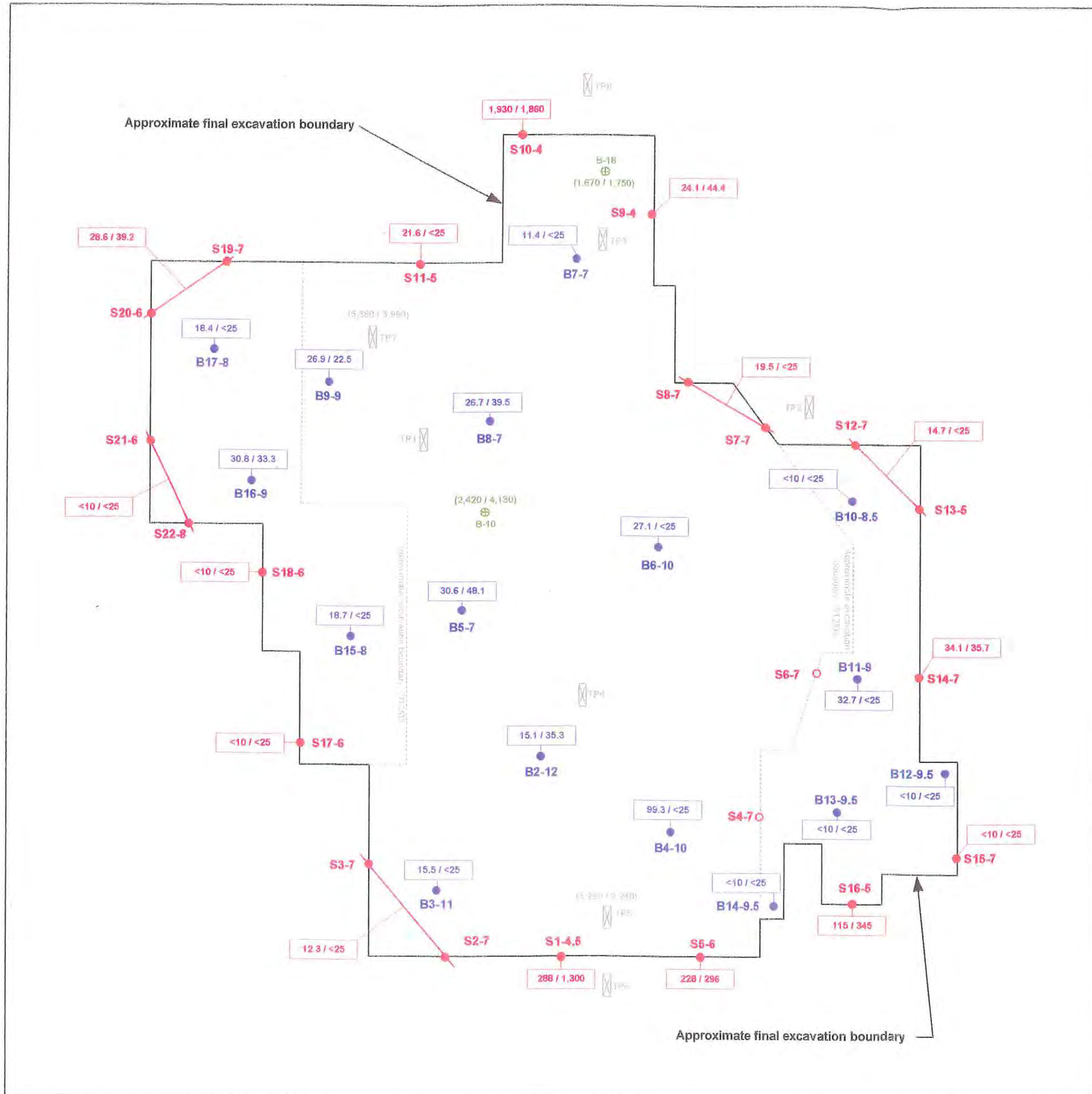
SUMMARY OF ANALYTICAL RESULTS FOR PETROLEUM HYDROCARBONS
Former Thermafiber Facility -- Tacoma, Washington

Sample Designation	Sample Depth (ft)	Sample Type	Diesel-Range TPH Concentration (mg/kg)[a]	Oil-Range TPH Concentration (mg/kg)[a]
Previous Soil Boring Samples (Kennedy/Jenks Consultants 2002)				
B10-0.5-2.8[b]	0.5 to 2.8	Discrete	1,700	***4,130***
B10-7-9[b]	7 to 9	Discrete	***2,420***	***2,310***
B18-1.5-3.5[b]	1.5 to 3.5	Discrete	1,670	1,750
Test Pit Characterization Soil Samples				
HC-TP5-5[b]	5	Discrete	***5,290***	***3,280***
HC-TP7-4[b]	4	Discrete	***5,580***	***3,990***
Petroleum Hydrocarbon-Affected Soil Excavation Sidewall Samples				
S1-4.5	4.5	Discrete	288	1,300
S2-7 S3-7	7 7	Laboratory Composite	12.3	<25[c]
S4-7[b]	7	Discrete	***10,100***	***17,100***
S5-6	6	Discrete	228	296
S6-7[b]	7	Discrete	***3,820***	***5,410***
S7-7 S8-7	7 7	Laboratory Composite	19.5	<25
S9-4	4	Discrete	24.1	44.4
S10-4	4	Discrete	1,930	1,860
S11-5	5	Discrete	21.6	<25
S12-7 S13-7	7 7	Laboratory Composite	14.7	<25
S14-7	7	Discrete	34.1	35.7
S15-7	7	Discrete	<10	<25
S16-5	5	Discrete	115	345
S17-6	6	Discrete	<10	<25
S18-6	6	Discrete	<10	<25
S19-7 S20-6	7 6	Laboratory Composite	28.6	39.2
S21-6 S22-8	6 8	Laboratory Composite	<10	<25
Petroleum Hydrocarbon-Affected Soil Excavation Bottom Samples				
B2-12	12	Discrete	15.1	35.3
B3-11	11	Discrete	15.5	<25
B4-10	10	Discrete	99.3	<25
B5-7	7	Discrete	30.6	48.1
B6-10	10	Discrete	27.1	<25
B7-7	7	Discrete	11.4	<25
B8-7	7	Discrete	26.7	39.5
B9-9	9	Discrete	26.9	22.5
B10-8.5	8.5	Discrete	<10	<25
B11-9	9	Discrete	32.7	<25
B12-9.5	9.5	Discrete	<10	<25
B13-9.5	9.5	Discrete	<10	<25
B14-9.5	9.5	Discrete	<10	<25
B15-8	8	Discrete	18.7	<25
B16-9	9	Discrete	30.8	33.3
B17-8	8	Discrete	18.4	<25
MTCA Method A Industrial Soil Cleanup Level			2,000	2,000

Notes:

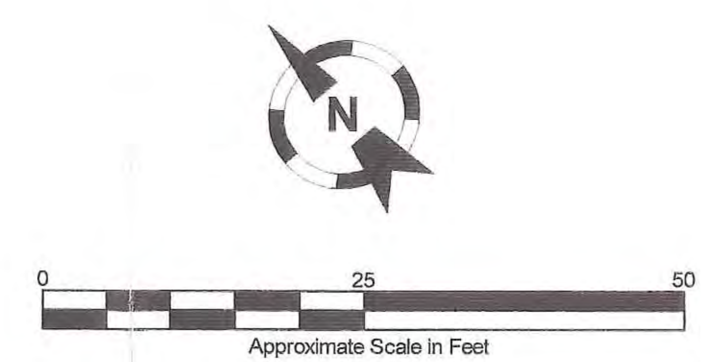
a) Diesel- and oil-range petroleum hydrocarbons analyzed by Ecology Method NWTPH-Dx (extended).
b) Soil material represented by the samples was subsequently removed from the excavation. Refer to Figure 3 for sample locations.
c) "<" denotes that the analyte was not detected at a concentration above the indicated laboratory reporting limit.

Concentrations above the indicated cleanup level are shown in bold and italics



LEGEND:

B8-7 ●	Confirmation Soil Sample Location and Designation--Excavation Bottom
S2-7 ●	Confirmation Soil Sample Location and Designation--Excavation Sidewalls
S6-7 ○	Confirmation Soil Sample Location and Designation--Excavation Sidewalls (SOIL SUBSEQUENTLY EXCAVATED)
26.7 / 39.5	Diesel- and Oil-Range Petroleum Hydrocarbon Concentration (diesel / oil) in mg/kg for Bottom Samples ("<" denotes a concentration below the laboratory reporting limit)
19.5 / <25	Diesel- and Oil-Range Petroleum Hydrocarbon Concentration (diesel / oil) in mg/kg for Sidewall Samples ("<" denotes a concentration below the laboratory reporting limit)
	Denotes a Laboratory Composite Analysis
TP1	Approximate Exploratory Test Pit Location and Designation
(5,880 / 3,990)	Diesel- and Oil-Range Petroleum Hydrocarbon Concentration (diesel / oil) in mg/kg for Exploratory Test Pits (SOIL SUBSEQUENTLY EXCAVATED)
B-10 ⊕	Approximate Previous Soil Boring Location and Designation (Kennedy/Jenks Consultants 2002)
(1,670 / 1,750)	Diesel- and Oil-Range Petroleum Hydrocarbon Concentration (diesel / oil) in mg/kg for Previous Soil Borings (SOIL SUBSEQUENTLY EXCAVATED)



Kennedy/Jenks Consultants

FORMER THERMAFIBER FACILITY
2301 TAYLOR WAY
TACOMA, WASHINGTON

PETROLEUM HYDROCARBON EXCAVATION AREA AND CONFIRMATION SOIL SAMPLING MAP

026149.00/HCEXMAP.VSD

FIGURE 3

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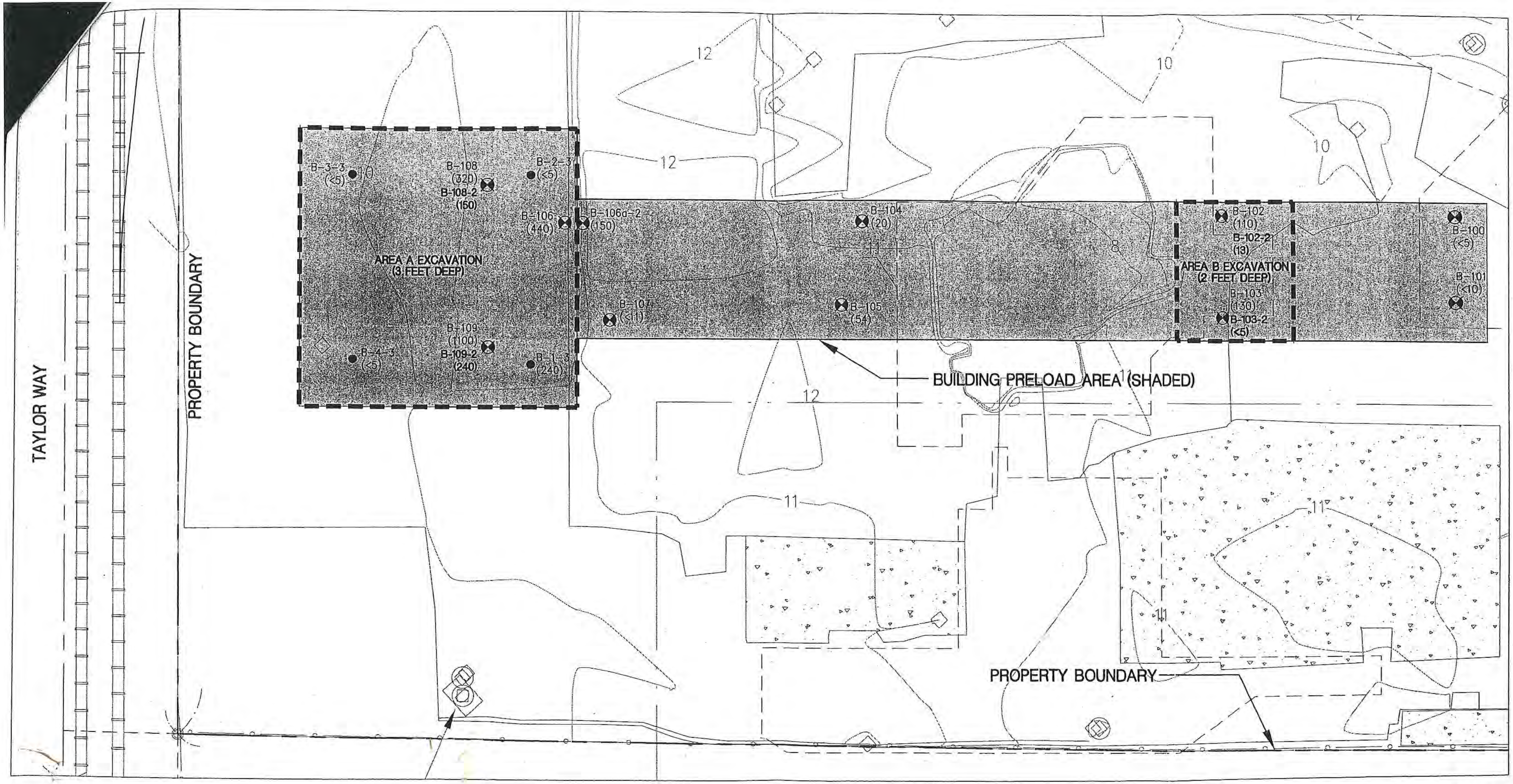

LEGEND:

B-109 (1100) TOTAL ARSENIC CONCENTRATION (mg/kg) SAMPLE DATE 10 SEPTEMBER 2004

B-109-2 (240) TOTAL ARSENIC CONCENTRATION (mg/kg) SAMPLE DATE 11 OCTOBER 2004

B-3-3 (<5) TOTAL ARSENIC CONCENTRATION (mg/kg) SAMPLE DATE 15 NOVEMBER 2004

EXCAVATION AREA

NOTE:

ALL LOCATIONS ARE APPROXIMATE.

BUILDING FOOTPRINT
PROVIDED BY COLE & THOMPSON ARCHITECTS.

N

0 20 40

APPROXIMATE SCALE IN FEET

Kennedy/Jenks Consultants

CARLILE LEASEHOLD
TACOMA, WASHINGTON

SAMPLING LOCATION AND EXCAVATION AREA LOCATION MAP

046006.00/P04SK001A

FIGURE 1

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UNDERGROUND STORAGE TANK DECOMMISSIONING/SITE ASSESSMENT AND FINAL CLEANUP

PORT OF TACOMA/CARLYLE
2301 TAYLOR WAY
TACOMA, WASHINGTON 98401

SUBMITTED TO:

PORT OF TACOMA
ENVIRONMENTAL SECTION
P.O. BOX 1837
TACOMA, WASHINGTON 98401-1837

PREPARED BY:

DLH ENVIRONMENTAL CONSULTING
2400 NW 80TH STREET
PMB #114
SEATTLE, WASHINGTON 98117-4449

OCTOBER 14, 2005

TABLE OF CONTENTS

1.0 PROJECT DESCRIPTION/SCOPE OF WORK

During construction activities at the subject property in August 2005, an underground storage tank (UST) was discovered that had not be previously documented. During the preparation for the removal of the tank, an additional tank was discovered. No information regarding these tanks was found in historical research. A concrete slab and possibly an old pump island (no pumps) was also uncovered and later removed.

The tanks were removed by Glacier Environmental Services, Inc. of Mukilteo, Washington. Donna Hewitt of DLH Environmental Consulting (DLH) was on-site to conduct the site assessment during tank removal operations and to conduct confirmational soil sampling. Ms. Hewitt is a WDOE registered Site Assessor and an IFCI Underground Storage Tank Decommissioning Supervisor (ICC #1044716-U2). Laboratory analysis was conducted by Spectra Laboratories located in Tacoma, Washington and Friedman and Bruyah Inc. of Seattle, WA (see Appendix B for laboratory reports and chain of custody forms). Tank disposal was conducted by Glacier Environmental Services, Inc. (see Appendix D for disposal data), and stockpiled soil was disposed of at the Tacoma LRI Facility.

The following tanks were decommissioned:

- Tank 1 (T1) 5000 gal diesel
- Tank 2 (T2) 4000 gal diesel

A site sketch showing the location of the tanks is provided in Appendix A.

As part of the site assessment, soil samples were collected from the tank excavations and analyzed for hydrocarbon content. Stockpiled soils were also sampled and analyzed. The required WDOE UST permanent closure/site assessment form was completed and is a part of this report (see Appendix C).

2.0 METHODS OF INVESTIGATION

Soil surrounding the tanks was removed from the first tank and the tank was pumped out and the product was sampled for identification. After the second tank was discovered, the tanks were pumped again, inerted, cut open, then removed and hauled off site for disposal (Appendix D).

One soil sample was collected from overburden soils for hydrocarbon identification using Method NWTPH-HCID (analysis by Friedman & Bruyah, Inc.). After the soil was determined to contain diesel and not gasoline, additional soil samples for hydrocarbon analysis were collected from the bottom and sidewalls of the tank excavations and from stockpiled soils. Sidewall soil samples were collected from two distinct soil layers at depth and in contact with the tanks: an unconsolidated fill layer (referred to as the top layer) and a clay layer (referred to as the bottom layer) see Figure 2 in Appendix A. Soil samples (13 total) were placed in sterilized glassware furnished by the project analytical laboratories. In an effort to minimize the possible loss of any volatile hydrocarbons that may have been present in the soil, the samples were stored in an iced chest until delivered to the laboratory.

All EPA-established sample-handling protocols, including chain of custody procedures, were observed during the course of the project.

Samples were analyzed according to the WDOE document "Guidance for Site Checks and Site Assessments for Underground Storage Tanks," February 1991 (Revised October 1992), which included Methods NWTPH-HCID, NWTPH-DX, and BTEX. In addition, the soil samples were analyzed for PNA/PAHs (8270C), arsenic, and lead per Port of Tacoma protocols for the site.

3.0 RESULTS OF INVESTIGATION

3.1 Soil Conditions

Site soils surrounding the tanks consisted of approximately 6 feet of recently deposited clean fill underlain by asphalt, concrete, an unconsolidated fill layer, then a clay layer (see Figure 2 in Appendix A).

3.2 Groundwater

Seasonal perched water was noted at approximately 9 feet below ground level.

3.3 Observation of Tank Removal Activities

Prior to removal, the tanks were pumped by Marine Vacuum Services of Seattle, Washington. On the day of removal, additional pumping was required (mostly water), then the tanks were inerted by Sound Testing, Inc. Once the tanks were inerted, holes were cut in the tops of the tanks and the tanks were cleaned and rinsed.

The tanks were removed from the ground with a backhoe, placed on trailer for removal from the site, and inspected for holes. Numerous holes were present in each tank.

3.4 Hydrocarbon Testing

Soil samples were collected from stockpiled soils, excavation walls (in the two soil types on each sidewall described previously) and below the tanks. The samples were analyzed for Total Petroleum Hydrocarbon (TPH) content using Method NWTPH-Dx for diesel and BTEX. The results of laboratory analysis are presented in Table A. Laboratory reports are located in Appendix B.

3.5 Additional Testing

Additional sampling for PAH/PNAs, arsenic, and lead was requested by the Port of Tacoma. These results are presented in Table B and Table C.

TABLE A
Soil Sample Analytical Results
Hydrocarbons

Sample #	Sample Location	Analysis	Results
T1-83005	Overburden soils from Tank 1	NWTPH-HCID	diesel
83105-S-1	South side wall in top layer	NWTPH-Dx BTEX	< 100 ppm BC
83105-S-2	South side wall in bottom layer	NWTPH-Dx	< 100 ppm
83105-W-1	West side wall in top layer	NWTPH-Dx BTEX	< 100 ppm BC
83105-W-2	West side wall in bottom layer	NWTPH-Dx	< 100 ppm
83105-E-1	East side wall in top layer	NWTPH-Dx BTEX	< 100 ppm BC
83105-E-2	East side wall in bottom layer	NWTPH-Dx	< 100 ppm
83105-N-1	North side wall in top layer	NWTPH-Dx BTEX	< 100 ppm BC
83105-N-2	North side wall in bottom layer	NWTPH-Dx	< 100 ppm
83105-T1-B	Tank 1, bottom soil sample in the bottom layer	NWTPH-Dx BTEX	< 100 ppm BC
83105-T2-B	Tank 2, bottom soil sample in bottom layer	NWTPH-Dx	< 100 ppm
83105-STOCK 1	Stockpiled overburden material, Tank 1	NWTPH-Dx	< 100 ppm
83105-STOCK-2	Stockpiled overburden material, Tank 2	NWTPH-Dx	<100 ppm
83105-STOCK-3	Stockpiled soil from the sides and below tanks	NWTPH-Dx	< 100 ppm

NWTPH = Northwest Total Petroleum Hydrocarbon
HCID = Hydrocarbon Identification
BTEX = Benzene, toluene, ethyl benzene, xylene
BC = Below cleanup
ppm = Parts per million
Dx = Diesel extended to include heavy oil

TABLE B
Soil Sample Analytical Results
PAH/PNA

Sample #	Sample Location	Analysis	Results
83105-S-1	South side wall in top layer	SW84 8 8270C	BC
83105-W-1	West side wall in top layer	SW84 8 8270C	BC
83105-E-1	East side wall in top layer	SW84 8 8270C	BC
83105-N-1	North side wall in top layer	SW84 8 8270C	BC
83105-N-2	North side wall in bottom (clay) layer	SW84 8 8270C	BC
83105-T1-B	Tank 1, bottom soil sample in bottom layer	SW84 8 8270C	BC

BC = Below Cleanup

TABLE C
Soil Sample Analytical Results
Arsenic and Lead

Sample #	Sample Location	Analysis	Results
83105-S-1	South side wall in top layer	Arsenic Lead	15 ppm <4 ppm
83105-W-1	West side wall in top layer	Arsenic Lead	27 ppm 74 ppm
83105-E-1	East side wall in top layer	Arsenic Lead	13 ppm <4 ppm
83105-N-1	North side wall in top layer	Arsenic Lead	110 ppm 25 ppm
83105-T1-B	Tank 1, bottom soil sample in bottom layer	Arsenic Lead	9 ppm <4 ppm
83105-T2-B	Tank 2, bottom soil sample in bottom layer	Arsenic Lead	20 ppm < 4 ppm
83105-STOCK-1	Stockpiled overburden material, Tank 1	Arsenic Lead	47 ppm 21 ppm
83105-STOCK-2	Stockpiled overburden material, Tank 2	Arsenic Lead	15 ppm 5 ppm
83105-STOCK-3	Stockpiled soils from sidewall and below T1 and T2	Arsenic Lead	22 ppm 15 ppm

ppm = Parts per million

4.0 WASHINGTON STATE DEPARTMENT OF ECOLOGY (WDOE) REQUIREMENTS

The WDOE requires a permanent closure/site assessment form to be filled out during UST decommissioning projects. This form has been completed and is located in Appendix C. Cleanup levels on this site were based on Method A cleanup levels.

5.0 CONCLUSIONS

The following conclusions are based on the results of the soil sample analysis:

- Analysis of soil samples collected around and under the underground storage tanks indicated the *absence* of diesel, heavy oil, BTEX or PNA and PAHs compounds.

- Analysis of soil samples collected around and under the underground storage tanks indicated the *presence* of arsenic and lead and therefore stockpiled materials were disposed of at the Tacoma LRI Facility.

6.0 RECOMMENDATIONS

Based on the results of this site assessment, no recommendations are made at this time.

7.0 LIMITATIONS

This report has been prepared for specific application to this project in a manner consistent with the level of care and skill normally exercised by members of the environmental science profession currently practicing under similar conditions in the area.

Recommendations and conclusions contained in this report are based on evaluation of technical information made available and reviewed during the course of this survey. Our work product and judgements rendered meet the standard of care of our profession at this time. No other warranty, expressed or implied, is made concerning the professional conclusions and recommendations included in this report.

DLH Environmental Consulting shall not be responsible for conditions or consequences arising from relevant facts that were withheld, concealed, or not fully disclosed at the time this evaluation was performed.

DLH Environmental Consulting has no control over the accuracy of information provided by outside consultants, contractors, and agencies and, therefore, disclaims responsibility for any inaccuracies incurred. Also, DLH Environmental Consulting accepts no responsibility for verifying compliance with government regulations for hazardous material and waste use or storage at the subject facility.

The underlying philosophy in formulating the conclusions and recommendations was to reduce uncertainties regarding the property and pertaining to environmental hazards, to the degree possible. Therefore, the results of this assessment should be viewed as reasonably accurate estimates, given the project limitations of the existing environmental condition of the property.

This report is for the exclusive use of Port of Tacoma, Glacier Environmental Services Inc., and their representatives. If new information becomes available as a result of future site work, which may include excavations, borings, studies, etc., DLH Environmental Consulting reserves the right to reevaluate the conclusions of this report and to provide amendments as required.

APPENDIX A

SITE MAP

SITE SKETCH

SITE PHOTOGRAPHS

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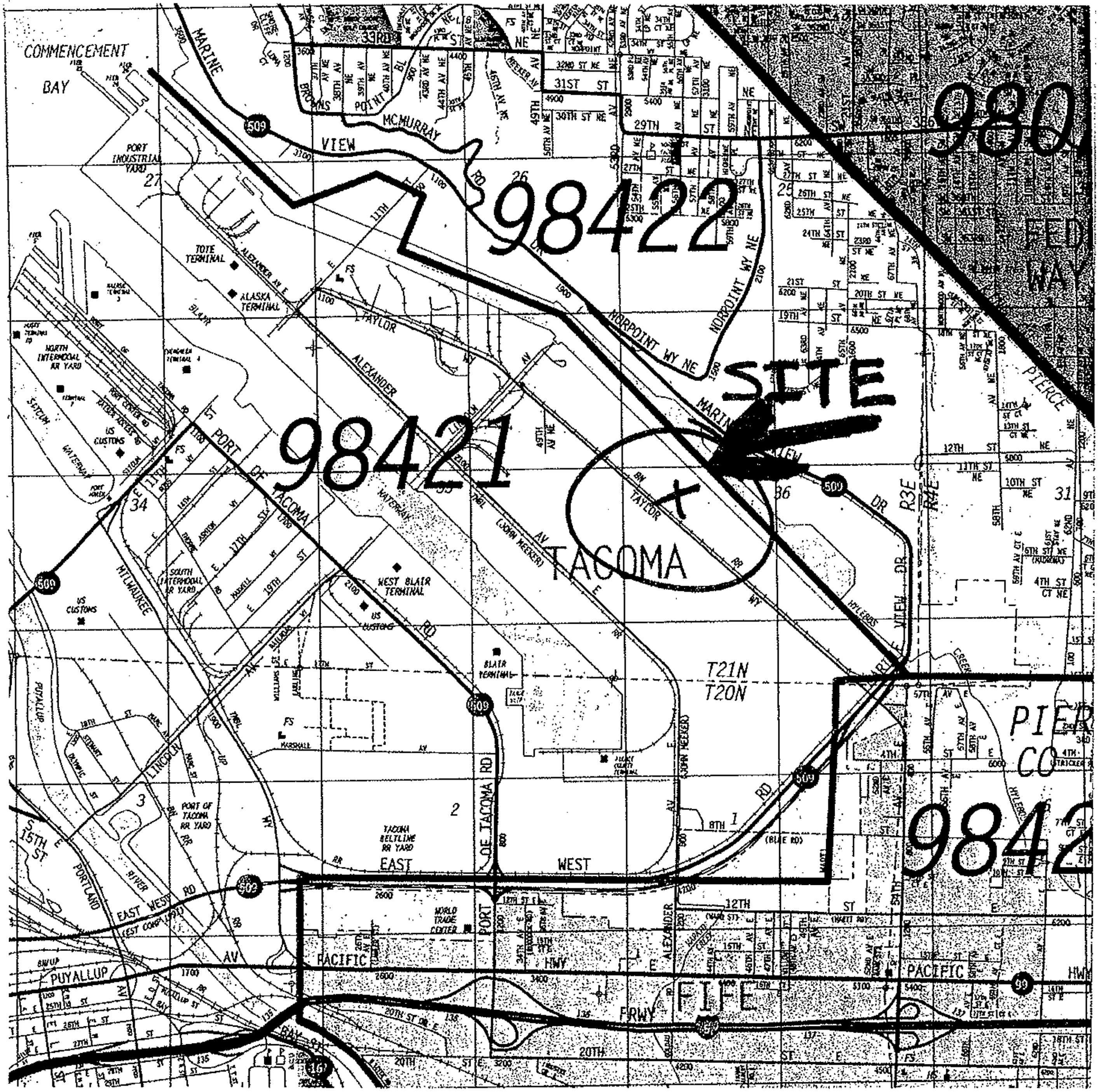
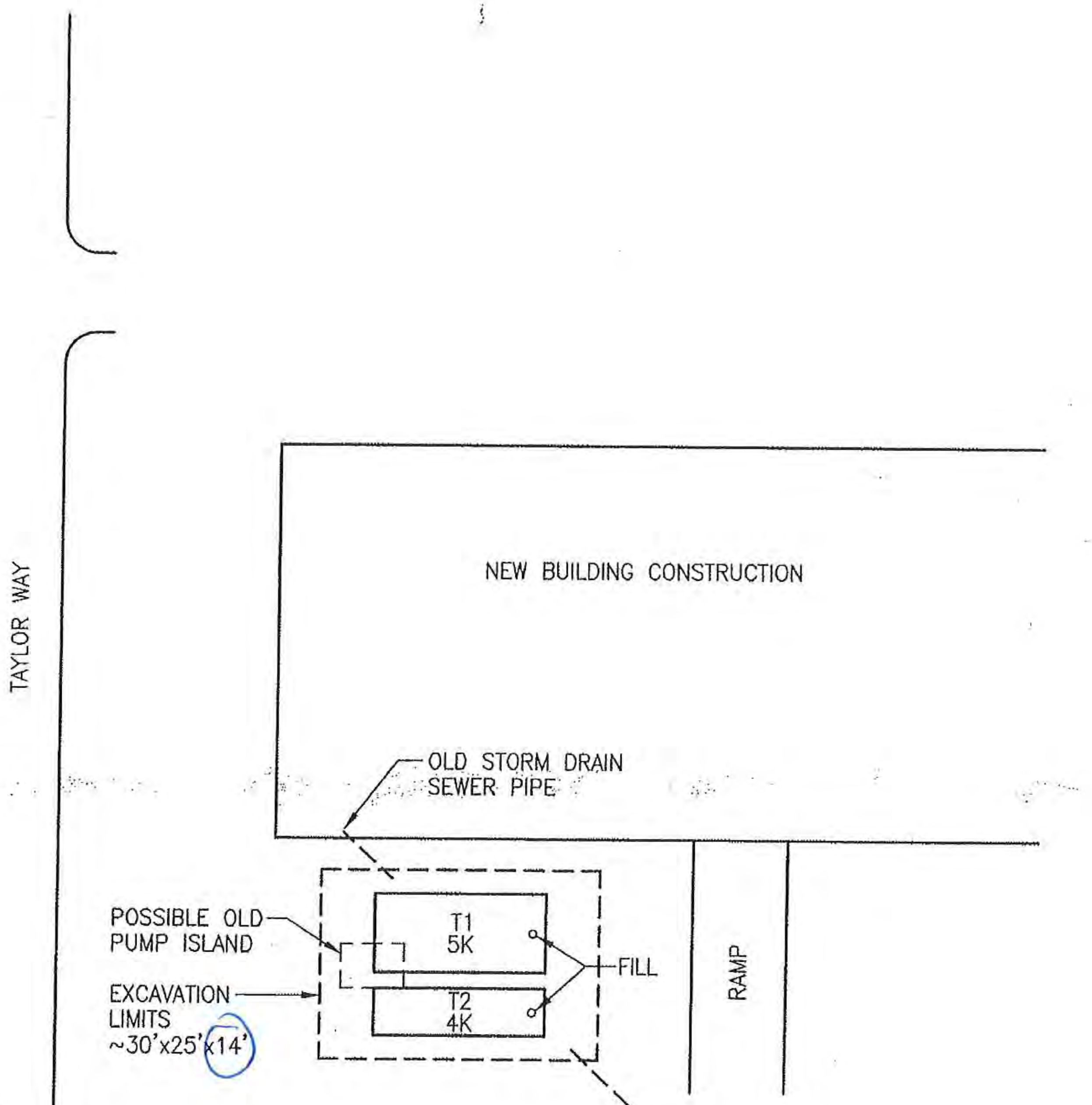


SUBJECT SITE
2301 TAYLOR WAY



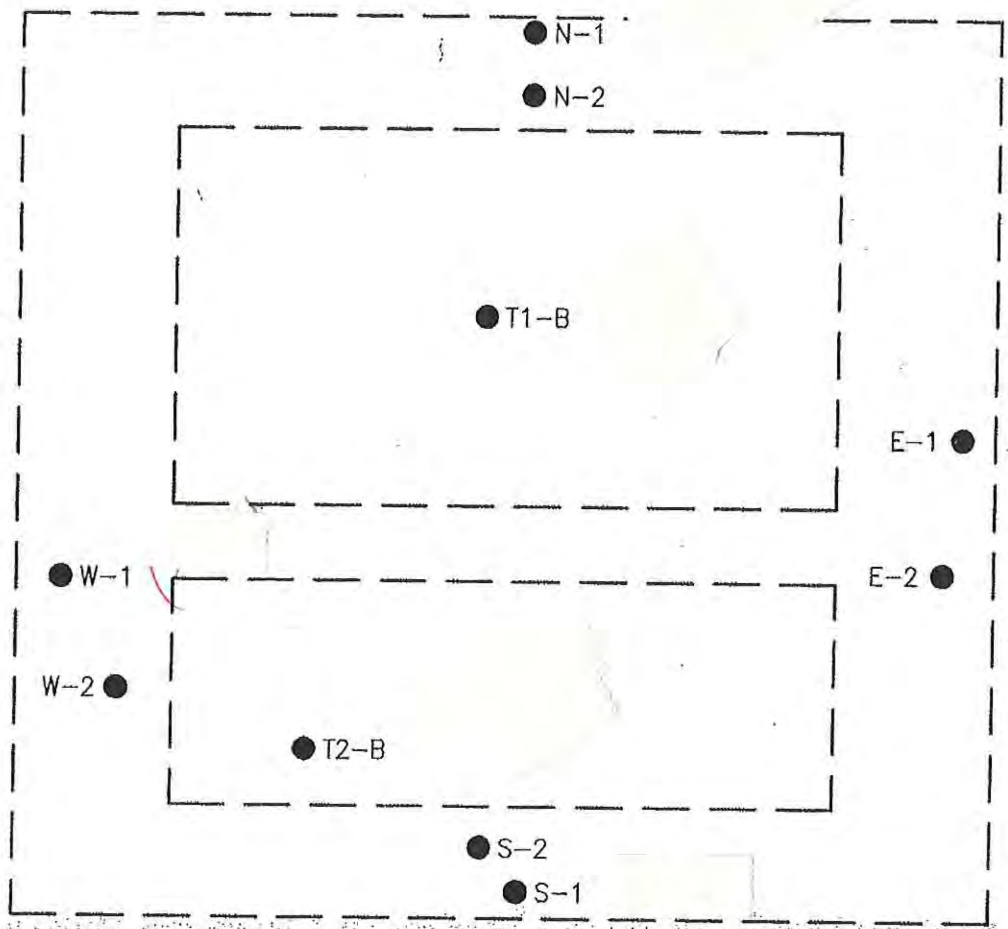
T1 – 5000 GAL DIESEL
T2 – 4000 GAL DIESEL

CARLYLE TANKS
PORT OF TACOMA, 2301 TAYLOR WAY

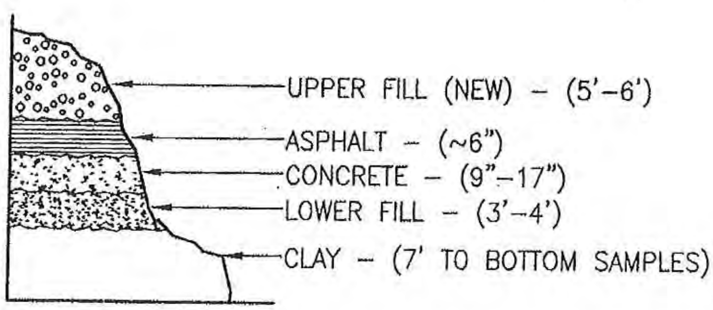
DLH Environmental Consulting
NOT TO SCALE

FIGURE 1
8/30/2005

North



EXCAVATION SOIL SAMPLE LOCATION



CROSS SECTION
OF TANK EXCAVATION

● SOIL SAMPLE LOCATIONS

● N-1, S-1, E-1, W-1
COLLECTED IN LOWER FILL

● N-2, S-2, E-2, W-2
T1-B, T2-B
COLLECTED IN CLAY LAYER

CARLYLE TANKS
PORT OF TACOMA, 2301 TAYLOR WAY

DLH Environmental Consulting

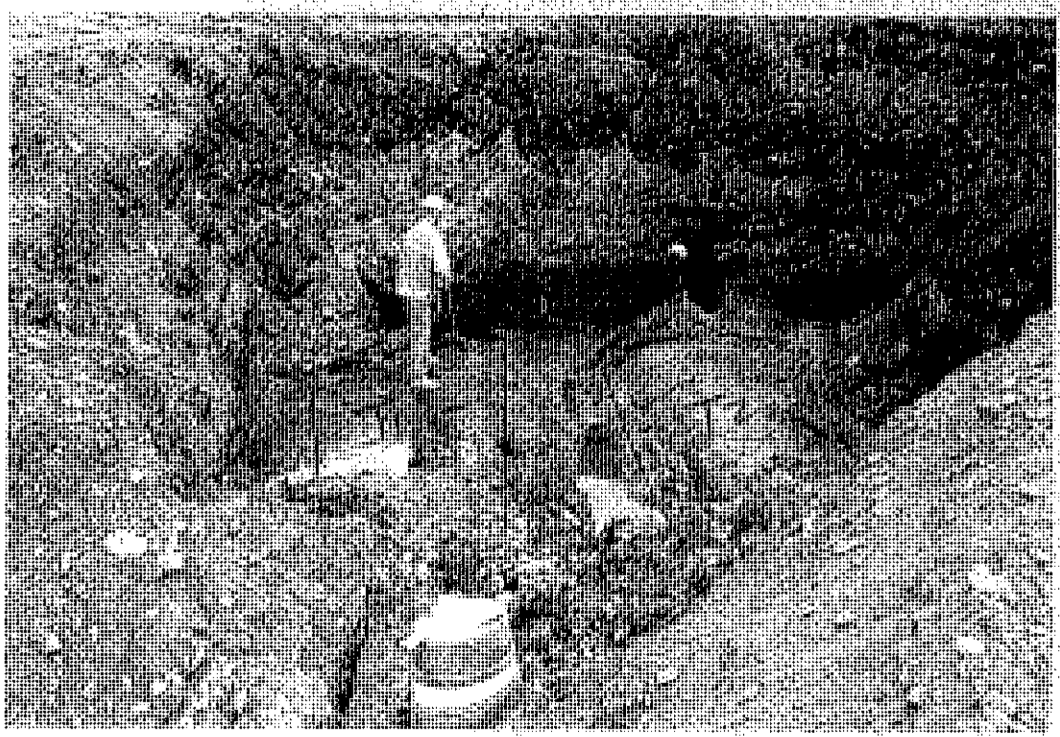
NOT TO SCALE

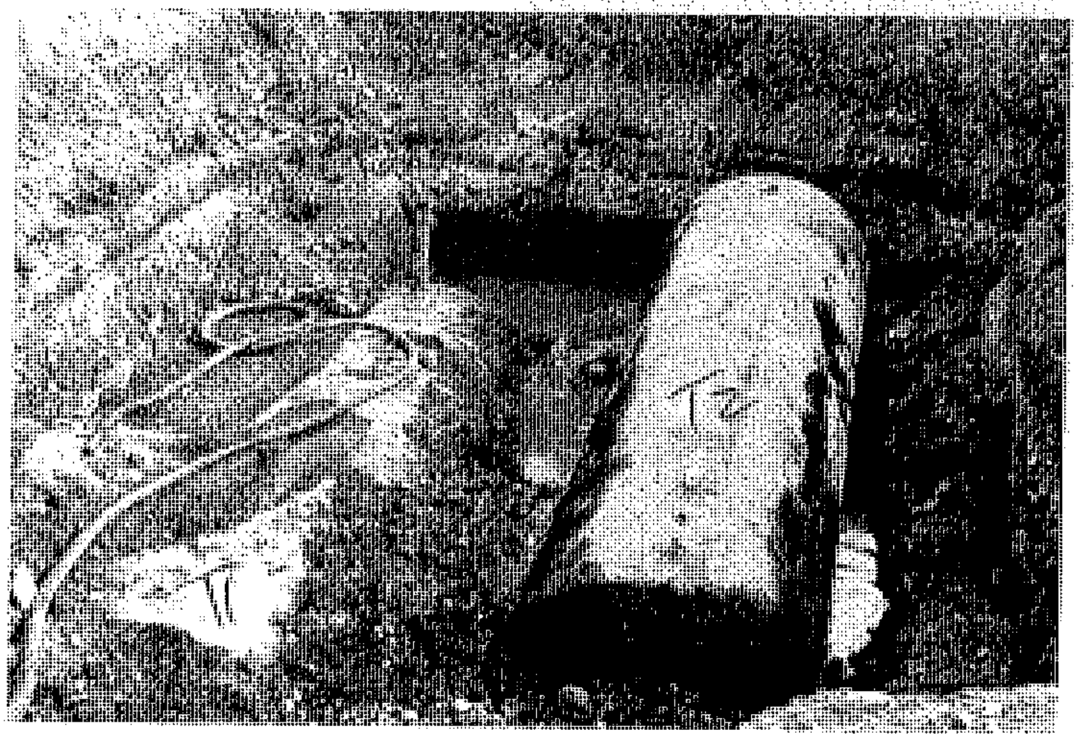
FIGURE 2
8/30/2005

North

SITE PHOTOGRAPHS

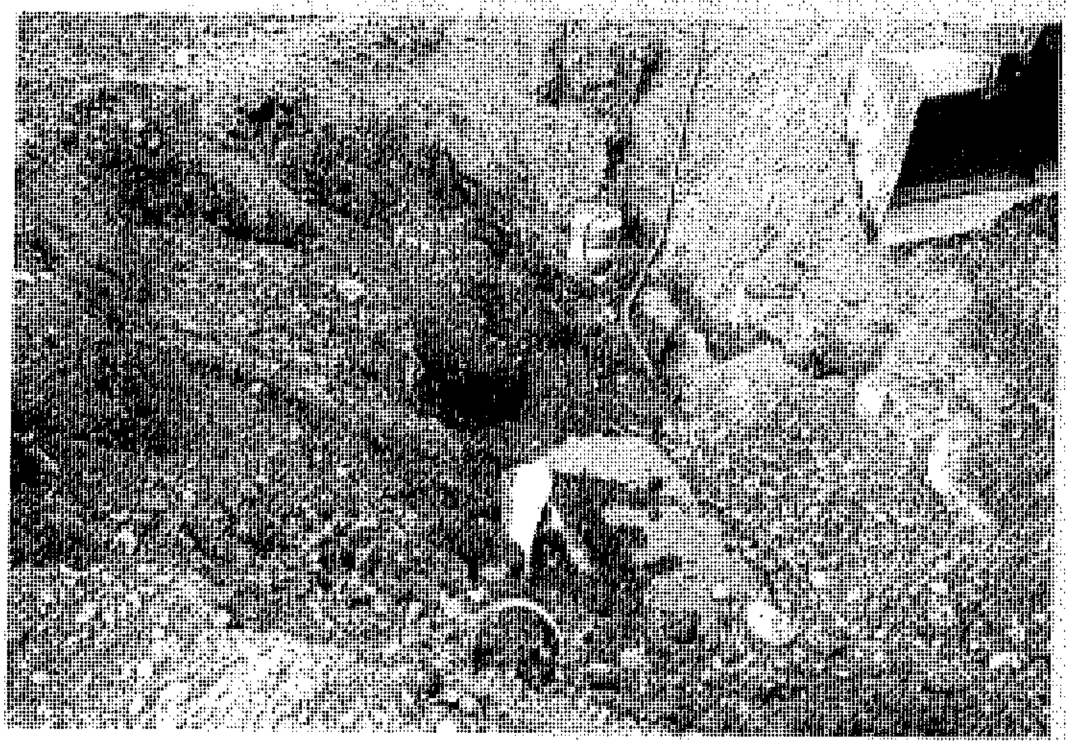
Port of Tacoma/Carlyle
2301 Taylor Way - Tacoma, Washington

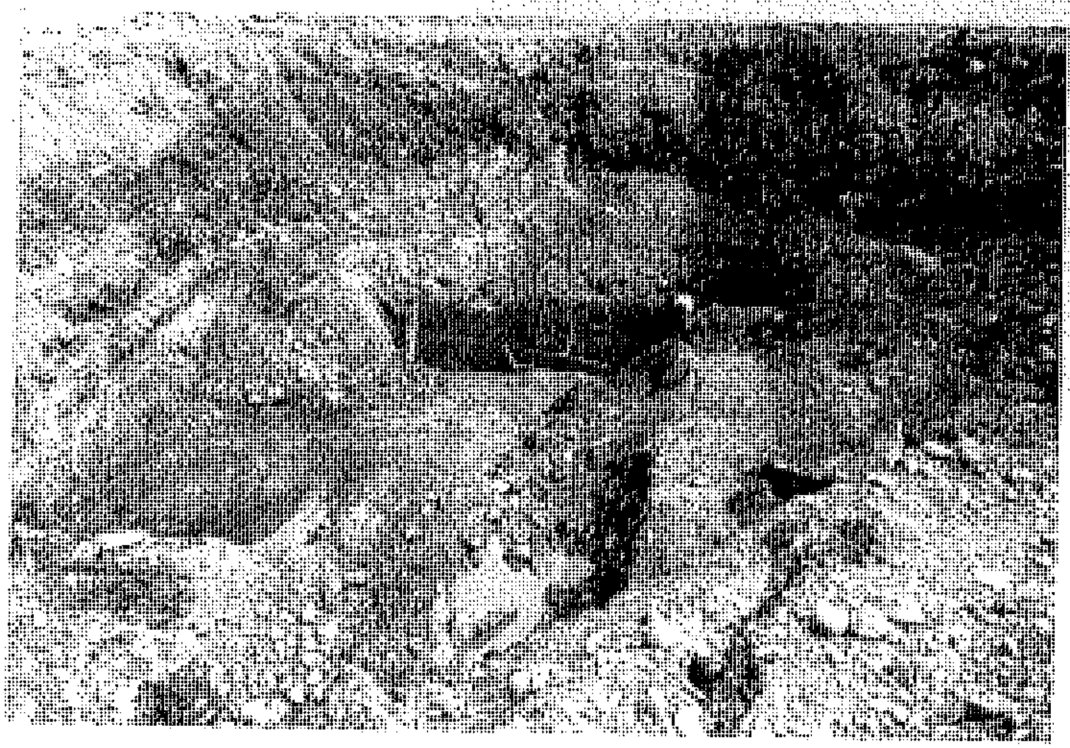




SITE PHOTOGRAPHS

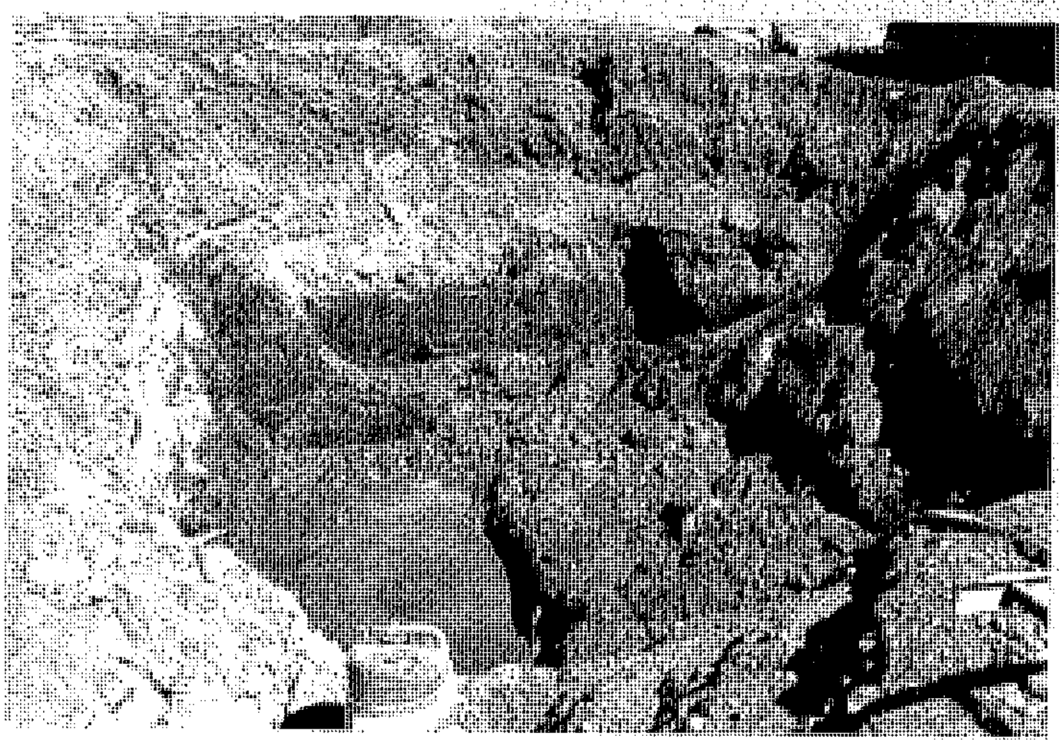
Port of Tacoma/Carlyle
2301 Taylor Way - Tacoma, Washington





SITE PHOTOGRAPHS

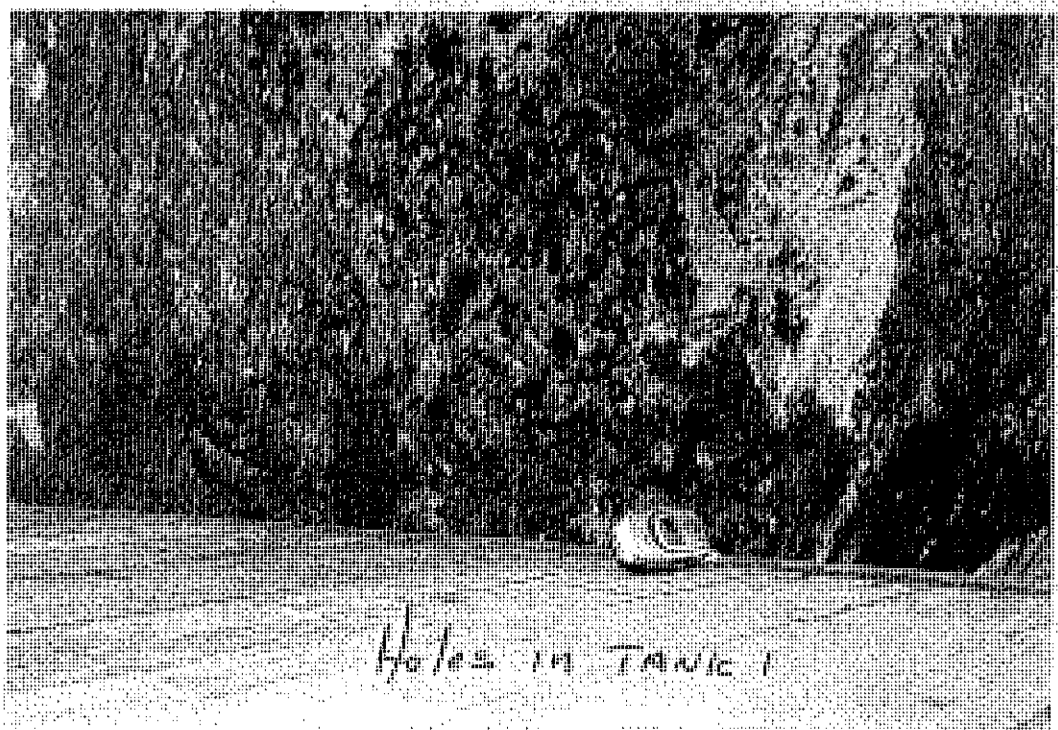
Port of Tacoma/Carlyle
2301 Taylor Way - Tacoma, Washington

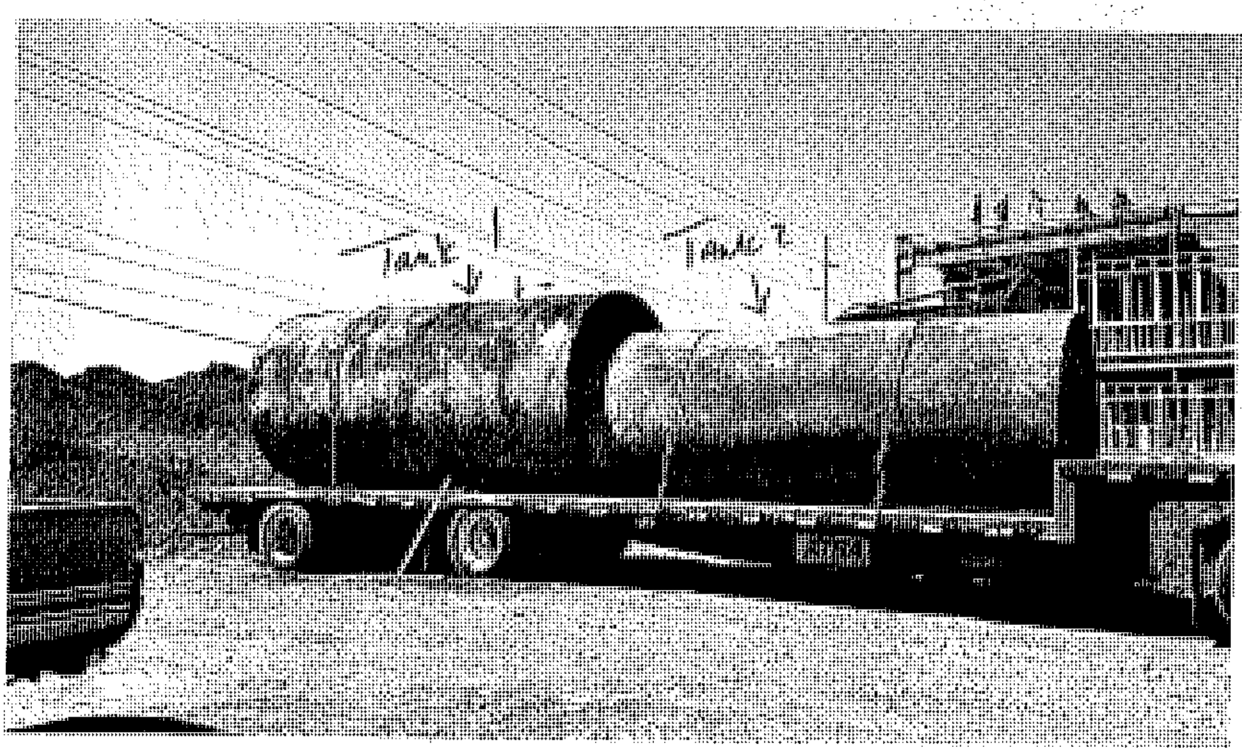


DLH ENVIRONMENTAL CONSULTING SEATTLE, WASHINGTON (206) 632-3123

SITE PHOTOGRAPHS

Port of Tacoma/Carlyle
2301 Taylor Way - Tacoma, Washington





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APPENDIX B

LABORATORY REPORTS
CHAIN OF CUSTODY FORMS

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FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Charlene Morrow, M.S.
Yelena Aravkina, M.S.
Bradley T. Benson, B.S.
Kurt Johnson, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
TEL: (206) 285-8282
FAX: (206) 283-5044
e-mail: fbi@isomedia.com

September 1, 2005

Donna Hewitt, Project Manager
DLH Environmental Consulting
2400 NW 80th St., #114
Seattle, WA 98117-4449

Dear Ms. Hewitt:

Included are the results from the testing of material submitted on August 30, 2005 from the Port of Tacoma, F&BI 508264 project. There is 1 page included in this report. Any samples that may remain are currently scheduled for disposal in 30 days. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Charlene Morrow

Charlene Morrow
Chemist

Enclosures
DLH0901R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 09/01/05
Date Received: 08/30/05
Project: Port of Tacoma, F&BI 508264
Date Extracted: 08/30/05
Date Analyzed: 08/30/05

RESULTS FROM THE ANALYSIS OF THE SOIL SAMPLES FOR GASOLINE, DIESEL AND HEAVY OIL BY NWTPH-HCID
Results Reported as Not Detected (ND) or Detected (D)

THE DATA PROVIDED BELOW WAS PERFORMED PER THE GUIDELINES ESTABLISHED BY THE WASHINGTON DEPARTMENT OF ECOLOGY AND WERE NOT DESIGNED TO PROVIDE INFORMATION WITH REGARDS TO THE ACTUAL IDENTIFICATION OF ANY MATERIAL PRESENT

Sample ID Laboratory ID	Gasoline	Diesel	Heavy Oil	Surrogate (% Recovery)
T1-83005 508264-01	ND	D	ND	99
Method Blank	ND	ND	ND	100

ND - Material not detected at or above 20 mg/kg gas, 50 mg/kg diesel and 100 mg/kg heavy oil.

508264

SAMPLE CHAIN OF CUSTODY

CM 08/30/05

DOT

Page # 1 of 1

Send Report To Donna Hewitt

Company DLit

Address 2400 NW 80th St #114

City, State, ZIP Seattle, WA 98117

Phone # 2066323123 Fax# 2067060302

SAMPLERS (signature)

PROJECT NAME/NO. Port of Tacoma

PO #

REMARKS Call me with Results 206-632-3123

TURNAROUND TIME
- ☐ Standard (2 Weeks)
- ☒ RUSH 2 hrs
- Rush charges authorized by:

SAMPLE DISPOSAL
- ☐ Dispose after 30 days
- ☐ Return samples
- ☐ Will call with instructions

Sample ID	Lab ID	Date	Time	Sample Type	# of containers	TPH-Diesel	TPH-Gasoline	BTEX by 8021B	VOCs by 8260	SVOCs by 8270	HFS	ACID				Notes
TI-83005	01	8/30/05	9:45	Soil	1							X				Rush

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Donna Hewitt	DLit	8/30/05	11:50
Received by:	Nhan Phan	FeBI	8/30/05	11:50
Relinquished by:				
Received by:				

FORMS\COC\COC.DOC

SPECTRA Laboratories

2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850 • Fax (253) 572-9838

09/02/2005

Port of Tacoma
PO Box 1837
Tacoma, WA 98401
Attn: Doug Hillman

Project: Carlyle Tank
Sample Matrix: Soil
Date Sampled: 08/31/2005
Date Received: 08/31/2005
Spectra Project: 2005080492
Rush

Client ID	Spectra #	Analyte	Result	Units	Method
83105-S-1	1	Diesel	<10	mg/Kg	NWTPH-D
83105-S-1	1	Oil	<100	mg/Kg	NWTPH-D
83105-S-1	1	Benzene	<0.025	mg/Kg	SW846 8260B
83105-S-1	1	Ethylbenzene	<0.025	mg/Kg	SW846 8260B
83105-S-1	1	Methyl-tert-Butyl Ether	<0.025	mg/Kg	SW846 8260B
83105-S-1	1	Toluene	0.047	mg/Kg	SW846 8260B
83105-S-1	1	Total Xylenes	<0.05	mg/Kg	SW846 8260B
83105-S-2	2	Diesel	<10	mg/Kg	NWTPH-D
83105-S-2	2	Oil	<100	mg/Kg	NWTPH-D
83105-W-1	3	Diesel	36	mg/Kg	NWTPH-D
83105-W-1	3	Oil	<100	mg/Kg	NWTPH-D
83105-W-1	3	Benzene	<0.025	mg/Kg	SW846 8260B
83105-W-1	3	Ethylbenzene	<0.025	mg/Kg	SW846 8260B
83105-W-1	3	Methyl-tert-Butyl Ether	<0.025	mg/Kg	SW846 8260B
83105-W-1	3	Toluene	0.061	mg/Kg	SW846 8260B
83105-W-1	3	Total Xylenes	<0.05	mg/Kg	SW846 8260B
83105-W-2	4	Diesel	<10	mg/Kg	NWTPH-D
83105-W-2	4	Oil	<100	mg/Kg	NWTPH-D
83105-E-1	5	Diesel	<10	mg/Kg	NWTPH-D
83105-E-1	5	Oil	<100	mg/Kg	NWTPH-D
83105-E-1	5	Benzene	<0.025	mg/Kg	SW846 8260B
83105-E-1	5	Ethylbenzene	<0.025	mg/Kg	SW846 8260B
83105-E-1	5	Methyl-tert-Butyl Ether	<0.025	mg/Kg	SW846 8260B
83105-E-1	5	Toluene	0.06	mg/Kg	SW846 8260B

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager

SPECTRA Laboratories

2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850 • Fax (253) 572-9838

09/02/2005

Port of Tacoma
PO Box 1837
Tacoma, WA 98401
Attn: Doug Hillman

Project: Carlyle Tank
Sample Matrix: Soil
Date Sampled: 08/31/2005
Date Received: 08/31/2005
Spectra Project: 2005080492
Rush

Client ID	Spectra #	Analyte	Result	Units	Method
83105-E-1	5	Total Xylenes	<0.05	mg/Kg	SW846 8260B
83105-E-2	6	Diesel	<10	mg/Kg	NWTPH-D
83105-E-2	6	Oil	<100	mg/Kg	NWTPH-D
83105-N-1	7	Diesel	<10	mg/Kg	NWTPH-D
83105-N-1	7	Oil	<100	mg/Kg	NWTPH-D
83105-N-1	7	Benzene	<0.025	mg/Kg	SW846 8260B
83105-N-1	7	Ethylbenzene	<0.025	mg/Kg	SW846 8260B
83105-N-1	7	Methyl-tert-Butyl Ether	<0.025	mg/Kg	SW846 8260B
83105-N-1	7	Toluene	0.06	mg/Kg	SW846 8260B
83105-N-1	7	Total Xylenes	<0.05	mg/Kg	SW846 8260B
83105-N-2	8	Diesel	<10	mg/Kg	NWTPH-D
83105-N-2	8	Oil	<100	mg/Kg	NWTPH-D
83105-T1-B	9	Diesel	<10	mg/Kg	NWTPH-D
83105-T1-B	9	Oil	<100	mg/Kg	NWTPH-D
83105-T1-B	9	Benzene	<0.025	mg/Kg	SW846 8260B
83105-T1-B	9	Ethylbenzene	<0.025	mg/Kg	SW846 8260B
83105-T1-B	9	Methyl-tert-Butyl Ether	<0.025	mg/Kg	SW846 8260B
83105-T1-B	9	Toluene	0.079	mg/Kg	SW846 8260B
83105-T1-B	9	Total Xylenes	<0.05	mg/Kg	SW846 8260B
83105-T2-B	10	Diesel	<10	mg/Kg	NWTPH-D
83105-T2-B	10	Oil	<100	mg/Kg	NWTPH-D
83105-Stock 1	11	Diesel	44	mg/Kg	NWTPH-D
83105-Stock 1	11	Oil	<100	mg/Kg	NWTPH-D

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager

(FRI)SEP 2 2005 16:14/ST. 16:12/NO. 6826759015 P 2

FROM

SPECTRA Laboratories

2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850 • Fax (253) 572-9838

09/02/2005

Port of Tacoma
PO Box 1837
Tacoma, WA 98401
Attn: Doug Hillman

Project: Carlyle Tank
Sample Matrix: Soil
Date Sampled: 08/31/2005
Date Received: 08/31/2005
Spectra Project: 2005080492
Rush

Client ID	Spectra #	Analyte	Result	Units	Method
83105-Stock 2	12	Diesel	<10	mg/Kg	NWTPH-D
83105-Stock 2	12	Oil	<100	mg/Kg	NWTPH-D
83105-Stock 3	13	Diesel	<10	mg/Kg	NWTPH-D
83105-Stock 3	13	Oil	<100	mg/Kg	NWTPH-D

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager

SPECTRA Laboratories

2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850 • Fax (253) 572-9838

09/06/2005

Project:	Carlyle Tank
Client ID:	83105-S-1
Sample Matrix:	Soil
Date Sampled:	08/31/2005
Date Received:	08/31/2005
Spectra Project:	2005080492
Spectra Number:	1
	Rush

Port of Tacoma
PO Box 1837
Tacoma, WA 98401
Attn: Doug Hillman

Analyte	Result	Units	Method
Diesel	<10	mg/Kg	NWTPH-D
Oil	<100	mg/Kg	NWTPH-D
Total Arsenic	15	mg/Kg	SW846 6010B
Total Lead	< 4	mg/Kg	SW846 6010B
Benzene	<0.025	mg/Kg	SW846 8260B
Ethylbenzene	<0.025	mg/Kg	SW846 8260B
Methyl-tert-Butyl Ether	<0.025	mg/Kg	SW846 8260B
Toluene	0.047	mg/Kg	SW846 8260B
Total Xylenes	<0.05	mg/Kg	SW846 8260B
2-Methylnaphthalene	<0.08	mg/Kg	SW846 8270C
Acenaphthene	<0.08	mg/Kg	SW846 8270C
Acenaphthylene	<0.08	mg/Kg	SW846 8270C
Anthracene	<0.08	mg/Kg	SW846 8270C
Benzo(a)Anthracene	<0.08	mg/Kg	SW846 8270C
Benzo(a)Pyrene	<0.08	mg/Kg	SW846 8270C
Benzo(b)Fluoranthene	<0.08	mg/Kg	SW846 8270C
Benzo(ghi)Perylene	<0.08	mg/Kg	SW846 8270C
Benzo(k)Fluoranthene	<0.08	mg/Kg	SW846 8270C
Chrysene	<0.08	mg/Kg	SW846 8270C
Dibenz(a,h)Anthracene	<0.08	mg/Kg	SW846 8270C
Fluoranthene	<0.08	mg/Kg	SW846 8270C
Fluorene	<0.08	mg/Kg	SW846 8270C
Indeno(1,2,3-cd)Pyrene	<0.08	mg/Kg	SW846 8270C
Naphthalene	<0.08	mg/Kg	SW846 8270C
Phenanthrene	<0.08	mg/Kg	SW846 8270C
Pyrene	<0.08	mg/Kg	SW846 8270C

Surrogate	Recovery	Method
Toluene-d8	94	SW846 8260B
4-Bromofluorobenzene	112	SW846 8260B
p-Terphenyl	78	NWTPH-D
Nitrobenzene-d5	40	SW846 8270C
2-Fluorobiphenyl	55	SW846 8270C
p-Terphenyl-d14	83	SW846 8270C

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager

(TUE)SEP 6 2005 17:04/ST. 17:03/NO. 6328759033 P 1
FROM

SPECTRA Laboratories

2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850 • Fax (253) 572-9838

09/06/2005

Port of Tacoma
PO Box 1837
Tacoma, WA 98401
Attn: Doug Hillman

Project: Carlyle Tank
Client ID: 83105-S-2
Sample Matrix: Soil
Date Sampled: 08/31/2005
Date Received: 08/31/2005
Spectra Project: 2005080492
Spectra Number: 2
Rush

Analyte	Result	Units	Method	Analyte	Result	Units	Method
Diesel	<10	mg/Kg	NWTPH-D				
Oil	<100	mg/Kg	NWTPH-D				

Surrogate	Recovery	Method
p-Terphenyl	82	NWTPH-D

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager

FROM

(TUE)SEP 6 2005 17:04/ST. 17:03/NO. 6826759033 P 2

SPECTRA Laboratories

2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850 • Fax (253) 572-9838

09/06/2005

Port of Tacoma
PO Box 1837
Tacoma, WA 98401
Attn: Doug Hillman

Project:	Carlyle Tank
Client ID:	83105-W-1
Sample Matrix:	Soil
Date Sampled:	08/31/2005
Date Received:	08/31/2005
Spectra Project:	2005080492
Spectra Number:	3
	Rush

Analyte	Result	Units	Method	Analyte	Result	Units	Method
Diesel	36	mg/Kg	NWTPH-D	Fluorene	<0.08	mg/Kg	SW846 8270C
Oil	<100	mg/Kg	NWTPH-D	Indeno(1,2,3-cd)Pyrene	<0.08	mg/Kg	SW846 8270C
Total Arsenic	27	mg/Kg	SW846 6010B	Naphthalene	<0.08	mg/Kg	SW846 8270C
Total Lead	74	mg/Kg	SW846 6010B	Phenanthrene	<0.08	mg/Kg	SW846 8270C
Benzene	<0.025	mg/Kg	SW846 8260B	Pyrene	<0.08	mg/Kg	SW846 8270C
Ethylbenzene	<0.025	mg/Kg	SW846 8260B				
Methyl-tert-Butyl Ether	<0.025	mg/Kg	SW846 8260B				
Toluene	0.061	mg/Kg	SW846 8260B				
Total Xylenes	<0.05	mg/Kg	SW846 8260B				
2-Methylnaphthalene	<0.08	mg/Kg	SW846 8270C				
Acenaphthene	<0.08	mg/Kg	SW846 8270C				
Acenaphthylene	<0.08	mg/Kg	SW846 8270C				
Anthracene	<0.08	mg/Kg	SW846 8270C				
Benzo(a)Anthracene	<0.08	mg/Kg	SW846 8270C				
Benzo(a)Pyrene	<0.08	mg/Kg	SW846 8270C				
Benzo(b)Fluoranthene	<0.08	mg/Kg	SW846 8270C				
Benzo(ghi)Perylene	<0.08	mg/Kg	SW846 8270C				
Benzo(k)Fluoranthene	<0.08	mg/Kg	SW846 8270C				
Chrysene	<0.08	mg/Kg	SW846 8270C				
Dibenz(a,h)Anthracene	<0.08	mg/Kg	SW846 8270C				
Fluoranthene	<0.08	mg/Kg	SW846 8270C				

Surrogate	Recovery	Method	Surrogate	Recovery	Method
Toluene-d8	96	SW846 8260B	2-Fluorobiphenyl	54	SW846 8270C
4-Bromofluorobenzene	113	SW846 8260B	p-Terphenyl-d14	85	SW846 8270C
p-Terphenyl	92	NWTPH-D			
Nitrobenzene-d5	39	SW846 8270C			

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager

(TUE)SEP 6 2005 17:05/ST. 17:05/NO. 6326759088 P 3 FROM

SPECTRA Laboratories

2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850 • Fax (253) 572-9838

09/06/2005

Port of Tacoma
PO Box 1837
Tacoma, WA 98401
Attn: Doug Hillman

Project:	Carlyle Tank
Client ID:	83105-W-2
Sample Matrix:	Soil
Date Sampled:	08/31/2005
Date Received:	08/31/2005
Spectra Project:	2005080492
Spectra Number:	4
	Rush

Analyte	Result	Units	Method	Analyte	Result	Units	Method
Diesel	<10	mg/Kg	NWTPH-D				
Oil	<100	mg/Kg	NWTPH-D				

Surrogate	Recovery	Method
p-Terphenyl	80	NWTPH-D

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager

(TUE)SEP 6 2005 17:05/ST. 17:08/NO. 6826759083 P 4 FROM

SPECTRA Laboratories

2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850 • Fax (253) 572-9838

09/06/2005

Project:	Carlyle Tank
Client ID:	83105-E-1
Sample Matrix:	Soil
Date Sampled:	08/31/2005
Date Received:	08/31/2005
Spectra Project:	2005080492
Spectra Number:	5
	Rush

Port of Tacoma
PO Box 1837
Tacoma, WA 98401
Attn: Doug Hillman

Analyte	Result	Units	Method	Analyte	Result	Units	Method
Diesel	<10	mg/Kg	NWTPH-D	Fluorene	<0.08	mg/Kg	SW846 8270C
Oil	<100	mg/Kg	NWTPH-D	Indeno(1,2,3-cd)Pyrene	<0.08	mg/Kg	SW846 8270C
Total Arsenic	13	mg/Kg	SW846 6010B	Naphthalene	<0.08	mg/Kg	SW846 8270C
Total Lead	<4	mg/Kg	SW846 6010B	Phenanthrene	<0.08	mg/Kg	SW846 8270C
Benzene	<0.025	mg/Kg	SW846 8260B	Pyrene	<0.08	mg/Kg	SW846 8270C
Ethylbenzene	<0.025	mg/Kg	SW846 8260B				
Methyl-tert-Butyl Ether	<0.025	mg/Kg	SW846 8260B				
Toluene	0.06	mg/Kg	SW846 8260B				
Total Xylenes	<0.05	mg/Kg	SW846 8260B				
2-Methylnaphthalene	<0.08	mg/Kg	SW846 8270C				
Acenaphthene	<0.08	mg/Kg	SW846 8270C				
Acenaphthylene	<0.08	mg/Kg	SW846 8270C				
Anthracene	<0.08	mg/Kg	SW846 8270C				
Benzo(a)Anthracene	<0.08	mg/Kg	SW846 8270C				
Benzo(a)Pyrene	<0.08	mg/Kg	SW846 8270C				
Benzo(b)Fluoranthene	<0.08	mg/Kg	SW846 8270C				
Benzo(ghi)Perylene	<0.08	mg/Kg	SW846 8270C				
Benzo(k)Fluoranthene	<0.08	mg/Kg	SW846 8270C				
Chrysene	<0.08	mg/Kg	SW846 8270C				
Dibenz(a,h)Anthracene	<0.08	mg/Kg	SW846 8270C				
Fluoranthene	<0.08	mg/Kg	SW846 8270C				

Surrogate	Recovery	Method	Surrogate	Recovery	Method
Toluene-d8	97	SW846 8260B	2-Fluorobiphenyl	61	SW846 8270C
4-Bromofluorobenzene	114	SW846 8260B	p-Terphenyl-d14	72	SW846 8270C
p-Terphenyl	88	NWTPH-D			
Nitrobenzene-d5	39	SW846 8270C			

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager

SPECTRA Laboratories

2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850 • Fax (253) 572-9838

09/06/2005

Port of Tacoma
PO Box 1837
Tacoma, WA 98401
Attn: Doug Hillman

Project: Carlyle Tank
Client ID: 83105-E-2
Sample Matrix: Soil
Date Sampled: 08/31/2005
Date Received: 08/31/2005
Spectra Project: 2005080492
Spectra Number: 6
Rush

Analyte	Result	Units	Method	Analyte	Result	Units	Method
Diesel	<10	mg/Kg	NWTPH-D				
Oil	<100	mg/Kg	NWTPH-D				

Surrogate	Recovery	Method
p-Terphenyl	78	NWTPH-D

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager

SPECTRA Laboratories

2221 Ross Way - Tacoma, WA 98421 - (253) 272-4850 - Fax (253) 572-9838

09/06/2005

Port of Tacoma
PO Box 1837
Tacoma, WA 98401
Attn: Doug Hillman

Project: Carlyle Tank
Client ID: 83105-N-1
Sample Matrix: Soil
Date Sampled: 08/31/2005
Date Received: 08/31/2005
Spectra Project: 2005080492
Spectra Number: 7
Rush

Analyte	Result	Units	Method
Diesel	<10	mg/Kg	NWTPH-D
Oil	<100	mg/Kg	NWTPH-D
Total Arsenic	110	mg/Kg	SW846 6010B
Total Lead	35	mg/Kg	SW846 6010B
Benzene	<0.025	mg/Kg	SW846 8260B
Ethylbenzene	<0.025	mg/Kg	SW846 8260B
Methyl-tert-Butyl Ether	<0.025	mg/Kg	SW846 8260B
Toluene	0.06	mg/Kg	SW846 8260B
Total Xylenes	<0.05	mg/Kg	SW846 8260B
2-Methylnaphthalene	<0.08	mg/Kg	SW846 8270C
Acenaphthene	<0.08	mg/Kg	SW846 8270C
Acenaphthylene	<0.08	mg/Kg	SW846 8270C
Anthracene	<0.08	mg/Kg	SW846 8270C
Benzo(a)Anthracene	<0.08	mg/Kg	SW846 8270C
Benzo(a)Pyrene	<0.08	mg/Kg	SW846 8270C
Benzo(b)Fluoranthene	<0.08	mg/Kg	SW846 8270C
Benzo(ghi)Perylene	<0.08	mg/Kg	SW846 8270C
Benzo(k)Fluoranthene	<0.08	mg/Kg	SW846 8270C
Chrysene	<0.08	mg/Kg	SW846 8270C
Dibenz(a,h)Anthracene	<0.08	mg/Kg	SW846 8270C
Fluoranthene	<0.08	mg/Kg	SW846 8270C

Analyte	Result	Units	Method
Fluorene	<0.08	mg/Kg	SW846 8270C
Indeno(1,2,3-cd)Pyrene	<0.08	mg/Kg	SW846 8270C
Naphthalene	<0.08	mg/Kg	SW846 8270C
Phenanthrene	<0.08	mg/Kg	SW846 8270C
Pyrene	<0.08	mg/Kg	SW846 8270C

Surrogate	Recovery	Method
Toluene-d8	93	SW846 8260B
4-Bromofluorobenzene	110	SW846 8260B
p-Terphenyl	97	NWTPH-D
Nitrobenzene-d5	41	SW846 8270C

Surrogate	Recovery	Method
2-Fluorobiphenyl	63	SW846 8270C
p-Terphenyl-d14	78	SW846 8270C

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager

(TUE)SEP 6 2005 17:05/ST. 17:03/NO. 6826759088 P 7

FROM

SPECTRA Laboratories

2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850 • Fax (253) 572-9838

09/06/2005

Project:	Carlyle Tank
Client ID:	83105-N-2
Sample Matrix:	Soil
Date Sampled:	08/31/2005
Date Received:	08/31/2005
Spectra Project:	2005080492
Spectra Number:	8
	Rush

Port of Tacoma
PO Box 1837
Tacoma, WA 98401
Attn: Doug Hillman

Analyte	Result	Units	Method	Analyte	Result	Units	Method
Diesel	<10	mg/Kg	NWTPH-D				
Oil	<100	mg/Kg	NWTPH-D				

Surrogate	Recovery	Method
p-Terphenyl	74	NWTPH-D

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager

SPECTRA Laboratories

2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850 • Fax (253) 572-9838

09/06/2005

Project:	Carlyle Tank
Client ID:	83105-T1-B
Sample Matrix:	Soil
Date Sampled:	08/31/2005
Date Received:	08/31/2005
Spectra Project:	2005080492
Spectra Number:	9
	Rush

Port of Tacoma
PO Box 1837
Tacoma, WA 98401
Attn: Doug Hillman

Analyte	Result	Units	Method
Diesel	<10	mg/Kg	NWTPH-D
Oil	<100	mg/Kg	NWTPH-D
Total Arsenic	9	mg/Kg	SW846 6010B
Total Lead	< 4	mg/Kg	SW846 6010B
Benzene	<0.025	mg/Kg	SW846 8260B
Ethylbenzene	<0.025	mg/Kg	SW846 8260B
Methyl-tert-Butyl Ether	<0.025	mg/Kg	SW846 8260B
Toluene	0.079	mg/Kg	SW846 8260B
Total Xylenes	<0.05	mg/Kg	SW846 8260B
2-Methylnaphthalene	<0.08	mg/Kg	SW846 8270C
Acenaphthene	<0.08	mg/Kg	SW846 8270C
Acenaphthylene	<0.08	mg/Kg	SW846 8270C
Anthracene	<0.08	mg/Kg	SW846 8270C
Benzo(a)Anthracene	<0.08	mg/Kg	SW846 8270C
Benzo(a)Pyrene	<0.08	mg/Kg	SW846 8270C
Benzo(b)Fluoranthene	<0.08	mg/Kg	SW846 8270C
Benzo(ghi)Perylene	<0.08	mg/Kg	SW846 8270C
Benzo(k)Fluoranthene	<0.08	mg/Kg	SW846 8270C
Chrysene	<0.08	mg/Kg	SW846 8270C
Dibenz(a,h)Anthracene	<0.08	mg/Kg	SW846 8270C
Fluoranthene	<0.08	mg/Kg	SW846 8270C
Fluorene	<0.08	mg/Kg	SW846 8270C
Indeno(1,2,3-cd)Pyrene	<0.08	mg/Kg	SW846 8270C
Naphthalene	<0.08	mg/Kg	SW846 8270C
Phenanthrene	<0.08	mg/Kg	SW846 8270C
Pyrene	<0.08	mg/Kg	SW846 8270C

Surrogate	Recovery	Method
Toluene-d8	94	SW846 8260B
4-Bromofluorobenzene	110	SW846 8260B
p-Terphenyl	78	NWTPH-D
Nitrobenzene-d5	47	SW846 8270C
2-Fluorobiphenyl	73	SW846 8270C
p-Terphenyl-d14	70	SW846 8270C

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager

(TUE)SEP 6 2005 17:08/ST. 17:08/NO. 6326759033 P 9

FROM

SPECTRA Laboratories
2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850 • Fax (253) 572-9838

09/06/2005

Project:	Carlyle Tank
Client ID:	83105-T2-B
Sample Matrix:	Soil
Date Sampled:	08/31/2005
Date Received:	08/31/2005
Spectra Project:	2005080492
Spectra Number:	10

Rush

Port of Tacoma
PO Box 1837
Tacoma, WA 98401
Attn: Doug Hillman

Analyte	Result	Units	Method	Analyte	Result	Units	Method
Diesel	<10	mg/Kg	NWTPH-D				
Oil	<100	mg/Kg	NWTPH-D				
Total Arsenic	20	mg/Kg	SW846 6010B				
Total Lead	< 4	mg/Kg	SW846 6010B				

Surrogate	Recovery	Method
p-Terphenyl	74	NWTPH-D

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager

FROM
(TUE)SEP 6 2005 17:08/ST. 17:03/NO. 6826759083 P 10

SPECTRA Laboratories

2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850 • Fax (253) 572-9838

09/06/2005

Project:	Carlyle Tank
Client ID:	83105-Stock 1
Sample Matrix:	Soil
Date Sampled:	08/31/2005
Date Received:	08/31/2005
Spectra Project:	2005080492
Spectra Number:	11
	Rush

Port of Tacoma
PO Box 1837
Tacoma, WA 98401
Attn: Doug Hillman

Analyte	Result	Units	Method	Analyte	Result	Units	Method
Diesel	44	mg/Kg	NWTPH-D				
Oil	<100	mg/Kg	NWTPH-D				
Total Arsenic	47	mg/Kg	SW846 6010B				
Total Lead	21	mg/Kg	SW846 6010B				

Surrogate	Recovery	Method
p-Terphenyl	90	NWTPH-D

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager

(TUE)SEP 6 2005 17:06/ST. 17:03/NO. 6826759088 P 11

FROM

SPECTRA Laboratories

2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850 • Fax (253) 572-9838

09/06/2005

Port of Tacoma
PO Box 1837
Tacoma, WA 98401
Attn: Doug Hillman

Project:	Carlyle Tank
Client ID:	83105-Stock 2
Sample Matrix:	Soil
Date Sampled:	08/31/2005
Date Received:	08/31/2005
Spectra Project:	2005080492
Spectra Number:	12
	Rush

Analyte	Result	Units	Method	Analyte	Result	Units	Method
Diesel	<10	mg/Kg	NWTPH-D				
Oil	<100	mg/Kg	NWTPH-D				
Total Arsenic	15	mg/Kg	SW846 6010B				
Total Lead	5	mg/Kg	SW846 6010B				

Surrogate	Recovery	Method
o-Terphenyl	74	NWTPH-D

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager

(TUE)SEP 6 2005 17:06/ST. 17:03/NO. 6326759038 P 12

FROM

SPECTRA Laboratories

2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850 • Fax (253) 572-9838

09/06/2005

Project: Carlylc Tank
Client ID: 83105-Stock 3
Sample Matrix: Soil
Date Sampled: 08/31/2005
Date Received: 08/31/2005
Spectra Project: 2005080492
Spectra Number: 13
Rush

Port of Tacoma
PO Box 1837
Tacoma, WA 98401
Attn: Doug Hillman

Analyte	Result	Units	Method	Analyte	Result	Units	Method
Diesel	<10	mg/Kg	NWTPH-D				
Oil	<100	mg/Kg	NWTPH-D				
Total Arsenic	22	mg/Kg	SW846 6010B				
Total Lead	15	mg/Kg	SW846 6010B				

Surrogate	Recovery	Method
p-Terphenyl	78	NWTPH-D

SPECTRA LABORATORIES

Steve Hibbs, Laboratory Manager

(TUE)SEP 6 2005 17:07/ST. 17:03/NO. 6826759083 P 13
FROM

CHAIN of CUSTODY

PAGE 1 of 2

STANDARD ☐ RUSH ☒

SPECTRA Laboratories

2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850 • Fax (253) 572-9838 • www.spectra-lab.com

CLIENT: Port of Tacoma
ADDRESS: P.O. BOX 1837 Tacoma, WA 98401-1837

PROJECT: Carlyle Tank

CONTACT: Doug Hillman

PHONE: FAX:

e-MAIL: I Prefer FAX ☐ or e-MAIL ☐

PURCHASE ORDER #:

SAMPLE ID	DATE SAMPLED	TIME SAMPLED	MATRIX	NUMBER OF CONTAINERS	NWTPH-HCID	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1664 SGT-HEM	1664 HEM	8260/624 VOA	8260 CHLOR SOLVENTS	8270/625 SEMI VOA	PAH/PNA-8270 * cPAH LLAP	8082 PCB	TOTAL METALS RCRA8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	pH 9040/9045	TX/TOX 9076	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY)	ARSENIC	LEAD
83105-S-1	5/31/05	2:40	Soil	2		X			X						X												X	X
83105-S-2		2:50							X																			
83105-W-1		3:00				X			X						X												X	X
83105-W-2		3:05							X																			
83105-E-1		3:40				X			X						X												X	X
83105-E-2		3:50							X																			
83105-N-1		3:55				X			X						X												X	X
83105-N-2		4:00							X																			
83105-T1-B		4:03				X			X						X												X	X
83105-T2-B		4:20		1					X																		X	X

SPECIAL INSTRUCTIONS/COMMENTS:
Send Copy of Report to
DLH Environmental Consulting
2400 NW 80th ST. # 114
Seattle, WA 98117
Donna Hewitt 206 632 3123

RETURN SAMPLES ☐ DISPOSE SAMPLES ☐
(Fee Applies)

	SIGNATURE	PRINTED NAME	COMPANY	DATE	TIME
RELINQUISHED BY	[signature]	Donna Hewitt	DLH	5/31/05	1645
RECEIVED BY	[signature]	KA Nason	Spectra	5/31/05	1645
RELINQUISHED BY					
RECEIVED BY					

Payment Terms: Net 30 days. Past due accounts subject to 1½% per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other associated costs of collection regardless of whether suit is filed. *Spectra Analytical, Inc.*

M99CS000569M 04/04

SPECTRA Laboratories

CHAIN of CUSTODY

PAGE 2 of 2

STANDARD ☐ RUSH ☒

2221 Ross Way • Tacoma, WA 98421 • (253) 272-4850 • Fax (253) 572-9838 • www.spectra-lab.com

CLIENT: Port of Tacoma

ADDRESS:

PROJECT: Carlyle

CONTACT: Doug Hillman

PHONE: FAX:

e-MAIL: I Prefer FAX ☐ or e-MAIL ☐

PURCHASE ORDER #:

					HYDROCARBONS							ORGANICS					METALS				OTHER							
SAMPLE ID	DATE SAMPLED	TIME SAMPLED	MATRIX	NUMBER OF CONTAINERS	NWTPH-HCID	BTEX	BTEX/NWTPH-G	NWTPH-G	NWTPH-Dx	1664 SGT-HEM	1664 HEM	8260/624 VOA	8260 CHLOR SOLVENTS	8270/625 SEMI VOA	PAH/PNA-8270	8082 PCB	TOTAL METALS RCRA8	TOTAL METALS (SPECIFY)	TCLP METALS RCRA 8	TCLP METALS (SPECIFY)	pH 9040/9045	TX/TOX 9076	TURBIDITY	FLASH POINT	BOD	SOLIDS (SPECIFY)	Arsenic	Lead
83105-Stock 1	8/31/05	1:30	Soil	1					X																		X	X
83105-STOCK 2	↓	1245	"	1					X																		X	X
83105-STOCK 3	↓	4:10	"	1					X																		X	X

SPECIAL INSTRUCTIONS/COMMENTS:

	SIGNATURE	PRINTED NAME	COMPANY	DATE	TIME
RELINQUISHED BY	[signature]	Donna Hewitt	DLH	8/31/05	1645
RECEIVED BY	[signature]	Ka Nason	Spectra	8/31/05	1645
RELINQUISHED BY					
RECEIVED BY					

RETURN SAMPLES ☐ DISPOSE SAMPLES ☐ (Fee Applies)

Payment Terms: Net 30 days. Past due accounts subject to 1½% per month interest. Customer agrees to pay all costs of collection including reasonable attorney's fees and all other associated costs of collection regardless of whether suit is filed. *Spectra Analytical, Inc.*

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Appendix G

Boring Logs from Phase I-III Supplemental RI Work

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SOIL CLASSIFICATION LEGEND

MAJOR DIVISIONS / TYPICAL NAMES

Major Divisions			Symbol	Typical Names
COARSE GRAINED SOILS More than half is larger than No. 200 sieve	GRAVELS More than half coarse fraction is larger than No. 4 sieve size	Clean gravels with little or no fines	GW	Well graded gravels, gravel-sand mixtures
			GP	Poorly graded gravels, gravel-sand mixtures
		Gravel with over 12% fines	GM	Silty gravels, gravel-sand-silt mixtures
			GC	Clayey gravels, gravel-sand-clay mixtures
	SANDS More than half coarse fraction is smaller than No. 4 sieve size	Clean sands with little or no fines	SW	Well graded sands, gravelly sands
			SP	Poorly graded sands, gravelly sands
		Sands with over 12% fines	SM	Silty sand, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures
FINE GRAINED SOILS More than half is smaller than No. 200 sieve	SILTS AND CLAYS Liquid limit less than 50		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL	Organic clays and organic silty clays of low plasticity
	SILTS AND CLAYS Liquid limit greater than 50		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS			PT	Peat and other highly organic soils

SAMPLE TYPE SYMBOLS

- Disturbed bag or jar sample
- Std. Penetration Test (2.0" OD)
- Type U Ring Sampler (3.25" OD)
- California Sampler (3.0" OD)
- Undisturbed Tube Sample
- Grab Sample
- Core Run
- Non-standard Penetration Test (with split spoon sampler)

CONTACT BETWEEN UNITS

- Change in geologic unit
- Soil type change within geologic unit
- Obscure or gradational change

DESCRIPTORS FOR SOIL STRATA AND STRUCTURE (ENGLISH/METRIC)

General Thickness or Spacing

Parting:	less than 1/16 in. (1/6 cm)
Seam:	1/16 to 1/2 in. (1/6 to 1 1/4 cm)
Layer:	1/2 to 12 in. (1 1/4 to 30 1/2 cm)
Stratum:	> 12 in. (30 1/2 cm)
Scattered:	< 1 per ft. (30 1/2 cm)
Numerous:	> 1 per ft. (30 1/2 cm)

Structure

Pocket:	Erratic, discontinuous deposit of limited extent
Lens:	Lenticular deposit
Varved:	Alternating seams of silt and clay
Laminated:	Alternating seams
Interbedded:	Alternating layers

General Attitude

Near horizontal:	0 to 10 deg.
Low angle:	10 to 45 deg.
High angle:	45 to 80 deg.
Near Vertical:	80 to 90 deg.

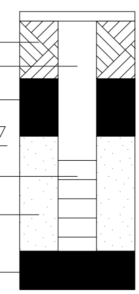
MOISTURE DESCRIPTION

- Dry - Free of moisture, dusty
- Moist - Damp but no visible free water
- Wet - Visible free water, saturated

STRUCTURE DESCRIPTION (cont.)

Fractured	Breaks easily along definite fractured planes
Slickensided	Polished, glossy, fractured planes
Blocky, Diced	Breaks easily into small angular lumps
Sheared	Disturbed texture, mix of strengths
Homogeneous	Same color and appearance throughout

WELL COMPLETIONS



RELATIVE DENSITY OR CONSISTENCY VS. SPT N-VALUE

COARSE GRAINED			FINE GRAINED		
Density	N (blows/ft)	Approx. Relative Density (%)	Consistency	N (blows/ft)	Approx. Undrained Shear Str. (psf)
Very Loose	0 to 4	0 - 15	Very Soft	0 to 2	<250
Loose	4 to 10	15 - 35	Soft	2 to 4	250 - 500
Medium Dense	10 to 30	35 - 65	Medium Stiff	4 to 8	500 - 1000
Dense	30 to 50	65 - 85	Stiff	8 to 15	1000 - 2000
Very Dense	Over 50	85 - 100	Very Stiff	15 to 30	2000 - 4000
			Hard	over 30	>4000

PHYSICAL PROPERTY TEST

- AL - Atterberg Limits
- FC - Fines Content
- GSD - Grain Size Distribution
- MC - Moisture Content
- MD - Moisture Content/Dry Density
- Comp - Compaction Test (Proctor)
- SG - Specific Gravity
- CBR - California Bearing Ratio
- RM - Resilient Modulus
- Perm - Permeability
- TXP - Triaxial Permeability
- Cons - Consolidation
- Chem - Analytical Chemical Analysis
- Corr - Corrosion
- VS - Vane Shear
- DS - Direct Shear
- UC - Unconfined Compression
- TX - Triaxial Compression
- UU - Unconsolidated, Undrained
- CU - Consolidated, Undrained
- CD - Consolidated, Drained

Notes:

1. Sample descriptions in this report are based on visual field and laboratory observations, which include density/consistency, moisture condition, grain size, and plasticity estimates, and should not be construed to imply field or laboratory testing unless presented herein. Visual-manual classification methods in accordance with ASTM D 2488 were used as an identification guide. Where laboratory data are available, soil classifications are in general accordance with ASTM D 2487.

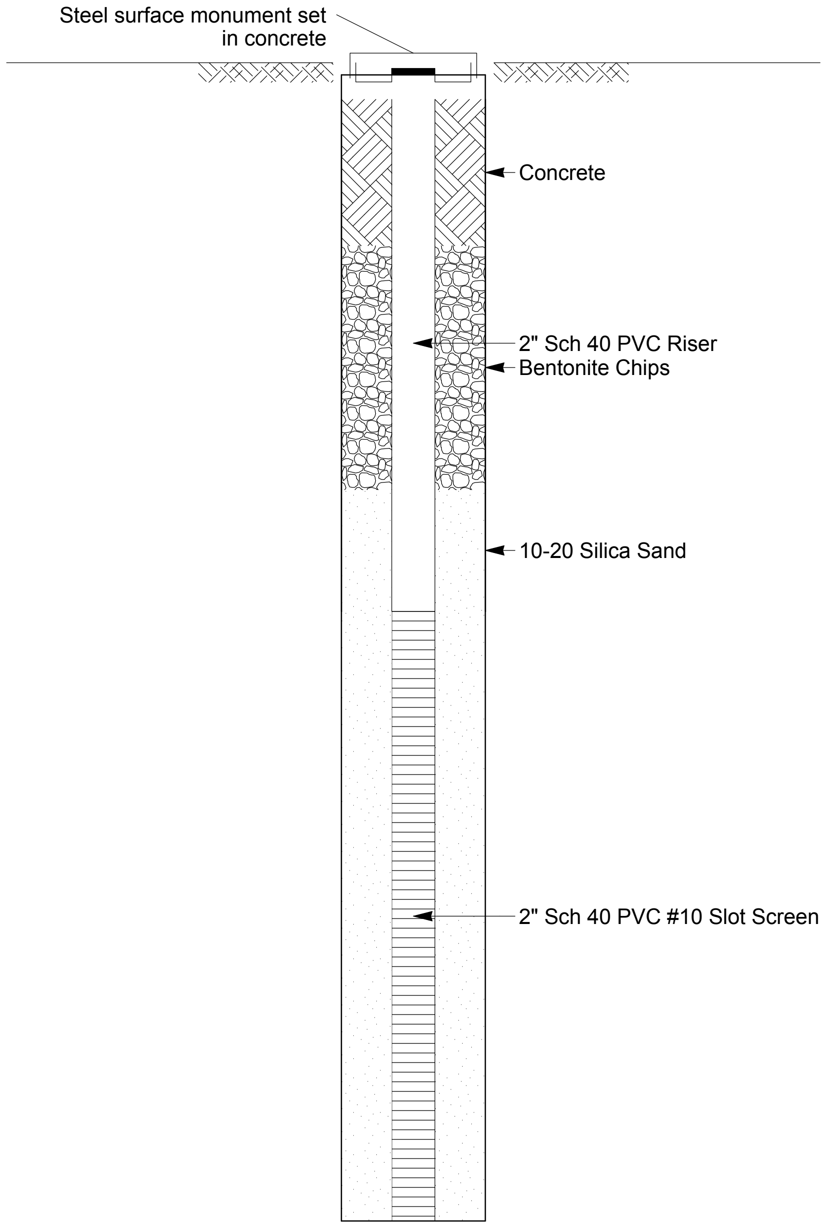
2. Dual symbols are used to indicate gravel and sand units with 5 to 12 percent fines.

3. WOR = weight of rod.

CDM Smith

Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

Project No: 19921.106749 Figure: G1



TYPICAL MONITORING WELL CONSTRUCTION 19921-106749 TAYLOR WAY PROPERTY.GPJ GINT STD US LAB.GDT 3/4/15 REV.

CDM Smith

TYPICAL MONITORING WELL CONSTRUTION

Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

Project No: 19921.106749 Figure: G2

1 of 1

Boring Log DPT1

Arsenic Using An XRF (ppm)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
242								SM		Gravelly, Silty SAND (SM), tan, moist, asphalt debris and angular gravel (Fill). 6 thick black asphalt-like material with silver metallic slag at 1.5 ft bgs.	
ND						4		SP		SAND (SP), brown, fine grained, trace silt, loose, moist (Fill). Becomes silty SAND (SM), 6 lense of silt at 5 ft bgs, moist.	
ND						6				Boring terminated at 6 ft bgs. No groundwater encountered during drilling. *Analyzed using an Innov-X brand x-ray fluorescence meter (XRF).	

Depth scale (feet): 2, 4, 6, 8, 10, 12, 14, 16, 18

Location: See Site Plan
Surface Elevation:
Logged By: AW

Drill Rig: Geoprobe
Equipment/Hammer: DPT/NA
Date Completed: 8-20-08

Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

CDM Smith

Boring Log DPT1
Project No: 19921.106749

Figure: G3
1 of 1

LOG OF BORING WITH WELL_PAM 19921-106749 TAYLOR WAY PROPERTY.GPJ GINT STD US LAB.GDT 3/4/15 REV.

Boring Log DPT2

Arsenic Using An XRF (ppm)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
										3 inch asphalt.	
								SM		Gravelly, Silty SAND (SM), tan, gravel is fine, angular, moist (Fill).	
6,274						2				Black shot material at ~26 inch bgs (4 thick).	
								SP		SAND (SP), brown, fine to medium grained, medium dense, moist (Fill).	
						4				Boring terminated at 4 ft bgs. No groundwater encountered during drilling. *Analyzed using an Innov-X brand x-ray fluorescence meter (XRF).	
						6					
						8					
						10					
						12					
						14					
						16					
						18					

- Location: See Site Plan
- Surface Elevation:
- Logged By: AW
- Drill Rig: Geoprobe
- Equipment/Hammer: DPT/NA
- Date Completed: 8-20-08

Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

CDM Smith

Boring Log DPT2
Project No: 19921.106749

Figure: G4
1 of 1

LOG OF BORING WITH WELL_PAM 19921-106749 TAYLOR WAY PROPERTY.GPJ GINT STD US LAB.GDT 3/4/15 REV.

Boring Log DPT3

Arsenic Using An XRF (ppm)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
										3 inch asphalt.	
51								SM		Gravelly, Silty SAND (SM), gray (Fill). Black asphalt-like material at 1 ft bgs, some rootlets.	
						2		CL		Gravelly, Sandy CLAY (CL), yellow-green, low plasticity, gravel is fine to coarse, angular, moist (Fill).	
								SM		Slightly Silty SAND (SM), gray, fine grained, interbedded lenses of silt with some clay, low plasticity, moist to wet (Fill).	
						4				Boring terminated at 4 ft bgs. No groundwater encountered during drilling. *Analyzed using an Innov-X brand x-ray fluorescence meter (XRF).	
						6					
						8					
						10					
						12					
						14					
						16					
						18					

Location: See Site Plan
Surface Elevation:
Logged By: AW

Drill Rig: Geoprobe
Equipment/Hammer: DPT/NA
Date Completed: 8-20-08

LOG OF BORING WITH WELL_PAM 19921-106749 TAYLOR WAY PROPERTY.GPJ GINT STD US LAB.GDT 3/4/15 REV.

CDM Smith

Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

Boring Log DPT3
Project No: 19921.106749

Figure: G5

Boring Log DPT4

Arsenic Using An XRF (ppm)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
										3 inch asphalt.	
								SM		Gravelly, Silty SAND (SM), tan to dark brown, gravel is fine to coarse, subangular, moist (Fill).	
						2					
										3 inch lens of black slag-like material.	
1,487								SM		Silty SAND (SM), brown, loose, moist (Fill).	
						4				Boring terminated at 4 ft bgs. No groundwater encountered during drilling. *Analyzed using an Innov-X brand x-ray fluorescence meter (XRF).	
						6					
						8					
						10					
						12					
						14					
						16					
						18					

Location: See Site Plan
Surface Elevation:
Logged By: AW

Drill Rig: Geoprobe
Equipment/Hammer: DPT/NA
Date Completed: 8-20-08

CDM Smith

Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

Boring Log DPT4
Project No: 19921.106749

Figure: G6
1 of 1

LOG OF BORING WITH WELL_PAM 19921-106749 TAYLOR WAY PROPERTY.GPJ GINT STD US LAB.GDT 3/4/15 REV.

Boring Log DPT5A

Arsenic Using An XRF (ppm)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
										3 inch asphalt.	
										Gravelly, Silty SAND (SM), tan, green-brown, gray, fine to medium grained sand, gravel is angular (Fill).	
60						2		SM			
6,538											
										4 to 6 inch layer of black metallic material and slag.	
1,714						4				Silty SAND (SM), brown, fine grained, wet to saturated (Fill).	
						6		SM			
						8				Boring terminated at 8 ft bgs.	
										*Analyzed using an Innov-X brand x-ray fluorescence meter (XRF).	
						10					
						12					
						14					
						16					
						18					

Location: See Site Plan
Surface Elevation:
Logged By: AW

Drill Rig: Geoprobe
Equipment/Hammer: DPT/NA
Date Completed: 8-20-08

CDM Smith

Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

Boring Log DPT5A
Project No: 19921.106749

Figure: G7
1 of 1

Boring Log DPT5B

Arsenic Using An XRF (ppm)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
										3 inch asphalt.	
										Not sampled.	
						2					
						4				Slightly Silty SAND (SM), dark gray, fine to medium grained, medium dense, moist to wet (Fill).	
ND						6		SM			
						8				Boring terminated at 8 ft bgs. No groundwater encountered during drilling. *Analyzed using an Innov-X brand x-ray fluorescence meter (XRF).	
						10					
						12					
						14					
						16					
						18					

Location: See Site Plan
Surface Elevation:
Logged By: AW

Drill Rig: Geoprobe
Equipment/Hammer: DPT/NA
Date Completed: 8-20-08

LOG OF BORING WITH WELL_PAM 19921-106749 TAYLOR WAY PROPERTY.GPJ GINT STD US LAB.GDT 3/4/15 REV.

CDM Smith

Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

Boring Log DPT5B
Project No: 19921.106749

Figure: G8
1 of 1

Boring Log DPT6

Arsenic Using An XRF (ppm)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
										3 inch asphalt.	
										Gravelly Silty SAND (SM), tan, moist (Fill).	
61										Black at 1.5 ft bgs.	
						2					
								SM		Greenish tint at 3 ft bgs.	
						4					
248						6				Slightly Silty SAND (SM), dark gray, fine to medium grained, some unstratified silt, with shell fragments, medium dense, moist to wet (Fill).	
605											
						8		SM			
						10				SAND (SP), medium to coarse grained, trace silt, saturated.	
30								SP			
						12				Boring terminated at 12 ft bgs.	
										*Analyzed using an Innov-X brand x-ray fluorescence meter (XRF).	
						14					
						16					
						18					

Location: See Site Plan
Surface Elevation:
Logged By: AW

Drill Rig: Geoprobe
Equipment/Hammer: DPT/NA
Date Completed: 8-20-08

CDM Smith

Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

Boring Log DPT6
Project No: 19921.106749

Figure: G9
1 of 1

LOG OF BORING WITH WELL_PAM 19921-106749 TAYLOR WAY PROPERTY.GPJ GINT STD US LAB.GDT 3/4/15 REV.

Boring Log DPT7

Arsenic Using An XRF (ppm)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	USCS	DESCRIPTION	Elev. (feet)
						0–0.25		3 inch asphalt and subbase.	
						0.25–2	SM	Gravelly Silty SAND (SM), tan to dark brown, fine to coarse, subangular gravel, medium dense, moist (Fill).	
						2–2.75		8 inch concrete and subbase layer.	
ND						2.75–5	SM	Gravelly Silty SAND (SM), brown, fine to coarse subangular gravel, dense, dry to moist (Fill). Becomes loose, wet.	
3,106						5–11	SM	Silty SAND (SM), dark brown, trace gravel, medium dense (Fill). Becomes wet, increasing gravel. Contains rootlets.	
334									
ND						11–12	OL	Clayey SILT (OL), brown, abundant organic material (marsh grass), medium stiff, moist (Tideflat).	
						12		Boring terminated at 12 ft bgs.	

*Analyzed using an Innov-X brand x-ray fluorescence meter (XRF).

Location: See Site Plan
Surface Elevation:
Logged By: AW

Drill Rig: Geoprobe
Equipment/Hammer: DPT/NA
Date Completed: 8-20-08

CDM Smith

Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

Boring Log DPT7
Project No: 19921.106749

Figure: G10

Boring Log DPT8

Arsenic Using An XRF (ppm)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
						0–0.25				3 inch asphalt and subbase.	
ND						0.25–4		SM		Gravelly Silty SAND (SM), brown and tan, dense, multiple oxidation stains (Fill).	
25						4–8		SP		SAND (SP), black, fine to coarse grained, trace silt (Fill). Becomes wet.	
						8				Boring terminated at 8 ft bgs. *Analyzed using an Innov-X brand x-ray fluorescence meter (XRF).	

Location: See Site Plan
Surface Elevation:
Logged By: AW

Drill Rig: Geoprobe
Equipment/Hammer: DPT/NA
Date Completed: 8-20-08

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Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

Boring Log DPT8
Project No: 19921.106749

Figure: G11
1 of 1

LOG OF BORING WITH WELL_PAM 19921-106749 TAYLOR WAY PROPERTY.GPJ GINT STD US LAB.GDT 3/4/15 REV.

Boring Log DPT9

Arsenic Using An XRF (ppm)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
										3 inch asphalt and subbase.	
								SM		Gravelly Silty SAND (SM), dark brown to tan, medium dense to dense, moist to dry, multiple oxidation stains (Fill).	
104						2					
						4					
						6		SP		SAND (SP), black, fine to coarse grained, trace silt, moist to wet (Fill).	
22											
						8				Boring terminated at 8 ft bgs. *Analyzed using an Innov-X brand x-ray fluorescence meter (XRF).	
						10					
						12					
						14					
						16					
						18					

Location: See Site Plan
Surface Elevation:
Logged By: AW

Drill Rig: Geoprobe
Equipment/Hammer: DPT/NA
Date Completed: 8-20-08

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Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

Boring Log DPT9
Project No: 19921.106749

Figure: G12
1 of 1

Boring Log DPT10

Arsenic Using An XRF (ppm)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
						0				3 inch asphalt and subbase.	
										Gravelly Silty SAND (SM), tan to brown, medium dense to dense, slightly moist to dry, oxidation staining (Fill).	
						2					
ND											
						4				Increasing gravel.	
								SM			
2,588						6				5 inch black lens at 6 ft bgs.	
										Slightly Silty SAND (SM), black, medium dense, wet (Fill).	
44						▽				Becomes saturated.	
						8					
						10				Boring terminated at 10 ft bgs. Groundwater encountered at 7.5 ft bgs. *Analyzed using an Innov-X brand x-ray fluorescence meter (XRF).	
						12					
						14					
						16					
						18					

Location: See Site Plan
Surface Elevation:
Logged By: AW

Drill Rig: Geoprobe
Equipment/Hammer: DPT/NA
Date Completed: 8-20-08

Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

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Boring Log DPT10 Figure: G13
Project No: 19921.106749 1 of 1

LOG OF BORING WITH WELL_PAM 19921-106749 TAYLOR WAY PROPERTY.GPJ GINT STD US LAB.GDT 3/4/15 REV.

Boring Log DPT11

Arsenic Using An XRF (ppm)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	USCS	DESCRIPTION	Elev. (feet)
						0–0.3		3.5 inch asphalt and subbase.	
							SM	Silty Gravelly SAND (SM), tan, medium dense, dry (Fill).	
40						2	SM	Gravelly Silty SAND (SM), dark brown to black, fine to coarse, angular gravel, medium dense to dense, slightly moist (Fill).	
531						4			
							OL	Silty CLAY (OL), brown, with some gravel and silt, soft, very moist, abundant organic material.	
187						6		Wood debris at 5.5 ft bgs.	
141						7		Becomes saturated.	
						8			
						10		Boring terminated at 10 ft bgs. Groundwater encountered at 7 ft bgs. *Analyzed using an Innov-X brand x-ray fluorescence meter (XRF).	

Location: See Site Plan
Surface Elevation:
Logged By: AW

Drill Rig: Geoprobe
Equipment/Hammer: DPT/NA
Date Completed: 8-21-08

Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

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Boring Log DPT11
Project No: 19921.106749

Figure: G14
1 of 1

LOG OF BORING WITH WELL_PAM 19921-106749 TAYLOR WAY PROPERTY.GPJ GINT STD US LAB.GDT 3/4/15 REV.

Boring Log DPT12

Arsenic Using An XRF (ppm)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
						0				3 inch asphalt and subbase.	
79								SM		Gravelly Silty SAND (SM), tan to dark brown, dense to very dense, dry to slightly moist, multiple oxidation stains, gravel 0.3 to 1 inch subangular to angular (Fill).	
150						4					
72						5		ML		Gravelly Sandy SILT (ML), brown, gravel subangular, stiff to soft, moist (Fill). Decreasing gravel and sand content at 6 ft bgs.	
ND											
						11				Boring terminated at 11 ft bgs. *Analyzed using an Innov-X brand x-ray fluorescence meter (XRF).	

Location: See Site Plan
Surface Elevation:
Logged By: AW

Drill Rig: Geoprobe
Equipment/Hammer: DPT/NA
Date Completed: 8-21-08

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Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

Boring Log DPT12
Project No: 19921.106749

Figure: G15

LOG OF BORING WITH WELL_PAM 19921-106749 TAYLOR WAY PROPERTY.GPJ GINT STD US LAB.GDT 3/4/15 REV.

Boring Log DPT13

Arsenic Using An XRF (ppm)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	USCS	DESCRIPTION	Elev. (feet)
						0		3.5 inch asphalt and subbase.	
							SM	Gravelly Silty SAND (SM), tan to dark brown, 0.2 to 1 inch subangular to angular gravel, medium dense to dense, multiple oxidation stains (Fill).	
3,380								6 inch black lens contains white quartzite.	
2,869									
						5	ML	SILT (ML), brown to black, with clay, soft, very moist (Fill).	
30								Becomes wet.	
ND						8	OL	Silty CLAY (OL), brown, soft, very moist, contains abundant organic material (Tideflat)	
						12		Boring terminated at 12 ft bgs.	
								*Analyzed using an Innov-X brand x-ray fluorescence meter (XRF).	

Location: See Site Plan
Surface Elevation:
Logged By: AW

Drill Rig: Geoprobe
Equipment/Hammer: DPT/NA
Date Completed: 8-21-08

Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

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Boring Log DPT13
Project No: 19921.106749

Figure: G16
1 of 1

LOG OF BORING WITH WELL_PAM 19921-106749 TAYLOR WAY PROPERTY.GPJ GINT STD US LAB.GDT 3/4/15 REV.

Boring Log DPT14

Arsenic Using An XRF (ppm)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
										3 inch asphalt and subbase.	
58						2		SM		Gravelly Silty SAND (SM), tan to brown, 0.3 to 1 inch subangular to angular gravel, medium dense to dense, dry to moist (Fill).	
ND						4		ML		Sandy SILT (ML), dark brown, with some clay, trace gravel, soft.	
						6					
						8					
						10					
						12				Boring terminated at 12 ft bgs. Low groundwater production. Drove DPT 6 inch to east to obtain groundwater sample. *Analyzed using an Innov-X brand x-ray fluorescence meter (XRF).	
						14					
						16					
						18					

Location: See Site Plan
Surface Elevation:
Logged By: AW

Drill Rig: Geoprobe
Equipment/Hammer: DPT/NA
Date Completed: 8-21-08

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Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

Boring Log DPT14 Figure: G17
Project No: 19921.106749

LOG OF BORING WITH WELL_PAM 19921-106749 TAYLOR WAY PROPERTY.GPJ GINT STD US LAB.GDT 3/4/15 REV.

Boring Log DPT15

Arsenic Using An XRF (ppm)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
										3 inch asphalt and subbase.	
										Gravelly SIlty SAND (SM), tan, fine to coarse, subangular gravel, dense, dry to slightly moist (Fill).	
								SM		Becomes black.	
407						2					
										Silty SAND (SM), brown, medium dense, moist, slight oxidation staining (Fill).	
						4					
ND						6					
								SM		Becomes wet at 7.5 ft bgs.	
						8					
										Becomes dark brown at 9.5 ft bgs.	
						10					
						12				Boring terminated at 12 ft bgs.	
										*Analyzed using an Innov-X brand x-ray fluorescence meter (XRF).	
						14					
						16					
						18					

Location: See Site Plan
Surface Elevation:
Logged By: AW

Drill Rig: Geoprobe
Equipment/Hammer: DPT/NA
Date Completed: 8-21-08

LOG OF BORING WITH WELL_PAM 19921-106749 TAYLOR WAY PROPERTY.GPJ GINT STD US LAB.GDT 3/4/15 REV.

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Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

Boring Log DPT15
Project No: 19921.106749

Figure: G18

Boring Log DPT16

Arsenic Using An XRF (ppm)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
										4 inch asphalt and subbase.	
								SM		Gravelly Silty SAND (SM), tan to brown, fine to coarse, angular gravel, medium dense, moist to wet (Fill).	
						2				Silty SAND (SM), brown, medium dense, moist, ~1mm bedding (Fill). 6 inch sandy SILT lens at 2 ft bgs.	
ND						4					
ND										Oxidation staining at 5 ft bgs.	
						6				Becomes dark gray at 6 ft bgs.	
						▽		SM		Becomes saturated at 7 ft bgs.	
						8					
						10				Organics (wood debris, roots) at 10 ft bgs.	
ND											
						12				Boring terminated at 12 ft bgs. Groundwater encountered at 7 ft bgs. *Analyzed using an Innov-X brand x-ray fluorescence meter (XRF).	
						14					
						16					
						18					

Location: See Site Plan
Surface Elevation:
Logged By: AW

Drill Rig: Geoprobe
Equipment/Hammer: DPT/NA
Date Completed: 8-21-08

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Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

Boring Log DPT16
Project No: 19921.106749

Figure: G19
1 of 1

LOG OF BORING WITH WELL_PAM 19921-106749 TAYLOR WAY PROPERTY.GPJ GINT STD US LAB.GDT 3/4/15 REV.

Boring Log DPT17

Arsenic Using An XRF (ppm)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
										3 inch asphalt and subbase.	
						2		SM		Gravelly SIlty SAND (SM), tan to gray, 0.3 to 1 inch angular gravel, dry, multiple oxidation stains (Fill).	
ND						4		ML		Sandy SILT (ML), dark brown, medium stiff, scattered rootlets (Fill). Gravel lens at 4 ft bgs.	
						6					
ND								OL		Silty CLAY (OL), dark brown to black, medium stiff, contains abundant organic material (Tideflat).	
						8				Boring terminated at 8 ft bgs.	
										*Analyzed using an Innov-X brand x-ray fluorescence meter (XRF).	
						10					
						12					
						14					
						16					
						18					

Location: See Site Plan
Surface Elevation:
Logged By: AW

Drill Rig: Geoprobe
Equipment/Hammer: DPT/NA
Date Completed: 8-21-08

Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

CDM Smith

Boring Log DPT17
Project No: 19921.106749

Figure: G20
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LOG OF BORING WITH WELL_PAM 19921-106749 TAYLOR WAY PROPERTY.GPJ GINT STD US LAB.GDT 3/4/15 REV.

Boring Log DPT18

Arsenic Using An XRF (ppm)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
										3 inch asphalt and subbase.	
140						2		SM		Gravelly Silty SAND (SM), tan to dark brown, 0.3 to 1 inch subangular gravel, medium dense to dense (Fill).	
						4		ML		Sandy SILT (ML), brown, soft, contains rootlets (Fill).	
						6				Boring terminated at 4 ft bgs. *Analyzed using an Innov-X brand x-ray fluorescence meter (XRF).	
						8					
						10					
						12					
						14					
						16					
						18					

Location: See Site Plan
Surface Elevation:
Logged By: AW

Drill Rig: Geoprobe
Equipment/Hammer: DPT/NA
Date Completed: 8-21-08

LOG OF BORING WITH WELL_PAM 19921-106749 TAYLOR WAY PROPERTY.GPJ GINT STD US LAB.GDT 3/4/15 REV.

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Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

Boring Log DPT18
Project No: 19921.106749

Figure: G21

Boring Log DPT19

Arsenic Using An XRF (ppm)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
										3 inch asphalt and subbase.	
								SM		Gravelly Silty SAND (SM), tan to dark brown, 0.1 to 1 inch fine to coarse, angular gravel, dense, dry, multiple oxidation stains (Fill).	
						2					
967										Becomes moist at 3 ft bgs, 6 inch dark brown to black lens with white quartzite.	
						4				Boring terminated at 4 ft bgs.	
										*Analyzed using an Innov-X brand x-ray fluorescence meter (XRF).	
						6					
						8					
						10					
						12					
						14					
						16					
						18					

Location: See Site Plan
Surface Elevation:
Logged By: AW

Drill Rig: Geoprobe
Equipment/Hammer: DPT/NA
Date Completed: 8-21-08

CDM Smith

Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

Boring Log DPT19
Project No: 19921.106749

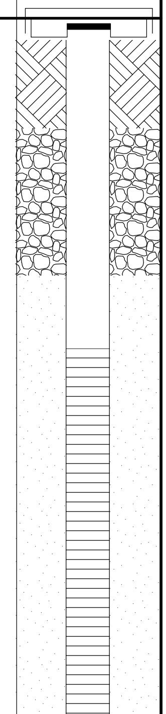
Figure: G22
1 of 1

LOG OF BORING WITH WELL_PAM 19921-106749 TAYLOR WAY PROPERTY.GPJ GINT STD US LAB.GDT 3/4/15 REV.

Boring Log MW1R

Arsenic Using An XRF (ppm)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / 6 in.)	Depth (feet)	USCS	DESCRIPTION	Elev. (feet)
						0		4 inch asphalt.	
							GP	Sandy GRAVEL (GP), dark gray, coarse grained, some silt, rounded, medium dense, moist (Fill).	
14 150 282					9 11 16	2		Becomes brown, piece of slag, piece of brick.	
17					6 0 0	4.5	MH	Clayey SILT (MH), gray/dark gray, some charcoal and marsh grass, very soft, wet (Fill).	
53					0 0 0	7	SM	Silty SAND (SM), dark gray to black, angular, fine gravel, loose, saturated, more silt at 9.2 ft bgs (Fill).	
						9.2	MH	Clayey SILT (MH), with marsh grass (Tideflat).	
						9.5		Boring terminated at 9.5 ft bgs. Groundwater encountered at 7.5 ft bgs during drilling	

Well or Piezometer Completion



Location: See Site Plan
Surface Elevation:
Logged By: PJM

Drill Rig: HSA
Equipment/Hammer: SPT/140
Date Completed: 12-12-06

CDM Smith

Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

Boring Log MW1R
Project No: 19921.106749

Figure: G23
1 of 1

Boring Log MW13R

Arsenic Using An XRF (ppm)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)	Well or Piezometer Completion
										4 inch asphalt.		
										Sandy GRAVEL (GP), dark brown, coarse grained, some silt, rounded, medium dense, moist (Fill).		
72							G			Becomes dark gray, loose to medium dense, rounded.		
					2 4 7			GP				
20										Becomes brown, wet.		
19					0 0 0	5		MH		Silty CLAY (MH), gray/dark gray, very soft, wet, piece of charcoal (Fill).		
24					0 1 0			SM		Silty SAND (SM), gray/dark gray, fine grained, angular, loose, wet, siltier at 9 ft bgs.		
										Clayey SILT (OL), dark brown, with many organics (marsh grass), very soft, moist (Tideflat).		
					0 0 0	10						
21												
					0 0 0					Decreasing clay content, trace very fine sand.		
<5								OL		With occasional thin sand lenses.		
					0 0 0	15				Becomes wet, few organics.		
16												
					0 0 0			SM		Silty SAND (SM), dark gray, fine grained, very loose, saturated (Deltaic Sediments).		
					0 0 0	20				Sandy SILT (ML), dark brown, very soft, wet, increasing stiffness with depth, with sand lenses and shell fragments at 21.5 ft bgs (Deltaic Sediments).		
<5								ML				
					0 0 0					With sand lenses.		
										Boring terminated at 24 ft bgs. Groundwater encountered at 6 and 18 ft bgs during drilling.		
						25						

LOG OF BORING WITH WELL_PAM 19921-106749 TAYLOR WAY PROPERTY.GPJ GINT STD US LAB.GDT 3/4/15 REV.

Location: See Site Plan
Surface Elevation:
Logged By: PJM

Drill Rig: HSA
Equipment/Hammer: SPT/140
Date Completed: 12-12-06

Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

CDM Smith

Boring Log MW13R
Project No: 19921.106749

Figure: G24
1 of 1

Boring Log MW24

Arsenic Using An XRF (ppm)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	USCS	DESCRIPTION	Elev. (feet)
								4 inch asphalt.	
116 202							SP	Gravelly SAND (SP), dark brown, fine to medium grained, with silt, medium dense, wet (Fill).	
45					6 5 4 3 1 1	5	GP	GRAVEL (GP), dark brown, some sand and silt, loose, wet, gravel is fine to medium grained (pea gravel-like) at 6.5 ft bgs (Fill). Becomes dark gray, saturated.	
16					0 1 0	10	ML	Clayey SILT (ML), dark gray, trace organics, very soft, wet (Fill).	
<5					0 0 0		SM	Silty SAND (SM), dark brown, fine grained, with sand lenses, medium dense, wet, interlayered silty sand and clayey silt (SM-ML), with some organics (in layers), very soft, wet. Abundant marsh grasses at 14 ft bgs.	
<5					0 0 1	15	SP	SAND (SP), black, fine grained, very loose, saturated.	
					0 3 2		ML	Clayey SILT (ML), dark brown, with marsh organics, medium stiff, moist (Tideflat).	
					3 6 8 3 6 10	20	SP	SAND (SP), black, fine grained, medium dense, saturated (Deltaic Sediments).	
							ML	Sandy SILT (ML), very dark brown, very fine-grained sand, very soft, wet (Deltaic Sediments).	
					1 6 9	25	SM	Interlayered Silty SAND (SM) and SAND (SP), fine grained, medium dense, saturated (Deltaic Sediments).	
								Boring terminated at 26.5 ft bgs. Groundwater encountered at 8.5, 15, and 18.5 ft bgs during drilling.	

Well or Piezometer Completion

Location: See Site Plan
Surface Elevation:
Logged By: PJM

Drill Rig: HSA
Equipment/Hammer: SPT/140
Date Completed: 12-13-06

Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

CDM Smith

Boring Log MW24
Project No: 19921.106749

Figure: G25

LOG OF BORING WITH WELL_PAM 19921-106749 TAYLOR WAY PROPERTY.GPJ GINT STD US LAB.GDT 3/4/15 REV.

Boring Log MW25

Arsenic Using An XRF (ppm)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)	Well or Piezometer Completion
										8 inch concrete.		
9							G	SP		Gravelly SAND (SP), dark brown, fine grained, medium dense, moist (Fill).		
6						2	G			Hole vacuumed out to 5 ft bgs, slough to 3.5 ft bgs and groundwater in hole at 3.5 ft bgs.		
						4						
					15 18 16	6		GP		Sandy GRAVEL (GP), gray-brown, fine to coarse grained, trace silt, dense (Fill).		
					11 7 11	8		SP		SAND (SP), dark gray, fine grained, trace silt, medium dense, saturated (Fill).		
						10		OL		Clayey SILT (OL), dark brown, with some marsh grass, soft, wet (Tideflat).		
										Boring terminated at 10 ft bgs. Groundwater encountered at 3.5 ft bgs during drilling.		
						12						
						14						
						16						
						18						

Location: See Site Plan
Surface Elevation:
Logged By: PJM

Drill Rig: HSA
Equipment/Hammer: SPT/140
Date Completed: 12-13-06

LOG OF BORING WITH WELL_PAM 19921-106749 TAYLOR WAY PROPERTY.GPJ GINT STD US LAB.GDT 3/4/15 REV.

CDM Smith

Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

Boring Log MW25
Project No: 19921.106749

Figure: G26

Boring Log MW26

Arsenic Using An XRF (ppm)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)	Well or Piezometer Completion
								SP		Gravelly SAND (SP), dark brown, fine grained, medium dense, moist (Fill).		
25 34					13 7 5					With some slag.		
<5					0	5		ML		Clayey SILT (ML), dark brown, with some organics, very soft, wet (Fill).		
					0 1 0			PT		~0.5-foot thick PEAT layer.		
								ML		Sandy SILT (ML), dark brown, very fine grained sand, very soft, wet (Tideflat).		
					0 1 0	10		OH		Clayey SILT (OH), dark brown, abundant marsh grasses, very soft, moist (Tideflat).		
					1 0 1					Becomes Sandy SILT (OH), with some marsh grasses, very soft, wet.		
					0 1 1	15		ML		Clayey SILT (ML), dark brown, very soft, wet/saturated (Deltaic Sediments).		
					0					With sand and pockets of sand, few organics, very soft, saturated.		
						20						
										Sand becomes very fine grained, few sea shells, trace marsh grass, very soft, wet.		
						25				Boring terminated at 24 ft bgs. Groundwater encountered at 15 ft bgs during drilling.		

Location: See Site Plan
Surface Elevation:
Logged By: PJM

Drill Rig: HSA
Equipment/Hammer: SPT/140
Date Completed: 12-13-06

LOG OF BORING WITH WELL_PAM 19921-106749 TAYLOR WAY PROPERTY.GPJ GINT STD US LAB.GDT 3/4/15 REV.

CDM Smith

Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

Boring Log MW26
Project No: 19921.106749

Figure: G27
1 of 1

Boring Log MW27

Arsenic Using An XRF (ppm)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)	Well or Piezometer Completion
824						0–2				Gravelly SAND (SP), dark brown, fine to medium grained, medium dense, moist (Fill).		
						2	G	SP		Becomes dark gray.		
<5					4 4 1	3–4.5				Becomes fine grained, loose, moist. With thin seams of silt, iron staining.		
<5					1 0 0	4.5–6.5		SP		Silty SAND (SP), dark brown, fine grained, loose, moist, interlayered with sandy SILT (Fill).		
						6.5–8.25		ML		Clayey SILT (ML), dark brown, few organics, very soft, wet (Fill).		
					1 0 0	8.25–8.5		PT		PEAT (PT), black, moist.		
						8.5–9.5		OH		Clayey SILT (OH), dark brown, with silty SAND interlayers and abundant marsh grasses, very soft, wet (Tideflat).		
						9.5				Boring terminated at 9.5 ft bgs. No apparent groundwater encountered during drilling.		

Depth scale (feet): 2, 4, 6, 8, 10, 12, 14, 16, 18

Location: See Site Plan	Drill Rig: HSA
Surface Elevation:	Equipment/Hammer: SPT/140
Logged By: PJM	Date Completed: 12-13-06

Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

CDM Smith

Boring Log MW27 — Figure: G28
Project No: 19921.106749 — 1 of 1

LOG OF BORING WITH WELL_PAM 19921-106749 TAYLOR WAY PROPERTY.GPJ GINT STD US LAB.GDT 3/4/15 REV.

Boring Log MW28

Arsenic Using An XRF (ppm)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)	Well or Piezometer Completion
54 6					27 29 32		G	SP		Gravelly SAND (SP), dark brown, fine- to medium-grained sand, medium-grained gravel, some silt, very dense, moist (Fill). Becomes dark gray. Becomes dark brown.		
								GP		Sandy GRAVEL (GP), dark brown, fine to coarse grained, slightly silty, very dense, moist (Fill).		
246 172 137					7 8 8 0 0 1	5		SP		SAND (SP), black, fine grained, trace silt, medium dense, moist, 2 inch layer silty sand at 5.5' followed by 2 inch layer gravelly sand (Fill). Becomes saturated, silty, with wood fibers 7.5 to 8 ft bgs. Becomes black, fine-grained sand, trace silt, very loose, saturated.		
13 7 7					0 0 0 0	10 15		OL		Clayey SILT (OL), dark yellow-brown, very soft, moist, abundant marsh grasses (Tideflat). Becomes gray-brown. Becomes dark brown, few organics, with some very fine sand partings, small piece of wood.		
					3 4 9	20		SP-SM		Interlayered black SAND (SP) and Silty SAND (SM, fine grained, loose, saturated (Deltaic Sediments).		
					5 8 12 8 12 10	25		SP		SAND (SP), black, fine grained, trace silt, saturated (Deltaic Sediments).		
										Boring terminated at 27 ft bgs. Groundwater encountered at 7.5 and 20 ft bgs during drilling.		

Location: See Site Plan
Surface Elevation:
Logged By: PJM

Drill Rig: HSA
Equipment/Hammer: SPT/140
Date Completed: 12-14-06

Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

Boring Log MW28
Project No: 19921.106749

Figure: G29
1 of 1

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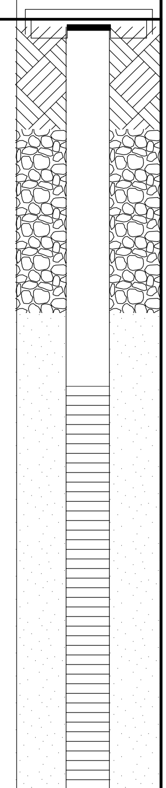
LOG OF BORING WITH WELL_PAM 19921-106749 TAYLOR WAY PROPERTY.GPJ GINT STD US LAB.GDT 3/4/15 REV.

Boring Log MW29

Arsenic Using An XRF (ppm)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
						0		SP		Gravelly SAND (SP), dark brown, fine to medium grained, some silt, rounded gravel, very dense (Fill).	
87							G			Becomes black.	
						2					
24							G			Becomes dark brown.	
104					18 22 30	4				Becomes black.	
										With traces of wood.	
355											
185					7 4 4	6				Becomes dark gray, loose.	
2708											
3325										With wood debris.	
40						8		ML		Sandy SILT (ML), dark brown, with some gravel, medium stiff, wet (Fill).	
					1 0 0	▽		SP		SAND (SP), black, fine grained, trace silt, very loose, saturated (Fill).	
6						10		OL		Clayey SILT (OL), dark yellow-brown, abundant marsh grasses, very soft, moist (Tideflat).	
										Boring terminated at 10.5 ft bgs. groundwater encountered at 8.5 ft bgs during drilling.	
						12					
						14					
						16					
						18					

Well or Piezometer Completion



Location: See Site Plan
Surface Elevation:
Logged By: PJM

Drill Rig: HSA
Equipment/Hammer: SPT/140
Date Completed: 12-14-06

Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

CDM Smith

Boring Log MW29
Project No: 19921.106749

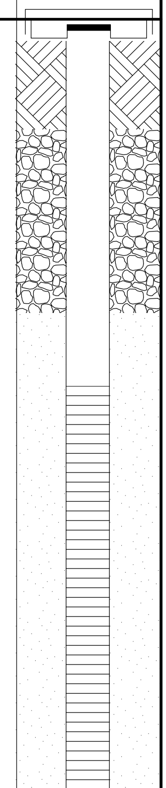
Figure: G30
1 of 1

LOG OF BORING WITH WELL_PAM 19921-106749 TAYLOR WAY PROPERTY.GPJ GINT STD US LAB.GDT 3/4/15 REV.

Boring Log MW30

Arsenic Using An XRF (ppm)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / foot)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
										Gravelly SAND (SP), dark brown, some silt, rounded gravel, dense, moist (Fill).	
419							G			Becomes black.	
					18 19 18	2		SP		Becomes dark brown. Piece of red brick.	
					5 5 4			SP		SAND (SP), dark gray, fine grained, trace silt, loose, moist (Fill).	
58						4				Thin silt seam at 4 ft bgs.	
										Clayey SILT (ML), gray, medium stiff, moist (Fill).	
69					0 1 1			ML		Becomes soft, saturated.	
54						6					
								SP		SAND (SP), dark brown, fine grained, with few coarse white grains, some silt, very loose, saturated (Fill).	
					0 1 1					Clayey SILT (ML), dark brown, very soft, wet (Fill).	
<5						8		ML		1 inch layer of black organic fiberous material.	
21					0 0 0						
						10		OL		Clayey SILT (OL), dark yellow-brown, abundant marsh grasses, very soft, moist (Tideflat).	
										Boring terminated at 10.5 ft bgs. Groundwater encountered at 5 ft bgs during drilling.	
						12					
						14					
						16					
						18					

Well or Piezometer Completion



Location: See Site Plan
Surface Elevation:
Logged By: PJM

Drill Rig: HSA
Equipment/Hammer: SPT/140
Date Completed: 12-14-06

Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

CDM Smith

Boring Log MW30
Project No: 19921.106749

Figure: G31
1 of 1

LOG OF BORING WITH WELL_PAM 19921-106749 TAYLOR WAY PROPERTY.GPJ GINT STD US LAB.GDT 3/4/15 REV.

Boring Log MW31

Arsenic Using An XRF (ppm)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / 6 in.)	Depth (feet)	USCS	DESCRIPTION	Elev. (feet)
						0–8	SP	Gravelly SAND (SP), black, green pockets, fine to medium grained sand, coarse, subangular gravel, dense, moist, granitic rock in shoe (Fill).	
53					10 12 18				
35					10 16 23				
					5 5 6				
						8–10	SW	Gravelly SAND (SW), gray, fine to coarse grained sand, well graded, rounded gravel, loose, wet (Fill).	
23					7 3 1				
125									
						10–10.5	OL	Clayey SILT (OL), brown, soft, moist to wet, abundant marsh grass (Tideflat).	

Boring terminated at 10.5 ft bgs.

*Analyzed using an Innov-X brand x-ray fluorescence meter (XRF).

Well or Piezometer Completion

Location: See Site Plan
Surface Elevation:
Logged By: AW

Drill Rig: Mobile B-50
Equipment/Hammer: SPT/140
Date Completed: 8-18-08

CDM Smith

Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

Boring Log MW31
Project No: 19921.106749

Figure: G32
1 of 1

LOG OF BORING WITH WELL_PAM 19921-106749 TAYLOR WAY PROPERTY.GPJ GINT STD US LAB.GDT 3/4/15 REV.

Boring Log MW32

Arsenic Using An XRF (ppm)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / 6 in.)	Depth (feet)	USCS	DESCRIPTION	Elev. (feet)
						0–3.5	SM	Silty SAND (SM), tan/olive gray, fine to coarse grained (Fill).	
					5 13 19	2.5–4			
15						4	SP	SAND (SP), black, fine grained, loose (Fill).	
15						6			
					1	7.5–9			
					0	9–10.25	OL	Clayey SILT (OL), brown to olive gray, soft, wet, abundant marsh grass (Tideflat).	
17						10			
						10.5		Boring terminated at 10.5 ft bgs. *Analyzed using an Innov-X brand x-ray fluorescence meter (XRF).	

Well or Piezometer Completion

Location: See Site Plan
Surface Elevation:
Logged By: AW

Drill Rig: Mobile B-50
Equipment/Hammer: SPT/140
Date Completed: 8-18-08

CDM Smith

Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

Boring Log MW32
Project No: 19921.106749

Figure: G33
1 of 1

LOG OF BORING WITH WELL_PAM 19921-106749 TAYLOR WAY PROPERTY.GPJ GINT STD US LAB.GDT 3/4/15 REV.

Boring Log MW33

Arsenic Using An XRF (ppm)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / 6 in.)	Depth (feet)	USCS	DESCRIPTION
						0–3	SM	Silty SAND (SM), tan, coarse grained (Fill).
21					5 6 8	2		
						3–7.5	SP	SAND (SP), black, fine grained, loose, moist (Fill).
28					3 8 11	5		
						7.5–11.5	OL	Clayey SILT (OL), abundant organic material (marsh grass) (Tideflat).
<6					0	7.5		
						11.5		Boring terminated at 11.5 ft bgs.

*Analyzed using an Innov-X brand x-ray fluorescence meter (XRF).

Location: See Site Plan
Surface Elevation:
Logged By: AW

Drill Rig: Mobile B-50
Equipment/Hammer: SPT/140
Date Completed: 8-18-08

LOG OF BORING WITH WELL_PAM 19921-106749 TAYLOR WAY PROPERTY.GPJ GINT STD US LAB.GDT 3/4/15 REV.

Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

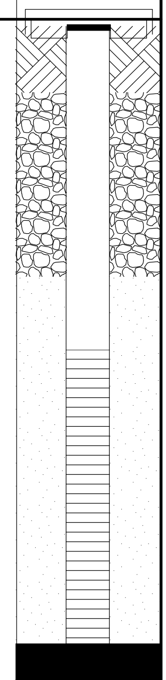
CDM Smith

Boring Log MW33
Project No: 19921.106749

Figure: G34
1 of 1

Boring Log MW34

Arsenic Using An XRF (ppm)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)	Well or Piezometer Completion
								SM		Gravelly Silty SAND (SM), tan, fine to coarse, subangular gravel, loose, moist (Fill).		
						2						
					8 10 12					SAND (SP), black/tan, fine to medium grained, trace silt, loose, moist (Fill).		
179						4						
					4 5			SP				
						6				Becomes black, wet, increasing silt.		
9												
					21 1							
						8		ML		SILT (ML), gray, trace fine sand, moist to wet, no organic material present (Fill).		
<6					0 1			SM		Silty SAND (SM), interbedded lenses of SILT.		
						10				Contains marsh grass.		
<9										Contains rootlets.		
										Boring terminated at 10.5 ft bgs.		
										*Analyzed using an Innov-X brand x-ray fluorescence meter (XRF).		
						12						
						14						
						16						
						18						



LOG OF BORING WITH WELL_PAM 19921-106749 TAYLOR WAY PROPERTY.GPJ GINT STD US LAB.GDT 3/4/15 REV.

Location: See Site Plan
Surface Elevation:
Logged By: AW

Drill Rig: Mobile B-50
Equipment/Hammer: SPT/140
Date Completed: 8-18-08

CDM Smith

Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

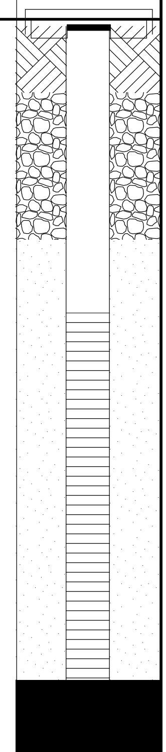
Boring Log MW34
Project No: 19921.106749

Figure: G35
1 of 1

Boring Log MW35

Arsenic Using An XRF (ppm)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / 6 in.)	Depth (feet)	USCS	DESCRIPTION	Elev. (feet)
					5 5 3	2	ML	Gravelly SILT (ML), tan, angular gravel, moist (Fill).	
<6						4	SP	SAND (SP), black, fine grained, loose, moist (Fill).	
<11					2 3 2		ML	SILT (ML), olive-gray, soft, some marsh grass (Fill).	
<6						6	SP	SAND (SP), black, fine grained, moist (Fill).	
					1			Becomes Silty SAND (SM).	
						8	ML	SILT (ML), olive gray, trace fine sand, soft.	
<9								Increasing sand, thin beds of fine sand.	
					0	10			
6								Becomes sandy silt.	
						12		Boring terminated at 11.5 ft bgs.	
								*Analyzed using an Innov-X brand x-ray fluorescence meter (XRF).	
						14			
						16			
						18			

Well or Piezometer Completion



Location: See Site Plan
Surface Elevation:
Logged By: AW

Drill Rig: Mobile B-50
Equipment/Hammer: SPT/140
Date Completed: 8-18-08

CDM Smith

Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

Boring Log MW35
Project No: 19921.106749

Figure: G36
1 of 1

LOG OF BORING WITH WELL_PAM 19921-106749 TAYLOR WAY PROPERTY.GPJ GINT STD US LAB.GDT 3/4/15 REV.

Boring Log MW-36

Arsenic Using An XRF (ppm)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / 6 in.)	Depth (feet)	USCS	DESCRIPTION	Elev. (feet)	Well or Piezometer Completion
<6					11 12 15	0–4	SM	Gravelly, silty SAND (SM), brown, poorly graded fine sand with fine to coarse subrounded gravel, medium dense, moist (Fill).		
<8					34 31 24; 35 29 24	4–7.5	GW	Sandy GRAVEL (GW), olive gray, well graded fine to coarse subangular gravel, fine sand, trace silt, very dense, moist (Fill).		
23					31 34 36	7.5–9	ML	SILT (ML), black, very soft, non-plastic, saturated, slight sheen and hydrocarbon odor (Fill).		
6					2 4 3	9–10.5	CL	CLAY (CL), brown, firm, low plasticity, abundant organics present (Marsh grass, rootlets, 30%) wet (tide flat).		

Groundwater encountered at 7 ft. Borehole terminated at 10.5 ft.

Location: See Site Plan
Surface Elevation:
Logged By: AW

Drill Rig: HSA
Equipment/Hammer: SPT/140
Date Completed: 1-6-14

Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

CDM Smith

Boring Log MW-36
Project No: 19921.106749

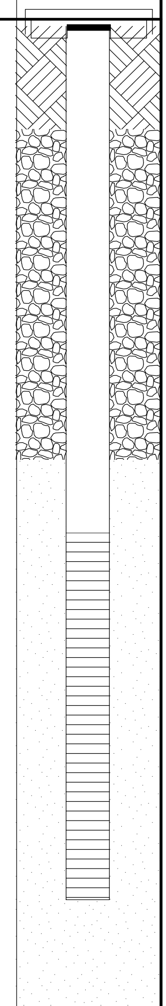
Figure: G37
1 of 1

LOG OF BORING WITH WELL_PAM 19921-106749 TAYLOR WAY PROPERTY.GPJ GINT STD US LAB.GDT 3/4/15 REV.

Boring Log MW-37

Arsenic Using An XRF (ppm)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)
						0		SM		Gravelly silty SAND (SM), brown, poorly graded fine sand with fine to coarse subrounded gravel and silt, dense, moist (Fill).	
20					40 26 19	2	◣				
						4					
25					40 21 22		◣				
174						6				Becomes black, apparent fine bits of slag present.	
					29 15 14	8	◣	SP		SAND (SP), black, poorly graded fine to medium sand, trace silt, medium dense, moist to wet, (dredge fill).	
24											
					28 19 12	▽	◣			Becomes saturated.	
12						10					
10						12	◣	CL		CLAY (CL), brown, stiff, low to medium plasticity, abundant organics (rootlets, marsh grass, 30-40%), wet (tide flat).	
						14				Groundwater encountered at 9 ft. Borehole terminated at 13.5 ft.	
						16					
						18					

Well or Piezometer Completion



Location: See Site Plan
Surface Elevation:
Logged By: AW

Drill Rig: HSA
Equipment/Hammer: SPT/140
Date Completed: 1-6-14

Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

CDM Smith

Boring Log MW-37
Project No: 19921.106749

Figure: G38
1 of 1

LOG OF BORING WITH WELL_PAM 19921-106749 TAYLOR WAY PROPERTY.GPJ GINT STD US LAB.GDT 3/4/15 REV.

Boring Log MW-38

Arsenic Using An XRF (ppm)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)	Well or Piezometer Completion
17					43 50	0–3.75		SM		Gravelly silty SAND (SM), olive gray, poorly graded fine sand with fine to coarse subrounded gravel and silt, very dense, moist (Fill).		
12					10 12 20	3.75–7		SP-SM		SAND with silt (SP-SM), dark gray, poorly graded fine to medium sand, slightly silty, dense, moist to wet (Fill).		
<6					8 7 8	7–10.5		SM		Silty SAND (SM), medium dense, saturated (Dredge Fill).		
9					7 5 8							
7					0 0 2	10.5–12		CL		CLAY (CL), brown, very soft, low plasticity, abundant marsh grass (25%), wet.		

Groundwater encountered at 7 ft. Borehole terminated at 12 ft.

Depth (feet): 2, 4, 6, 8, 10, 12, 14, 16, 18

Location: See Site Plan
Surface Elevation:
Logged By: AW

Drill Rig: HSA
Equipment/Hammer: SPT/140
Date Completed: 1-6-14

CDM Smith

Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

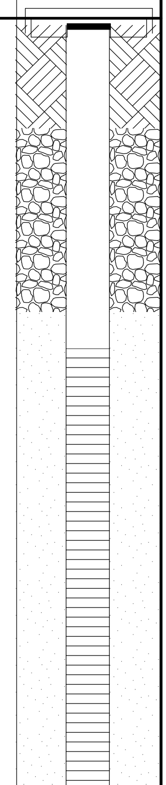
Boring Log MW-38
Project No: 19921.106749

Figure: G39
1 of 1

LOG OF BORING WITH WELL_PAM 19921-106749 TAYLOR WAY PROPERTY.GPJ GINT STD US LAB.GDT 3/4/15 REV.

Boring Log MW-39

Arsenic Using An XRF (ppm)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / 6 in.)	Depth (feet)	Sample	USCS	Symbol	DESCRIPTION	Elev. (feet)	Well or Piezometer Completion
										Gravely, silty SAND (SM), dark brown, poorly graded fine sand with fine to coarse subrounded gravel, silt, very dense, moist (Fill).		
7					60 38 37	2						
								SM				
						4						
<6					18 20 17					Decreasing gravel, some black coloration, becomes dense and wet.		
						6						
										Silty SAND (SM), black brown, poorly graded fine sand with silt, loose, saturated (dredge fill).		
8					6 5 3	8		SM				
7					3 3 3					CLAY (CL), dark brown, firm, wet, low plasticity, organics (marsh grass, rootlets) (tide flat).		
						10		CL				
										Groundwater encountered at 6.5 ft. Borehole terminated at 10.5 ft.		
						12						
						14						
						16						
						18						



Location: See Site Plan
Surface Elevation:
Logged By: AW

Drill Rig: HSA
Equipment/Hammer: SPT/140
Date Completed: 1-7-14

Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

CDM Smith

Boring Log MW-39
Project No: 19921.106749

Figure: G40
1 of 1

LOG OF BORING WITH WELL_PAM 19921-106749 TAYLOR WAY PROPERTY.GPJ GINT STD US LAB.GDT 3/4/15 REV.

Boring Log MW-40

Arsenic Using An XRF (ppm)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / 6 in.)	Depth (feet)	USCS	DESCRIPTION
10 7					40 17 17	0–2.5	SM	Gravely, silty SAND (SM), brown, poorly graded fine sand, fine to coarse subrounded gravel and silt, dense, moist.
<6					37 22 14	2.5–7.5	SP-SM	SAND with silt (SP-SM), dark brown/black, poorly graded fine sand, fine to coarse subrounded gravel and silt, dense, moist (dredge fill).
					2 1 2	7.5–8	PT	Abundant organics, including wood fragments and rootlets, silty.
8						8–9.5	CL	CLAY (CL), dark brown, soft, moist, low to medium plasticity (tide flat), organics grass and rootlets.
								Groundwater encountered at 4 ft. Borehole terminated at 9.5 ft.

Depth (feet): 2, 4, 6, 8, 10, 12, 14, 16, 18

Sample | Symbol | Elev. (feet) | Well or Piezometer Completion

LOG OF BORING WITH WELL_PAM 19921-106749 TAYLOR WAY PROPERTY.GPJ GINT STD US LAB.GDT 3/4/15 REV.

Location: See Site Plan
Surface Elevation:
Logged By: AW

Drill Rig: HSA
Equipment/Hammer: SPT/140
Date Completed: 1-7-14

CDM Smith

Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

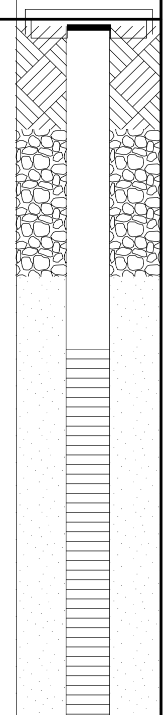
Boring Log MW-40
Project No: 19921.106749

Figure: G41
1 of 1

Boring Log MW-41

Arsenic Using An XRF (ppm)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / 6 in.)	Depth (feet)	USCS	DESCRIPTION	Elev. (feet)
						0	SM	Very gravely, silty SAND (SM), brown, poorly graded sand, subangular gravel, moist (Fill), dense.	
7					67 27 23	2	SP	SAND (SP), black/brown, poorly graded snd, moist, dense (dredge fill).	
9					17 9 9	5		Becomes slightly silty, medium dense, wet.	
7						7.3	ML	Sandy SILT (ML), gray-olive, soft, non plastic (dredge fill) wet.	
8					4 4 2	8	CL	Silty CLAY (CL), gray olive, firm, wet, medium plasticity (tide flat).	
						9.5		Groundwater encountered at 4.5 ft. Borehole terminated at 9.5 ft.	

Well or Piezometer Completion



Location: See Site Plan
Surface Elevation:
Logged By: AW

Drill Rig: HSA
Equipment/Hammer: SPT/140
Date Completed: 1-7-14

Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

Boring Log MW-41
Project No: 19921.106749

Figure: G42
1 of 1

CDM Smith

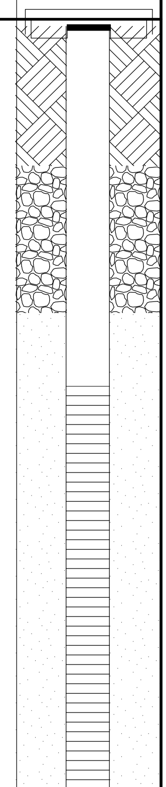
LOG OF BORING WITH WELL_PAM 19921-106749 TAYLOR WAY PROPERTY.GPJ GINT STD US LAB.GDT 3/4/15 REV.

Boring Log MW-42

Arsenic Using An XRF (ppm)	Sample No.	Moisture Content (%)	Dry Density (pcf)	OVM (ppm)	Penetration Resistance (blows / 6 in.)	Depth (feet)	USCS	DESCRIPTION	Elev. (feet)
						0	SM	Gravelly, sitly SAND (SM), brown, poorly graded sand, fine to coarse subangular gravel, with silt, very dense, moist (Fill).	
<6					17 27 25	2	SM		
<5					19 27 19	4–6	SM	Increasing gravel, sand becomes dense, contains iron oxide staining, moist.	
8					10 12 13	8	SM	As above, becomes medium dense	
6					4 4 3	9	PT	Abundant organics, rootlets, silty.	
						10	CL	Silty CLAY (CL), brown, firm, low to medium plasticity (tide flat), wet.	

Groundwater encountered at 6 ft. Borehole terminated at 10.5 ft.

Well or Piezometer Completion



Location: See Site Plan
Surface Elevation:
Logged By: AW

Drill Rig: HSA
Equipment/Hammer: SPT/140
Date Completed: 1-7-14

Taylor Way Property
Supplemental Remedial Investigation
Tacoma, Washington

CDM Smith

Boring Log MW-42
Project No: 19921.106749

Figure: G43
1 of 1

LOG OF BORING WITH WELL_PAM 19921-106749 TAYLOR WAY PROPERTY.GPJ GINT STD US LAB.GDT 3/4/15 REV.

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Appendix H

Supplemental RI Analytical and QA Reports

This appendix has been placed into a separate document due to its large size. It is available upon request from Ecology.

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Appendix I

Letter from Ecology Regarding Murray Pacific/USGI Contaminant Boundary

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STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300
711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

September 4, 2015

Mr. Nizar Hindi
Environmental Manager
United States Gypsum Company
550 West Adams Street
Chicago, IL 50551-3676

Subject: USG Taylor Way Plant Site, Ecology Cleanup Site ID 5003

Dear Mr. Hindi:

This letter is to respond to your request for Ecology to clarify the area along the Hylebos Waterway shoreline that Ecology expects USG Corporation to include in the Feasibility Study and draft Cleanup Action Plan for the USG Taylor Way Plant Site at 2301 Taylor Way, in Tacoma, Washington ("Site").

<u>Background</u>
Agreed Order No. DE 3405 requires USG and the Port of Tacoma to conduct a Supplemental Remedial Investigation, Feasibility Study, and draft Cleanup Action Plan for the Site. To date, USG has been taking the lead under the Agreed Order, and submitted a draft Supplemental Remedial Investigation (Supplemental RI) in March 2015.

The Supplemental RI found groundwater contaminated with arsenic along the Hylebos Waterway shoreline close to, and on both sides of, the property line between the former USG Taylor Way plant and the property to the northwest located at 3502 Lincoln Avenue. That neighboring property is the location of another cleanup site, Murray Pacific #1, where a cleanup occurred in the mid-1990s. The Port of Tacoma currently owns both properties.

Arsenic is the primary contaminant in groundwater and soils at the Site, as it was at the Murray Pacific #1 site. The Murray Pacific #1 cleanup consisted of removal of surface soils and Asarco-derived slag, which included excavations along the Hylebos Waterway embankment. One surface aquifer groundwater monitoring well from the Murray Pacific cleanup remains on the Murray Pacific Site, close to the shoreline and approximately 500 feet northeast of the USG/Murray Pacific property boundary.

Additional monitoring wells were installed by USG along the Murray Pacific shoreline during the USG remedial investigation work. The enclosure with this letter is a map showing the monitoring well locations. Groundwater on the Site is not considered potable, therefore the potential to impact surface water is the relevant pathway for groundwater at the Site. The shoreline wells contain elevated arsenic, which indicates that groundwater may cause exceedances of the surface water quality criteria. Monitoring data from wells in this area between 2008 and 2014 indicate that arsenic concentrations appear to be decreasing.

USG believes that the arsenic in shoreline wells cannot all be attributed to the USG plant site operations, and that some of the elevated arsenic in shoreline groundwater is a result of remnant contamination from the Murray Pacific #1 Site. Therefore, USG has requested Ecology's guidance about the geographic extent of responsibility under Agreed Order No. DE 3405 for evaluating cleanup alternatives for the shoreline.

Ecology Guidance

Ecology believes it is not possible to definitively tell where the USG Site groundwater contamination stops and any remnant groundwater contamination from the Murray Pacific Site begins, along the shore of Hylebos Waterway. However, Ecology agrees it is possible that some of the contaminated groundwater in wells in this area could be attributable to remnant contamination from Murray Pacific #1.

We believe that a reasonable approach for this area would be for USG and the Port of Tacoma to include the Murray Pacific #1 shoreline from the property boundary (of 2301 Taylor Way and 3502 Lincoln Avenue) up to, and including, MW-31 in the analysis of cleanup alternatives under the Feasibility Study.

In addition to any active remediation that is determined to be necessary for the above-described area, Ecology also requires the parties to implement long term groundwater monitoring of the entire shoreline area from the property boundary to MW 33 to determine if the downward trend in groundwater concentrations will eventually reach the surface water cleanup levels to be determined in the Cleanup Action Plan. We expect the monitoring plan to be included as a requirement of the eventual Cleanup Action Plan for the Site.

Please call me at (360) 407-6260 if you have questions or would like to discuss this approach.

Sincerely,

Joyce Mercuri,
Cleanup Project Manager
Toxics Cleanup Program
Southwest Region

JM: kf

Enclosure: USG Taylor Way Plant Site and Murray Pacific Site Monitoring Wells

By certified mail: 9171082133393970418696

cc (email): Jonathan Thompson, Ecology Assistant Attorney General
Pam Morrill, CDM Smith Consultants
Scott Hooton, Port of Tacoma
Andy Smith, Ecology, Toxics Cleanup Program
Rebecca Lawson, Ecology, Toxics Cleanup Program

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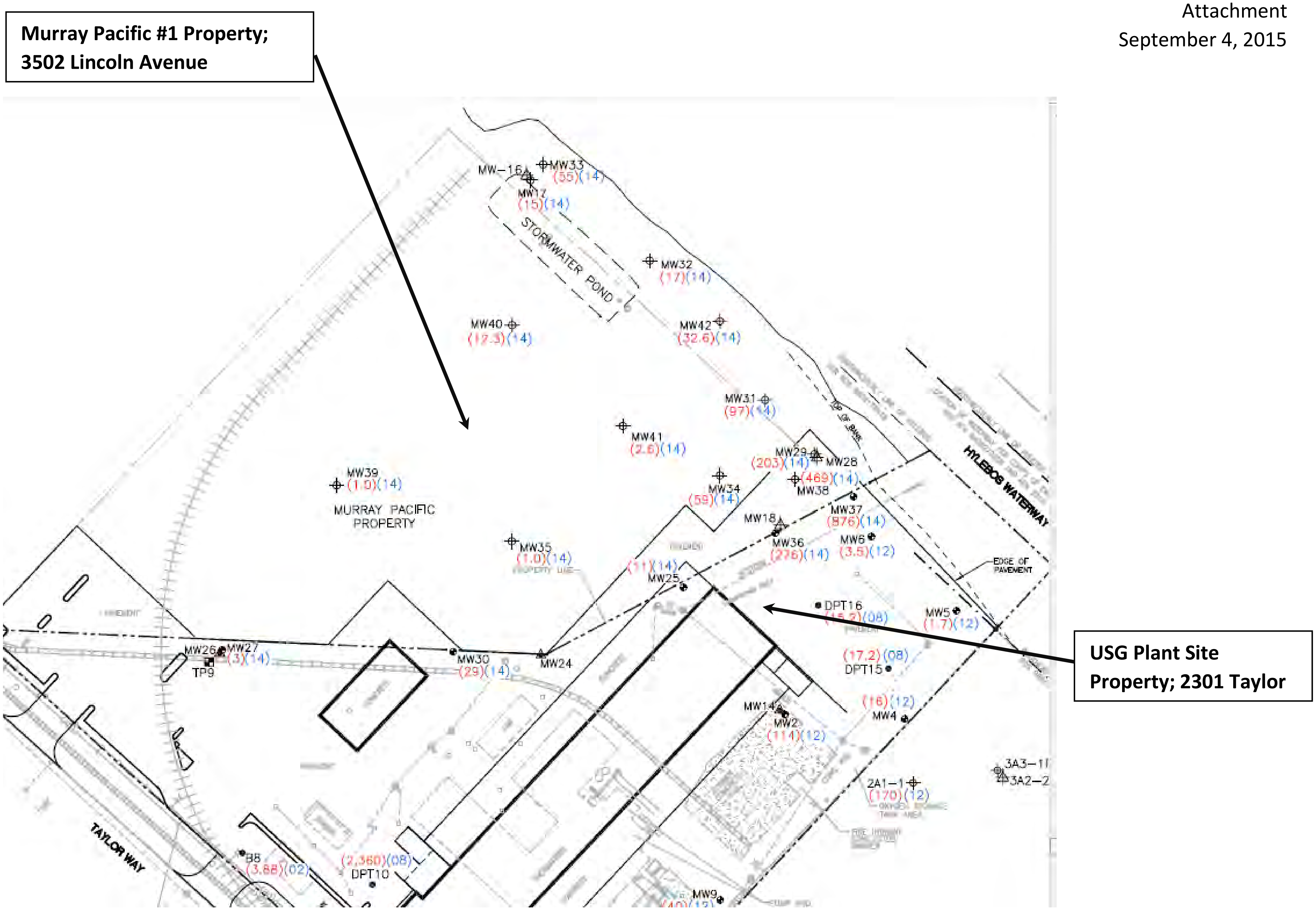
Attachment
September 4, 2015



Attachment: USG Taylor Way Plant Site and Murray Pacific Site Monitoring Wells
(Legend: Figures in red parentheses are dissolved arsenic concentrations; figures in blue parentheses are the year of the data result).

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Appendix J

Arsenic Fate and Transport at the Site

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Appendix J

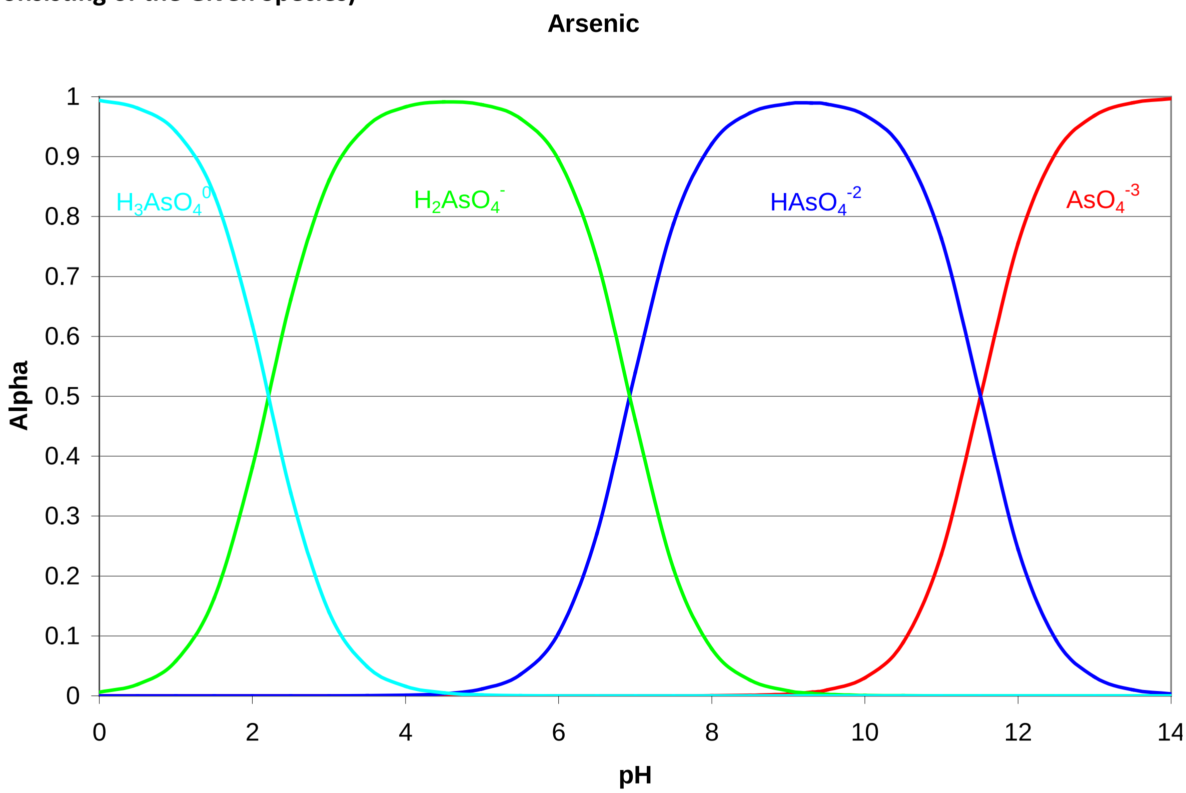
Arsenic Fate and Transport at the Site

The fate and transport of arsenic describes the mechanisms which control the mobility of arsenic under different site conditions (pH, Eh, water chemistry, etc.). The discussion will begin with an overview of how arsenic behaves under different geochemical conditions and conclude with a discussion of the Site conditions and how they specifically affect the fate and transport of arsenic at the Site. This appendix supports the discussion presented in Section 9 of the Taylor Way Property Supplemental Remedial Investigation (RI) report.

J.1 Arsenic Geochemistry

Arsenic (As) occurs in two oxidation states in natural waters: +3 (arsenite) and +5 (arsenate). As(+5) exists predominantly as a negatively charged ion (anion) above a pH of about 2. As(+5) is predominantly monovalent (charge of -1) over the pH range of 2 to 7 ($H_2AsO_4^-$), divalent from pH 7 to 11.5 ($HAsO_4^{-2}$), and trivalent at pH values above 11.5 (AsO_4^{-3})(**Figure J-1**). As(+3) exists as a neutral ion ($H_3AsO_3^0$) at pH values less than about 9 as shown in **Figure J-2**.

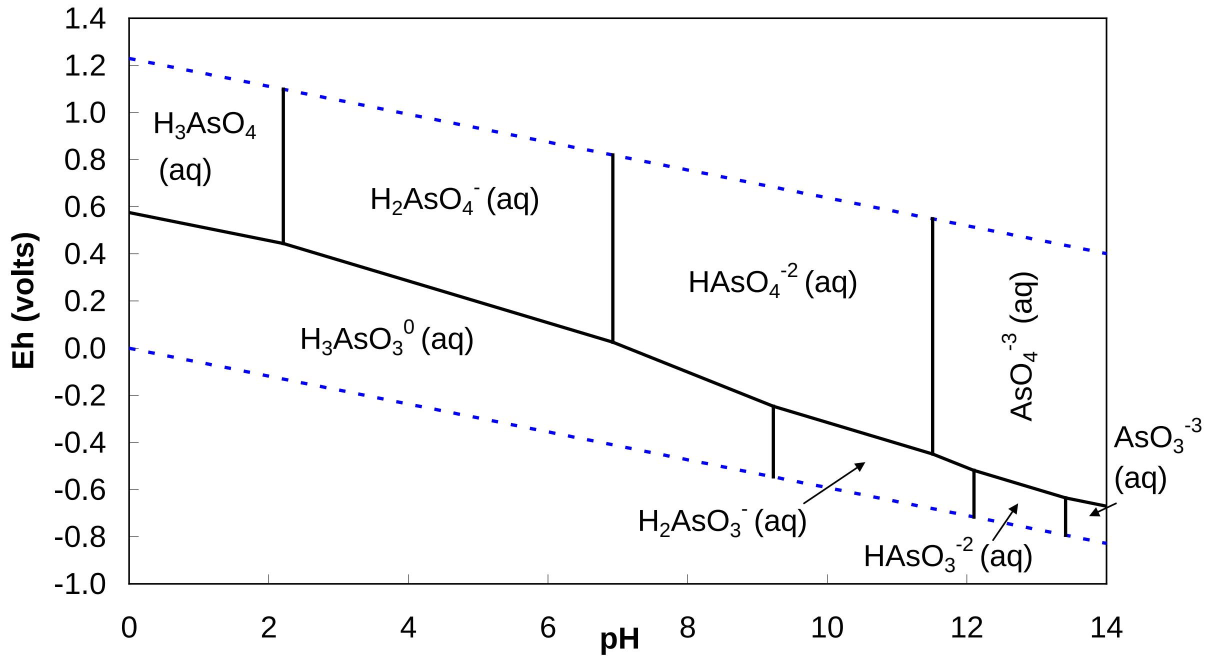
Figure J-1 Arsenate Speciation as a Function of pH (Alpha is the Fraction of the Total Dissolved Arsenate Consisting of the Given Species)



The speciation of arsenic at the site is important, because charged ions tend to adsorb more readily than neutral ions. In general, arsenic has a strong affinity for iron phases and arsenic concentrations often correlate with iron concentrations in soils and sediments. Arsenic can substitute into iron oxyhydroxides under oxidizing conditions and into iron phosphate phases and green rust under moderately reducing conditions. Under strongly reducing conditions (sulfate-reducing) arsenic can substitute into iron sulfide phases or form the mineral arsenopyrite (FeAsS). The controls on aqueous arsenic concentrations are important in attenuating arsenic at the site and will be discussed in the following sections.

The aqueous arsenate and arsenite species distribution with Eh and pH are shown in **Figure J-2**.

Figure J-2 Eh-pH Diagram for the System As-O-H at 25°C and 1 atm.



As(+3) is predominantly a neutral species ($H_3AsO_3^0$) below a pH of about 9. H_2AsO^{-3} and $HAsO_3^{-2}$ do not become important until the pH exceeds 9 standard units (su), which is higher than observed in the vast majority of natural waters.

J.1.1 Arsenic Pure Phase Minerals

Pure phase arsenic minerals such as orpiment (As_2S_3), realgar (AsS), and arsenopyrite (FeAsS) occur mainly in ore deposits formed from hydrothermal fluids within the earth's crust. A few pure phase arsenic minerals occur under low temperature and low pressure conditions at the earth's surface, such as scorodite ($FeAsO_4{\cdot}2H_2O$ at low pH) and arsenic sulfides (under reducing conditions). However, the vast majority of pure phase arsenic minerals are too soluble to be present in soils that are in contact with water.

J.1.2 Arsenic Solid-Solution Phases

Arsenic forms solid-solution phases with ferric hydroxide and iron hydroxysulfates such as jarosite ($HFe_3(OH)_6(SO_4)_2$) and schwertmannite ($Fe_8O_8(OH)_6SO_4$) and with amorphous silica. Arsenate, like silicate, has a tetrahedral form (a central atom coordinated with four oxygen atoms), which may facilitate the incorporation of arsenate into amorphous silica.

Amorphous phases such as ferric hydroxide or schwertmanite tend to substitute arsenate for hydroxide or sulfate. A reaction to form an iron-arsenic solid-solution is as follows:

$$Fe^{+3} + xAsO_4^{-3} + (3\text{-}3x)\ OH^- \rightarrow [FeAsO_4\ 2H_2O]_x[Fe(OH)_3]_{1-x} \qquad (1)$$

The amount of substitution of arsenic into ferric hydroxide is determined by the pH of the solution (more arsenic substitution occurs at lower pH values) and the concentration of arsenic in solution (higher arsenic concentrations result in more substitution).

J.1.3 Arsenic Adsorption

Arsenic adsorbs to solid surfaces due partly to interactions between the negatively charged ions and a positively charged surface. Therefore, arsenic adsorption tends to be favored for solid materials that are positively charged. The surface charge of the material depends on the type of solid, the pH of the water, and the concentration of other anions in solution.

At low pH values, the water and mineral surfaces have higher concentrations of hydronium ion (H_3O^+), which imparts a positive charge to the surface. As the pH increases, the hydronium ion concentration decreases relative to the hydroxide ion (OH^-) concentration in both the water and the solid materials within the water.

At a specific threshold pH value called the pH of the zero-point-of-charge (ZPC), the surface charge transitions from positive to neutral to negative. Once the surface charge becomes negative, adsorption of the negatively charged arsenate ions become less prevalent. The pH of the ZPC is different for different materials, as shown in **Table J-1**.

Table J-1 pH of the Zero-Point-of-Charge (pH_{ZPC}) for Various Minerals[a]

Material	Formula	pH_{ZPC}
Magnetite	Fe_3O_4	6.5
Goethite	FeOOH	7.8
Hematite	Fe_2O_3	6.7
Amorphous Ferric Hydroxide	$Fe(OH)_3$	8.5
Aluminum Hydroxide	γ-AlOOH	8.2
Aluminum Hydroxide	Ά-Al(OH)$_3$	5.0
Amorphous Silica	SiO_2	2.0
Manganese Dioxide	δ-MnO_2	2.8
Montmorillonite Clay	$Na_{0.2}Ca_{0.1}Al_2Si_4O_{10}(OH)_2 \bullet 10\ H_2O$	2.5
Kaolinite Clay	$Al_2Si_2O_5(OH)_4$	4.6

a) Data from Stumm and Morgan (1981)

The materials with a higher pH_{ZPC} are able to maintain a positive charge at a higher pH than for materials with a lower pH_{ZPC}. Of the materials listed in **Table J-1**, amorphous ferric hydroxide is the best anion adsorbent at higher pH values (below 8.5).

Under typical Eh/pH conditions, As(+3) is a neutral ion and does not adsorb well to negatively or positively charged surfaces. Therefore, As(+3) is roughly 4 to 10 times more mobile than As(+5) (Duel and Swoboda, 1972). In addition, As(+3) is about 60 times more toxic to humans than arsenate (Hounslow, 1980).

Arsenic has a strong affinity for iron phases and minerals. Strong correlations between arsenic and iron have been found in soils (Woolson et al., 1971; Duel and Swoboda, 1972); in ores (Shnyukov, 1963); within ferrihydrite impurities in phosphate pebbles (Stow, 1969); and in sediments impacted by arsenic-containing groundwaters (Whiting, 1992).

The solid material properties not only control the degree to which arsenic is adsorbed at a given pH, but also the amount of arsenic that can be adsorbed before the surface of the solid becomes saturated. The process is described mathematically by the Langmuir Isotherm, which is as follows:

C (solid) = Kl*Am*C(soln)/(1+Kl*C(soln)) (2)

Where,

C(solid)= concentration of arsenic adsorbed to the solid phase (milligrams per kilogram[mg/kg])

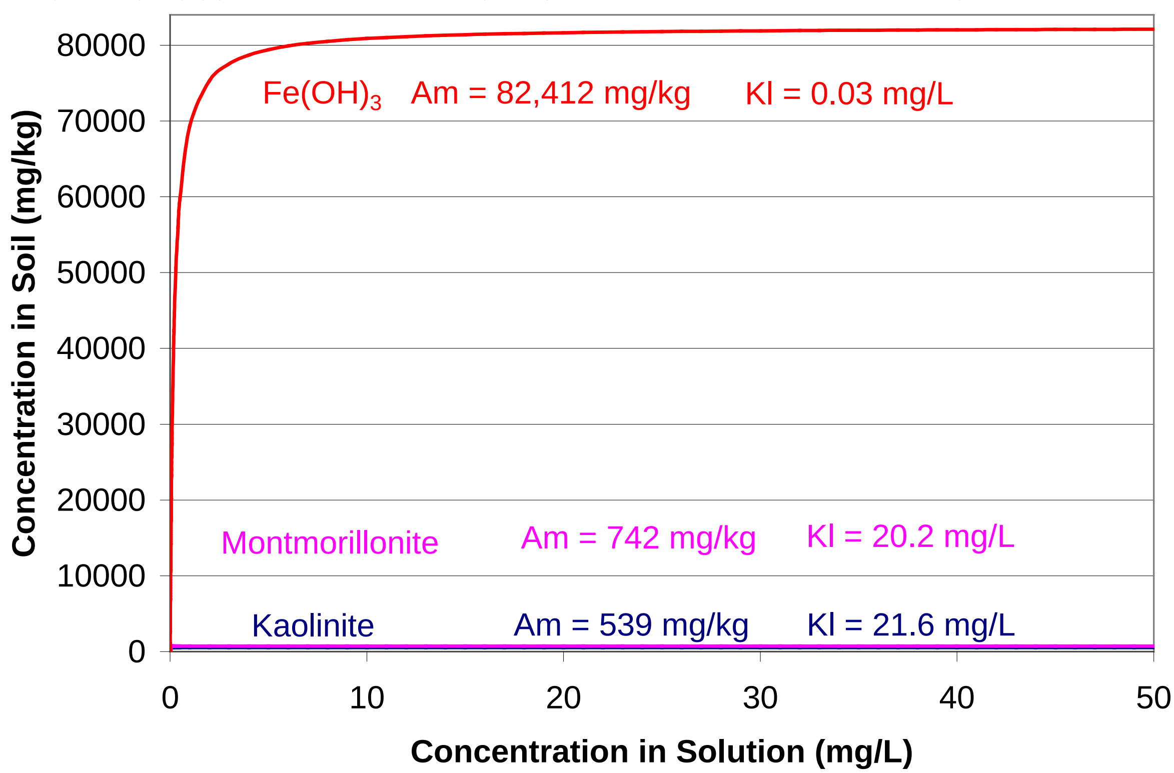
C(soln) = concentration of arsenic dissolved in the solution phase (milligrams per liter [mg/L])

Am = maximum adsorption capacity of the solid (mg/kg)

Kl = Langmuir adsorption constant

Examples of Langmuir Adsorption Isotherms for three different solid materials are illustrated in **Figure J-3.**

Figure J-3 - Langmuir Isotherms Illustrating Arsenate Adsorption Capacities of $Fe(OH)_3$(s), Kaolinite, and Montmorillonite at a pH of 5 su. (Langmuir adsorption constants (Kl and Am) are from Pierce and Moore (1982) for $Fe(OH)_3$(s) and Frost and Griffin (1977) for kaolinite and montmorillonite.)



As illustrated in **Figure J-3,** the adsorption of arsenate can be understood by imagining a "clean" soil or sediment that is subjected to waters with increasing arsenate concentrations (such as with the migration of an arsenate-bearing groundwater plume). As the solution arsenate concentrations increase, increasingly greater amounts of arsenate can be "forced" onto the solid surface. The steep part of the curve is where the soil arsenate concentration increases rapidly. As the arsenate concentrations on the soil continue to increase, a point is eventually reached where the solid surfaces are completely saturated with arsenate and there is no more capacity for additional arsenate adsorption.

No matter how high the dissolved arsenate concentrations become, the solid arsenate concentration remains constant. The flat part of the curve describes the saturation point of the solid. The Langmuir Am constant is the adsorption capacity and determines the level of the flat portion of the curve, while the Kl constant determines the rate at which Am is reached (the steepness of the initial segment of the curve).

Figure J-3 shows that at pH 5 su, iron hydroxide has a much higher arsenate adsorption capacity than montmorillonite or kaolinite clays. Theoretically, a sample of ferric hydroxide could be analyzed, and the concentration of arsenic could be compared to Am. If analysis of the solid shows that the arsenic concentration is significantly higher than Am, then arsenate is likely controlled by coprecipitation rather than adsorption.

In practice, soils and sediments are rarely composed of a single phase, but are instead heterogeneous mixtures of different minerals with varying amounts of iron hydroxide present. However, the affinity of arsenate for iron minerals such as iron hydroxide can be used to evaluate the fate and transport of arsenate when exposed to soils of varying iron contents.

In addition, pH has a significant effect on the adsorption capacity of arsenic, as shown in **Table J-2**.

Table J-2 Adsorption Capacity of Arsenate and Arsenite vs. pH

	Arsenate Adsorption Capacity (mg/kg)		Arsenite Adsorption Capacity (mg/kg)
pH	$Fe(OH)_3$ (s)[a]	$Al(OH)_3$ (s)[b]	$Fe(OH)_3$ (s)[a]
5	82,412	119,872	34,688
6	63,682	110,732	37,685
7	34,014	88,331	38,434
8	16,932	62,783	36,561
9	10,189	37,535	31,242

a) Pierce and Moore (1982)

b) Anderson et al. (1976)

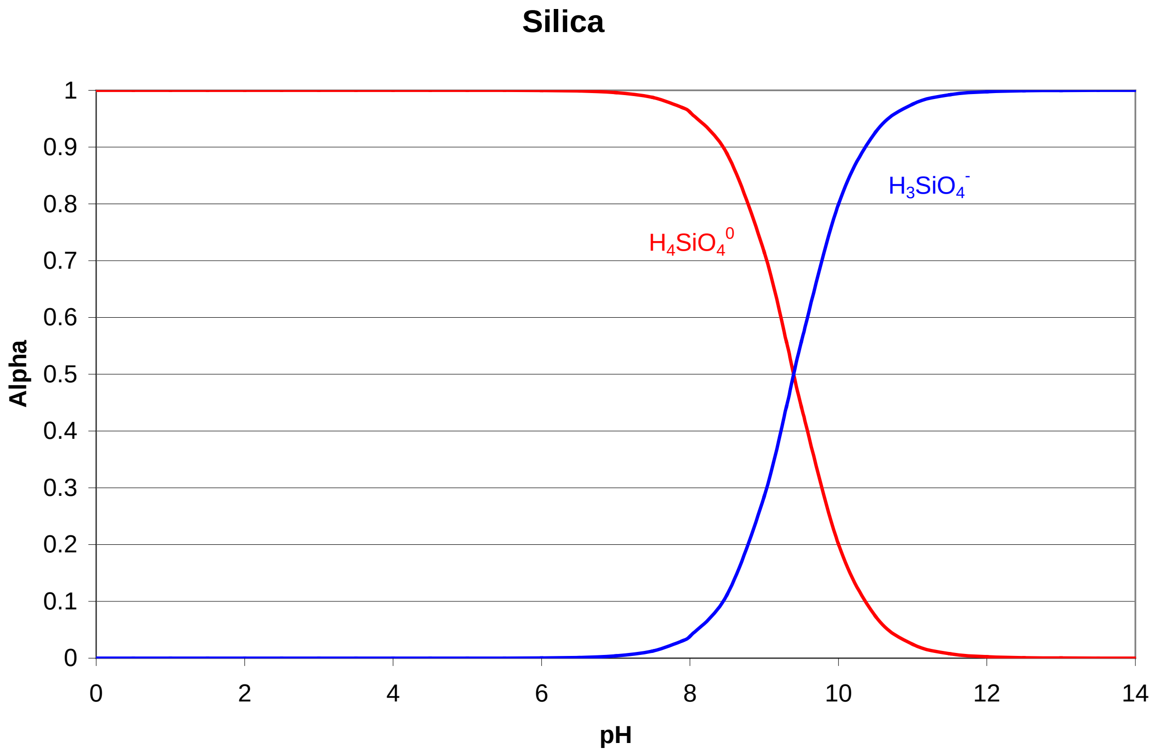
The pH dependence is due to the speciation of arsenic and the surface charge of the solid at different pH values. Arsenate is a negatively charged ion (anion) at pH values greater than about 2 (**Figure J-1**), while the aluminum and iron hydroxides tend to be positively charged. However, as the pH increases, the surfaces of the solids become less positive and the arsenate species become increasingly negative, resulting in fewer adsorption sites. Arsenite, being a neutral species below pH 9 (**Figure J-2**), is relatively insensitive to changes in pH.

Phosphate competes with arsenate for adsorption sites, resulting in less arsenate adsorption and greater mobility. Other ions such as chloride, sulfate, and nitrate have little or no effect on arsenic adsorption at low concentrations.

J.1.4 Effect of Silica

Dissolved silica competes with arsenic for adsorption sites, and can affect both the effectiveness and the adsorption capacity of commercial adsorption media such as Sorb33® manufactured by Severn Trent. As the pH of the solution increases (above about 8.5 su), two reactions occur: 1) the surface charge of the media become negative, which tends to repel negatively charged arsenic oxyanions, and 2) the dissolved silica species go from neutral species to predominantly charged anions, which compete with arsenic for specific adsorption sites (see **Figure J-4**).

Figure J-4 Silica Speciation as a Function of pH (Alpha is the Fraction of the Total Dissolved Silica Consisting of the Given Species).



J.1.5 Effect of Natural Organic Matter (NOM) and Hydrocarbons

NOM and hydrocarbons tend to increase the mobility of arsenic by creating reducing conditions that favor the dissolution of iron oxyhydroxide phases and by converting arsenic from the less mobile arsenate form to the more mobile arsenite form. NOM, hydrocarbons, and hydrocarbon conversion products (organics acids, esters, ketones, etc.) can create the reducing conditions that tend to mobilize arsenic.

When a hydrocarbon release occurs within an arsenic source area or where a secondary arsenic source is present (i.e., arsenic adsorbed onto or co-precipitated within aquifer sediments), the arsenic plume evolves according to the following steps (Brown et al., 2010):

1. An initial phase of plume expansion
2. Plume stability where the footprint is static
3. A final stage in which the plume retreats towards the petroleum source area.

In stage 1, arsenic plume expansion occurs until the dissolution of hydrocarbons (and their degradation products) is balanced by their removal (via degradation or adsorption). The balance of hydrocarbon dissolution and attenuation marks stage 2. Once the hydrocarbon source is depleted or decreased to a point where attenuation of the hydrocarbons and associated degradation products dominates, the plume begins to retreat. Redox conditions generally revert to ambient conditions as the plume retreats.

Once the hydrocarbon plume retreats, arsenic slowly attenuates in response to the more oxidizing conditions.

J.2 Arsenic Speciation at the Site

As discussed above, the fate and transport of arsenic is strongly dependent on the oxidation state and speciation of the ions. Arsenic speciation was determined for the Site both by direct measurement and from the Eh and pH data.

J.2.1 Measured Values

During the August 2008 sampling round, arsenic (III) and total arsenic were measured by the analytical laboratory, while arsenic (V) was obtained by difference. **Table J-3** compares the results of the arsenic speciation analyses with the Eh and pH data (June 2009 and January 2014).

Table J-3 Summary of Measured As(III) and As(V) Concentrations

Well	As(III) (mg/L)	As(V) (mg/L)	%As (III)	pH	ORP (mv)	Temp	Eh (v)
MW1R	0.474	0.025	95.0%	6.95	-276	16.2	-0.0682
MW5	-	-		6.75	-201	13.2	0.0098
MW9	0.027	0.0427	38.7%	6.97	-26	20.3	0.1777
MW29	0.488	0.142	77.5%	6.29	-135	18.2	0.0708
MW25	0.0976	0.0146	87.0%	6.45	-208	13	0.003
MW30	0.00635	0.003	68.0%	6.26	-190	15.3	0.0187
MW31	-	-	-	6.38	-180	14.4	0.0296
MW32	-	-	-	6.48	-205	16.3	0.0027
MW33	0.0794	0.0231	77.5%	6.75	-189	14.5	0.0205
MW34	-	-	-	6.43	-176	15.3	0.0327
MW35	-	-	-	6.16	-163	12.5	0.0485
1C3-1	0.803	0.263	75.3%	7.29	-166	14	0.044
2B1-1	0.121	0.0706	63.2%	6.45	-	17.2	-
MW36*	0.222	0.0382	85.3%	6.40	-99	11.7	0.113
MW37*	0.689	0.230	75.0%	6.50	-74	12.3	0.138
MW38*	0.410	0.101	80.2%	6.80	-100	12.2	0.112
MW39*	0.00065	<0.00019	>77.4%	5.98	24	9.8	0.238
MW40*	0.0081	0.00247	76.6%	6.20	-18	9.1	0.197
MW41*	0.00117	0.00123	48.8%	6.20	-47	9.7	0.167
MW42*	0.0266	0.00393	87.1%	6.10	30	9.5	0.245

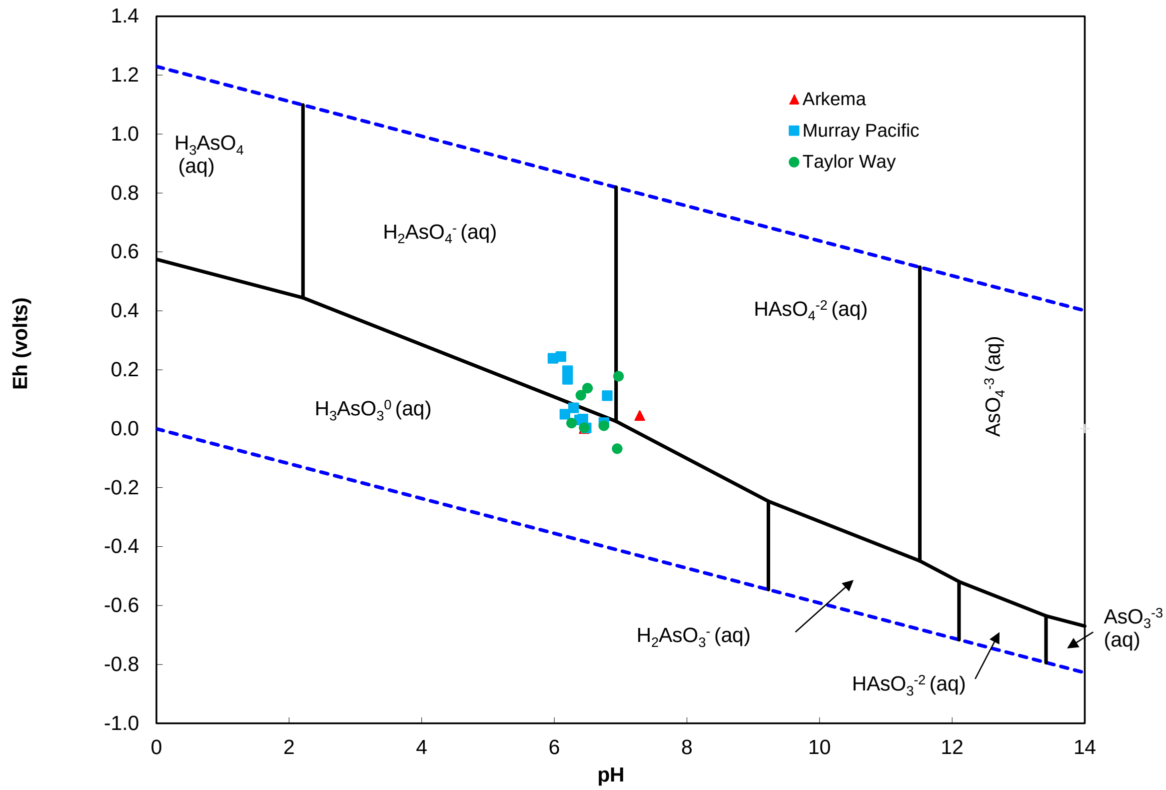
Eh with respect to the Standard Hydrogen Electrode (SHE) in volts = (ORP in mv + (224 mv – Celsius temperature))/1000mv/v
*January 2014 data
ORP – oxidation reduction potential

The results indicate that, with the exception of wells MW9 (39 percent As(III)) and MW-41 (49 percent As(III)), most (63 to 95 percent) of the arsenic is in the reduced arsenite form.

J.2.2 Predictions from Eh and pH

The Eh and pH data presented in **Table J-3** were plotted on an Eh-pH diagram for arsenic (see **Figure J-5**). These results are consistent with the measured arsenic speciation for about half of the data points, which plot within the arsenite field ($H_3AsO_3^0$). The other half, which plot within the arsenate fields ($H_2AsO_4^-$ and $HAsO_4^{-2}$) should consist of predominantly arsenite (As+3). The exception is well MW9 which appears to have slightly more arsenate. (Note that points that lie directly on a field boundary contain 50 percent of each of the species on either side of the line.) The fact that the form of arsenic in many of the wells consists predominantly of arsenite (based on the arsenic speciation data in **Table J-3**) are predicted to consist of arsenate based on Eh/pH indicates that these wells are out of equilibrium with respect to the redox potential. Redox disequilibrium occurs when the oxidation or reduction of some species occurs faster than for other redox sensitive ions that control the Eh.

Figure J-5 Arsenic Eh-pH Diagram Showing the Site Data (green diamonds).

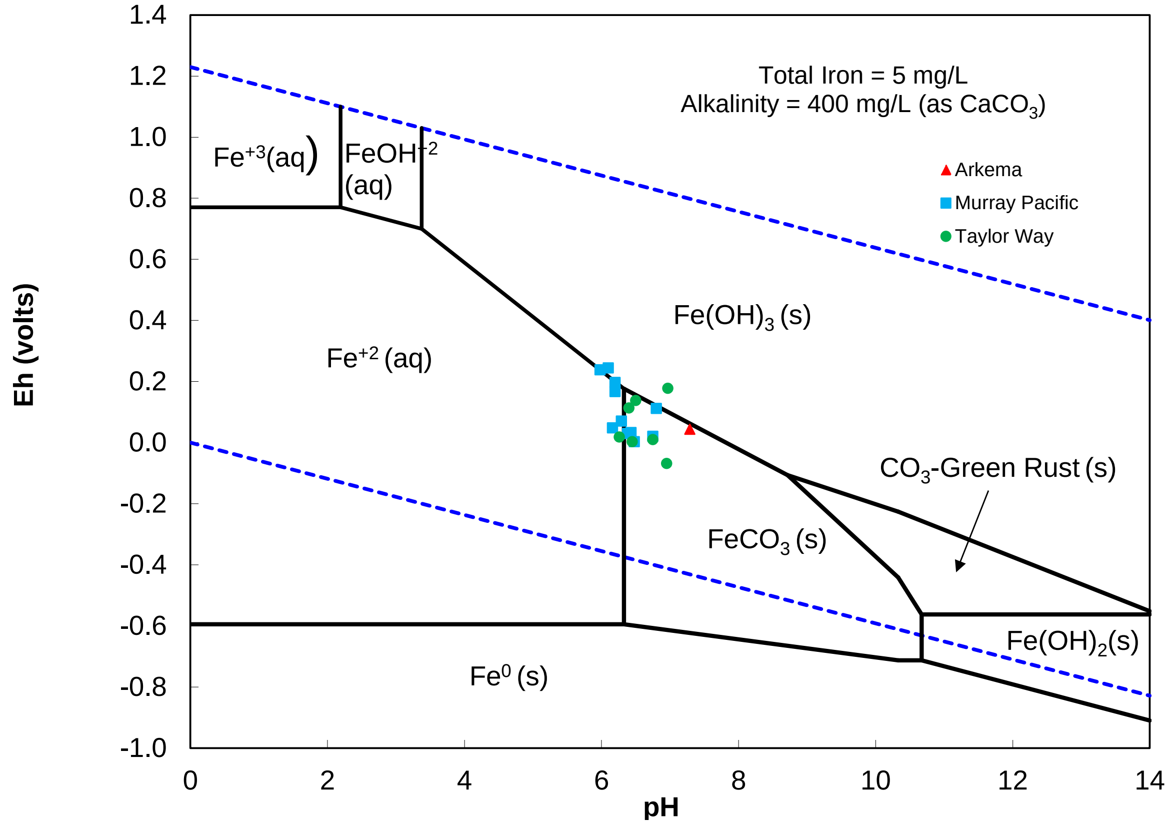


J.3 Arsenic Attenuation at the Site

J.3.1 Coprecipitation with Iron Phases

Aqueous arsenic concentrations are often controlled by coprecipitation with iron oxyhydroxide phases. To determine if iron oxyhydroxides are forming at the site, the Eh and pH data for the surface aquifer wells were plotted on an Eh-pH diagram for iron (see **Figure J-6**).

Figure J-6 Iron Eh-pH Diagram Eh-pH for the system Fe-C-O-H at 25°C and 1 atm showing the On-Site and Off-Site Data

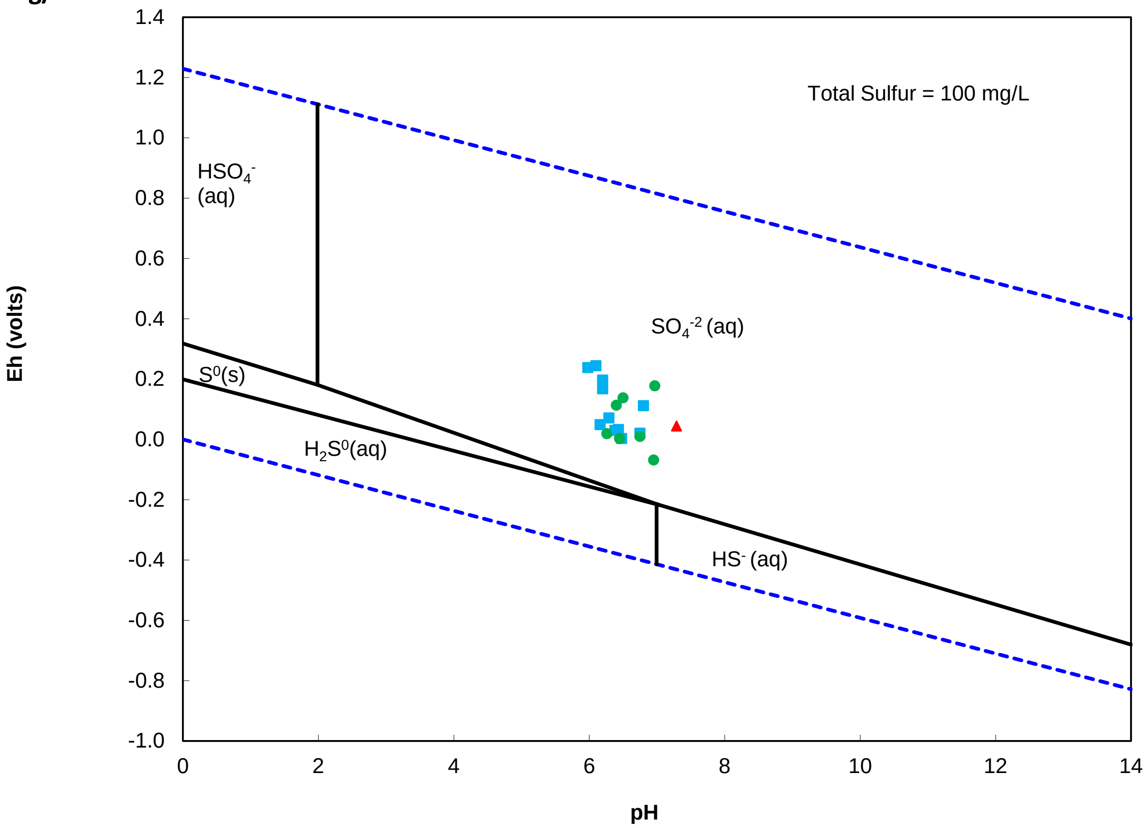


The iron concentrations at the Site ranged from <0.02 to 18.7 mg/L, the value of 5 mg/L which was used to construct the diagram is close to the Site well median value of 7.3 mg/L. The alkalinity value of 400 mg/L used is close to the median value of 468 mg/L and within the range (246 to 885 mg/L) for the Site wells (May 2012 data).

The figure indicates that iron concentrations are controlled by iron carbonate and in some cases iron oxyhydroxide. The control on iron is important, because arsenic usually occurs with iron. The arsenic is typically either adsorbed onto or co-precipitated when iron phases form.

Figure J-7 shows that the aquifer is not under sulfate reducing conditions, although such conditions may exist within microenvironments containing organic matter or other reducing agents. Such microenvironments could exist within clay lenses, for example. The lack of sulfate reducing conditions suggests that arsenic is not being controlled by sulfide phases.

Figure J-7 Eh-pH diagram for the Sulfur System with On-Site and Off-Site Data Shown. Total sulfur = 100 mg/L.



In order to more accurately address the iron chemistry of the system, PHREEQC geochemical modeling was performed (Parkhurst and Appelo, 1999). PHREEQC is a thermodynamic equilibrium program designed to model chemical speciation in aqueous solutions, determine the saturation states of solutions with minerals and gases, and predict the results of various reactions, such as dissolution of minerals and oxidation.

The modeling shows which phases or minerals are saturated (if any) for each well. Generally, if a solution is at saturation with respect to a mineral, that mineral would be expected to be present within the aquifer matrix in which the water is in contact. Minerals which are undersaturated would dissolve when placed in contact with the solution, while minerals that are supersaturated would eventually precipitate the material (assuming the mineral forms at low temperature).

PHREEQC uses a term called the saturation index (SI) to quantify the degree of saturation of a mineral. SI is defined as follows:

$$SI = \text{Log}\ (IAP/Ksp) \tag{3}$$

Where IAP is the ion activity product and Ksp is the solubility product constant for the phase in question.

For phases at saturation, IAP=Ksp and SI = 0. A negative SI indicates that the phase is unsaturated (IAP<Ksp) while a positive SI (IAP>Ksp) indicates the phase is supersaturated. In practice, a range of

0±0.5 SI units is considered saturated due to uncertainties in analytical and thermodynamic data (Hem, 1970).

The results of the modeling are presented in **Table J-4**.

Table J-4 Summary of Saturation Indices Obtained Using PHREEQC

Phase	Formula	MW1R	MW5	MW25	MW30	MW33	1C3-1
Calcite	$CaCO_3$	0.07	-1.52	-0.59	-0.88	-0.94	0.35
Fluorite	CaF_2	-0.33	-0.9	0.3	-1.88	-1.18	-0.2
Amorphous Iron Hydroxide	$Fe(OH)_3$	-3.32	-2.35	-2.71	-3.17	-1.83	0.09
Hydroxyapatite	$Ca_5(PO_4)_3OH$	-0.3	-7.71	-2.09	-3.63	-1.65	0.17
Rhodocrosite	$MnCO_3$	0.69	-0.86	-0.31	-0.46	-0.15	0.81
Siderite	$FeCO_3$	0.59	0.58	0.85	0.48	0.54	1.71
Amorphous Silica	SiO_2	-0.47	-0.36	-0.17	-0.12	-0.43	-0.37
Strengite	$FePO_4\ 2H_2O$	-1.98	-0.63	-0.31	-0.5	0.32	0.99
Vivianite	$Fe_3(PO_4)_2\ 8H_2O$	-0.07	0.47	2	0.76	2.25	2.71

Shading indicates phases at saturation according to the criteria of Hem (1970).

As suggested by the Eh-pH diagram for iron (**Figure J-6**) shown previously, iron hydroxide is generally not at equilibrium in the system except at off-site well 1C3-1. The iron chemistry within the on-site groundwater appears to be controlled by iron carbonate phases such as siderite and phosphate phases, such as strengite and/or vivianite. In reality, arsenic is likely also controlled by precipitation of iron oxyhydroxides such as $Fe(OH)_3$. The fact that this phase appears to be undersaturated based on the PHREEQC modeling (**Table J-4**) does not necessarily mean that this phase is not forming within the aquifer. The analyses used in the PHREEQC modeling were obtained from wells sampled using low flow techniques. The sampling tube would not typically be placed near the top of the saturated zone where the oxygen concentrations would be higher. Sites that have reduced groundwater which are recharged by oxygenated infiltration water tend to develop a redox gradient where the oxygenated infiltration water meets the more reduced groundwater. The redox gradient where the conditions change from iron-reducing to iron oxidizing may only represent a foot of saturated thickness. Therefore, a sample collected from deeper than about a foot below the groundwater surface will consist of the iron-reducing water in which iron oxyhydroxides are predicted to be undersaturated. Further evidence that some iron oxyhydroxides are forming at the site will be presented below when discussing the effect of hydrocarbons on arsenic mobility.

Interestingly, the groundwater is at saturation with respect to ferric hydroxide for well 1C3-1, which is located within the Arkema NBA recharge area. In this area, the zone of oxidized surface water would be deeper (due to mounding) than on the Taylor Way property, and the 5-10 ft. of saturated thickness represented by the well would be more representative of the oxidized portion of the aquifer.

Below the redox gradient, arsenic is controlled by ferrous iron phases such as siderite and iron phosphates. The importance for arsenic is that arsenic and phosphorous are within the same family in the periodic table and tend to behave similarly in the environment. Both arsenate and phosphate form oxyanions in solution—they both compete for the same adsorption sites on mineral surfaces and both tend to substitute for each other within solid phases. The phosphate minerals strengite ($FePO_4\ 2H_2O$) and vivianite ($Fe_3(PO_4)_2\ 8H_2O$) have arsenate counterparts in the minerals scorodite ($FeAsO_4\ 2H_2O$) and $Fe_3(AsO_4)_2\ 8H_2O$.

Substitution of arsenate for phosphate within these phases has been documented in the literature (Whiting, 1992) and has been observed during electron microprobe analyses at several environmental sites by CDM Smith. Arsenite ($H_3AsO_3^0$) may also substitute into these phases—especially when in an amorphous form, which is able to accommodate a greater variation in ionic radii and charges than a crystalline structure. Although it appears likely that arsenic is controlled by the coprecipitation of iron phosphate and carbonate phases, it cannot be shown conclusively without performing arsenic speciation on the soil, such as electron microprobe analyses.

J.3.2 Adsorption

In addition to coprecipitation with iron carbonate and phosphate minerals, arsenic is also likely adsorbing to the surfaces of iron-bearing minerals within the aquifer such as magnetite, pyroxenes, amphiboles, and biotite.

Green rust has been shown to be an important sink for arsenic within zero-valent-iron treatment walls (Su and Puls, 2004) and within iron rich reservoir sediments (Root et al., 2007). Su and Puls (2004) also showed that arsenic (III) was oxidized to arsenic (V) on the surface of the green rust. The authors also suggested that arsenic (V) was adsorbed onto the surfaces of the green rust preferentially to arsenic (III).

The implication of the study for the Site is that attenuation of arsenic within the aquifer begins with adsorption of arsenic (V), which results in the groundwater system re-equilibrating by oxidizing some of the arsenic (III) to arsenic (V).

J.3.3 Dissolved Organic Carbon, Dissolved Oxygen, and Redox Potential

The Dissolved Organic Carbon (DOC) and other data for comparison are presented in **Table J-5**.

Table J-5 Comparison of DOC [1] with Other Parameters

Well	DOC [a)] (mg/L)	Oxidation-Reduction Potential (mv)	Total Dissolved Arsenic (mg/L)	Dissolved Oxygen (mg/L)	Total Dissolved Phosphorous (mg/L)
MW1R	18.3	-276	1.79	1.75	1.10
MW5	19.2	-201	0.0014	6.01	1.31
MW25	8.73	-208	0.210	2.34	-
MW30	17.9	-190	0.039	1.98	2.42
MW31	15.1	-180	0.150	1.13	1.60
MW32	18.8	-205	0.161	1.06	-
MW33	17.7	-189	0.084	1.38	3.12
MW34	6.9	-176	0.157	4.11	-
MW35	10.2	-163	0.0016	1.42	-
1C3-1	42	-166	1.24	1.60	1.44
MW36*	9.08	-99	0.276	0.69	-
MW37*	13.0	-74	0.876	1.02	-
MW38*	12.1	-100	0.469	0.91	-
MW39*	5.88	24	0.001	1.07	-
MW40*	6.41	-18	0.0123	0.42	-
MW41*	6.17	-47	0.0026	0.39	-
MW42*	4.23	30	0.0326	0.71	-

DOC = Dissolved Organic Carbon
Red indicates either Murray Pacific Property or NBA wells
*January 2014 data

CDM Smith

The DOC concentrations do not appear to correlate (either positively or negatively) with ORP, total dissolved As, dissolved oxygen (DO), or total dissolved phosphorus (P), indicating that either the system is not in equilibrium or the DO data were in error. For a system in complete equilibrium, the DOC would consume the DO in the water and the ORP would decrease. At equilibrium, DOC would also reduce As(V) to As(III) and dissolve iron minerals (both by reducing ferric iron to ferrous and by forming aqueous complexes with iron), which would tend to increase total dissolved arsenic concentrations. Total dissolved P would also increase due to dissolution of iron phosphates and/or by the presence of organic P within the DOC molecules.

The reason for the disequilibrium is likely the slow rate of reaction for DO with DOC and the comparatively rapid rate of dissolution of organic matter. The implication is that organic matter does not appear to control aqueous arsenic concentrations except in specific areas, as discussed below.

J.3.4 Effect of NOM and Hydrocarbons

The area which was impacted by the hydrocarbon release from the Bunker C tank extends into the area of wells MW29, MW36, MW37 and MW38, as discussed in Section 8.2 of the RI report. Arsenic transport in this area is more of a concern than for other areas of the site for a number of reasons, including:

1. The hydrocarbon release occurred within an area which contained arsenic-bearing waste.
2. The surface aquifer may be thicker in this area due to the presence of drainage features within the historic land surface. Groundwater appears to be funneled into this area based on the groundwater contours (Figure 11i in the RI) and probably represents a groundwater discharge area.
3. Wood debris is also present in the vicinity of the arsenic-bearing waste materials.
4. The area is adjacent to the Murray Pacific Property, which is currently unpaved and an area of groundwater recharge.
5. MW 37 contained fine bits of slag
6. Several borings in this area contained elevated soil arsenic in contact with the water table.
7. This area was beneath the waste material berm which had highly leachable arsenic wastes in it.

The Eh values indicate that the groundwater in the area is currently no more reducing than in other areas (**Table J-3**). Similarly, DOC concentrations in this area (**Table J-5**) are not elevated relative to the other wells. The removal of the Bunker C fuel tank and associated impacted soils should have limited plume expansion (stage 1) and initiated stage 2 (steady state). The relatively reducing conditions of the site groundwater and the presence of residual wood waste in the area has likely greatly decreased the rate at which the plume transitions from stage 2 (steady state) to stage 3 (plume retreat). The arsenic plume may not retreat until the organics have been leached from the wood waste, which could be a very long time.

The situation is also complicated by the apparent “funneling” of groundwater through this area, where it is apparently the primary discharge point to the Hylebos Waterway.

J.3.5 Arsenic Transport Velocity at the Site

Arsenic attenuation is often described by the partition coefficient (Kd), which includes all attenuation, including adsorption, precipitation, and coprecipitation processes. The partition coefficient expression is as follows:

$$Kd = C_{soil}/C_{soln} \qquad (4)$$

Where,

Kd	=	The partition coefficient (liters per kilogram [L/kg])
C_{soil}	=	The concentration of arsenic on the soil or aquifer sediment (mg/kg)
C_{soln}	=	The concentration of arsenic in solution (i.e. groundwater) (mg/L)

Kd is useful because it can be used to calculate the retardation factor (R), which is a measure of the transport velocity of arsenic at the site relative to the groundwater. The retardation factor is calculated using the following:

$$R = 1 + (\rho/n)\ Kd = V/V_c \qquad (5)$$

Where,

ρ	=	The dry bulk density of the aquifer matrix (L/kg)
n	=	The total porosity of the aquifer matrix (volume fraction)
V	=	The groundwater velocity (ft/day)
V_c	=	The velocity of the arsenic (ft/day)

Once R is known, the transport velocity of arsenic at the site can be determined.

The partition coefficient is typically determined by performing a bench-scale test using clean aquifer material and impacted groundwater from the site. Kd values for arsenic reported in the literature vary by orders of magnitude, depending on the properties of the aquifer sediment or soil (iron content, grain size, mineralogy) and the nature of the groundwater (pH, Eh, concentration of competing ions).

Because a site-specific Kd value has not been determined for the Taylor Way Property, published Kd values for the adjacent Arkema Property (Mariner et al., 1996) were used. The nature of the aquifer material should be the same, because the Kd values were determined for the upper (surface) aquifer.

However, the nature of the water within the penite-impacted arsenic plume at the Arkema Property differed from the Taylor Way Property by having a much higher range of pH values (8.5 to 11 su) and high concentrations of dissolved silica (~15 mg/L up to ~70,000 mg/L as SiO_2). The high silica concentrations resulted from the high pH of the wastes and brines disposed of on the Arkema Property.

There was an inverse correlation between pH and the resulting Kd value. The Kd values obtained for the Arkema Property ranged from 0.2 L/kg at pH 11 to 2 L/kg at pH 8.5. Extrapolating these data points to pH 6.75 (approximate pH for the Taylor Way Property) results in a Kd of 3.26 L/kg. Based on the classification of Dragun (1988), a Kd value between 2 and 10 represents a low mobility compound.

As a check on the Kd value, the arsenic concentrations of soil and the associated pore water were used to calculate site-specific values. In most cases, an exact correspondence between the soil and pore water cannot be achieved due to the differences in well screen intervals compared to soil sampling intervals. **Table J-6** presents the Kd values using the wells installed as part of the Supplemental RI.

Table J-6 - Summary of Calculated Arsenic Kd Values for the Supplemental Wells with Literature Values for Comparison

Location	Soil As Concentration (mg/kg)	Soil Depth	Groundwater As Concentration (mg/L)	Water Depth	Kd (L/kg)	Notes
MW-36	114	7.5	0.276	7.0	413	Source/residual hydrocarbon area
MW-37	191	10	0.876	9.0	218	
MW-38	13	8.0	0.469	7.0	28	
MW-39	7	7.5	0.001	6.5	7000	Murray Pacific Property
MW-40	6	5.0	0.0123	4.0	488	
MW-41	6	5.0	0.0026	4.5	2308	
MW-42	17	5.0	0.0326	5.0	521	
As(III) Agricultural Soils- Median of 37 values[1]					3.3 (1.0-8.3)[2]	pH between 4.5 and 9
As(V) Agricultural Soils - Median of 19 values[1]					6.7 (1.9-18)[2]	

1. Baes and Sharp, 1983 Table 4
2. Range in parentheses

All of the values shown in **Table J-6** are much higher than the value calculated from the Arkema site. Therefore, the value of 3.26 L/kg can be considered conservative.

Using an arsenic Kd of 3.26 L/kg, a dry bulk density of 1.65 L/kg, a porosity of 0.2, and a groundwater velocity of 0.09 ft/day (between wells MW1R and MW9) results in an R of 27.9 (1+[1.65/0.2]*3.25 = 27.9) and an arsenic velocity of 0.0012 ft/day (0.09/27.9 = 0.0012). The groundwater velocity between MW9 and MW5 ranges from 0.01 ft/day during the dry season to 0.09 ft/day in the wet season. The arsenic time of travel between MW9 and MW5 would then range from 372 to 3,340 yrs (using a distance of 437 ft between the two wells).

The groundwater velocity is extremely slow at 0.033 ft/day and the arsenic velocity is nearly 28 times slower. The time required for the groundwater to travel the 315 feet from well MW1R to MW9 is approximately 26 years (315 ft/0.033 ft/d = 9,545 days = 26 yrs). By comparison, the arsenic would require about 730 years (315 ft/0.0012 = 266,318 d = 730 yrs) to travel between the two wells.

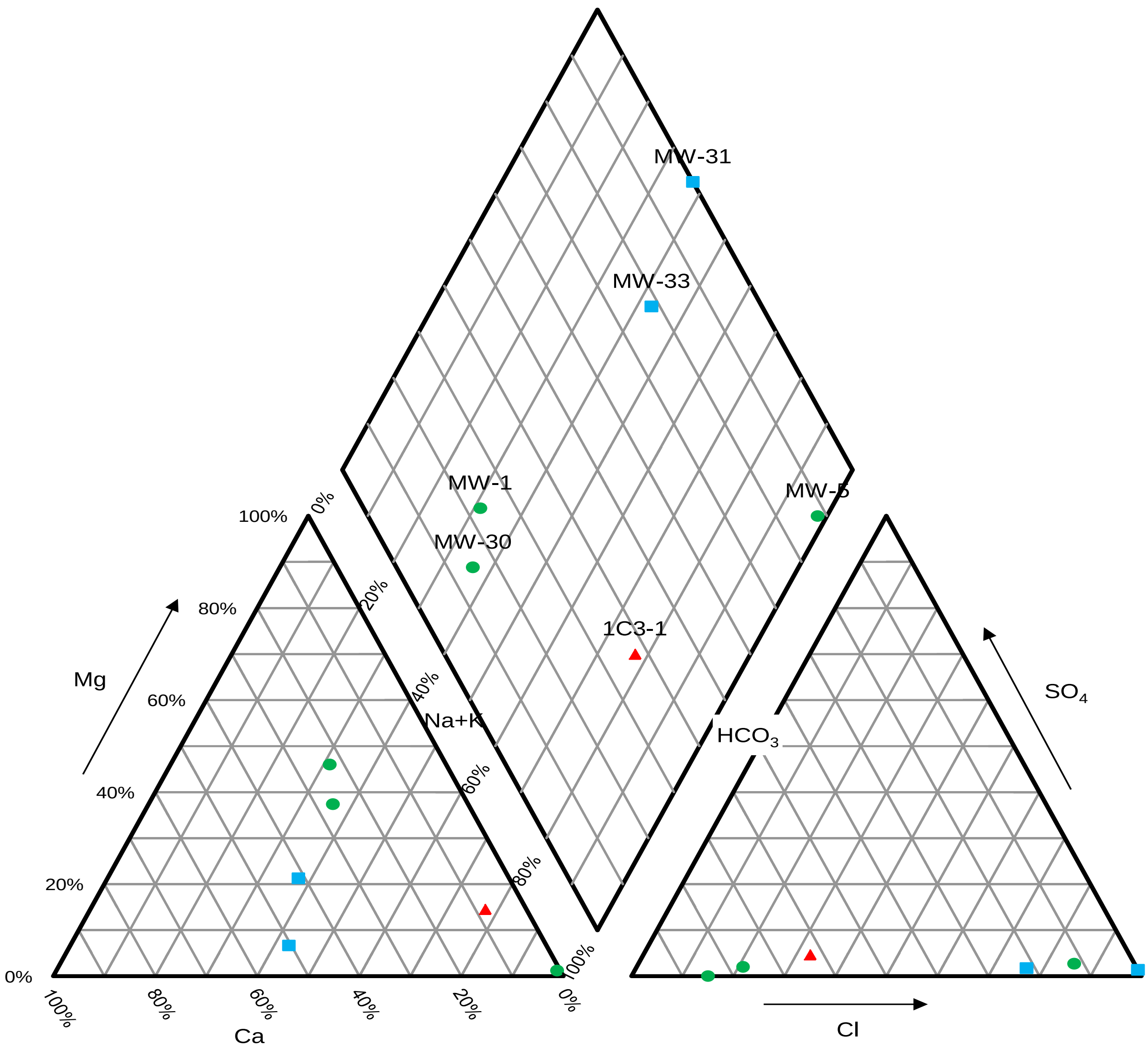
The arsenic mobility on the Site appears to be very low, with the possible exception of the area down-gradient of the Bunker C release (wells MW29, MW36, MW37 and MW38). The arsenic Kd values in this area are lower than for the Murray Pacific wells (**Table J-6**), but are still much higher than the value of 3.26 L/kg used in the calculations above. However, the groundwater velocity in this area may be higher than the velocity between wells MW1R and MW9.

J.4 Arsenic Source Evaluation

J.4.1 Major Anions and Cations

The source of arsenic-bearing groundwater at the Site can be evaluated by looking at the other constituents present in the water. **Figure J-8** is a Piper diagram showing the differences in the well data for the major anions (chloride, sulfate, and bicarbonate) and cations (sodium + potassium, calcium, and magnesium).

Figure J-8 Piper Diagram Showing the Data for Selected On-Site (Taylor Way Property - green circles) and Off-Site Locations (red triangle for Arkema and blue squares for Murray Pacific).



The Arkema well (1C3-1) plots in a different quadrant of the diagram than the Taylor Way Property wells. In general, the reason for the separation is the relatively high concentrations of sodium and potassium relative to calcium and magnesium. The high sodium is due to the presence of the salt pads. MW5 has an even stronger sodium signature (located at the Na+K apex of the cation triangle), but is separated from 1C3-1 by the relatively low alkalinity of MW5 compared to 1C3-1. With the exception of well MW5, which is a sodium chloride water, the Taylor Way Property data range from calcium chloride to calcium-magnesium bicarbonate type waters. This is illustrated by well MW-5 which is at the eastern corner of the upper part of the diagram, which indicates that sodium and chloride predominate. Well MW5 is believed to have been impacted by the salt pads. Well MW1R does not appear in the same area for this sampling round due to the relatively low conductivity.

The sulfate concentration is very low in all of the wells due to either a lack of sulfate-bearing minerals (i.e., gypsum) within the aquifer or reduction of sulfate to sulfide. As the Eh-pH conditions do not appear to be favorable for sulfate reduction (see **Figure J-7**), a lack of sulfate-bearing minerals is the most likely explanation for the low sulfate concentrations.

J.5 Summary Conclusions

The fate and transport of arsenic at the site are summarized below:

- Arsenic exists predominantly in the reduced arsenite (more mobile) form at the site. However, oxidation of arsenite to arsenate is likely occurring on mineral surfaces, resulting in enhanced arsenic attenuation.

- Iron and arsenic concentrations are likely controlled by precipitation of iron carbonates and phosphates at the site, based on the PHREEQC modeling results and Eh-pH diagram. In other words, the precipitation of these phases removes arsenic from solution, controlling how high groundwater arsenic concentration can go. In the upper part of the aquifer, a redox gradient likely exists where iron is oxidized from ferrous to ferric leading to precipitation of iron oxyhydroxide solids and co-precipitation of arsenic.

- Redox conditions at the site are not in equilibrium with respect to arsenic, DO or DOC, which suggests that a redox gradient is present within the groundwater. A redox gradient occurs where oxygenated infiltration water mixes with relatively reducing groundwater. Minerals can form within this gradient (such as iron oxyhydroxides) that are not predicted to form deeper within the aquifer.

- Arsenic has low mobility at the site due to the formation of iron carbonate, iron phosphate, and iron oxyhydroxide phases, all of which can attenuate arsenic.

- Arsenic transport is more of a concern down-gradient of the former Bunker C tank hydrocarbon release due to the presence of arsenic-bearing waste, wood waste, and residual hydrocarbons, by the apparent funneling of groundwater through this area, and the proximity to the Hylebos Waterway.

- Arsenic transport at the site is at least 27.9 times slower than the groundwater velocity, resulting in extremely long transport times for arsenic to travel downgradient (on the order of hundreds of years). The low arsenic mobility is due to formation of arsenic-bearing iron carbonates, iron phosphates and iron oxyhydroxides.

- The MW1/MW1R area groundwater has a high DOC concentration (18 mg/L) and the lowest Eh value on the Taylor Way property (-68 mV). The arsenic concentrations are also higher than for other area wells (1.79 mg/L). One possible reason for the higher concentrations at this well could be migration of contaminants in groundwater from the Arkema NBA, which contains both slag and wood waste. Well 1C3-1 in the NBA has similar or higher DOC (42 mg/L) and arsenic concentrations (1.24 mg/L) and a relatively low Eh (44 mV). Another possibility is that when the water levels increase in the area, previously unsaturated wastes become saturated and subject to leaching of arsenic. Either of these processes or both could be occurring.

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