Report

Groundwater Quality Investigation
Gate J-28, Boeing Developmental Center
Tukwila, Washington

May 31, 2001

Prepared for

The Boeing Company

Prepared by

LANDAU ASSOCIATES, INC.

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1.0 INTRODUCTION

This report summarizes a groundwater quality investigation conducted at Gate J-28 at The Boeing Company (Boeing) Developmental Center (DC) located at 9725 East Marginal Way South, Tukwila, Washington (Figure 1). Landau Associates conducted this investigation on behalf of Boeing, the current property owner, in accordance with the *Work Plan, Monitoring Well Installation, Gate J-28, Boeing Developmental Center, Tukwila, Washington, Landau Associates, March 26, 2001* (work plan; Landau Associates 2001).

This investigation consisted of installing two monitoring wells, DC-MW-7 and DC-MW-8, near the 9-04 building, development of the wells, and collection and analysis of groundwater samples for petroleum-related constituents. At the time of the investigation, the 9-04 building was being used for storage, generation, and distribution of hazardous substances and dangerous wastes.

Prior to this investigation, GeoEngineers collected soil and groundwater samples from direct-push borings located in this area as part of a phase II environmental site assessment for the Museum of Flight. No soil samples contained diesel-range petroleum hydrocarbons. Oil-range petroleum hydrocarbons were detected in only one soil sample from this area. The soil sample collected from boring B-9 at a depth of 12 ft contained 490 mg/kg oil-range petroleum hydrocarbons. No other soil samples from this area contained oil-range petroleum hydrocarbons. Diesel-range petroleum hydrocarbons were measured at a concentration of 6.9 mg/L in a groundwater sample collected from boring B-10 (GeoEngineers 2001). No sources for this material have been identified.

Results from this investigation will be submitted to the Washington State Department of Ecology (Ecology) to support a no-further-action determination for a portion of the Developmental Center that is planned to be donated to the Museum of Flight. Originally, monitoring well DC-MW-7 was the only proposed well; however, at the client's request and in response to Ecology comments on the work plan, an additional monitoring well, DC-MW-8, was also installed. The locations of the two wells are shown on Figure 2.

2.0 FIELD INVESTIGATION ACTIVITIES

This section describes the activities associated with installation, development, and groundwater sampling of monitoring wells DC-MW-7 and DC-MW-8.

2.1 UTILITY LOCATE

On April 16, 2001, a Landau Associates and a Boeing representative met with Applied Professional Services (APS) to conduct a private utility survey. APS found a fiberoptics line, a gas line, a high voltage line, and a storm drain line in close proximity to the proposed location of DC-MW-8. No utilities were located near DC-MW-7. The public utilities along the west side of East Marginal Way were located by the public utility locate service several days in advance of APS's locate.

2.2 BOREHOLE DRILLING

Borehole drilling and monitoring well installation was performed by Cascade Drilling, Inc. (Cascade) using 4.25-inch ID hollow-stem auger rig; however, due to the close proximity of utilities to DC-MW-8, the first 4 ft of the borehole was hand dug to check for the presence of utility lines. No utilities were encountered; therefore, at 4-ft below ground surface (BGS) drilling commenced.

Each borehole was drilled to a depth of 18.5-ft BGS. During drilling, soil cuttings were observed continuously and screened for organic vapors using a photoionization detector (PID) by a Landau Associates field representative. In accordance with the work plan, no soil samples were collected as part of this investigation.

Ground surface conditions at boring DC-MW-7 consisted of 2-inch thick asphalt overlying a crushed gravel base course material. Underlying the base course material was a brown, gravelly, silty sand with pieces of asphalt and brick. The material became a gray silty sand with depth and the amount of asphalt and brick diminished with depth. A hydrocarbon odor was observed in the drill cuttings near the bottom of the borehole (approximately 13 ft BGS); however, no measurable organic vapors were detected using the PID.

Ground surface conditions at boring DC-MW-8 consisted of 2-inch thick asphalt overlying a crushed gravel base course material. Beginning at 2.5 ft to approximately 5 ft BGS, a brown fine to medium sand with trace silt and gravel and red-brown mottling was encountered. Below 5 ft, the material became a brown fine to medium sand with silt. The sand became gray with depth.

Actual lithologic contacts could not be logged based solely on drill cuttings (i.e., depth-discrete samples were not collected). Groundwater at the time of drilling was encountered at approximately 11-ft

BGS at both locations. A record of the soil and groundwater conditions observed during drilling is presented on the boring logs (Figures 4 and 5) using the soil classification system shown on Figure 3.

2.3 MONITORING WELL INSTALLATION AND CONSTRUCTION

Installation and construction of monitoring wells DC-MW-7 and DC-MW-8 were performed in accordance with Ecology *Minimum Standards for Construction and Maintenance of Wells* (WAC 173-160), as applicable. Both monitoring wells were constructed of 2-inch diameter, schedule 40 PVC casing and screen and were installed to the bottom of the borehole. The wells were screened with 0.010-inch slot size machine-slotted screen from approximately 8 ft BGS to 18 ft BGS. A filter pack consisting of commercially prepared, No. 10/20 Colorado silica sand was installed around the screen, extending from the bottom of the end cap to 3 ft above the screen (5 ft BGS). The annular space above the filter pack was filled with bentonite chips to approximately 1.75 ft BGS at well DC-MW-7 and to approximately 1.6 ft BGS at well DC-MW-8. A flush-mounted steel monument was set in concrete at the surface to the depth of the bentonite chips. A lockable cap with a waterproof seal was placed at the top of each well casing and the monitoring wells were tagged with metal tabs bearing the Ecology well identification numbers.

2.4 WELL DEVELOPMENT

On April 19, 2001, the wells were developed by a Landau Associates representative. Well development was performed using the procedures described in the work plan. The wells were developed using a centrifugal pump and dedicated tubing after using a disposable bailer to remove silt. Development with the centrifugal pump continued until a minimum of 5 casing volumes had been purged and the turbidity of the purge water was visibly low. Groundwater parameters (pH, conductivity, and dissolved oxygen) were also measured during development using the procedures described in the February 2001 *Developmental Center Groundwater Monitoring Plan* (Boeing's groundwater monitoring plan; Boeing 2001). Development continued until all parameters had stabilized. During well development, 95 gallons of groundwater was removed from well DC-MW-7 and 110 gallons was removed from well DC-MW-8.

2.5 GROUNDWATER SAMPLING

On April 23, groundwater samples were collected from each well by a Landau Associates representative. In accordance with Boeing's groundwater monitoring plan, prior to sample collection each well was purged until the pH, conductivity, and dissolved oxygen parameters had stabilized. Purging and sample collection were conducted using a dedicated bladder pump installed by Boeing and low-flow sampling techniques, as described in Boeing's groundwater monitoring plan.

2.6 RESIDUAL WASTE MANAGEMENT

Soil cuttings and residual groundwater generated during this investigation were placed into separate 55-gallon drums. The drums were labeled by a Boeing representative using Hold-For-Analysis labels. All drums, labels, and pallets were supplied and managed by Boeing. Disposal of the waste will be in accordance with appropriate regulations and Boeing disposal practices.

2.7 SURVEYING

The ground surface elevation and the top of the PVC casing elevation for each well were surveyed by Boeing. The ground surface and the top of well casing elevations for the wells are recorded on the well logs. The northing and easting coordinates for each well had not been surveyed at the time that this report was issued.

3.0 GROUNDWATER MONITORING

Groundwater samples are to be collected from monitoring wells DC-MW-7 and DC-MW-8 and submitted for analysis on a quarterly basis for 4 quarters or until the wells are abandoned. The April sampling event is considered to be the first quarterly sampling event. This section describes the analyses that were performed, the quality of the data, and the analytical results.

3.1 LABORATORY ANALYSIS AND DATA QUALITY EVALUATION

The groundwater samples were analyzed for benzene, ethylbenzene, toluene, and xylenes (BETX) using U.S. Environmental Protection Agency (EPA) method 8021; polycyclic aromatic hydrocarbons (PAHs) using EPA method 8270 with selected ion monitoring (SIM); gasoline-range hydrocarbons using the NWTPH-Gx method; and diesel- and motor oil-range hydrocarbons using the NWTPH-Dx method. All of the analyses were performed by Analytical Resources, Inc. (ARI) located in Seattle, Washington.

Following receipt of the analytical results, the quality of the data was evaluated by Landau Associates in accordance with the procedures and requirements specified in Section 3.0 of the work plan. According to the evaluation, no data were qualified or rejected, and the data were determined acceptable for use. Laboratory data sheets are provided in Appendix A.

3.2 EVALUATION OF GROUNDWATER QUALITY

Ethylbenzene, xylene, naphthalene, 2-methylnaphthalene, 1-methylnaphthalene, and acenapthene were detected in the groundwater sample collected at DC-MW-7 at concentrations of 1.9 µg/L or less; however, no gasoline-range or other-range petroleum hydrocarbons were detected in the sample. Diesel-range petroleum hydrocarbons were detected in the groundwater sample collected at DC-MW-8 at a concentration of 0.66 mg/L; however, no other petroleum-related constituents were detected in the sample. The analytical results for each sample are presented in Table 1.

The constituents detected in well DC-MW-7 are usually associated with gasoline. They are not typically found in groundwater associated with diesel, especially weathered diesel. The results indicate that the gasoline-related constituents detected in well DC-MW-7 are probably from a different source than the diesel-range petroleum hydrocarbons detected in well DC-MW-8.

No constituents in well DC-MW-7 exceed current or adopted MTCA method A groundwater cleanup levels or method B cleanup levels based on protection of marine surface water (consistent with anticipated site-wide Developmental Center groundwater cleanup levels).

Only diesel-range petroleum hydrocarbons were detected in well DC-MW-8. The measured concentration is below the current method A groundwater cleanup level (1.0 mg/L for all petroleum

hydrocarbons), but slightly above the adopted level that will be effective August 15, 2001 (0.5 mg/L for diesel-range petroleum hydrocarbons).

Based on the results from the first quarter of groundwater monitoring, we recommend that future groundwater samples be analyzed only for gasoline- and diesel-range petroleum hydrocarbons. The measured concentration of diesel-range petroleum hydrocarbons in well DC-MW-8 (0.66 mg/L) is significantly lower than that measured by GeoEngineers earlier this year (6.9 mg/L; GeoEngineers 2001), indicating that the extent of diesel-range petroleum hydrocarbons in groundwater at this property is likely to be limited.

Soil sampling performed in 1987 indicated petroleum concentrations were slightly above the MTCA method A soil cleanup levels adopted February 2001. Soil sampling performed by GeoEngineers (GeoEngineers 2001) did not indicate the presence of diesel-range petroleum hydrocarbons. The source of the diesel-range petroleum hydrocarbons has not been identified; however, the available information does not indicate a source on Boeing property and additional action other than groundwater monitoring is not warranted.

4.0 USE OF THIS REPORT

This report has been prepared for the exclusive use of The Boeing Company for specific application to the Gate J-28 area. No other party is entitled to rely on the information, conclusions, and recommendations included in this document without the express written consent of Landau Associates. Further, the reuse of information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by Landau Associates, shall be at the user's sole risk. Landau Associates warrants that within the limitations of scope, schedule, and budget, our services have been provided in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions as this project. We make no other warranty, either express or implied.

This document has been prepared under the supervision and direction of the following key staff.

LANDAU ASSOCIATES, INC.

By:

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Project Geologist

and

Kristy J. Hendrickson, P.E.
Principal

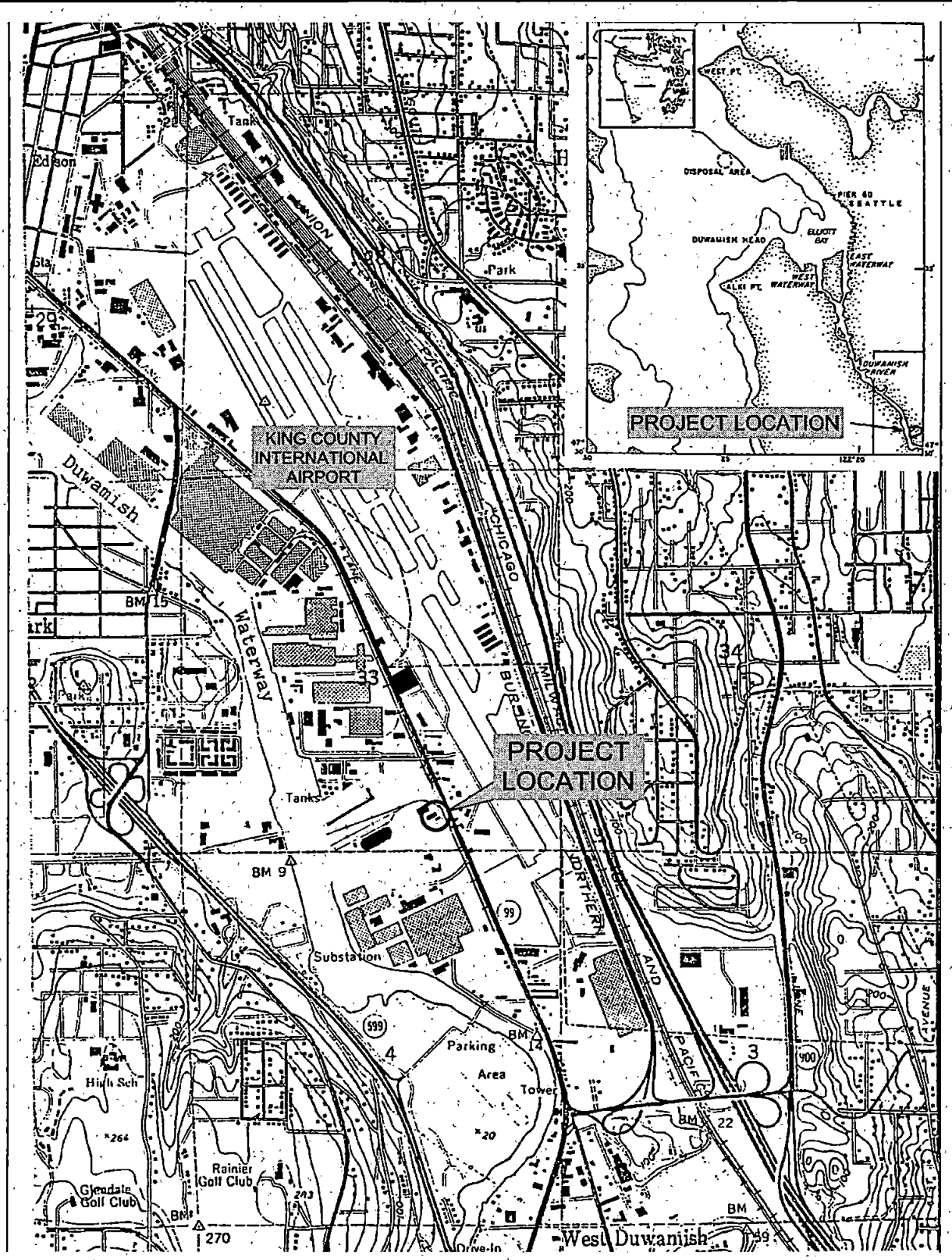
SJP/KJH/tam

5.0 REFERENCES

Boeing. 2001. *Developmental Center Groundwater Monitoring Plan.* Boeing Military Aircraft and Missile Systems; Safety, Health, and Environmental Affairs. February.

GeoEngineers. 2001. *Phase II Environmental Site Assessment Report, 9725 East Marginal Way South, Seattle, Washington*. March.

Landau Associates. 2001. *Monitoring Well Installation Work Plan, Gate J-28, Boeing Developmental Center, Tukwila, Washington.* March 26.



Source: U.S.G.S. 7.5 Minute Series (Topographic) Map: Seattle South Quadrangle.

Landau Associates	The Boeing Company Tukwila, Washington	**Vicinity Map**

Figure 1

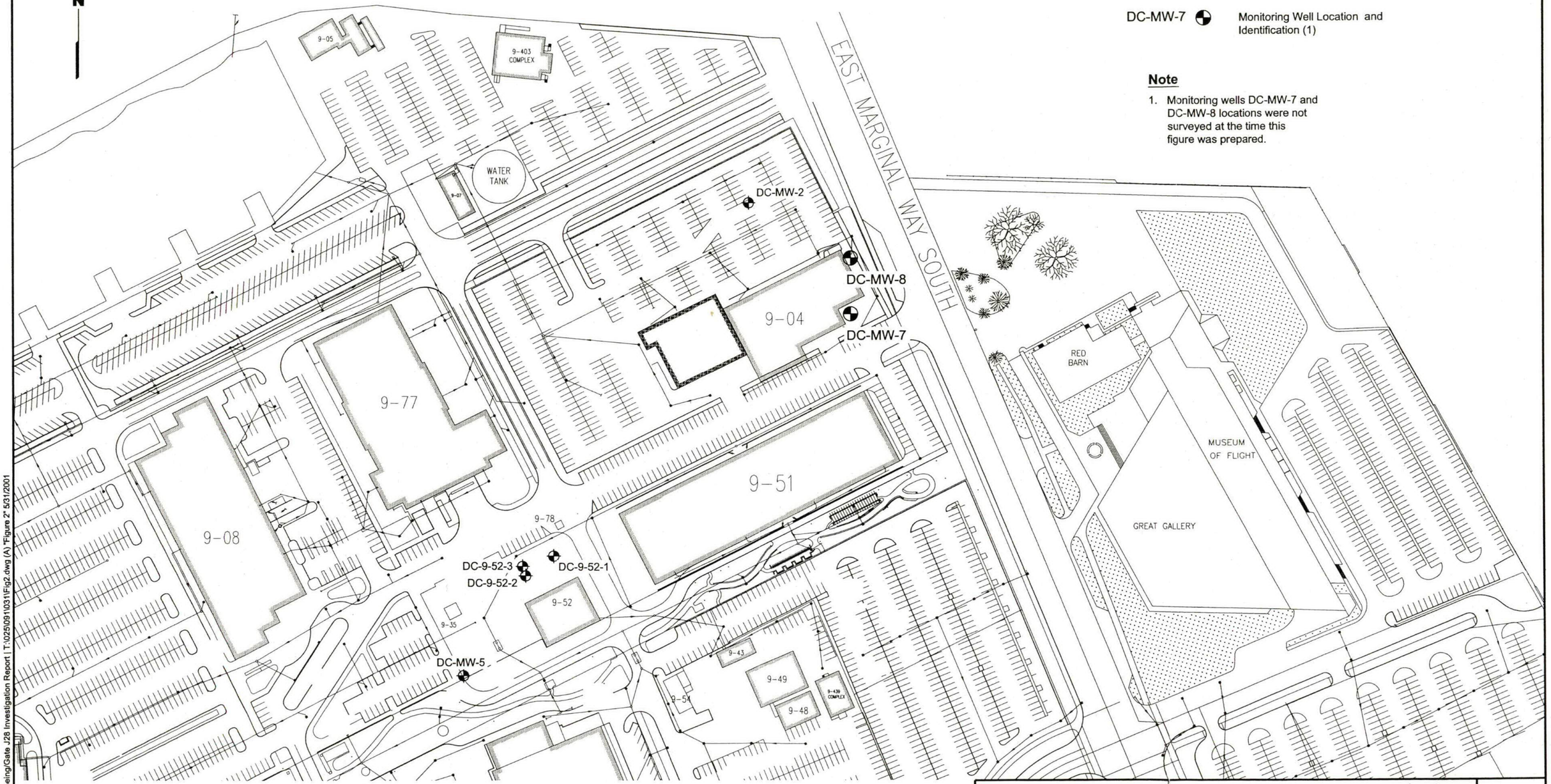
N

Legend

DC-MW-7 — Monitoring Well Location and Identification (1)

Note

1. Monitoring wells DC-MW-7 and DC-MW-8 locations were not surveyed at the time this figure was prepared.



0 150 300

Approximate Scale in Feet

Landau Associates

The Boeing Company Tukwila, Washington	**Monitoring Well Locations**	Figure 2

Boeing/Gate J28 Investigation Report | T:\025\091\031\Fig2.dwg (A) "Figure 2" 5/31/2001

Soil Classification System

MAJOR DIVISIONS			GRAPHIC SYMBOL	USCS LETTER SYMBOL[1]	TYPICAL DESCRIPTIONS[2][3]
COARSE-GRAINED SOIL (More than 50% of material is larger than No. 200 sieve size)	GRAVEL AND GRAVELLY SOIL (More than 50% of coarse fraction retained on No. 4 sieve)	CLEAN GRAVEL (Little or no fines)		GW	Well-graded gravel; gravel/sand mixture(s); little or no fines
				GP	Poorly graded gravel; gravel/sand mixture(s); little or no fines
		GRAVEL WITH FINES (Appreciable amount of fines)		GM	Silty gravel; gravel/sand/silt mixture(s)
				GC	Clayey gravel; gravel/sand/clay mixture(s)
	SAND AND SANDY SOIL (More than 50% of coarse fraction passed through No. 4 sieve)	CLEAN SAND (Little or no fines)		SW	Well-graded sand; gravelly sand; little or no fines
				SP	Poorly graded sand; gravelly sand; little or no fines
		SAND WITH FINES (Appreciable amount of fines)		SM	Silty sand; sand/silt mixture(s)
				SC	Clayey sand; sand/clay mixture(s)
FINE-GRAINED SOIL (More than 50% of material is smaller than No. 200 sieve size)	SILT AND CLAY (Liquid limit less than 50)			ML	Inorganic silt and very fine sand; rock flour; silty or clayey fine sand or clayey silt with slight plasticity
				CL	Inorganic clay of low to medium plasticity; gravelly clay; sandy clay; silty clay; lean clay
				OL	Organic silt; organic, silty clay of low plasticity
	SILT AND CLAY (Liquid limit greater than 50)			MH	Inorganic silt; micaceous or diatomaceous fine sand
				CH	Inorganic clay of high plasticity; fat clay
				OH	Organic clay of medium to high plasticity; organic silt
	HIGHLY ORGANIC SOIL			PT	Peat; humus; swamp soil with high organic content

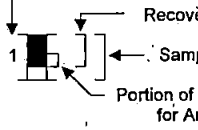
OTHER MATERIALS	GRAPHIC SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
PAVEMENT		AC or PC	Asphalt concrete pavement or Portland cement pavement
ROCK		RK	Rock (See Rock Classification)
WOOD		WD	Wood, lumber, wood chips
DEBRIS		DB	Construction debris, garbage

Notes:
1. USCS letter symbols correspond to the symbols used by the Unified Soil Classification System and ASTM classification methods. Dual letter symbols (e.g., SP-SM) for a sand or gravel indicate a soil with an estimated 5-15% fines. Multiple letter symbols (e.g., ML/CL) indicate borderline or multiple soil classifications.
2. Soil descriptions are based on the general approach presented in the *Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)*, as outlined in ASTM D 2488. Where laboratory index testing has been conducted, soil classifications are based on the *Standard Test Method for Classification of Soils for Engineering Purposes*, as outlined in ASTM D 2487.
3. Soil description terminology is based on visual estimates (in the absence of laboratory test data) of the percentages of each soil type and is defined as follows:

Primary Constituent:	> 50%	- "GRAVEL," "SAND," "SILT," "CLAY," etc.
Secondary Constituents:	> 30% and ≤ 50%	- "very gravelly," "very sandy," "very silty," etc.
	> 15% and ≤ 30%	- "gravelly," "sandy," "silty," etc.
Additional Constituents:	> 5% and ≤ 15%	- "with gravel," "with sand," "with silt," etc.
	≤ 5%	- "trace gravel," "trace sand," "trace silt," etc., or not noted.

Drilling and Sampling Key

SAMPLE NUMBER & INTERVAL



SAMPLER TYPE

Code	Description
a	3.25-inch O.D., 2.42-inch I.D. Split Spoon
b	2.00-inch O.D., 1.50-inch I.D. Split Spoon
c	Shelby Tube
d	Grab Sample
e	Other - See text if applicable
1	300-lb Hammer, 30-inch Drop
2	140-lb Hammer, 30-inch Drop
3	Pushed
4	Soil Cuttings

Groundwater

▽ ATD — Approximate water elevation at time of drilling (ATD) or on date noted. Groundwater levels can fluctuate due to precipitation, seasonal conditions, and other factors.

Field and Lab Test Data

Code	Description
PP = 1.0	Pocket Penetrometer, tsf
TV = 0.5	Torvane, tsf
PID = 100	Photoionization Detector VOC screening, ppm
W = 10	Moisture Content, %
D = 120	Dry Density, pcf
-200 = 60	Material smaller than No. 200 sieve, %
GS	Grain Size - See separate figure for data
AL	Atterberg Limits - See separate figure for data
GT	Other Geotechnical Testing
CA	Chemical Analysis

25091.31 5/22/01 S:\MODELING\GINTW\PROJECTS\025091.GPJ SOIL CLASS SHEET

Landau Associates

Monitoring Well Installation
Gate J-28, Boeing
Developmental Center
Tukwila, Washington

Soil Classification System and Key

Figure 3

DC-MW-7

SAMPLE DATA				SOIL PROFILE			GROUNDWATER
Depth (ft)	Sample Number & Interval	Sampler Type	Blows/Foot	Test Data	Graphic Symbol	USCS Symbol	Water Level
0		d4		PID = 0.0		GP	Black ASPHALT (2 " thick)
						SM	Brown, sandy CRUSHED GRAVEL (moist) (base course material)
2							Brown, gravelly, silty SAND, with brick and asphalt pieces (becomes gray with depth) (moist) (fill to possible native soil)
4		d4		PID = 0.0			
6							
8							
10		d4		PID = 0.0			drilling action became smooth- no grinding action noted; no debris observed in cuttings from this depth to the bottom of the borehole
12							(hydrocarbon odor, wet cuttings noted)
14		d4		PID = 0.0			
16							
18		d4		PID = 0.0			
20							

Drilling Method: Limited Access, 4.25" ID HSA

Ground Elevation (ft): 14.09 (NGVD)

Drilled By: Cascade Drilling Inc.

ATD

Monitoring Well Detail

8.25 in

- Flush-mounted steel monument with concrete surface seal and lockable waterproof cap
- Bentonite chips
- 2-inch diameter, Schedule 40 PVC well casing
- 10/20 Colorado sand filter pack
- 2-inch diameter, Schedule 40 PVC screen (0.010-inch slot size)
- Threaded end cap

Boring Completed 04/18/01
Total Depth of Boring = 18.5 ft.

Monitoring Well Completed 04/18/01
Elevation at Top of Monitoring Well Casing = 13.69 ft.
Total Depth of Monitoring Well = 18.5 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to Soil Classification System and Key figure for explanation of graphics and symbols.

25091.31 5/22/01 S:\MODELING\GINTW\PROJECTS\025091.GPJ WELL LOG

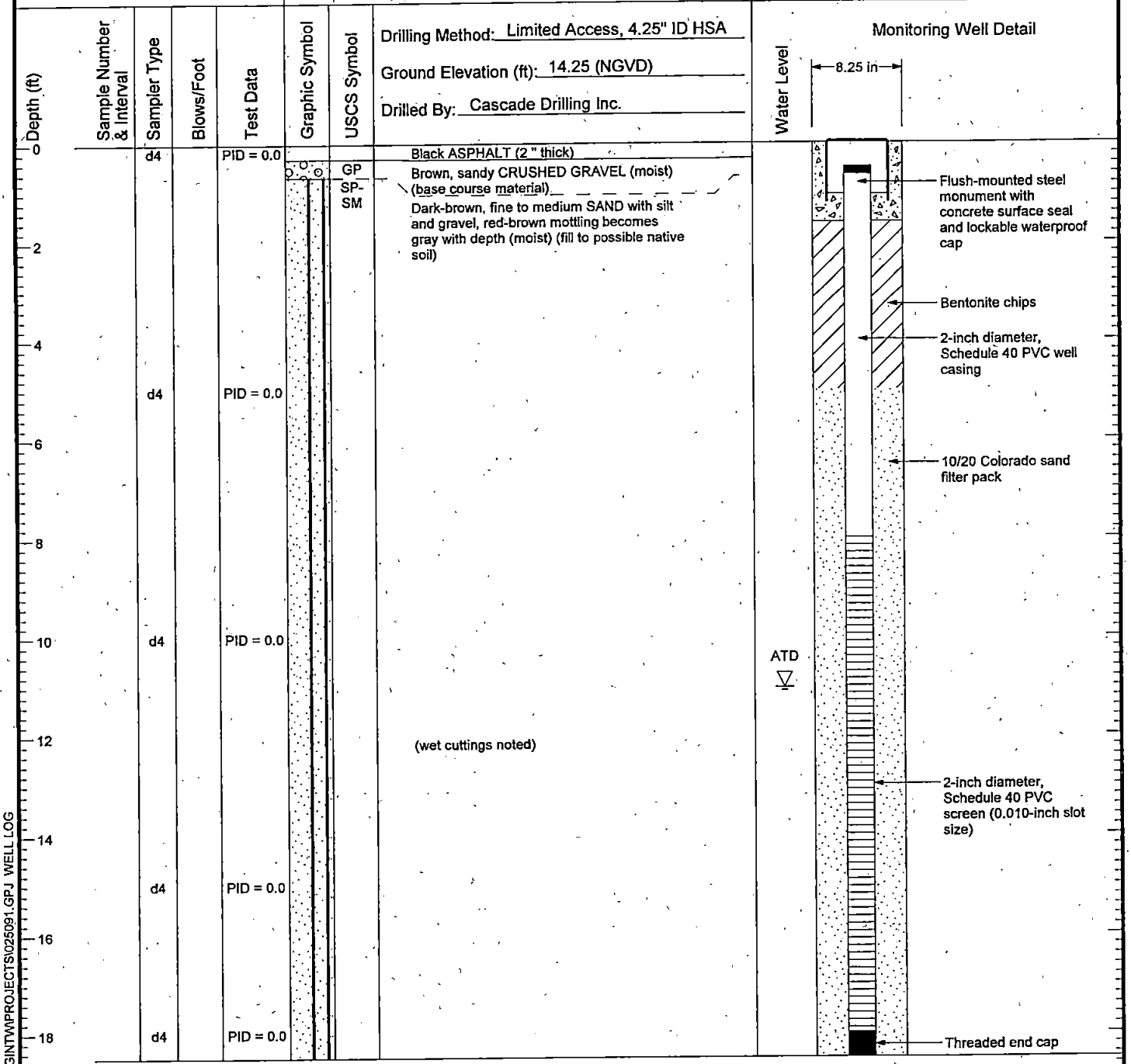
Landau Associates

Monitoring Well Installation
Gate J-28, Boeing
Developmental Center
Tukwila, Washington

Log of Boring and Monitoring Well
DC-MW-7

Figure
4

DC-MW-8



Boring Completed 04/18/01
Total Depth of Boring = 18.5 ft.

Monitoring Well Completed 04/18/01
Elevation at Top of Monitoring Well Casing = 13.92 ft.
Total Depth of Monitoring Well = 18.5 ft.

Notes:
1. Stratigraphic contacts are based on field interpretations and are approximate.
2. Reference to the text of this report is necessary for a proper understanding of subsurface conditions.
3. Refer to Soil Classification System and Key figure for explanation of graphics and symbols.

25091.31 5/22/01 S:\MODELING\GINTWPROJECTS\025091.GPJ WELL LOG

Landau Associates

Monitoring Well Installation
Gate J-28, Boeing
Developmental Center
Tukwila, Washington

Log of Boring and Monitoring Well
DC-MW-8

Figure
5

TABLE 1
GROUNDWATER ANALYTICAL RESULTS
GATE J28, BOEING DEVELOPMENTAL CENTER

	DC-MW-7 DA16B 4/23/01	DC-MW-8 DA16A 4/23/01
PAHs (µg/L) (Method 8270-SIM)		
Naphthalene	1.0	0.10 U
2-Methylnaphthalene	0.11	0.10 U
1-Methylnaphthalene	1.0	0.10 U
Acenaphthylene	0.10 U	0.10 U
Acenaphthene	0.12	0.10 U
Fluorene	0.10 U	0.10 U
Phenanthrene	0.10 U	0.10 U
Anthracene	0.10 U	0.10 U
Fluoranthene	0.10 U	0.10 U
Pyrene	0.10 U	0.10 U
Benzo(a)anthracene	0.10 U	0.10 U
Chrysene	0.10 U	0.10 U
Benzo(b)fluoranthene	0.10 U	0.10 U
Benzo(k)fluoranthene	0.10 U	0.10 U
Benzo(a)pyrene	0.10 U	0.10 U
Indeno(1,2,3-cd)pyrene	0.10 U	0.10 U
Dibenz(a,h)anthracene	0.10 U	0.10 U
Benzo(g,h,i)perylene	0.10 U	0.10 U
Perylene	0.10 U	0.10 U
Biphenyl	0.10 U	0.10 U
2,6-Dimethylnaphthalene	0.10 U	0.10 U
1-Methylphenanthrene	0.10 U	0.10 U
Benzo(e)pyrene	0.10 U	0.10 U
BETX (µg/L) (Method 8021B-Mod)		
Benzene	1.0 U	1.0 U
Toluene	1.0 U	1.0 U
Ethylbenzene	1.7	1.0 U
m,p-Xylene	1.9	1.0 U
o-Xylene	1.0 U	1.0 U
PETROLEUM HYDROCARBONS (mg/L) (Method NWTPH-Dx)		
Gasoline Range	0.25 U	0.25 U
Diesel Range	0.25 U	0.66
Motor Oil Range	0.50 U	0.50 U

U = Indicates compound was analyzed for, but not detected at the given detection limit.

APPENDIX A

Laboratory Data

Analytical Resources, Incorporated
Analytical Chemists and Consultants

May 7, 2001

Joan McGilton
The Boeing Company
P.O. Box 3707, M/S 7A-XA
Seattle, WA 98124-2207

RE: Project: Boeing Development Center J-28 Well Sampling/ ARI Job: DA16

Please find enclosed the original chain of custody record and analytical results for the above referenced project. Two water samples and a trip blank were received in good condition on April 23, 2001.

Samples were analyzed for SIM PAHs, BETX, and gasoline and diesel range hydrocarbons referencing NWPTH methods, EPA methods and ARI SOPs. Samples were allowed to settle before extraction occurred, as requested on the COC.

The BETX 5/2/01 method blank had slightly low bromobenzene surrogate recovery. The associated LCS had high trifluorotoluene surrogate recovery. A second method blank and LCS were run on 5/5/01 with both surrogates for the MB in compliance, but the LCS was slightly high. As the BETX compounds were non-detect in the MB, no corrective action was taken for the LCS surrogate recoveries.

No other analytical complications were noted. Quality control analysis results are included for your review. Copies of the reports and all associated raw data will be kept on file at ARI. If you have any questions or require additional information, please contact me at your convenience.

Sincerely,

ANALYTICAL RESOURCES, INC.

Stephanie Lucas
Project Manager
(206) 389-6154

SPL/sl
Enclosure

cc: Kris Hendrickson, Landau, Edmonds
Carl Bach, The Boeing Company, MS 46-23

Standard Turnaround - 2wk

01-6255 - 01-6257

3.2

Landau Associates
130 2nd Avenue S.
Edmonds, WA 98020
Phone (425) 778-0907
Fax (425) 778-6409

Chain-of-Custody Record

Please send results to:
① Kris Hendrickson @ Landau Assoc. 130 2nd Ave S, Edmonds, WA 98020
② Joan McGilton The Boeing Company MC 7A-WH P.O. Box 3707 Seattle, WA 98124
③ electronic copy to: Anne Halvorsen @ Landau Assoc.

Project 025091.31 Boeing Dev. Center J-28 Job No. Well Sampling

Client The Boeing Company (Joan McGilton/Carl Bach)

Project Location Boeing Developemental Center

Sampler's Name Jennifer Parsons

Sample No.	Date	Time	Location	No. of Containers	Testing Parameters: BETX by EPA Method 8021	PAHs by SIM Method 8270	NWTPH-Gx	NWTPH-Dx	Observations/Comments
DC-MW-8	4/23/01	0917	9-04 bldg (East of)	5	X	X	X	X	allow samples to settle before analysis
DC-MW-7	4/23/01	1045	9-04 bldg	5	X	X	X	X	allow samples to settle before analysis
TripBlank	4/16/01			2	X		X		

Special Shipment/Handling or Storage Requirements

Method of Shipment Hand delivered # of coolers: 1 Iced w/temp blank

Relinquished by	Received by	Relinquished by	Received by
Signature: Jennifer Parsons	Signature: Deborah Johnson	Signature:	Signature:
Printed Name: Jennifer Parsons	Printed Name: Deborah Johnson	Printed Name:	Printed Name:
Company: Landau Assoc, Inc	Company: ARI	Company:	Company:
Date: 4/23/01 Time: 11:45	Date: 4/23/01 Time: 11:45	Date: Time:	Date: Time:

WHITE COPY - Project File YEL - COPY - Laboratory COPY - Client F ntati

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET **Sample No: DC-MW-8**
PNAs by Selected Ion Monitoring GC/MS

Lab Sample ID: DA16A
LIMS ID: 01-6255
Matrix: Water
Data Release Authorized:
Reported: 05/02/01

QC Report No: DA16-Boeing Corporate SHEA
Project: Boeing Dev. Center J-28
025091.31
Date Sampled: 04/23/01
Date Received: 04/23/01

Date extracted: 04/25/01
Date analyzed: 05/01/01 16:14
Instrument: NT1

Sample Volume: 500 mL
Final Extract Volume: 0.50 mL
Conc/Dilution Factor: 1:1

CAS Number	Analyte	ug/L
91-20-3	Naphthalene	0.10 U
91-57-6	2-Methylnaphthalene	0.10 U
90-12-0	1-Methylnaphthalene	0.10 U
208-96-8	Acenaphthylene	0.10 U
83-32-9	Acenaphthene	0.10 U
86-73-7	Fluorene	0.10 U
85-01-8	Phenanthrene	0.10 U
120-12-7	Anthracene	0.10 U
206-44-0	Fluoranthene	0.10 U
129-00-0	Pyrene	0.10 U
56-55-3	Benzo(a)anthracene	0.10 U
218-01-9	Chrysene	0.10 U
205-99-2	Benzo(b)fluoranthene	0.10 U
207-08-9	Benzo(k)fluoranthene	0.10 U
50-32-8	Benzo(a)pyrene	0.10 U
193-39-5	Indeno(1,2,3-cd)pyrene	0.10 U
53-70-3	Dibenz(a,h)anthracene	0.10 U
191-24-2	Benzo(g,h,i)perylene	0.10 U
198-55-0	Perylene	0.10 U
92-52-4	Biphenyl	0.10 U
581-42-0	2,6-Dimethylnaphthalene	0.10 U
832-69-9	1-Methylphenanthrene	0.10 U
192-97-2	Benzo(e)pyrene	0.10 U

Base/Neutral Surrogate Recovery	
d10-2-Methylnaphthalene	70.7%
d14-Dibenzo(a,h)anthracene	94.0%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET **Sample No: DC-MW-7**
PNAs by Selected Ion Monitoring GC/MS

Lab Sample ID: DA16B
LIMS ID: 01-6256
Matrix: Water
Data Release Authorized:
Reported: 05/02/01

QC Report No: DA16-Boeing Corporate SHEA
Project: Boeing Dev. Center J-28
025091.31
Date Sampled: 04/23/01
Date Received: 04/23/01

Date extracted: 04/25/01
Date analyzed: 05/01/01 16:38
Instrument: NT1

Sample Volume: 500 mL
Final Extract Volume: 0.50 mL
Conc/Dilution Factor: 1:1

CAS Number	Analyte	ug/L
91-20-3	**Naphthalene**	**1.0**
91-57-6	**2-Methylnaphthalene**	**0.11**
90-12-0	**1-Methylnaphthalene**	**1.0**
208-96-8	Acenaphthylene	0.10 U
83-32-9	**Acenaphthene**	**0.12**
86-73-7	Fluorene	0.10 U
85-01-8	Phenanthrene	0.10 U
120-12-7	Anthracene	0.10 U
206-44-0	Fluoranthene	0.10 U
129-00-0	Pyrene	0.10 U
56-55-3	Benzo(a)anthracene	0.10 U
218-01-9	Chrysene	0.10 U
205-99-2	Benzo(b)fluoranthene	0.10 U
207-08-9	Benzo(k)fluoranthene	0.10 U
50-32-8	Benzo(a)pyrene	0.10 U
193-39-5	Indeno(1,2,3-cd)pyrene	0.10 U
53-70-3	Dibenz(a,h)anthracene	0.10 U
191-24-2	Benzo(g,h,i)perylene	0.10 U
198-55-0	Perylene	0.10 U
92-52-4	Biphenyl	0.10 U
581-42-0	2,6-Dimethylnaphthalene	0.10 U
832-69-9	1-Methylphenanthrene	0.10 U
192-97-2	Benzo(e)pyrene	0.10 U

Base/Neutral Surrogate Recovery	
d10-2-Methylnaphthalene	74.7%
d14-Dibenzo(a,h)anthracene	90.3%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET **Sample No: Method Blank**
PNAs by Selected Ion Monitoring GC/MS

Lab Sample ID: DA16MB
LIMS ID: 01-6255
Matrix: Water
Data Release Authorized: MV
Reported: 05/02/01

QC Report No: DA16-Boeing Corporate SHEA
Project: Boeing Dev. Center J-28
025091.31
Date Sampled: NA
Date Received: NA

Date extracted: 04/25/01
Date analyzed: 05/01/01 15:00
Instrument: NT1

Sample Volume: 500 mL
Final Extract Volume: 0.50 mL
Conc/Dilution Factor: 1:1

CAS Number	Analyte	ug/L
91-20-3	Naphthalene	0.10 U
91-57-6	2-Methylnaphthalene	0.10 U
90-12-0	1-Methylnaphthalene	0.10 U
208-96-8	Acenaphthylene	0.10 U
83-32-9	Acenaphthene	0.10 U
86-73-7	Fluorene	0.10 U
85-01-8	Phenanthrene	0.10 U
120-12-7	Anthracene	0.10 U
206-44-0	Fluoranthene	0.10 U
129-00-0	Pyrene	0.10 U
56-55-3	Benzo(a)anthracene	0.10 U
218-01-9	Chrysene	0.10 U
205-99-2	Benzo(b)fluoranthene	0.10 U
207-08-9	Benzo(k)fluoranthene	0.10 U
50-32-8	Benzo(a)pyrene	0.10 U
193-39-5	Indeno(1,2,3-cd)pyrene	0.10 U
53-70-3	Dibenz(a,h)anthracene	0.10 U
191-24-2	Benzo(g,h,i)perylene	0.10 U
198-55-0	Perylene	0.10 U
92-52-4	Biphenyl	0.10 U
581-42-0	2,6-Dimethylnaphthalene	0.10 U
832-69-9	1-Methylphenanthrene	0.10 U
192-97-2	Benzo(e)pyrene	0.10 U

Base/Neutral Surrogate Recovery	
d10-2-Methylnaphthalene	74.7%
d14-Dibenzo(a,h)anthracene	86.3%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PNA's by Selected Ion Monitoring GC/MS

Lab Sample ID: DA16LC
LIMS ID: 01-6255
Matrix: Water

QC Report No: DA16-Boeing Corporate SHEA
Project: Boeing Dev. Center J-28
025091.31

Data Release Authorized: MW
Reported: 05/02/01

	SPIKE VALUE	SPIKE AMT	% RECOVERY	RPD
LAB CONTROL SAMPLE				
Phenanthrene	2.50	3.00	83.3%	
Chrysene	2.48	3.00	82.7%	
Benzo(k)fluoranthene	2.62	3.00	87.3%	
LCDUPLICATE				
Phenanthrene	2.54	3.00	84.7%	1.6%
Chrysene	2.46	3.00	82.0%	0.8%
Benzo(k)fluoranthene	2.59	3.00	86.3%	1.2%

Values reported in ug/L

Spike Blank Surrogate Recovery

LC-d10-2-Methylnaphthalene	75.0%
LC-d14-Dibenzo(a,h)anthracene	84.0%
SD-d10-2-Methylnaphthalene	79.0%
SD-d14-Dibenzo(a,h)anthracene	85.0%

ANALYTICAL RESOURCES INCORPORATED

WATER BETX SYSTEM MONITORING COMPOUND SUMMARY

Matrix: Water

QC Report No: DA16

LIMS ID	Lab ID	Client ID	TFT	BB	TOT OUT
01-6255MB	050201MB	Method Blank	90%	82% *	1
01-6255LC	050201LC	Lab Control	125% *	106%	1
01-6255LCD	DA16LCD	LCDuplicate	117% *	104%	1
01-6255	DA16A	DC-MW-8	115%	100%	0
01-6256MB	050501MB	Method Blank	92%	94%	0
01-6256	DA16B	DC-MW-7	92%	91%	0
01-6257	DA16C	TRIP BLANKS	117%	106%	0

	MB/LCS QC LIMITS	SAMPLE QC LIMITS
(TFT) = Trifluorotoluene	(77-116)	(80-120)
(BB) = Bromobenzene	(85-120)	(80-108)

Limits Updated - 12/01/99

\# Column to be used to flag recovery values

* Values outside of required QC limits

D System Monitoring Compound diluted out

FORM-II BETX

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod

ANALYTICAL RESOURCES INCORPORATED

Sample No: DC-MW-8

Lab Sample ID: DA16A
LIMS ID: 01-6255
Matrix: Water

QC Report No: DA16-Boeing Corporate SHEA
Project: Boeing Dev. Center J-28
025091.31
Date Sampled: 04/23/01
Date Received: 04/23/01

Data Release Authorized: CH 5/7/1
Reported: 05/07/01

Date analyzed: 05/02/01

Volume Purged: 5.0 mL
Dilution: 1:1

Reported in ppb (ug/L)

CAS Number	Analyte	Value
71-43-2	Benzene	1.0 U
108-88-3	Toluene	1.0 U
100-41-4	Ethylbenzene	1.0 U
	m,p-Xylene	1.0 U
95-47-6	o-Xylene	1.0 U

BETX Surrogate Recovery

Trifluorotoluene	115%
Bromobenzene	100%

Data Qualifiers

U	Indicates compound was analyzed for, but not detected at the given detection limit.
J	Indicates an estimated value when that result is less than the calculated detection limit.
E	Indicates a value above the linear range of the detector. Dilution Required
S	Indicates no value reported due to saturation of the detector.
D	Indicates the surrogate was diluted out.
B	Found in associated method blank.
Y	Indicates a raised reporting limit due to matrix interferences. The analyte may be present at or below the listed concentration, but in the opinion of the analyst, confirmation was inadequate.
NA	Indicates compound was not analyzed.
NR	Indicates no recovery due to interferences.

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod

ANALYTICAL RESOURCES INCORPORATED

Sample No: DC-MW-7

Lab Sample ID: DA16B
LIMS ID: 01-6256
Matrix: Water

QC Report No: DA16-Boeing Corporate SHEA
Project: Boeing Dev. Center J-28
025091.31
Date Sampled: 04/23/01
Date Received: 04/23/01

Data Release Authorized: CH 5/7/01
Reported: 05/07/01

Date analyzed: 05/05/01

Volume Purged: 5.0 mL
Dilution: 1:1

Reported in ppb (ug/L)

CAS Number	Analyte	Value
71-43-2	Benzene	1.0 U
108-88-3	Toluene	1.0 U
100-41-4	**Ethylbenzene**	**1.7**
	m,p-Xylene	**1.9**
95-47-6	o-Xylene	1.0 U

BETX Surrogate Recovery

Trifluorotoluene	92.0%
Bromobenzene	91.0%

Data Qualifiers

U Indicates compound was analyzed for, but not detected at the given detection limit.
J Indicates an estimated value when that result is less than the calculated detection limit.
E Indicates a value above the linear range of the detector. Dilution Required
S Indicates no value reported due to saturation of the detector.
D Indicates the surrogate was diluted out.
B Found in associated method blank.
Y Indicates a raised reporting limit due to matrix interferences. The analyte may be present at or below the listed concentration, but in the opinion of the analyst, confirmation was inadequate.
NA Indicates compound was not analyzed.
NR Indicates no recovery due to interferences.

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod

ANALYTICAL RESOURCES INCORPORATED

Sample No: TRIP BLANKS

Lab Sample ID: DA16C
LIMS ID: 01-6257
Matrix: Water

QC Report No: DA16-Boeing Corporate SHEA
Project: Boeing Dev. Center J-28
025091.31
Date Sampled: 04/23/01
Date Received: 04/23/01

Data Release Authorized: CH 5/7/01
Reported: 05/07/01

Date analyzed: 05/02/01

Volume Purged: 5.0 mL
Dilution: 1:1

Reported in ppb (ug/L)

CAS Number	Analyte	Value
71-43-2	Benzene	1.0 U
108-88-3	Toluene	1.0 U
100-41-4	Ethylbenzene	1.0 U
	m,p-Xylene	1.0 U
95-47-6	o-Xylene	1.0 U

BETX Surrogate Recovery

Trifluorotoluene	117%
Bromobenzene	106%

Data Qualifiers

U Indicates compound was analyzed for, but not detected at the given detection limit.
J Indicates an estimated value when that result is less than the calculated detection limit.
E Indicates a value above the linear range of the detector. Dilution Required
S Indicates no value reported due to saturation of the detector.
D Indicates the surrogate was diluted out.
B Found in associated method blank.
Y Indicates a raised reporting limit due to matrix interferences. The analyte may be present at or below the listed concentration, but in the opinion of the analyst, confirmation was inadequate.
NA Indicates compound was not analyzed.
NR Indicates no recovery due to interferences.

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod

ANALYTICAL RESOURCES INCORPORATED

Sample No: Method Blank

Lab Sample ID: DA16MB
LIMS ID: 01-6255
Matrix: Water

QC Report No: DA16-Boeing Corporate SHEA
Project: Boeing Dev. Center J-28
025091.31
Date Sampled: NA
Date Received: NA

Data Release Authorized: CH
Reported: 05/07/01 5/11/01

Date analyzed: 05/02/01

Volume Purged: 5.0 mL
Dilution: 1:1

Reported in ppb (ug/L)

CAS Number	Analyte	Value
71-43-2	Benzene	1.0 U
108-88-3	Toluene	1.0 U
100-41-4	Ethylbenzene	1.0 U
	m,p-Xylene	1.0 U
95-47-6	o-Xylene	1.0 U

BETX Surrogate Recovery

Trifluorotoluene	90.1%
Bromobenzene	82.3%

Data Qualifiers

U	Indicates compound was analyzed for, but not detected at the given detection limit.
J	Indicates an estimated value when that result is less than the calculated detection limit.
E	Indicates a value above the linear range of the detector. Dilution Required
S	Indicates no value reported due to saturation of the detector.
D	Indicates the surrogate was diluted out.
B	Found in associated method blank.
Y	Indicates a raised reporting limit due to matrix interferences. The analyte may be present at or below the listed concentration, but in the opinion of the analyst, confirmation was inadequate.
NA	Indicates compound was not analyzed.
NR	Indicates no recovery due to interferences.

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod

ANALYTICAL RESOURCES INCORPORATED

Sample No: Method Blank

Lab Sample ID: DA16MB
LIMS ID: 01-6256
Matrix: Water

QC Report No: DA16-Boeing Corporate SHEA
Project: Boeing Dev. Center J-28
025091.31
Date Sampled: NA
Date Received: NA

Data Release Authorized: CH 5/9/01
Reported: 05/07/01

Date analyzed: 05/05/01

Volume Purged: 5.0 mL
Dilution: 1:1

Reported in ppb (ug/L)

CAS Number	Analyte	Value
71-43-2	Benzene	1.0 U
108-88-3	Toluene	1.0 U
100-41-4	Ethylbenzene	1.0 U
	m,p-Xylene	1.0 U
95-47-6	o-Xylene	1.0 U

BETX Surrogate Recovery

Trifluorotoluene	91.6%
Bromobenzene	94.2%

Data Qualifiers

U	Indicates compound was analyzed for, but not detected at the given detection limit.
J	Indicates an estimated value when that result is less than the calculated detection limit.
E	Indicates a value above the linear range of the detector. Dilution Required
S	Indicates no value reported due to saturation of the detector.
D	Indicates the surrogate was diluted out.
B	Found in associated method blank.
Y	Indicates a raised reporting limit due to matrix interferences. The analyte may be present at or below the listed concentration, but in the opinion of the analyst, confirmation was inadequate.
NA	Indicates compound was not analyzed.
NR	Indicates no recovery due to interferences.

ORGANICS ANALYSIS DATA SHEET
BETX by Method SW8021BMod

ANALYTICAL RESOURCES INCORPORATED

Lab Sample ID: DA16LCS
LIMS ID: 01-6255
Matrix: Water

QC Report No: DA16-Boeing Corporate SHEA
Project: Boeing Dev. Center J-28
025091.31

Data Release Authorized: CH
Reported: 05/07/01 5/7/-1

LCS/LCSDUPLICATE ANALYSIS

Date Analyzed: 05/02/01

CONSTITUENT	SPIKE FOUND	SPIKE ADDED	% REC	% RPD
Lab Control Sample				
Benzene	30.4	25.0	122%	
Toluene	30.1	25.0	120%	
Ethylbenzene	30.7	25.0	123%	
m,p-Xylene	61.2	50.0	122%	
o-Xylene	29.4	25.0	118%	
LCDuplicate				
Benzene	30.3	25.0	121%	0.3%
Toluene	31.1	25.0	124%	3.3%
Ethylbenzene	31.0	25.0	124%	1.0%
m,p-Xylene	61.5	50.0	123%	0.5%
o-Xylene	29.7	25.0	119%	1.0%

BETX SURROGATE REC	LCS	LCSD
Trifluorotoluene	125%	117%
Bromobenzene	106%	104%

Values reported in parts per billion (ug/L)

BETX SPIKE CONTROL LIMITS

Percent Recovery 75-130%

ANALYTICAL RESOURCES INCORPORATED

WATER TPHg SYSTEM MONITORING COMPOUND SUMMARY

Matrix: Water QC Report No: DA16

LIMS ID	Lab ID	Client ID	TFT	BB	TOT OUT
01-6255MB	050201MB	Method Blank	95.7%	83.2%	0
01-6255	DA16A	DC-MW-8	88.2%	83.6%	0
01-6256MB	050501MB	Method Blank	97.4%	98.6%	0
01-6256LC	050501LC	Lab Control	102%	109%	0
01-6256	DA16B	DC-MW-7	99.2%	98.2%	0
01-6257	DA16C	TRIP BLANKS	94.2%	85.5%	0

	MB/LCS QC LIMITS	SAMPLE QC LIMITS
(TFT) = Trifluorotoluene	(69.0-135)	(80.0-120)
(BB) = Bromobenzene	(68.0-127)	(80.0-120)

Limits Updated - 08/01/00

\# Column to be used to flag recovery values

* Values outside of required QC limits

D System Monitoring Compound diluted out

ANALYTICAL RESOURCES INCORPORATED

TOTAL GASOLINE RANGE HYDROCARBONS
NWTPHg - Toluene to Naphthalene

Matrix: Water

QC Report No: DA16-Boeing Corporate SHEA
Project: Boeing Dev. Center J-28
025091.31

Data Release Authorized: cjt
Reported: 05/07/01 5/1/01

Date Received: 04/23/01

Lab ID	Client Sample ID	Date Analyzed	Dilution Factor	Gas Range	Gas ID	Surr A Rec	Surr B Rec
DA16-0502MB	Method Blank	05/02/01	1:1	0.25 U	NO	95.7%	83.2%
01-6255-DA16A	DC-MW-8	05/02/01	1:1	0.25 U	NO	88.2%	83.6%
DA16-0505MB	Method Blank	05/05/01	1:1	0.25 U	NO	97.4%	98.6%
01-6256-DA16B	DC-MW-7	05/05/01	1:1	0.25 U	NO	99.2%	98.2%
01-6257-DA16C	TRIP BLANKS	05/02/01	1:1	0.25 U	NO	94.2%	85.5%

Surrogate A is Trifluorotoluene.
Surrogate B is Bromobenzene.

Values reported in ppm (mg/L).
Quantitation on total peaks in the gasoline range from Toluene to Naphthalene.

Data Qualifiers

U	Compound not detected at the given detection limit.
X	Value detected above linear range of instrument. Dilution required.
J	Indicates an estimated value below the calculated detection limit.
S	No value reported due to saturation of the detector. Dilution required.
D	Indicates the surrogate was not detected because of dilution of the extract.
NR	Indicates no recovery due to matrix interference.

ANALYTICAL RESOURCES INCORPORATED

TOTAL GASOLINE RANGE HYDROCARBONS
NWTPHg - Toluene to Naphthalene

Lab Sample ID: DA16SB
LIMS ID: 01-6256
Matrix: Water

QC Report No: DA16-Boeing Corporate SHEA
Project: Boeing Dev. Center J-28
025091.31

Data Release Authorized: CH 5/1/01
Reported: 05/07/01

LABORATORY CONTROL SAMPLE RECOVERY REPORT
Analyzed 05/05/01

CONSTITUENT	SPIKE FOUND	SPIKE ADDED	% RECOVERY
LABORATORY CONTROL SAMPLE			
Gasoline Range Hydrocarbons	2.50	2.50	100%

TPHg Surrogate Recovery

Trifluorotoluene	102%
Bromobenzene	109%

Values reported in parts per million (mg/L)

TPHg SPIKE CONTROL LIMITS

Percent Recovery	50-150%
Duplicate RPD	<50%

Advisory QA Limits

ANALYTICAL RESOURCES INCORPORATED

TOTAL DIESEL HYDROCARBONS COMPOUND SUMMARY

Matrix: Water

QC Report No: DA16

LIMS ID	Lab ID	Extracted	Client ID	MeArach	TOT OUT
01-6255MB	042601MB	04/25/01	Method Blank	91%	0
01-6255LC	042601LC	04/25/01	Lab Control	83%	0
01-6255LCD	042701LCD	04/25/01	Lab Control Dup	74%	0
01-6255	DA16A	04/25/01	DC-MW-8	58%	0
01-6256	DA16B	04/25/01	DC-MW-7	56%	0

	Control QC LIMITS	Sample QC LIMITS
(MeArach) = Methylarachidate	(65-118)	(54-133)

\# Column to be used to flag recovery values

* Values outside of required QC limits

D System Monitoring Compound diluted out

FORM-II TPHD

TOTAL DIESEL RANGE HYDROCARBONS
NWTPHD Range C12 to C24 by GC/FID
and Motor Oil

ANALYTICAL RESOURCES INCORPORATED

Lab ID: 01-6255
Matrix: Water

QC Report No: DA16-Boeing Corporate SHEA
Project: Boeing Dev. Center J-28
025091.31
Date Received: 04/23/01

Data Release Authorized: CH
Reported: 05/02/01 5/2/01

Lab ID	Sample ID	Date Extracted	Date Analyzed	Dilution Factor	Diesel Range	*HC ID	Motor Oil Range	Surr Rec
DA16MB	Method Blank	04/25/01	04/26/01	1:1	0.25 U	---	0.50 U	91.0%
DA16A	DC-MW-8	04/25/01	04/27/01	1:1	0.66	NO	0.50 U	58.0%
DA16B	DC-MW-7	04/25/01	04/27/01	1:1	0.25 U	---	0.50 U	56.0%

Surrogate is Methyl-Arachidate.

* ID indicates, in the opinion of the analyst, the petroleum product with the best pattern match. 'NO' indicates that there was not a good match for any of the requested products.
Values reported in ppm (mg/L)
Diesel quantitation on total peaks in the range from C12 to C24.
Motor Oil quantitation on total peaks in the range from C24 to C38.

Data Qualifiers

U	Compound not detected at the given detection limit.
J	Indicates an estimated value below the calculated detection limit.
S	No value reported due to saturation of the detector. Dilution required.
D	Indicates the surrogate was not detected because of dilution of the extract.
E	Indicates a value above the linear range of the detector. Dilution required.
NR	Indicates no recovery due to matrix interference.
B	Indicates compound also detected in the method blank.

TOTAL DIESEL RANGE HYDROCARBONS
NWTPHD Range C12 to C24 by GC/FID

ANALYTICAL RESOURCES INCORPORATED

Lab Sample ID: DA16SB
LIMS ID: 01-6255
Matrix: Water

QC Report No: DA16-Boeing Corporate SHEA
Project: Boeing Dev. Center J-28
025091.31

Data Release Authorized: CK 5/2/01
Reported: 05/02/01

LABORATORY CONTROL SAMPLE RECOVERY REPORT
Extracted: 04/25/01
Analyzed: 04/26/01

CONSTITUENT	SPIKE FOUND	SPIKE ADDED	% RECOVERY	RPD
Diesel Range Hydrocarbons-LCS	2.05	2.50	82.0%	
Diesel Range Hydrocarbons-LCD	1.87	2.50	74.8%	9.2%

TPHd Surrogate Recovery

Methylarachidate-LCS 83.0%

Methylarachidate-LCD 74.0%

Values reported in parts per million (mg/L)