ANNUAL CLASS I WELL REPORT
Waste Disposal Well #1
January – December 2015

Western Refining Southwest, Inc.
Bloomfield Terminal
Bloomfield, New Mexico
Permit # - UIC-CL1-009
API # - 30-45-29002

Submitted January 28, 2016

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(163)

Western Refining

WNR LISTED NYSE

OIL CONS. DIV DIST. 3

FEB 01 2016

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January 28, 2016

Carl Chavez
New Mexico Oil Conservation Division
Environmental Bureau
1220 South St. Francis Dr
Santa Fe, NM 87505

UPS Tracking #: 1Z 881 839 01 7251 4684

RE: Western Refining Southwest, Inc. - Bloomfield Terminal
2015 Annual Class I Well Report
Non-Hazardous Injection Well
Permit # - UIC-CL-009
API # - 30- 45-29002

Mr. Chavez,

Western Refining Southwest, Inc. – Bloomfield Terminal ("Western") is submitting the *2015 Annual Class I Well Report* documenting the operations of the facility's Class I non-hazardous injection well during 2015. The well is located in the NE/4, SE/4 of Section 27, Township 29 North, Range 11West, NMPM, San Juan County, New Mexico and is operated by Western Refining Southwest, Inc. Due to complications that arose during the initiation of the Mechanical Integrity Test in September 2015, the injection well has since been plugged and abandoned following approval by the New Mexico Environment Department Oil Conservation Division (NMOCD). This report will be the final report for the above referenced injection well.

If you need more information, please contact me at (505) 632-8013.

Sincerely,

Ron Weaver
Regional Terminals Manager
Western Refining Southwest, Inc.

Cc: Brandon Powell (NMOCD Aztec District Office)
Randy Schmaltz (WNR – Bloomfield)
Allen Hains – Western Refining (WNR - El Paso)

Certification

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

Ron Weaver
Regional Terminals Manager

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EXECUTIVE SUMMARY

This report provides a summary of activities conducted in 2015 on Waste Disposal Well #1 (WDW-#1) at the Western Refining Bloomfield ("Western") facility. The following is a summary of well operations and well testing activities performed in 2015.

Operational Summary

Injection Volume - The volume injected into the disposal well during 2015 was 10,386,505 gallons. Western suspended refining operations at the Bloomfield Refinery on November 23, 2009. The facility currently operates as a Bulk Terminal. The crude unloading and product loading racks, storage tanks and other supporting equipment remain in operation.

Sampling and Chemical Analyses - Injection fluids samples were collected on a quarterly basis for chemical analysis, with the following exception. A quarterly sample was not collected during the fourth quarter of 2015 due to the fact that the injection well was not in operation beyond September 22, 2015 as it was plugged and abandoned. Quarterly samples were collected during the 1st, 2nd, and 3rd quarters of 2015. Analytical results did not exhibit characteristics of being a hazardous waste.

Maintenance Operations – On September 22, 2015 Western Refining was scheduled to conduct the annual Mechanical Integrity Test (MIT), Bradenhead, and High Pressure Shutdown Test with a representative of NMOCD present to observe. The Bradenhead Test and High Pressure Shutdown Test passed. In the course of setting up the MIT test, the annulus casing showed a sudden increase in pressure. The test was suspended and the well was shut down. Western began troubleshooting the problem by pressure testing the injection well tubing. The results of the pressure test showed the integrity of the tubing to be good. Western, at this point, believed the issue was with the well packer. This began the attempt to remove the well packer to have it replaced. In the process of attempting to retrieve the packer the well casing was damaged. The damage was determined to un-salvageable and prompted the decision to have the well plugged and

abandoned. Western received conditional approval on October 26th, 2015 from NMOCD District 3 to plug and abandon the well. Well abandonment activities commenced the week of October 26th, 2015 with a representative from OCD on-site to witness the plugging activities. Associated C-103s are included in Appendix A.

Mechanical Integrity Tests - The 2015 MIT was not conducted as the well failed before the test could be set up. The failure took place on September 22, 2015 and the well was shut down as a result of the failure.

Area of Review (AOR) - No wells are known to be currently producing petroleum from the Mesaverde injection zone within the AOR, a one-mile radius of WDW #1.

Recommendations

Western no longer operates the injection well as a result of un-repairable damage. Western went through the required process to have the well plugged and abandoned. This will be the final report submitted for this well.

1.0 INTRODUCTION

This report provides a summary of activities conducted during 2015 on Waste Disposal Well #1 (WDW #1). The disposal well was part of the Western Bloomfield Terminal facility operations. The facility is located south of Bloomfield, New Mexico in San Juan County. The well location is depicted in Figure 1. The physical address of the facility is as follows:

Bloomfield Terminal
#50 County Road 4990
Bloomfield, NM 87413

The Bloomfield Terminal is located on approximately 263 acres. Bordering the facility is a combination of federal and private properties. Public property managed by the Bureau of Land Management lies to the south. The majority of undeveloped land in the vicinity of the facility is used extensively for oil and gas production and, in some instances, grazing. U.S. Highway 550 is located approximately one-half mile west of the facility. The topography of the main portion of the site is generally flat with steep bluffs to the north.

WDW #1 is owned by San Juan Refining Company, a New Mexico corporation. It is operated by Western Refining Southwest, Inc. formerly known as Giant Industries Arizona, Inc. an Arizona corporation.

1.1 Well Information

Well Name & Number:	Waste Disposal Well #1
OCD UIC:	UIC-CL1-009
OCD Discharge Plan Permit Number:	GW-130
Well Classification:	Class I Non-hazardous
API Number:	30-045-29002
Legal Location:	1250 FEL, 2442FSL, I Sec 27 T29S R11E
Physical Address:	#50 Road 4990, Bloomfield, NM 87413

2.0 SUMMARY OF ACTIVITIES

The following list of activities was conducted in 2015 on WDW #1 located at the Bloomfield facility:

- 02/17/15 1st Quarter 2015 Sampling Event
- 04/01/15 2nd Quarter 2015 Sampling Event
- 07/01/15 3rd Quarter 2015 Sampling Event
- 09/22/15 Braidenhead Test
- 09/22/15 High Pressure Shutdown Test

An analytical sample was not collected during the fourth quarter of 2015 due to the fact that the injection well was not operational for the quarter. Quarterly samples collected for laboratory analysis were submitted to Hall Environmental Laboratories located in Albuquerque, New Mexico. Copies of the analytical reports are provided in Appendix B. A summary of the analytical results is provided in Table 3.

A representative of New Mexico Oil Conservation Division (NMOCD) was on-site to witness the Bradenhead Test, High Pressure Shutdown Test, and MIT on September 22, 2015. Only the Braidenhead and High Pressure Tests were conducted successfully. While setting up the MIT test the well failed and prevented the tests from being preformed.

On September 22, 2015 Western Refining was scheduled to conduct the annual MIT, Bradenhead and, High Pressure Shutdown Test with a representative of NMOCD present to observe. The Bradenhead Test and High Pressure Shutdown Test passed. In the course of setting up the MIT test, the annulus casing showed a sudden increase in pressure. The test was suspended and the well was shut down. Western began troubleshooting the problem by pressure testing the injection well tubing. The results of the pressure test showed the integrity of the tubing to be good. Western, at this point, believed the issue was with the well packer. This began the attempt to remove the well packer to have it replaced. In the process of attempting to retrieve the packer the well casing was damaged. The damage was determined to un-salvageable and prompted the decision to have the well plugged and abandoned. Western received conditional approval on October 26th, 2015 from NMOCD District 3 to plug and abandon the well. Well abandonment

activities commenced the week of October 26th, 2015 with a representative from OCD on-site to witness the plugging activities. Associated C-103s are included in Appendix A.

3.0 INJECTION VOLUME

The Monthly Injection Well Report summarizing injection volumes and well performance parameters is presented as Table 1.

3.1 Injection Volume

The volume injected into the disposal well during 2015 was 10,386,505 gallons. Throughout 2015 the injection well operated within the operational limits of less than 1,150 psi.

3.2 Injection Well Down-Time

The injection well was down approximately 4,789 hours in 2015. The well was permanently shut down on September 22, 2015.

4.0 SAMPLING AND CHEMICAL ANALYSIS

Samples were collected of the injection water on a quarterly basis and analyzed for the following per Item #9 of the Bloomfield Refinery Class I (Non-Hazardous) Disposal Well UIC-CL1-009 (GW-130) Discharge Permit Renewal dated March 23, 2004:

- Volatile Organic Compounds (VOCs);
- Semi-Volatile Organic Compounds (SVOCs);
- General Chemistry Parameters (included calcium, potassium, magnesium, sodium, bicarbonate, carbonate, chloride, sulfate, total dissolved solids, pH, and conductivity);
- RCRA 8 Metals; and
- RCRA Characteristics for Ignitability, Corrosivity, and Reactivity.

Fourth quarter samples were not collected due to the well not being operational during that time. First quarter samples were collected February 17, 2015. Second quarter samples were collected April 1, 2015. Third quarter samples were collected July 1, 2015. A summary of the analytical results is provided in Table 3.

All quarterly samples collected for laboratory analysis were submitted to Hall Environmental Analysis Laboratory located in Albuquerque, NM. The analytical results conclude that the injected water did not exhibit characteristics of hazardous waste. The respective quarterly analytical reports and Laboratory Quality Assurance Plan are provided in Appendices B and C, respectively.

5.0 TESTING AND MAINTENANCE ACTIVITIES

In addition to the conducting general preventative maintenance activities on the injection well equipment, the following testing and well maintenance activities were conducted during 2015:

- High-pressure shutdown and Bradenhead Testing.
- Well maintenance to fix problems with the well
- Plug and abandonment of the well

The Mechanical Integrity Testing (MIT) did not take place since the well as not able to be repaired. All activities were conducted following NMOCD approval, and such documentation is provided in Appendix A. The following is a brief summary of the testing and well maintenance activities conducted in 2015.

5.1 Mechanical Integrity Testing

A representative of New Mexico Oil Conservation Division (NMOCD) was on-site to witness a High Pressure Shutdown Test, Bradenhead Test, and MIT on September 22, 2015. The Bradenhead and High Pressure Shutdown test were witnessed by Monica Kuehling of NMOCD-Aztec and the MIT test was not able to be preformed.

5.2 Down-hole maintenance

On September 22, 2015 Western Refining was scheduled to conduct the annual MIT, Bradenhead, and High Pressure Shutdown Test with a representative of NMOCD present to observe. The Bradenhead Test and High Pressure Shutdown Test passed. In the course of setting up the MIT test, the annulus casing showed a sudden increase in pressure. The test was suspended and the well was shut down. Western began troubleshooting the problem by pressure testing the injection well tubing. The results of the pressure test showed the integrity of the tubing to be good. Western, at this point, believed the issue was with the well packer. This began the attempt to remove the well packer to have it replaced. In the process of attempting to retrieve the packer the well casing was damaged. The damage was determined to un-salvageable and prompted the decision to

have the well plugged and abandoned. Western received conditional approval on October 26th, 2015 from NMOCD District 3 to plug and abandon the well. Well abandonment activities commenced the week of October 26th, 2015 with a representative from OCD on-site to witness the plugging activities. Associated C-103s are included in Appendix A.

6.0 WELL EVALUATION

6.1 Well Evaluation

Between January 2015 and September 2015, the injection well operated normally and within the operation limit of 1,150 psi. The well was permanently shut down on September 22, 2015.

6.2 Area of Review (AOR)

The Area of Review data was updated in the 2011 Annual Bottom hole Pressure Surveys and Pressure Fall-Off Tests for Waste Disposal Well #1Report (Cobb & Associates, 2011). At that time, no new wells are known to have been installed within the one-mile radius.

Fifty-eight wells were found within a one-mile radius of WDW #1, which injects water into the Mesaverde formation. The wells and status are spotted on an area map, Figure 3, with a well number listed with the well data in Table 2. Of these wells, 15 have been plugged and abandoned. Four wells are classified as dry holes and are believed to be plugged and abandoned. Twenty-four wells produce petroleum from shallow zones. One well is an Entrada injection well. Fourteen wells produce petroleum from the Dakota and Gallup zones, which are deeper than the Mesaverde interval used for injection purposes. No wells are producing from the injection interval within a one-mile radius of WDW #1.

Twenty-four of the 59 wells have penetrated the injection zone. Of these, three have been plugged. Five wells are currently producing from shallow zones and 14 wells produce from deep zones. There are two injection wells including WDW #1 and Ashcroft SWD #1 well.

No wells are currently producing petroleum from the Mesaverde injection zone within the AOR, a one-mile radius of WDW #1.

7.0 CONCLUSIONS AND RECOMMENDATIONS

The following is a summary of well operations and well testing activities performed in 2014.

7.1 Conclusions

Injection Volume - The volume injected into the disposal well during 2015 was 10,386,505 gallons. Western suspended refining operations at the Bloomfield Refinery on November 23, 2009. The crude unloading and product loading racks, storage tanks and other supporting equipment remain in operation.

Sampling and Chemical Analyses - Injection fluids samples were collected for chemical analysis on a quarterly basis when the well was operational. Analytical results did not exhibit characteristics of hazardous waste.

Maintenance Operations - Down-hole maintenance activities were conducted in 2015 to attempt to repair the injection well. The well was beyond repair and went through the process to have it plugged and abandoned.

Mechanical Integrity Tests - The 2015 well testing program witnessed by a representative of OCD included a High-Pressure Shutdown Test and a Bradenhead Test. The MIT was not conducted since the well was not able to resume operation.

Well Evaluation – The injection well operated normally between January and September 2015 within the operational limit of 1,150 psi throughout 2015.

Area of Review (AOR) - No wells are currently producing petroleum from the Mesaverde injection zone within the AOR, a one-mile radius of WDW #1.

7.2 Recommendations

Western no longer operates the injection well as it has failed and was permanently plugged and abandoned. This will be the final report submitted for this well.

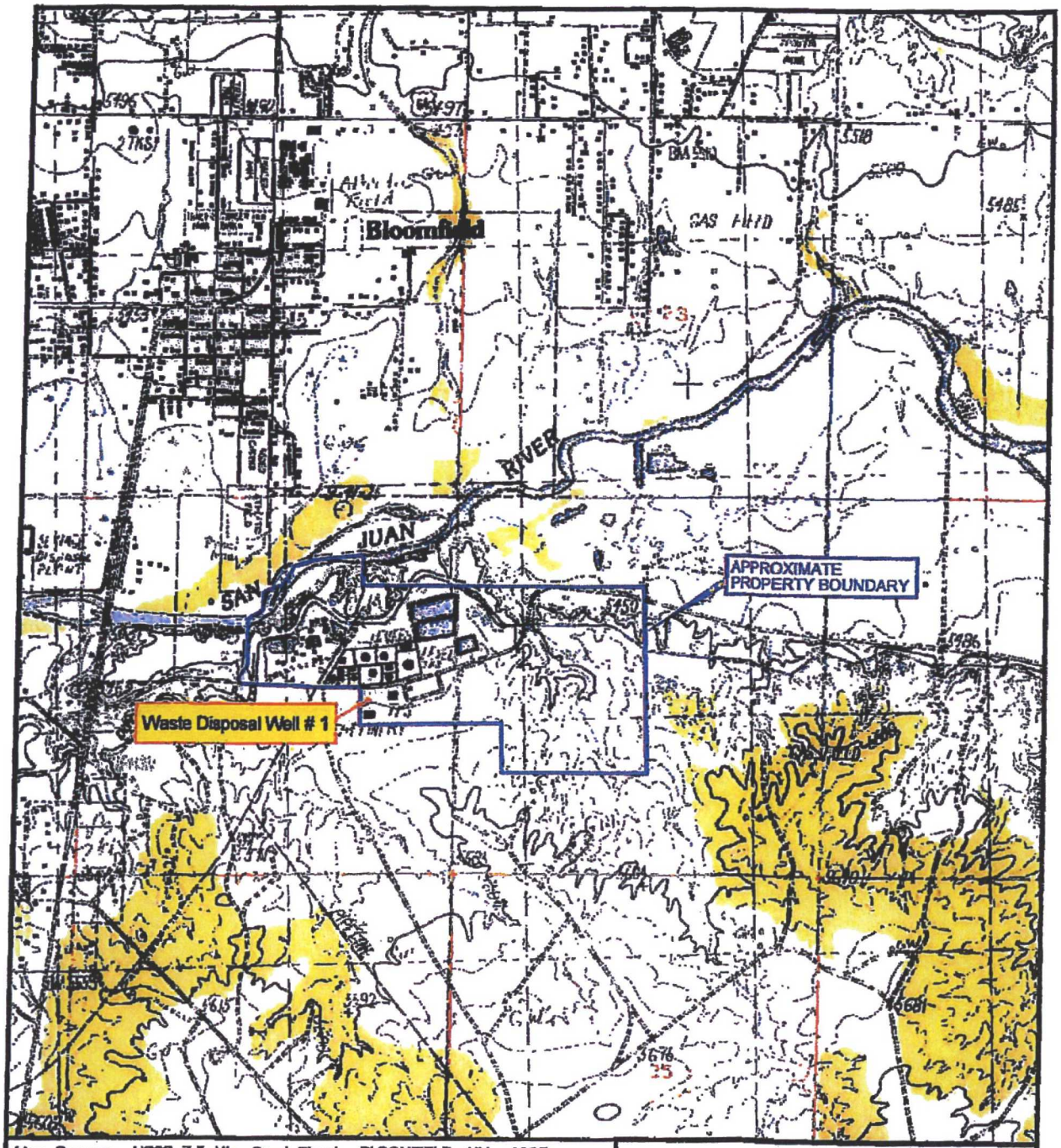
8.0 REFERENCES

Cobb & Associates, 2009a, Evaluation of Disposal Well #1 Bloomfield Refinery, August 26, 2009.

Cobb & Associates, 2011, 2011 Annual Bottom hole Pressure Surveys and Pressure Fall-Off Tests for Waste Disposal Well #1Report December 21, 2011.

Bloomfield Refinery Class I (Non-Hazardous) Disposal Well UIC-CL1-009 (GW-130) Discharge Permit Renewal dated March 23, 2004.

FIGURES



Map Source: USGS 7.5 Min. Quad Sheet BLOOMFIELD, NM., 1985.

N

0 2000

SCALE IN FEET

QUADRANGLE LOCATION

Western Refining

WESTERN REFINING SOUTHWEST

PROJ. NO.: Western Refining | DATE: 01/06/10 | FILE: WestRef-A25

FIGURE 1
SITE LOCATION MAP

WESTERN REFINING DISPOSAL WELL #1

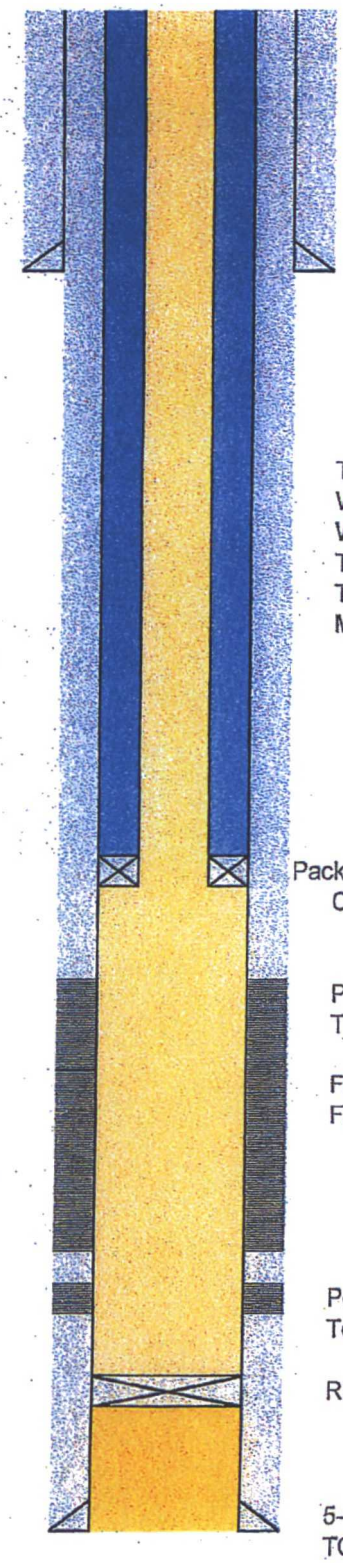
NW, SW SECTION 26, T29N, R11W

NO.: 30-045-29002

SUBSURFACE
HOUSTON, TX
SOUTH BEND, IN
BATON ROUGE, LA

FIGURE 1
DISPOSAL WELL #1 WELL SCHEMATIC
Western Refining Inc.
Bloomfield, NM

Date:	4/26/2006	Approved By:	rls	Job No.:	70F5830
Drawn By:	rls	Checked By:		Scale:	N/A



8-5/8", 48#/ft, Surface Casing @ 830'
TOC: Surface
Hole Size: 11.0"

Tubing: 2-7/8", Acid Resistant Fluoroline Cement Lined
Wt of Tubing: 6.5 #/ft
Wt of Tubing Lined: 7.55 #/ft
Tubing ID: 2.128"
Tubing Drift ID: 2.000"
Minimum ID @ Packer: ~1.87" estimated

Packer: Unknown Packer Type @ 3221'
Could be a Guiberson or similar model Uni-6

Perforations: 3276' - 3408' 4JSPF 0.5 EHD
Top of the Cliff House Formation: 3276'

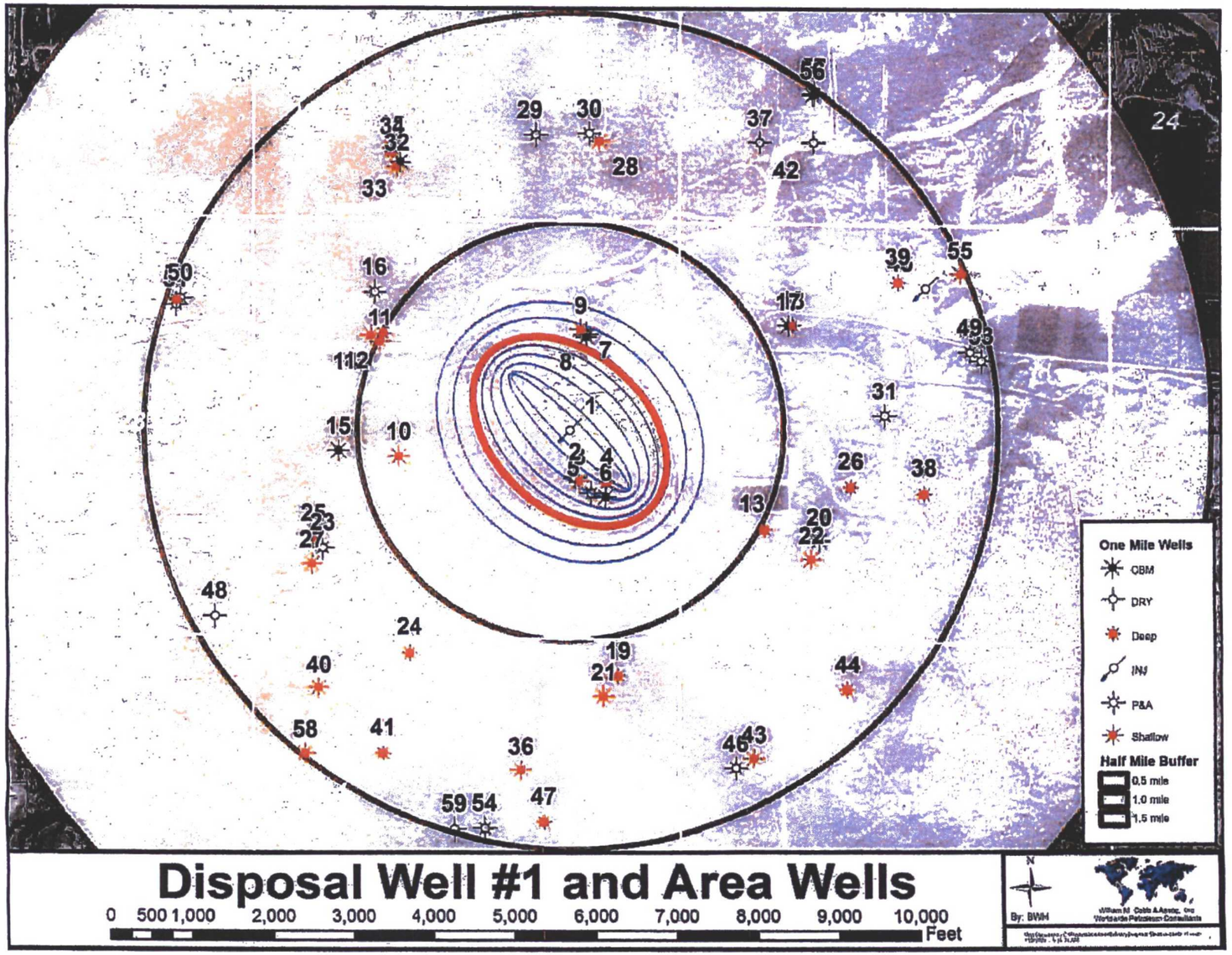
Fill was cleaned out of well on 4/20/06
Fill was orginally tagged at 3325'

Perforations: 3435' - 3460' 4JSPF 0.5 EHD
Top of the Menefee Formation: 3400'

RBP: 3520'

5-1/2", 15.5#/ft, Production Casing @3600'
TOC: Surface
Hole Size: 7-7/8"

Figure 3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One Mile Wells
OBM
DRY
Deep
INJ
P&A
Shallow
Half Mile Buffer
0.5 mile
1.0 mile
1.5 mile
Disposal Well #1 and Area Wells
0 500 1,000 2,000 3,000 4,000 5,000 6,000 7,000 8,000 9,000 10,000
Feet
N
By: BWH

TABLES

TABLE 1

WESTERN REFINING SOUTHWEST, INC. - BLOOMFIELD TERMINAL
P.O. BOX 159
BLOOMFIELD, NEW MEXICO 87413

QUARTERLY INJECTION WELL REPORT
DISCHARGE PLAN GW-130
NE1/4 SE1/4 SECTION 27, T29N, R11W
NMPM, SAN JUAN COUNTY, NEW MEXICO

PERIOD 2015	AMOUNT OF WATER FROM RIVER (GALLONS)	AMOUNT TO SOLAR EVAP PONDS (GALLONS)	TOTALIZER AMOUNT INJECTED (GALLONS)	DOWN-TIME (HRS)	INJECTION PRESSURE			ANNULAR PRESSURE			ON-LINE FLOW RATES		
					MAX (PSIA)	MIN (PSIA)	AVG (PSIA)	MAX (PSIA)	MIN (PSIA)	AVG (PSIA)	MAX (GPM)	MIN (GPM)	AVG (GPM)
JAN	380	1,416,000	-	744	850	823	836	157	128	147	0	0	0
FEB	1,293	-	1,435,535	231	1071	817	979	173	127	159	59	0	35
MAR	578	-	1,957,682	109	1106	871	1044	210	141	157	54	0	43
APR	1,317	285,307	1,137,693	298	1067	854	946	207	140	164	53	0	25
MAY	990	2,156,000	-	744	875	836	853	193	119	150	0	0	0
JUN	635	2,267,159	1,468,841	119	1090	834	991	188	133	157	54	29	40
JUL	587	1,292,517	1,497,483	152	1108	860	1025	174	115	153	47	36	41
AUG	-	580,533	1,765,467	0	1082	1025	1063	191	132	166	43	34	39
SEP	-	2,010,196	1,123,804	184	1104	982	1059	199	139	169	41	24	36
OCT	-	-	-	-	-	-	-	-	-	-	-	-	-
NOV	-	-	-	-	-	-	-	-	-	-	-	-	-
DEC	-	-	-	-	-	-	-	-	-	-	-	-	-

The total amount injected in 2015 is: **10,386,505** gallons NOTE: Well was abaondoned October 28, 2015

CERTIFICATION: Kelly Roberson DATE: 10-29-2015

Table 2

Map Seq.	Miles to DW1	WELLNAME	#	APINO	Perf Top	Perf Bottom	Total Depth	P&A Date	ULSTR	OPERATOR	RESERVOIR	Status	Pen. Inj. Zone
1	0.00	DISPOSAL	1	30-045-29002	3276	3514	3514		I-27-29N-11W	WESTERN REFINING	MESAVERDE	INJ	Yes
2	0.11	DAVIS GAS COM F	1	30-045-07825	6157	6298	6298	19-Jan-94	I-27-29N-11W	BP AMERICA	DAKOTA	P&A	Yes
3	0.12	DAVIS GAS COM G	1	30-045-23554	2827	2839	2839		I-27-29N-11W	XTO ENERGY, INC	CHACRA	Shallow	No
4	0.15	DAVIS GAS COM F	1R	30-045-30833	5314	5646	6177		I-27-29N-11W	XTO ENERGY, INC	GALLUP	Deep	Yes
5	0.16	Davis Pooled Unit	1	30-045-07812			1717	18-Oct-82	I-27-29N-11W	Pre-Ongard	PICTURED CLIFFS	P&A	No
6	0.18	JACQUE	1	30-045-34463	1543	1714	1714		I-27-29N-11W	HOLCOMB O&G	FRUITLAND COAL	CBM	No
7	0.23	JACQUE	2	30-045-34409	1483	1689	1689		H-27-29N-11W	HOLCOMB O&G	FRUITLAND COAL	CBM	No
8	0.23	Davis PU/FB Umbarger	2	30-045-07883			1800	18-Aug-55	H-27-29N-11W	Pre-Ongard		P&A	No
9	0.24	DAVIS GAS COM F	1E	30-045-24084	2701	2810	6262		H-27-29N-11W	XTO ENERGY, INC	CHACRA	Shallow	Yes
10	0.41	CONGRESS	18	30-045-25673	1680	1770	5808		K-27-29N-11W	Burlington	PICTURED CLIFFS	Shallow	Yes
11	0.49	LAUREN KELLY	1	30-045-27361	1326	1354	1354		F-27-29N-11W	MANANA GAS INC	FRUITLAND SAND	Shallow	No
12	0.49	MANGUM	1E	30-045-24673	6024	6160	6160		F-27-29N-11W	Burlington	DAKOTA	Deep	Yes
13	0.51	CALVIN	1	30-045-12003	6176	6348	6348		M-26-29N-11W	Burlington	DAKOTA	Deep	Yes
14	0.52	MARIAN S	1	30-045-27365	2578	2710	2710		F-27-29N-11W	MANANA GAS INC	CHACRA	Shallow	No
15	0.55	MANGUM	1	30-045-07835	1388	1661	6214		L-27-29N-11W	Burlington	FRUITLAND COAL	CBM	Yes
16	0.56	Black Diamond	1	30-045-07896			800	09-Nov-78	C-27-29N-11W	Pre-Ongard		P&A	No
17	0.57	DAVIS GAS COM J	1	30-045-25329	1462	1645	4030		F-26-29N-11W	HOLCOMB O&G	FRUITLAND COAL	CBM	Yes
18	0.58	SULLIVAN GAS COM D	1E	30-045-24083	6086	6242	6242		F-26-29N-11W	XTO ENERGY, INC	DAKOTA	Deep	Yes
19	0.60	CONGRESS	16	30-045-25657	6086	6148	6148		A-34-29N-11W	Burlington	GALLUP	Deep	Yes
20	0.64	CALVIN	100	30-045-31118	1468	1760	1760		N-26-29N-11W	Burlington	FRUITLAND COAL	CBM	No
21	0.64	SUMMIT	9	30-045-24574	2747	2857	2857		A-34-29N-11W	Burlington	CHACRA	Shallow	No
22	0.64	CONGRESS	9	30-045-24572	2746	2869	2869		N-26-29N-11W	ENERGEN	CHACRA	Shallow	No
23	0.64	Garland "B"	1	30-045-07903	1664	1747	1747	27-Jun-75	M-27-29N-11W	Pre-Ongard	PICTURED CLIFFS	P&A	No
24	0.65	SUMMIT	15	30-045-25707	5326	5970	5970		C-34-29N-11W	ENERGEN	GALLUP	Deep	Yes

Table 2

Map Seq.	Miles to DW1	WELLNAME	#	APINO	Perf Top	Perf Bottom	Total Depth	P&A Date	ULSTR	OPERATOR	RESERVOIR	Status	Pen. Inj. Zone
25	0.65	GARLAND	3	30-045-24573	2668	2790	2790		M-27-29N-11W	ENERGEN	CHACRA	Shallow	No
26	0.67	CALVIN	3	30-045-25612	5295	5870	5870		K-26-29N-11W	Burlington	GALLUP	Deep	Yes
27	0.68	GARLAND B	1R	30-045-21732	1648	1678	1678		M-27-29N-11W	Burlington	PICTURED CLIFFS	Shallow	No
28	0.70	NANCY HARTMAN	2	30-045-26721	2627	2754	2754		P-22-29N-11W	MANANA GAS INC	CHACRA	Shallow	No
29	0.71	GRACE PEARCE	1	30-045-07959	1380	1466	1466	02-Mar-00	O-22-29N-11W	JOHN C PICKETT	FRUITLAND SAND	P&A	No
30	0.72	HARTMAN	1	30-045-07961	6072	6274	6274	14-Jun-99	P-22-29N-11W	MANANA GAS INC	DAKOTA	P&A	Yes
31	0.73	Davis	1	30-045-07776			1917	11-Nov-58	M-26-29N-11W	Pre-Ongard	(N/A)	P&A	No
32	0.75	MARY JANE	1	30-045-26731	2622	2732	2732		N-22-29N-11W	MANANA GAS INC	CHACRA	Shallow	No
33	0.76	ROYAL FLUSH	1	30-045-34312	1440	1608	1608		N-22-29N-11W	MANANA GAS INC	FRUITLAND COAL	CBM	No
34	0.79	COOK	1	30-045-07940	6052	6226	6226		N-22-29N-11W	MANANA GAS INC	DAKOTA	Deep	Yes
35	0.79	COOK	2	30-045-13089	1390	1410	1410		N-22-29N-11W	MANANA GAS INC	FRUITLAND SAND	Shallow	No
36	0.82	SHELLY	2	30-045-20755	1726	1736	1736		G-34-29N-11W	CHAPARRAL O&G	PICTURED CLIFFS	Shallow	No
37	0.82	HARE	3	30-545-02123			2335		M-23-29N-11W	Pre-Ongard	FARMINGTON	DRY	No
38	0.84	CALVIN	1F	30-045-33093	6172	6430	6430		J-26-29N-11W	Burlington	DAKOTA	Deep	Yes
39	0.85	SULLIVAN GAS COM D	1	30-045-07733	6047	6160	6160		B-26-29N-11W	XTO ENERGY, INC	DAKOTA	Deep	Yes
40	0.85	ELLEDGE FEDERAL 34	11	30-045-24834	1060	1064	1525		D-34-29N-11W	MCELVAIN O&G	FARMINGTON,NORTH	Shallow	No
41	0.89	CONGRESS	7E	30-045-24835	6202	6347	6347		F-34-29N-11W	Burlington	DAKOTA	Deep	Yes
42	0.90	HARE	4	30-545-02124			2015		O-23-29N-11W	Pre-Ongard	FARMINGTON	DRY	No
43	0.90	CONGRESS	4E	30-045-24837	2784	2906	6328		E-35-29N-11W	Burlington	CHACRA	Shallow	Yes
44	0.90	CONGRESS	15	30-045-25675	5369	5943	5943		C-35-29N-11W	Burlington	GALLUP	Deep	Yes
45	0.90	ASHCROFT SWD	1	30-045-30788	6952	7070	7382		B-26-29N-11W	XTO ENERGY, INC	MORRISON BLUFF EN	INJ	Yes
46	0.90	LEA ANN	1	30-045-20752	1776	1790	1790	18-Dec-99	E-35-29N-11W	CHAPARRAL O&G	PICTURED CLIFFS	P&A	No
47	0.94	CONGRESS	5	30-045-07672	6171	6340	6340		G-34-29N-11W	Burlington	DAKOTA	Deep	Yes
48	0.94	Viles EE	1	30-045-07751			870		P-28-29N-11W	Pre-Ongard		DRY	No

Table 2

Map Seq.	Miles to DW1	WELLNAME	#	APINO	Perf Top	Perf Bottom	Total Depth	P&A Date	ULSTR	OPERATOR	RESERVOIR	Status	Pen. Inj. Zone
49	0.95	Sullivan	1X	30-045-29107			900	23-Jun-55	G-26-29N-11W	Pre-Ongard	PICTURED CLIFFS	P&A	No
50	0.97	Madsen Selby Pooled Unit	2	30-045-07895			1600	05-May-78	A-28-29N-11W	Pre-Ongard	PICTURED CLIFFS	P&A	No
51	0.97	Masden-Selby	3	30-045-07762			600	05-Jun-78	A-28-29N-11W	Pre-Ongard		P&A	No
52	0.97	MASDEN GAS COM	1	30-045-07894	6023	6125	6125		A-28-29N-11W	XTO ENERGY, INC	DAKOTA	Deep	Yes
53	0.97	Sullivan	1	30-045-07870			1420	31-Aug-53	G-26-29N-11W	Pre-Ongard	PICTURED CLIFFS	P&A	No
54	0.98	CONGRESS	1	30-045-07674			PC	30-Oct-53	J-34-29N-11W	Pre-Ongard	PICTURED CLIFFS	P&A	No
55	0.98	EARL B SULLIVAN	1	30-045-23163	2750	2761	2761		B-26-29N-11W	XTO ENERGY, INC	CHACRA	Shallow	No
56	0.99	STATE GAS COM BS	1	30-045-23550	1470	1648	2761		K-23-29N-11W	HOLCOMB O&G	FRUITLAND COAL	CBM	No
57	0.99	PEARCE GAS COM	1	30-045-07985	6154	6182	6182	10-Mar-97	K-23-29N-11W	BP AMERICA	DAKOTA	P&A	Yes
58	0.99	CHAPARRAL	1	30-045-20609	1712	1731	1731		E-34-29N-11W	CHAPARRAL O&G	PICTURED CLIFFS	Shallow	No
59	0.99	CONGRESS	2	30-545-02151			Frtlnd		-34-29N-11W	Pre-Ongard	FRUITLAND SAND	DRY	No

Status	Total Wells	Pen Inj. Zone	
		Yes	No
P&A	15	3	12
Dry	4	0	4
INJ	2	2	0
CBM	7	2	5
Shallow	17	3	14
Deep	14	14	0
Total	59	24	35

Table 3

Injection Well
2015 Quarterly Analytical Summary

	Toxicity Characteristics	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Volatile Organic Compounds *(ug/L)*		2/17/2015	4/1/2015	7/1/2015	
1,1,1,2-Tetrachloroethane		< 5.0	< 5.0	< 1.0	na
1,1,1-Trichloroethane		< 5.0	< 5.0	< 1.0	na
1,1,2,2-Tetrachloroethane		< 10	< 10	< 2.0	na
1,1,2-Trichloroethane		< 5.0	< 5.0	< 1.0	na
1,1-Dichloroethane		< 5.0	< 5.0	< 1.0	na
1,1-Dichloroethene		< 5.0	< 5.0	< 1.0	na
1,1-Dichloropropene		< 5.0	< 5.0	< 1.0	na
1,2,3-Trichlorobenzene		< 5.0	< 5.0	< 1.0	na
1,2,3-Trichloropropane		< 10	< 10	< 2.0	na
1,2,4-Trichlorobenzene		< 5.0	< 5.0	< 1.0	na
1,2,4-Trimethylbenzene		< 5.0	< 5.0	< 1.0	na
1,2-Dibromo-3-chloropropane		< 10	< 10	< 2.0	na
1,2-Dibromoethane (EDB)		< 5.0	< 5.0	< 1.0	na
1,2-Dichlorobenzene		< 5.0	< 5.0	< 1.0	na
1,2-Dichloroethane (EDC)	500	< 5.0	< 5.0	< 1.0	na
1,2-Dichloropropane		< 5.0	< 5.0	< 1.0	na
1,3,5-Trimethylbenzene		< 5.0	< 5.0	< 1.0	na
1,3-Dichlorobenzene		< 5.0	< 5.0	< 1.0	na
1,3-Dichloropropane		< 5.0	< 5.0	< 1.0	na
1,4-Dichlorobenzene	7500	< 5.0	< 5.0	< 1.0	na
1-Methylnaphthalene		< 20	< 20	< 4.0	na
2,2-Dichloropropane		< 10	< 10	< 2.0	na
2-Butanone		< 50	< 50	11	na
2-Chlorotoluene		< 5.0	< 5.0	< 1.0	na
2-Hexanone		< 50	< 50	< 10	na
2-Methylnaphthalene		< 20	< 20	< 4.0	na
4-Chlorotoluene		< 5.0	< 5.0	< 1.0	na
4-Isopropyltoluene		< 5.0	< 5.0	< 1.0	na
4-Methyl-2-pentanone		< 50	< 50	< 10	na
Acetone		500	76	72	na
Benzene	500	< 5.0	< 5.0	< 1.0	na
Bromobenzene		< 5.0	< 5.0	< 1.0	na
Bromodichloromethane		< 5.0	< 5.0	< 1.0	na
Bromoform		< 5.0	< 5.0	< 1.0	na
Bromomethane		< 15	< 15	< 3.0	na
Carbon disulfide		< 50	< 50	< 10	na
Carbon Tetrachloride	500	< 5.0	< 5.0	< 1.0	na
Chlorobenzene	100000	< 5.0	< 5.0	< 1.0	na
Chloroethane		< 10	< 10	< 2.0	na
Chloroform	6000	< 5.0	< 5.0	< 1.0	na
Chloromethane		< 15	< 15	< 3.0	na
cis-1,2-DCE		< 5.0	< 5.0	< 1.0	na
cis-1,3-Dichloropropene		< 5.0	< 5.0	< 1.0	na
Dibromochloromethane		< 5.0	< 5.0	< 1.0	na
Dibromomethane		< 5.0	< 5.0	< 1.0	na
Dichlorodifluoromethane		< 5.0	< 5.0	< 1.0	na
Ethylbenzene		< 5.0	< 5.0	< 1.0	na
Hexachlorobutadiene	500	< 5.0	< 5.0	< 1.0	na
Isopropylbenzene		< 5.0	< 5.0	< 1.0	na
Methyl tert-butyl ether (MTBE)		< 5.0	< 5.0	< 1.0	na
Methylene Chloride		< 15	< 15	< 3.0	na
Naphthalene		< 10	< 15	< 2.0	na
n-Butylbenzene		< 15	< 5.0	< 1.0	na
n-Propylbenzene		< 5.0	< 10	< 3.0	na

Table 3

Injection Well
2015 Quarterly Analytical Summary

	Toxicity Characteristics	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
sec-Butylbenzene		< 5.0	< 5.0	< 1.0	na
Styrene		< 5.0	< 5.0	< 1.0	na
tert-Butylbenzene		< 5.0	< 5.0	< 1.0	na
Tetrachloroethene (PCE)		< 5.0	< 5.0	< 1.0	na
Toluene		< 5.0	< 5.0	1.5	na
trans-1,2-DCE		< 5.0	< 5.0	< 1.0	na
trans-1,3-Dichloropropene		< 5.0	< 5.0	< 1.0	na
Trichloroethene (TCE)		< 5.0	< 5.0	< 1.0	na
Trichlorofluoromethane		< 5.0	< 5.0	< 1.0	na
Vinyl chloride	200	< 5.0	< 5.0	< 1.0	na
Xylenes, Total		< 7.5	< 7.5	< 1.5	na
Semi-Volatile Organic Compounds *(ug/L)*					
1,2,4-Trichlorobenzene		< 10	< 10	< 10	na
1,2-Dichlorobenzene		< 10	< 10	< 10	na
1,3-Dichlorobenzene		< 10	< 10	< 10	na
1,4-Dichlorobenzene	7500	< 10	< 10	< 10	na
1-Methylnaphthalene		< 10	< 10	< 10	na
2,4,5-Trichlorophenol		< 10	< 10	< 10	na
2,4,6-Trichlorophenol	2000	< 10	< 10	< 10	na
2,4-Dichlorophenol		< 20	< 20	< 20	na
2,4-Dimethylphenol		17	< 10	< 10	na
2,4-Dinitrophenol		< 20	< 20	< 20	na
2,4-Dinitrotoluene	130	< 10	< 10	< 10	na
2,6-Dinitrotoluene		< 10	< 10	< 10	na
2-Chloronaphthalene		< 10	< 10	< 10	na
2-Chlorophenol		< 10	< 10	< 10	na
2-Methylnaphthalene		< 10	< 10	< 10	na
2-Methylphenol		55	14	< 10	na
2-Nitroaniline		< 10	< 10	< 10	na
2-Nitrophenol		< 10	< 10	< 10	na
3,3´-Dichlorobenzidine		< 10	< 10	< 10	na
3+4-Methylphenol		79	48	< 10	na
3-Nitroaniline		< 10	< 10	< 10	na
4,6-Dinitro-2-methylphenol		< 20	< 20	< 20	na
4-Bromophenyl phenyl ether		< 10	< 10	< 10	na
4-Chloro-3-methylphenol		< 10	< 10	< 10	na
4-Chloroaniline		< 10	< 10	< 10	na
4-Chlorophenyl phenyl ether		< 10	< 10	< 10	na
4-Nitroaniline		< 10	< 10	< 10	na
4-Nitrophenol		< 10	< 10	< 10	na
Acenaphthene		< 10	< 10	< 10	na
Acenaphthylene		< 10	< 10	< 10	na
Aniline		< 10	< 10	< 10	na
Anthracene		< 10	< 10	< 10	na
Azobenzene		< 10	< 10	< 10	na
Benz(a)anthracene		< 10	< 10	< 10	na
Benzo(a)pyrene		< 10	< 10	< 10	na
Benzo(b)fluoranthene		< 10	< 10	< 10	na
Benzo(g,h,i)perylene		< 10	< 10	< 10	na
Benzo(k)fluoranthene		< 10	< 10	< 10	na
Benzoic acid		< 20	25	< 20	na
Benzyl alcohol		< 10	< 10	< 10	na
Bis(2-chloroethoxy)methane		< 10	< 10	< 10	na
Bis(2-chloroethyl)ether		< 10	< 10	< 10	na
Bis(2-chloroisopropyl)ether		< 10	< 10	< 10	na

Table 3

Injection Well
2015 Quarterly Analytical Summary

	Toxicity Characteristics	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Bis(2-ethylhexyl)phthalate		< 10	12	< 10	na
Butyl benzyl phthalate		< 10	< 10	< 10	na
Carbazole		< 10	< 10	< 10	na
Chrysene		< 10	< 10	< 10	na
Dibenz(a,h)anthracene		< 10	< 10	< 10	na
Dibenzofuran		< 10	< 10	< 10	na
Diethyl phthalate		< 10	< 10	< 10	na
Dimethyl phthalate		< 10	< 10	< 10	na
Di-n-butyl phthalate		< 10	< 10	< 10	na
Di-n-octyl phthalate		< 10	< 10	< 10	na
Fluoranthene		< 10	< 10	< 10	na
Fluorene		< 10	< 10	< 10	na
Hexachlorobenzene	130	< 10	< 10	< 10	na
Hexachlorobutadiene	500	< 10	< 10	< 10	na
Hexachlorocyclopentadiene		< 10	< 10	< 10	na
Hexachloroethane	3000	< 10	< 10	< 10	na
Indeno(1,2,3-cd)pyrene		< 10	< 10	< 10	na
Isophorone		< 10	< 10	< 10	na
Naphthalene		< 10	< 10	< 10	na
Nitrobenzene	2000	< 10	< 10	< 10	na
N-Nitrosodimethylamine		< 10	< 10	< 10	na
N-Nitrosodi-n-propylamine		< 10	< 10	< 10	na
N-Nitrosodiphenylamine		< 10	< 10	< 10	na
Pentachlorophenol	100000	< 20	< 20	< 20	na
Phenanthrene		< 10	< 10	< 10	na
Phenol		21	< 10	< 10	na
Pyrene		< 10	< 10	< 10	na
Pyridine	5000	< 10	< 10	< 10	na
General Chemistry *(mg/L unless otherwise stated)*					
Specific Conductance *(umhos/cm)*		2900	4900	2000	na
Chloride		950	1400	480	na
Sulfate		48	9.5	65	na
Total Dissolved Solids		2290	2890	1220	na
pH *(pH Units)*		7.19	6.94	7.45	na
Bicarbonate (As CaCO3)		300	358.6	274.6	na
Carbonate (As CaCO3)		< 2.0	< 2.000	< 2.000	na
Calcium		180	300	120	na
Magnesium		38	57	28	na
Potassium		15	21	7.7	na
Sodium		560	750	280	na
Total Alkalinity (as CaCO3)		300	358.6	274.6	na
Total Metals *(mg/L)*					
Arsenic	5.0	< 0.020	< 0.020	< 0.020	na
Barium	100.0	0.36	0.44	0.27	na
Cadmium	1.0	< 0.0020	< 0.0020	< 0.0020	na
Chromium	5.0	< 0.0060	< 0.0060	< 0.0060	na
Lead	5	< 0.0050	< 0.0050	< 0.0050	na
Selenium	1	< 0.050	< 0.050	< 0.050	na
Silver	5	< 0.0050	< 0.0050	< 0.0050	na
Mercury	0.2	< 0.00020	< 0.00020	< 0.0010	na
Ignitability, Corrosivity, and Reactivity					
Reactive Cyanide *(mg/L)*		< 0.0200	< 1.00	< 1.00	na
Reactive Sulfide *(mg/L)*		< 0.450	0.87	< 1.0	na
Ignitability *(° F)*	< 140° F	>200	>200	>200	na
Corrosivity (ph Units)	≤ 2 or ≥ 12.5	7.22	7.17	7.36	na

Notes:
na = well shut down

APPENDIX A

NEW MEXICO ENERGY, MINERALS & NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION
AZTEC DISTRICT OFFICE
1000 RIO BRAZOS ROAD
AZTEC NM 87410
(505) 334-6178 FAX: (505) 334-6170
http://emnrd.state.nm.us/ocd/District III/3distric.htm

OIL CONS. DIV DIST. 3
SEP 22 2015

BRADENHEAD TEST REPORT

(submit 1 copy to above address)

Date of Test 9-22-15 Operator San Juan Refining Co. API #30-0 45-29002

Property Name Disposal SWD Well No. 1 Location: Unit I Section 27 Township 29 Range 11

Well Status(Shut-In or Producing) Initial PSI: Tubing 1040 Intermediate N/A Casing 152 Bradenhead 0

OPEN BRADENHEAD AND INTERMEDIATE TO ATMOSPHERE INDIVIDUALLY FOR 15 MINUTES EACH

Testing	PRESSURE Bradenhead BH	Int	Csg	INTERM Int	Csg
TIME 5 min	0		152		
10 min	0		155		
15 min	0		155		
20 min					
25 min					
30 min					

FLOW CHARACTERISTICS	BRADENHEAD	INTERMEDIATE
Steady Flow		
Surges		
Down to Nothing	✓	
Nothing		
Gas	✓	
Gas & Water		
Water		

If bradenhead flowed water, check all of the descriptions that apply below:

CLEAR____ FRESH____ SALTY____ SULFUR____ BLACK____

5 MINUTE SHUT-IN PRESSURE BRADENHEAD 0 INTERMEDIATE N/A

REMARKS: Hard puff when opened.
Nothing when opened after 5 min shut in.

By [signature] Witness Monica Kuehling

____
(Position)

E-mail address __________

Submit 1 Copy To Appropriate District Office
District I – (575) 393-6161
1625 N. French Dr., Hobbs, NM 88240
District II – (575) 748-1283
811 S. First St., Artesia, NM 88210
District III – (505) 334-6178
1000 Rio Brazos Rd., Aztec, NM 87410
District IV – (505) 476-3460
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy, Minerals and Natural Resources

OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-103
Revised August 1, 2011

	WELL API NO. 30-045-29002-00
	5. Indicate Type of Lease STATE ☐ FEE ☒
	6. State Oil & Gas Lease No. N/A
SUNDRY NOTICES AND REPORTS ON WELLS (DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT" (FORM C-101) FOR SUCH PROPOSALS.) 1. Type of Well: Oil Well ☐ Gas Well ☒ Other – (Disposal Well)	7. Lease Name or Unit Agreement Name Disposal
	8. Well Number: #001
2. Name of Operator San Juan Refining Co. / Western Refining Southwest, Inc. – Bloomfield Terminal	9. OGRID Number: 037218
3. Address of Operator # 50 Road 4990, Bloomfield, NM, 87413	10. Pool name or Wildcat: Blanco/Mesa Verde
4. Well Location Unit Letter I : 2442 feet from the south line and 1250 feet from the East line Section 27 Township 29 N Range 11 W NMPM County San Juan	
	11. Elevation *(Show whether DR, RKB, RT, GR, etc.)*

12. Check Appropriate Box to Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:		SUBSEQUENT REPORT OF:	
PERFORM REMEDIAL WORK ☐	PLUG AND ABANDON ☐	REMEDIAL WORK ☐	ALTERING CASING ☐
TEMPORARILY ABANDON ☐	CHANGE PLANS ☐	COMMENCE DRILLING OPNS. ☐	P AND A ☐
PULL OR ALTER CASING ☐	MULTIPLE COMPL ☐	CASING/CEMENT JOB ☐	
DOWNHOLE COMMINGLE ☐			
OTHER: Annual MIT, Bradenhead, ☒		OTHER: ☐	

13. Describe proposed or completed operations. (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work). SEE RULE 19.15.7.14 NMAC. For Multiple Completions: Attach wellbore diagram of proposed completion or recompletion.

Western Refining Southwest, Inc. – Bloomfield Terminal requests permission to perform the annual MIT and Bradenhead test on the Class I injection well referenced above. The tests will be performed on Tuesday, September 22th, 2015. Monica Kuehling has agreed to be here to monitor the tests.

Spud Date: Rig Release Date:

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNATURE [signature] TITLE Environmental Coordinator DATE 9/2/15

Type or print name Matthew Krakow E-mail address: matt.krakow@wnr.com PHONE: 505-632-4169

For State Use Only

APPROVED BY: [signature] TITLE Environmental Engineer DATE 9/2/2015
Conditions of Approval (if any):

Submit 1 Copy To Appropriate District Office
District I – (575) 393-6161
1625 N. French Dr., Hobbs, NM 88240
District II – (575) 748-1283
811 S. First St., Artesia, NM 88210
District III – (505) 334-6178
1000 Rio Brazos Rd., Aztec, NM 87410
District IV – (505) 476-3460
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy, Minerals and Natural Resources

OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-103
Revised July 18, 2013

WELL API NO.
30-045-29002-00

5. Indicate Type of Lease
STATE ☐ FEE ☒

6. State Oil & Gas Lease No.
N/A

SUNDRY NOTICES AND REPORTS ON WELLS
(DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT" (FORM C-101) FOR SUCH PROPOSALS.)

7. Lease Name or Unit Agreement Name
Disposal

1. Type of Well: Oil Well ☐ Gas Well ☒ Other – (Disposal Well)

8. Well Number: #001

2. Name of Operator: San Juan Refining Co. / Western Refining Southwest, Inc. - Bloomfield Terminal

9. OGRID Number: 037218

3. Address of Operator
#50 Road 4990, Bloomfield, NM, 87413

10. Pool name or Wildcat
Blanco/Mesa Verde

4. Well Location
Unit Letter I : 2442 feet from the South line and 1250 feet from the East line
Section 27 Township 29N Range 11 W NMPM San Juan County

11. Elevation *(Show whether DR, RKB, RT, GR, etc.)*

12. Check Appropriate Box to Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
PERFORM REMEDIAL WORK	☐	PLUG AND ABANDON	☐	REMEDIAL WORK	☐	ALTERING CASING	☐
TEMPORARILY ABANDON	☐	CHANGE PLANS	☐	COMMENCE DRILLING OPNS.	☐	P AND A	☒
PULL OR ALTER CASING	☐	MULTIPLE COMPL	☐	CASING/CEMENT JOB	☐		
DOWNHOLE COMMINGLE	☐						
CLOSED-LOOP SYSTEM	☐						
OTHER:	☐			OTHER:			☐

13. Describe proposed or completed operations. (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work). SEE RULE 19.15.7.14 NMAC. For Multiple Completions: Attach wellbore diagram of proposed completion or recompletion.

Western RefineryCo. plugged and abandoned this well on October 27 - 29, 2015 per the attached report:

Plug #1 with CR at 2785' spot 170 sxs (200.6 cf) Class B cement from 3533' to 2785'. Tag TOC at 2782'.
Plug #2 with squeeze holes at 2750' and CR at 2700' spot 56 sxs (66.08 cf) Class B cement from 2750' to 2647 squeeze 44 sxs outside, 6 sxs below, 6 sxs down 53' on top of CR.
Plug #3 with squeeze holes at 2390' and CR at 2350' spot 50 sxs (59 cf) Class B cement from 2390' to 2235' squeeze 32 sxs outside, 5 sxs below leaving 13 sxs on top of CR to cover the Chacra top. Tag TOC at 2180'.
Plug #4 with 20 sxs (23.6 cf) Class B cement from 1746' to 1570' to cover the Pictured Cliffs top.
Plug #5 with 24 sxs (28.32 cf) Class B cement from 1407' to 1197' to cover the Fruitland top.
Plug #6 spot 113 sxs (133.34 cf) Class B cement from 915' to 150', to top off casing from 150' to surface with 16 sxs to cover the surface casing shoe.
Plug #7 with 53 sxs Class B cement top off casings and install P&A marker with coordinates 36° 41' 46" N/ 107° 58' 26" W.

10/27/15 Rode cement equipment to location. Spot in and RU. Wait on rig crew to set CR. Pressure test tubing to 1500 PSI, OK. Pressure test casing to 1000 PSI, OK. Spot plug #1 with calculated TOC at 2785'. Sting out. RD. SDFD.

10/28/15 Travel to location. Spot in and RU cement equipment. RU A-Plus wireline. RIH and tag at 2782'. Perforate 3 HSC squeeze holes at 2750'. Establish rate of 1-1/2 bpm at 850 PSI. TIH and set Weatherford CR at 2700'. Spot plug #2 with calculated TOC at 2647'. Displace with 15.2 mud. POH. Reverse circulate clean. RU A-Plus wireline. Perforate 3 HSC squeeze holes at 2390'. Casing started flowing from squeeze holes. SI well. Check well pressures: casing 180 PSI. Wireline RIH and set 5-1/2" CR at 2350'. Spot plug #3 with calculated TOC at 2235'. Displace with mud. Reverse circulate well clean. RD. SDFD.

10/29/15 Travel to location. Spot in and RU cement equipment. TIH and tag TOC at 2180'. Circulate well clean. Spot plugs #4, #5 and #6. Cut off wellhead. Spot plug #7 top off casings and install P&A marker with coordinates 36° 41' 46" N/ 107° 58' 26" W. RD and MOL. P&A Ops witness by M. Kuehling w/ NMOCD

Spud Date: PNR only

Rig R

Approved for plugging of wellbore only. Liability under bond is retained pending Receipt of C-103 (Subsequent Report of Well Plugging) which may be found @ OCD web page under forms www.emnrd.state.us/ocd

OIL CONS. DIV DIST. 3
NOV 23 2015

I hereby certify that the information above is true and complet

SIGNATURE _____ TITLE Agent / Engineer DATE 11/18/2015

Type or print name John Thompson E-mail address: johnew@cybermesa.net PHONE: 505-320-1748

For State Use Only

APPROVED BY: _____ TITLE DEPUTY OIL & GAS INSPECTOR DISTRICT #3 DATE 12/1/15

Conditions of Approval (if any):

RV

OIL CONS. DIV DIST. 3
SEP 25 2015

Submit 1 Copy To Appropriate District Office
District I – (575) 393-6161
1625 N. French Dr., Hobbs, NM 88240
District II – (575) 748-1283
811 S. First St., Artesia, NM 88210
District III – (505) 334-6178
1000 Rio Brazos Rd., Aztec, NM 87410
District IV – (505) 476-3460
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy, Minerals and Natural Resources

OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-103
Revised August 1, 2011

	WELL API NO. 30-045-29002-00
	5. Indicate Type of Lease STATE ☐ FEE ☒
	6. State Oil & Gas Lease No. N/A
SUNDRY NOTICES AND REPORTS ON WELLS (DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT" (FORM C-101) FOR SUCH PROPOSALS.)	7. Lease Name or Unit Agreement Name Disposal
1. Type of Well: Oil Well ☐ Gas Well ☒ Other – (Disposal Well)	8. Well Number: #001
2. Name of Operator San Juan Refining Co. / Western Refining Southwest, Inc. – Bloomfield Refinery	9. OGRID Number: 037218
3. Address of Operator # 50 Road 4990, Bloomfield, NM, 87413	10. Pool name or Wildcat: Blanco/Mesa Verde
4. Well Location Unit Letter I : 2442 feet from the south line and 1250 feet from the East line Section 27 Township 29 N Range 11 W NMPM County San Juan	
	11. Elevation *(Show whether DR, RKB, RT, GR, etc.)*

12. Check Appropriate Box to Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:		SUBSEQUENT REPORT OF:	
PERFORM REMEDIAL WORK ☐	PLUG AND ABANDON ☐	REMEDIAL WORK ☐	ALTERING CASING ☐
TEMPORARILY ABANDON ☐	CHANGE PLANS ☐	COMMENCE DRILLING OPNS. ☐	P AND A ☐
PULL OR ALTER CASING ☐	MULTIPLE COMPL ☐	CASING/CEMENT JOB ☐	
DOWNHOLE COMMINGLE ☐			
OTHER: Troubleshoot injection well problem ☐		OTHER: ☐	

13. Describe proposed or completed operations. (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work). SEE RULE 19.15.7.14 NMAC. For Multiple Completions: Attach wellbore diagram of proposed completion or recompletion.

Western Refining Southwest, Inc. – Bloomfield Terminal is going to pressure test the tubing on the Class I injection well referenced above. The test would consist of setting a plug using a wireline rig and pressurizing the tubing to determine its integrity in response to the recent MIT failure. The tests will be performed on Thursday, September 25th, 2015.

Spud Date: Rig Release Date:

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNATURE [signature] TITLE Environmental Coordinator DATE 9/24/15

Type or print name Matthew Krakow E-mail address: matt.krakow@wnr.com PHONE: 505-632-4169

For State Use Only

APPROVED BY: [signature] TITLE DEPUTY OIL & GAS INSPECTOR DISTRICT #3 DATE SEP 25 2015

Conditions of Approval (if any):

APPENDIX B

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

March 16, 2015

Kelly Robinson
Western Refining Southwest, Inc.
#50 CR 4990
Bloomfield, NM 87413
TEL: (505) 632-4166
FAX (505) 632-3911

RE: Injection Well 2-17-15 OrderNo.: 1502723

Dear Kelly Robinson:

Hall Environmental Analysis Laboratory received 1 sample(s) on 2/18/2015 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites. In order to properly interpret your results it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0190

Sincerely,

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Western Refining Southwest, Inc.
Project: Injection Well 2-17-15
Lab ID: 1502723-001 **Matrix:** AQUEOUS

Client Sample ID: Injection Well
Collection Date: 2/17/2015 11:20:00 AM
Received Date: 2/18/2015 8:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 300.0: ANIONS						Analyst: **LGT**	
Chloride	950	50		mg/L	100	2/18/2015 2:54:18 PM	R24392
Sulfate	48	5.0		mg/L	10	2/18/2015 2:41:53 PM	R24392
EPA METHOD 7470: MERCURY						Analyst: **MMD**	
Mercury	ND	0.00020		mg/L	1	2/26/2015 9:17:02 AM	17887
EPA 6010B: TOTAL RECOVERABLE METALS						Analyst: **ELS**	
Arsenic	ND	0.020		mg/L	1	2/21/2015 12:09:42 PM	17834
Barium	0.36	0.020		mg/L	1	2/21/2015 12:09:42 PM	17834
Cadmium	ND	0.0020		mg/L	1	2/21/2015 12:09:42 PM	17834
Calcium	180	10		mg/L	10	2/21/2015 12:11:20 PM	17834
Chromium	ND	0.0060		mg/L	1	2/21/2015 12:09:42 PM	17834
Lead	ND	0.0050		mg/L	1	2/21/2015 12:09:42 PM	17834
Magnesium	38	1.0		mg/L	1	2/21/2015 12:09:42 PM	17834
Potassium	15	1.0		mg/L	1	2/21/2015 12:09:42 PM	17834
Selenium	ND	0.050		mg/L	1	2/21/2015 12:09:42 PM	17834
Silver	ND	0.0050		mg/L	1	2/21/2015 12:09:42 PM	17834
Sodium	560	10		mg/L	10	2/21/2015 12:11:20 PM	17834
EPA METHOD 8270C: SEMIVOLATILES						Analyst: **DAM**	
Acenaphthene	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
Acenaphthylene	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
Aniline	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
Anthracene	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
Azobenzene	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
Benz(a)anthracene	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
Benzo(a)pyrene	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
Benzo(b)fluoranthene	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
Benzo(g,h,i)perylene	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
Benzo(k)fluoranthene	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
Benzoic acid	ND	20		µg/L	1	2/23/2015 4:43:18 PM	17825
Benzyl alcohol	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
Bis(2-chloroethoxy)methane	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
Bis(2-chloroethyl)ether	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
Bis(2-chloroisopropyl)ether	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
Bis(2-ethylhexyl)phthalate	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
4-Bromophenyl phenyl ether	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
Butyl benzyl phthalate	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
Carbazole	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
4-Chloro-3-methylphenol	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
4-Chloroaniline	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
O	RSD is greater than RSDlimit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Western Refining Southwest, Inc.
Project: Injection Well 2-17-15
Lab ID: 1502723-001 **Matrix:** AQUEOUS

Client Sample ID: Injection Well
Collection Date: 2/17/2015 11:20:00 AM
Received Date: 2/18/2015 8:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8270C: SEMIVOLATILES						Analyst: **DAM**	
2-Chloronaphthalene	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
2-Chlorophenol	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
4-Chlorophenyl phenyl ether	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
Chrysene	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
Di-n-butyl phthalate	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
Di-n-octyl phthalate	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
Dibenz(a,h)anthracene	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
Dibenzofuran	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
1,2-Dichlorobenzene	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
1,3-Dichlorobenzene	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
1,4-Dichlorobenzene	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
3,3'-Dichlorobenzidine	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
Diethyl phthalate	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
Dimethyl phthalate	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
2,4-Dichlorophenol	ND	20		µg/L	1	2/23/2015 4:43:18 PM	17825
2,4-Dimethylphenol	17	10		µg/L	1	2/23/2015 4:43:18 PM	17825
4,6-Dinitro-2-methylphenol	ND	20		µg/L	1	2/23/2015 4:43:18 PM	17825
2,4-Dinitrophenol	ND	20		µg/L	1	2/23/2015 4:43:18 PM	17825
2,4-Dinitrotoluene	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
2,6-Dinitrotoluene	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
Fluoranthene	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
Fluorene	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
Hexachlorobenzene	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
Hexachlorobutadiene	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
Hexachlorocyclopentadiene	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
Hexachloroethane	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
Indeno(1,2,3-cd)pyrene	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
Isophorone	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
1-Methylnaphthalene	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
2-Methylnaphthalene	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
2-Methylphenol	55	10		µg/L	1	2/23/2015 4:43:18 PM	17825
3+4-Methylphenol	79	10		µg/L	1	2/23/2015 4:43:18 PM	17825
N-Nitrosodi-n-propylamine	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
N-Nitrosodimethylamine	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
N-Nitrosodiphenylamine	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
Naphthalene	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
2-Nitroaniline	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
3-Nitroaniline	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
4-Nitroaniline	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

- * Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- O RSD is greater than RSDlimit
- R RPD outside accepted recovery limits
- S Spike Recovery outside accepted recovery limits
- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- P Sample pH Not In Range
- RL Reporting Detection Limit

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Western Refining Southwest, Inc.
Project: Injection Well 2-17-15
Lab ID: 1502723-001 **Matrix:** AQUEOUS

Client Sample ID: Injection Well
Collection Date: 2/17/2015 11:20:00 AM
Received Date: 2/18/2015 8:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8270C: SEMIVOLATILES						Analyst: **DAM**	
Nitrobenzene	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
2-Nitrophenol	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
4-Nitrophenol	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
Pentachlorophenol	ND	20		µg/L	1	2/23/2015 4:43:18 PM	17825
Phenanthrene	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
Phenol	21	10		µg/L	1	2/23/2015 4:43:18 PM	17825
Pyrene	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
Pyridine	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
1,2,4-Trichlorobenzene	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
2,4,5-Trichlorophenol	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
2,4,6-Trichlorophenol	ND	10		µg/L	1	2/23/2015 4:43:18 PM	17825
Surr: 2-Fluorophenol	42.5	17.6-104		%REC	1	2/23/2015 4:43:18 PM	17825
Surr: Phenol-d5	52.5	17.7-89.9		%REC	1	2/23/2015 4:43:18 PM	17825
Surr: 2,4,6-Tribromophenol	62.3	16.3-122		%REC	1	2/23/2015 4:43:18 PM	17825
Surr: Nitrobenzene-d5	83.4	45.3-117		%REC	1	2/23/2015 4:43:18 PM	17825
Surr: 2-Fluorobiphenyl	72.8	43-113		%REC	1	2/23/2015 4:43:18 PM	17825
Surr: 4-Terphenyl-d14	43.6	47.6-122	S	%REC	1	2/23/2015 4:43:18 PM	17825
EPA METHOD 8260B: VOLATILES						Analyst: **cadg**	
Benzene	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
Toluene	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
Ethylbenzene	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
Methyl tert-butyl ether (MTBE)	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
1,2,4-Trimethylbenzene	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
1,3,5-Trimethylbenzene	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
1,2-Dichloroethane (EDC)	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
1,2-Dibromoethane (EDB)	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
Naphthalene	ND	10		µg/L	5	2/26/2015 12:27:45 PM	R24544
1-Methylnaphthalene	ND	20		µg/L	5	2/26/2015 12:27:45 PM	R24544
2-Methylnaphthalene	ND	20		µg/L	5	2/26/2015 12:27:45 PM	R24544
Acetone	500	50		µg/L	5	2/26/2015 12:27:45 PM	R24544
Bromobenzene	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
Bromodichloromethane	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
Bromoform	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
Bromomethane	ND	15		µg/L	5	2/26/2015 12:27:45 PM	R24544
2-Butanone	ND	50		µg/L	5	2/26/2015 12:27:45 PM	R24544
Carbon disulfide	ND	50		µg/L	5	2/26/2015 12:27:45 PM	R24544
Carbon Tetrachloride	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
Chlorobenzene	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
Chloroethane	ND	10		µg/L	5	2/26/2015 12:27:45 PM	R24544

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
O	RSD is greater than RSDlimit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Western Refining Southwest, Inc.
Client Sample ID: Injection Well
Project: Injection Well 2-17-15
Collection Date: 2/17/2015 11:20:00 AM
Lab ID: 1502723-001 **Matrix:** AQUEOUS **Received Date:** 2/18/2015 8:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **cadg**	
Chloroform	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
Chloromethane	ND	15		µg/L	5	2/26/2015 12:27:45 PM	R24544
2-Chlorotoluene	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
4-Chlorotoluene	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
cis-1,2-DCE	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
cis-1,3-Dichloropropene	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
1,2-Dibromo-3-chloropropane	ND	10		µg/L	5	2/26/2015 12:27:45 PM	R24544
Dibromochloromethane	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
Dibromomethane	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
1,2-Dichlorobenzene	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
1,3-Dichlorobenzene	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
1,4-Dichlorobenzene	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
Dichlorodifluoromethane	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
1,1-Dichloroethane	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
1,1-Dichloroethene	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
1,2-Dichloropropane	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
1,3-Dichloropropane	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
2,2-Dichloropropane	ND	10		µg/L	5	2/26/2015 12:27:45 PM	R24544
1,1-Dichloropropene	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
Hexachlorobutadiene	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
2-Hexanone	ND	50		µg/L	5	2/26/2015 12:27:45 PM	R24544
Isopropylbenzene	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
4-Isopropyltoluene	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
4-Methyl-2-pentanone	ND	50		µg/L	5	2/26/2015 12:27:45 PM	R24544
Methylene Chloride	ND	15		µg/L	5	2/26/2015 12:27:45 PM	R24544
n-Butylbenzene	ND	15		µg/L	5	2/26/2015 12:27:45 PM	R24544
n-Propylbenzene	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
sec-Butylbenzene	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
Styrene	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
tert-Butylbenzene	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
1,1,1,2-Tetrachloroethane	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
1,1,2,2-Tetrachloroethane	ND	10		µg/L	5	2/26/2015 12:27:45 PM	R24544
Tetrachloroethene (PCE)	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
trans-1,2-DCE	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
trans-1,3-Dichloropropene	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
1,2,3-Trichlorobenzene	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
1,2,4-Trichlorobenzene	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
1,1,1-Trichloroethane	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
1,1,2-Trichloroethane	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
O	RSD is greater than RSDlimit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Western Refining Southwest, Inc.
Client Sample ID: Injection Well
Project: Injection Well 2-17-15
Collection Date: 2/17/2015 11:20:00 AM
Lab ID: 1502723-001 **Matrix:** AQUEOUS **Received Date:** 2/18/2015 8:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst:	**cadg**
Trichloroethene (TCE)	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
Trichlorofluoromethane	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
1,2,3-Trichloropropane	ND	10		µg/L	5	2/26/2015 12:27:45 PM	R24544
Vinyl chloride	ND	5.0		µg/L	5	2/26/2015 12:27:45 PM	R24544
Xylenes, Total	ND	7.5		µg/L	5	2/26/2015 12:27:45 PM	R24544
Surr: 1,2-Dichloroethane-d4	101	70-130		%REC	5	2/26/2015 12:27:45 PM	R24544
Surr: 4-Bromofluorobenzene	103	70-130		%REC	5	2/26/2015 12:27:45 PM	R24544
Surr: Dibromofluoromethane	101	70-130		%REC	5	2/26/2015 12:27:45 PM	R24544
Surr: Toluene-d8	98.7	70-130		%REC	5	2/26/2015 12:27:45 PM	R24544
SM2510B: SPECIFIC CONDUCTANCE						Analyst:	**JRR**
Conductivity	2900	0.010		µmhos/cm	1	2/18/2015 12:49:27 PM	R24379
SM4500-H+B: PH						Analyst:	**JRR**
pH	7.19	1.68	H	pH units	1	2/18/2015 12:49:27 PM	R24379
SM2320B: ALKALINITY						Analyst:	**JRR**
Bicarbonate (As CaCO3)	300	20		mg/L CaCO3	1	2/18/2015 12:49:27 PM	R24379
Carbonate (As CaCO3)	ND	2.0		mg/L CaCO3	1	2/18/2015 12:49:27 PM	R24379
Total Alkalinity (as CaCO3)	300	20		mg/L CaCO3	1	2/18/2015 12:49:27 PM	R24379
SM2540C MOD: TOTAL DISSOLVED SOLIDS						Analyst:	**KS**
Total Dissolved Solids	2290	40.0	*	mg/L	1	2/19/2015 3:19:00 PM	17793

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

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E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
O	RSD is greater than RSDlimit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits		

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: HALL ENVIRONMENTAL ANALYSIS LAB
Address: 4901 HAWKINS NE SUITE D
ALBUQUERQUE, NM 87109
Attn: ANDY FREEMAN

Batch #: 150219026
Project Name: 1502723

Analytical Results Report

Sample Number 150219026-001 **Sampling Date** 2/17/2015 **Date/Time Received** 2/19/2015 1:20 PM
Client Sample ID 1502723-001E / INJECTION WELL **Sampling Time** 11:20 AM
Matrix Water **Sample Location**
Comments

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Cyanide (reactive)	ND	mg/L	0.02	2/24/2015	CRW	SW846 CH7	
Flashpoint	>200	°F		2/25/2015	KFG	EPA 1010	
pH	7.13	ph Units		2/20/2015	KJS	SM 4500pH-B	
Sulfide	ND	mg/L	0.45	3/3/2015	HSW	SM4500S2F	
Reactive sulfide	ND	mg/L	0.45	3/3/2015	HSW	SW846 CH7	

Authorized Signature

John Coddington, Lab Manager

MCL EPA's Maximum Contaminant Level
ND Not Detected
PQL Practical Quantitation Limit

The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Anatek Labs, Inc.

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504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: HALL ENVIRONMENTAL ANALYSIS LAB
Address: 4901 HAWKINS NE SUITE D
ALBUQUERQUE, NM 87109
Attn: ANDY FREEMAN

Batch #: 150219026
Project Name: 1502723

Analytical Results Report

Quality Control Data

Lab Control Sample

Parameter	LCS Result	Units	LCS Spike	%Rec	AR %Rec	Prep Date	Analysis Date
Sulfide	0.200	mg/L	0.2	100.0	70-130	3/3/2015	3/3/2015
Reactive sulfide	0.200	mg/L	0.2	100.0	70-130	3/3/2015	3/3/2015
Cyanide (reactive)	0.488	mg/L	0.5	97.6	80-120	2/24/2015	2/24/2015

Matrix Spike

Sample Number	Parameter	Sample Result	MS Result	Units	MS Spike	%Rec	AR %Rec	Prep Date	Analysis Date
150219026-001	Reactive sulfide	ND	0.727	mg/L	0.91	79.9	70-130	3/3/2015	3/3/2015
150219026-001	Cyanide (reactive)	ND	0.953	mg/L	1	95.3	80-120	2/24/2015	2/24/2015

Matrix Spike Duplicate

Parameter	MSD Result	Units	MSD Spike	%Rec	%RPD	AR %RPD	Prep Date	Analysis Date
Cyanide (reactive)	0.955	mg/L	1	95.5	0.2	0-25	2/24/2015	2/24/2015

Method Blank

Parameter	Result	Units	PQL	Prep Date	Analysis Date
Cyanide (reactive)	ND	mg/L	1	2/24/2015	2/24/2015
Reactive sulfide	ND	mg/L	1	3/3/2015	3/3/2015
Sulfide	ND	mg/L	0.05	3/3/2015	3/3/2015

AR	Acceptable Range
ND	Not Detected
PQL	Practical Quantitation Limit
RPD	Relative Percentage Difference

Comments:

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87693; ID:ID00013; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1502723**

16-Mar-15

Client: Western Refining Southwest, Inc.

Project: Injection Well 2-17-15

Sample ID **MB**	SampType: **MBLK**	TestCode: **EPA Method 300.0: Anions**
Client ID: **PBW**	Batch ID: **R24392**	RunNo: **24392**
Prep Date:	Analysis Date: **2/18/2015**	SeqNo: **718760** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	ND	0.50								
Sulfate	ND	0.50								

Sample ID **LCS**	SampType: **LCS**	TestCode: **EPA Method 300.0: Anions**
Client ID: **LCSW**	Batch ID: **R24392**	RunNo: **24392**
Prep Date:	Analysis Date: **2/18/2015**	SeqNo: **718761** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	4.8	0.50	5.000	0	96.3	90	110			
Sulfate	9.9	0.50	10.00	0	98.6	90	110			

Qualifiers:

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J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
O	RSD is greater than RSDlimit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1502723**

16-Mar-15

Client: Western Refining Southwest, Inc.

Project: Injection Well 2-17-15

Sample ID **5mL rb**	SampType: **MBLK**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **PBW**	Batch ID: **R24544**	RunNo: **24544**
Prep Date:	Analysis Date: **2/26/2015**	SeqNo: **722682** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	ND	1.0								
Toluene	ND	1.0								
Ethylbenzene	ND	1.0								
Methyl tert-butyl ether (MTBE)	ND	1.0								
1,2,4-Trimethylbenzene	ND	1.0								
1,3,5-Trimethylbenzene	ND	1.0								
1,2-Dichloroethane (EDC)	ND	1.0								
1,2-Dibromoethane (EDB)	ND	1.0								
Naphthalene	ND	2.0								
1-Methylnaphthalene	ND	4.0								
2-Methylnaphthalene	ND	4.0								
Acetone	ND	10								
Bromobenzene	ND	1.0								
Bromodichloromethane	ND	1.0								
Bromoform	ND	1.0								
Bromomethane	ND	3.0								
2-Butanone	ND	10								
Carbon disulfide	ND	10								
Carbon Tetrachloride	ND	1.0								
Chlorobenzene	ND	1.0								
Chloroethane	ND	2.0								
Chloroform	ND	1.0								
Chloromethane	ND	3.0								
2-Chlorotoluene	ND	1.0								
4-Chlorotoluene	ND	1.0								
cis-1,2-DCE	ND	1.0								
cis-1,3-Dichloropropene	ND	1.0								
1,2-Dibromo-3-chloropropane	ND	2.0								
Dibromochloromethane	ND	1.0								
Dibromomethane	ND	1.0								
1,2-Dichlorobenzene	ND	1.0								
1,3-Dichlorobenzene	ND	1.0								
1,4-Dichlorobenzene	ND	1.0								
Dichlorodifluoromethane	ND	1.0								
1,1-Dichloroethane	ND	1.0								
1,1-Dichloroethene	ND	1.0								
1,2-Dichloropropane	ND	1.0								
1,3-Dichloropropane	ND	1.0								
2,2-Dichloropropane	ND	2.0								

Qualifiers:

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- J Analyte detected below quantitation limits
- O RSD is greater than RSDlimit
- R RPD outside accepted recovery limits
- S Spike Recovery outside accepted recovery limits
- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- P Sample pH Not In Range
- RL Reporting Detection Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1502723**

16-Mar-15

Client: Western Refining Southwest, Inc.

Project: Injection Well 2-17-15

Sample ID **5mL rb**	SampType: **MBLK**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **PBW**	Batch ID: **R24544**	RunNo: **24544**
Prep Date:	Analysis Date: **2/26/2015**	SeqNo: **722682** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
1,1-Dichloropropene	ND	1.0								
Hexachlorobutadiene	ND	1.0								
2-Hexanone	ND	10								
Isopropylbenzene	ND	1.0								
4-Isopropyltoluene	ND	1.0								
4-Methyl-2-pentanone	ND	10								
Methylene Chloride	ND	3.0								
n-Butylbenzene	ND	3.0								
n-Propylbenzene	ND	1.0								
sec-Butylbenzene	ND	1.0								
Styrene	ND	1.0								
tert-Butylbenzene	ND	1.0								
1,1,1,2-Tetrachloroethane	ND	1.0								
1,1,2,2-Tetrachloroethane	ND	2.0								
Tetrachloroethene (PCE)	ND	1.0								
trans-1,2-DCE	ND	1.0								
trans-1,3-Dichloropropene	ND	1.0								
1,2,3-Trichlorobenzene	ND	1.0								
1,2,4-Trichlorobenzene	ND	1.0								
1,1,1-Trichloroethane	ND	1.0								
1,1,2-Trichloroethane	ND	1.0								
Trichloroethene (TCE)	ND	1.0								
Trichlorofluoromethane	ND	1.0								
1,2,3-Trichloropropane	ND	2.0								
Vinyl chloride	ND	1.0								
Xylenes, Total	ND	1.5								
Surr: 1,2-Dichloroethane-d4	9.9		10.00		99.2	70	130			
Surr: 4-Bromofluorobenzene	10		10.00		104	70	130			
Surr: Dibromofluoromethane	10		10.00		104	70	130			
Surr: Toluene-d8	9.8		10.00		97.8	70	130			

Sample ID **100ng lcs**	SampType: **LCS**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **LCSW**	Batch ID: **R24544**	RunNo: **24544**
Prep Date:	Analysis Date: **2/26/2015**	SeqNo: **722684** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	21	1.0	20.00	0	104	70	130			
Toluene	21	1.0	20.00	0	103	70	130			
Chlorobenzene	20	1.0	20.00	0	102	70	130			

Qualifiers:

- * Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- O RSD is greater than RSDlimit
- R RPD outside accepted recovery limits
- S Spike Recovery outside accepted recovery limits
- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- P Sample pH Not In Range
- RL Reporting Detection Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1502723**

16-Mar-15

Client: Western Refining Southwest, Inc.

Project: Injection Well 2-17-15

Sample ID **100ng lcs**	SampType: **LCS**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **LCSW**	Batch ID: **R24544**	RunNo: **24544**
Prep Date:	Analysis Date: **2/26/2015**	SeqNo: **722684** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
1,1-Dichloroethene	22	1.0	20.00	0	112	75.6	144			
Trichloroethene (TCE)	20	1.0	20.00	0	102	70	130			
Surr: 1,2-Dichloroethane-d4	10		10.00		101	70	130			
Surr: 4-Bromofluorobenzene	10		10.00		101	70	130			
Surr: Dibromofluoromethane	10		10.00		102	70	130			
Surr: Toluene-d8	10		10.00		100	70	130			

Qualifiers:

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J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
O	RSD is greater than RSDlimit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1502723**

16-Mar-15

Client: Western Refining Southwest, Inc.

Project: Injection Well 2-17-15

Sample ID **mb-17825**	SampType: **MBLK**	TestCode: **EPA Method 8270C: Semivolatiles**
Client ID: **PBW**	Batch ID: **17825**	RunNo: **24458**
Prep Date: **2/20/2015**	Analysis Date: **2/23/2015**	SeqNo: **720293** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Acenaphthene	ND	10								
Acenaphthylene	ND	10								
Aniline	ND	10								
Anthracene	ND	10								
Azobenzene	ND	10								
Benz(a)anthracene	ND	10								
Benzo(a)pyrene	ND	10								
Benzo(b)fluoranthene	ND	10								
Benzo(g,h,i)perylene	ND	10								
Benzo(k)fluoranthene	ND	10								
Benzoic acid	ND	20								
Benzyl alcohol	ND	10								
Bis(2-chloroethoxy)methane	ND	10								
Bis(2-chloroethyl)ether	ND	10								
Bis(2-chloroisopropyl)ether	ND	10								
Bis(2-ethylhexyl)phthalate	ND	10								
4-Bromophenyl phenyl ether	ND	10								
Butyl benzyl phthalate	ND	10								
Carbazole	ND	10								
4-Chloro-3-methylphenol	ND	10								
4-Chloroaniline	ND	10								
2-Chloronaphthalene	ND	10								
2-Chlorophenol	ND	10								
4-Chlorophenyl phenyl ether	ND	10								
Chrysene	ND	10								
Di-n-butyl phthalate	ND	10								
Di-n-octyl phthalate	ND	10								
Dibenz(a,h)anthracene	ND	10								
Dibenzofuran	ND	10								
1,2-Dichlorobenzene	ND	10								
1,3-Dichlorobenzene	ND	10								
1,4-Dichlorobenzene	ND	10								
3,3'-Dichlorobenzidine	ND	10								
Diethyl phthalate	ND	10								
Dimethyl phthalate	ND	10								
2,4-Dichlorophenol	ND	20								
2,4-Dimethylphenol	ND	10								
4,6-Dinitro-2-methylphenol	ND	20								
2,4-Dinitrophenol	ND	20								

Qualifiers:

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- J Analyte detected below quantitation limits
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- S Spike Recovery outside accepted recovery limits
- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- P Sample pH Not In Range
- RL Reporting Detection Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1502723**

16-Mar-15

Client: Western Refining Southwest, Inc.

Project: Injection Well 2-17-15

Sample ID **mb-17825**	SampType: **MBLK**	TestCode: **EPA Method 8270C: Semivolatiles**
Client ID: **PBW**	Batch ID: **17825**	RunNo: **24458**
Prep Date: **2/20/2015**	Analysis Date: **2/23/2015**	SeqNo: **720293** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
2,4-Dinitrotoluene	ND	10								
2,6-Dinitrotoluene	ND	10								
Fluoranthene	ND	10								
Fluorene	ND	10								
Hexachlorobenzene	ND	10								
Hexachlorobutadiene	ND	10								
Hexachlorocyclopentadiene	ND	10								
Hexachloroethane	ND	10								
Indeno(1,2,3-cd)pyrene	ND	10								
Isophorone	ND	10								
1-Methylnaphthalene	ND	10								
2-Methylnaphthalene	ND	10								
2-Methylphenol	ND	10								
3+4-Methylphenol	ND	10								
N-Nitrosodi-n-propylamine	ND	10								
N-Nitrosodimethylamine	ND	10								
N-Nitrosodiphenylamine	ND	10								
Naphthalene	ND	10								
2-Nitroaniline	ND	10								
3-Nitroaniline	ND	10								
4-Nitroaniline	ND	10								
Nitrobenzene	ND	10								
2-Nitrophenol	ND	10								
4-Nitrophenol	ND	10								
Pentachlorophenol	ND	20								
Phenanthrene	ND	10								
Phenol	ND	10								
Pyrene	ND	10								
Pyridine	ND	10								
1,2,4-Trichlorobenzene	ND	10								
2,4,5-Trichlorophenol	ND	10								
2,4,6-Trichlorophenol	ND	10								
Surr: 2-Fluorophenol	180		200.0		89.4	17.6	104			
Surr: Phenol-d5	160		200.0		78.8	17.7	89.9			
Surr: 2,4,6-Tribromophenol	160		200.0		78.9	16.3	122			
Surr: Nitrobenzene-d5	81		100.0		81.4	45.3	117			
Surr: 2-Fluorobiphenyl	82		100.0		82.2	43	113			
Surr: 4-Terphenyl-d14	60		100.0		60.2	47.6	122			

Qualifiers:

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E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
O	RSD is greater than RSDlimit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1502723**

16-Mar-15

Client: Western Refining Southwest, Inc.

Project: Injection Well 2-17-15

Sample ID **lcs-17825** SampType: **LCS** TestCode: **EPA Method 8270C: Semivolatiles**

Client ID: **LCSW** Batch ID: **17825** RunNo: **24458**

Prep Date: **2/20/2015** Analysis Date: **2/23/2015** SeqNo: **720294** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Acenaphthene	64	10	100.0	0	64.1	47.9	114			
4-Chloro-3-methylphenol	130	10	200.0	0	65.2	51.7	122			
2-Chlorophenol	130	10	200.0	0	65.7	40.7	113			
1,4-Dichlorobenzene	65	10	100.0	0	65.0	39.6	99.9			
2,4-Dinitrotoluene	50	10	100.0	0	50.5	40.8	113			
N-Nitrosodi-n-propylamine	67	10	100.0	0	67.3	51.2	111			
4-Nitrophenol	130	10	200.0	0	65.4	15.7	86.9			
Pentachlorophenol	120	20	200.0	0	58.1	21.6	104			
Phenol	140	10	200.0	0	70.0	28.6	71.7			
Pyrene	56	10	100.0	0	56.0	54.2	128			
1,2,4-Trichlorobenzene	62	10	100.0	0	62.0	40.9	101			
Surr: 2-Fluorophenol	140		200.0		71.0	17.6	104			
Surr: Phenol-d5	140		200.0		71.3	17.7	89.9			
Surr: 2,4,6-Tribromophenol	140		200.0		69.7	16.3	122			
Surr: Nitrobenzene-d5	70		100.0		70.5	45.3	117			
Surr: 2-Fluorobiphenyl	68		100.0		67.6	43	113			
Surr: 4-Terphenyl-d14	51		100.0		50.9	47.6	122			

Sample ID **lcsd-17825** SampType: **LCSD** TestCode: **EPA Method 8270C: Semivolatiles**

Client ID: **LCSS02** Batch ID: **17825** RunNo: **24458**

Prep Date: **2/20/2015** Analysis Date: **2/23/2015** SeqNo: **720295** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Acenaphthene	82	10	100.0	0	81.7	47.9	114	24.2	27.2	
4-Chloro-3-methylphenol	170	10	200.0	0	86.0	51.7	122	27.5	25.9	R
2-Chlorophenol	140	10	200.0	0	67.7	40.7	113	2.98	22.5	
1,4-Dichlorobenzene	68	10	100.0	0	67.9	39.6	99.9	4.30	24.6	
2,4-Dinitrotoluene	72	10	100.0	0	72.0	40.8	113	35.2	25.3	R
N-Nitrosodi-n-propylamine	75	10	100.0	0	75.2	51.2	111	11.1	23.6	
4-Nitrophenol	170	10	200.0	0	87.0	15.7	86.9	28.3	34.7	S
Pentachlorophenol	140	20	200.0	0	69.5	21.6	104	17.8	32.8	
Phenol	150	10	200.0	0	74.9	28.6	71.7	6.87	25.5	S
Pyrene	73	10	100.0	0	72.7	54.2	128	25.9	31.4	
1,2,4-Trichlorobenzene	73	10	100.0	0	72.6	40.9	101	15.8	25.9	
Surr: 2-Fluorophenol	160		200.0		77.6	17.6	104	0	0	
Surr: Phenol-d5	150		200.0		75.6	17.7	89.9	0	0	
Surr: 2,4,6-Tribromophenol	180		200.0		90.3	16.3	122	0	0	
Surr: Nitrobenzene-d5	79		100.0		78.9	45.3	117	0	0	
Surr: 2-Fluorobiphenyl	81		100.0		81.0	43	113	0	0	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
E	Value above quantitation range
J	Analyte detected below quantitation limits
O	RSD is greater than RSDlimit
R	RPD outside accepted recovery limits
S	Spike Recovery outside accepted recovery limits
B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
P	Sample pH Not In Range
RL	Reporting Detection Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1502723**

16-Mar-15

Client: Western Refining Southwest, Inc.

Project: Injection Well 2-17-15

Sample ID	**lcsd-17825**	SampType:	**LCSD**		TestCode:	**EPA Method 8270C: Semivolatiles**					
Client ID:	**LCSS02**	Batch ID:	**17825**		RunNo:	**24458**					
Prep Date:	**2/20/2015**	Analysis Date:	**2/23/2015**		SeqNo:	**720295**	Units:	**µg/L**			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: 4-Terphenyl-d14		72		100.0		72.5	47.6	122	0	0	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
O	RSD is greater than RSDlimit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1502723**

16-Mar-15

Client: Western Refining Southwest, Inc.

Project: Injection Well 2-17-15

Sample ID	**1502723-001c dup**	SampType: **DUP**			TestCode: **SM2510B: Specific Conductance**					
Client ID:	**Injection Well**	Batch ID: **R24379**			RunNo: **24379**					
Prep Date:		Analysis Date: **2/18/2015**			SeqNo: **718418**		Units: **µmhos/cm**			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Conductivity		2900	0.010						0.349	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
O	RSD is greater than RSDlimit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1502723**

16-Mar-15

Client: Western Refining Southwest, Inc.

Project: Injection Well 2-17-15

Sample ID	**MB-17887**	SampType:	**MBLK**		TestCode:	**EPA Method 7470: Mercury**				
Client ID:	**PBW**	Batch ID:	**17887**		RunNo:	**24523**				
Prep Date:	**2/25/2015**	Analysis Date:	**2/26/2015**		SeqNo:	**722178**	Units:	**mg/L**		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	ND	0.00020								

Sample ID	**LCS-17887**	SampType:	**LCS**		TestCode:	**EPA Method 7470: Mercury**				
Client ID:	**LCSW**	Batch ID:	**17887**		RunNo:	**24523**				
Prep Date:	**2/25/2015**	Analysis Date:	**2/26/2015**		SeqNo:	**722179**	Units:	**mg/L**		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0051	0.00020	0.005000	0	102	80	120			

Qualifiers:

- * Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- O RSD is greater than RSDlimit
- R RPD outside accepted recovery limits
- S Spike Recovery outside accepted recovery limits
- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- P Sample pH Not In Range
- RL Reporting Detection Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1502723**

16-Mar-15

Client: Western Refining Southwest, Inc.

Project: Injection Well 2-17-15

Sample ID **MB-17834** SampType: **MBLK** TestCode: **EPA 6010B: Total Recoverable Metals**

Client ID: **PBW** Batch ID: **17834** RunNo: **24435**

Prep Date: **2/20/2015** Analysis Date: **2/21/2015** SeqNo: **719770** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	ND	0.020								
Barium	ND	0.020								
Cadmium	ND	0.0020								
Calcium	ND	1.0								
Chromium	ND	0.0060								
Lead	ND	0.0050								
Magnesium	ND	1.0								
Potassium	ND	1.0								
Selenium	ND	0.050								
Silver	ND	0.0050								
Sodium	ND	1.0								

Sample ID **LCS-17834** SampType: **LCS** TestCode: **EPA 6010B: Total Recoverable Metals**

Client ID: **LCSW** Batch ID: **17834** RunNo: **24435**

Prep Date: **2/20/2015** Analysis Date: **2/21/2015** SeqNo: **719771** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	0.52	0.020	0.5000	0	104	80	120			
Barium	0.49	0.020	0.5000	0	97.6	80	120			
Cadmium	0.49	0.0020	0.5000	0	98.8	80	120			
Calcium	50	1.0	50.00	0	99.5	80	120			
Chromium	0.50	0.0060	0.5000	0	99.2	80	120			
Lead	0.49	0.0050	0.5000	0	99.0	80	120			
Magnesium	49	1.0	50.00	0	98.7	80	120			
Potassium	47	1.0	50.00	0	94.2	80	120			
Selenium	0.50	0.050	0.5000	0	100	80	120			
Silver	0.11	0.0050	0.1000	0	106	80	120			
Sodium	49	1.0	50.00	0	97.4	80	120			

Qualifiers:

- * Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- O RSD is greater than RSDlimit
- R RPD outside accepted recovery limits
- S Spike Recovery outside accepted recovery limits
- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- P Sample pH Not In Range
- RL Reporting Detection Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1502723**

16-Mar-15

Client: Western Refining Southwest, Inc.

Project: Injection Well 2-17-15

Sample ID **1502723-001c dup**	SampType: **DUP**			TestCode: **SM4500-H+B: pH**						
Client ID: **Injection Well**	Batch ID: **R24379**			RunNo: **24379**						
Prep Date:	Analysis Date: **2/18/2015**			SeqNo: **718422**		Units: **pH units**				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
pH	7.22	1.68								H

Qualifiers:

- * Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- O RSD is greater than RSDlimit
- R RPD outside accepted recovery limits
- S Spike Recovery outside accepted recovery limits
- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- P Sample pH Not In Range
- RL Reporting Detection Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1502723**

16-Mar-15

Client: Western Refining Southwest, Inc.
Project: Injection Well 2-17-15

Sample ID **mb-1**	SampType: **MBLK**	TestCode: **SM2320B: Alkalinity**
Client ID: **PBW**	Batch ID: **R24379**	RunNo: **24379**
Prep Date:	Analysis Date: **2/18/2015**	SeqNo: **718434** Units: **mg/L CaCO3**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	ND	20								

Sample ID **lcs-1**	SampType: **LCS**	TestCode: **SM2320B: Alkalinity**
Client ID: **LCSW**	Batch ID: **R24379**	RunNo: **24379**
Prep Date:	Analysis Date: **2/18/2015**	SeqNo: **718435** Units: **mg/L CaCO3**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	80	20	80.00	0	99.7	90	110			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
E	Value above quantitation range
J	Analyte detected below quantitation limits
O	RSD is greater than RSDlimit
R	RPD outside accepted recovery limits
S	Spike Recovery outside accepted recovery limits
B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
P	Sample pH Not In Range
RL	Reporting Detection Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1502723**

16-Mar-15

Client: Western Refining Southwest, Inc.

Project: Injection Well 2-17-15

Sample ID **MB-17793**	SampType: **MBLK**	TestCode: **SM2540C MOD: Total Dissolved Solids**
Client ID: **PBW**	Batch ID: **17793**	RunNo: **24408**
Prep Date: **2/18/2015**	Analysis Date: **2/19/2015**	SeqNo: **718999** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	ND	20.0								

Sample ID **LCS-17793**	SampType: **LCS**	TestCode: **SM2540C MOD: Total Dissolved Solids**
Client ID: **LCSW**	Batch ID: **17793**	RunNo: **24408**
Prep Date: **2/18/2015**	Analysis Date: **2/19/2015**	SeqNo: **719000** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	1020	20.0	1000	0	102	80	120			

Qualifiers:

- * Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- O RSD is greater than RSDlimit
- R RPD outside accepted recovery limits
- S Spike Recovery outside accepted recovery limits
- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- P Sample pH Not In Range
- RL Reporting Detection Limit

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

Sample Log-In Check List

Client Name: Western Refining Southw Work Order Number: 1502723 RcptNo: 1

Received by/date: AM 02/18/15

Logged By: Ashley Gallegos 2/18/2015 8:00:00 AM AG

Completed By: Ashley Gallegos 2/18/2015 8:45:45 AM AG

Reviewed By: CS 02/18/15

Chain of Custody

1. Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
2. Is Chain of Custody complete?	Yes ☑	No ☐	Not Present ☐
3. How was the sample delivered?	Courier		

Log In

4. Was an attempt made to cool the samples?	Yes ☑	No ☐	NA ☐
5. Were all samples received at a temperature of >0° C to 6.0°C	Yes ☑	No	NA
6. Sample(s) in proper container(s)?	Yes ☑	No ☐	
7. Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
8. Are samples (except VOA and ONG) properly preserved?	Yes ☑	No ☐	
9. Was preservative added to bottles?	Yes	No ☑	NA ☐
10. VOA vials have zero headspace?	Yes ☑	No ☐	No VOA Vials ☐
11. Were any sample containers received broken?	Yes ☐	No ☑	
12. Does paperwork match bottle labels? (Note discrepancies on chain of custody)	Yes ☑	No ☐	# of preserved bottles checked for pH: 1 2 (<2 or >12 unless noted)
13. Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	Adjusted? No
14. Is it clear what analyses were requested?	Yes ☑	No ☐	
15. Were all holding times able to be met? (If no, notify customer for authorization.)	Yes ☑	No ☐	Checked by:

Special Handling (if applicable)

16. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☑

Person Notified: _____ Date _____

By Whom: _____ Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding: _____

Client Instructions: _____

17. Additional remarks:

18. **Cooler Information**

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	1.7	Good	Yes			

Chain-of-Custody Record

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

Tel. 505-345-3975 Fax 505-345-4107

Client: Western Refining

Mailing Address: #50 CR 4990 Bloomfield, NM 87413

Phone #: 505-632-4135

email or Fax#:

QA/QC Package:

☐ Standard ☒ Level 4 (Full Validation)

Accreditation

☐ NELAP ☐ Other

☐ EDD (Type)

Turn-Around Time:

☒ Standard ☐ Rush

Project Name: Injection Well 2-17-15

Project #:

Project Manager:

Sampler: Bob

On Ice: ☒ Yes ☐ No

Sample Temperature: 1.7

HEAL No. 1502723

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No.
2-17-15	11:20	H_2O	Injection Well	3-VOA	HCl	-001
				1-Liter	amber	
				1-500ml		
				1-500ml		
				1-250ml	H_2SO_4	
				1-500ml	HNO_3	
				1-500ml	NaOH	
				1-500ml	Zn-Acetate	

Analysis Request

BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gas only)	TPH 8015B (GRO / DRO / MRO)	~~TPH (Method 418.1)~~ TDS	~~EDB (Method 504.1)~~ Backup	PAH's (8310 or 8270 SIMS)	RCRA 8 Metals Ca, Mg, Na, K	Anions (F, Cl, NO_3, NO_2, PO_4, SO_4)	8081 Pesticides / 8082 PCB's	8260B (VOA)	8270 (Semi-VOA)	Ignitability, Corrosivity, Reactivity	Eq. pH, SO_4, Alk, Cl, Sulfides	Air Bubbles (Y or N)
									X				
										X			
											X		
			X									X	
			~~X~~	X									
						X							
											X		
												X	

Date:	Time:	Relinquished by:	Received by:	Date	Time
2-17-15	1612	Robert Krakow	Christa Walls	2/17/15	1612
2/17/15	1750	Christine Walters		02/18/15	0800

Remarks: Per BK - analyze for RCI

AT 02/18/15

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

April 28, 2015

Kelly Robinson

Western Refining Southwest, Inc.
#50 CR 4990
Bloomfield, NM 87413
TEL: (505) 632-4166
FAX (505) 632-3911

RE: Injection Well OrderNo.: 1504086

Dear Kelly Robinson:

Hall Environmental Analysis Laboratory received 1 sample(s) on 4/2/2015 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites. In order to properly interpret your results it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0190

Sincerely,

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Western Refining Southwest, Inc.
Project: Injection Well
Lab ID: 1504086-001 **Matrix:** AQUEOUS

Client Sample ID: Injection Well
Collection Date: 4/1/2015 10:15:00 AM
Received Date: 4/2/2015 7:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 300.0: ANIONS						Analyst: **LGT**	
Chloride	1400	50		mg/L	100	4/2/2015 6:46:26 PM	R25272
Sulfate	9.5	5.0		mg/L	10	4/2/2015 6:34:01 PM	R25272
EPA METHOD 7470: MERCURY						Analyst: **MED**	
Mercury	ND	0.00020		mg/L	1	4/13/2015 3:11:02 PM	18653
EPA 6010B: TOTAL RECOVERABLE METALS						Analyst: **ELS**	
Arsenic	ND	0.020		mg/L	1	4/4/2015 12:54:50 PM	18515
Barium	0.44	0.020		mg/L	1	4/4/2015 12:54:50 PM	18515
Cadmium	ND	0.0020		mg/L	1	4/4/2015 12:54:50 PM	18515
Calcium	300	10		mg/L	10	4/4/2015 12:56:16 PM	18515
Chromium	ND	0.0060		mg/L	1	4/4/2015 12:54:50 PM	18515
Lead	ND	0.0050		mg/L	1	4/4/2015 12:54:50 PM	18515
Magnesium	57	1.0		mg/L	1	4/4/2015 12:54:50 PM	18515
Potassium	21	1.0		mg/L	1	4/4/2015 12:54:50 PM	18515
Selenium	ND	0.050		mg/L	1	4/4/2015 12:54:50 PM	18515
Silver	ND	0.0050		mg/L	1	4/4/2015 12:54:50 PM	18515
Sodium	750	10		mg/L	10	4/4/2015 12:56:16 PM	18515
EPA METHOD 8270C: SEMIVOLATILES						Analyst: **DAM**	
Acenaphthene	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
Acenaphthylene	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
Aniline	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
Anthracene	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
Azobenzene	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
Benz(a)anthracene	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
Benzo(a)pyrene	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
Benzo(b)fluoranthene	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
Benzo(g,h,i)perylene	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
Benzo(k)fluoranthene	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
Benzoic acid	25	20		µg/L	1	4/8/2015 3:02:35 PM	18572
Benzyl alcohol	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
Bis(2-chloroethoxy)methane	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
Bis(2-chloroethyl)ether	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
Bis(2-chloroisopropyl)ether	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
Bis(2-ethylhexyl)phthalate	12	10		µg/L	1	4/8/2015 3:02:35 PM	18572
4-Bromophenyl phenyl ether	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
Butyl benzyl phthalate	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
Carbazole	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
4-Chloro-3-methylphenol	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
4-Chloroaniline	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
O	RSD is greater than RSDlimit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Western Refining Southwest, Inc.
Project: Injection Well
Lab ID: 1504086-001 **Matrix:** AQUEOUS

Client Sample ID: Injection Well
Collection Date: 4/1/2015 10:15:00 AM
Received Date: 4/2/2015 7:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8270C: SEMIVOLATILES						Analyst: **DAM**	
2-Chloronaphthalene	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
2-Chlorophenol	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
4-Chlorophenyl phenyl ether	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
Chrysene	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
Di-n-butyl phthalate	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
Di-n-octyl phthalate	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
Dibenz(a,h)anthracene	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
Dibenzofuran	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
1,2-Dichlorobenzene	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
1,3-Dichlorobenzene	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
1,4-Dichlorobenzene	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
3,3'-Dichlorobenzidine	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
Diethyl phthalate	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
Dimethyl phthalate	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
2,4-Dichlorophenol	ND	20		µg/L	1	4/8/2015 3:02:35 PM	18572
2,4-Dimethylphenol	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
4,6-Dinitro-2-methylphenol	ND	20		µg/L	1	4/8/2015 3:02:35 PM	18572
2,4-Dinitrophenol	ND	20		µg/L	1	4/8/2015 3:02:35 PM	18572
2,4-Dinitrotoluene	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
2,6-Dinitrotoluene	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
Fluoranthene	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
Fluorene	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
Hexachlorobenzene	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
Hexachlorobutadiene	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
Hexachlorocyclopentadiene	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
Hexachloroethane	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
Indeno(1,2,3-cd)pyrene	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
Isophorone	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
1-Methylnaphthalene	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
2-Methylnaphthalene	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
2-Methylphenol	14	10		µg/L	1	4/8/2015 3:02:35 PM	18572
3+4-Methylphenol	48	10		µg/L	1	4/8/2015 3:02:35 PM	18572
N-Nitrosodi-n-propylamine	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
N-Nitrosodimethylamine	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
N-Nitrosodiphenylamine	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
Naphthalene	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
2-Nitroaniline	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
3-Nitroaniline	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
4-Nitroaniline	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
E	Value above quantitation range
J	Analyte detected below quantitation limits
O	RSD is greater than RSDlimit
R	RPD outside accepted recovery limits
S	Spike Recovery outside accepted recovery limits
B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
P	Sample pH Not In Range
RL	Reporting Detection Limit

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Western Refining Southwest, Inc.
Project: Injection Well
Lab ID: 1504086-001 **Matrix:** AQUEOUS

Client Sample ID: Injection Well
Collection Date: 4/1/2015 10:15:00 AM
Received Date: 4/2/2015 7:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8270C: SEMIVOLATILES						Analyst: **DAM**	
Nitrobenzene	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
2-Nitrophenol	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
4-Nitrophenol	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
Pentachlorophenol	ND	20		µg/L	1	4/8/2015 3:02:35 PM	18572
Phenanthrene	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
Phenol	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
Pyrene	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
Pyridine	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
1,2,4-Trichlorobenzene	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
2,4,5-Trichlorophenol	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
2,4,6-Trichlorophenol	ND	10		µg/L	1	4/8/2015 3:02:35 PM	18572
Surr: 2-Fluorophenol	50.2	17.6-104		%REC	1	4/8/2015 3:02:35 PM	18572
Surr: Phenol-d5	46.5	17.7-89.9		%REC	1	4/8/2015 3:02:35 PM	18572
Surr: 2,4,6-Tribromophenol	65.5	16.3-122		%REC	1	4/8/2015 3:02:35 PM	18572
Surr: Nitrobenzene-d5	60.5	45.3-117		%REC	1	4/8/2015 3:02:35 PM	18572
Surr: 2-Fluorobiphenyl	50.8	43-113		%REC	1	4/8/2015 3:02:35 PM	18572
Surr: 4-Terphenyl-d14	46.9	47.6-122	S	%REC	1	4/8/2015 3:02:35 PM	18572
EPA METHOD 8260B: VOLATILES						Analyst: **DJF**	
Benzene	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
Toluene	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
Ethylbenzene	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
Methyl tert-butyl ether (MTBE)	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
1,2,4-Trimethylbenzene	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
1,3,5-Trimethylbenzene	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
1,2-Dichloroethane (EDC)	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
1,2-Dibromoethane (EDB)	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
Naphthalene	ND	10		µg/L	5	4/2/2015 8:23:27 PM	R25251
1-Methylnaphthalene	ND	20		µg/L	5	4/2/2015 8:23:27 PM	R25251
2-Methylnaphthalene	ND	20		µg/L	5	4/2/2015 8:23:27 PM	R25251
Acetone	76	50		µg/L	5	4/2/2015 8:23:27 PM	R25251
Bromobenzene	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
Bromodichloromethane	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
Bromoform	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
Bromomethane	ND	15		µg/L	5	4/2/2015 8:23:27 PM	R25251
2-Butanone	ND	50		µg/L	5	4/2/2015 8:23:27 PM	R25251
Carbon disulfide	ND	50		µg/L	5	4/2/2015 8:23:27 PM	R25251
Carbon Tetrachloride	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
Chlorobenzene	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
Chloroethane	ND	10		µg/L	5	4/2/2015 8:23:27 PM	R25251

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

- * Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- O RSD is greater than RSDlimit
- R RPD outside accepted recovery limits
- S Spike Recovery outside accepted recovery limits
- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- P Sample pH Not In Range
- RL Reporting Detection Limit

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Western Refining Southwest, Inc.
Project: Injection Well
Lab ID: 1504086-001 **Matrix:** AQUEOUS

Client Sample ID: Injection Well
Collection Date: 4/1/2015 10:15:00 AM
Received Date: 4/2/2015 7:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **DJF**	
Chloroform	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
Chloromethane	ND	15		µg/L	5	4/2/2015 8:23:27 PM	R25251
2-Chlorotoluene	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
4-Chlorotoluene	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
cis-1,2-DCE	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
cis-1,3-Dichloropropene	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
1,2-Dibromo-3-chloropropane	ND	10		µg/L	5	4/2/2015 8:23:27 PM	R25251
Dibromochloromethane	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
Dibromomethane	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
1,2-Dichlorobenzene	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
1,3-Dichlorobenzene	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
1,4-Dichlorobenzene	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
Dichlorodifluoromethane	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
1,1-Dichloroethane	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
1,1-Dichloroethene	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
1,2-Dichloropropane	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
1,3-Dichloropropane	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
2,2-Dichloropropane	ND	10		µg/L	5	4/2/2015 8:23:27 PM	R25251
1,1-Dichloropropene	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
Hexachlorobutadiene	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
2-Hexanone	ND	50		µg/L	5	4/2/2015 8:23:27 PM	R25251
Isopropylbenzene	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
4-Isopropyltoluene	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
4-Methyl-2-pentanone	ND	50		µg/L	5	4/2/2015 8:23:27 PM	R25251
Methylene Chloride	ND	15		µg/L	5	4/2/2015 8:23:27 PM	R25251
n-Butylbenzene	ND	15		µg/L	5	4/2/2015 8:23:27 PM	R25251
n-Propylbenzene	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
sec-Butylbenzene	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
Styrene	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
tert-Butylbenzene	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
1,1,1,2-Tetrachloroethane	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
1,1,2,2-Tetrachloroethane	ND	10		µg/L	5	4/2/2015 8:23:27 PM	R25251
Tetrachloroethene (PCE)	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
trans-1,2-DCE	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
trans-1,3-Dichloropropene	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
1,2,3-Trichlorobenzene	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
1,2,4-Trichlorobenzene	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
1,1,1-Trichloroethane	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
1,1,2-Trichloroethane	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
O	RSD is greater than RSDlimit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Western Refining Southwest, Inc.
Project: Injection Well
Lab ID: 1504086-001 **Matrix:** AQUEOUS

Client Sample ID: Injection Well
Collection Date: 4/1/2015 10:15:00 AM
Received Date: 4/2/2015 7:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst:	**DJF**
Trichloroethene (TCE)	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
Trichlorofluoromethane	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
1,2,3-Trichloropropane	ND	10		µg/L	5	4/2/2015 8:23:27 PM	R25251
Vinyl chloride	ND	5.0		µg/L	5	4/2/2015 8:23:27 PM	R25251
Xylenes, Total	ND	7.5		µg/L	5	4/2/2015 8:23:27 PM	R25251
Surr: 1,2-Dichloroethane-d4	91.2	70-130		%REC	5	4/2/2015 8:23:27 PM	R25251
Surr: 4-Bromofluorobenzene	87.3	70-130		%REC	5	4/2/2015 8:23:27 PM	R25251
Surr: Dibromofluoromethane	101	70-130		%REC	5	4/2/2015 8:23:27 PM	R25251
Surr: Toluene-d8	91.7	70-130		%REC	5	4/2/2015 8:23:27 PM	R25251
SM2510B: SPECIFIC CONDUCTANCE						Analyst:	**JRR**
Conductivity	4900	0.010		µmhos/cm	1	4/3/2015 3:32:30 PM	R25315
SM4500-H+B: PH						Analyst:	**JRR**
pH	6.94	1.68	H	pH units	1	4/3/2015 3:32:30 PM	R25315
SM2320B: ALKALINITY						Analyst:	**JRR**
Bicarbonate (As CaCO3)	358.6	20.00		mg/L CaCO3	1	4/3/2015 3:32:30 PM	R25315
Carbonate (As CaCO3)	ND	2.000		mg/L CaCO3	1	4/3/2015 3:32:30 PM	R25315
Total Alkalinity (as CaCO3)	358.6	20.00		mg/L CaCO3	1	4/3/2015 3:32:30 PM	R25315
SM2540C MOD: TOTAL DISSOLVED SOLIDS						Analyst:	**KS**
Total Dissolved Solids	2890	200	*	mg/L	1	4/3/2015 3:48:00 PM	18487

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

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E	Value above quantitation range
J	Analyte detected below quantitation limits
O	RSD is greater than RSDlimit
R	RPD outside accepted recovery limits
S	Spike Recovery outside accepted recovery limits
B	Analyte detected in the associated Method Blank
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit
P	Sample pH Not In Range
RL	Reporting Detection Limit

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client:	HALL ENVIRONMENTAL ANALYSIS LAB	**Batch #:**	150403019
Address:	4901 HAWKINS NE SUITE D ALBUQUERQUE, NM 87109	**Project Name:**	1504086
Attn:	ANDY FREEMAN		

Analytical Results Report

Sample Number	150403019-001	**Sampling Date**	4/1/2015	**Date/Time Received**	4/3/2015 11:40 AM
Client Sample ID	1504086-001E / INJECTION WELL			**Sampling Time**	10:15 AM
Matrix	Water	**Sample Location**			
Comments					

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Cyanide (reactive)	ND	mg/L	1	4/8/2015	CRW	SW846 CH7	
Flashpoint	>200	°F		4/6/2015	KFG	EPA 1010	
pH	7.17	ph Units		4/6/2015	KJS	SM 4500pH-B	
Reactive sulfide	0.872	mg/L	0.36	4/6/2015	HSW	SW846 CH7	

Authorized Signature

John Coddington, Lab Manager

MCL EPA's Maximum Contaminant Level
ND Not Detected
PQL Practical Quantitation Limit

The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; MT:CERT0026; NM: ID00013; OR:ID200001-002; WA:C585
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: HALL ENVIRONMENTAL ANALYSIS LAB
Address: 4901 HAWKINS NE SUITE D
ALBUQUERQUE, NM 87109
Attn: ANDY FREEMAN

Batch #: 150403019
Project Name: 1504086

Analytical Results Report

Quality Control Data

Lab Control Sample

Parameter	LCS Result	Units	LCS Spike	%Rec	AR %Rec	Prep Date	Analysis Date
Cyanide (reactive)	0.555	mg/L	0.5	111.0	80-120	4/8/2015	4/8/2015
Reactive sulfide	0.2	mg/L	0.2	100.0	70-130	4/6/2015	4/6/2015

Matrix Spike

Sample Number	Parameter	Sample Result	MS Result	Units	MS Spike	%Rec	AR %Rec	Prep Date	Analysis Date
150403019-001A	Reactive sulfide	0.872	1.60	mg/L	0.73	99.7	70-130	4/6/2015	4/6/2015
150403019-001	Cyanide (reactive)	ND	0.464	mg/L	0.5	92.8	80-120	4/8/2015	4/8/2015

Matrix Spike Duplicate

Parameter	MSD Result	Units	MSD Spike	%Rec	%RPD	AR %RPD	Prep Date	Analysis Date
Cyanide (reactive)	0.447	mg/L	0.5	89.4	3.7	0-25	4/8/2015	4/8/2015

Method Blank

Parameter	Result	Units	PQL	Prep Date	Analysis Date
Cyanide (reactive)	ND	mg/L	1	4/8/2015	4/8/2015
Reactive sulfide	ND	mg/L	0.5	4/6/2015	4/6/2015

AR	Acceptable Range
ND	Not Detected
PQL	Practical Quantitation Limit
RPD	Relative Percentage Difference

Comments:

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1504086**

28-Apr-15

Client: Western Refining Southwest, Inc.
Project: Injection Well

Sample ID **MB**	SampType: **MBLK**	TestCode: **EPA Method 300.0: Anions**
Client ID: **PBW**	Batch ID: **R25272**	RunNo: **25272**
Prep Date:	Analysis Date: **4/2/2015**	SeqNo: **747284** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	ND	0.50								
Sulfate	ND	0.50								

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
O	RSD is greater than RSDlimit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1504086**

28-Apr-15

Client: Western Refining Southwest, Inc.

Project: Injection Well

Sample ID **5ml rb**	SampType: **MBLK**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **PBW**	Batch ID: **R25251**	RunNo: **25251**
Prep Date:	Analysis Date: **4/2/2015**	SeqNo: **746628** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	ND	1.0								
Toluene	ND	1.0								
Ethylbenzene	ND	1.0								
Methyl tert-butyl ether (MTBE)	ND	1.0								
1,2,4-Trimethylbenzene	ND	1.0								
1,3,5-Trimethylbenzene	ND	1.0								
1,2-Dichloroethane (EDC)	ND	1.0								
1,2-Dibromoethane (EDB)	ND	1.0								
Naphthalene	ND	2.0								
1-Methylnaphthalene	ND	4.0								
2-Methylnaphthalene	ND	4.0								
Acetone	ND	10								
Bromobenzene	ND	1.0								
Bromodichloromethane	ND	1.0								
Bromoform	ND	1.0								
Bromomethane	ND	3.0								
2-Butanone	ND	10								
Carbon disulfide	ND	10								
Carbon Tetrachloride	ND	1.0								
Chlorobenzene	ND	1.0								
Chloroethane	ND	2.0								
Chloroform	ND	1.0								
Chloromethane	ND	3.0								
2-Chlorotoluene	ND	1.0								
4-Chlorotoluene	ND	1.0								
cis-1,2-DCE	ND	1.0								
cis-1,3-Dichloropropene	ND	1.0								
1,2-Dibromo-3-chloropropane	ND	2.0								
Dibromochloromethane	ND	1.0								
Dibromomethane	ND	1.0								
1,2-Dichlorobenzene	ND	1.0								
1,3-Dichlorobenzene	ND	1.0								
1,4-Dichlorobenzene	ND	1.0								
Dichlorodifluoromethane	ND	1.0								
1,1-Dichloroethane	ND	1.0								
1,1-Dichloroethene	ND	1.0								
1,2-Dichloropropane	ND	1.0								
1,3-Dichloropropane	ND	1.0								
2,2-Dichloropropane	ND	2.0								

Qualifiers:

- * Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- O RSD is greater than RSDlimit
- R RPD outside accepted recovery limits
- S Spike Recovery outside accepted recovery limits
- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- P Sample pH Not In Range
- RL Reporting Detection Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1504086**

28-Apr-15

Client: Western Refining Southwest, Inc.
Project: Injection Well

Sample ID **5ml rb**	SampType: **MBLK**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **PBW**	Batch ID: **R25251**	RunNo: **25251**
Prep Date:	Analysis Date: **4/2/2015**	SeqNo: **746628** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
1,1-Dichloropropene	ND	1.0								
Hexachlorobutadiene	ND	1.0								
2-Hexanone	ND	10								
Isopropylbenzene	ND	1.0								
4-Isopropyltoluene	ND	1.0								
4-Methyl-2-pentanone	ND	10								
l ıylene Chloride	ND	3.0								
n-Butylbenzene	ND	3.0								
n-Propylbenzene	ND	1.0								
sec-Butylbenzene	ND	1.0								
Styrene	ND	1.0								
tert-Butylbenzene	ND	1.0								
1,1,1,2-Tetrachloroethane	ND	1.0								
1,1,2,2-Tetrachloroethane	ND	2.0								
Tetrachloroethene (PCE)	ND	1.0								
trans-1,2-DCE	ND	1.0								
trans-1,3-Dichloropropene	ND	1.0								
1,2,3-Trichlorobenzene	ND	1.0								
1,2,4-Trichlorobenzene	ND	1.0								
1,1,1-Trichloroethane	ND	1.0								
1,1,2-Trichloroethane	ND	1.0								
Trichloroethene (TCE)	ND	1.0								
Trichlorofluoromethane	ND	1.0								
1,2,3-Trichloropropane	ND	2.0								
Vinyl chloride	ND	1.0								
Xylenes, Total	ND	1.5								
Surr: 1,2-Dichloroethane-d4	9.0		10.00		90.2	70	130			
Surr: 4-Bromofluorobenzene	9.9		10.00		98.5	70	130			
Surr: Dibromofluoromethane	10		10.00		100	70	130			
Surr: Toluene-d8	8.9		10.00		89.1	70	130			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
O	RSD is greater than RSDlimit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1504086**

28-Apr-15

Client: Western Refining Southwest, Inc.

Project: Injection Well

Sample ID **mb-18572**	SampType: **MBLK**	TestCode: **EPA Method 8270C: Semivolatiles**
Client ID: **PBW**	Batch ID: **18572**	RunNo: **25381**
Prep Date: **4/8/2015**	Analysis Date: **4/8/2015**	SeqNo: **751155** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Acenaphthene	ND	10								
Acenaphthylene	ND	10								
Aniline	ND	10								
Anthracene	ND	10								
Azobenzene	ND	10								
Benz(a)anthracene	ND	10								
Benzo(a)pyrene	ND	10								
Benzo(b)fluoranthene	ND	10								
Benzo(g,h,i)perylene	ND	10								
Benzo(k)fluoranthene	ND	10								
Benzoic acid	ND	20								
Benzyl alcohol	ND	10								
Bis(2-chloroethoxy)methane	ND	10								
Bis(2-chloroethyl)ether	ND	10								
Bis(2-chloroisopropyl)ether	ND	10								
Bis(2-ethylhexyl)phthalate	ND	10								
4-Bromophenyl phenyl ether	ND	10								
Butyl benzyl phthalate	ND	10								
Carbazole	ND	10								
4-Chloro-3-methylphenol	ND	10								
4-Chloroaniline	ND	10								
2-Chloronaphthalene	ND	10								
2-Chlorophenol	ND	10								
4-Chlorophenyl phenyl ether	ND	10								
Chrysene	ND	10								
Di-n-butyl phthalate	ND	10								
Di-n-octyl phthalate	ND	10								
Dibenz(a,h)anthracene	ND	10								
Dibenzofuran	ND	10								
1,2-Dichlorobenzene	ND	10								
1,3-Dichlorobenzene	ND	10								
1,4-Dichlorobenzene	ND	10								
3,3'-Dichlorobenzidine	ND	10								
Diethyl phthalate	ND	10								
Dimethyl phthalate	ND	10								
2,4-Dichlorophenol	ND	20								
2,4-Dimethylphenol	ND	10								
4,6-Dinitro-2-methylphenol	ND	20								
2,4-Dinitrophenol	ND	20								

Qualifiers:

- * Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- O RSD is greater than RSDlimit
- R RPD outside accepted recovery limits
- S Spike Recovery outside accepted recovery limits
- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- P Sample pH Not In Range
- RL Reporting Detection Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1504086**

28-Apr-15

Client: Western Refining Southwest, Inc.
Project: Injection Well

Sample ID **mb-18572**	SampType: **MBLK**	TestCode: **EPA Method 8270C: Semivolatiles**	
Client ID: **PBW**	Batch ID: **18572**	RunNo: **25381**	
Prep Date: **4/8/2015**	Analysis Date: **4/8/2015**	SeqNo: **751155**	Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
2,4-Dinitrotoluene	ND	10								
2,6-Dinitrotoluene	ND	10								
Fluoranthene	ND	10								
Fluorene	ND	10								
Hexachlorobenzene	ND	10								
Hexachlorobutadiene	ND	10								
Hexachlorocyclopentadiene	ND	10								
Hexachloroethane	ND	10								
Indeno(1,2,3-cd)pyrene	ND	10								
Isophorone	ND	10								
1-Methylnaphthalene	ND	10								
2-Methylnaphthalene	ND	10								
2-Methylphenol	ND	10								
3+4-Methylphenol	ND	10								
N-Nitrosodi-n-propylamine	ND	10								
N-Nitrosodimethylamine	ND	10								
N-Nitrosodiphenylamine	ND	10								
Naphthalene	ND	10								
2-Nitroaniline	ND	10								
3-Nitroaniline	ND	10								
4-Nitroaniline	ND	10								
Nitrobenzene	ND	10								
2-Nitrophenol	ND	10								
4-Nitrophenol	ND	10								
Pentachlorophenol	ND	20								
Phenanthrene	ND	10								
Phenol	ND	10								
Pyrene	ND	10								
Pyridine	ND	10								
1,2,4-Trichlorobenzene	ND	10								
2,4,5-Trichlorophenol	ND	10								
2,4,6-Trichlorophenol	ND	10								
Surr: 2-Fluorophenol	170		200.0		86.8	17.6	104			
Surr: Phenol-d5	170		200.0		85.8	17.7	89.9			
Surr: 2,4,6-Tribromophenol	170		200.0		85.6	16.3	122			
Surr: Nitrobenzene-d5	78		100.0		78.4	45.3	117			
Surr: 2-Fluorobiphenyl	79		100.0		79.3	43	113			
Surr: 4-Terphenyl-d14	80		100.0		80.3	47.6	122			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
O	RSD is greater than RSDlimit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1504086**

28-Apr-15

Client: Western Refining Southwest, Inc.

Project: Injection Well

Sample ID	**MB-18653**	SampType: **MBLK**		TestCode: **EPA Method 7470: Mercury**					
Client ID:	**PBW**	Batch ID: **18653**		RunNo: **25477**					
Prep Date:	**4/13/2015**	Analysis Date: **4/13/2015**		SeqNo: **754166**		Units: **mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	ND	0.00020								

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
O	RSD is greater than RSDlimit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1504086**

28-Apr-15

Client: Western Refining Southwest, Inc.

Project: Injection Well

Sample ID **MB-18515**	SampType: **MBLK**	TestCode: **EPA 6010B: Total Recoverable Metals**
Client ID: **PBW**	Batch ID: **18515**	RunNo: **25295**
Prep Date: **4/3/2015**	Analysis Date: **4/4/2015**	SeqNo: **747966** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	ND	0.020								
Barium	ND	0.020								
Cadmium	ND	0.0020								
Calcium	ND	1.0								
Chromium	ND	0.0060								
Lead	ND	0.0050								
Magnesium	ND	1.0								
Potassium	ND	1.0								
Selenium	ND	0.050								
Silver	ND	0.0050								
Sodium	ND	1.0								

Qualifiers:

- * Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- O RSD is greater than RSDlimit
- R RPD outside accepted recovery limits
- S Spike Recovery outside accepted recovery limits
- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- P Sample pH Not In Range
- RL Reporting Detection Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1504086**

28-Apr-15

Client: Western Refining Southwest, Inc.

Project: Injection Well

Sample ID **mb-1**	SampType: **MBLK**	TestCode: **SM2320B: Alkalinity**							
Client ID: **PBW**	Batch ID: **R25315**	RunNo: **25315**							
Prep Date:	Analysis Date: **4/3/2015**	SeqNo: **748965**	Units: **mg/L CaCO3**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	ND	20.00								

Sample ID **mb-2**	SampType: **MBLK**	TestCode: **SM2320B: Alkalinity**							
Client ID: **PBW**	Batch ID: **R25315**	RunNo: **25315**							
Prep Date:	Analysis Date: **4/3/2015**	SeqNo: **748989**	Units: **mg/L CaCO3**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	ND	20.00								

Qualifiers:

- * Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- J Analyte detected below quantitation limits
- O RSD is greater than RSDlimit
- R RPD outside accepted recovery limits
- S Spike Recovery outside accepted recovery limits
- B Analyte detected in the associated Method Blank
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- P Sample pH Not In Range
- RL Reporting Detection Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1504086**

28-Apr-15

Client: Western Refining Southwest, Inc.
Project: Injection Well

Sample ID **MB-18487**	SampType: **MBLK**	TestCode: **SM2540C MOD: Total Dissolved Solids**
Client ID: **PBW**	Batch ID: **18487**	RunNo: **25292**
Prep Date: **4/2/2015**	Analysis Date: **4/3/2015**	SeqNo: **747841** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	ND	20.0								

Sample ID **1504086-001BMS**	SampType: **MS**	TestCode: **SM2540C MOD: Total Dissolved Solids**
Client ID: **Injection Well**	Batch ID: **18487**	RunNo: **25292**
Prep Date: **4/2/2015**	Analysis Date: **4/3/2015**	SeqNo: **747863** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	13000	200	10000	2890	101	80	120			

Sample ID **1504086-001BMSD**	SampType: **MSD**	TestCode: **SM2540C MOD: Total Dissolved Solids**
Client ID: **Injection Well**	Batch ID: **18487**	RunNo: **25292**
Prep Date: **4/2/2015**	Analysis Date: **4/3/2015**	SeqNo: **747864** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	13100	200	10000	2890	102	80	120	0.841	5	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
O	RSD is greater than RSDlimit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	Spike Recovery outside accepted recovery limits		

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

Sample Log-In Check List

Client Name: Western Refining Southw Work Order Number: 1504086 RcptNo: 1

Received by/date: AT 04/02/15

Logged By: Lindsay Mangin 4/2/2015 7:00:00 AM

Completed By: Lindsay Mangin 4/2/2015 9:21:57 AM

Reviewed By: JA 04/02/15

Chain of Custody

1. Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
2. Is Chain of Custody complete?	Yes ☑	No ☐	Not Present ☐
3. How was the sample delivered?	Courier		

Log In

4. Was an attempt made to cool the samples?	Yes ☑	No ☐	NA ☐
5. Were all samples received at a temperature of >0° C to 6.0°C	Yes ☑	No ☐	NA ☐
6. Sample(s) in proper container(s)?	Yes ☑	No ☐	
7. Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
8. Are samples (except VOA and ONG) properly preserved?	Yes ☑	No ☐	
9. Was preservative added to bottles?	Yes ☐	No ☑	NA ☐
10. VOA vials have zero headspace?	Yes ☑	No ☑	No VOA Vials ☐
11. Were any sample containers received broken?	Yes ☐	No ☑	
12. Does paperwork match bottle labels? (Note discrepancies on chain of custody)	Yes ☑	No ☐	# of preserved bottles checked for pH: 1, 2 (<2 or >12 unless noted)
13. Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	Adjusted? no
14. Is it clear what analyses were requested?	Yes ☑	No ☐	
15. Were all holding times able to be met? (If no, notify customer for authorization.)	Yes ☑	No ☐	Checked by: CS

CS 04/02/15 Sample -001A (2 of 3 and 3 of 3 have bubbles. -CS 04/02/15

Special Handling (if applicable)

16. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☑

Person Notified: _____ Date _____

By Whom: _____ Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding: _____

Client Instructions: _____

17. Additional remarks:

18. Cooler Information

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	1.0	Good	Yes			

Chain-of-Custody Record

Client: Western Refining

Mailing Address: #50 CR 4990
Bloomfield, NM 87413

Phone #: 505-632-4135

email or Fax#:

QA/QC Package:
☐ Standard ☒ Level 4 (Full Validation)

Accreditation
☐ NELAP ☐ Other

☐ EDD (Type)

Turn-Around Time:
☒ Standard ☐ Rush

Project Name:
Injection Well 4-1-15

Project #:
PO # 1261263

Project Manager:

Sampler: Bob
On Ice: ☒ Yes ☐ No
Sample Temperature: 1.0

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com
4901 Hawkins NE - Albuquerque, NM 87109
Tel. 505-345-3975 Fax 505-345-4107

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1504086
4-1-15	10:15	H_2O	Injection Well	3-VOA	HCl	-001
				1-liter	amber	-001
				1-500ml		-001
				1-500ml		-001
				1-120ml	H_2SO_4	-001
				1-500ml	HNO_3	-001
				1-500ml	NaOH	-001
				1-500ml	2N Acetate	-001

Analysis Request

BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gas only)	TPH 8015B (GRO / DRO / MRO)	TDS	BACKUP	PAH's (8310 or 8270 SIMS)	RCRA 8 Metals	Anions ($F, Cl, NO_3, NO_2, PO_4, SO_4$)	8081 Pesticides / 8082 PCB's	8260B (VOA)	8270 (Semi-VOA)	Ignitability, Corrosivity	Reactivity	Ec, pH, SO_4, Alk, Cl	Sulfides	Air Bubbles (Y or N)
									X						
										X					
											X				
				X									X		
					X										
						X									
												X			
														X	

Date:	Time:	Relinquished by:	Received by:	Date	Time
4-1-15	1624	Robert Krakow	Matt Wade	4/1/15	1624
4/1/15	1825	Christine Walden		4/02/15	0700

Remarks:

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

August 06, 2015

Kelly Robinson

Western Refining Southwest, Inc.
#50 CR 4990
Bloomfield, NM 87413
TEL: (505) 632-4166
FAX (505) 632-3911

RE: Injection Well 7-1-15 OrderNo.: 1507094

Dear Kelly Robinson:

Hall Environmental Analysis Laboratory received 1 sample(s) on 7/2/2015 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites. In order to properly interpret your results it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0190

Sincerely,

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Analytical Report
Lab Order **1507094**
Date Reported: **8/6/2015**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Western Refining Southwest, Inc.
Project: Injection Well 7-1-15
Lab ID: 1507094-001 **Matrix:** AQUEOUS

Client Sample ID: Injection Well
Collection Date: 7/1/2015 9:00:00 AM
Received Date: 7/2/2015 7:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 300.0: ANIONS						Analyst: **LGT**	
Chloride	480	50		mg/L	100	7/2/2015 5:18:55 PM	R27295
Sulfate	65	5.0		mg/L	10	7/2/2015 5:06:31 PM	R27295
SM2510B: SPECIFIC CONDUCTANCE						Analyst: **JRR**	
Conductivity	2000	0.010		µmhos/cm	1	7/6/2015 11:31:17 AM	R27329
SM2320B: ALKALINITY						Analyst: **JRR**	
Bicarbonate (As CaCO3)	274.6	20.00		mg/L CaCO3	1	7/6/2015 11:31:17 AM	R27329
Carbonate (As CaCO3)	ND	2.000		mg/L CaCO3	1	7/6/2015 11:31:17 AM	R27329
Total Alkalinity (as CaCO3)	274.6	20.00		mg/L CaCO3	1	7/6/2015 11:31:17 AM	R27329
SM2540C MOD: TOTAL DISSOLVED SOLIDS						Analyst: **KS**	
Total Dissolved Solids	1220	40.0	*	mg/L	1	7/8/2015 5:09:00 PM	20129
SM4500-H+B: PH						Analyst: **JRR**	
pH	7.45	1.68	H	pH units	1	7/6/2015 11:31:17 AM	R27329
EPA METHOD 7470: MERCURY						Analyst: **JLF**	
Mercury	ND	0.0010		mg/L	5	7/8/2015 4:47:51 PM	20158
EPA 6010B: TOTAL RECOVERABLE METALS						Analyst: **MED**	
Arsenic	ND	0.020		mg/L	1	7/9/2015 10:51:23 AM	20102
Barium	0.27	0.020		mg/L	1	7/9/2015 10:51:23 AM	20102
Cadmium	ND	0.0020		mg/L	1	7/16/2015 12:13:28 PM	20102
Calcium	120	5.0		mg/L	5	7/9/2015 1:02:36 PM	20102
Chromium	ND	0.0060		mg/L	1	7/14/2015 3:52:06 PM	20102
Lead	ND	0.0050		mg/L	1	7/9/2015 10:51:23 AM	20102
Magnesium	28	1.0		mg/L	1	7/9/2015 10:51:23 AM	20102
Potassium	7.7	1.0		mg/L	1	7/9/2015 10:51:23 AM	20102
Selenium	ND	0.050		mg/L	1	7/16/2015 12:13:28 PM	20102
Silver	ND	0.0050		mg/L	1	7/16/2015 12:13:28 PM	20102
Sodium	280	5.0		mg/L	5	7/9/2015 1:02:36 PM	20102
EPA METHOD 8270C: SEMIVOLATILES						Analyst: **DAM**	
Acenaphthene	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
Acenaphthylene	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
Aniline	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
Anthracene	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
Azobenzene	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
Benz(a)anthracene	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
Benzo(a)pyrene	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
Benzo(b)fluoranthene	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
Benzo(g,h,i)perylene	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Western Refining Southwest, Inc. **Client Sample ID:** Injection Well
Project: Injection Well 7-1-15 **Collection Date:** 7/1/2015 9:00:00 AM
Lab ID: 1507094-001 **Matrix:** AQUEOUS **Received Date:** 7/2/2015 7:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8270C: SEMIVOLATILES						Analyst: **DAM**	
Benzo(k)fluoranthene	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
Benzoic acid	ND	20		µg/L	1	7/10/2015 1:30:30 PM	20095
Benzyl alcohol	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
Bis(2-chloroethoxy)methane	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
Bis(2-chloroethyl)ether	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
Bis(2-chloroisopropyl)ether	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
Bis(2-ethylhexyl)phthalate	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
4-Bromophenyl phenyl ether	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
Butyl benzyl phthalate	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
Carbazole	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
4-Chloro-3-methylphenol	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
4-Chloroaniline	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
2-Chloronaphthalene	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
2-Chlorophenol	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
4-Chlorophenyl phenyl ether	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
Chrysene	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
Di-n-butyl phthalate	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
Di-n-octyl phthalate	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
Dibenz(a,h)anthracene	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
Dibenzofuran	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
1,2-Dichlorobenzene	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
1,3-Dichlorobenzene	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
1,4-Dichlorobenzene	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
3,3'-Dichlorobenzidine	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
Diethyl phthalate	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
Dimethyl phthalate	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
2,4-Dichlorophenol	ND	20		µg/L	1	7/10/2015 1:30:30 PM	20095
2,4-Dimethylphenol	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
4,6-Dinitro-2-methylphenol	ND	20		µg/L	1	7/10/2015 1:30:30 PM	20095
2,4-Dinitrophenol	ND	20		µg/L	1	7/10/2015 1:30:30 PM	20095
2,4-Dinitrotoluene	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
2,6-Dinitrotoluene	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
Fluoranthene	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
Fluorene	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
Hexachlorobenzene	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
Hexachlorobutadiene	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
Hexachlorocyclopentadiene	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
Hexachloroethane	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
Indeno(1,2,3-cd)pyrene	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095

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Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Western Refining Southwest, Inc. **Client Sample ID:** Injection Well
Project: Injection Well 7-1-15 **Collection Date:** 7/1/2015 9:00:00 AM
Lab ID: 1507094-001 **Matrix:** AQUEOUS **Received Date:** 7/2/2015 7:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8270C: SEMIVOLATILES						Analyst: **DAM**	
Isophorone	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
1-Methylnaphthalene	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
2-Methylnaphthalene	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
2-Methylphenol	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
3+4-Methylphenol	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
N-Nitrosodi-n-propylamine	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
N-Nitrosodimethylamine	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
N-Nitrosodiphenylamine	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
Naphthalene	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
2-Nitroaniline	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
3-Nitroaniline	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
4-Nitroaniline	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
Nitrobenzene	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
2-Nitrophenol	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
4-Nitrophenol	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
Pentachlorophenol	ND	20		µg/L	1	7/10/2015 1:30:30 PM	20095
Phenanthrene	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
Phenol	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
Pyrene	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
Pyridine	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
1,2,4-Trichlorobenzene	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
2,4,5-Trichlorophenol	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
2,4,6-Trichlorophenol	ND	10		µg/L	1	7/10/2015 1:30:30 PM	20095
Surr: 2-Fluorophenol	66.2	14.9-111		%REC	1	7/10/2015 1:30:30 PM	20095
Surr: Phenol-d5	64.1	11.3-108		%REC	1	7/10/2015 1:30:30 PM	20095
Surr: 2,4,6-Tribromophenol	75.7	15.7-154		%REC	1	7/10/2015 1:30:30 PM	20095
Surr: Nitrobenzene-d5	84.6	47.8-106		%REC	1	7/10/2015 1:30:30 PM	20095
Surr: 2-Fluorobiphenyl	63.7	21.3-123		%REC	1	7/10/2015 1:30:30 PM	20095
Surr: 4-Terphenyl-d14	51.4	14.3-135		%REC	1	7/10/2015 1:30:30 PM	20095
EPA METHOD 8260B: VOLATILES						Analyst: **BCN**	
Benzene	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
Toluene	1.5	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
Ethylbenzene	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
Naphthalene	ND	2.0		µg/L	1	7/9/2015 8:19:52 PM	R27397

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
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S	% Recovery outside of range due to dilution or matrix		

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Western Refining Southwest, Inc. **Client Sample ID:** Injection Well
Project: Injection Well 7-1-15 **Collection Date:** 7/1/2015 9:00:00 AM
Lab ID: 1507094-001 **Matrix:** AQUEOUS **Received Date:** 7/2/2015 7:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **BCN**	
1-Methylnaphthalene	ND	4.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
2-Methylnaphthalene	ND	4.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
Acetone	72	10		µg/L	1	7/9/2015 8:19:52 PM	R27397
Bromobenzene	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
Bromodichloromethane	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
Bromoform	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
Bromomethane	ND	3.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
2-Butanone	11	10		µg/L	1	7/9/2015 8:19:52 PM	R27397
Carbon disulfide	ND	10		µg/L	1	7/9/2015 8:19:52 PM	R27397
Carbon Tetrachloride	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
Chlorobenzene	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
Chloroethane	ND	2.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
Chloroform	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
Chloromethane	ND	3.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
2-Chlorotoluene	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
4-Chlorotoluene	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
cis-1,2-DCE	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
Dibromochloromethane	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
Dibromomethane	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
1,2-Dichlorobenzene	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
1,3-Dichlorobenzene	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
1,4-Dichlorobenzene	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
Dichlorodifluoromethane	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
1,1-Dichloroethane	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
1,1-Dichloroethene	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
1,2-Dichloropropane	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
1,3-Dichloropropane	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
2,2-Dichloropropane	ND	2.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
1,1-Dichloropropene	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
Hexachlorobutadiene	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
2-Hexanone	ND	10		µg/L	1	7/9/2015 8:19:52 PM	R27397
Isopropylbenzene	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
4-Isopropyltoluene	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
4-Methyl-2-pentanone	ND	10		µg/L	1	7/9/2015 8:19:52 PM	R27397
Methylene Chloride	ND	3.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
n-Butylbenzene	ND	3.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
n-Propylbenzene	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

- * Value exceeds Maximum Contaminant Level.
- B Analyte detected in the associated Method Blank
- D Sample Diluted Due to Matrix
- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- P Sample pH Not In Range
- R RPD outside accepted recovery limits
- RL Reporting Detection Limit
- S % Recovery outside of range due to dilution or matrix

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Western Refining Southwest, Inc.
Client Sample ID: Injection Well
Project: Injection Well 7-1-15
Collection Date: 7/1/2015 9:00:00 AM
Lab ID: 1507094-001 **Matrix:** AQUEOUS **Received Date:** 7/2/2015 7:00:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **BCN**	
sec-Butylbenzene	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
Styrene	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
tert-Butylbenzene	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
trans-1,2-DCE	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
1,1,1-Trichloroethane	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
1,1,2-Trichloroethane	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
Trichloroethene (TCE)	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
Trichlorofluoromethane	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
1,2,3-Trichloropropane	ND	2.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
Vinyl chloride	ND	1.0		µg/L	1	7/9/2015 8:19:52 PM	R27397
Xylenes, Total	ND	1.5		µg/L	1	7/9/2015 8:19:52 PM	R27397
Surr: 1,2-Dichloroethane-d4	96.9	70-130		%REC	1	7/9/2015 8:19:52 PM	R27397
Surr: 4-Bromofluorobenzene	90.8	70-130		%REC	1	7/9/2015 8:19:52 PM	R27397
Surr: Dibromofluoromethane	103	70-130		%REC	1	7/9/2015 8:19:52 PM	R27397
Surr: Toluene-d8	95.5	70-130		%REC	1	7/9/2015 8:19:52 PM	R27397

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
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S	% Recovery outside of range due to dilution or matrix		

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client:	HALL ENVIRONMENTAL ANALYSIS LAB	**Batch #:**	150707035
Address:	4901 HAWKINS NE SUITE D ALBUQUERQUE, NM 87109	**Project Name:**	1507094
Attn:	ANDY FREEMAN		

Analytical Results Report

Sample Number	150707035-001	**Sampling Date**	7/1/2015	**Date/Time Received**	7/7/2015 11:00 AM
Client Sample ID	1507094-001E / INJECTION WELL			**Sampling Time**	9:00 AM
Matrix	Water	**Sample Location**			
Comments					

Parameter	Result	Units	PQL	Analysis Date	Analyst	Method	Qualifier
Cyanide (reactive)	ND	mg/L	1	7/15/2015	CRW	SW846 CH7	
Flashpoint	>200	°F		7/15/2015	KFG	EPA 1010	
pH	7.36	ph Units		7/8/2015	KMC	SM 4500pH-B	
Reactive sulfide	ND	mg/L	1	7/15/2015	HSW	SW846 CH7	

Authorized Signature

John Coddington, Lab Manager

MCL EPA's Maximum Contaminant Level
ND Not Detected
PQL Practical Quantitation Limit

This report shall not be reproduced except in full, without the written approval of the laboratory.
The results reported relate only to the samples indicated.
Soil/solid results are reported on a dry-weight basis unless otherwise noted.

Anatek Labs, Inc.

1282 Alturas Drive • Moscow, ID 83843 • (208) 883-2839 • Fax (208) 882-9246 • email moscow@anateklabs.com
504 E Sprague Ste. D • Spokane WA 99202 • (509) 838-3999 • Fax (509) 838-4433 • email spokane@anateklabs.com

Client: HALL ENVIRONMENTAL ANALYSIS LAB
Address: 4901 HAWKINS NE SUITE D
ALBUQUERQUE, NM 87109
Attn: ANDY FREEMAN

Batch #: 150707035
Project Name: 1507094

Analytical Results Report

Quality Control Data

Lab Control Sample

Parameter	LCS Result	Units	LCS Spike	%Rec	AR %Rec	Prep Date	Analysis Date
Reactive sulfide	0.816	mg/L	0.907	90.0	70-130	7/15/2015	7/15/2015
Cyanide (reactive)	0.486	mg/L	0.5	97.2	80-120	7/15/2015	7/15/2015

Matrix Spike

Sample Number	Parameter	Sample Result	MS Result	Units	MS Spike	%Rec	AR %Rec	Prep Date	Analysis Date
150707035-001A	Reactive sulfide	ND	0.816	mg/L	0.907	90.0	70-130	7/15/2015	7/15/2015
150707035-001	Cyanide (reactive)	ND	0.462	mg/L	0.5	92.4	80-120	7/15/2015	7/15/2015

Matrix Spike Duplicate

Parameter	MSD Result	Units	MSD Spike	%Rec	%RPD	AR %RPD	Prep Date	Analysis Date
Cyanide (reactive)	0.454	mg/L	0.5	90.8	1.7	0-25	7/15/2015	7/15/2015

Method Blank

Parameter	Result	Units	PQL	Prep Date	Analysis Date
Cyanide (reactive)	ND	mg/L	1	7/15/2015	7/15/2015
Reactive sulfide	ND	mg/L	1	7/15/2015	7/15/2015

AR	Acceptable Range
ND	Not Detected
PQL	Practical Quantitation Limit
RPD	Relative Percentage Difference

Comments:

Certifications held by Anatek Labs ID: EPA:ID00013; AZ:0701; CO:ID00013; FL(NELAP):E87893; ID:ID00013; MT:CERT0028; NM: ID00013; OR:ID200001-002; WA:C595
Certifications held by Anatek Labs WA: EPA:WA00169; ID:WA00169; WA:C585; MT:Cert0095; FL(NELAP): E871099

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1507094**

06-Aug-15

Client: Western Refining Southwest, Inc.

Project: Injection Well 7-1-15

Sample ID **MB**	SampType: **MBLK**	TestCode: **EPA Method 300.0: Anions**
Client ID: **PBW**	Batch ID: **R27295**	RunNo: **27295**
Prep Date:	Analysis Date: **7/2/2015**	SeqNo: **817819** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	ND	0.50								
Sulfate	ND	0.50								

Sample ID **LCS**	SampType: **LCS**	TestCode: **EPA Method 300.0: Anions**
Client ID: **LCSW**	Batch ID: **R27295**	RunNo: **27295**
Prep Date:	Analysis Date: **7/2/2015**	SeqNo: **817820** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	5.0	0.50	5.000	0	99.0	90	110			
Sulfate	10	0.50	10.00	0	103	90	110			

Qualifiers:

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D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1507094**

06-Aug-15

Client: Western Refining Southwest, Inc.

Project: Injection Well 7-1-15

Sample ID **100ng LCS**	SampType: **LCS**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **LCSW**	Batch ID: **R27397**	RunNo: **27397**
Prep Date:	Analysis Date: **7/9/2015**	SeqNo: **822125** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	18	1.0	20.00	0	90.9	70	130			
Toluene	17	1.0	20.00	0	87.2	70	130			
Chlorobenzene	17	1.0	20.00	0	85.5	70	130			
1,1-Dichloroethene	19	1.0	20.00	0	95.4	70	130			
Trichloroethene (TCE)	17	1.0	20.00	0	84.0	70	130			
Surr: 1,2-Dichloroethane-d4	9.3		10.00		93.4	70	130			
Surr: 4-Bromofluorobenzene	9.9		10.00		99.3	70	130			
Surr: Dibromofluoromethane	11		10.00		106	70	130			
Surr: Toluene-d8	10		10.00		100	70	130			

Sample ID **rb1**	SampType: **MBLK**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **PBW**	Batch ID: **R27397**	RunNo: **27397**
Prep Date:	Analysis Date: **7/9/2015**	SeqNo: **822418** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	ND	1.0								
Toluene	ND	1.0								
Ethylbenzene	ND	1.0								
Methyl tert-butyl ether (MTBE)	ND	1.0								
1,2,4-Trimethylbenzene	ND	1.0								
1,3,5-Trimethylbenzene	ND	1.0								
1,2-Dichloroethane (EDC)	ND	1.0								
1,2-Dibromoethane (EDB)	ND	1.0								
Naphthalene	ND	2.0								
1-Methylnaphthalene	ND	4.0								
2-Methylnaphthalene	ND	4.0								
Acetone	ND	10								
Bromobenzene	ND	1.0								
Bromodichloromethane	ND	1.0								
Bromoform	ND	1.0								
Bromomethane	ND	3.0								
2-Butanone	ND	10								
Carbon disulfide	ND	10								
Carbon Tetrachloride	ND	1.0								
Chlorobenzene	ND	1.0								
Chloroethane	ND	2.0								
Chloroform	ND	1.0								
Chloromethane	ND	3.0								
2-Chlorotoluene	ND	1.0								

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1507094**

06-Aug-15

Client: Western Refining Southwest, Inc.

Project: Injection Well 7-1-15

Sample ID **rb1**	SampType: **MBLK**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **PBW**	Batch ID: **R27397**	RunNo: **27397**
Prep Date:	Analysis Date: **7/9/2015**	SeqNo: **822418** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
4-Chlorotoluene	ND	1.0								
cis-1,2-DCE	ND	1.0								
cis-1,3-Dichloropropene	ND	1.0								
1,2-Dibromo-3-chloropropane	ND	2.0								
Dibromochloromethane	ND	1.0								
Dibromomethane	ND	1.0								
1,2-Dichlorobenzene	ND	1.0								
1,3-Dichlorobenzene	ND	1.0								
1,4-Dichlorobenzene	ND	1.0								
Dichlorodifluoromethane	ND	1.0								
1,1-Dichloroethane	ND	1.0								
1,1-Dichloroethene	ND	1.0								
1,2-Dichloropropane	ND	1.0								
1,3-Dichloropropane	ND	1.0								
2,2-Dichloropropane	ND	2.0								
1,1-Dichloropropene	ND	1.0								
Hexachlorobutadiene	ND	1.0								
2-Hexanone	ND	10								
Isopropylbenzene	ND	1.0								
4-Isopropyltoluene	ND	1.0								
4-Methyl-2-pentanone	ND	10								
Methylene Chloride	ND	3.0								
n-Butylbenzene	ND	3.0								
n-Propylbenzene	ND	1.0								
sec-Butylbenzene	ND	1.0								
Styrene	ND	1.0								
tert-Butylbenzene	ND	1.0								
1,1,1,2-Tetrachloroethane	ND	1.0								
1,1,2,2-Tetrachloroethane	ND	2.0								
Tetrachloroethene (PCE)	ND	1.0								
trans-1,2-DCE	ND	1.0								
trans-1,3-Dichloropropene	ND	1.0								
1,2,3-Trichlorobenzene	ND	1.0								
1,2,4-Trichlorobenzene	ND	1.0								
1,1,1-Trichloroethane	ND	1.0								
1,1,2-Trichloroethane	ND	1.0								
Trichloroethene (TCE)	ND	1.0								
Trichlorofluoromethane	ND	1.0								
1,2,3-Trichloropropane	ND	2.0								

Qualifiers:

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- ND Not Detected at the Reporting Limit
- P Sample pH Not In Range
- R RPD outside accepted recovery limits
- RL Reporting Detection Limit
- S % Recovery outside of range due to dilution or matrix

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1507094**

06-Aug-15

Client: Western Refining Southwest, Inc.

Project: Injection Well 7-1-15

Sample ID **rb1**	SampType: **MBLK**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **PBW**	Batch ID: **R27397**	RunNo: **27397**
Prep Date:	Analysis Date: **7/9/2015**	SeqNo: **822418** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Vinyl chloride	ND	1.0								
Xylenes, Total	ND	1.5								
Surr: 1,2-Dichloroethane-d4	10		10.00		102	70	130			
Surr: 4-Bromofluorobenzene	10		10.00		104	70	130			
Surr: Dibromofluoromethane	11		10.00		107	70	130			
Surr: Toluene-d8	9.9		10.00		98.7	70	130			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
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ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
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QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1507094**

06-Aug-15

Client: Western Refining Southwest, Inc.

Project: Injection Well 7-1-15

Sample ID **mb-20095**	SampType: **MBLK**	TestCode: **EPA Method 8270C: Semivolatiles**
Client ID: **PBW**	Batch ID: **20095**	RunNo: **27414**
Prep Date: **7/6/2015**	Analysis Date: **7/10/2015**	SeqNo: **822558** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Acenaphthene	ND	10								
Acenaphthylene	ND	10								
Aniline	ND	10								
Anthracene	ND	10								
Azobenzene	ND	10								
Benz(a)anthracene	ND	10								
Benzo(a)pyrene	ND	10								
Benzo(b)fluoranthene	ND	10								
Benzo(g,h,i)perylene	ND	10								
Benzo(k)fluoranthene	ND	10								
Benzoic acid	ND	20								
Benzyl alcohol	ND	10								
Bis(2-chloroethoxy)methane	ND	10								
Bis(2-chloroethyl)ether	ND	10								
Bis(2-chloroisopropyl)ether	ND	10								
Bis(2-ethylhexyl)phthalate	ND	10								
4-Bromophenyl phenyl ether	ND	10								
Butyl benzyl phthalate	ND	10								
Carbazole	ND	10								
4-Chloro-3-methylphenol	ND	10								
4-Chloroaniline	ND	10								
2-Chloronaphthalene	ND	10								
2-Chlorophenol	ND	10								
4-Chlorophenyl phenyl ether	ND	10								
Chrysene	ND	10								
Di-n-butyl phthalate	ND	10								
Di-n-octyl phthalate	ND	10								
Dibenz(a,h)anthracene	ND	10								
Dibenzofuran	ND	10								
1,2-Dichlorobenzene	ND	10								
1,3-Dichlorobenzene	ND	10								
1,4-Dichlorobenzene	ND	10								
3,3´-Dichlorobenzidine	ND	10								
Diethyl phthalate	ND	10								
Dimethyl phthalate	ND	10								
2,4-Dichlorophenol	ND	20								
2,4-Dimethylphenol	ND	10								
4,6-Dinitro-2-methylphenol	ND	20								
2,4-Dinitrophenol	ND	20								

Qualifiers:

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- ND Not Detected at the Reporting Limit
- P Sample pH Not In Range
- R RPD outside accepted recovery limits
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- S % Recovery outside of range due to dilution or matrix

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1507094**

06-Aug-15

Client: Western Refining Southwest, Inc.

Project: Injection Well 7-1-15

Sample ID **mb-20095**	SampType: **MBLK**	TestCode: **EPA Method 8270C: Semivolatiles**
Client ID: **PBW**	Batch ID: **20095**	RunNo: **27414**
Prep Date: **7/6/2015**	Analysis Date: **7/10/2015**	SeqNo: **822558** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
2,4-Dinitrotoluene	ND	10								
2,6-Dinitrotoluene	ND	10								
Fluoranthene	ND	10								
Fluorene	ND	10								
Hexachlorobenzene	ND	10								
Hexachlorobutadiene	ND	10								
Hexachlorocyclopentadiene	ND	10								
Hexachloroethane	ND	10								
Indeno(1,2,3-cd)pyrene	ND	10								
Isophorone	ND	10								
1-Methylnaphthalene	ND	10								
2-Methylnaphthalene	ND	10								
2-Methylphenol	ND	10								
3+4-Methylphenol	ND	10								
N-Nitrosodi-n-propylamine	ND	10								
N-Nitrosodimethylamine	ND	10								
N-Nitrosodiphenylamine	ND	10								
Naphthalene	ND	10								
2-Nitroaniline	ND	10								
3-Nitroaniline	ND	10								
4-Nitroaniline	ND	10								
Nitrobenzene	ND	10								
2-Nitrophenol	ND	10								
4-Nitrophenol	ND	10								
Pentachlorophenol	ND	20								
Phenanthrene	ND	10								
Phenol	ND	10								
Pyrene	ND	10								
Pyridine	ND	10								
1,2,4-Trichlorobenzene	ND	10								
2,4,5-Trichlorophenol	ND	10								
2,4,6-Trichlorophenol	ND	10								
Surr: 2-Fluorophenol	140		200.0		69.6	14.9	111			
Surr: Phenol-d5	150		200.0		74.2	11.3	108			
Surr: 2,4,6-Tribromophenol	150		200.0		75.2	15.7	154			
Surr: Nitrobenzene-d5	75		100.0		75.0	47.8	106			
Surr: 2-Fluorobiphenyl	76		100.0		75.9	21.3	123			
Surr: 4-Terphenyl-d14	52		100.0		52.2	14.3	135			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1507094**

06-Aug-15

Client: Western Refining Southwest, Inc.

Project: Injection Well 7-1-15

Sample ID **lcs-20095**	SampType: **LCS**	TestCode: **EPA Method 8270C: Semivolatiles**
Client ID: **LCSW**	Batch ID: **20095**	RunNo: **27414**
Prep Date: **7/6/2015**	Analysis Date: **7/10/2015**	SeqNo: **822559** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Acenaphthene	51	10	100.0	0	51.2	47.8	99.7			
4-Chloro-3-methylphenol	110	10	200.0	0	56.2	58.1	103			S
2-Chlorophenol	73	10	200.0	0	36.7	49.5	96.8			S
1,4-Dichlorobenzene	34	10	100.0	0	33.8	40.4	89.4			S
2,4-Dinitrotoluene	42	10	100.0	0	41.8	38.6	91.3			
N-Nitrosodi-n-propylamine	51	10	100.0	0	51.1	53.9	95.6			S
4-Nitrophenol	93	10	200.0	0	46.3	26.4	108			
Pentachlorophenol	98	20	200.0	0	49.1	36.5	86.6			
Phenol	85	10	200.0	0	42.7	29.3	108			
Pyrene	56	10	100.0	0	56.2	45.7	100			
1,2,4-Trichlorobenzene	43	10	100.0	0	42.9	39.3	94.5			
Surr: 2-Fluorophenol	67		200.0		33.4	14.9	111			
Surr: Phenol-d5	86		200.0		43.0	11.3	108			
Surr: 2,4,6-Tribromophenol	120		200.0		62.3	15.7	154			
Surr: Nitrobenzene-d5	47		100.0		46.6	47.8	106			S
Surr: 2-Fluorobiphenyl	53		100.0		53.0	21.3	123			
Surr: 4-Terphenyl-d14	44		100.0		44.1	14.3	135			

Sample ID **lcsd-20095**	SampType: **LCSD**	TestCode: **EPA Method 8270C: Semivolatiles**
Client ID: **LCSS02**	Batch ID: **20095**	RunNo: **27414**
Prep Date: **7/6/2015**	Analysis Date: **7/10/2015**	SeqNo: **822560** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Acenaphthene	76	10	100.0	0	76.1	47.8	99.7	39.1	28.2	R
4-Chloro-3-methylphenol	160	10	200.0	0	81.3	58.1	103	36.4	24.4	R
2-Chlorophenol	150	10	200.0	0	76.8	49.5	96.8	70.6	28.1	R
1,4-Dichlorobenzene	72	10	100.0	0	72.5	40.4	89.4	72.9	31.2	R
2,4-Dinitrotoluene	55	10	100.0	0	54.6	38.6	91.3	26.4	44.4	
N-Nitrosodi-n-propylamine	76	10	100.0	0	76.4	53.9	95.6	39.6	24.2	R
4-Nitrophenol	130	10	200.0	0	63.8	26.4	108	31.8	36.6	
Pentachlorophenol	130	20	200.0	0	65.8	36.5	86.6	29.1	29.5	
Phenol	160	10	200.0	0	77.8	29.3	108	58.2	30	R
Pyrene	69	10	100.0	0	69.3	45.7	100	20.8	31	
1,2,4-Trichlorobenzene	86	10	100.0	0	85.7	39.3	94.5	66.6	24	R
Surr: 2-Fluorophenol	140		200.0		70.6	14.9	111	0	0	
Surr: Phenol-d5	160		200.0		79.2	11.3	108	0	0	
Surr: 2,4,6-Tribromophenol	160		200.0		82.0	15.7	154	0	0	
Surr: Nitrobenzene-d5	80		100.0		79.5	47.8	106	0	0	
Surr: 2-Fluorobiphenyl	77		100.0		77.3	21.3	123	0	0	

Qualifiers:

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- B Analyte detected in the associated Method Blank
- D Sample Diluted Due to Matrix
- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- P Sample pH Not In Range
- R RPD outside accepted recovery limits
- RL Reporting Detection Limit
- S % Recovery outside of range due to dilution or matrix

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1507094**

06-Aug-15

Client: Western Refining Southwest, Inc.

Project: Injection Well 7-1-15

Sample ID **lcsd-20095**	SampType: **LCSD**	TestCode: **EPA Method 8270C: Semivolatiles**
Client ID: **LCSS02**	Batch ID: **20095**	RunNo: **27414**
Prep Date: **7/6/2015**	Analysis Date: **7/10/2015**	SeqNo: **822560** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: 4-Terphenyl-d14	51		100.0		51.2	14.3	135	0	0	

Sample ID **mb-20218**	SampType: **MBLK**	TestCode: **EPA Method 8270C: Semivolatiles**
Client ID: **PBW**	Batch ID: **20218**	RunNo: **27531**
Prep Date: **7/13/2015**	Analysis Date: **7/15/2015**	SeqNo: **826536** Units: **%REC**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: 2-Fluorophenol	90		200.0		45.0	14.9	111			
Surr: Phenol-d5	75		200.0		37.3	11.3	108			
Surr: 2,4,6-Tribromophenol	140		200.0		69.6	15.7	154			
Surr: Nitrobenzene-d5	64		100.0		64.4	47.8	106			
Surr: 2-Fluorobiphenyl	61		100.0		61.2	21.3	123			
Surr: 4-Terphenyl-d14	45		100.0		45.2	14.3	135			

Sample ID **lcs-20218**	SampType: **LCS**	TestCode: **EPA Method 8270C: Semivolatiles**
Client ID: **LCSW**	Batch ID: **20218**	RunNo: **27531**
Prep Date: **7/13/2015**	Analysis Date: **7/15/2015**	SeqNo: **826537** Units: **%REC**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: 2-Fluorophenol	110		200.0		53.4	14.9	111			
Surr: Phenol-d5	82		200.0		41.0	11.3	108			
Surr: 2,4,6-Tribromophenol	150		200.0		74.7	15.7	154			
Surr: Nitrobenzene-d5	74		100.0		74.2	47.8	106			
Surr: 2-Fluorobiphenyl	74		100.0		73.5	21.3	123			
Surr: 4-Terphenyl-d14	44		100.0		44.2	14.3	135			

Sample ID **lcsd-20218**	SampType: **LCSD**	TestCode: **EPA Method 8270C: Semivolatiles**
Client ID: **LCSS02**	Batch ID: **20218**	RunNo: **27531**
Prep Date: **7/13/2015**	Analysis Date: **7/15/2015**	SeqNo: **826538** Units: **%REC**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: 2-Fluorophenol	100		200.0		52.2	14.9	111	0	0	
Surr: Phenol-d5	84		200.0		41.8	11.3	108	0	0	
Surr: 2,4,6-Tribromophenol	150		200.0		75.7	15.7	154	0	0	
Surr: Nitrobenzene-d5	76		100.0		76.0	47.8	106	0	0	
Surr: 2-Fluorobiphenyl	69		100.0		68.5	21.3	123	0	0	
Surr: 4-Terphenyl-d14	46		100.0		45.5	14.3	135	0	0	

Qualifiers:

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- ND Not Detected at the Reporting Limit
- P Sample pH Not In Range
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- RL Reporting Detection Limit
- S % Recovery outside of range due to dilution or matrix

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1507094**

06-Aug-15

Client: Western Refining Southwest, Inc.

Project: Injection Well 7-1-15

Sample ID	**1507094-001b dup**	SampType:	**DUP**	TestCode:	**SM2510B: Specific Conductance**					
Client ID:	**Injection Well**	Batch ID:	**R27329**	RunNo:	**27329**					
Prep Date:		Analysis Date:	**7/6/2015**	SeqNo:	**819171**	Units:	**µmhos/cm**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Conductivity	2000	0.010						0.0491	20	

Qualifiers:

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H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1507094**

06-Aug-15

Client: Western Refining Southwest, Inc.

Project: Injection Well 7-1-15

Sample ID **MB-20158**	SampType: **MBLK**	TestCode: **EPA Method 7470: Mercury**
Client ID: **PBW**	Batch ID: **20158**	RunNo: **27365**
Prep Date: **7/8/2015**	Analysis Date: **7/8/2015**	SeqNo: **820590** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	ND	0.00020								

Sample ID **LCS-20158**	SampType: **LCS**	TestCode: **EPA Method 7470: Mercury**
Client ID: **LCSW**	Batch ID: **20158**	RunNo: **27365**
Prep Date: **7/8/2015**	Analysis Date: **7/8/2015**	SeqNo: **820591** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0051	0.00020	0.005000	0	102	80	120			

Sample ID **1507094-001DMS**	SampType: **MS**	TestCode: **EPA Method 7470: Mercury**
Client ID: **Injection Well**	Batch ID: **20158**	RunNo: **27365**
Prep Date: **7/8/2015**	Analysis Date: **7/8/2015**	SeqNo: **820635** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0059	0.0010	0.005000	0	118	75	125			

Sample ID **1507094-001DMSD**	SampType: **MSD**	TestCode: **EPA Method 7470: Mercury**
Client ID: **Injection Well**	Batch ID: **20158**	RunNo: **27365**
Prep Date: **7/8/2015**	Analysis Date: **7/8/2015**	SeqNo: **820638** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0058	0.0010	0.005000	0	116	75	125	1.62	20	

Qualifiers:

- * Value exceeds Maximum Contaminant Level.
- B Analyte detected in the associated Method Blank
- D Sample Diluted Due to Matrix
- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- J Analyte detected below quantitation limits
- ND Not Detected at the Reporting Limit
- P Sample pH Not In Range
- R RPD outside accepted recovery limits
- RL Reporting Detection Limit
- S % Recovery outside of range due to dilution or matrix

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1507094**

06-Aug-15

Client: Western Refining Southwest, Inc.

Project: Injection Well 7-1-15

Sample ID **MB-20102**	SampType: **MBLK**	TestCode: **EPA 6010B: Total Recoverable Metals**
Client ID: **PBW**	Batch ID: **20102**	RunNo: **27378**
Prep Date: **7/6/2015**	Analysis Date: **7/9/2015**	SeqNo: **821352** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	ND	0.020								
Barium	ND	0.020								
Calcium	ND	1.0								
Lead	ND	0.0050								
Magnesium	ND	1.0								
Potassium	ND	1.0								
Sodium	ND	1.0								

Sample ID **LCS-20102**	SampType: **LCS**	TestCode: **EPA 6010B: Total Recoverable Metals**
Client ID: **LCSW**	Batch ID: **20102**	RunNo: **27378**
Prep Date: **7/6/2015**	Analysis Date: **7/9/2015**	SeqNo: **821353** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	0.52	0.020	0.5000	0	103	80	120			
Barium	0.49	0.020	0.5000	0	98.5	80	120			
Calcium	51	1.0	50.00	0	102	80	120			
Lead	0.50	0.0050	0.5000	0	100	80	120			
Magnesium	50	1.0	50.00	0	101	80	120			
Potassium	48	1.0	50.00	0	96.8	80	120			
Sodium	49	1.0	50.00	0	98.9	80	120			

Sample ID **MB-20102**	SampType: **MBLK**	TestCode: **EPA 6010B: Total Recoverable Metals**
Client ID: **PBW**	Batch ID: **20102**	RunNo: **27491**
Prep Date: **7/6/2015**	Analysis Date: **7/14/2015**	SeqNo: **824974** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chromium	ND	0.0060								

Sample ID **LCS-20102**	SampType: **LCS**	TestCode: **EPA 6010B: Total Recoverable Metals**
Client ID: **LCSW**	Batch ID: **20102**	RunNo: **27491**
Prep Date: **7/6/2015**	Analysis Date: **7/14/2015**	SeqNo: **824975** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chromium	0.49	0.0060	0.5000	0	98.5	80	120			

Sample ID **MB-20102**	SampType: **MBLK**	TestCode: **EPA 6010B: Total Recoverable Metals**
Client ID: **PBW**	Batch ID: **20102**	RunNo: **27540**
Prep Date: **7/6/2015**	Analysis Date: **7/16/2015**	SeqNo: **826932** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Qualifiers:

- * Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- R RPD outside accepted recovery limits
- S % Recovery outside of range due to dilution or matrix
- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- P Sample pH Not In Range
- RL Reporting Detection Limit

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1507094**

06-Aug-15

Client: Western Refining Southwest, Inc.

Project: Injection Well 7-1-15

Sample ID **MB-20102**	SampType: **MBLK**	TestCode: **EPA 6010B: Total Recoverable Metals**
Client ID: **PBW**	Batch ID: **20102**	RunNo: **27540**
Prep Date: **7/6/2015**	Analysis Date: **7/16/2015**	SeqNo: **826932** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cadmium	ND	0.0020								
Selenium	ND	0.050								
Silver	ND	0.0050								

Sample ID **LCS-20102**	SampType: **LCS**	TestCode: **EPA 6010B: Total Recoverable Metals**
Client ID: **LCSW**	Batch ID: **20102**	RunNo: **27540**
Prep Date: **7/6/2015**	Analysis Date: **7/16/2015**	SeqNo: **826933** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cadmium	0.50	0.0020	0.5000	0	101	80	120			
Selenium	0.50	0.050	0.5000	0	99.7	80	120			
Silver	0.10	0.0050	0.1000	0	105	80	120			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1507094**

06-Aug-15

Client: Western Refining Southwest, Inc.

Project: Injection Well 7-1-15

Sample ID	**1507094-001b dup**	SampType: **DUP**			TestCode: **SM4500-H+B: pH**					
Client ID:	**Injection Well**	Batch ID: **R27329**			RunNo: **27329**					
Prep Date:		Analysis Date: **7/6/2015**			SeqNo: **819204**	Units: **pH units**				
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
pH		7.46	1.68								H

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1507094**

06-Aug-15

Client: Western Refining Southwest, Inc.

Project: Injection Well 7-1-15

Sample ID **mb-1**	SampType: **MBLK**	TestCode: **SM2320B: Alkalinity**							
Client ID: **PBW**	Batch ID: **R27329**	RunNo: **27329**							
Prep Date:	Analysis Date: **7/6/2015**	SeqNo: **819128**	Units: **mg/L CaCO3**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	ND	20.00								

Sample ID **lcs-1**	SampType: **LCS**	TestCode: **SM2320B: Alkalinity**							
Client ID: **LCSW**	Batch ID: **R27329**	RunNo: **27329**							
Prep Date:	Analysis Date: **7/6/2015**	SeqNo: **819129**	Units: **mg/L CaCO3**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	78.36	20.00	80.00	0	98.0	90	110			

Sample ID **mb-2**	SampType: **MBLK**	TestCode: **SM2320B: Alkalinity**							
Client ID: **PBW**	Batch ID: **R27329**	RunNo: **27329**							
Prep Date:	Analysis Date: **7/6/2015**	SeqNo: **819152**	Units: **mg/L CaCO3**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	ND	20.00								

Sample ID **lcs-2**	SampType: **LCS**	TestCode: **SM2320B: Alkalinity**							
Client ID: **LCSW**	Batch ID: **R27329**	RunNo: **27329**							
Prep Date:	Analysis Date: **7/6/2015**	SeqNo: **819153**	Units: **mg/L CaCO3**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	79.44	20.00	80.00	0	99.3	90	110			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1507094**

06-Aug-15

Client: Western Refining Southwest, Inc.

Project: Injection Well 7-1-15

Sample ID **MB-20129**	SampType: **MBLK**	TestCode: **SM2540C MOD: Total Dissolved Solids**
Client ID: **PBW**	Batch ID: **20129**	RunNo: **27360**
Prep Date: **7/7/2015**	Analysis Date: **7/8/2015**	SeqNo: **820297** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	ND	20.0								

Sample ID **LCS-20129**	SampType: **LCS**	TestCode: **SM2540C MOD: Total Dissolved Solids**
Client ID: **LCSW**	Batch ID: **20129**	RunNo: **27360**
Prep Date: **7/7/2015**	Analysis Date: **7/8/2015**	SeqNo: **820298** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	1010	20.0	1000	0	101	80	120			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

Sample Log-In Check List

Client Name: Western Refining Southw Work Order Number: 1507094 RcptNo: 1

Received by/date: AT 07/02/15

Logged By: Anne Thorne 7/2/2015 7:00:00 AM

Completed By: Anne Thorne 7/2/2015

Reviewed By: CS 07/02/15

Chain of Custody

1. Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
2. Is Chain of Custody complete?	Yes ☑	No ☐	Not Present ☐
3. How was the sample delivered?	Courier		

Log In

4. Was an attempt made to cool the samples?	Yes ☑	No ☐	NA ☐
5. Were all samples received at a temperature of >0° C to 6.0°C	Yes ☑	No ☐	NA ☐
6. Sample(s) in proper container(s)?	Yes ☑	No ☐	
7. Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
8. Are samples (except VOA and ONG) properly preserved?	Yes ☑	No ☐	
9. Was preservative added to bottles?	Yes ☐	No ☑	NA ☐
10. VOA vials have zero headspace?	Yes ☐	No ☐	No VOA Vials ☑
11. Were any sample containers received broken?	Yes ☐	No ☑	
12. Does paperwork match bottle labels? (Note discrepancies on chain of custody)	Yes ☑	No ☐	
13. Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	
14. Is it clear what analyses were requested?	Yes ☑	No ☐	
15. Were all holding times able to be met? (If no, notify customer for authorization.)	Yes ☑	No ☐	

# of preserved bottles checked for pH: 2 2 (<2 or >12 unless noted)

Adjusted? —

Checked by: JA

Special Handling (if applicable)

16. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☑

Person Notified: Date:

By Whom: Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding:

Client Instructions:

17. Additional remarks:

18. Cooler Information

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	1.0	Good	Yes			

Chain-of-Custody Record

Client: Western Refining

Mailing Address: #50 CR 4990
Bloomfield, NM 87413

Phone #: 505-632-4135

email or Fax#:

QA/QC Package:
☒ Standard ☐ Level 4 (Full Validation)

Accreditation
☐ NELAP ☐ Other _____

☐ EDD (Type) _____

Turn-Around Time:
☒ Standard ☐ Rush _____

Project Name:
Injection Well 7-1-15

Project #:
P.O.# 12610939

Project Manager:

Sampler: Bob

On Ice: ☒ Yes ☐ No

Sample Temperature: 1.0

HALL ENVIRONMENTAL ANALYSIS LABORATORY
www.hallenvironmental.com
4901 Hawkins NE - Albuquerque, NM 87109
Tel. 505-345-3975 Fax 505-345-4107

Analysis Request

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No 1507094	BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gas only)	TPH 8015B (GRO / DRO / MRO)	~~TPH (Method 418.1)~~ TDS	~~EDB (Method 504.1)~~ Back up	PAH's (8310 or 8270 SIMS)	RCRA 8 Metals Ca, Mg, Na, K	Anions ($F, Cl, NO_3, NO_2, PO_4, SO_4$)	8081 Pesticides / 8082 PCB's	8260B (VOA)	8270 (Semi-VOA)	Ignitability	Reactivity, Corrosivity	Ea, Alk, Cl	Sulfides	Air Bubbles (Y or N)
7-1-15	9:00	H_2O	injection well	5-VOA	HCl	-001										X						
				1-liter	amber	-002											X					
				1-500ml		-003												X				
				1-500ml		-004				X										X		
				1-125ml	H_2SO_4	-005					X											
				1-500ml	HNO_3	-006							X									
				1-500ml	NaOH	-007													X			
				1-500ml	Zn Acetate	-008															X	

Date:	Time:	Relinquished by:	Received by:	Date	Time
7-1-15	1215	Robert Bracken	Christy Walker	7/1/15	1215
7/1/15	1810	Christy Walker		07/02/15	0700

Remarks:

APPENDIX C

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory

QUALITY ASSURANCE PLAN

Effective Date: August 13th, 2014

Revision 9.9

www.hallenvironmental.com

Control Number: 00000158

Approved By:

Andy Freeman
Laboratory Manager

8/12/14
Date

Approved By:

Carolyn Swanson
Quality Assurance/Quality Control Officer

8/12/2014
Date

4901 Hawkins NE ■ Suite D ■ Albuquerque, NM 87109
505.345.3975 ■ Fax 505.345.4107
www.hallenvironmental.com

Approved By:

8/13/14

Ian Cameron Date
Assistant Laboratory Manager

8-13-14

John Caldwell Date
Assistant Laboratory Manager
Semi-Volatiles Technical Director

8-13-14

Rene Aguilera Date
Volatiles Technical Director

8/13/14

Tiffany Shaw Date
Metals Technical Director

8/13/14

Stacey McCoy Date
Wet Chemistry Technical Director

8/13/14

Stephanie Shaffers Date
Microbiology Technical Director

Table of Contents

3.0 Introduction

Purpose of Document

The purpose of this Quality Assurance Plan is to formally document the quality assurance policies and procedures of Hall Environmental Analysis Laboratory, Inc. (HEAL), for the benefit of its employees, clients, and accrediting organizations. HEAL continually implements all aspects of this plan as an essential and integral part of laboratory operations in order to ensure that high quality data is produced in an efficient and effective manner.

Objectives

The objective of HEAL is to achieve and maintain excellence in environmental testing. This is accomplished by developing, incorporating and documenting the procedures and policies specified by each of our accrediting authorities and outlined in this plan. These activities are carried out by a laboratory staff that is analytically competent, well-qualified, and highly trained. An experienced management team, knowledgeable in their area of expertise, monitors them. Finally, a comprehensive quality assurance program governs laboratory practices and ensures that the analytical results are valid, defensible, reproducible, reconstructable and of the highest quality.

HEAL establishes and thoroughly documents its activities to ensure that all data generated and processed will be scientifically valid and of known and documented quality. Routine laboratory activities are detailed in method specific standard operating procedures (SOP). All data reported meets the applicable requirements for the specific method or methods that are referenced, ORELAP, TCEQ, EPA, client specific requirements and/or State Bureaus. In the event that these requirements are ever in contention with each other, it is HEAL's policy to always follow the most prudent requirement available. For specific method requirements refer to HEAL's Standard Operating Procedures (SOP's), EPA methods, Standard Methods 20th edition, ASTM methods or state specific methods.

HEAL management ensures that this document is correct in terms of required accuracy and data reproducibility, and that the procedures contain proper quality control measures. HEAL management additionally ensures that all equipment is reliable, well-maintained and appropriately calibrated. The procedures and practices of the laboratory are geared towards not only strictly following our regulatory requirements but also allowing the flexibility to conform to client specific specifications. Meticulous records are maintained for all samples and their respective analyses so that results are well-documented and defensible in a court of law.

The HEAL Quality Assurance/Quality Control Officer (QA/QCO) and upper management are responsible for supervising and administering this quality assurance program, and

ensuring each individual is responsible for its proper implementation. All HEAL management remains committed to the encouragement of excellence in analytical testing and will continue to provide the necessary resources and environment conducive to its achievement.

Policies

Understanding that quality cannot be mandated, it is the policy of this laboratory to provide an environment that encourages all staff members to take pride in the quality of their work. In addition to furnishing proper equipment and supplies, HEAL stresses the importance of continued training and professional development. Further, HEAL recognizes the time required for data interpretation. Therefore, no analyst should feel pressure to sacrifice data quality for data quantity. Each staff member must perform with the highest level of integrity and professional competence, always being alert to problems that could compromise the quality of their technical work.

Management and senior personnel supervise analysts closely in all operations. Under no circumstance is the willful act or fraudulent manipulation of analytical data condoned. Such acts must be reported immediately to HEAL management. Reported acts will be assessed on an individual basis and resulting actions could result in dismissal. The laboratory staff is encouraged to speak with lab managers or senior management if they feel that there are any undo commercial, financial, or other pressures, which might adversely affect the quality of their work; or in the event that they suspect that data quality has been compromised in any way. HEAL's Quality Assurance/Quality Control Officer is available if any analyst and/or manager wishes to anonymously report any suspected or known breaches in data integrity.

Understanding the importance of meeting customer requirements in addition to the requirements set forth in statutory and regulatory requirements, HEAL shall periodically seek feedback from customers and evaluate the feedback in order to initiate improvements.

All proprietary rights and client information at HEAL (including national security concerns) are considered confidential. No information will be given out without the express verbal or written permission of the client. All reports generated will be held in the strictest of confidence.

HEAL shall continually improve the effectiveness of its management system through the use of the policies and procedures outlined in this Quality Assurance Plan. Quality control results, internal and external audit findings, management reviews, new and continual training and corrective and preventive actions are continually evaluated to identify possible improvements and to ensure that appropriate communication processes are taking place regarding the effectiveness of the management system. HEAL shall ensure that the

integrity of the quality system is maintained when changes to the system are planned and implemented.

This is a controlled document. Each copy is assigned a unique tracking number and when released to a client or accrediting agency the QA/QCO keeps the tracking number on file. This document is reviewed on an annual basis to ensure that it is valid and representative of current practices at HEAL.

4.0 Organization and Responsibility

Company

HEAL is accredited in accordance with the 2009 TNI standard (see NELAC accredited analysis list in the QA Department or on the company website), through ORELAP and TCEQ and by the Arizona Department of Health Services. Additionally, HEAL is qualified as defined under the State of New Mexico Water Quality Control Commission regulations and the New Mexico State Drinking Water Bureau. HEAL is a locally owned small business that was established in 1991. HEAL is a full service environmental analysis laboratory with analytical capabilities that include both organic and inorganic methodologies and has performed analyses of soil, water, and air as well as various other matrices for many sites in the region. HEAL's client base includes local, state and federal agencies, private consultants, commercial industries as well as individual homeowners. HEAL has performed as a subcontractor to the state of New Mexico and to the New Mexico Department of Transportation. HEAL has been acclaimed by its customers as producing quality results and as being adaptive to client-specific needs.

The laboratory is divided into an organic section, an inorganic section and a microbiology section. Each section has a designated manager/technical director. The technical directors report directly to the laboratory manager, who oversees all operations.

Certifications

ORELAP – NELAC Oregon Primary accrediting authority.

TCEQ – NELAC Texas Secondary accrediting authority.

The Arizona Department of Health Services

The New Mexico Drinking Water Bureau

See our website at www.hallenvironmental.com or the QA Office for copies of current licenses and licensed parameters.

In the event of a certification being revoked or suspended, HEAL will notify, in writing, those clients that require the affected certification.

Personnel

HEAL management ensures the competence of all who operate equipment, perform environmental tests, evaluate results, and sign test reports. Personnel performing specific tasks shall be qualified on the basis of appropriate education, training, experience and /or demonstrated skills.

HEAL ensures that all personnel are aware of the relevance and importance of their activities and how each employee contributes to the achievement of the objectives defined throughout this document.

All personnel shall be responsible for complying with HEAL's quality assurance/quality control requirements that pertain to their technical function. Each technical staff member must have a combination of experience and education to adequately demonstrate specific knowledge of their particular function and a general knowledge of laboratory operations, test methods, quality assurance/quality control procedures, and records management.

All employees' training certificates and diplomas are kept on file with demonstrations of capability for each method they perform. An Organizational Chart can be found at the end of this section and a personnel list is available in the current Controlled Document Logbook.

Laboratory Director

The Laboratory Director is responsible for overall technical direction and business leadership of HEAL. The Laboratory Manager, the Project Manager and Quality Assurance/Quality Control Officer report directly to the Laboratory Director. Someone with a minimum of 7 years of directly related experience and a bachelor's degree in a scientific or engineering discipline should fill this position.

Laboratory Manager/Lead Technical Director

The Laboratory Manager shall exercise day–to-day supervision of laboratory operations for the appropriate fields of accreditation and reporting of results. The Laboratory Manager shall be experienced in the fields of accreditation for which the laboratory is approved or seeking accreditation. The Laboratory Manager shall certify that personnel with appropriate educational and/or technical background perform all tests for which HEAL is accredited. Such certification shall be documented.

The Laboratory Manager shall monitor standards of performance in quality control and quality assurance and monitor the validity of the analyses performed and data generated at HEAL to assure reliable data.

The Laboratory Manager is responsible for the daily operations of the laboratory. The Laboratory Manager is the lead technical director of the laboratory and, in conjunction with the section technical directors, is responsible for coordinating activities within the laboratory with the overall goal of efficiently producing high quality data within a reasonable time frame.

In events where employee scheduling or current workload is such that new work cannot be incorporated, without missing hold times, the Laboratory Manager has authority to modify employee scheduling, re-schedule projects or, when appropriate, allocate the work to approved subcontracting laboratories.

Additionally, the laboratory manager reviews and approves new analytical procedures and methods, and performs a final review of most analytical results. The Laboratory Manager provides technical support to both customers and HEAL staff.

The Laboratory Manager also observes the performance of supervisors to ensure that good laboratory practices and proper techniques are being taught and utilized, and to assist in overall quality control implementation and strategic planning for the future of the company. Other duties include assisting in establishing laboratory policies that lead to the fulfillment of requirements for various certification programs, assuring that all Quality Assurance and Quality Control documents are reviewed and approved, and assisting in conducting Quality Assurance Audits.

The laboratory manager addresses questions or complaints that cannot be answered by the section managers.

The Laboratory Manager shall have a bachelor's degree in a chemical, environmental, biological sciences, physical sciences or engineering field, and at least five years of experience in the environmental analysis of representative inorganic and organic analytes for which the laboratory seeks or maintains accreditation.

Assistant Laboratory Manager

The Assistant Laboratory Manager shall aid the Laboratory Manager in exercising day–to-day supervision of laboratory operations for the appropriate fields of accreditation and reporting of results. The Assistant Laboratory Manager shall be experienced in the fields of accreditation for which the laboratory is approved or seeking accreditation.

The Assistant Laboratory Manager is responsible for helping the Laboratory Manager in the daily operations of the laboratory. In conjunction with the section Technical Directors, the Assistant Laboratory Manager is responsible for coordinating activities within the laboratory with the overall goal of efficiently producing high quality data within a reasonable time frame.

The Assistant Laboratory Manager shall have at least ten years of experience in environmental analysis of representative inorganic and/or organic analytes for which the laboratory seeks or maintains accreditation.

Quality Assurance Quality Control Officer

The Quality Assurance/Quality Control Officer (QA/QCO) serves as the focal point for QA/QC and shall be responsible for the oversight and/or review of quality control data. The QA/QCO functions independently from laboratory operations and shall be empowered to halt unsatisfactory work and/or prevent the reporting of results generated from an out-of-control measurement system. The QA/QCO shall objectively evaluate data and perform assessments without any outside/managerial influence. The QA/QCO shall have direct access to the highest level of management at which decisions are made on laboratory policy and/or resources. The QA/QCO shall notify laboratory management of deficiencies in the quality system in periodic, independent reports.

The QA/QCO shall have general knowledge of the analytical test methods for which data review is performed and have documented training and/or experience in QA/QC procedures and in the laboratory's quality system. The QA/QCO will have a minimum of a BS in a scientific or related field and a minimum of three years of related experience.

The QA/QCO shall schedule and conduct internal audits as per the Internal Audit SOP at least annually, monitor and trend Corrective Action Reports as per the Data Validation SOP, periodically review control charts for out of control conditions, and initiate any appropriate corrective actions.

The QA/QCO shall oversee the analysis of proficiency testing in accordance with our standards and monitor any corrective actions issued as a result of this testing.

The QA/QCO reviews all standard operating procedures and statements of work in order to assure their accuracy and compliance to method and regulatory requirements.

The QA/QCO shall be responsible for maintaining and updating this quality manual.

Project Managers

The role of the project manager is to act as a liaison between HEAL and our clients. The Project Manager updates clients on the status of projects in-house, prepares quotations for new work, and is responsible for HEAL's marketing effort.

All new work is assessed by the Project Manager and reviewed with the other managers so as to not exceed the laboratory's capacity. In events where employee scheduling or current workload is such that new work cannot be incorporated without missing hold times, the Project Manager has authority to re-schedule projects.

It is also the duty of the project manager to work with the Laboratory Manager and QA/QCO to insure that before new work is undertaken, the resources required and accreditations requested are available to meet the client's specific needs.

Additionally, the Project Manager can initiate the review of the need for new analytical procedures and methods, and perform a final review of some analytical results. The Project Manager provides technical support to customers. Someone with a minimum of 2 years of directly related experience and a bachelor's degree in a scientific or engineering discipline should fill this position.

Technical Directors

Technical Directors are full-time members of the staff at HEAL who exercise day-to-day supervision of laboratory operations for the appropriate fields of accreditation and reporting of results for their department within HEAL. A Technical Director's duties shall include, but not be limited to, monitoring standards of performance in quality control and quality assurance, monitoring the validity of the analyses performed and the data generated in their sections to ensure reliable data, overseeing training and supervising departmental staff, scheduling incoming work for their sections, and monitoring laboratory personnel to ensure that proper procedures and techniques are being utilized. They supervise and implement new Quality Control procedures as directed by the QA/QCO, update and maintain quality control records including, but not limited to, training forms, IDOCs, ADOCPs, and MDLs, and evaluate laboratory personnel in their Quality Control activities. In addition, technical directors are responsible for upholding the spirit and intent of HEAL's data integrity procedures.

As Technical Directors of their associated section, they review analytical data to acknowledge that data meets all criteria set forth for good Quality Assurance practices. Someone with a minimum of 2 years of experience in the environmental analysis of representative analytes for which HEAL seeks or maintains accreditation and a bachelor's degree in a scientific or related discipline should fill this position.

The education requirements for a Technical Director may be waived at the discretion of HEAL's accrediting agencies.

Health and Safety / Chemical Hygiene Officer

Refer to the most recent version of the Health and Safety and Chemical Hygiene Plans for the roles, responsibilities, and basic requirements of the Health and Safety Officer (H&SO) and the Chemical Hygiene Officer (CHO). These jobs can be executed by the same employee.

Analyst I, II and III

Analysts are responsible for the analysis of various sample matrices including, but not limited to, solid, aqueous, and air, as well as the generation of high quality data in accordance with the HEAL SOPs and QA/QC guidelines in a reasonable time as prescribed by standard turnaround schedules or as directed by the Section Manager or Laboratory Manager.

Analysts are responsible for making sure all data generated is entered in the database in the correct manner and the raw data is reviewed, signed and delivered to the appropriate peer for review. An analyst reports daily to the section manager and will inform them as to material needs of the section specifically pertaining to the analyses performed by the analyst. Additional duties may include preparation of samples for analysis, maintenance of lab instruments or equipment, and cleaning and providing technical assistance to lower level laboratory staff.

The senior analyst in the section may be asked to perform supervisory duties as related to operational aspects of the section. The analyst may perform all duties of a lab technician.

The position of Analyst is a full or part time hourly position and is divided into three levels, Analyst I, II, and III. All employees hired into an Analyst position at HEAL must begin as an Analyst I and remain there at a minimum of three months regardless of their education and experience. Analyst I must have a minimum of an AA in a related field or equivalent experience (equivalent experience means years of related experience can be substituted for the education requirement). An Analyst I is responsible for analysis, instrument operation, including calibration and data reduction. Analyst II must have a minimum of an AA in a related field or equivalent experience and must have documented and demonstrated aptitude to perform all functions of an Analyst II. An Analyst II is responsible for the full analysis of their test methods, routine instrument maintenance, purchase of consumables as dictated by their Technical Director, advanced data reduction, and basic data review. Analyst II may also assist Analyst III in method development and, as dictated by their Technical Director, may be responsible for the review and/or revision of their method specific SOPs. Analyst III must have Bachelor's degree or equivalent experience and must have documented and demonstrated aptitude to perform all functions of an Analyst III. An Analyst III is responsible for all tasks completed by an Analyst I and II as well as advanced data review, non-routine instrument maintenance, assisting their technical director in basic supervisory duties and method development.

Laboratory Technician

A laboratory technician is responsible for providing support to analysts in the organics, inorganics and disposal departments. Laboratory Technicians can assist analysts in basic sample preparation, general laboratory maintenance, glassware washing, chemical inventories, sample disposal and sample kit preparation. This position can be filled by someone without the education and experience necessary to obtain a position as an analyst.

Sample Control Manager

The sample control manager is responsible for receiving samples and reviewing the sample login information after it has been entered into the computer. The sample control manager also checks the samples against the chain-of-custody for any sample and/or labeling discrepancies prior to distribution.

The sample control manager is responsible for sending out samples to the sub-contractors along with the review and shipping of field sampling bottle kits. The sample control manager acts as a liaison between the laboratory and field sampling crew to ensure that the appropriate analytical test is assigned. If a discrepancy is noted, the sample control manager or sample custodian will contact the customer to resolve any questions or problems. The sample control manager is an integral part of the customer service team.

This position should be filled by someone with a high school diploma and a minimum of 2 years of related experience and can also be filled by a senior manager.

Sample Custodians

Sample Custodians work directly under the Sample Control Manager. They are responsible for sample intake into the laboratory and into the LIMS. Sample Custodians take orders from our clients and prepare appropriate bottle kits to meet the clients' needs. Sample Custodians work directly with the clients in properly labeling and identifying samples as well as properly filling out legal COCs. When necessary, Sample Custodians contact clients to resolve any questions or problems associated with their samples. Sample Custodians are responsible for distributing samples throughout the laboratory and are responsible for notifying analysts of special circumstances such as short holding times or improper sample preservation upon receipt.

Sample Disposal Custodian

The sample disposal custodian is responsible for characterizing and disposing of samples in accordance to the most recent version of the sample disposal SOP. The sample disposal custodian collects waste from the laboratory and transports it to the disposal warehouse for storage and eventual disposal. The sample disposal custodian is responsible for maintaining the disposal warehouse and following the requirements for documentation, integrity, chemical hygiene and health and safety as set forth in the various HEAL administrative SOPs. The sample disposal custodian is responsible for overseeing any laboratory technicians employed at the disposal warehouse.

This position should be filled by someone with a high school diploma and a minimum of 1 year of related experience.

Bookkeeper

The Bookkeeper is responsible for the preparation of quarterly financials and quarterly payroll reports. The bookkeeper monitors payables, receivables, deposits, pays all bills and maintains an inventory of administrative supplies. The Bookkeeper completes final data package assembly and oversees the consignment of final reports. The Bookkeeper assists in the project management of drinking water compliance samples for NMED and NMEFC and any other tasks as assigned by the Laboratory Manager. This position should be filled by someone with a degree in accounting or a minimum of a high school diploma and at least 4 years of directly related experience.

Administrative Assistant

The Administrative Assistant is responsible for aiding administrative staff in tasks that include but are not limited to: the processing and consignment of final reports, and the generation of client specific spreadsheets. This position should be filled by someone with a minimum of a high school diploma.

IT Specialist

The IT Specialist is responsible for the induction and maintenance of all hard and software technology not maintained through a service agreement. The IT Specialist follows the requirements of this document, all regulatory documents and the EPAs Good Automated Laboratory Practices. This position should be filled by someone with a degree in a computer related field, or at least two years of directly related experience.

Delegations in the Absence of Key Personnel

Planned absences shall be preceded by notification to the Laboratory Manager. The appropriate staff members shall be informed of the absence. In the case of unplanned absences, the superior shall either assume the responsibilities and duties or delegate the responsibilities and duties to another appropriately qualified employee.

In the event that the Laboratory Manager is absent for a period of time exceeding fifteen consecutive calendar days, another full-time staff member meeting the basic qualifications and competent to temporarily perform this function will be designated. If this absence exceeds thirty-five consecutive calendar days, HEAL will notify ORELAP in writing of the absence and the pertinent qualifications of the temporary laboratory manager.

Laboratory Personnel Qualification and Training

All personnel joining HEAL shall undergo orientation and training. During this period the new personnel shall be introduced to the organization and their responsibilities, as well as the policies and procedures of the company. They shall also undergo on-the-job training and shall work with trained staff. They will be shown required tasks and be observed while performing them.

When utilizing staff undergoing training, appropriate supervision shall be dictated and overseen by the appropriate section technical director. Prior to analyzing client samples, a new employee, or an employee new to a procedure, must meet the following basic requirements. The SOP and Method(s) for the analysis must be read and signed by the employee indicating that they read, understand, and intend to comply with the requirements of the documents. The employee must undergo documented training. Training is conducted by a senior analyst familiar with the procedure and overseen by the section Technical Director. This training is documented by any means deemed appropriate by the trainer and section Technical Director, and kept on file in the employees file located in the QA/QCO's office. The employee must perform a successful Initial Demonstration of Capability (IDOC). See the current Document Control Logbook for the training documents and checklists utilized at HEAL to ensure that all of these requirements are met. Once all of the above requirements are met it is incumbent upon the section Technical Director to determine at which point the employee can begin to perform the test unsupervised. A Certification to Complete Work Unsupervised (see the current Document Control Logbook) is then filled out by the employee and technical director.

IDOCs are required for all new analysts and methods prior to sample analysis. IDOCs are also required any time there is a change in the instrument, analyte list or method. If more than twelve months have passed since an analyst performed an IDOC and they

have not performed the method and/or have not met the continuing DOC requirements, the analyst must perform an IDOC prior to resuming the test.

All IDOCs shall be documented through the use of the certification form which can be found in the current Document Control Logbook. IDOCs are performed by analyzing four Laboratory Control Spikes (LCSs). Using the results of the LCSs the mean recovery is calculated in the appropriate reporting units and the standard deviations of the population sample (n-1) (in the same units) as well as the relative percent difference for each parameter of interest. When it is not possible or pertinent to determine mean and standard deviations HEAL assesses performance against establish and documented criteria dictated in the method SOP. The mean and standard deviation are compared to the corresponding acceptance criteria for precision and accuracy in the test method (if applicable) or in laboratory-generated acceptance criteria. In the event that the HEAL SOP or test method(s) fail to establish the pass/fail criteria the default limits of +/- 20% for calculated recovery and <20% relative percent difference based on the standard deviation will be utilized. If all parameters meet the acceptance criteria, the IDOC is successfully completed. If any one of the parameters do not meet the acceptance criteria, the performance is unacceptable for that parameter and the analyst must either locate and correct the source of the problem and repeat the test for all parameters of interest or repeat the test for all parameters that failed to meet criteria. Repeat failure, however, confirms a general problem with the measurement system. If this occurs the source of the problem must be identified and the test repeated for all parameters of interest.

New employees that do not have prior analysis experience will not be allowed to perform analysis until they have demonstrated attention to detail with minimal errors in the assigned tasks. To ensure a sustained level of quality performance among staff members, continuing demonstration of capability shall be performed at least once a year. These are as an Annual Documentation of Continued Proficiency (ADOCP).

At least once per year an ADOCP must be completed. This is achieved by the acceptable performance of a blind sample (typically by using a PT sample, but can be a single blind (to the analyst) sample), by performing another IDOC, or by summarizing the data of four consecutive laboratory control samples with acceptable levels of precision and accuracy (these limits are those currently listed in the LIMS for an LCS using the indicated test method(s).) ADOCPs are documented using a standard form and are kept on file in each analyst's employee folder. ADOCPs may be demonstrated as an analyst group utilizing LIMS control charting, so long as all listed analysts participated, the results are consecutive and pass the requirements for precision and accuracy.

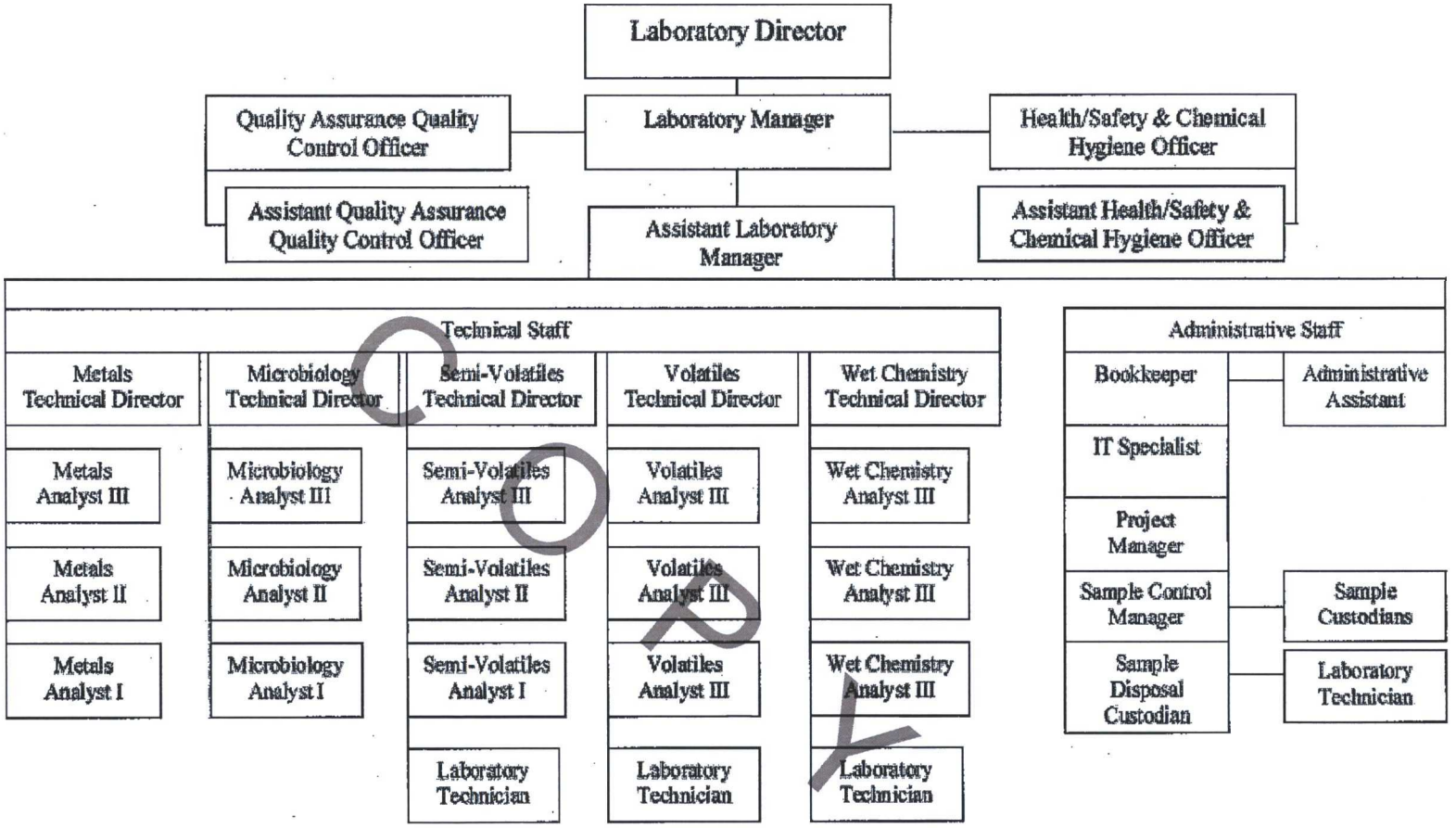
Each new employee shall be provided with data integrity training as a formal part of their new employee orientation. Each new employee will sign an ethics and data integrity agreement to ensure that they understand that data quality is our main objective. Every HEAL employee recognizes that although turnaround time is

important, quality is put above any pressure to complete the task expediently. Analysts are not compensated for passing QC parameters nor are incentives given for the quantity of work produced. Data Integrity and Ethics training are performed on an annual basis in order to remind all employees of HEAL's policy on data quality. Employees are required to understand that any infractions of the laboratory data integrity procedures will result in a detailed investigation that could lead to very serious consequences including immediate termination, debarment, or civil/criminal prosecution.

Training for each member of HEAL's technical staff is further established and maintained through documentation that each employee has read, understood, and is using the latest version of this Quality Assurance Manual. Training courses or workshops on specific equipment, analytical techniques, or laboratory procedures are documented through attendance sheets, certificates of attendance, training forms,. or quizzes. This training documentation is located in analyst specific employee folders in the QA/QCO Office. On the front of all methods, SOPs, and procedures for HEAL, there is a signoff sheet that is signed by all pertinent employees, indicating that they have read, understand, and agree to perform the most recent version of the document.

The effectiveness of training will be evaluated during routine data review, annual employee reviews, and internal and external audits. Repetitive errors, complaints and audit findings serve as indicators that training has been ineffective. When training is deemed to have been ineffective a brief review of the training process will be completed and a re-training conducted as soon as possible.

HEAL Personnel Chart



5.0 Receipt and Handling of Samples

Reviewing Requests, Tenders and Contracts

All contracts and written requests by clients are closely reviewed to ensure that the client's data quality objectives can be met to their specifications. This review includes making sure that HEAL has the resources necessary to perform the tests to the clients specifications.

When HEAL is unable to meet the clients specifications their samples will be subcontracted to an approved laboratory capable of meeting the client's data quality objectives.

Sampling

Procedures

HEAL does not provide field sampling for any projects. Sample kits are prepared and provided for clients upon request. The sample kits contain the appropriate sampling containers (with a preservative when necessary), labels, blue ice (The use of "blue ice" by anyone except HEAL personnel is discouraged because it generally does not maintain the appropriate temperature of the sample. If blue ice is used, it should be completely frozen at the time of use, the sample should be chilled before packing, and special notice taken at sample receipt to be certain the required temperature has been maintained.), a cooler, chain-of-custody forms, plastic bags, bubble wrap, and any special sampling instructions. Sample kits are reviewed prior to shipment for accuracy and completeness.

Containers

Containers which are sent out for sampling are purchased by HEAL from a commercial source. Glass containers are certified "EPA Cleaned" QA level 1. Plastic containers are certified clean when required. These containers are received with a Certificate of Analysis verifying that the containers have been cleaned according to the EPA wash procedure. Containers are used once and discarded. If the samples are collected and stored in inappropriate containers the laboratory may not be able to accurately quantify the amount of the desired components. In this case, re-sampling may be required.

Preservation

If sampling for analyte(s) requires preservation, the sample custodians fortify the containers prior to shipment to the field, or provide the preservative for the sampler to add in the field. The required preservative is introduced into the vials in uniform amounts

and done so rapidly to minimize the risk of contamination. Vials that contain a preservative are labeled appropriately. If the samples are stored with inappropriate preservatives, the laboratory may not be able to accurately quantify the amount of the desired components. In this case re-sampling may be required.

Refer to the current Login SOP and/or the current price book for detailed sample receipt and handling procedures, appropriate preservation and holding time requirements.

Sample Custody

Chain-of-Custody Form

A Chain-of-Custody (COC) form is used to provide a record of sample chronology from the field to receipt at the laboratory. HEAL's COC contains the client's name, address, phone and fax numbers, the project name and number, the project manager's name, and the field sampler's name. It also identifies the date and time of sample collection, sample matrix, field sample ID number, number/volume of sample containers, sample temperature upon receipt, and any sample preservative information.

There is also a space to record the HEAL ID number assigned to samples after they are received. Next to the sample information is a space for the client to indicate the desired analyses to be performed. There is a section for the client to indicate the data package level as well as any accreditation requirements. Finally, there is a section to track the actual custody of the samples. The custody section contains lines for signatures, dates and times when samples are relinquished and received. The COC form also includes a space to record special sample related instructions, sampling anomalies, time constraints, and any sample disposal considerations.

It is paramount that all COCs arrive at HEAL complete and accurate so that the samples can be processed and allocated for testing in a timely and efficient manner. A sample chain-of-custody form can be found in the current Document Control Logbook or on line at www.hallenvironmental.com.

Should a specific project or client require the use of an internal COC, advanced notification and approval must be obtained. The use of internal COCs are not part of our standard operating procedure.

Receiving Samples

Samples are received by authorized HEAL personnel. Upon arrival, the COC is compared to the respective samples. After the samples and COC have been determined to be complete and accurate, the sampler signs over the COC. The HEAL staff member in turn signs the chain-of-custody, also noting the current date, time, and sample temperature. This relinquishes custody of the samples from the sampler and

delegates sample custody to HEAL. The first (white) copy of the COC form is filed in the appropriate sample folder. The second (yellow) copy of the COC form is filed in the COC file in the sample control manager's office. The third (pink) copy of the COC form is given to the person who has relinquished custody of the samples.

Logging in Samples and Storage

Standard Operating Procedures have been established for the receiving and tracking of all samples (refer to the current HEAL Login SOP). These procedures ensure that samples are received and properly logged into the laboratory and that all associated documentation, including chain of custody forms, is complete and consistent with the samples received. Each sample set is given a unique HEAL tracking ID number. Individual sample locations within a defined sample set are given a unique sample ID suffix-number. Labels with the HEAL numbers, and tests requested, are generated and placed on their respective containers. The pH of preserved, non-volatile samples is checked and noted if out of compliance. Due to the nature of the samples, the pHs of volatiles samples are checked after analysis. Samples are reviewed prior to being distributed for analysis.

All samples received that are requested for compliance, whether on the COC or by contract, will be identified as compliance samples in the LIMS so as to properly notify the analytical staff that they are to be analyzed in accordance with the test method(s) as well as the compliance requirements.

Samples are distributed for analysis based upon the requested tests. In the event that sample volume is limited and different departments at HEAL are required to share the sample, volatile work takes precedence and will always be analyzed first before the sample is sent to any other department for analysis.

Care will be taken to store samples isolated from laboratory contaminants, standards and highly contaminated samples.

All samples that require thermal preservation shall be acceptably stored at a temperature range just above freezing to 6 °C unless specified at another range by the SOP and Method.

Each project (sample set) is entered into the Laboratory Information Management System (LIMS) with a unique ID that will be identified on every container. The ID tag includes the Lab ID, Client ID, date and time of collection, and the analysis/analyses to be performed. The LIMS continually updates throughout the lab. Therefore, at any time, an analyst or manager may inquire about a project and/or samples status. For more information about the login procedures, refer to the Sample Login SOP.

Disposal of Samples

Samples are held at HEAL for a minimum of thirty days and then transferred to the HEAL warehouse for disposal. Analytical results are used to characterize their respective sample contamination level(s) so that the proper disposal can be performed. These wastes will be disposed of according to their hazard as well as their type and level of contamination. Refer to the Hall Environmental Analysis Laboratory Chemical Hygiene Plan and current Sample Disposal SOP for details regarding waste disposal.

Waste drums are provided by an outside agency. These drums are removed by the outside agency and disposed of in a proper manner.

The wastes that are determined to be non-hazardous are disposed of as non-hazardous waste in accordance with the Chemical Hygiene Plan and Sample Disposal SOP.

6.0 Analytical Procedures

All analytical methods used at HEAL incorporate necessary and sufficient Quality Assurance and Quality Control practices. A Standard Operating Procedure (SOP) is used to provide the necessary criteria to yield acceptable results. These procedures are reviewed at least annually and revised as necessary and are attached as a pdf file in the Laboratory Information Management System (LIMS) for easy access by each analyst. The sample is often consumed or altered during the analytical process. Therefore, it is important that each step in the analytical process be correctly followed in order to yield valid data.

When unforeseen problems arise, the analyst, technical director, and, when necessary, laboratory manager meet to discuss the factors involved. The analytical requirements are evaluated and a suitable corrective action or resolution is established. The client is notified in the case narrative with the final report or before, if the validity of their result is in question.

List of Procedures Used

Typically, the procedures used by HEAL are EPA approved methodologies or 20th edition Standard Methods. However, proprietary methods for client specific samples are sometimes used. On occasion, multiple methods or multiple method revisions are used, in this event the SOP is written to include the requirements of all referenced methods. The following tables list EPA and Standard Methods Method numbers with their corresponding analytes and/or instrument classification.

Methods Utilized at HEAL

Drinking Water(DW) Non-Potable Water (NPW) Solids (S)

Methodology	Matrix	Title of Method
180.1	DW NPW	"Turbidity (Nephelometric)"
200.2	DW NPW	"Sample Preparation Procedure For Spectrochemical Determination of Total Recoverable Elements"
200.7	DW NPW	"Determination of Metals and Trace Elements in Water and Wastes by Inductively Coupled Plasma-Atomic Emission Spectrometry"
200.8	DW NPW	"Determination of Trace Elements in Waters and Wastes by Inductively Coupled Plasma-Mass Spectrometry."
245.1	DW NPW	"Mercury (Manual Cold Vapor Technique)"

300.0	DW NPW S	"Determination of Inorganic Anions by Ion Chromatography"
413.2	NPW S	"Oil and Grease"
418.1	NPW S	"Petroleum Hydrocarbons (Spectrophotometric, Infrared)"
504.1	DW	"EDB, DBCP and 123TCP in Water by Microextraction and Gas Chromatography"
524.2	DW	"Measurement of Purgeable Organic Compounds in Water by Capillary Column Gas Chromatography/Mass Spectrometry"
552.3	DW	"Determination of Haloacetic Acids and Dalapon in Drinking Water by Ion-Exchange Liquid-Solid Extraction and Gas Chromatography with an Electron Capture Detector"
624	NPW	Appendix A to Part 136 Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater Method 624-Purgeables"
1311	S	"Toxicity Characteristic Leaching Procedure"
1311ZHE	S	"Toxicity Characteristic Leaching Procedure"
1664A	NPW	"N-Hexane Extractable Material (HEM; Oil and Grease) and Silica Gel Treated N-Hexane Extractable Material) by Extraction and Gravimetry"
3005A	NPW	"Acid Digestion of Waters for Total Recoverable or Dissolved Metals for Analysis by FLAA or ICP Spectroscopy"
3010A	NPW	"Acid Digestion of Aqueous Samples and Extracts for Total Metals for Analysis by FLAA or ICP Spectroscopy"
3050B	S	"Acid Digestion of Sediment, Sludge, and Soils"
3510C	DW NPW	"Separatory Funnel Liquid-Liquid Extraction"
3540	S	"Soxhlet Extraction"
3545	S	"Pressurized Fluid Extraction(PFE)"
3665	NPW S	"Sulfuric Acid/Permanganate Cleanup"
5030B	NPW	"Purge-and-Trap for Aqueous Samples"
5035	S	"Closed-System Purge-and-Trap and Extraction for Volatile Organics in Soil and Waste Samples"
6010B	NPW S	"Inductively Coupled Plasma-Atomic Emission Spectrometry"

7470A	NPW	"Mercury in Liquid Waste (Manual Cold-Vapor Technique)"
7471A	S	"Mercury in Solid or Semisolid Waste (Manual Cold Vapor Technique)"
8021B	NPW S	"Aromatic and Halogenated Volatiles By Gas Chromatography Using Photoionization and/or Electrolytic Conductivity Detectors"
8015D	NPW	"Nonhalogenated Volatile Organics by Gas Chromatography"
	S	(Gasoline Range and Diesel Range Organics)
8081A	NPW S	"Organochlorine Pesticides by Gas Chromatography"
8082	NPW S	"Polychlorinated Biphenyls (PCBs) by Gas Chromatography"
8260B	NPW S	"Volatile Organic Compounds by Gas Chromatography/ Mass Spectrometry (GC/MS)"
8270C	NPW S	"Semivolatile Organic Compounds by Gas Chromatography/ Mass Spectrometry (GC/MS)"
8310	NPW S	"Polynuclear Aromatic Hydrocarbons"
9060	NPW	"Total Organic Carbon"
9067	NPW S	"Phenolics (Spectrophotometric, MBTH With Distillation)"
9095A	S	"Paint Filter Liquids Test"
H-8167	DW NPW	"Method 8167 Chlorine, Total"
Walkley/Black	S	FOC/TOC WB
SM2320 B	DW NPW	"Alkalinity"
SM2340B	NPW	"2340 Hardness"
SM2510B	DW NPW	"2510 Conductivity"
SM2540 B	NPW	"Total Solids Dried at 103-105° C"
SM2540 C	DW NPW	"Total Dissolved Solids Dried at 180° C"
SM2540 D	NPW	"Total Suspended Solids Dried at 103-105° C"
SM4500-H+B	DW NPW	"pH Value"
SM4500-NH3 C	NPW S	"4500-NH3" Ammonia
SM4500-Norg	NPW	"4500-Norg" Total Kjeldahl Nitrogen (TKN)

C	S	
SM5210 B	NPW	"5210 B. 5-day BOD Test"
SM5310 B	DW	"5310" Total Organic Carbon (TOC)
SM9223B	NPW DW	"9223 Enzyme Substrate Coliform Test"
8000B	NPW S	"Determinative Chromatographic Separations"
8000C	NPW S	"Determinative Chromatographic Separations"

Criteria for Standard Operating Procedures

HEAL has Standard Operating Procedures (SOPs) for each of the test methods listed above. These SOPs are based upon the listed methods and detail the specific procedure and equipment utilized as well as the quality requirements necessary to prove the integrity of the data. SOPs are reviewed or revised every twelve months or sooner if necessary. The review/revision is documented in the Master SOP Logbook filed in the QA/QC Office. All SOPs are available in the LIMS under the Documents and SOPs menu.
Hand written corrections or alterations to SOPs are not permitted. In the event that a correction is needed and a revision is not immediately possible, a corrective action report will be generated documenting the correction or alteration, signed by the section Technical Director and the QA/QC Officer and will be scanned into the current SOP and will document the change until a new revision is possible.

Controlled documents such as calibration summary forms, analysis bench sheets, etc. are tracked as appendices in SOPs, through the Controlled Document Logbook with copies available through the LIMS or through the MOAL as bound logbooks.

Each HEAL test method SOP shall include or reference the following topics where applicable:

Identification of the test method;
Applicable matrix or matrices;
Limits of detection and quantitation;
Scope and application, including parameters to be analyzed;
Summary of the test method;
Definitions;
Interferences;
Safety;
Equipment and supplies;
Reagents and standards;

Sample collection, preservation, shipment and storage;
Quality control parameters;
Calibration and standardization;
Procedure;
Data analysis and calculations;
Method performance;
Pollution prevention;
Data assessment and acceptance criteria for quality control measures;
Corrective actions for out-of-control data;
Contingencies for handling out-of-control or unacceptable data;
Waste management;
References; and
Any tables, diagrams, flowcharts and validation data.

7.0 Calibration

All equipment and instrumentation used at HEAL are operated, maintained and calibrated according to manufacturers' guidelines, as well as criteria set forth in applicable analytical methodology. Personnel who have been properly trained in their procedures perform the operation and calibration. Brief descriptions of the calibration processes for our major laboratory equipment and instruments are found below.

Thermometers

The thermometers in the laboratory are used to measure the temperatures of the refrigerators, freezers, ovens, water baths, incubators, hot blocks, ambient laboratory conditions, TCLP Extractions, digestion blocks, and samples at the time of log-in. All NIST traceable thermometers are either removed from use upon their documented expiration date or they are checked annually with a NIST-certified thermometer and a correction factor is noted on each thermometer log. See the most current Login SOP for detailed procedures on this calibration procedure.

Data Loggers are used to record refrigerator temperatures. These data loggers are calibrated quarterly with NIST-certified thermometers.

The NIST thermometer should be recalibrated at least every five years or whenever the thermometer has been exposed to temperature extremes.

Refrigerators/Freezers

Each laboratory refrigerator or freezer contains a thermometer capable of measuring to a minimum precision of 0.1°C. The thermometers are kept with the bulb immersed in liquid. Each day of use, the temperatures of the refrigerators are recorded to insure that the refrigerators are within the required designated range. Samples are stored separately from the standards to reduce the risk of contamination.

See the current Catastrophic Failure SOP for the procedure regarding how to handle failed refrigerators or freezers.

Ovens

The ovens contain thermometers graduated by 1° C. The ovens are calibrated quarterly against NIST thermometers and checked each day of use as required and in whatever way is dictated by or appropriate for the method in use.

Analytical and Table Top Balances

The table top balances are capable of weighing to a minimum precision of 0.01 grams. The analytical balances are capable of weighing to a minimum precision of 0.0001 grams. Records are kept of daily calibration checks for the balances in use. Working weights are used in these checks. The balances are annually certified by an outside source and the certifications are on file with the QA/QCO.

Balances, unless otherwise indicated by method specific SOPs, will be checked each day of use with at least two weights that will bracket the working range of the balance for the day. Daily balance checks will be done using working weights that are calibrated annually against Class S weights. Class S weights are calibrated by an external provider as required. The Class S weights are used once a year, or more frequently if required, to assign values to the Working Weights. During the daily balance checks, the working weights are compared to their assigned values and must pass in order to validate the calibration of the balance. The assigned values, as well as the daily checks, for the working weights are recorded in the balance logbook for each balance.

Instrument Calibration

An instrument calibration is the relationship between the known concentrations of a set of calibration standards introduced into an analytical instrument and the measured response they produce. Calibration curve standards are a prepared series of aliquots at various known concentration levels from a primary source reference standard. Specific mathematical types of calibration techniques are outlined in SW-846 8000B and/or 8000C. The entire initial calibration must be performed prior to sample analyses.

The lowest standard in the calibration curve must be at or below the required reporting limit.

Refer to the current SOP to determine the minimum requirement for calibration points.

Most compounds tend to be linear and a linear approach should be favored when linearity is suggested by the calibration data. Non-linear calibration should be considered only when a linear approach cannot be applied. It is not acceptable to use an alternate calibration procedure when a compound fails to perform in the usual manner. When this occurs, it is indicative of instrument issues or operator error.

If a non-linear calibration curve fit is employed, a minimum of six calibration levels must be used for second-order (quadratic) curves.

When more than 5 levels of standards are analyzed in anticipation of using second-order calibration curves, all calibration points MUST be used regardless of the calibration option employed. The highest or lowest calibration point may be excluded for the purpose of narrowing the calibration range and meeting the requirements for a specific calibration option. Otherwise, unjustified exclusion of calibration data is expressly forbidden.

Analytical methods vary in QC acceptance criteria. HEAL follows the method specific guidelines for QC acceptance. The specific acceptance criteria are outlined in the analytical methods and their corresponding SOPs.

pH Meter

The pH meter measures to a precision of 0.01 pH units. The pH calibration logbook contains the calibration before each use, or each day of use, if used more than once per day. It is calibrated using a minimum of 3 certified buffers. Also available with the pH meter is a magnetic stirrer with a temperature sensor. See the current pH SOP (SM4500 H+ B) for specific details regarding calibration of the pH probe.

Other Analytical Instrumentation and Equipment

The conductivity probe is calibrated as needed and checked daily when in use.

Eppendorf (or equivalent brands) pipettes are checked gravimetrically prior to use.

Standards

All of the source reference standards used are ordered from a reliable commercial vendor. A Certificate of Analysis (CoA), which verifies the quality of the standard, accompanies the standards from the vendor. The Certificates of Analysis are dated and stored on file by the Technical Directors or their designee. These standards are traceable to the National Institute of Standards (NIST). When salts are purchased and used as standards the certificate of purity must be obtained from the vendor and filed with the CoAs.

All standard solutions, calibration curve preparations, and all other quality control solutions are labeled in a manner that can be traced back to the original source reference standard. All source reference standards are entered into the LIMS with an appropriate description of the standard. Dilutions of the source reference standard (or any mixes of the source standards) are fully tracked in the LIMS. Standards are labeled with the date opened for use and with an expiration date.

As part of the quality assurance procedures at HEAL, analysts strictly adhere to manufacturer recommendations for storage times/expiration dates and policies of analytical standards and quality control solutions.

Reagents

HEAL ensures that the reagents used are of acceptable quality for their intended purpose. This is accomplished by ordering high quality reagents and adhering to good laboratory practices so as to minimize contamination or chemical degradation. All reagents must meet any specifications noted in the analytical method. Refer to the current Purchase of Consumables SOP for details on how this is accomplished and documented.

Upon receipt, all reagents are assigned a separate ID number, and logged into the LIMS. All reagents shall be labeled with the date received into the laboratory and again with the date opened for use. Recommended shelf life, as defined by the manufacturer, shall be documented and controlled. Dilutions or solutions prepared shall be clearly labeled, dated, and initialed. These solutions are traceable back to their primary reagents and do not extend beyond the expiration date listed for the primary reagent.

All gases used with an instrument shall meet specifications of the manufacturer. All safety requirements that relate to maximum and/or minimum allowed pressure, fitting types, and leak test frequency, shall be followed. When a new tank of gas is placed in use, it shall be checked for leaks and the date put in use will be written in the instrument maintenance logbook.

HEAL continuously monitors the quality of the reagent water and provides the necessary indicators for maintenance of the purification systems in order to assure that the quality of laboratory reagent water meets established criteria for all analytical methods. The majority of HEAL methods utilize medium quality deionized reagent water maintained at a resistivity greater than 1MΩ in accordance with SM1080.

Reagent blank samples are also analyzed to ensure that no contamination is present at detectable levels. The frequency of reagent blank analysis is typically the same as calibration verification samples. Refrigerator storage blanks are stored in the volatiles refrigerator for a period of one week and analyzed and replaced once a week.

8.0 Maintenance

Maintenance logbooks are kept for each major instrument and all support equipment in order to document all repair and maintenance. In the front of the logbook, the following information is included:

Unique Name of the Item or Equipment
Manufacturer
Type of Instrument
Model Number
Serial Number
Date Received and Date Placed into Service
Location of Instrument
Condition of Instrument Upon Receipt

For routine maintenance, the following information shall be included in the log:

Maintenance Date
Maintenance Description
Maintenance Performed by Initials

A manufacturer service agreement (or equivalent) covers most major instrumentation to assure prompt and reliable response to maintenance needs beyond HEAL instrument operator capabilities.

Refer to the current Maintenance and Troubleshooting SOP for each section in the laboratory for further information.

9.0 Data Integrity

For HEAL's policy on ethics and data integrity, see section 3.0 of this document. Upon being hired, and annually thereafter, all employees at HEAL undergo documented data integrity training. All new employees sign an Ethics and Data Integrity Agreement, documenting their understanding of the high standards of integrity required at HEAL and outlining their responsibilities in regards to ethics and data integrity. See the current Document Control Logbook for a copy of this agreement.

In instances of ethical concern, analysts are required to report the known or suspected concern to their Technical Director, the Laboratory Manager, or the QA/QCO. This will be done in a confidential and receptive environment, allowing all employees to privately discuss ethical issues or report items of ethical concern.

Once reported and documented, the ethical concern will be immediately elevated to the Laboratory Manager and the need for an investigation, analyst remediation, or termination will be determined on a case-by-case basis.

All reported instances of ethical concern will be thoroughly documented and handled in a manner sufficient to rectify any breaches in data integrity with an emphasis on preventing similar incidences from happening in the future.

10.0 Quality Control

Internal Quality Control Checks

HEAL utilizes various internal quality control checks, including duplicates, matrix spikes, matrix spike duplicates, method blanks, laboratory control spikes, laboratory control spike duplicates, surrogates, internal standards, calibration standards, quality control charts, proficiency tests and calculated measurement uncertainty.

Refer to the current method SOP to determine the frequency and requirements of all quality controls. In the event that the frequency of analysis is not indicated in the method specific SOP, duplicate samples, laboratory control spikes (LCS), Method Blanks (MB), and matrix spikes and matrix spike duplicates (MS/MSD) are analyzed for every batch of twenty samples.

When sample volume is limited on a test that requires an MS/MSD an LCSD shall be analyzed to demonstrate precision and accuracy and when possible a sample duplicate will be analyzed.

Duplicates are identical tests repeated for the same sample or matrix spike in order to determine the precision of the test method. A Relative Percent Difference (RPD) is calculated as a measure of this precision. Unless indicated in the SOP, the default acceptance limit is </= 20%.

Matrix Spikes and Matrix Spike Duplicates are spiked samples (MS/MSD) that are evaluated with a known added quantity of a target compound. This is to help determine the accuracy of the analyses and to determine the matrix effects on analyte recovery. A percent recovery is calculated to assess the quality of the accuracy. In the event that the acceptance criteria is not outlined in the SOP, a default limit of 70-130% will be utilized. When an MSD is employed an RPD is calculated and when not indicated in the SOP shall be acceptable at </= 20%.

> In an effort to evaluate all received matricies, MS/MSD samples are chosen randomly. Notable exceptions to this policy are when a client requests the MS/MSD be analyzed utilizing their sample or in the event the matrix requires such a significant dilution that utilizing it as an MS/MSD is impractical.

When appropriate for the method, a Method Blank should be analyzed with each batch of samples processed to assess contamination levels in the laboratory. MBs consist of all the reagents measured and treated as they are with samples, except without the samples. This enables the laboratory to ensure clean reagents and procedures. Guidelines should be in place for accepting or rejecting data based on the level of contamination in the blank. In the event that these guidelines are not dictated by the SOP or in client specific work plans, the MB should be less than the MDL reported for the analyte being reported.

It is important to note that the LIMS qualifies samples for Method Blank failures when the amount in the blank is greater than the sample's listed PQL.

A Laboratory Control Spike and Laboratory Control Spike Duplicate (LCS/LCSD) are reagent blanks, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes. It is generally used to establish intra-laboratory or analyst-specific precision and bias or to assess the performance of all or a portion of the measurement system. Guidelines are outlined in each SOP for the frequency and pass fail requirements for LCS and LCSDs. These limits can be set utilizing control charts as discussed below.

Surrogates are utilized when dictated by method and are substances with properties that mimic the analytes of interest. The surrogate is an analyte that is unlikely to be found in environmental samples. Refer to the appropriate Method and SOP for guidelines on pass/fail requirements for surrogates.

Internal Standards are utilized when dictated by the method and are known amounts of standard added to a test portion of a sample as a reference for evaluating and controlling the precision and bias of the applied analytical method. Refer to the appropriate Method and SOP for guidelines on pass/fail requirements for Internal Standards.

Proficiency Test (PT) Samples are samples provided by an unbiased third party. They are typically analyzed twice a year, between five and seven months apart, or at any other interval as defined in the method SOP. They contain a pre-determined concentration of the target compound, which is unknown to HEAL. HEAL's management and all analysts shall ensure that all PT samples are handled in the same manner as real environmental samples utilizing the same staff, methods, procedures, equipment, facilities and frequency of analysis as used for routine analysis of that analyte. When analyzing a PT, HEAL shall employ the same calibration, laboratory quality control and acceptance criteria, sequence of analytical steps, number of replicates and other procedures as used when analyzing routine samples. PT results are reported as normal samples, within the working range of the associated calibration curve. In the event an analyte concentration is less than the PQL, the result shall be reported as less than the PQL.

With regards to analyzing PT Samples HEAL shall not send any PT sample, or portion of a PT sample, to another laboratory for any analysis for which we seek accreditation, or are accredited. HEAL shall not knowingly receive any PT sample or portion of a PT sample from another laboratory for any analysis for which the sending laboratory seeks accreditation, or is accredited. Laboratory management or staff will not communicate with any individual at another laboratory concerning the PT sample. Laboratory management or staff shall not attempt to obtain the assigned value of any PT sample from the PT Provider.

Upon receiving a Not Acceptable PT result for any analyte, a root cause analysis is conducted and the cause of the failure determined and corrected. As defined by TNI, two

out of the past three PTs must be acceptable to maintain accreditation for any given analyte. If this requirement is not met, a successful history will be reestablished by the analysis of an additional PT sample. For accredited tests, the PT provider will be notified, when the PT is for corrective action purposes. The analysis dates of successive PT samples for the same TNI accredited analyte shall be at least fifteen days apart.

Calibration standards are standards run to calibrate. Once the calibration is established the same standards can be analyzed as Continuing Calibration Verifications (CCV), used to confirm the consistency of the instrumentation. Calibration standards can be utilized at the beginning and end of each batch, or more frequently as required. Typically Continuing Calibration Blanks (CCB) are run in conjunction with CCVs. Refer to the current method SOP for frequency and pass/fail requirements of CCVs and CCBs.

Control Limits are limits of acceptable ranges of the values of quality control checks. The control limits approximate a 99% confidence interval around the mean recovery. Any matrix spike, surrogate, or LCS results outside of the control limits require further evaluation and assessment. This should begin with the comparison of the results from the samples or matrix spike with the LCS results. If the recoveries of the analytes in the LCS are outside of the control limits, then the problem may lie with the application of the extraction, with cleanup procedures, or with the chromatographic procedure. Once the problem has been identified and addressed, corrective action may include reanalysis of samples or re-extraction followed by reanalysis. When the LCS results are within the control limits, the issue may be related to the sample matrix or to the use of an inappropriate extraction, cleanup, and/or determinative method for the matrix. If the results are to be used for regulatory compliance monitoring, then steps must be taken to demonstrate that the analytes of concern can be determined in the sample matrix at the levels of interest. Data generated with laboratory control samples that fall outside of the established control limits are judged to be generated during an "out-of-control" situation. These data are considered suspect and shall be repeated or reported with qualifiers.

Control limits are to be updated only by Technical Directors, Section Supervisors or the Quality Assurance Officer. Control limits should be established and updated according to the requirements of the method being utilized. When the method does not specify, and control limits are to be generated or updated for a test, the following guidelines shall be utilized.

Limits should typically be generated utilizing the most recent 20-40 data values. In order to obtain an even distribution across multiple instruments and to include more than a single day's worth of data, surrogate limits should be generated using around 100 data values. The data values used shall not reuse values that were included in the previous Control Limit update. The data values shall also be reviewed by the LIMS for any Grubbs Outliers, and if identified, the outliers must be removed prior to generating new limits. The results used to update control limits should meet all other QC criteria associated with the determinative method. For example, MS/MSD recoveries from a GC/MS procedure should be generated from samples analyzed after a valid tune and a valid initial calibration that includes all

analytes of interest. Additionally, no analyte should be reported when it is beyond the working range of the calibration currently in use. MS/MSD and surrogate limits should be generated using the same set of extraction, cleanup, and analysis procedures.

All generated limits should be evaluated for appropriateness. Where limits have been established for MS/MSD samples, the LCS/LCSD limits should fall within those limits, as the LCS/LCSD are prepared in a clean matrix. Surrogate limits should be updated using all sample types and should be evaluated to ensure that all instruments as well as a reasonable dispersion across days are represented by the data. LCS/LCSD recovery limits should be evaluated to verify that they are neither inappropriately wide nor unreasonably tight. The default LCS/LCSD acceptance limits of 70-130% and RPD of 20% (or those limits specified by the method for LCS/LCSD and/or CCV acceptability), should be used to help make this evaluation. Technical directors may choose to use warning limits when they feel their generated limits are too wide, or default LCS limits when they feel their limits have become arbitrarily tight.

Once new Control Limits have been established and updated in the LIMS, the Control Charts shall be printed and reviewed by the appropriate section supervisor and primary analyst performing the analysis for possible trends and compared to the previous Control Charts. The technical director initials the control charts, indicating that they have been reviewed and that the updated Limits have been determined to be accurate and appropriate. Any manual alterations to the limits will be documented and justified on the printed control chart. These initialed charts are then filed in the QA/QCO office.

Once established, control limits should be reviewed after every 20-30 data values and updated at least every six months, provided that there are sufficient points to do so. The limits used to evaluate results shall be those in place at the time that the sample was analyzed. Once limits are updated, those limits apply to all subsequent analyses.

When updating surrogate control limits, all data, regardless of sample/QC type, shall be updated together and assigned one set of limits for the same method/matrix.

In the event that there are insufficient data points to update limits that are over a year old, the default limits, as established in the method or SOP, shall be re-instated. Refer to the requirements in SW-846 method 8000B and 8000C for further guidance on generating control limits.

Calculated Measurement Uncertainty is calculated annually using LCSs in order to determine the laboratory specific uncertainty associated with each test method. These uncertainty values are available to our clients upon request and are utilized as a trending tool internally to determine the effectiveness of new variables introduced into the procedure over time.

Client Requested QC

Occasionally certain clients will require QC that is not defined by or covered in the SOPs. These special requests will be issued to all analysts and data reviewers in writing and the analysts and data reviewers will be provided with guidance on how to properly document the client requested deviation/QC in their preparation and analytical batches.

Precision, Accuracy, Detection Levels

Precision

The laboratory uses sample duplicates, laboratory control spike duplicates, and matrix spike duplicates to assess precision in terms of relative percent difference (RPD). HEAL requires the RPD to fall within the 99% confidence interval of established control charts or an RPD of less than 20% if control charts are not available. RPD's greater than these limits are considered out-of-control and require an appropriate response.

$$RPD = 2 \times \frac{(\text{Sample Result} - \text{Duplicate Result})}{(\text{Sample Result} + \text{Duplicate Result})} \times 100$$

Accuracy

The accuracy of an analysis refers to the difference between the calculated value and the actual value of a measurement. The accuracy of a laboratory result is evaluated by comparing the measured amount of QC reference material recovered from a sample and the known amount added. Control limits can be established for each analytical method and sample matrix. Recoveries are assessed to determine the method efficiency and/or the matrix effect.

Analytical accuracy is expressed as the Percent Recovery (%R) of an analyte or parameter. A known amount of analyte is added to an environmental sample before the sample is prepared and subsequently analyzed. The equation used to calculate percent recovery is:

$$\%Recovery = \{(concentration^* \text{ recovered})/(concentration^* \text{ added})\} \times 100$$

*or amount

HEAL requires that the Percent Recovery to fall within the 99 % confidence interval of established control limits. A value that falls outside of the confidence interval requires a warning and process evaluation. The confidence intervals are calculated by determining the mean and sample standard deviation. If control limits are not available, the range of 80 to 120% is used unless the specific method dictates

otherwise. Percent Recoveries outside of this range mandate additional action such as analyses by Method of Standard Additions, additional sample preparation(s) where applicable, method changes, and out-of-control action or data qualification.

Detection Limit

Current practices at HEAL define the Detection Limit (DL) as the smallest amount that can be detected above the baseline noise in a procedure within a stated confidence level.

HEAL presently utilizes an Instrument Detection Limit (IDL), a Method Detection Limit (MDL), and a Practical Quantitation Limit (PQL). The relationship between these levels is approximately
IDL: MDL: PQL = 1:5:5.

The IDL is a measure of the sensitivity of an analytical instrument. The IDL is the amount which, when injected, produces a detectable signal in 99% of the analyses at that concentration. An IDL can be considered the minimum level of analyte concentration that is detectable above random baseline noise.

The MDL is a measure of the sensitivity of an analytical method. MDL studies are required annually for each quality system matrix, technology and analyte, unless indicated otherwise in the referenced method. An MDL determination (as required in 40CFR part 136 Appendix B) consists of replicate spiked samples carried through all necessary preparation steps. The spike concentration is three times the standard deviation of three replicates of spikes. At least seven replicates are spiked and analyzed and their standard deviation(s) calculated. Routine variability is critical in passing the 10 times rule and is best achieved by running the MDLs over different days and when possible over several calibration events. Standard Methods and those methods used for drinking water analysis must have MDL studies that are performed over a period of at least three days in order to include day to day variations. The method detection limit (MDL) can be calculated using the standard deviation according to the formula:

$$MDL = s * t\ (99\%),$$

where t (99%) is the Student's t-value for the 99% confidence interval. The t-value depends on the number of trials used in calculating the sample standard deviation, so choose the appropriate value according to the number of trials.

Number of Trials	t(99%)
6	3.36
7	3.14
8	3.00
9	2.90

The calculated MDL must not be less than 10 times the spiked amount or the study must be performed again with a lower concentration.

Where there are multiple MDL values for the same test method in the LIMS the highest MDL value is utilized.

The PQL is significant because different laboratories can produce different MDLs although they may employ the same analytical procedures, instruments and sample matrices. The PQL is about two to five times the MDL and represents a practical, and routinely achievable, reporting level with a good certainty that the reported value is reliable. It is often determined by regulatory limits. The reported PQL for a sample is dependent on the dilution factor utilized during sample analysis.

In the event that an analyte will not be reported less than the PQL, an MDL study is not required and a PQL check shall be done, at least annually, in place of the MDL study. The PQL check shall consist of a QC sample spiked at or below the PQL. All sample-processing and analysis steps of the analytical method shall be included in the PQL check and shall be done for each quality system matrix, technology, and analyte. A successful check is one where the recovery of each analyte is within the established method acceptance criteria. When this criterion is not defined by the method or SOP, a default limit of +/-50% shall be utilized.

Quality Control Parameter Calculations

Mean

The sample mean is also known as the arithmetic average. It can be calculated by adding all of the appropriate values together, and dividing this sum by the number of values.

$$\text{Average} = (\Sigma x_l) / n$$

x_l = the value x in the l^{th} trial
n = the number of trials

Standard Deviation

The sample standard deviation, represented by s, is a measure of dispersion. The dispersion is considered to be the difference between the average and each of the

values x_i. The variance, s^2, can be calculated by summing the squares of the differences and dividing by the number of differences. The sample standard deviation, s, can be found by taking the square root of the variance.

$$\text{Standard deviation} = s = [\Sigma (x_i - \text{average})^2 / (n - 1)]^{1/2}$$

Percent Recovery (LCS and LCSD)

$$\text{Percent Recovery} = \frac{(\text{Spike Sample Result})}{(\text{Spike Added})} \text{X100}$$

Percent Recovery (MS, MSD)

$$\text{Percent Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{(\text{Spike Added})} \text{X100}$$

Control Limits

Control Limits are calculated by the LIMS using the average percent recovery (x), and the standard deviation (s).

Upper Control Limit = x + 3s
Lower Control Limit = x – 3s

These control limits approximate a 99% confidence interval around the mean recovery.

Grubbs Outliers

Grubbs Outliers are calculated by the LIMS during the generation of control limits and uncertainties. An outlier is an observation that appears to deviate markedly from other observations in the sample set and are removed, unless documented otherwise.

Identify both the lowest and highest values in the sample set. Use the following equations to determine the T values.

$$T = \frac{x_{max} - x_{mean}}{sd} \quad \text{(for the largest value)}$$

$$T = \frac{x_{mean} - x_{min}}{sd} \quad \text{(for the smallest value)}$$

Compare the T values to the Grubbs' critical value table. If either value of T is greater than the critical value (assuming a 5% risk) for the sample size, the point(s) must be dropped then the calculation repeated for both the lowest and highest value using the new mean and standard deviation.
The Grubbs test is repeated until there are no longer any outliers detected. Keep in mind you must have at least 20 data points available to generate your limits.

RPD (Relative Percent Difference)

Analytical precision is expressed as a percentage of the difference between the results of duplicate samples for a given analyst. Relative percent difference (RPD) is calculated as follows:

$$RPD = \frac{2 \times (\text{Sample Result} - \text{Duplicate Result})}{(\text{Sample Result} + \text{Duplicate Result})} \times 100$$

Uncertainty Measurements

Uncertainty, as defined by ISO, is the parameter associated with the result of a measurement that characterizes the dispersion of the values that could reasonably be attributed to the measurement. Ultimately, uncertainty measurements are used to state how good a test result is and to allow the end user of the data to properly interpret their reported data. All procedures allow for some uncertainty. For most analyses, the components and estimates of uncertainty are reduced by following well-established test methods. To further reduce uncertainty, results generally are not reported below the lowest calibration point (PQL) or above the highest calibration point (UQL). Understanding that there are many influential quantities affecting a measurement result, so many in fact that it is impossible to identify all of them, HEAL calculates measurement uncertainty at least annually using LCSs. These estimations of measurement uncertainty are kept on file in the method folders in the QA/QC office.

Measurement Uncertainty contributors are those that may be determined statistically. These shall be generated by estimating the overall uncertainty in the entire analytical process by measuring the dispersion of values obtained from laboratory control samples over time. At least 20 of the most recent LCS data points are gathered. The standard deviation(s) is calculated using these LCS data points. Since it can be

assumed that the possible estimated values of the spikes are approximately normally distributed with approximate standard deviation(s), the unknown value of the spike is believed to lie in 95% confidence interval, corresponding to an uncertainty range of +/- 2(s).

Calculate standard deviation (s) and 95% confidence interval according to the following formulae:

$$s = \sqrt{\frac{\sum (x - \bar{x})^2}{(n-1)}}$$

Where: s = standard deviation
x = number in series
$\bar{x}$ = calculated mean of series
n = number of samples taken

$95\%\ confidence = 2 \times s$

Example: Assuming that after gathering 20 of the most recent LCS results for Bromide, we have calculated the standard deviations of the values and achieved a result of 0.0326, our measurement of uncertainty for Bromide (at 95% confidence = 2 x s) is 0.0652.

Total Nitrogen

Total nitrogen is calculated as follows:

Total Nitrogen = TKN + NO_2 + NO_3

Langelier Saturation Index

The Langelier Saturation Index (LSI) is calculated as follows:

Solids Factor (SF) =(Log10[TDS] - 1) / 10
Ca Hardness Factor (HF) = Log10([Ca] x 2.497) - 0.4
Alkalinity Factor (AF) = Log10[Alkalinity]
Temp. Factor (TF) = -13.12 x Log10(°C + 273) + 34.55
pHs (pH @ saturation) =(9.3 + SF + TF) - (HF + AF)
LSI = pH - pH_s

Calibration Calculations

1. Response Factor or Calibration Factor:

$RF = ((A_x)(C_{is}))/((A_{is})(C_x))$ $CF=(A_x)/(C_x)$

a. Average RF or CF

$RF_{AVE} = \Sigma RF_i / n$

b. Standard Deviation

$s = SQRT \{ [\Sigma (RF_i - RF_{AVE})^2] / (n-1) \}$

c. Relative Standard Deviation

$RSD = s / RF_{AVE}$

Where:
A_x = Area of the compound
C_x = Concentration of the compound
A_{is} = Area of the internal standard
C_{is} = Concentration of the internal standard
n = number of pairs of data
RF_i = Response Factor (or other determined value)
RF_{AVE} = Average of all the response factors
Σ = the sum of all the individual values

2. Linear Regression

$y=mx+b$

a. Slope (m)

$m =(n\Sigma x_i y_i - (n\Sigma x_i)*(n\Sigma y_i)) / (n\Sigma x_i^2 - (\Sigma x_i)^2)$

b. Intercept (b)

$b = y_{AVE} - m*(x_{AVE})$

c. Correlation Coefficient (cc)

$$CC\ (r) = \{ \Sigma((x_i - x_{ave})*(y_i - y_{ave})) \} / \{ SQRT((\Sigma(x_i - x_{ave})^2)*(\Sigma(y_i - y_{ave})^2)) \}$$

Or

$$CC\ (r) = [(\Sigma w * \Sigma wxy) - (\Sigma wx * \Sigma wy)] / (sqrt(([(\Sigma w * \Sigma wx^2) - (\Sigma wx * \Sigma wx)] * [(\Sigma w * \Sigma wy^2) - (\Sigma wy * \Sigma wy)])))]$$

d. Coefficient of Determination

$$COD\ (r^2) = CC*CC$$

Where:
y = Response (Area) Ratio A_x/A_{is}
x = Concentration Ratio C_x/C_{is}
m = slope
b = intercept
n = number of replicate x,y pairs
x_i = individual values for independent variable
y_i = individual values for dependent variable
Σ = the sum of all the individual values
x_{ave} = average of the x values
y_{ave} = average of the y values
w = weighting factor, for equal weighting w=1

3. Quadratic Regression

$$y = ax^2 + bx + c$$

a. Coefficient of Determination

$$COD\ (r^2) = (\Sigma(y_i - y_{ave})^2 - \{[(n-1)/(n-p)] * [\Sigma(y_i - Y_i)^2]\}) / \Sigma(y_i - y_{ave})^2$$

Where:
y = Response (Area) Ratio A_x/A_{is}
x = Concentration Ratio C_x/C_{is}
a = x^2 coefficient
b = x coefficient
c = intercept
y_i = individual values for each dependent variable
x_i = individual values for each independent variable
y_{ave} = average of the y values
n = number of pairs of data
p = number of parameters in the polynomial equation (I.e., 3 for third order, 2 for second order)

$Yi = ((2*a*(C_x/C_{is})^2)-b^2+b+(4*a*c))/(4a)$

b. Coefficients (a,b,c) of a Quadratic Regression

$a = S_{(x2y)}S_{(xx)}-S_{(xy)}S_{(xx2)} / S_{(xx)}S_{(x2x2)}-[S_{(xx2)}]^2$

$b = S_{(xy)}S_{(x2x2)}-S_{(x2y)}S_{(xx2)} / S_{(xx)}S_{(x2x2)}-[S_{(xx2)}]^2$

$c = [(\Sigma yw)/n] - b*[(\Sigma xw)/n] - a*[\Sigma(x^2w)/n]$

Where:
n = number of replicate x,y pairs
x = x values
y = y values
$w = S^{-2} / (\Sigma S^{-2}/n)$
$S_{(xx)} = (\Sigma x^2w) - [(\Sigma xw)^2 / n]$
$S_{(xy)} = (\Sigma xyw) - [(\Sigma xw)*(\Sigma yw) / n]$
$S_{(xx2)} = (\Sigma x^3w) - [(\Sigma xw)*(\Sigma x^2w) / n]$
$S_{(x2y)} = (\Sigma x^2yw) - [(\Sigma x^2w)*(\Sigma yw) / n]$
$S_{(x2x2)} = (\Sigma x^4w) - [(\Sigma x^2w)^2 / n]$
Or If unweighted calibration, w=1
S(xx) = (Sx2) - [(Sx)2 / n]
S(xy) = (Sxy) - [(Sx)*(Sy) / n]
S(xx2) = (Sx3) - [(Sx)*(Sx2) / n]
S(x2y) = (Sx2y) - [(Sx2)*(Sy) / n]
S(x2x2) = (Sx4) - [(Sx2)2 / n]

Weighting

Weighting of 1/x or $1/x^2$ is permissible for linear calibrations. Weighting shall not be employed for quadratic calibrations. When weighting, use the above equations by substituting x for 1/x or $1/x^2$.

Concentration Calculations

On-Column Concentration for Average RRF Calibration using Internal Standard

On-Column Concentration $C_x = ((A_x)(C_{is}))/((A_{is})(RF_{AVE}))$

On-Column Concentration for Average CF Calibration using External Standard

On-Column Concentration $C_x = (A_x)/(CF_{AVE})$

On-Column Concentration for Linear Calibration

If determining an external standard, then exclude the A_{is} and C_{is} for internal standards

On-Column Concentration $C_x = ((\text{Absolute}\{[(A_x)/(A_{is})] - b\})/m) * C_{is}$

Where: m = slope
b = intercept
A_x = Area of the Sample
C_{is} = Concentration of the Internal Standard
A_{is} = Area of the Internal Standard

On-Column Concentration for Quadratic Calibration

If determining an external standard, then exclude the A_{is} and C_{is} for internal standards

On-Column Concentration $=[(+SQRT(b^2-(4*a*(c-y)))-b)/(2*a)] * C_{is}$

Where: $a = x^2$ coefficient
b = x coefficient
c = intercept
y = Area Ratio = A_x/A_{is}
C_{is} = Concentration of the Internal Standard

Final Concentration (Wet Weight)

$$\text{Concentration for Extracted Samples} = \frac{(\text{On-Column Conc})(\text{Dilution})(\text{Final Volume})}{(\text{Initial Amount})(\text{Injection Volume})}$$

$$\text{Concentration for Purged Samples} = \frac{(\text{On-Column Conc})(\text{Purged Amount})(\text{Dilution})}{(\text{Purged Amount})}$$

Dry Weight Concentration

$$\text{Dry Weight Concentration} = \frac{\text{Final Concentration Wet Weight} * 100}{\% \text{ Solids}}$$

Percent Difference

$$\% \text{ Difference} = \frac{\text{Absolute(Continuing Calibration RRF - Average RRF)}}{\text{Average RRF}} * 100$$

Percent Drift

$$\% \text{ Drift} = \frac{\text{Absolute(Calculated Concentration - Theoretical Concentration)}}{\text{Theoretical Concentration}} * 100$$

Dilution Factor

Dilution Factor =(Volume of Solvent + Solute) / Volume of Solute

Relative Retention Time

RRT =RT of Compound / RT of ISTD

Breakdown Percent

$$\text{Breakdown} = \frac{\text{Area of DDD + Area of DDE}}{\text{Average (DDT, DDE and DDD)}}$$

-or-

$$\frac{\text{Area of Endrin Ketone + Area of Endrin Aldehyde}}{\text{Average (Endrin, Endrin Ketone, Endrin Aldehyde)}}$$

11.0 Data Reduction, Validation, Reporting, and Record Keeping

All data reported must be of the highest possible accuracy and quality. During the processes of data reduction, validation, and report generation, all work is thoroughly checked to insure that error is minimized.

Data Reduction

The analyst who generated the data usually performs the data reduction. The calculations include evaluation of surrogate recoveries (where applicable), and other miscellaneous calculations related to the sample quantitation.

If the results are computer generated, then the formulas must be confirmed by hand calculations, at minimum, one per batch.

See the current Data Validation SOP for details regarding data reduction.

Validation

A senior analyst, most often the section supervisor, validates the data. All data undergoes peer review. If an error is detected, it is brought to the analyst's attention so that he or she can rectify the error, and perform further checks to ensure that all data for that batch is sound. Previous and/or common mistakes are stringently monitored throughout the validation process. Data is reported using appropriate significant figure criteria. In most cases, two significant digits are utilized, but three significant digits can be used in QC calculations. Significant digits are not rounded until after the last step of a sample calculation. All final reports undergo a review by the laboratory manager, the project manager, or their designee, to provide a logical review of all results before they are released to the client.

If data is to be manually transferred between media, the transcribed data is checked by a peer. This includes data typing, computer data entry, chromatographic data transfer, data table inclusion to a cover letter, or when data results are combined with other data fields.

All hand-written data from run logs, analytical standard logbooks, hand-entered data logbooks, or on instrument-generated chromatograms, are systematically archived should the need for future retrieval arise.

See the current Data Validation SOP for details regarding data validation.

Reports and Records

All records at HEAL are retained and maintained through the procedures outlined in the most recent version of the Records Control SOP.

Sample reports are compiled by the Laboratory Information Management System (LIMS). Most data is transferred directly from the instruments to the LIMS. After being processed by the analyst and reviewed by a data reviewer, final reports are approved and signed by the senior laboratory management. A comparative analysis of the data is performed at this point. For example, if TKN and NH3 are analyzed on the same sample, the NH3 result should never be greater than the TKN result. Lab results and reports are released only to appropriately designated individuals. Release of the data can be by fax, email, electronic deliverables, or mailed hard copy.

When a project is completed, the final report, chain of custody, any relevant supporting data, and the quality assurance/control worksheets are scanned as a .pdf file onto the main server. Original client folders are kept on file and are arranged by project number. Additionally, all electronic data is backed up routinely on the HEAL main server. The backup includes raw data, chromatograms, and report documents. Hard copies of chromatograms are stored separately according to the instrument and the analysis date. All records and analytical data reports are retained in a secure location as permanent records for a minimum period of five years (unless specified otherwise in a client contract). Access to archived information shall be documented with an access log. Access to archived electronic reports and data will be password protected. In the event that HEAL transfers ownership or terminates business practices, complete records will be maintained or transferred according to the client's instructions.

After issuance, the original report shall remain unchanged. If a correction to the report is necessary, then an additional document shall be issued. This document shall have a title of "Addendum to Test Report" or Correction to Original Report", or equivalent. Demonstration of original report integrity comes in two forms. First, the report date is included on each page of the final report. Second, each page is numbered in sequential order, making the addition or omission of any data page(s) readily detectable.

12.0 Corrective Action

Refer to the most recent version of the Data Validation SOP for the procedure utilized in filling out a Corrective Action Report. A blank copy of the corrective action report is available in the current Document Control Logbook.

The limits that have been defined for data acceptability also form the basis for corrective action initiation. Initiation of corrective action occurs when the data generated from continuing calibration standard, sample surrogate recovery, laboratory control spike, matrix spike, or sample duplicates exceed acceptance criteria. If corrective action is necessary, the analyst or the section supervisor will coordinate to take the following guidelines into consideration in order to determine and correct the measurement system deficiency:

Check all calculations and data measurements systems (Calibrations, reagents, instrument performance checks, etc.).

Assure that proper procedures were followed.

Unforeseen problems that arise during sample preparation and/or sample analysis that lead to treating a sample differently from documented procedures shall be documented with a corrective action report. The section supervisor and laboratory manager shall be made aware of the problem at the time of the occurrence. See the appropriate SOP regarding departures from documented procedures.

Continuing calibration standards below acceptance criteria cannot be used for reporting analytical data unless method specific criteria states otherwise.

Continuing calibration standards above acceptance criteria can be used to report data as long as the failure is isolated to a single standard and the corresponding samples are non-detect for the failing analyte.

Samples with non-compliant surrogate recoveries should be reanalyzed, unless deemed un-necessary by the supervisor for matrix, historical data, or other analysis-related anomalies.

Laboratory and Matrix Spike acceptance criteria vary significantly depending on method and matrix. Analysts and supervisors meet and discuss appropriate corrective action measures as spike failures occur.

In the event that results must be reported with associated QC failures, the data must be qualified appropriately to notify the end user of the QC failure.

Sample duplicates with RPD values outside control limits require supervisor evaluation and possible reanalysis.

A second mechanism for initiation of corrective action is that resulting from Quality Assurance performance audits, system audits, inter- and intra-laboratory comparison studies. Corrective Actions initiated through this mechanism will be monitored and coordinated by the laboratory QA/QCO.

All corrective action forms are entered in the LIMS and included with the raw data for peer review, signed by the technical director of the section and included in the case narrative to the client whose samples were affected. All Corrective action forms in the LIMS are reviewed by the QA/QCO.

13.0 Quality Assurance Audits, Reports and Complaints

Internal/External Systems' Audits, Performance Evaluations, and Complaints

Several procedures are used to assess the effectiveness of the quality control system. One of these methods includes internal performance evaluations, which are conducted by the use of control samples, replicate measurements, and control charts. External performance audits, which are conducted by the use of inter-laboratory checks, such as participation in laboratory evaluation programs and performance evaluation samples available from a NELAC-accredited Proficiency Standard Vendor, are another method.

Proficiency samples will be obtained twice per year from an appropriate vendor for all tests and matrices for which we are accredited and for which PTs are available. HEAL participates in soil, waste water, drinking water, and underground storage tank PT studies. Copies of results are available upon request. HEAL's management and all analysts shall ensure that all PT samples are handled in the same manner as real environmental samples utilizing the same staff, methods, procedures, equipment, facilities, and frequency of analysis as used for routine analysis of that analyte. When analyzing a PT, HEAL shall employ the same calibration, laboratory quality control and acceptance criteria, sequence of analytical steps, number of replicates, and other procedures as used when analyzing routine samples.

With regards to analyzing PT Samples, HEAL shall not send any PT sample, or portion of a PT sample, to another laboratory for any analysis for which we seek accreditation, or are accredited. HEAL shall not knowingly receive any PT sample or portion of a PT sample from another laboratory for any analysis for which the sending laboratory seeks accreditation, or is accredited. Laboratory management or staff will not communicate with any individual at another laboratory concerning the PT sample. Laboratory management or staff shall not attempt to obtain the assigned value of any PT sample from the PT Provider.

Internal Audits are performed annually by the QA/QCO in accordance with the current Internal Audit SOP. The system audit consists of a qualitative inspection of the QA system in the laboratory and an assessment of the adequacy of the physical facilities for sampling, calibration, and measurement. This audit includes a careful evaluation and review of laboratory quality control procedures. Internal audits are performed using the guidelines outlined below, which include, but are not limited to:

1. Review of staff qualifications, demonstration of capability, and personnel training programs
2. Storage and handling of reagents, standards, and samples
3. Standard preparation logbook and LIMS procedures
4. Extraction logbooks
5. Raw data logbooks
6. Analytical logbooks or batch printouts and instrument maintenance logbooks

7. Data review procedures
8. Corrective action procedures
9. Review of data packages, which is performed regularly by the lab manager/QA Officer.

The QA/QCO will conduct these audits on an annual basis.

Management Reviews

HEAL management shall periodically, and at least annually, conduct a review of the laboratory's quality system and environmental testing activities to ensure their continuing suitability and effectiveness, and to introduce necessary changes or improvements. The review shall take account of:

1. the suitability and implementation of policies and procedures
2. reports from managerial and supervisory personnel
3. the outcome of recent internal audits
4. corrective and preventive actions
5. assessments by external bodies
6. the results of inter-laboratory comparisons or proficiency tests
7. changes in volume and type of work
8. client feed back
9. complaints
10. other relevant factors, such as laboratory health and safety, QC activities, resources, and staff training.

Findings from management reviews and the actions that arise from them shall be recorded and any corrective actions that arise shall be completed in an appropriate and agreed upon timescale.

Complaints

Complaints from clients are documented and given to the laboratory manager. The lab manager shall review the information and contact the client. If doubt is raised concerning the laboratory's policies or procedures, then an audit of the section or sections may be performed. All records of complaints and subsequent actions shall be maintained in the client compliant logbook for five years unless otherwise stated.

Internal and External Reports

The QA/QCO is responsible for preparation and submission of quality assurance reports to the appropriate management personnel as problems and issues arise. These reports

include the assessment of measurement systems, data precision and accuracy, and the results of performance and system audits. Additionally, they include significant QA problems, corrective actions, and recommended resolution measures. Reports of these Quality Assurance Audits describe the particular activities audited, procedures utilized in the examination and evaluation of laboratory records, and data validation procedures. Finally, there are procedures for evaluating the performance of Quality Control and Quality Assurance activities, and laboratory deficiencies and the implementation of corrective actions with the review requirements.

14.0 References (Analytical Protocols Utilized at HEAL)

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