

Topic: Assessment of Metals Concentrations in Groundwater
Gude Landfill, Montgomery County

Date: October 8, 2013

PURPOSE

During development of the Draft Assessment of Corrective Measures (ACM) Report for the Gude Landfill (the Landfill), the Montgomery County Department of Environmental Protection (the County) and EA Engineering, Science, and Technology, Inc. (EA) met with Maryland Department of the Environment (MDE) on August 6, 2013. During the meeting, MDE noted the intermittent metals concentrations exceeding maximum contaminant levels (MCLs). The County and EA responded that Amendment No. 1 to the Nature and Extent Study Report had previously addressed this issue. Reported total metals concentrations from samples collected using three (3) volume well purge methodology were not considered representative of groundwater conditions, due to the presence of suspended sediment in these samples. However, the County agreed to revisit this issue using alternative sampling methodology that may result in lower sample turbidity. The methodologies and results of this investigation are provided below.

GROUNDWATER SAMPLING AND ANALYSIS METHODOLOGY

EA conducted one round of groundwater sampling at five (5) selected monitoring wells where recent reported total metal concentrations exceeded MCLs (OB04A, OB06, OB11, OB105 and MW-6). A Monitoring Well Location Map is attached illustrating the five (5) wells sampled as part of this investigation. For comparison purposes, the sampling was conducted in two (2) sampling events, with the first event utilizing low flow sampling, which is expected to yield lower sample turbidity, and the second event utilizing three (3) well volume purge sampling, which has been utilized during semi-annual monitoring events at the Landfill. The two (2) sampling events were conducted three (3) days apart to minimize the potential effect of the first sampling event on the second sampling event. The field sampling forms, including applicable field data, are attached for reference. The groundwater sampling and analysis activities conducted during the investigation included the following:

- Gauge and record the groundwater depth and total well depth at each of the five (5) monitoring wells;
- Use low flow sampling (day 1) and three (3) well volume purge (day 2) techniques to purge the wells, collect appropriate field measurements (temperature, pH, conductivity, turbidity, dissolved oxygen), and collect a sample from each groundwater monitoring well in pre-preserved laboratory supplied containers;
- Collect one (1) duplicate sample for each sampling event (two [2] total);
- Contain the purge water generated during sampling and deposit it at the leachate pre-treatment plant at the Oaks Landfill;
- Record all appropriate field data on sampling forms;
- Immediately pack samples on ice with proper chain-of-custody documentation enclosed; and,
- Deliver the samples and chain-of-custody to Phase Separation Science in Baltimore, Maryland for the following analyses:
 - Turbidity by EPA Method 180.1
 - Total Metals by EPA Method 6020/6010

GROUNDWATER SAMPLE ANALYTICAL DATA EVALUATION

A Table of Analytical Results is attached, which summarizes the analytical results and MCL exceedances for the samples collected using both low flow and three (3) well volume techniques. The laboratory analytical reports for the samples collected during the investigation are also attached.

Following receipt of the analytical data from the laboratory, EA evaluated the turbidity and total metals results. The laboratory turbidity results showed significantly higher levels in the samples collected using the three (3) well volume purge method in MW-6 and OB105. The samples collected from OB04, OB06 and OB11 did not show significant differences in turbidity levels between low flow and three (3) well volume purge methods. Total metals MCL exceedances were detected in three (3) of the five (5) samples collected from groundwater monitoring wells using the three (3) well volume purging technique. Total metals MCL exceedances were only detected in one (1) of the five (5) samples collected from groundwater monitoring wells using the low flow sampling technique. The single exceedance was a low-level MCL exceedance for mercury (MCL of 2.0 µg/L), which was detected at 2.6 µg/L in OB11 (2.4 µg/L in the duplicate). Mercury was also reported at concentrations exceeding the MCL in the three (3) volume well purge sample collected from the OB11, at a concentration of 2.1 µg/L.

Comparison of samples collected using low flow and three (3) well volume purging techniques indicates that MCL and Action Level exceedances for arsenic and lead in MW-6, lead in OB105 and cadmium in OB11 occurred only in the three (3) well volume purge sample. This supports the finding of Amendment No.1 to the Nature and Extent Study Report, that exceedances of MCLs for metals at the Landfill result primarily from high turbidity (i.e., sediment mixed with groundwater) in the samples. These data further indicate that this high turbidity in certain wells may result from the current three (3) well volume purging procedure used by the County as part of on-going semi-annual monitoring.

Mercury was reported in OB11 at concentrations exceeding the MCL in the samples collected using both low flow and three well volume purge techniques, indicating that this mercury exceedance is not associated with the three (3) well volume sampling technique. This exceedance is consistent with sporadic, low-level mercury detections within the Landfill groundwater monitoring network, and is considered to be consistent with the conclusion of the NES Amendment No. 1 (EA 2011a) that metals in groundwater are not indicative of potential Landfill impacts. Dissolved mercury analysis has been performed for all groundwater monitoring well samples collected for the last three (3) semi-annual groundwater sampling events (March 2012, September 2012, and March 2013) and has resulted in no MCL exceedances for mercury. Additionally, background mercury concentrations in central Maryland soil have been documented to average 0.14 ppm (MDE 2008).

CONCLUSION

The results collected during this investigation support the prior conclusions of Amendment No. 1 to the Nature and Extent Study Report, which indicated that metals exceeded MCLs on an intermittent basis and are not indicative of landfill impacts.

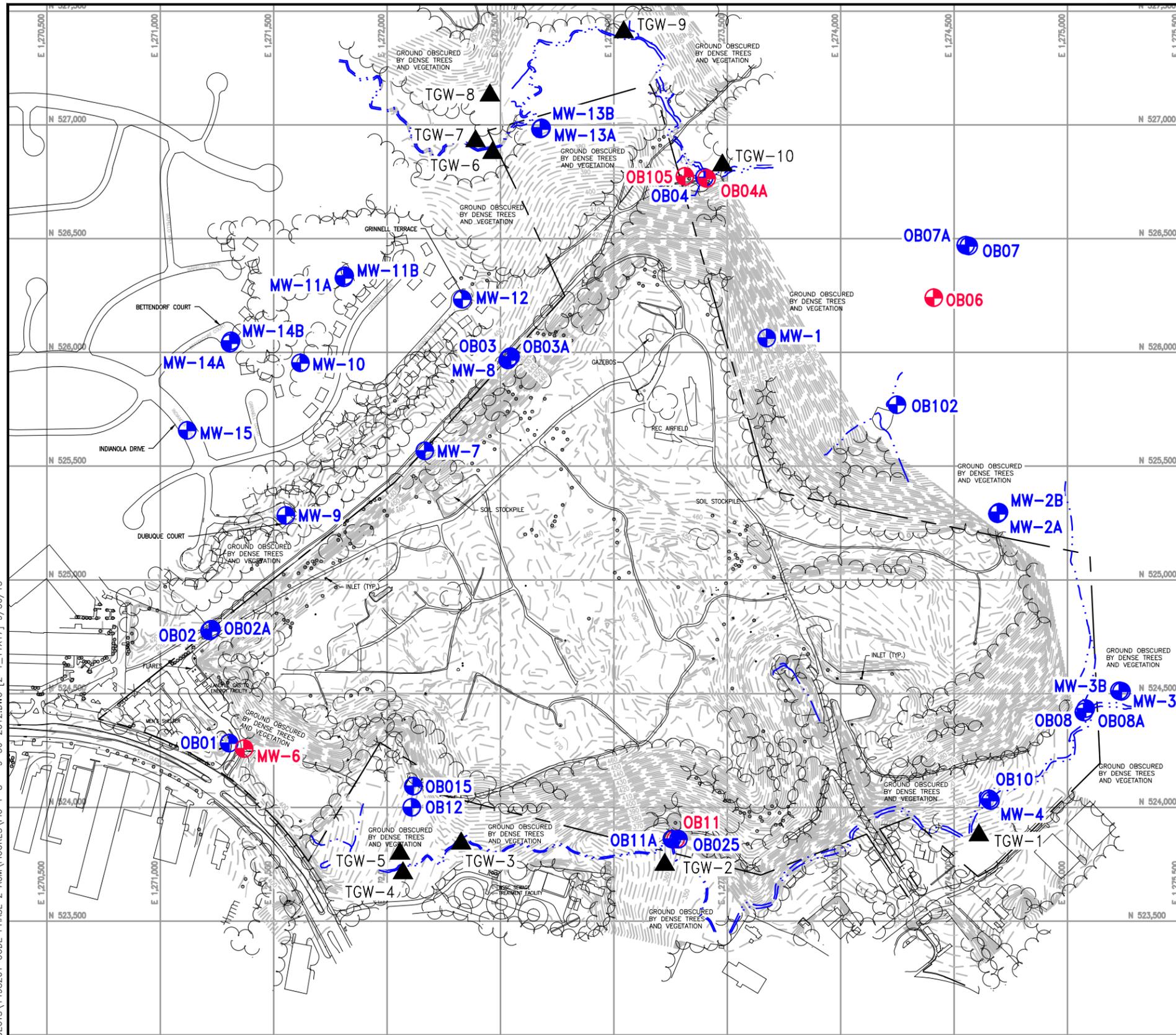
Attachments:

- Attachment A: Monitoring Well Location Map
- Attachment B: Field Sampling Forms
- Attachment C: Table of Metals Analytical Results
- Attachment D: Laboratory Analytical Reports

Attachment A
Monitoring Well Location Map

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FILE PATH: G:\PROJECTS\1498201 GUDE PHASE 2 ACM\FIGURES\FIG 1-8 - 9-30-2012.DWG [2-1-11X17] 9/30/13

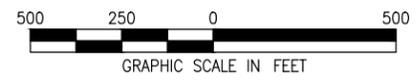


- NOTES:
1. TOPOGRAPHY COMPILED BY APPLIED MAPPING SOLUTIONS, INC. USING PHOTOGRAMMETRIC METHODS WITH PHOTOGRAPHY DATED 06/24/09 AND SUPPLEMENTED WITH FIELD SURVEY PERFORMED BY C.C. JOHNSON & MALHOTRA, P.C., OCTOBER 2009.
 2. SURVEY OF STREAMS TAKEN FROM 2007 PHOTOGRAMMETRY BY AXIS GEOSPATIAL, LLC.
 3. HORIZONTAL DATUM IS NORTH AMERICAN DATUM OF 1983/91 (NAD-83/91). COORDINATE SYSTEM IS MARYLAND STATE PLANE, U.S. SURVEY FEET. VERTICAL DATUM IS NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD-88) WITH ELEVATIONS SHOWN IN FEET.
 4. TOPOGRAPHY IS APPROXIMATE IN AREAS NOTED "GROUND OBSCURED BY DENSE TREES AND VEGETATION".
 5. FIELD SURVEY OF MW-14A, MW-14B, & MW-15, TEMPORARY GROUNDWATER MONITORING LOCATIONS, AND STREAM GAUGE LOCATIONS PERFORMED BY C.C. JOHNSON & MALHOTRA, P.C., AUGUST 2011.



LEGEND

- 400 --- 10-FT CONTOUR
- 2 --- 2-FT CONTOUR
- --- PROPERTY BOUNDARY
- --- STREAM
- MW-X GROUNDWATER MONITORING WELL
- ▲ TGW-X TEMPORARY GROUNDWATER MONITORING LOCATION
- OB06 MONITORING WELL SAMPLED AS PART OF ASSESSMENT OF METALS CONCENTRATIONS IN GROUNDWATER



GUDE LANDFILL
ASSESSMENT OF CORRECTIVE MEASURES
MONTGOMERY COUNTY, MARYLAND

MONITORING WELL LOCATION MAP

DESIGNED BY PL/LJO	DRAWN BY TJP	DATE OCT. 2013	PROJECT NO. 62196.08
CHECKED BY PC	PROJECT MGR. JK	DRAWING NO. -	FIGURE X-X

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Attachment B
Field Sampling Forms

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SAMPLE CHAIN OF CUSTODY/AGREEMENT FORM

www.phaseonline.com
email: info@phaseonline.com

PHASE SEPARATION SCIENCE, INC.

1 CLIENT: <u>EA ENGINEERING</u> OFFICE LOC. <u>H.V. MD</u>		PSS Work Order #: _____ PAGE <u>1</u> OF <u>1</u>			
PROJECT MGR: <u>PETE LEKAS</u> PHONE NO.: <u>(410) 584 7000</u>		Matrix Codes: SW=Surface Wtr DW=Drinking Wtr GW=Ground Wtr WW=Waste Wtr O=Oil S=Soil WL=Waste Liquid WS=Waste Solid W= Wipe			
EMAIL: <u>PLEKAS@E4EST</u> FAX NO.: <u>()</u>		Preservatives Used: _____			
PROJECT NAME: <u>GUDE LF</u> PROJECT NO.: <u>149201</u>		Analysis/Method Required: <u>3</u>			
SITE LOCATION: <u>GUDE LF</u> P.O. NO.: _____		No. CONTAINERS: _____			
SAMPLERS: <u>J. Deumond</u> DW CERT NO.: _____		SAMPLE TYPE: _____ C = COMP G = GRAB			
LAB NO.	SAMPLE IDENTIFICATION	DATE	TIME	MATRIX (See Codes)	REMARKS
	<u>MN-6-LF</u>	<u>9-16-13</u>	<u>1130</u>	<u>GW</u>	<u>+</u>
	<u>OB04A-LF</u>	<u>9-16-13</u>	<u>1245</u>	<u>GW</u>	<u>+</u>
	<u>OB105-LF</u>	<u>9-16-13</u>	<u>1450</u>	<u>GW</u>	<u>+</u>
	<u>OB06-LF</u>	<u>9-16-13</u>	<u>1545</u>	<u>GW</u>	<u>+</u>
	<u>DUP-LF</u>	<u>9-16-13</u>	<u>1730</u>	<u>GW</u>	<u>+</u>
	<u>OB11-LF</u>	<u>9-16-13</u>	<u>1730</u>	<u>GW</u>	<u>+</u>
4 Requested Turnaround Time: <input checked="" type="checkbox"/> 5-Day <input type="checkbox"/> 3-Day <input type="checkbox"/> 2-Day <input type="checkbox"/> Next Day <input type="checkbox"/> Emergency <input type="checkbox"/> Other Data Deliverables Required: _____ # of Coolers: _____ Custody Seal: <u>MS</u> Ice Presapp: <u>NO</u> Temp: <u>10C</u> Shipping Carrier: <u>Chert</u>					
5 Relinquished By: (1) _____ Received By: _____ Relinquished By: (2) _____ Received By: _____ Relinquished By: (3) _____ Received By: _____ Relinquished By: (4) _____ Received By: _____					
Special Instructions: <u>Please Contact Pete Lekas For DELIVERABLE REQ.</u>					

6630 Baltimore National Pike • Route 40 West • Baltimore, Maryland 21228 • (410) 747-8770 • (800) 932-9047 • Fax (410) 788-8723
 The client (Client Name), by signing, or having client's agent sign, this "Sample Chain of Custody/Agreement Form", agrees to pay for the above requested services per the latest version of the Service Brochure or PSS-provided quotation including any and all attorney's or other reasonable fees if collection becomes necessary.



SAMPLE CHAIN OF CUSTODY/AGREEMENT FORM

www.phaseonline.com
email: info@phaseonline.com

PHASE SEPARATION SCIENCE, INC.

1 CLIENT: Environmental Science OFFICE LOC. A.S. MD PAGE 1 OF 1

PROJECT MGR: Paul Lukas PHONE NO.: 410 991 3300

EMAIL: Phase@PhaseOnline.com

PROJECT NAME: Green LF PROJECT NO.: 199701

SITE LOCATION: Green LF P.O. NO.:

SAMPLERS: J. Dammers DW CERT NO.:

LAB NO.	SAMPLE IDENTIFICATION	DATE	TIME	MATRIX (See Codes)	REMARKS
	<u>MW-6-3X</u>	<u>11-09-09</u>	<u>0935</u>	<u>GW</u>	<u>High Turb.</u>
	<u>DUP-3X</u>	<u>11-09-09</u>	<u>0935</u>		<u>H. Low Turb.</u>
	<u>OB04A-3X</u>	<u>11-09-09</u>	<u>1005</u>		
	<u>OB105-3X</u>	<u>11-09-09</u>	<u>1100</u>		
	<u>OB06-3X</u>	<u>11-09-09</u>	<u>1210</u>		<u>High Turb.</u>
	<u>OB11-3X</u>	<u>11-09-09</u>	<u>1330</u>		

2

3

4

5

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 The client (Client Name), by signing, or having client's agent sign, this "Sample Chain of Custody/Agreement Form", agrees to pay for the above requested services per the latest version of the Service Brochure or PSS-provided quotation including any and all attorney's or other reasonable fees if collection becomes necessary.

WELL PURGING AND SAMPLING RECORD

WELL ID MW-6 SAMPLE NO. ① MW-6-LF
 WELL/SITE DESCRIPTION NEAR ENTRANCE BY LAGOON

DATE 9/16/2013 TIME 0820 AIR TEMP. _____

WELL DEPTH 27' TOC ft CASING HEIGHT ~2' ft
 WATER DEPTH 17.4' ft WELL DIAMETER 2" in
 WATER COL. HEIGHT 9.6' ft SANDPACK DIAM. UNK in
 EQUIVALENT VOLUME OF STANDING WATER _____ (gal) (L)
 PUMP RATE ~100 mL/min (gpm) (L/min)
 PUMP TIME 50 min min
 WELL WENT DRY? () Yes () No PUMP TIME N/A min
 VOL. REMOVED ~5.5 L (gal) (L) RECOVERY TIME N/A min
 PURGE AGAIN? () Yes () No TOTAL VOL. REMOVED ~5.5 L (gal) (L)

Date	Time	Volume Removed	pH	Cond.	Temp.	ORP	Turb.	DO	Depth to Water from TOC	Pump Rate
		Unit: mL	SU	ms/cm	°C		NTU	mg/L		mL/min
9.16	0845	500	5.83	0.932	15.85	103.1	N/A	1.61	17.53	100
	0850	500	6.22	0.913	15.94	111.5	N/A	1.67	17.55	100
	0855	500	6.79	0.916	15.97	117.2	N/A	0.65	17.63	100
	0900	500	6.58	0.918	15.96	121.3	N/A	0.22	17.75	100
STOP TO WAIT FOR TURBIDIMETER - N/A										
	1055	500	5.94	0.950	17.17	150.6	13.8	1.26	17.60	100
	1100	500	5.92	0.942	16.76	148.6	7.11	1.42	17.75	100
	1105	500	5.88	0.942	16.81	150.2	6.18	0.95	17.85	100
	1110	500	5.90	0.942	16.72	150.3	5.71	0.78	17.92	100
	1115	500	5.89	0.940	16.70	150.3	4.49	0.83	18.05	100
	1120	500	5.89	0.939	16.65	150.8	3.91	0.98	18.18	100
	1125	500	5.90	0.938	16.60	152.1	4.80	1.09	18.29	100

COMMENTS LEAKY FLOW-THRU CELL ON YSI CAUSED FLUXUATING DISSOLVED OXYGEN READINGS -
SAMPLE TIME 1130

SIGNATURE 



EA Engineering, Science,
and Technology, Inc.

WELL PURGING AND SAMPLING RECORD

WELL ID OBO4A SAMPLE NO. ② OBO4A-LF
 WELL/SITE DESCRIPTION Bottom Hill near Lagoon + Creek + Pipeline

DATE 9/16/13 TIME 1200 AIR TEMP. _____

WELL DEPTH 85.5' TOC ft CASING HEIGHT ~3' ft
 WATER DEPTH 5.95' ft WELL DIAMETER 2" in
 WATER COL. HEIGHT 79.55' ft SANDPACK DIAM. UNK in
 EQUIVALENT VOLUME OF STANDING WATER _____ (gal) (L)
 PUMP RATE 100 mL/min (gpm) (LPM)
 PUMP TIME 35 min min
 WELL WENT DRY? () Yes () No PUMP TIME N/A min
 VOL. REMOVED ~4 () (L) RECOVERY TIME N/A min
 PURGE AGAIN? () Yes () No TOTAL VOL. REMOVED ~4 () (L)

Date	Time	Volume Removed	pH	Cond.	Temp.	ORP	Turb.	DO	Depth to Water	Pump Rate
		Unit: mL	SU	mS/cm	°C		NTU	mg/L	from TOC	mL/min
9-16	1210	500	5.84	1.301	19.36	133.7	4.17	2.52	6.10	100
	1215	500	5.68	1.275	18.05	133.4	2.96	0.71	6.09	100
	1220	500	5.60	1.244	16.99	144.5	2.13	0.26	6.09	100
	1225	500	5.57	1.234	16.57	156.1	1.37	0.16	6.09	100
	1230	500	5.59	1.227	16.33	169.2	2.53	0.14	6.09	100
	1235	500	5.61	1.226	16.29	175.3	1.82	0.14	6.09	100
	1240	500	5.61	1.225	16.26	178.5	1.51	0.13	6.09	100
	1245	500	5.62	1.225	16.24	179.9	1.32	0.13	6.09	100

COMMENTS SAMPLE TIME 1245

SIGNATURE _____



EA Engineering, Science,
and Technology, Inc.

WELL PURGING AND SAMPLING RECORD

WELL ID OB105 SAMPLE NO. ③ OB105-LF
 WELL/SITE DESCRIPTION FLUSH MOUNT DOWN HILL NEAR LAGOON + CREEK
+ PIPELINE UNDER TREE CLOSER TO ROAD

DATE 9/16/2013 TIME 1400 AIR TEMP. 75°F

WELL DEPTH 16' BGS ft CASING HEIGHT FLUSH ft
 WATER DEPTH 4' ft WELL DIAMETER 4" in
 WATER COL. HEIGHT 12' ft SANDPACK DIAM. UNK in
 EQUIVALENT VOLUME OF STANDING WATER _____ (gal) (L)
 PUMP RATE 100 mL/min (gpm) (LPM)
 PUMP TIME 45 min min
 WELL WENT DRY? () Yes () No PUMP TIME N/A min
 VOL. REMOVED ≈ 6.5 L (L) RECOVERY TIME N/A min
 PURGE AGAIN? () Yes () No TOTAL VOL. REMOVED ≈ 6.5 L (L)

Date	Time	Volume Removed	pH	Cond.	Temp.	ORP	Turb.	DO	Depth to Water from TOC	Pump Rate
		Unit: mL								mL/min
9-16-13	1405	2000	6.76	0.937	19.17	-78.4	14.3	1.22	4.70	400 EST.
	1410	500	6.68	0.950	18.88	-85.8	15.4	0.94	4.90	100
	1415	500	6.61	1.050	18.68	-81.9	15.0	1.29	4.92	100
	1420	500	6.62	1.162	18.37	-85.6	18.8	1.70	4.92	100
	1425	500	6.62	1.515	18.13	-88.8	17.9	0.39	4.83	100
	1430	500	6.61	2.183	17.91	-81.6	7.24	0.21	4.82	100
	1435	500	6.62	2.203	17.84	-64.4	7.37	0.19	4.55	100
	1440	500	6.62	2.220	17.75	-61.0	6.59	0.20	4.54	100
	1445	500	6.62	2.221	17.70	-60.5	6.08	0.19	4.52	100
	1450	500	6.62	2.219	17.68	-60.3	6.43	0.19	4.51	100

COMMENTS EMPTY FLOW THRU TO OPEN TO GET BETTER SEAL @ 1412
LEAKY GRIND DIFFICULT TO MEASURE FLOW RATE INITIALLY.
SAMPLE TIME 1450

SIGNATURE



EA Engineering, Science,
and Technology, Inc.

WELL PURGING AND SAMPLING RECORD

WELL ID 0806 SAMPLE NO. (4) 0806-LF
 WELL/SITE DESCRIPTION NW Woods Down Hill MAIN SITE

DATE 9/16/13 TIME 1500 AIR TEMP. 61°F

WELL DEPTH 68' TOC ft CASING HEIGHT ~2' ft
 WATER DEPTH 11.35' ft WELL DIAMETER 2" in
 WATER COL. HEIGHT 56.65' ft SANDPACK DIAM. UNK in
 EQUIVALENT VOLUME OF STANDING WATER _____ (gal) (L)
 PUMP RATE 100 mL/min (gpm) (LPM)
 PUMP TIME 35 min min
 WELL WENT DRY? () Yes () No PUMP TIME N/A min
 VOL. REMOVED ~4 L (gal) (L) RECOVERY TIME N/A min
 PURGE AGAIN? () Yes () No TOTAL VOL. REMOVED ~4 L (gal) (L)

Date	Time	Volume Removed	pH	Cond.	Temp.	ORP	Turb.	DO	Depth to Water from TOC	Pump Rate
		Unit: mL	SW	mg/L	°C		NTU	mg/L		mL/min
9.16.13	1510	500	6.02	1.069	14.15	97.5	8.49	2.34	12.50	100
	1515	500	5.90	1.064	14.01	103.7	6.45	2.01	12.72	100
	1520	500	5.80	1.048	13.54	113.4	7.39	1.46	12.85	100
	1525	500	5.76	1.034	13.25	116.6	7.54	1.11	12.89	100
	1530	500	5.75	1.025	13.02	121.1	8.11	0.96	12.90	100
	1535	500	5.74	1.026	12.99	121.2	8.43	0.80	12.90	100
	1540	500	5.75	1.026	12.92	121.1	8.49	0.65	12.90	1.00
	1545	500	5.75	1.027	12.89	122.1	7.93	0.59	12.90	100

COMMENTS LEAKY Flow thru Cell or YSI CAUSED fluctuating Dissolved Oxygen Readings.
SAMPLE TIME 1545

SIGNATURE



EA Engineering, Science,
and Technology, Inc.

WELL PURGING AND SAMPLING RECORD

WELL ID OB 11 SAMPLE NO. OB11-LF ⁵ + ⁶ DUP-LF
 WELL/SITE DESCRIPTION OVER Hill Down By Greese PAST W/IMBATOR PD.

DATE 9/16/13 TIME 1630 AIR TEMP. _____

WELL DEPTH 104' TOC ft CASING HEIGHT 3' ft
 WATER DEPTH 9.8' ft WELL DIAMETER 2" in
 WATER COL. HEIGHT 94.2 ft SANDPACK DIAM. UNK in
 EQUIVALENT VOLUME OF STANDING WATER _____ (gal) (L)
 PUMP RATE 100 mL/min (gpm) (LPM)
 PUMP TIME 50 min min
 WELL WENT DRY? () Yes () No PUMP TIME N/A min
 VOL. REMOVED ~5.5 ~~(gal)~~ (L) RECOVERY TIME N/A min
 PURGE AGAIN? () Yes () No TOTAL VOL. REMOVED ~5.52 ~~(gal)~~ (L)

Date	Time	Volume Removed	pH	Cond.	Temp.	ORP	Turb.	DO	Depth to Water from TOC	Pump Rate
		Unit:	SV	µS/cm	°C		NTU	mg/L		mg/min
9.16	1640	500	6.16	1.030	17.89	13.9	12.3	3.17	9.9	100
	1645	500	6.09	1.020	17.43	8.1	11.1	2.86	9.5	100
	1650	500	6.06	1.013	17.20	-7.2	6.96	2.47	9.5	100
	1655	500	6.05	1.010	17.08	-11.2	6.57	2.25	9.5	100
	1700	500	6.04	1.008	16.88	-17.3	5.36	1.92	9.5	100
	1705	500	6.03	1.005	16.88	-18.0	4.41	1.85	9.5	100
	1710	500	6.03	1.004	16.86	-19.3	3.34	1.77	9.5	100
	1715	500	6.02	1.005	16.84	-20.2	4.25	1.49	9.5	100
	1720	500	6.01	1.004	16.87	-21.6	3.82	1.39	9.5	100
	1725	500	6.00	1.005	16.93	-22.1	3.79	1.33	9.5	100
	1730	500	6.00	1.004	16.99	-22.5	3.42	1.30	9.5	100

COMMENTS 1730 SAMPLE TIME PARENT TO DUP-LF

SIGNATURE



EA Engineering, Science,
and Technology, Inc.

WELL PURGING AND SAMPLING RECORD

WELL ID MW-6 SAMPLE NO. ① MW-6-3x + ② DUP-3x
 WELL/SITE DESCRIPTION NEAR ENTRANCE BY LAGOON

DATE 9/19/2013 TIME 0740 AIR TEMP. 48°F

WELL DEPTH 27' TOC ft CASING HEIGHT ~2' ft
 WATER DEPTH 17.49 ft WELL DIAMETER 2" in
 WATER COL. HEIGHT 9.51 ft SANDPACK DIAM. UNK in
 EQUIVALENT VOLUME OF STANDING WATER 1.55 (gal) ~~(LPM)~~
 PUMP RATE 1 GPM (gpm) (LPM)
 PUMP TIME ~5 min
 WELL WENT DRY? () Yes (X) No PUMP TIME N/A min
 VOL. REMOVED ~5 (gal) ~~(LPM)~~ RECOVERY TIME N/A min
 PURGE AGAIN? () Yes (X) No TOTAL VOL. REMOVED ~5 (gal) ~~(LPM)~~

Date	Time	Volume Removed	pH	Cond.	Temp.	ORP	Turb.	DO	Depth to Water from TOC	Pump Rate
		Unit: GAL								GPM
9-19-13	0925	—								N/A
	0930	1	6.20	1267	14.94	117.2	1053	473	N/A	1
	0935	5	5.98	1246	14.55	169	114	446	N/A	1

COMMENTS WHILE PUMP BROKE AFTER BEGINNING OF INITIAL PUMPING
WATER VERY TURBID - FIXED + RESTART.
SAMPLE TIME 0935 PARENT TO DUP-3x

SIGNATURE [Signature]



EA Engineering, Science,
and Technology, Inc.

WELL PURGING AND SAMPLING RECORD

WELL ID OB105 SAMPLE NO. OB105-3x

WELL/SITE DESCRIPTION Flush Mount Down Hill NEAR Lagoon + CREEK + PIPELINE UNDER TREES Closer to ROAD

DATE 9/19/13 TIME 1030 AIR TEMP. _____

WELL DEPTH 16' BGS ft CASING HEIGHT FLUSH ft
 WATER DEPTH 3.8 ft WELL DIAMETER 4" in
 WATER COL. HEIGHT 12.2 ft SANDPACK DIAM. UNK in
 EQUIVALENT VOLUME OF STANDING WATER 7.9 (gal) (L)
 PUMP RATE 1 GPM (gpm) (LPM)
 PUMP TIME ≈ 25 min
 WELL WENT DRY? () Yes (X) No PUMP TIME N/A min
 VOL. REMOVED ≈ 25 (gal) (L) RECOVERY TIME N/A min
 PURGE AGAIN? () Yes (X) No TOTAL VOL. REMOVED ≈ 25 (gal) (L)

Date	Time	Volume Removed	pH	Cond.	Temp.	ORP	Turb.	DO	Depth to Water from TOC	Pump Rate
		Unit: GAL	SU	US/cm	°C	mV	NTU	mg/L		GPM
9.19.13	1035	1	6.93	989	14.55	-6	1137	2.65	N/A	1
	1045	10	6.24	1973	13.92	51.3	921	1.72	N/A	1
	11:00	25	6.18	2016	13.51	69.2	820	1.5	N/A	1

COMMENTS SAMPLE TIME 11:00

SIGNATURE [Signature]



EA Engineering, Science,
and Technology, Inc.

WELL PURGING AND SAMPLING RECORD

WELL ID OB 06 SAMPLE NO. (5) OB06-34

WELL/SITE DESCRIPTION NW Woods Down Hill MAIN SITE

DATE 9/19/13 TIME 1135 AIR TEMP. _____

WELL DEPTH 68' TOC ft CASING HEIGHT ~ 2' ft
 WATER DEPTH 11.39 ft WELL DIAMETER 2" in
 WATER COL. HEIGHT 56.6 ft SANDPACK DIAM. UNK in
 EQUIVALENT VOLUME OF STANDING WATER 9.2 (gal) (L)
 PUMP RATE 1 GPM (gpm) (LPM)
 PUMP TIME ~ 30 min
 WELL WENT DRY? () Yes (X) No PUMP TIME N/A min
 VOL. REMOVED ~ 30 (gal) (L) RECOVERY TIME N/A min
 PURGE AGAIN? () Yes (X) No TOTAL VOL. REMOVED ~ 30 (gal) (L)

Date	Time	Volume Removed	pH	Cond.	Temp.	ORP	Turb.	DO	Depth to Water from TOC	Pump Rate
		Unit: G	SU	US/cm	°C	mV	NTU	Mg/L		Gpm
9.19.13	1140	1	6.72	1472	12.92	113.7	19.4	2.15	N/A	1
	1155	15	6.17	1438	10.36	209.9	13.8	0.84	N/A	1
	1210	30	5.65	1436	10.35	222.8	11.7	0.34	N/A	1

COMMENTS Sample Time 12:10

SIGNATURE [Signature]



EA Engineering, Science, and Technology, Inc.

WELL PURGING AND SAMPLING RECORD

WELL ID OB11 SAMPLE NO. (6) OB11-34
WELL/SITE DESCRIPTION Over Hill Drive B4 CREEK JUST W/ LINEATOR RD

DATE 9/19/13 TIME 1230 AIR TEMP. _____

WELL DEPTH 104' Toc ft CASING HEIGHT ~2' ft
WATER DEPTH 9.94 ft WELL DIAMETER 2" in
WATER COL. HEIGHT 94.1 ft SANDPACK DIAM. UNK in
EQUIVALENT VOLUME OF STANDING WATER 15.3 ~~(gal)~~ ~~(L)~~
PUMP RATE 1 GPM ~~(gpm)~~ (LPM)
PUMP TIME ~46 min min
WELL WENT DRY? () Yes () No PUMP TIME N/A min
VOL. REMOVED ~46 ~~(gal)~~ ~~(L)~~ RECOVERY TIME N/A min
PURGE AGAIN? () Yes () No TOTAL VOL. REMOVED ~46 ~~(gal)~~ ~~(L)~~

Date	Time	Volume Removed	pH	Cond.	Temp.	ORP	Turb.	DO	Depth to Water from TOC	Pump Rate
		Unit: <u>gal</u>	<u>SU</u>	<u>uS/cm</u>	<u>°C</u>	<u>MV</u>	<u>NTU</u>	<u>mg/L</u>		<u>(gpm)</u>
9.19.13	1235	1	6.04	1375	13.71	29.4	17.1	1.63	N/A	1
	1255	21	5.53	1505	14.30	190.4	7.8	0.28	N/A	1
	1320	46	5.55	1520	14.38	210.9	7.5	0.23	N/A	1

COMMENTS 1320 Sample Time

SIGNATURE [Signature]

Attachment C
Table of Analytical Results

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TABLE OF METALS ANALYTICAL RESULTS
600 EAST GUDE DRIVE, ROCKVILLE, MARYLAND 20850

				MW-6-LF 9/16/2013	MW-6-3X 9/19/2013	DUP-3X 9/19/2013	OB04A-LF 9/16/2013	OB04A-3X 9/19/2013	OB06-LF 9/16/2013	OB06-3X 9/19/2013
Method	Analysis	Units	Screening Criteria							
SW-846 6020 A	Antimony	µg/L	6	5 U	5 U	5 U	5 U	5 U	5 U	5 U
SW-846 6020 A	Arsenic	µg/L	10	2.5	32	42	1 U	1 U	0.62 J	1 U
SW-846 6020 A	Barium	µg/L	2000	300	390	410	58	51	180	170
SW-846 6020 A	Beryllium	µg/L	4	1 U	1.3	1.6	1 U	1 U	1 U	1 U
SW-846 6020 A	Cadmium	µg/L	5	1 U	1 U	0.5 J	1 U	1 U	1 U	1 U
SW-846 6020 A	Calcium	µg/L		76000	78000	79000	110000	120000	140000	140000
SW-846 6020 A	Chromium	µg/L	100	1 U	12	13	0.53 J	1 U	1 U	1 U
SW-846 6020 A	Cobalt	µg/L		340	350	370	0.95 J	1.2	5.1	5.2
SW-846 6020 A	Copper	µg/L	1300	2.6	54	67	26	20	3.6	3.3
SW-846 6020 A	Hardness (Ca & Mg)	µg/L		410	430	440	590	640	580	580
SW-846 6020 A	Iron	µg/L		10000 U	17000	16000	10000 U	100 U	10000 U	130
SW-846 6020 A	Lead	µg/L	15	1 U	25	34	1 U	1 U	1 U	1 U
SW-846 6020 A	Magnesium	µg/L		54000	58000	58000	77000	82000	55000	57000
SW-846 6020 A	Manganese	µg/L		40000	37000	37000	1400	1200	560	520
SW-846 6020 A	Mercury	µg/L	2	0.2 U	0.14 J	0.16 J	0.13 J	0.11 J	0.12 J	0.15 J
SW-846 6020 A	Nickel	µg/L		34	56	58	19	16	9.9	9.4
SW-846 6020 A	Potassium	µg/L		3500	3800	3900	4700	4400	4300	3900
SW-846 6020 A	Selenium	µg/L	50	0.58 J	3.8	5	1 U	1 U	1 U	1 U
SW-846 6020 A	Silver	µg/L		1 U	1 U	1.1	0.55 J	1 U	1 U	1 U
SW-846 6020 A	Sodium	µg/L		65000	65000	65000	81000	87000	95000	98000
SW-846 6020 A	Thallium	µg/L	2	1 U	1 U	1 U	1 U	1 U	1 U	1 U
SW-846 6020 A	Vanadium	µg/L		5 U	14	16	5 U	5 U	5 U	5 U
SW-846 6020 A	Zinc	µg/L		2000 U	140	150	2000 U	21	2000 U	19 J
EPA 180.1	Turbidity	NTU		4.6	3400	3900	4.3	0.41	4.3	1.4

Notes:

Screening Criteria - May 2013 EPA Regional Screening Level table's

Maximum Contaminant Level when available. May 2013 EPA

µg/L - micrograms per liter

J- The target analyte was positively identified below the reporting

limit but greater than the limit of detection

U- Not detected

Cells exceeding the screening criteria are shaded gray



TABLE OF METALS ANALYTICAL RESULTS
600 EAST GUDE DRIVE, ROCKVILLE, MARYLAND 20850

				OB105-LF 9/16/2013	OB105-3X 9/19/2013	OB11-LF 9/16/2013	DUP-LF 9/16/2013	OB11-3X 9/19/2013
Method	Analysis	Units	Screening Criteria					
SW-846 6020 A	Antimony	µg/L	6	5 U	5 U	5 U	5 U	5 U
SW-846 6020 A	Arsenic	µg/L	10	1.8	7.8	1.1	1.1	0.62 J
SW-846 6020 A	Barium	µg/L	2000	260	190	50	51	22
SW-846 6020 A	Beryllium	µg/L	4	1 U	3.3	1 U	1 U	1 U
SW-846 6020 A	Cadmium	µg/L	5	1 U	1.5	2.8	2.7	9.8
SW-846 6020 A	Calcium	µg/L		130000	170000	100000	110000	120000
SW-846 6020 A	Chromium	µg/L	100	1.6	37	1.1	1.1	1 U
SW-846 6020 A	Cobalt	µg/L		6.4	48	2.6	2.6	1.5
SW-846 6020 A	Copper	µg/L	1300	1.3	58	2.7	2.6	2.9
SW-846 6020 A	Hardness (Ca & Mg)	µg/L		820	920	480	510	580
SW-846 6020 A	Iron	µg/L		11000	41000	10000 U	10000 U	100 U
SW-846 6020 A	Lead	µg/L	15	1 U	42	0.53 J	1	1 U
SW-846 6020 A	Magnesium	µg/L		120000	120000	56000	57000	68000
SW-846 6020 A	Manganese	µg/L		2100	3100	770	830	780
SW-846 6020 A	Mercury	µg/L	2	0.2 U	1.4	2.6	2.4	2.1
SW-846 6020 A	Nickel	µg/L		11	95	25	24	30
SW-846 6020 A	Potassium	µg/L		70000	12000	11000	12000	4300
SW-846 6020 A	Selenium	µg/L	50	1 U	0.69 J	1 U	1 U	1 U
SW-846 6020 A	Silver	µg/L		1 U	1 U	1 U	1 U	1 U
SW-846 6020 A	Sodium	µg/L		280000	150000	59000	61000	71000
SW-846 6020 A	Thallium	µg/L	2	1 U	1 U	1 U	1 U	1 U
SW-846 6020 A	Vanadium	µg/L		5 U	92	5 U	5 U	5 U
SW-846 6020 A	Zinc	µg/L		2000 U	490	4300	2000 U	42
EPA 180.1	Turbidity	NTU		120	1100	2.8	3.3	0.41

Notes:

Screening Criteria - May 2013 EPA Regional Screening Level table's

Maximum Contaminant Level when available. May 2013 EPA

µg/L - micrograms per liter

J- The target analyte was positively identified below the reporting

limit but greater than the limit of detection

U- Not detected

Cells exceeding the screening criteria are shaded gray

Attachment D
Laboratory Analytical Reports

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Analytical Report for
EA Engineering, Science and Technology, Inc.
Certificate of Analysis No.: 13091707

Project Manager: Pete Lekas

Project Name : Gude LF

Project Location: Gude LF

Project ID : 1498201.000.7



September 24, 2013
Phase Separation Science, Inc.
6630 Baltimore National Pike
Baltimore, MD 21228
Phone: (410) 747-8770
Fax: (410) 788-8723

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PHASE SEPARATION SCIENCE, INC.



September 24, 2013

Pete Lekas
EA Engineering, Science and Technology, Inc.
231 Schilling Circle
Hunt Valley, MD 21031

Reference: PSS Work Order(s) No: **13091707**
Project Name: Gude LF
Project Location: Gude LF
Project ID.: 1498201.000.7

Dear Pete Lekas :

This report includes the analytical results from the analyses performed on the samples received under the project name referenced above and identified with the Phase Separation Science (PSS) Work Order(s) numbered **13091707**.

All work reported herein has been performed in accordance with current NELAP standards, referenced methodologies, PSS Standard Operating Procedures and the PSS Quality Assurance Manual unless otherwise noted in the Case Narrative Summary. PSS is limited in liability to the actual cost of the sample analysis done.

PSS reserves the right to return any unused samples, extracts or related solutions. Otherwise, the samples are scheduled for disposal, without any further notice, on October 22, 2013. This includes any samples that were received with a request to be held but lacked a specific hold period. It is your responsibility to provide a written request defining a specific disposal date if additional storage is required. Upon receipt, the request will be acknowledged by PSS, thus extending the storage period.

This report shall not be reproduced except in full, without the written approval of an authorized PSS representative. A copy of this report will be retained by PSS for at least 5 years, after which time it will be disposed of without further notice, unless prior arrangements have been made.

We thank you for selecting Phase Separation Science, Inc. to serve your analytical needs. If you have any questions concerning this report, do not hesitate to contact us at 410-747-8770 or info@phaseonline.com.

Sincerely,

A handwritten signature in black ink that reads 'Dan Prucnal'.

Dan Prucnal
Laboratory Manager



Sample Summary

Client Name: EA Engineering, Science and Technology, Inc.
Project Name: Gude LF

Work Order Number(s): 13091707

Project ID: 1498201.000.7

The following samples were received under chain of custody by Phase Separation Science (PSS) on 09/17/2013 at 01:01 pm

Lab Sample Id	Sample Id	Matrix	Date/Time Collected
13091707-001	MW-6-LF	GROUND WATER	09/16/13 11:30
13091707-002	OB04A-LF	GROUND WATER	09/16/13 12:45
13091707-003	OB105-LF	GROUND WATER	09/16/13 14:50
13091707-004	OB06-LF	GROUND WATER	09/16/13 15:45
13091707-005	DUP-LF	GROUND WATER	09/16/13 17:30
13091707-006	OB11-LF	GROUND WATER	09/16/13 17:30

Please reference the Chain of Custody and Sample Receipt Checklist for specific container counts and preservatives. Any sample conditions not in compliance with sample acceptance criteria are described in Case Narrative Summary.

Notes:

1. The presence of a common laboratory contaminant such as methylene chloride may be considered a possible laboratory artifact. Where observed, appropriate consideration of data should be taken.
2. The following analytical results are never reported on a dry weight basis: pH, flashpoint, moisture and paint filter test.
3. Drinking water samples collected for the purpose of compliance with SDWA may not be suitable for their intended use unless collected by a certified sampler [COMAR 26.08.05.07.C.2].
4. The analyses of 1,2-dibromo-3-chloropropane (DBCP) and 1,2-dibromoethane (EDB) by EPA 524.2 and calcium, magnesium, sodium and iron by EPA 200.8 are not currently promulgated for use in testing to meet the Safe Drinking Water Act and as such cannot be used for compliance purposes. The listings of the current promulgated methods for testing in compliance with the Safe Drinking Water Act can be found in the 40 CFR part 141.1, for the primary drinking water contaminants, and part 141.3, for the secondary drinking water contaminants.
5. The analyses of chlorine, pH, dissolved oxygen, temperature and sulfite for non-potable water samples tested for compliance for Virginia Pollution Discharge Elimination System (VDPES) permits and Virginia Pollutant Abatement (VPA) permits, have a maximum holding time of 15 minutes established by 40CFR136.3.

Standard Flags/Abbreviations:

- B A target analyte or common laboratory contaminant was identified in the method blank. Its presence indicates possible field or laboratory contamination.
- C Results Pending Final Confirmation.
- E The data exceeds the upper calibration limit; therefore, the concentration is reported as estimated.
- Fail The result exceeds the regulatory level for Toxicity Characteristic (TCLP) as cited in 40 CFR 261.24 Table 1.
- J The target analyte was positively identified below the reporting limit but greater than the LOD.
- LOD Limit of Detection. An estimate of the minimum amount of a substance that an analytical process can reliably detect. An LOD is analyte and matrix specific.
- ND Not Detected at or above the reporting limit.
- RL PSS Reporting Limit.
- U Not detected.



Case Narrative Summary

Client Name: EA Engineering, Science and Technology, Inc.

Project Name: Gude LF

Work Order Number(s): 13091707

Project ID: 1498201.000.7

Any holding time exceedances, deviations from the method specifications, regulatory requirements or variations to the procedures outlined in the PSS Quality Assurance Manual are outlined below.

Sample Receipt:

All sample receipt conditions were acceptable.

Analytical:

Total Metals

Batch: 108905

CCV for Zinc (111% recovery) exceeds acceptance criteria of 90-110%.

NELAP accreditation was held for all analyses performed unless noted below. See www.phaseonline.com for complete PSS scope of accreditation.

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 6630 BALTIMORE NATIONAL PIKE
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 BALTIMORE, MD 21228
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PHASE SEPARATION SCIENCE, INC.



CERTIFICATE OF ANALYSIS

No: 13091707

EA Engineering, Science and Technology, Inc., Hunt Valley, MD
 September 24, 2013

Project Name: Gude LF
 Project Location: Gude LF
 Project ID: 1498201.000.7

Sample ID: MW-6-LF **Date/Time Sampled: 09/16/2013 11:30** **PSS Sample ID: 13091707-001**
Matrix: GROUND WATER **Date/Time Received: 09/17/2013 13:01**

Turbidity Analytical Method: EPA 180.1

	Result	Units	RL	Flag	Dil	LOD	Prepared	Analyzed	Analyst
Turbidity	4.6	NTU	0.20		1	0.2	09/18/13	09/18/13 08:10	1047

Total Metals Analytical Method: SW-846 6020 A Preparation Method: 3010A

	Result	Units	RL	Flag	Dil	LOD	Prepared	Analyzed	Analyst
Antimony	ND	ug/L	5.0		1	2.5	09/18/13	09/18/13 19:32	1034
Arsenic	2.5	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:32	1034
Barium	300	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:32	1034
Beryllium	ND	ug/L	1.0		1	0.5	09/18/13	09/19/13 17:47	1034
Cadmium	ND	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:32	1034
Hardness (Ca & Mg)	410	mg/L	66		100	33	09/18/13	09/23/13 17:16	1034
Calcium	76,000	ug/L	10,000		100	5,000	09/18/13	09/23/13 17:16	1034
Chromium	ND	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:32	1034
Cobalt	340	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:32	1034
Copper	2.6	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:32	1034
Iron	ND	ug/L	10,000		100	5,000	09/18/13	09/23/13 17:16	1034
Lead	ND	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:32	1034
Magnesium	54,000	ug/L	10,000		100	5,000	09/18/13	09/23/13 17:16	1034
Manganese	40,000	ug/L	100		100	50	09/18/13	09/23/13 17:16	1034
Mercury	ND	ug/L	0.20		1	0.1	09/18/13	09/18/13 19:32	1034
Nickel	34	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:32	1034
Potassium	3,500	ug/L	100		1	50	09/18/13	09/18/13 19:32	1034
Selenium	0.58	ug/L	1.0	J	1	0.5	09/18/13	09/19/13 17:47	1034
Silver	ND	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:32	1034
Sodium	65,000	ug/L	10,000		100	5,000	09/18/13	09/23/13 17:16	1034
Thallium	ND	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:32	1034
Vanadium	ND	ug/L	5.0		1	2.5	09/18/13	09/18/13 19:32	1034
Zinc	ND	ug/L	2,000		100	1,000	09/18/13	09/23/13 17:16	1034

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PHASE SEPARATION SCIENCE, INC.



CERTIFICATE OF ANALYSIS

No: 13091707

EA Engineering, Science and Technology, Inc., Hunt Valley, MD
 September 24, 2013

Project Name: Gude LF
 Project Location: Gude LF
 Project ID: 1498201.000.7

Sample ID: OB04A-LF **Date/Time Sampled: 09/16/2013 12:45** **PSS Sample ID: 13091707-002**
Matrix: GROUND WATER **Date/Time Received: 09/17/2013 13:01**

Turbidity Analytical Method: EPA 180.1

	Result	Units	RL	Flag	Dil	LOD	Prepared	Analyzed	Analyst
Turbidity	4.3	NTU	0.20		1	0.2	09/18/13	09/18/13 08:10	1047

Total Metals Analytical Method: SW-846 6020 A Preparation Method: 3010A

	Result	Units	RL	Flag	Dil	LOD	Prepared	Analyzed	Analyst
Antimony	ND	ug/L	5.0		1	2.5	09/18/13	09/18/13 19:38	1034
Arsenic	ND	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:38	1034
Barium	58	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:38	1034
Beryllium	ND	ug/L	1.0		1	0.5	09/18/13	09/19/13 17:53	1034
Cadmium	ND	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:38	1034
Hardness (Ca & Mg)	590	mg/L	66		100	33	09/18/13	09/23/13 17:22	1034
Calcium	110,000	ug/L	10,000		100	5,000	09/18/13	09/23/13 17:22	1034
Chromium	0.53	ug/L	1.0	J	1	0.5	09/18/13	09/18/13 19:38	1034
Cobalt	0.95	ug/L	1.0	J	1	0.5	09/18/13	09/18/13 19:38	1034
Copper	26	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:38	1034
Iron	ND	ug/L	10,000		100	5,000	09/18/13	09/23/13 17:22	1034
Lead	ND	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:38	1034
Magnesium	77,000	ug/L	10,000		100	5,000	09/18/13	09/23/13 17:22	1034
Manganese	1,400	ug/L	100		100	50	09/18/13	09/23/13 17:22	1034
Mercury	0.13	ug/L	0.20	J	1	0.1	09/18/13	09/18/13 19:38	1034
Nickel	19	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:38	1034
Potassium	4,700	ug/L	100		1	50	09/18/13	09/18/13 19:38	1034
Selenium	ND	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:38	1034
Silver	0.55	ug/L	1.0	J	1	0.5	09/18/13	09/18/13 19:38	1034
Sodium	81,000	ug/L	10,000		100	5,000	09/18/13	09/23/13 17:22	1034
Thallium	ND	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:38	1034
Vanadium	ND	ug/L	5.0		1	2.5	09/18/13	09/18/13 19:38	1034
Zinc	ND	ug/L	2,000		100	1,000	09/18/13	09/23/13 17:22	1034

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PHASE SEPARATION SCIENCE, INC.



CERTIFICATE OF ANALYSIS

No: 13091707

EA Engineering, Science and Technology, Inc., Hunt Valley, MD
 September 24, 2013

Project Name: Gude LF
 Project Location: Gude LF
 Project ID: 1498201.000.7

Sample ID: OB105-LF **Date/Time Sampled: 09/16/2013 14:50** **PSS Sample ID: 13091707-003**
Matrix: GROUND WATER **Date/Time Received: 09/17/2013 13:01**

Turbidity Analytical Method: EPA 180.1

	Result	Units	RL	Flag	Dil	LOD	Prepared	Analyzed	Analyst
Turbidity	120	NTU	0.20		1	0.2	09/18/13	09/18/13 08:10	1047

Total Metals Analytical Method: SW-846 6020 A Preparation Method: 3010A

	Result	Units	RL	Flag	Dil	LOD	Prepared	Analyzed	Analyst
Antimony	ND	ug/L	5.0		1	2.5	09/18/13	09/18/13 19:45	1034
Arsenic	1.8	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:45	1034
Barium	260	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:45	1034
Beryllium	ND	ug/L	1.0		1	0.5	09/18/13	09/19/13 17:59	1034
Cadmium	ND	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:45	1034
Hardness (Ca & Mg)	820	mg/L	66		100	33	09/18/13	09/23/13 17:28	1034
Calcium	130,000	ug/L	10,000		100	5,000	09/18/13	09/23/13 17:28	1034
Chromium	1.6	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:45	1034
Cobalt	6.4	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:45	1034
Copper	1.3	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:45	1034
Iron	11,000	ug/L	10,000		100	5,000	09/18/13	09/23/13 17:28	1034
Lead	ND	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:45	1034
Magnesium	120,000	ug/L	10,000		100	5,000	09/18/13	09/23/13 17:28	1034
Manganese	2,100	ug/L	100		100	50	09/18/13	09/23/13 17:28	1034
Mercury	ND	ug/L	0.20		1	0.1	09/18/13	09/18/13 19:45	1034
Nickel	11	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:45	1034
Potassium	70,000	ug/L	10,000		100	5,000	09/18/13	09/23/13 17:28	1034
Selenium	ND	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:45	1034
Silver	ND	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:45	1034
Sodium	280,000	ug/L	10,000		100	5,000	09/18/13	09/23/13 17:28	1034
Thallium	ND	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:45	1034
Vanadium	ND	ug/L	5.0		1	2.5	09/18/13	09/18/13 19:45	1034
Zinc	ND	ug/L	2,000		100	1,000	09/18/13	09/23/13 17:28	1034

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 800-932-9047
 FAX 410-788-8723

PHASE SEPARATION SCIENCE, INC.



CERTIFICATE OF ANALYSIS

No: 13091707

EA Engineering, Science and Technology, Inc., Hunt Valley, MD
 September 24, 2013

Project Name: Gude LF
 Project Location: Gude LF
 Project ID: 1498201.000.7

Sample ID: OB06-LF **Date/Time Sampled: 09/16/2013 15:45** **PSS Sample ID: 13091707-004**
Matrix: GROUND WATER **Date/Time Received: 09/17/2013 13:01**

Turbidity Analytical Method: EPA 180.1

	Result	Units	RL	Flag	Dil	LOD	Prepared	Analyzed	Analyst
Turbidity	4.3	NTU	0.20		1	0.2	09/18/13	09/18/13 08:10	1047

Total Metals Analytical Method: SW-846 6020 A Preparation Method: 3010A

	Result	Units	RL	Flag	Dil	LOD	Prepared	Analyzed	Analyst
Antimony	ND	ug/L	5.0		1	2.5	09/18/13	09/18/13 19:51	1034
Arsenic	0.62	ug/L	1.0	J	1	0.5	09/18/13	09/18/13 19:51	1034
Barium	180	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:51	1034
Beryllium	ND	ug/L	1.0		1	0.5	09/18/13	09/19/13 18:05	1034
Cadmium	ND	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:51	1034
Hardness (Ca & Mg)	580	mg/L	66		100	33	09/18/13	09/23/13 17:34	1034
Calcium	140,000	ug/L	10,000		100	5,000	09/18/13	09/23/13 17:34	1034
Chromium	ND	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:51	1034
Cobalt	5.1	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:51	1034
Copper	3.6	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:51	1034
Iron	ND	ug/L	10,000		100	5,000	09/18/13	09/23/13 17:34	1034
Lead	ND	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:51	1034
Magnesium	55,000	ug/L	10,000		100	5,000	09/18/13	09/23/13 17:34	1034
Manganese	560	ug/L	100		100	50	09/18/13	09/23/13 17:34	1034
Mercury	0.12	ug/L	0.20	J	1	0.1	09/18/13	09/18/13 19:51	1034
Nickel	9.9	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:51	1034
Potassium	4,300	ug/L	100		1	50	09/18/13	09/18/13 19:51	1034
Selenium	ND	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:51	1034
Silver	ND	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:51	1034
Sodium	95,000	ug/L	10,000		100	5,000	09/18/13	09/23/13 17:34	1034
Thallium	ND	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:51	1034
Vanadium	ND	ug/L	5.0		1	2.5	09/18/13	09/18/13 19:51	1034
Zinc	ND	ug/L	2,000		100	1,000	09/18/13	09/23/13 17:34	1034

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PHASE SEPARATION SCIENCE, INC.



CERTIFICATE OF ANALYSIS

No: 13091707

EA Engineering, Science and Technology, Inc., Hunt Valley, MD
 September 24, 2013

Project Name: Gude LF
 Project Location: Gude LF
 Project ID: 1498201.000.7

Sample ID: DUP-LF **Date/Time Sampled: 09/16/2013 17:30** **PSS Sample ID: 13091707-005**
Matrix: GROUND WATER **Date/Time Received: 09/17/2013 13:01**

Turbidity Analytical Method: EPA 180.1

	Result	Units	RL	Flag	Dil	LOD	Prepared	Analyzed	Analyst
Turbidity	3.3	NTU	0.20		1	0.2	09/18/13	09/18/13 08:10	1047

Total Metals Analytical Method: SW-846 6020 A Preparation Method: 3010A

	Result	Units	RL	Flag	Dil	LOD	Prepared	Analyzed	Analyst
Antimony	ND	ug/L	5.0		1	2.5	09/18/13	09/18/13 19:57	1034
Arsenic	1.1	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:57	1034
Barium	51	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:57	1034
Beryllium	ND	ug/L	1.0		1	0.5	09/18/13	09/19/13 18:11	1034
Cadmium	2.7	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:57	1034
Hardness (Ca & Mg)	510	mg/L	66		100	33	09/18/13	09/23/13 17:40	1034
Calcium	110,000	ug/L	10,000		100	5,000	09/18/13	09/23/13 17:40	1034
Chromium	1.1	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:57	1034
Cobalt	2.6	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:57	1034
Copper	2.6	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:57	1034
Iron	ND	ug/L	10,000		100	5,000	09/18/13	09/23/13 17:40	1034
Lead	1.0	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:57	1034
Magnesium	57,000	ug/L	10,000		100	5,000	09/18/13	09/23/13 17:40	1034
Manganese	830	ug/L	100		100	50	09/18/13	09/23/13 17:40	1034
Mercury	2.4	ug/L	0.20		1	0.1	09/18/13	09/18/13 19:57	1034
Nickel	24	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:57	1034
Potassium	12,000	ug/L	10,000		100	5,000	09/18/13	09/23/13 17:40	1034
Selenium	ND	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:57	1034
Silver	ND	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:57	1034
Sodium	61,000	ug/L	10,000		100	5,000	09/18/13	09/23/13 17:40	1034
Thallium	ND	ug/L	1.0		1	0.5	09/18/13	09/18/13 19:57	1034
Vanadium	ND	ug/L	5.0		1	2.5	09/18/13	09/18/13 19:57	1034
Zinc	ND	ug/L	2,000		100	1,000	09/18/13	09/23/13 17:40	1034

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PHASE SEPARATION SCIENCE, INC.



CERTIFICATE OF ANALYSIS

No: 13091707

EA Engineering, Science and Technology, Inc., Hunt Valley, MD
 September 24, 2013

Project Name: Gude LF
 Project Location: Gude LF
 Project ID: 1498201.000.7

Sample ID: OB11-LF **Date/Time Sampled: 09/16/2013 17:30** **PSS Sample ID: 13091707-006**
Matrix: GROUND WATER **Date/Time Received: 09/17/2013 13:01**

Turbidity Analytical Method: EPA 180.1

	Result	Units	RL	Flag	Dil	LOD	Prepared	Analyzed	Analyst
Turbidity	2.8	NTU	0.20		1	0.2	09/18/13	09/18/13 08:10	1047

Total Metals Analytical Method: SW-846 6020 A Preparation Method: 3010A

	Result	Units	RL	Flag	Dil	LOD	Prepared	Analyzed	Analyst
Antimony	ND	ug/L	5.0		1	2.5	09/18/13	09/18/13 20:03	1034
Arsenic	1.1	ug/L	1.0		1	0.5	09/18/13	09/18/13 20:03	1034
Barium	50	ug/L	1.0		1	0.5	09/18/13	09/18/13 20:03	1034
Beryllium	ND	ug/L	1.0		1	0.5	09/18/13	09/19/13 18:17	1034
Cadmium	2.8	ug/L	1.0		1	0.5	09/18/13	09/18/13 20:03	1034
Hardness (Ca & Mg)	480	mg/L	66		100	33	09/18/13	09/23/13 17:46	1034
Calcium	100,000	ug/L	10,000		100	5,000	09/18/13	09/23/13 17:46	1034
Chromium	1.1	ug/L	1.0		1	0.5	09/18/13	09/18/13 20:03	1034
Cobalt	2.6	ug/L	1.0		1	0.5	09/18/13	09/18/13 20:03	1034
Copper	2.7	ug/L	1.0		1	0.5	09/18/13	09/18/13 20:03	1034
Iron	ND	ug/L	10,000		100	5,000	09/18/13	09/23/13 17:46	1034
Lead	0.53	ug/L	1.0	J	1	0.5	09/18/13	09/18/13 20:03	1034
Magnesium	56,000	ug/L	10,000		100	5,000	09/18/13	09/23/13 17:46	1034
Manganese	770	ug/L	100		100	50	09/18/13	09/23/13 17:46	1034
Mercury	2.6	ug/L	0.20		1	0.1	09/18/13	09/18/13 20:03	1034
Nickel	25	ug/L	1.0		1	0.5	09/18/13	09/18/13 20:03	1034
Potassium	11,000	ug/L	10,000		100	5,000	09/18/13	09/23/13 17:46	1034
Selenium	ND	ug/L	1.0		1	0.5	09/18/13	09/18/13 20:03	1034
Silver	ND	ug/L	1.0		1	0.5	09/18/13	09/18/13 20:03	1034
Sodium	59,000	ug/L	10,000		100	5,000	09/18/13	09/23/13 17:46	1034
Thallium	ND	ug/L	1.0		1	0.5	09/18/13	09/18/13 20:03	1034
Vanadium	ND	ug/L	5.0		1	2.5	09/18/13	09/18/13 20:03	1034
Zinc	4,300	ug/L	2,000		100	1,000	09/18/13	09/23/13 17:46	1034



SAMPLE CHAIN OF CUSTODY/AGREEMENT FORM

www.phaseonline.com
email: info@phaseonline.com

PHASE SEPARATION SCIENCE, INC.

1 CLIENT: EA ENGINEERING OFFICE LOC. H.V. MD PSS Work Order #: 13091707 PAGE 1 OF 1

PROJECT MGR: PETE LEKAS PHONE NO.: (410) 584 7000
 EMAIL: PLEKAS@EAST FAX NO.: ()
 PROJECT NAME: GUDE LF PROJECT NO.: 149261
 SITE LOCATION: GUDE LF P.O. NO.: 0007
 SAMPLERS: J. Deumond DW CERT NO.:

2

LAB NO.	SAMPLE IDENTIFICATION	DATE	TIME	MATRIX (See Codes)	CONTAINERS	SAMPLE TYPE	COMP	G = GRAB	REMARKS
1	MW-6-LF	9-16-13	1130	GW	2	G			
2	OB04A-LF	9-16-13	1245	GW	2	G			
3	OB105-LF	9-16-13	1450	GW	2	G			
4	OB06-LF	9-16-13	1545	GW	2	G			
5	DUP-LF	9-16-13	1730	GW	2	G			
6	OB11-LF	9-16-13	1730	GW	2	G			

3 Matrix Codes: DW=Drinking Wtr GW=Ground Wtr WW=Waste Wtr O=Oil S=Soil WL=Waste Liquid WS=Waste Solid W=Wipe SW=Surface Wtr

4 Requested Turnaround Time: 5-Day 3-Day 2-Day Next Day Emergency Other

Data Deliverables Required: _____

Relinquished By: (1) [Signature] Date: 9-17-13 Time: 13:01 Received By: [Signature] Received By: _____

Relinquished By: (2) _____ Date: _____ Time: _____ Received By: _____

Relinquished By: (3) _____ Date: _____ Time: _____ Received By: _____

Relinquished By: (4) _____ Date: _____ Time: _____ Received By: _____

Special Instructions: PLEASE CONTACT PETE LEKAS FOR DELIVERABLE REQ.

of Coolers: 1 Custody Seal: AKS Ice Present: Yes Temp: 10C Shipping Carrier: West

6630 Baltimore National Pike • Route 40 West • Baltimore, Maryland 21228 • (410) 747-8770 • (800) 932-9047 • Fax (410) 788-8723
 The client (Client Name), by signing, or having client's agent sign, this "Sample Chain of Custody/Agreement Form", agrees to pay for the above requested services per the latest version of the Service Brochure or PSS-provided quotation including any and all attorney's or other reasonable fees if collection becomes necessary.



Phase Separation Science, Inc

Sample Receipt Checklist

Work Order #	13091707	Received By	Robyn Rhudy
Client Name	EA Engineering, Science and Techn	Date Received	09/17/2013 01:01:00 PM
Project Name	Gude LF	Delivered By	Client
Project Number	1498201.000.7	Tracking No	Not Applicable
Disposal Date	10/22/2013	Logged In By	Robyn Rhudy

Shipping Container(s)

No. of Coolers	1	Ice	Present
Custody Seal(s) Intact?	N/A	Temp (deg C)	1
Seal(s) Signed / Dated?	N/A	Temp Blank Present	No

Documentation

COC agrees with sample labels?	Yes
Chain of Custody	Yes

Sampler Name	<u>Jesse Drummond</u>
MD DW Cert. No.	<u>N/A</u>

Sample Container

Appropriate for Specified Analysis?	Yes
Intact?	Yes
Labeled and Labels Legible?	Yes

Custody Seal(s) Intact?	Not Applicable
Seal(s) Signed / Dated	Not Applicable

Total No. of Samples Received 6

Total No. of Containers Received 12

Preservation

Metals	(pH<2)	Yes
Cyanides	(pH>12)	N/A
Sulfide	(pH>9)	N/A
TOC, COD, Phenols	(pH<2)	N/A
TOX, TKN, NH3, Total Phos	(pH<2)	N/A
VOC, BTEX (VOA Vials Rcvd Preserved)	(pH<2)	N/A
Do VOA vials have zero headspace?		N/A

Comments: (Any "No" response must be detailed in the comments section below.)

For any improper preservation conditions, list sample ID, preservative added (reagent ID number) below as well as documentation of any client notification as well as client instructions. Samples for pH, chlorine and dissolved oxygen should be analyzed as soon as possible, preferably in the field at the time of sampling. Samples which require thermal preservation shall be considered acceptable when received at a temperature above freezing to 6°C. Samples that are hand delivered on the day that they are collected may not meet these criteria but shall be considered acceptable if there is evidence that the chilling process has begun such as arrival on ice.

Samples Inspected/Checklist Completed By:

Date: 09/17/2013

Robyn Rhudy

PM Review and Approval:

Date: 09/18/2013

Lynn Moran

Analytical Report for
EA Engineering, Science and Technology, Inc.
Certificate of Analysis No.: 13091920

Project Manager: Pete Lekas

Project Name : Gude LF

Project Location: Gude LF

Project ID : 1498201.000.7



September 26, 2013
Phase Separation Science, Inc.
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Baltimore, MD 21228
Phone: (410) 747-8770
Fax: (410) 788-8723

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PHASE SEPARATION SCIENCE, INC.



September 26, 2013

Pete Lekas
EA Engineering, Science and Technology, Inc.
231 Schilling Circle
Hunt Valley, MD 21031

Reference: PSS Work Order(s) No: **13091920**
Project Name: Gude LF
Project Location: Gude LF
Project ID.: 1498201.000.7

Dear Pete Lekas :

This report includes the analytical results from the analyses performed on the samples received under the project name referenced above and identified with the Phase Separation Science (PSS) Work Order(s) numbered **13091920**.

All work reported herein has been performed in accordance with current NELAP standards, referenced methodologies, PSS Standard Operating Procedures and the PSS Quality Assurance Manual unless otherwise noted in the Case Narrative Summary. PSS is limited in liability to the actual cost of the sample analysis done.

PSS reserves the right to return any unused samples, extracts or related solutions. Otherwise, the samples are scheduled for disposal, without any further notice, on October 24, 2013. This includes any samples that were received with a request to be held but lacked a specific hold period. It is your responsibility to provide a written request defining a specific disposal date if additional storage is required. Upon receipt, the request will be acknowledged by PSS, thus extending the storage period.

This report shall not be reproduced except in full, without the written approval of an authorized PSS representative. A copy of this report will be retained by PSS for at least 5 years, after which time it will be disposed of without further notice, unless prior arrangements have been made.

We thank you for selecting Phase Separation Science, Inc. to serve your analytical needs. If you have any questions concerning this report, do not hesitate to contact us at 410-747-8770 or info@phaseonline.com.

Sincerely,

A handwritten signature in black ink that reads 'Dan Prucnal'.

Dan Prucnal
Laboratory Manager



Sample Summary

Client Name: EA Engineering, Science and Technology, Inc.

Project Name: Gude LF

Work Order Number(s): 13091920

Project ID: 1498201.000.7

The following samples were received under chain of custody by Phase Separation Science (PSS) on 09/19/2013 at 03:10 pm

Lab Sample Id	Sample Id	Matrix	Date/Time Collected
13091920-001	MW-6-3X	GROUND WATER	09/19/13 09:35
13091920-002	DUP-3X	GROUND WATER	09/19/13 09:35
13091920-003	OB04A-3X	GROUND WATER	09/19/13 10:25
13091920-004	OB105-3X	GROUND WATER	09/19/13 11:00
13091920-005	OB06-3X	GROUND WATER	09/19/13 12:10
13091920-006	OB11-3X	GROUND WATER	09/19/13 13:20

Please reference the Chain of Custody and Sample Receipt Checklist for specific container counts and preservatives. Any sample conditions not in compliance with sample acceptance criteria are described in Case Narrative Summary.

Notes:

1. The presence of a common laboratory contaminant such as methylene chloride may be considered a possible laboratory artifact. Where observed, appropriate consideration of data should be taken.
2. The following analytical results are never reported on a dry weight basis: pH, flashpoint, moisture and paint filter test.
3. Drinking water samples collected for the purpose of compliance with SDWA may not be suitable for their intended use unless collected by a certified sampler [COMAR 26.08.05.07.C.2].
4. The analyses of 1,2-dibromo-3-chloropropane (DBCP) and 1,2-dibromoethane (EDB) by EPA 524.2 and calcium, magnesium, sodium and iron by EPA 200.8 are not currently promulgated for use in testing to meet the Safe Drinking Water Act and as such cannot be used for compliance purposes. The listings of the current promulgated methods for testing in compliance with the Safe Drinking Water Act can be found in the 40 CFR part 141.1, for the primary drinking water contaminants, and part 141.3, for the secondary drinking water contaminants.
5. The analyses of chlorine, pH, dissolved oxygen, temperature and sulfite for non-potable water samples tested for compliance for Virginia Pollution Discharge Elimination System (VDPES) permits and Virginia Pollutant Abatement (VPA) permits, have a maximum holding time of 15 minutes established by 40CFR136.3.

Standard Flags/Abbreviations:

- B A target analyte or common laboratory contaminant was identified in the method blank. Its presence indicates possible field or laboratory contamination.
- C Results Pending Final Confirmation.
- E The data exceeds the upper calibration limit; therefore, the concentration is reported as estimated.
- Fail The result exceeds the regulatory level for Toxicity Characteristic (TCLP) as cited in 40 CFR 261.24 Table 1.
- J The target analyte was positively identified below the reporting limit but greater than the LOD.
- LOD Limit of Detection. An estimate of the minimum amount of a substance that an analytical process can reliably detect. An LOD is analyte and matrix specific.
- ND Not Detected at or above the reporting limit.
- RL PSS Reporting Limit.
- U Not detected.



Case Narrative Summary

Client Name: EA Engineering, Science and Technology, Inc.

Project Name: Gude LF

Work Order Number(s): 13091920

Project ID: 1498201.000.7

Any holding time exceedances, deviations from the method specifications, regulatory requirements or variations to the procedures outlined in the PSS Quality Assurance Manual are outlined below.

Sample Receipt:

All sample receipt conditions were acceptable.

Analytical:

Total Metals + Hardness

Batch: 108973

Closing CCV for Calcium (113% recovery) exceeds acceptance criteria of 90-110%

NELAP accreditation was held for all analyses performed unless noted below. See www.phaseonline.com for complete PSS scope of accreditation.

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PHASE SEPARATION SCIENCE, INC.



CERTIFICATE OF ANALYSIS

No: 13091920

EA Engineering, Science and Technology, Inc., Hunt Valley, MD
 September 26, 2013

Project Name: Gude LF
 Project Location: Gude LF
 Project ID: 1498201.000.7

Sample ID: MW-6-3X **Date/Time Sampled: 09/19/2013 09:35** **PSS Sample ID: 13091920-001**
Matrix: GROUND WATER **Date/Time Received: 09/19/2013 15:10**

Turbidity Analytical Method: EPA 180.1

	Result	Units	RL	Flag	Dil	LOD	Prepared	Analyzed	Analyst
Turbidity	3,400	NTU	2.0		10	2	09/20/13	09/20/13 09:50	1034

Total Metals + Hardness Analytical Method: SW-846 6020 A Preparation Method: 3010A

	Result	Units	RL	Flag	Dil	LOD	Prepared	Analyzed	Analyst
Antimony	ND	ug/L	5.0		1	2.5	09/23/13	09/24/13 16:31	1034
Arsenic	32	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:31	1034
Barium	390	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:31	1034
Beryllium	1.3	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:31	1034
Cadmium	ND	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:31	1034
Hardness (Ca & Mg)	430	mg/L	66		100	33	09/23/13	09/25/13 15:03	1034
Calcium	78,000	ug/L	10,000		100	5,000	09/23/13	09/25/13 15:03	1034
Chromium	12	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:31	1034
Cobalt	350	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:31	1034
Copper	54	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:31	1034
Iron	17,000	ug/L	10,000		100	5,000	09/23/13	09/25/13 15:03	1034
Lead	25	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:31	1034
Magnesium	58,000	ug/L	10,000		100	5,000	09/23/13	09/25/13 15:03	1034
Manganese	37,000	ug/L	100		100	50	09/23/13	09/25/13 15:03	1034
Mercury	0.14	ug/L	0.20	J	1	0.1	09/23/13	09/24/13 16:31	1034
Nickel	56	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:31	1034
Potassium	3,800	ug/L	100		1	50	09/23/13	09/24/13 16:31	1034
Selenium	3.8	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:31	1034
Silver	ND	ug/L	1.0		1	0.5	09/23/13	09/25/13 13:27	1034
Sodium	65,000	ug/L	10,000		100	5,000	09/23/13	09/25/13 15:03	1034
Thallium	ND	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:31	1034
Vanadium	14	ug/L	5.0		1	2.5	09/23/13	09/24/13 16:31	1034
Zinc	140	ug/L	20		1	10	09/23/13	09/24/13 16:31	1034

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PHASE SEPARATION SCIENCE, INC.



CERTIFICATE OF ANALYSIS

No: 13091920

EA Engineering, Science and Technology, Inc., Hunt Valley, MD
 September 26, 2013

Project Name: Gude LF
 Project Location: Gude LF
 Project ID: 1498201.000.7

Sample ID: DUP-3X **Date/Time Sampled: 09/19/2013 09:35** **PSS Sample ID: 13091920-002**
Matrix: GROUND WATER **Date/Time Received: 09/19/2013 15:10**

Turbidity Analytical Method: EPA 180.1

	Result	Units	RL	Flag	Dil	LOD	Prepared	Analyzed	Analyst
Turbidity	3,900	NTU	2.0		10	2	09/20/13	09/20/13 09:50	1034

Total Metals + Hardness Analytical Method: SW-846 6020 A Preparation Method: 3010A

	Result	Units	RL	Flag	Dil	LOD	Prepared	Analyzed	Analyst
Antimony	ND	ug/L	5.0		1	2.5	09/23/13	09/24/13 16:37	1034
Arsenic	42	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:37	1034
Barium	410	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:37	1034
Beryllium	1.6	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:37	1034
Cadmium	0.50	ug/L	1.0	J	1	0.5	09/23/13	09/24/13 16:37	1034
Hardness (Ca & Mg)	440	mg/L	66		100	33	09/23/13	09/25/13 14:57	1034
Calcium	79,000	ug/L	10,000		100	5,000	09/23/13	09/25/13 14:57	1034
Chromium	13	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:37	1034
Cobalt	370	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:37	1034
Copper	67	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:37	1034
Iron	16,000	ug/L	10,000		100	5,000	09/23/13	09/25/13 14:57	1034
Lead	34	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:37	1034
Magnesium	58,000	ug/L	10,000		100	5,000	09/23/13	09/25/13 14:57	1034
Manganese	37,000	ug/L	100		100	50	09/23/13	09/25/13 14:57	1034
Mercury	0.16	ug/L	0.20	J	1	0.1	09/23/13	09/24/13 16:37	1034
Nickel	58	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:37	1034
Potassium	3,900	ug/L	100		1	50	09/23/13	09/24/13 16:37	1034
Selenium	5.0	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:37	1034
Silver	1.1	ug/L	1.0		1	0.5	09/23/13	09/25/13 13:33	1034
Sodium	65,000	ug/L	10,000		100	5,000	09/23/13	09/25/13 14:57	1034
Thallium	ND	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:37	1034
Vanadium	16	ug/L	5.0		1	2.5	09/23/13	09/24/13 16:37	1034
Zinc	150	ug/L	20		1	10	09/23/13	09/24/13 16:37	1034

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PHASE SEPARATION SCIENCE, INC.



CERTIFICATE OF ANALYSIS

No: 13091920

EA Engineering, Science and Technology, Inc., Hunt Valley, MD

September 26, 2013

Project Name: Gude LF
 Project Location: Gude LF
 Project ID: 1498201.000.7

Sample ID: OB04A-3X **Date/Time Sampled: 09/19/2013 10:25** **PSS Sample ID: 13091920-003**
Matrix: GROUND WATER **Date/Time Received: 09/19/2013 15:10**

Turbidity Analytical Method: EPA 180.1

	Result	Units	RL	Flag	Dil	LOD	Prepared	Analyzed	Analyst
Turbidity	0.41	NTU	0.20		1	0.2	09/20/13	09/20/13 09:50	1034

Total Metals + Hardness Analytical Method: SW-846 6020 A Preparation Method: 3010A

	Result	Units	RL	Flag	Dil	LOD	Prepared	Analyzed	Analyst
Antimony	ND	ug/L	5.0		1	2.5	09/23/13	09/24/13 16:43	1034
Arsenic	ND	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:43	1034
Barium	51	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:43	1034
Beryllium	ND	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:43	1034
Cadmium	ND	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:43	1034
Hardness (Ca & Mg)	640	mg/L	66		100	33	09/23/13	09/25/13 14:51	1034
Calcium	120,000	ug/L	10,000		100	5,000	09/23/13	09/25/13 14:51	1034
Chromium	ND	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:43	1034
Cobalt	1.2	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:43	1034
Copper	20	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:43	1034
Iron	ND	ug/L	100		1	50	09/23/13	09/24/13 16:43	1034
Lead	ND	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:43	1034
Magnesium	82,000	ug/L	10,000		100	5,000	09/23/13	09/25/13 14:51	1034
Manganese	1,200	ug/L	100		100	50	09/23/13	09/25/13 14:51	1034
Mercury	0.11	ug/L	0.20	J	1	0.1	09/23/13	09/24/13 16:43	1034
Nickel	16	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:43	1034
Potassium	4,400	ug/L	100		1	50	09/23/13	09/24/13 16:43	1034
Selenium	ND	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:43	1034
Silver	ND	ug/L	1.0		1	0.5	09/23/13	09/25/13 13:39	1034
Sodium	87,000	ug/L	10,000		100	5,000	09/23/13	09/25/13 14:51	1034
Thallium	ND	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:43	1034
Vanadium	ND	ug/L	5.0		1	2.5	09/23/13	09/24/13 16:43	1034
Zinc	21	ug/L	20		1	10	09/23/13	09/24/13 16:43	1034

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PHASE SEPARATION SCIENCE, INC.



CERTIFICATE OF ANALYSIS

No: 13091920

EA Engineering, Science and Technology, Inc., Hunt Valley, MD
 September 26, 2013

Project Name: Gude LF
 Project Location: Gude LF
 Project ID: 1498201.000.7

Sample ID: OB105-3X **Date/Time Sampled: 09/19/2013 11:00** **PSS Sample ID: 13091920-004**
Matrix: GROUND WATER **Date/Time Received: 09/19/2013 15:10**

Turbidity Analytical Method: EPA 180.1

	Result	Units	RL	Flag	Dil	LOD	Prepared	Analyzed	Analyst
Turbidity	1,100	NTU	2.0		10	2	09/20/13	09/20/13 09:50	1034

Total Metals + Hardness Analytical Method: SW-846 6020 A Preparation Method: 3010A

	Result	Units	RL	Flag	Dil	LOD	Prepared	Analyzed	Analyst
Antimony	ND	ug/L	5.0		1	2.5	09/23/13	09/24/13 16:49	1034
Arsenic	7.8	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:49	1034
Barium	190	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:49	1034
Beryllium	3.3	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:49	1034
Cadmium	1.5	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:49	1034
Hardness (Ca & Mg)	920	mg/L	66		100	33	09/23/13	09/25/13 14:45	1034
Calcium	170,000	ug/L	10,000		100	5,000	09/23/13	09/25/13 14:45	1034
Chromium	37	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:49	1034
Cobalt	48	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:49	1034
Copper	58	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:49	1034
Iron	41,000	ug/L	10,000		100	5,000	09/23/13	09/25/13 14:45	1034
Lead	42	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:49	1034
Magnesium	120,000	ug/L	10,000		100	5,000	09/23/13	09/25/13 14:45	1034
Manganese	3,100	ug/L	100		100	50	09/23/13	09/25/13 14:45	1034
Mercury	1.4	ug/L	0.20		1	0.1	09/23/13	09/24/13 16:49	1034
Nickel	95	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:49	1034
Potassium	12,000	ug/L	10,000		100	5,000	09/23/13	09/25/13 14:45	1034
Selenium	0.69	ug/L	1.0	J	1	0.5	09/23/13	09/24/13 16:49	1034
Silver	ND	ug/L	1.0		1	0.5	09/23/13	09/25/13 13:45	1034
Sodium	150,000	ug/L	10,000		100	5,000	09/23/13	09/25/13 14:45	1034
Thallium	ND	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:49	1034
Vanadium	92	ug/L	5.0		1	2.5	09/23/13	09/24/13 16:49	1034
Zinc	490	ug/L	20		1	10	09/23/13	09/24/13 16:49	1034

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PHASE SEPARATION SCIENCE, INC.



CERTIFICATE OF ANALYSIS

No: 13091920

EA Engineering, Science and Technology, Inc., Hunt Valley, MD

September 26, 2013

Project Name: Gude LF
 Project Location: Gude LF
 Project ID: 1498201.000.7

Sample ID: OB06-3X **Date/Time Sampled: 09/19/2013 12:10** **PSS Sample ID: 13091920-005**
Matrix: GROUND WATER **Date/Time Received: 09/19/2013 15:10**

Turbidity Analytical Method: EPA 180.1

	Result	Units	RL	Flag	Dil	LOD	Prepared	Analyzed	Analyst
Turbidity	1.4	NTU	0.20		1	0.2	09/20/13	09/20/13 09:50	1034

Total Metals + Hardness Analytical Method: SW-846 6020 A Preparation Method: 3010A

	Result	Units	RL	Flag	Dil	LOD	Prepared	Analyzed	Analyst
Antimony	ND	ug/L	5.0		1	2.5	09/23/13	09/24/13 16:55	1034
Arsenic	ND	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:55	1034
Barium	170	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:55	1034
Beryllium	ND	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:55	1034
Cadmium	ND	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:55	1034
Hardness (Ca & Mg)	580	mg/L	66		100	33	09/23/13	09/25/13 14:39	1034
Calcium	140,000	ug/L	10,000		100	5,000	09/23/13	09/25/13 14:39	1034
Chromium	ND	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:55	1034
Cobalt	5.2	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:55	1034
Copper	3.3	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:55	1034
Iron	130	ug/L	100		1	50	09/23/13	09/24/13 16:55	1034
Lead	ND	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:55	1034
Magnesium	57,000	ug/L	10,000		100	5,000	09/23/13	09/25/13 14:39	1034
Manganese	520	ug/L	100		100	50	09/23/13	09/25/13 14:39	1034
Mercury	0.15	ug/L	0.20	J	1	0.1	09/23/13	09/24/13 16:55	1034
Nickel	9.4	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:55	1034
Potassium	3,900	ug/L	100		1	50	09/23/13	09/24/13 16:55	1034
Selenium	ND	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:55	1034
Silver	ND	ug/L	1.0		1	0.5	09/23/13	09/25/13 13:51	1034
Sodium	98,000	ug/L	10,000		100	5,000	09/23/13	09/25/13 14:39	1034
Thallium	ND	ug/L	1.0		1	0.5	09/23/13	09/24/13 16:55	1034
Vanadium	ND	ug/L	5.0		1	2.5	09/23/13	09/24/13 16:55	1034
Zinc	19	ug/L	20	J	1	10	09/23/13	09/24/13 16:55	1034

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PHASE SEPARATION SCIENCE, INC.



CERTIFICATE OF ANALYSIS

No: 13091920

EA Engineering, Science and Technology, Inc., Hunt Valley, MD
 September 26, 2013

Project Name: Gude LF
 Project Location: Gude LF
 Project ID: 1498201.000.7

Sample ID: OB11-3X **Date/Time Sampled: 09/19/2013 13:20** **PSS Sample ID: 13091920-006**
Matrix: GROUND WATER **Date/Time Received: 09/19/2013 15:10**

Turbidity Analytical Method: EPA 180.1

	Result	Units	RL	Flag	Dil	LOD	Prepared	Analyzed	Analyst
Turbidity	0.41	NTU	0.20		1	0.2	09/20/13	09/20/13 09:50	1034

Total Metals + Hardness Analytical Method: SW-846 6020 A Preparation Method: 3010A

	Result	Units	RL	Flag	Dil	LOD	Prepared	Analyzed	Analyst
Antimony	ND	ug/L	5.0		1	2.5	09/23/13	09/24/13 17:01	1034
Arsenic	0.62	ug/L	1.0	J	1	0.5	09/23/13	09/24/13 17:01	1034
Barium	22	ug/L	1.0		1	0.5	09/23/13	09/24/13 17:01	1034
Beryllium	ND	ug/L	1.0		1	0.5	09/23/13	09/24/13 17:01	1034
Cadmium	9.8	ug/L	1.0		1	0.5	09/23/13	09/24/13 17:01	1034
Hardness (Ca & Mg)	580	mg/L	66		100	33	09/23/13	09/25/13 14:33	1034
Calcium	120,000	ug/L	10,000		100	5,000	09/23/13	09/25/13 14:33	1034
Chromium	ND	ug/L	1.0		1	0.5	09/23/13	09/24/13 17:01	1034
Cobalt	1.5	ug/L	1.0		1	0.5	09/23/13	09/24/13 17:01	1034
Copper	2.9	ug/L	1.0		1	0.5	09/23/13	09/24/13 17:01	1034
Iron	ND	ug/L	100		1	50	09/23/13	09/24/13 17:01	1034
Lead	ND	ug/L	1.0		1	0.5	09/23/13	09/24/13 17:01	1034
Magnesium	68,000	ug/L	10,000		100	5,000	09/23/13	09/25/13 14:33	1034
Manganese	780	ug/L	100		100	50	09/23/13	09/25/13 14:33	1034
Mercury	2.1	ug/L	0.20		1	0.1	09/23/13	09/24/13 17:01	1034
Nickel	30	ug/L	1.0		1	0.5	09/23/13	09/24/13 17:01	1034
Potassium	4,300	ug/L	100		1	50	09/23/13	09/24/13 17:01	1034
Selenium	ND	ug/L	1.0		1	0.5	09/23/13	09/24/13 17:01	1034
Silver	ND	ug/L	1.0		1	0.5	09/23/13	09/25/13 13:57	1034
Sodium	71,000	ug/L	10,000		100	5,000	09/23/13	09/25/13 14:33	1034
Thallium	ND	ug/L	1.0		1	0.5	09/23/13	09/24/13 17:01	1034
Vanadium	ND	ug/L	5.0		1	2.5	09/23/13	09/24/13 17:01	1034
Zinc	42	ug/L	20		1	10	09/23/13	09/24/13 17:01	1034



SAMPLE CHAIN OF CUSTODY/AGREEMENT FORM

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email: info@phaseonline.com

PHASE SEPARATION SCIENCE, INC.

1 CLIENT: EA Environmental Science, Inc. OFFICE LOC. H.V. MD
 PROJECT MGR: Peter Letkas PHONE NO.: 410-581-3000
 EMAIL: PLETKAS@EASCI.COM ()
 PROJECT NAME: GUSE LF PROJECT NO: 1498201
 SITE LOCATION: GUSE LF P.O. NO.:
 SAMPLERS: J. DAVENPORT DW CERT NO.:

PSS Work Order #: 13091920 PAGE 1 OF 1

Matrix Codes:
 SW=Surface Wtr DW=Drinking Wtr GW=Ground Wtr WW=Waste Wtr O=Oil S=Soil WL=Waste Liquid WS=Waste Solid W=Wipe

LAB NO.	SAMPLE IDENTIFICATION	DATE	TIME	MATRIX (See Codes)	CONTAINER NO.	SAMPLE TYPE	Preservatives Used	Analysis/Method Required	REMARKS
1	MW-6-3X	11-19-09	0935	GW	2	C			High Turb.
2	DUP-3X	11-19-09	0935	GW	2	C			H. Col Turb.
3	OB04A-3X	10-25	1025		2	C			
4	OB105-3X	11-08	1100		2	C			
5	OB06-3X	12-19	1210		2	C			
6	OB11-3X	13-20	1320		2	C			High Turb.

5 Relinquished By: (1) [Signature] Date: 9-11-13 Time: 15:10 Received By: [Signature]
 Relinquished By: (2) [Signature] Date: Time: Received By:
 Relinquished By: (3) Date: Time: Received By:
 Relinquished By: (4) Date: Time: Received By:

4 Requested Turnaround Time: 5-Day 3-Day 2-Day
 Next Day Emergency Other
 Data Deliverables Required:
 # of Coolers: 1
 Custody Seal: Abs
 Ice Present: Pres Temp: 1°C
 Shipping Carrier: Client
 Special Instructions:



Phase Separation Science, Inc

Sample Receipt Checklist

Work Order #	13091920	Received By	Robyn Rhudy
Client Name	EA Engineering, Science and Techn	Date Received	09/19/2013 03:10:00 PM
Project Name	Gude LF	Delivered By	Client
Project Number	1498201.000.7	Tracking No	Not Applicable
Disposal Date	10/24/2013	Logged In By	Lynn Moran

Shipping Container(s)

No. of Coolers	1	Ice	Present
Custody Seal(s) Intact?	N/A	Temp (deg C)	1
Seal(s) Signed / Dated?	N/A	Temp Blank Present	No

Documentation

COC agrees with sample labels?	Yes
Chain of Custody	Yes

Sampler Name	<u>Jesse Drummond</u>
MD DW Cert. No.	<u>N/A</u>

Sample Container

Appropriate for Specified Analysis?	Yes
Intact?	Yes
Labeled and Labels Legible?	Yes

Custody Seal(s) Intact?	Not Applicable
Seal(s) Signed / Dated	Not Applicable

Total No. of Samples Received 6

Total No. of Containers Received 12

Preservation

Metals	(pH<2)	Yes
Cyanides	(pH>12)	N/A
Sulfide	(pH>9)	N/A
TOC, COD, Phenols	(pH<2)	N/A
TOX, TKN, NH3, Total Phos	(pH<2)	N/A
VOC, BTEX (VOA Vials Rcvd Preserved)	(pH<2)	N/A
Do VOA vials have zero headspace?		N/A

Comments: (Any "No" response must be detailed in the comments section below.)

For any improper preservation conditions, list sample ID, preservative added (reagent ID number) below as well as documentation of any client notification as well as client instructions. Samples for pH, chlorine and dissolved oxygen should be analyzed as soon as possible, preferably in the field at the time of sampling. Samples which require thermal preservation shall be considered acceptable when received at a temperature above freezing to 6°C. Samples that are hand delivered on the day that they are collected may not meet these criteria but shall be considered acceptable if there is evidence that the chilling process has begun such as arrival on ice.

Samples Inspected/Checklist Completed By:

Date: 09/19/2013

Lynn Moran

PM Review and Approval:

Date: 09/20/2013

Simon Crisp