TECHNICAL MEMORANDUM

LANDAU ASSOCIATES
ENVIRONMENTAL | GEOTECHNICAL | NATURAL RESOURCES

TO: Carl Bach, The Boeing Company

FROM: Evelyn Ives, Colette Gaona, and Kristy J. Hendrickson, P.E.

DATE: October 17, 2014

RE: 3-333 BUILDING INTERIM ACTION
2014 GROUNDWATER COMPLIANCE MONITORING RESULTS
NORTH BOEING FIELD, SEATTLE, WASHINGTON

This technical memorandum presents results of the 2014 groundwater compliance monitoring events in the 3-333 building interim action area at North Boeing Field (NBF) in Seattle, Washington. A vicinity map is provided on Figure 1. The NBF 3-333 building interim action area is located within the Propulsion Engineering Labs (PEL) area and southwest of Building 3-333 at NBF. Groundwater compliance monitoring was performed in 2014 as part of the 2011 3-333 building interim action conducted by The Boeing Company (Boeing). The primary objective of the 2011 3-333 building interim action was to remove accessible soil that contained concentrations of polychlorinated biphenyls (PCBs) greater than the interim action level (IAL) approved by the Washington State Department of Ecology (Ecology). The interim action is described in the *2011 3-333 Building Soil Excavation Interim Action Report* (Landau Associates 2012a).

Groundwater monitoring in the 3-333 building interim action area was performed in accordance with the *Groundwater Compliance Monitoring Plan 2011 3-333 Area Soil Excavation* (CMP; Landau Associates 2012b). Two monitoring wells, NGW516 and NGW520, were sampled during four quarters in 2013. Groundwater monitoring results for 2013 are presented in the *3-333 Building Interim Action 2013 Groundwater Compliance Monitoring Results* technical memorandum (Landau Associates 2014). Based on the results presented in the technical memorandum (Landau Associates 2014), monitoring frequency at NGW520 was decreased to semi-annual for 2014 and sampling at NGW516 ceased, as it was demonstrated that compliance conditions at NGW516 were met during 2013 monitoring events. Monitoring events in 2014 consisted of measuring groundwater elevations and collecting semi-annual groundwater samples for analysis of PCBs at NGW520.

The total PCB results from each monitoring event were compared to the groundwater IAL for total PCBs [0.01 micrograms per liter (µg/L)]. In addition to the IAL, the PCB results from each quarterly monitoring event were also compared to the Remedial Investigation Screening Level (RISL) for total PCBs in groundwater, 0.044 µg/L. The RISL was established in the *NBF/Georgetown Steam Plant (GTSP) Remedial Investigation/Feasibility Study Work Plan* (RI/FS Work Plan; Leidos 2013) after the

interim action was completed and the CMP was submitted to and approved by Ecology. The RISLs are provided in Table 6-4 of the RI/FS Work Plan (Leidos 2013).

This technical memorandum provides a summary of 2014 groundwater monitoring results and recommendations based on those results.

GROUNDWATER MONITORING

Groundwater samples were collected from NGW520 in February and August of 2014. The groundwater level at NGW520 was measured with an electronic water interface probe before the wells were purged or sampled. Groundwater elevation contours for the entire PEL area for both wet and dry seasons are provided in the *3-333 Building Interim Action 2013 Groundwater Compliance Monitoring Results Technical Memorandum* (Landau Associates 2014). Generally, groundwater flows to the southwest toward the Lower Duwamish Waterway.

Groundwater monitoring well NGW520 was sampled using low flow sampling techniques [U.S. Environmental Protection Agency (EPA)/540/S-95/504] with a peristaltic pump and disposable polyethylene tubing. Low-flow purging was performed until groundwater parameters [pH, temperature, conductivity, and dissolved oxygen (DO)] stabilized. Samples were collected directly from the monitoring equipment into laboratory-supplied containers and stored on ice in a cooler. One duplicate was collected during each monitoring event. All sample bottles were labeled with well name, date, and time of sample collection and delivered to an Ecology-accredited laboratory under standard chain-of-custody procedures.

LABORATORY ANALYSES AND ANALYTICAL RESULTS

Groundwater samples were analyzed for PCBs by EPA Method SW8082 at the analytical laboratory, Analytical Resources, Inc. (ARI), located in Tukwila, Washington. Laboratory analytical reports are provided in Attachment 1. Analytical results were tabulated and validated as described in the CMP. Groundwater results from 2013 and 2014 monitoring at NGW520 are presented in Table 1. Total PCB results for 2013 and 2014 monitoring at NGW516 and NGW520 are presented on Figure 2. In 2013, both unfiltered and filtered samples at NGW520 were analyzed for PCBs during selected sampling events, as shown in Table 1 and on Figure 2. In 2014, only unfiltered samples were analyzed for PCBs.

Detected total PCBs concentrations in unfiltered samples from NGW520 were 0.018 µg/L in February 2014 and 0.030 µg/L in August 2014.

RECOMMENDATIONS

Analytical results from 2014 indicate that detected concentrations of total PCBs in NGW520 are above the IAL of 0.01 µg/L; however, they are below the RISL of 0.044 µg/L. As discussed above, the RISL was established in RI/FS Work Plan (Leidos 2013) after the interim action was completed and the CMP was submitted to and approved by Ecology. The Ecology-approved RISL of 0.044 µg/L will be used during the NBF RI as the screening level for total PCBs in groundwater. Boeing proposes that the RISL be used for comparison with groundwater compliance samples in the 3-333 building interim action area, to be consistent with the RISL established in the RI/FS Work Plan (0.044 µg/L).

Total PCB results at NGW520 have been consistently below the RISL of 0.044 µg/L for five consecutive monitoring events (three quarterly events in 2013 and two semi-annual events in 2014). Based on the demonstrated compliance with the RISL over five consecutive monitoring events, Boeing proposes that compliance monitoring at NGW520 be discontinued. Upon Ecology's approval of this change, compliance conditions associated with the 3-333 building interim action will have been met, and compliance monitoring in the 3-333 building interim action area will cease.

REFERENCES

Landau Associates. 2014. Technical Memorandum to Carl Bach, the Boeing Company, re: *3-333 Building Interim Action, 2013 Groundwater Monitoring Results, Remedial Investigation, North Boeing Field, Seattle, Washington*. March 3.

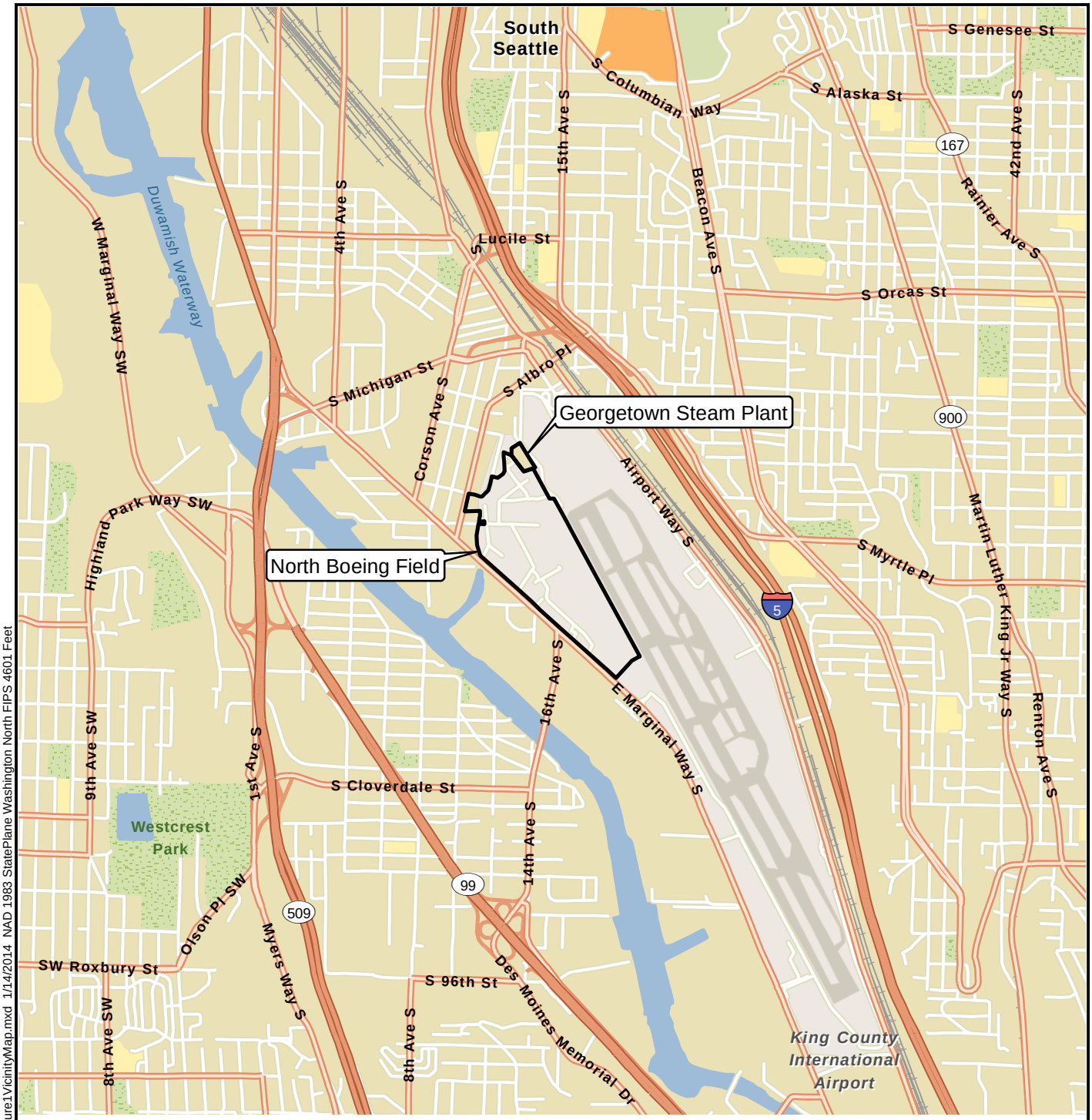
Landau Associates. 2012a. *Interim Action Report, 2011 3-333 Building Soil Excavation, North Boeing Field, Seattle, Washington.* Prepared for The Boeing Company. March 21.

Landau Associates. 2012b. *Groundwater Compliance Monitoring Plan 2011 3-333 Area Soil Excavation North Boeing Field Seattle, Washington*. Prepared for The Boeing Company. June 2012.

Leidos. 2013. North Boeing Field/Georgetown Steamplant Site, Remedial Investigation/Feasibility Study, Remedial Investigation/Feasibility Study Work Plan, Final. Prepared for the Washington State Department of Ecology, Toxics Cleanup Program, Bellevue, Washington. November 11.

EHI/CMG/KJH/tam
Attachments

Figure 1	Vicinity Map
Figure 2	3-333 Area Groundwater Compliance Monitoring Total PCB Results
Table 1	Analytical Results for Groundwater Samples Building 3-333 Compliance Monitoring
Attachment 1 –	Laboratory Analytical Reports



N

0 0.5 1

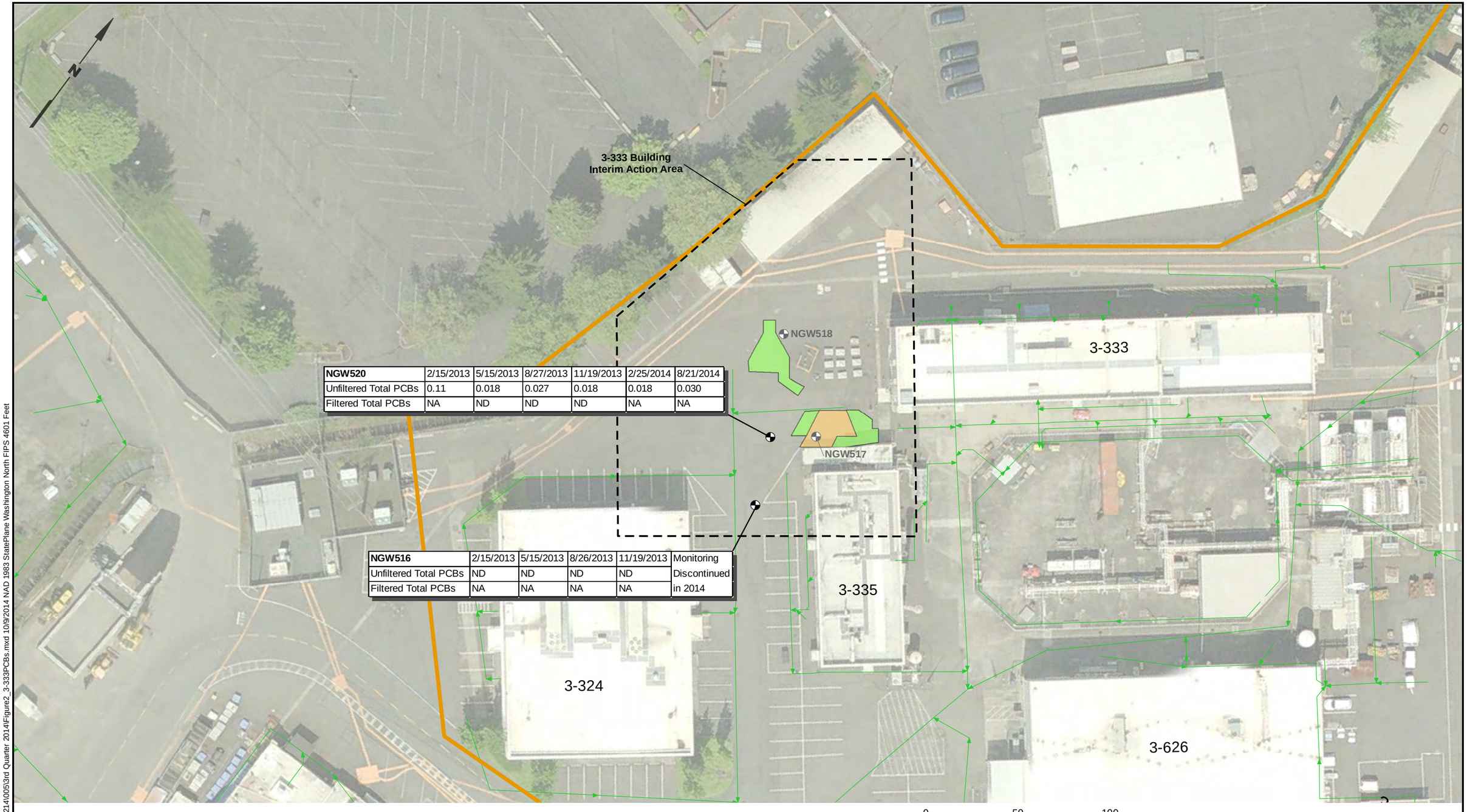
Miles

Data Source: Esri 2012

G:\Projects\025\082\214\001\RIFS GW Monitoring\Figure1VicinityMap.mxd 1/14/2014 NAD 1983 StatePlane Washington North FIPS 4601 Feet

LANDAU ASSOCIATES

North Boeing Field Seattle, Washington	**Vicinity Map**	Figure 1



NGW520	2/15/2013	5/15/2013	8/27/2013	11/19/2013	2/25/2014	8/21/2014
Unfiltered Total PCBs	0.11	0.018	0.027	0.018	0.018	0.030
Filtered Total PCBs	NA	ND	ND	ND	NA	NA

NGW516	2/15/2013	5/15/2013	8/26/2013	11/19/2013	Monitoring
Unfiltered Total PCBs	ND	ND	ND	ND	Discontinued
Filtered Total PCBs	NA	NA	NA	NA	in 2014

Legend

- PEL Boundary
- North Lateral
- Groundwater Monitoring Well
- Abandoned Groundwater Monitoring Well
- 3-333 Building Interim Action Area
- Non-TSCA Excavation
- TSCA Excavation

Notes

1. All results shown in µg/L.
2. NA = Not Analyzed ND = Not Detected
   PCBs = Polychlorinated Biphenyls.
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 50 100

Scale in Feet

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North Boeing Field
Seattle, Washington

3-333 Area
Groundwater Compliance Monitoring
Total PCB Results

Figure
2

G:\Projects\025\082214\00513rd Quarter 2014\Figure2_3-333PCBs.mxd 10/9/2014 NAD 1983 StatePlane Washington North FIPS 4601 Feet

TABLE 1
ANALYTICAL RESULTS FOR GROUNDWATER SAMPLES
BUILDING 3-333 COMPLIANCE MONITORING
NORTH BOEING FIELD

Sample ID	NGW520	Dup of NGW520 DUP1	NGW520	Dup of NGW520 DUP1	NGW520 Filtered (a)	Dup of NGW520 DUP1 Filtered (a)	NGW520	Dup of NGW520 DUP1	NGW520 Filtered (a)	Dup of NGW520 DUP1 Filtered (a)	NGW520	Dup of NGW520 DUP1	NGW520 Filtered (a)	Dup of NGW520 DUP1 Filtered (a)	NGW520	Dup of NGW520 DUP1	NGW520	Dup of NGW520 DUP1
SDG	1370132	1370132	1390912	1390912	1390912	1390912	XC42	XC42	XC42	XC42	XP14A	XP14B	NGW520-F	XP14E	YA51A	YA51B	YX39A	YX39E
Lab ID	6958893	6958895	7061582	7061579	7061583	7061580	XC42A	XC42B	XC42C	XC42D			XP14D					
Sample Date	2/15/2013	2/15/2013	5/15/2013	5/15/2013	5/15/2013	5/15/2013	8/27/2013	8/27/2013	8/27/2013	8/27/2013	11/19/2013	11/19/2013	11/19/2013	11/19/2013	2/25/2014	2/25/2014	8/21/2014	8/21/2014
PCBs (µg/L)																		
Method SW8082A																		
Aroclor 1016	0.0099 U	0.0097 U	0.0095 U	0.0097 U	0.0097 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
Aroclor 1221	0.0099 U	0.0097 U	0.0095 U	0.0097 U	0.0097 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
Aroclor 1232	0.0099 U	0.0097 U	0.0095 U	0.0097 U	0.0097 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
Aroclor 1242	0.0099 U	0.0097 U	0.0095 U	0.0097 U	0.0097 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	**0.018**	**0.017**	0.010 U	0.010 U	**0.018**	**0.014**	0.010 U	0.020 U
Aroclor 1248	0.0099 U	0.0097 U	0.0095 U	0.0097 U	0.0097 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.025 U	0.010 U
Aroclor 1254	**0.11**	**0.10**	**0.018**	**0.021**	0.0097 U	0.010 U	**0.027**	**0.026**	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	**0.030**	**0.022**
Aroclor 1260	0.0099 U	0.0097 U	0.0095 U	0.0097 U	0.0097 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.020 U	0.020 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
Aroclor 1262							0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
Aroclor 1268							0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U		
Total PCBs	**0.11**	**0.10**	**0.018**	**0.021**	ND	ND	**0.027**	**0.026**	ND	ND	**0.018**	**0.017**	ND	ND	**0.018**	**0.014**	**0.030**	**0.022**
BTEX (µg/L)																		
Method SW8021B Mod																		
Benzene	1.0 U	1.0 U	1.0 U	1.0 U			0.25 U	0.25 U			0.25 U	0.25 U						
Toluene	1.0 U	1.0 U	1.0 U	1.0 U			0.25 U	0.25 U			0.25 U	0.25 U						
Ethylbenzene	1.0 U	1.0 U	1.0 U	1.0 U			0.25 U	0.25 U			0.25 U	0.25 U						
Total Xylenes	3.0 U	3.0 U	3.0 U	3.0 U														
m, p-Xylene							0.50 U	0.50 U			0.50 U	0.50 U						
o-Xylene							0.25 U	0.25 U			0.25 U	0.25 U						
GASOLINE (µg/L)																		
NWTPH-Gx																		
NWTPH-Gx (C7-C12)	250 U	250 U	250 U	250 U			100 U	100 U			0.10 U	0.10 U						
VOC-SIM (µg/L)																		
SW8260CSIM																		
Trichloroethene	0.020 U	0.020 U	0.020 U	0.020 U														
Tetrachloroethene	0.020 U	0.020 U	0.020 U	0.020 U														
Vinyl Chloride	**0.047**	**0.043**	**0.083**	**0.092**														
cis-1,2-Dichloroethene	**0.036**	**0.034**	**0.049**	**0.054**														
VOLATILES (µg/L)																		
SW8260C																		
Vinyl Chloride							0.20 U	0.20 U			0.20 U	0.20 U						
cis-1,2-Dichloroethene							0.20 U	0.20 U			0.20 U	0.20 U						
Trichloroethene							0.20 U	0.20 U			0.20 U	0.20 U						
Tetrachloroethene							0.20 U	0.20 U			0.20 U	0.20 U						
Field Parameters																		
Temperature (°C)	11.8		14.97				19.22	19.22			16.29	16.29			12.57	12.57	20.79	20.79
Conductivity (uS/cm)	65.9		357				348	348			53.3	53.3			376	376	509	509
Dissolved Oxygen (mg/L)	0.68		0.69				0.76	0.76			0.31	0.31			0.28	0.28	0.64	0.64
pH	6.95		6.57				6.42	6.42			6.83	6.83			6.79	6.79	6.75	6.75
Oxygen Reduction Potential (mV)	NM		-68.5				-48.0	-48.0			-31.8	-31.8			-61.1	-61.1	-107.8	-107.8
Turbidity (NTU)	NM		NM				NM	NM			NM	NM			37.74	37.74	16.07	16.07

µg/L = micrograms per liter
C = degrees celsius
uS/cm = microsiemens per centimeter
mg/l = milligrams per liter
mV = millivolt
NTU = nephelometric turbidity unit

NM = Not Measured
ND = Not Detected
PCBs = polycyclic aromatic hydrocarbons
SIM = select ion monitoring
TPH-Gx = total petroleum hydrocarbons-gasoline range
BTEX = Benzene, Toluene, Ethylbenzene, Xylenes

U = Indicates the compound was undetected at the reported concentration.
J = Indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
Bold = Detected compound.

(a) Samples were filtered to evaluate the concentration of total PCBs in the dissolved phase.
(b) VOC analysis changeded from Method SW8260C SIM to SW8260C after it was determined that Method SW8260C provided sufficient reporting limits to meet the criteria established in the RI/FS Work Plan.

ATTACHMENT 1

Laboratory Analytical Reports

Analytical Resources, Incorporated
Analytical Chemists and Consultants

March 7, 2014

Kris Hendrickson
Landau Associates, Inc.
130 Second Ave
Edmonds, WA 98020

RE: Project: NBF – 3-333 Area CMP
ARI Job: YA51

Dear Kris:

Please find enclosed the Chain of Custody (COC) record, sample receipt documentation, and analytical results for the above referenced project. Analytical Resources, Inc. (ARI) accepted two water samples in good condition on February 25, 2015. The coolers were received with a temperature of 4.8°C.

The samples were analyzed for PCBs, as requested on the COC.

There were no irregularities with the samples.

Quality control analysis results are included for your review. Copies of the reports and all associated raw data will be kept on file electronically at ARI. If you have any questions or require additional information, please contact me at your convenience.

Sincerely,
ANALYTICAL RESOURCES, INC

Kelly Bottom
Client Services Manager
(206) 695-6211
kellyb@arilabs.com
www.arilabs.com

cc: Carl Bach, The Boeing Company, P.O. Box 3707, M/S 1W-12, Seattle, WA 98124-2207

4611 South 134th Place, Suite 100 • Tukwila WA 98168 • **206-695-6200** • **206-695-6201** fax

LANDAU ASSOCIATES

☒ **Seattle/Edmonds** (425) 778-0907
☐ **Tacoma** (253) 926-2493
☐ **Spokane** (509) 327-9737
☐ **Portland** (503) 542-1080
☐ ____________

Chain-of-Custody Record

Date 2/25/14
Page 1 of 1

Project Name NBF   Project No. 025082.214.005
Project Location/Event 3-333 Building CMP
Sampler's Name Evelyn Ives
Project Contact Colette Gaona, Kris Hendrickson
Send Results To C. Gaona, MaryJo Donnelly

Turnaround Time
☒ Standard
☐ Accelerated
☐ ____________

Sample I.D.	Date	Time	Matrix	No. of Containers	Testing Parameters: LL PCBs
NGW520-022514	2/25/14	11:30	AQ	2	X
Dup-1-022514	2/25/14	08:00	↓	2	X

Observations/Comments
~~X Allow water samples to settle, collect aliquot from clear portion~~ EHI 2/25/14
~~X NWTPH-Dx - run acid wash/silica gel cleanup~~

___ run samples standardized to ____________ product
___ Analyze for EPH if no specific product identified
VOC/BTEX/VPH (soil):
___ non-preserved
___ preserved w/methanol
___ preserved w/sodium bisulfate
___ Freeze upon receipt
___ Dissolved metal water samples field filtered
Other ____________

Special Shipment/Handling or Storage Requirements
Method of Shipment

Relinquished by	Received by	Relinquished by	Received by
Signature: Evelyn Ives (signature)	Signature: (signature)	Signature	Signature
Printed Name: Evelyn Ives	Printed Name: Taylor Streeter	Printed Name	Printed Name
Company: Landau Associates	Company: ALI	Company	Company
Date 2/25/14 Time 3:37	Date 2-25-14 Time 1537	Date Time	Date Time

WHITE COPY - Project File **YELLOW COPY - Laboratory** **PINK COPY - Client Representative** Rev 8/09

YA51 : 00002

Sample ID Cross Reference Report

ANALYTICAL RESOURCES INCORPORATED

ARI Job No: YA51
Client: The Boeing Company
Project Event: 025082.214.005
Project Name: NBF

	Sample ID	ARI Lab ID	ARI LIMS ID	Matrix	Sample Date/Time	VTSR
1.	NGW520-022514	YA51A	14-3135	Water	02/25/14 11:30	02/25/14 15:37
2.	DUP-1-022514	YA51B	14-3136	Water	02/25/14 08:00	02/25/14 15:37

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Boeing | Project Name: NBF

COC No(s): _____ NA | Delivered by: Fed-Ex UPS Courier Hand Delivered Other: _____

Assigned ARI Job No: YA51 | Tracking No. _____ NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of to cooler?	YES	(NO)
Were custody papers included with the cooler?	(YES)	NO
Were custody papers properly filled out (ink, signed, etc)	(YES)	NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry): 4.8 1.8

Time: _____

If cooler temperature is out of compliance fill out form 00070F | Temp Gun ID#: 90877452

Cooler Accepted by: TS Date: 2-25-14 Time: 1537

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler?		YES	(NO)
What kind of packing material was used? ... Bubble Wrap (Wet Ice) Gel Packs Baggies Foam Block Paper Other: _____			
Was sufficient ice used (if appropriate)?	NA	(YES)	NO
Were all bottles sealed in individual plastic bags?		YES	(NO)
Did all bottles arrive in good condition (unbroken)?		(YES)	NO
Were all bottle labels complete and legible?		(YES)	NO
Did the number of containers listed on COC match with the number of containers received?		(YES)	NO
Did all bottle labels and tags agree with custody papers?		(YES)	NO
Were all bottles used correct for the requested analyses?		(YES)	NO
Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)..	(NA)	YES	NO
Were all VOC vials free of air bubbles?	(NA)	YES	NO
Was sufficient amount of sample sent in each bottle?		(YES)	NO
Date VOC Trip Blank was made at ARI	(NA)	_____	

Was Sample Split by ARI: (NA) YES Date/Time: _____ Equipment: _____ Split by: _____

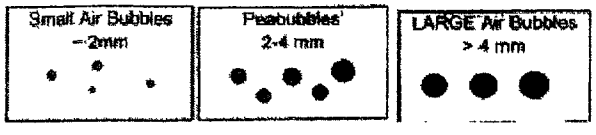
Samples Logged by: TS Date: 2-25-14 Time: 1600

*** Notify Project Manager of discrepancies or concerns ***

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: Date:



Small → "sm" (< 2 mm)
Peabubbles → "pb" (2 to < 4 mm)
Large → "lg" (4 to < 6 mm)
Headspace → "hs" (> 6 mm)

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PCB by GC/ECD Method SW8082A
Extraction Method: SW3510C

Sample ID: NGW520-022514
SAMPLE

Lab Sample ID: YA51A
LIMS ID: 14-3135
Matrix: Water
Data Release Authorized:
Reported: 03/06/14

QC Report No: YA51-The Boeing Company
Project: NBF
025082.214.005
Date Sampled: 02/25/14
Date Received: 02/25/14

Date Extracted: 02/27/14
Date Analyzed: 03/05/14 20:49
Instrument/Analyst: ECD7/JGR
GPC Cleanup: No
Sulfur Cleanup: Yes

Sample Amount: 1000 mL
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00
Silica Gel: Yes
Acid Cleanup: Yes

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	0.010	< 0.010 U
53469-21-9	Aroclor 1242	0.010	< 0.010 U
12672-29-6	Aroclor 1248	0.010	< 0.010 U
11097-69-1	**Aroclor 1254**	**0.010**	**0.018**
11096-82-5	Aroclor 1260	0.010	< 0.010 U
11104-28-2	Aroclor 1221	0.010	< 0.010 U
11141-16-5	Aroclor 1232	0.010	< 0.010 U
37324-23-5	Aroclor 1262	0.010	< 0.010 U
11100-14-4	Aroclor 1268	0.010	< 0.010 U

Reported in µg/L (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	61.5%
Tetrachlorometaxylene	65.0%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PCB by GC/ECD Method SW8082A
Extraction Method: SW3510C
Page 1 of 1

Sample ID: DUP-1-022514
SAMPLE

Lab Sample ID: YA51B
LIMS ID: 14-3136
Matrix: Water
Data Release Authorized:
Reported: 03/06/14

QC Report No: YA51-The Boeing Company
Project: NBF
025082.214.005
Date Sampled: 02/25/14
Date Received: 02/25/14

Date Extracted: 02/27/14
Date Analyzed: 03/05/14 21:11
Instrument/Analyst: ECD7/JGR
GPC Cleanup: No
Sulfur Cleanup: Yes

Sample Amount: 1000 mL
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00
Silica Gel: Yes
Acid Cleanup: Yes

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	0.010	< 0.010 U
53469-21-9	Aroclor 1242	0.010	< 0.010 U
12672-29-6	Aroclor 1248	0.010	< 0.010 U
11097-69-1	**Aroclor 1254**	**0.010**	**0.014**
11096-82-5	Aroclor 1260	0.010	< 0.010 U
11104-28-2	Aroclor 1221	0.010	< 0.010 U
11141-16-5	Aroclor 1232	0.010	< 0.010 U
37324-23-5	Aroclor 1262	0.010	< 0.010 U
11100-14-4	Aroclor 1268	0.010	< 0.010 U

Reported in µg/L (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	64.5%
Tetrachlorometaxylene	72.5%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PCB by GC/ECD Method SW8082A
Extraction Method: SW3510C

Sample ID: MB-022714
METHOD BLANK

Lab Sample ID: MB-022714
LIMS ID: 14-3135
Matrix: Water
Data Release Authorized:
Reported: 03/06/14

QC Report No: YA51-The Boeing Company
Project: NBF
025082.214.005
Date Sampled: NA
Date Received: NA

Date Extracted: 02/27/14
Date Analyzed: 03/05/14 18:37
Instrument/Analyst: ECD7/JGR
GPC Cleanup: No
Sulfur Cleanup: Yes

Sample Amount: 1000 mL
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00
Silica Gel: Yes
Acid Cleanup: Yes

CAS Number	Analyte	RL	Result
12674-11-2	Aroclor 1016	0.010	< 0.010 U
53469-21-9	Aroclor 1242	0.010	< 0.010 U
12672-29-6	Aroclor 1248	0.010	< 0.010 U
11097-69-1	Aroclor 1254	0.010	< 0.010 U
11096-82-5	Aroclor 1260	0.010	< 0.010 U
11104-28-2	Aroclor 1221	0.010	< 0.010 U
11141-16-5	Aroclor 1232	0.010	< 0.010 U
37324-23-5	Aroclor 1262	0.010	< 0.010 U
11100-14-4	Aroclor 1268	0.010	< 0.010 U

Reported in µg/L (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	72.2%
Tetrachlorometaxylene	66.0%

ANALYTICAL RESOURCES INCORPORATED

SW8082/PCB WATER SURROGATE RECOVERY SUMMARY

Matrix: Water

QC Report No: YA51-The Boeing Company
Project: NBF
025082.214.005

Client ID	DCBP % REC	DCBP LCL-UCL	TCMX % REC	TCMX LCL-UCL	TOT OUT
MB-022714	72.2%	32-108	66.0%	31-100	0
LCS-022714	76.5%	32-108	68.2%	31-100	0
LCSD-022714	71.5%	32-108	70.2%	31-100	0
NGW520-022514	61.5%	19-111	65.0%	21-100	0
DUP-1-022514	64.5%	19-111	72.5%	21-100	0

Prep Method: SW3510C
Log Number Range: 14-3135 to 14-3136

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PCB by GC/ECD Method SW8082A

Sample ID: LCS-022714
LCS/LCSD

Lab Sample ID: LCS-022714
LIMS ID: 14-3135
Matrix: Water
Data Release Authorized:
Reported: 03/06/14

QC Report No: YA51-The Boeing Company
Project: NBF
025082.214.005
Date Sampled: NA
Date Received: NA

Date Extracted LCS/LCSD: 02/27/14

Date Analyzed LCS: 03/05/14 19:43
LCSD: 03/05/14 20:05
Instrument/Analyst LCS: ECD7/JGR
LCSD: ECD7/JGR
GPC Cleanup: No
Sulfur Cleanup: Yes

Sample Amount LCS: 1000 mL
LCSD: 1000 mL
Final Extract Volume LCS: 0.50 mL
LCSD: 0.50 mL
Dilution Factor LCS: 1.00
LCSD: 1.00
Silica Gel: Yes
Acid Cleanup: Yes

Analyte	LCS	Spike Added-LCS	LCS Recovery	LCSD	Spike Added-LCSD	LCSD Recovery	RPD
Aroclor 1016	0.045	0.050	90.0%	0.046	0.050	92.0%	2.2%
Aroclor 1260	0.043	0.050	86.0%	0.045	0.050	90.0%	4.5%

PCB Surrogate Recovery

	LCS	LCSD
Decachlorobiphenyl	76.5%	71.5%
Tetrachlorometaxylene	68.2%	70.2%

Results reported in µg/L
RPD calculated using sample concentrations per SW846.

Analytical Resources, Incorporated
Analytical Chemists and Consultants

September 1, 2014

Kris Hendrickson
Landau Associates, Inc.
130 Second Ave
Edmonds, WA 98020

RE: Project: NBF – RI Sampling Semi Annual
ARI Job: YX39

Dear Kris:

Please find enclosed the Chain of Custody (COC) record, sample receipt documentation, and analytical results for the above referenced project. Analytical Resources, Inc. (ARI) accepted six water samples in good condition on August 21, 2014. The coolers were received with temperatures of 13.4 and 14.7°C.

The samples were analyzed for PCBs, as requested on the COC.

The PCBs matrix spike and matrix spike duplicate are out of control high for aroclor 1016.

There were no other irregularities with the samples.

Quality control analysis results are included for your review. Copies of the reports and all associated raw data will be kept on file electronically at ARI. If you have any questions or require additional information, please contact me at your convenience.

Sincerely,
ANALYTICAL RESOURCES, INC

Kelly Bottem
Client Services Manager
(206) 695-6211
kellyb@arilabs.com
www.arilabs.com

cc: Carl Bach, The Boeing Company, P.O. Box 3707, M/S 1W-12, Seattle, WA 98124-2207

4611 South 134th Place, Suite 100 • Tukwila WA 98168 • **206-695-6200** • **206-695-6201** fax

LANDAU ASSOCIATES

☒ Seattle/Edmonds (425) 778-0907
☐ Tacoma (253) 926-2493
☐ Spokane (509) 327-9737
☐ Portland (503) 542-1080
☐ _____

YX39

Date 8/21/14
Page 1 of 1

Chain-of-Custody Record

Project Name NBF (Boeing) Project No. 0025082.214.005
Project Location/Event RI Sampling Semi Annual
Sampler's Name Rosemary Trimmer
Project Contact Colette Gaona
Send Results To C. Gaona, Carl Bach, A. Halvorsen, Mary Jo Donnelly

Turnaround Time
☒ Standard
☐ Accelerated
☐ _____

Sample I.D.	Date	Time	Matrix	No. of Containers	Testing Parameters: PCBs (Low Level)	Observations/Comments
NGW520-082114	8/21/14	1225	H2O	2	X	
NGW521-082114		1425		2	X	
NGW522-082114		1525		6	X	
NGW523-082114		1345		2	X	
Dup-1-082114		1500		2	X	
Dup-2-082114		1530		2	X	

Observations/Comments:
- X Allow water samples to settle, collect aliquot from clear portion
- ~~X NWTPH-Dx - run acid wash/silica gel cleanup~~ RWT 8/21/14
- ___ run samples standardized to _____ product
- ___ Analyze for EPH if no specific product identified
- VOC/BTEX/VPH (soil):
  - ___ non-preserved
  - ___ preserved w/methanol
  - ___ preserved w/sodium bisulfate
  - ___ Freeze upon receipt
- ___ Dissolved metal water samples field filtered
- Other _____

Special Shipment/Handling or Storage Requirements on ice

Method of Shipment deliver to lab

Relinquished by	Received by	Relinquished by	Received by
Signature Rosemary Trimmer	Signature Chris Arnold	Signature	Signature
Printed Name Rosemary Trimmer	Printed Name	Printed Name	Printed Name
Company Landau Associates	Company AZI	Company	Company
Date 8/21/14 Time 1630	Date 8/21/14 Time 1630	Date _____ Time _____	Date _____ Time _____

WHITE COPY - Project File YELLOW COPY - Laboratory PINK COPY - Client Representative

Rev 8/09

ORIGINAL

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: LAA Boeing

Project Name: NBF

COC No(s): _____ (NA)

Delivered by: Fed-Ex UPS Courier Hand Delivered Other: _____

Assigned ARI Job No: YX39

Tracking No: _____ NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of to cooler? YES (NO)

Were custody papers included with the cooler? (YES) NO

Were custody papers properly filled out (ink, signed, etc.) (YES) NO

Temperature of Cooler(s) (°C) (recommended 2 0-6 0 °C for chemistry) 13.4 14.7 ___ ___ ___ ___

Time: 1630

If cooler temperature is out of compliance fill out form 00070F

Temp Gun ID#: 90877952

Cooler Accepted by: CA Date: 8/21/14 Time: 1630

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler? YES (NO)

What kind of packing material was used? Bubble Wrap (Wet Ice) Gel Packs Baggies Foam Block Paper Other: _____

Was sufficient ice used (if appropriate)? NA (YES) NO

Were all bottles sealed in individual plastic bags? YES (NO)

Did all bottles arrive in good condition (unbroken)? (YES) NO

Were all bottle labels complete and legible? (YES) NO

Did the number of containers listed on COC match with the number of containers received? (YES) NO

Did all bottle labels and tags agree with custody papers? (YES) NO

Were all bottles used correct for the requested analyses? (YES) NO

Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs)... (NA) YES NO

Were all VOC vials free of air bubbles? (NA) YES NO

Was sufficient amount of sample sent in each bottle? (YES) NO

Date VOC Trip Blank was made at ARI.. (NA) _____

Was Sample Split by ARI: (NA) YES Date/Time: _____ Equipment: _____ Split by: _____

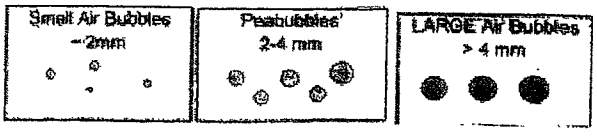
Samples Logged by: AV Date: 8/21/14 Time: 1700

*** Notify Project Manager of discrepancies or concerns ***

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions: Samples collected recently

By: Date:



Small → "sm" (< 2 mm)
Peabubbles → "pb" (2 to < 4 mm)
Large → "lg" (4 to < 6 mm)
Headspace → "hs" (> 6 mm)

Sample ID Cross Reference Report

ANALYTICAL RESOURCES INCORPORATED

ARI Job No: YX39
Client: The Boeing Company
Project Event: 0025082.214.005
Project Name: NBF

	Sample ID	ARI Lab ID	ARI LIMS ID	Matrix	Sample Date/Time	VTSR
1.	NGW520-082114	YX39A	14-17230	Water	08/21/14 12:25	08/21/14 16:30
2.	NGW521-082114	YX39B	14-17231	Water	08/21/14 14:25	08/21/14 16:30
3.	NGW522-082114	YX39C	14-17232	Water	08/21/14 15:25	08/21/14 16:30
4.	NGW523-082114	YX39D	14-17233	Water	08/21/14 13:45	08/21/14 16:30
5.	DUP-1-082114	YX39E	14-17234	Water	08/21/14 15:00	08/21/14 16:30
6.	DUP-2-082114	YX39F	14-17235	Water	08/21/14 15:30	08/21/14 16:30

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PCB by GC/ECD Method SW8082A
Extraction Method: SW3510C
Page 1 of 1

Sample ID: NGW520-082114
SAMPLE

Lab Sample ID: YX39A
LIMS ID: 14-17230
Matrix: Water
Data Release Authorized: Kelly
Reported: 08/29/14

QC Report No: YX39-The Boeing Company
Project: NBF
0025082.214.005
Date Sampled: 08/21/14
Date Received: 08/21/14

Date Extracted: 08/27/14
Date Analyzed: 08/28/14 15:46
Instrument/Analyst: ECD7/JGR
GPC Cleanup: No
Sulfur Cleanup: Yes

Sample Amount: 1000 mL
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00
Silica Gel: No
Acid Cleanup: Yes

CAS Number	Analyte	DL	LOQ	Result
12674-11-2	Aroclor 1016	0.0025	0.010	< 0.010 U
53469-21-9	Aroclor 1242	0.0025	0.010	< 0.010 U
12672-29-6	Aroclor 1248	0.0025	0.025	< 0.025 Y
11097-69-1	**Aroclor 1254**	**0.0025**	**0.010**	**0.030**
11096-82-5	Aroclor 1260	0.0028	0.010	< 0.010 U
11104-28-2	Aroclor 1221	0.0025	0.010	< 0.010 U
11141-16-5	Aroclor 1232	0.0025	0.010	< 0.010 U
37324-23-5	Aroclor 1262	0.0028	0.010	< 0.010 U

Reported in µg/L (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	66.2%
Tetrachlorometaxylene	54.0%

FORM I

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PCB by GC/ECD Method SW8082A
Extraction Method: SW3510C
Page 1 of 1

Sample ID: NGW521-082114
SAMPLE

Lab Sample ID: YX39B
LIMS ID: 14-17231
Matrix: Water
Data Release Authorized: Kelly
Reported: 08/29/14

QC Report No: YX39-The Boeing Company
Project: NBF
0025082.214.005
Date Sampled: 08/21/14
Date Received: 08/21/14

Date Extracted: 08/27/14
Date Analyzed: 08/28/14 16:08
Instrument/Analyst: ECD7/JGR
GPC Cleanup: No
Sulfur Cleanup: Yes

Sample Amount: 1000 mL
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00
Silica Gel: No
Acid Cleanup: Yes

CAS Number	Analyte	DL	LOQ	Result
12674-11-2	Aroclor 1016	0.0025	0.010	< 0.010 U
53469-21-9	**Aroclor 1242**	**0.0025**	**0.010**	**0.70 E**
12672-29-6	Aroclor 1248	0.0025	0.010	< 0.010 U
11097-69-1	Aroclor 1254	0.0025	0.10	< 0.10 Y
11096-82-5	Aroclor 1260	0.0028	0.010	< 0.010 U
11104-28-2	Aroclor 1221	0.0025	0.010	< 0.010 U
11141-16-5	Aroclor 1232	0.0025	0.010	< 0.010 U
37324-23-5	Aroclor 1262	0.0028	0.010	< 0.010 U

Reported in µg/L (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	69.2%
Tetrachlorometaxylene	60.8%

FORM I

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PCB by GC/ECD Method SW8082A
Extraction Method: SW3510C
Page 1 of 1

Sample ID: NGW521-082114
DILUTION

Lab Sample ID: YX39B
LIMS ID: 14-17231
Matrix: Water
Data Release Authorized: 8/29/14
Reported: 08/29/14

QC Report No: YX39-The Boeing Company
Project: NBF
0025082.214.005
Date Sampled: 08/21/14
Date Received: 08/21/14

Date Extracted: 08/27/14
Date Analyzed: 08/29/14 09:02
Instrument/Analyst: ECD7/JGR
GPC Cleanup: No
Sulfur Cleanup: Yes

Sample Amount: 1000 mL
Final Extract Volume: 0.50 mL
Dilution Factor: 5.00
Silica Gel: Yes
Acid Cleanup: Yes

CAS Number	Analyte	DL	LOQ	Result
12674-11-2	Aroclor 1016	0.012	0.050	< 0.050 U
53469-21-9	**Aroclor 1242**	**0.012**	**0.050**	**0.79**
12672-29-6	Aroclor 1248	0.012	0.050	< 0.050 U
11097-69-1	Aroclor 1254	0.012	0.12	< 0.12 Y
11096-82-5	Aroclor 1260	0.014	0.050	< 0.050 U
11104-28-2	Aroclor 1221	0.012	0.050	< 0.050 U
11141-16-5	Aroclor 1232	0.012	0.050	< 0.050 U
37324-23-5	Aroclor 1262	0.014	0.050	< 0.050 U

Reported in µg/L (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	77.2%
Tetrachlorometaxylene	63.2%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PCB by GC/ECD Method SW8082A
Extraction Method: SW3510C
Page 1 of 1

Sample ID: NGW522-082114
SAMPLE

Lab Sample ID: YX39C
LIMS ID: 14-17232
Matrix: Water
Data Release Authorized:
Reported: 08/29/14

QC Report No: YX39-The Boeing Company
Project: NBF
0025082.214.005
Date Sampled: 08/21/14
Date Received: 08/21/14

Date Extracted: 08/27/14
Date Analyzed: 08/28/14 16:29
Instrument/Analyst: ECD7/JGR
GPC Cleanup: No
Sulfur Cleanup: Yes

Sample Amount: 1000 mL
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00
Silica Gel: Yes
Acid Cleanup: Yes

CAS Number	Analyte	DL	LOQ	Result
12674-11-2	Aroclor 1016	0.0025	0.010	< 0.010 U
53469-21-9	**Aroclor 1242**	**0.0025**	**0.010**	**0.44**
12672-29-6	Aroclor 1248	0.0025	0.010	< 0.010 U
11097-69-1	Aroclor 1254	0.0025	0.050	< 0.050 Y
11096-82-5	Aroclor 1260	0.0028	0.010	< 0.010 U
11104-28-2	Aroclor 1221	0.0025	0.010	< 0.010 U
11141-16-5	Aroclor 1232	0.0025	0.010	< 0.010 U
37324-23-5	Aroclor 1262	0.0028	0.010	< 0.010 U

Reported in µg/L (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	68.5%
Tetrachlorometaxylene	61.5%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PCB by GC/ECD Method SW8082A
Extraction Method: SW3510C
Page 1 of 1

Sample ID: NGW522-082114
MATRIX SPIKE

Lab Sample ID: YX39C
LIMS ID: 14-17232
Matrix: Water
Data Release Authorized: Kelly
Reported: 08/29/14

QC Report No: YX39-The Boeing Company
Project: NBF
0025082.214.005
Date Sampled: 08/21/14
Date Received: 08/21/14

Date Extracted: 08/27/14
Date Analyzed: 08/28/14 16:51
Instrument/Analyst: ECD7/JGR
GPC Cleanup: No
Sulfur Cleanup: Yes

Sample Amount: 1000 mL
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00
Silica Gel: Yes
Acid Cleanup: Yes

CAS Number	Analyte	DL	LOQ	Result
12674-11-2	Aroclor 1016	0.010	0.010	---
53469-21-9	**Aroclor 1242**	**0.010**	**0.010**	**0.44**
12672-29-6	Aroclor 1248	0.010	0.010	< 0.010 U
11097-69-1	Aroclor 1254	0.075	0.075	< 0.075 Y
11096-82-5	Aroclor 1260	0.010	0.010	---
11104-28-2	Aroclor 1221	0.010	0.010	< 0.010 U
11141-16-5	Aroclor 1232	0.010	0.010	< 0.010 U
37324-23-5	Aroclor 1262	0.010	0.010	< 0.010 U

Reported in µg/L (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	66.2%
Tetrachlorometaxylene	55.8%

FORM I

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PCB by GC/ECD Method SW8082A
Extraction Method: SW3510C
Page 1 of 1

Sample ID: NGW522-082114
MATRIX SPIKE DUP

Lab Sample ID: YX39C
LIMS ID: 14-17232
Matrix: Water
Data Release Authorized: Kelly
Reported: 08/29/14

QC Report No: YX39-The Boeing Company
Project: NBF
0025082.214.005
Date Sampled: 08/21/14
Date Received: 08/21/14

Date Extracted: 08/27/14
Date Analyzed: 08/28/14 17:13
Instrument/Analyst: ECD7/JGR
GPC Cleanup: No
Sulfur Cleanup: Yes

Sample Amount: 1000 mL
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00
Silica Gel: Yes
Acid Cleanup: Yes

CAS Number	Analyte	DL	LOQ	Result
12674-11-2	Aroclor 1016	0.010	0.010	---
53469-21-9	**Aroclor 1242**	**0.010**	**0.010**	**0.51 E**
12672-29-6	Aroclor 1248	0.010	0.010	< 0.010 U
11097-69-1	Aroclor 1254	0.075	0.075	< 0.075 Y
11096-82-5	Aroclor 1260	0.010	0.010	---
11104-28-2	Aroclor 1221	0.010	0.010	< 0.010 U
11141-16-5	Aroclor 1232	0.010	0.010	< 0.010 U
37324-23-5	Aroclor 1262	0.010	0.010	< 0.010 U

Reported in µg/L (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	70.8%
Tetrachlorometaxylene	62.5%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PCB by GC/ECD Method SW8082A
Extraction Method: SW3510C
Page 1 of 1

Sample ID: NGW523-082114
SAMPLE

Lab Sample ID: YX39D
LIMS ID: 14-17233
Matrix: Water
Data Release Authorized: Kelly
Reported: 08/29/14

QC Report No: YX39-The Boeing Company
Project: NBF
0025082.214.005
Date Sampled: 08/21/14
Date Received: 08/21/14

Date Extracted: 08/27/14
Date Analyzed: 08/28/14 17:35
Instrument/Analyst: ECD7/JGR
GPC Cleanup: No
Sulfur Cleanup: Yes

Sample Amount: 1000 mL
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00
Silica Gel: No
Acid Cleanup: Yes

CAS Number	Analyte	DL	LOQ	Result
12674-11-2	Aroclor 1016	0.0025	0.010	< 0.010 U
53469-21-9	**Aroclor 1242**	**0.0025**	**0.010**	**0.35**
12672-29-6	Aroclor 1248	0.0025	0.010	< 0.010 U
11097-69-1	Aroclor 1254	0.0025	0.050	< 0.050 Y
11096-82-5	Aroclor 1260	0.0028	0.010	< 0.010 U
11104-28-2	Aroclor 1221	0.0025	0.010	< 0.010 U
11141-16-5	Aroclor 1232	0.0025	0.010	< 0.010 U
37324-23-5	Aroclor 1262	0.0028	0.010	< 0.010 U

Reported in µg/L (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	64.5%
Tetrachlorometaxylene	53.5%

FORM I

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PCB by GC/ECD Method SW8082A
Extraction Method: SW3510C
Page 1 of 1

Sample ID: DUP-1-082114
SAMPLE

Lab Sample ID: YX39E
LIMS ID: 14-17234
Matrix: Water
Data Release Authorized:
Reported: 08/29/14

QC Report No: YX39-The Boeing Company
Project: NBF
0025082.214.005
Date Sampled: 08/21/14
Date Received: 08/21/14

Date Extracted: 08/27/14
Date Analyzed: 08/28/14 17:57
Instrument/Analyst: ECD7/JGR
GPC Cleanup: No
Sulfur Cleanup: Yes

Sample Amount: 1000 mL
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00
Silica Gel: No
Acid Cleanup: Yes

CAS Number	Analyte	DL	LOQ	Result
12674-11-2	Aroclor 1016	0.0025	0.010	< 0.010 U
53469-21-9	Aroclor 1242	0.0025	0.020	< 0.020 Y
12672-29-6	Aroclor 1248	0.0025	0.010	< 0.010 U
11097-69-1	**Aroclor 1254**	**0.0025**	**0.010**	**0.022**
11096-82-5	Aroclor 1260	0.0028	0.010	< 0.010 U
11104-28-2	Aroclor 1221	0.0025	0.010	< 0.010 U
11141-16-5	Aroclor 1232	0.0025	0.010	< 0.010 U
37324-23-5	Aroclor 1262	0.0028	0.010	< 0.010 U

Reported in µg/L (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	61.2%
Tetrachlorometaxylene	54.2%

FORM I

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PCB by GC/ECD Method SW8082A
Extraction Method: SW3510C
Page 1 of 1

Sample ID: DUP-2-082114
SAMPLE

Lab Sample ID: YX39F
LIMS ID: 14-17235
Matrix: Water
Data Release Authorized: Kelly
Reported: 08/29/14

QC Report No: YX39-The Boeing Company
Project: NBF
0025082.214.005
Date Sampled: 08/21/14
Date Received: 08/21/14

Date Extracted: 08/27/14
Date Analyzed: 08/28/14 18:19
Instrument/Analyst: ECD7/JGR
GPC Cleanup: No
Sulfur Cleanup: Yes

Sample Amount: 1000 mL
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00
Silica Gel: No
Acid Cleanup: Yes

CAS Number	Analyte	DL	LOQ	Result
12674-11-2	Aroclor 1016	0.0025	0.010	< 0.010 U
53469-21-9	**Aroclor 1242**	**0.0025**	**0.010**	**0.65 E**
12672-29-6	Aroclor 1248	0.0025	0.010	< 0.010 U
11097-69-1	Aroclor 1254	0.0025	0.10	< 0.10 Y
11096-82-5	Aroclor 1260	0.0028	0.010	< 0.010 U
11104-28-2	Aroclor 1221	0.0025	0.010	< 0.010 U
11141-16-5	Aroclor 1232	0.0025	0.010	< 0.010 U
37324-23-5	Aroclor 1262	0.0028	0.010	< 0.010 U

Reported in µg/L (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	63.2%
Tetrachlorometaxylene	56.5%

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PCB by GC/ECD Method SW8082A
Extraction Method: SW3510C
Page 1 of 1

Sample ID: DUP-2-082114
DILUTION

Lab Sample ID: YX39F
LIMS ID: 14-17235
Matrix: Water
Data Release Authorized: kelly
Reported: 08/29/14

QC Report No: YX39-The Boeing Company
Project: NBF
0025082.214.005
Date Sampled: 08/21/14
Date Received: 08/21/14

Date Extracted: 08/27/14
Date Analyzed: 08/29/14 09:24
Instrument/Analyst: ECD7/JGR
GPC Cleanup: No
Sulfur Cleanup: Yes

Sample Amount: 1000 mL
Final Extract Volume: 0.50 mL
Dilution Factor: 5.00
Silica Gel: Yes
Acid Cleanup: Yes

CAS Number	Analyte	DL	LOQ	Result
12674-11-2	Aroclor 1016	0.012	0.050	< 0.050 U
53469-21-9	**Aroclor 1242**	**0.012**	**0.050**	**0.74**
12672-29-6	Aroclor 1248	0.012	0.050	< 0.050 U
11097-69-1	Aroclor 1254	0.012	0.15	< 0.15 Y
11096-82-5	Aroclor 1260	0.014	0.050	< 0.050 U
11104-28-2	Aroclor 1221	0.012	0.050	< 0.050 U
11141-16-5	Aroclor 1232	0.012	0.050	< 0.050 U
37324-23-5	Aroclor 1262	0.014	0.050	< 0.050 U

Reported in µg/L (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	73.0%
Tetrachlorometaxylene	58.9%

FORM I

YX39.00014

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PCB by GC/ECD Method SW8082A
Extraction Method: SW3510C

Sample ID: MB-082714
METHOD BLANK

Lab Sample ID: MB-082714
LIMS ID: 14-17232
Matrix: Water
Data Release Authorized: [signature]
Reported: 08/29/14

QC Report No: YX39-The Boeing Company
Project: NBF
0025082.214.005
Date Sampled: NA
Date Received: NA

Date Extracted: 08/27/14
Date Analyzed: 08/28/14 13:34
Instrument/Analyst: ECD7/JGR
GPC Cleanup: No
Sulfur Cleanup: Yes

Sample Amount: 1000 mL
Final Extract Volume: 0.50 mL
Dilution Factor: 1.00
Silica Gel: Yes
Acid Cleanup: Yes

CAS Number	Analyte	DL	LOQ	Result
12674-11-2	Aroclor 1016	0.0025	0.010	< 0.010 U
53469-21-9	Aroclor 1242	0.0025	0.010	< 0.010 U
12672-29-6	Aroclor 1248	0.0025	0.010	< 0.010 U
11097-69-1	Aroclor 1254	0.0025	0.010	< 0.010 U
11096-82-5	Aroclor 1260	0.0028	0.010	< 0.010 U
11104-28-2	Aroclor 1221	0.0025	0.010	< 0.010 U
11141-16-5	Aroclor 1232	0.0025	0.010	< 0.010 U
37324-23-5	Aroclor 1262	0.0028	0.010	< 0.010 U

Reported in µg/L (ppb)

PCB Surrogate Recovery

Decachlorobiphenyl	54.8%
Tetrachlorometaxylene	50.5%

ANALYTICAL RESOURCES INCORPORATED

SW8082/PCB WATER SURROGATE RECOVERY SUMMARY

Matrix: Water

QC Report No: YX39-The Boeing Company
Project: NBF
0025082.214.005

Client ID	DCBP % REC	DCBP LCL-UCL	TCMX % REC	TCMX LCL-UCL	TOT OUT
NGW520-082114	66.2%	29-120	54.0%	32-120	0
NGW521-082114	69.2%	29-120	60.8%	32-120	0
NGW521-082114 DL	77.2%	29-120	63.2%	32-120	0
MB-082714	54.8%	29-120	50.5%	32-120	0
LCS-082714	63.0%	29-120	53.5%	32-120	0
LCSD-082714	53.8%	29-120	51.2%	32-120	0
NGW522-082114	68.5%	29-120	61.5%	32-120	0
NGW522-082114 MS	66.2%	29-120	55.8%	32-120	0
NGW522-082114 MSD	70.8%	29-120	62.5%	32-120	0
NGW523-082114	64.5%	29-120	53.5%	32-120	0
DUP-1-082114	61.2%	29-120	54.2%	32-120	0
DUP-2-082114	63.2%	29-120	56.5%	32-120	0
DUP-2-082114 DL	73.0%	29-120	58.9%	32-120	0

Prep Method: SW3510C
Log Number Range: 14-17230 to 14-17235

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PCB by GC/ECD Method SW8082A
Page 1 of 1

Sample ID: NGW522-082114
MS/MSD

Lab Sample ID: YX39C
LIMS ID: 14-17232
Matrix: Water
Data Release Authorized: MW
Reported: 08/29/14

QC Report No: YX39-The Boeing Company
Project: NBF
0025082.214.005
Date Sampled: 08/21/14
Date Received: 08/21/14

Date Extracted MS/MSD: 08/27/14

Date Analyzed MS: 08/28/14 16:51
MSD: 08/28/14 17:13
Instrument/Analyst MS: ECD7/JGR
MSD: ECD7/JGR
GPC Cleanup: No
Sulfur Cleanup: Yes

Sample Amount MS: 1000 mL
MSD: 1000 mL
Final Extract Volume MS: 0.5 mL
MSD: 0.5 mL
Dilution Factor MS: 1.00
MSD: 1.00
Silica Gel: Yes
Acid Cleanup: Yes

Analyte	Sample	MS	Spike Added-MS	MS Recovery	MSD	Spike Added-MSD	MSD Recovery	RPD
Aroclor 1016	< 0.010	0.320	0.050	640%	0.371	0.050	742%	14.8%
Aroclor 1260	< 0.010	0.038	0.050	76.0%	0.041	0.050	82.0%	7.6%

Results reported in µg/L
RPD calculated using sample concentrations per SW846.

ANALYTICAL RESOURCES INCORPORATED

ORGANICS ANALYSIS DATA SHEET
PCB by GC/ECD Method SW8082A
Page 1 of 1

Sample ID: LCS-082714
LCS/LCSD

Lab Sample ID: LCS-082714
LIMS ID: 14-17232
Matrix: Water
Data Release Authorized:
Reported: 08/29/14

QC Report No: YX39-The Boeing Company
Project: NBF
0025082.214.005
Date Sampled: NA
Date Received: NA

Date Extracted LCS/LCSD: 08/27/14

Date Analyzed LCS: 08/28/14 13:56
LCSD: 08/28/14 14:18
Instrument/Analyst LCS: ECD7/JGR
LCSD: ECD7/JGR
GPC Cleanup: No
Sulfur Cleanup: Yes

Sample Amount LCS: 1000 mL
LCSD: 1000 mL
Final Extract Volume LCS: 0.50 mL
LCSD: 0.50 mL
Dilution Factor LCS: 1.00
LCSD: 1.00
Silica Gel: Yes
Acid Cleanup: Yes

Analyte	LCS	Spike Added-LCS	LCS Recovery	LCSD	Spike Added-LCSD	LCSD Recovery	RPD
Aroclor 1016	0.038	0.050	76.0%	0.040	0.050	80.0%	5.1%
Aroclor 1260	0.036	0.050	72.0%	0.035	0.050	70.0%	2.8%

PCB Surrogate Recovery

	LCS	LCSD
Decachlorobiphenyl	63.0%	53.8%
Tetrachlorometaxylene	53.5%	51.2%

Results reported in µg/L
RPD calculated using sample concentrations per SW846.