UICI - 8 - 4

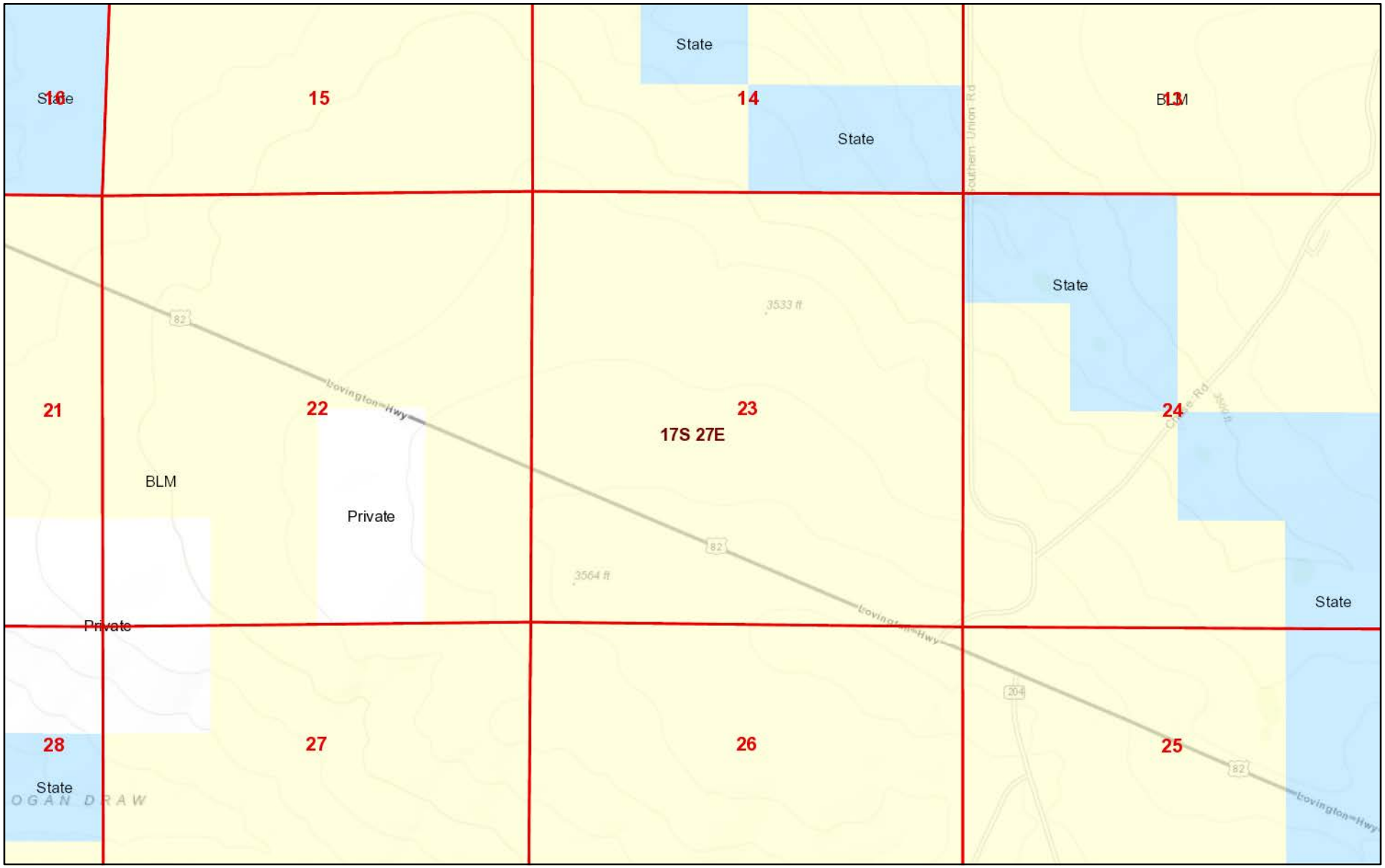
WDW-4 PERMITS, RENEWALS, & MODS (2 of 4)

2017

APPENDIX A

SURROUNDING LAND OWNERSHIP INFORMATION

ArcGIS Web Map



February 9, 2017

PLSSTownship

PLSSFirstDivision

Land Ownership

BLM

BOR

DOD FWS P SP

DOE I S USDA

FS NPS SGF VCNP

1:24,000

0 0.2 0.4 0.8 mi

0 0.225 0.45 0.9 km

Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey,

Web AppBuilder for ArcGIS

NM OSE | U.S. BLM | US Census Bureau, NMDOT | BLM | OCD | dsilcock, OCD | Texas Parks & Wildlife, Esri, HERE, Garmin, INCREMENT P, Intermap, USGS, METI/NASA, EPA, USDA |

APPENDIX B-1

GEOLEX 3D SEISMIC INTERPRETATION REPORT

Seismic Evaluation of Eddy County Devonian Reservoir Quality

Prepared for:
Holly Frontier/Navajo Refining Company
Artesia, NM

February 27, 2017

Prepared by:
Geolex, Inc.
Albuquerque, NM

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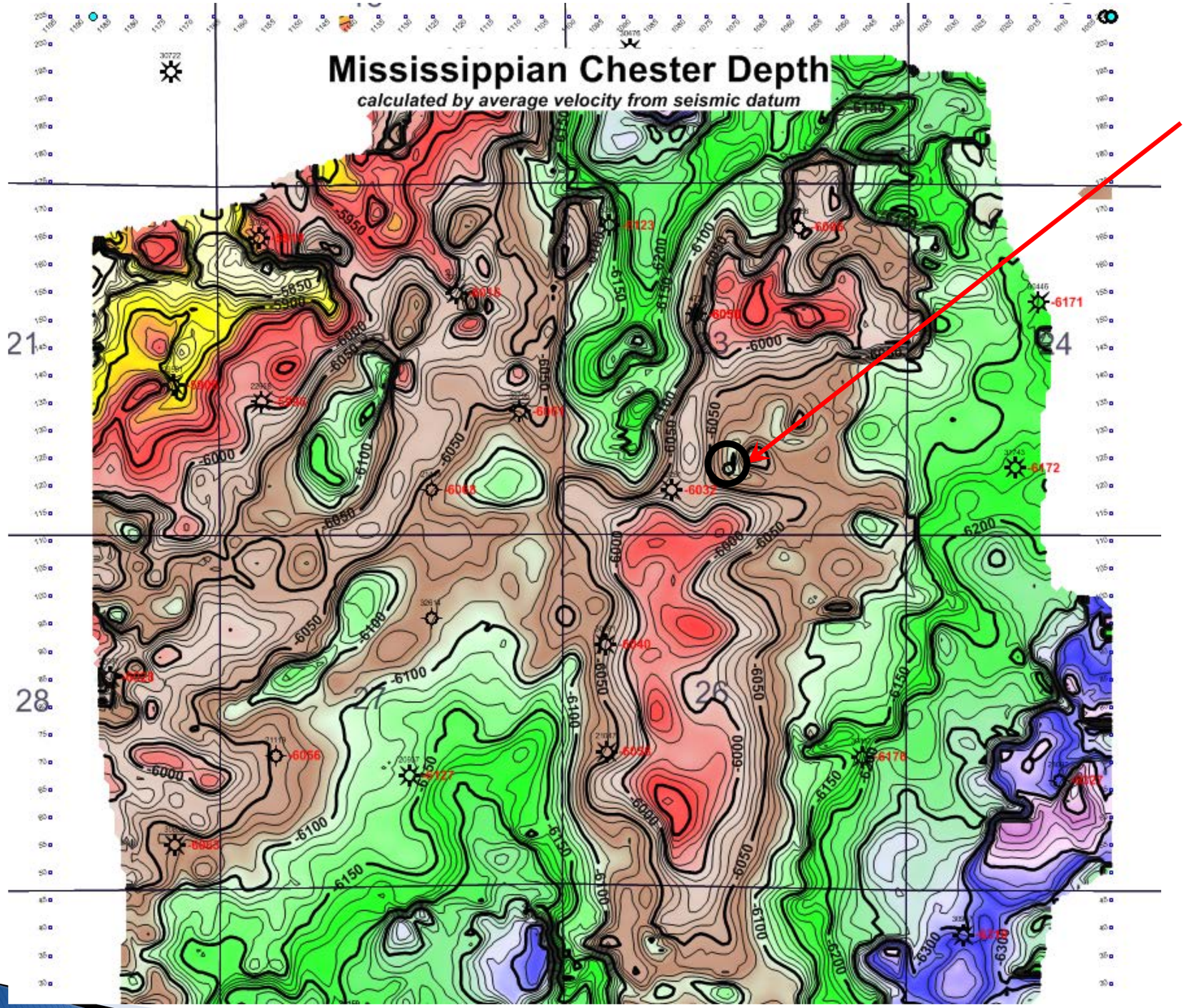

Proposed location
X=525861
Y= 660225

State Plane NAD 27
New Mexico East

Approx. 2500’ FWL & 1000’ FSL

Structural mapping at the closest mapable horizon, the Chester, indicates the proposed location is approximately 130 feet down dip from the crest of the structure in section 26 and in a structural sag, probably caused by karst collapse in the Devonian.

There appears to be no faulting in the vicinity of the location.

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Model based Seismic Trace Inversion is used to increase the seismic resolution and determine porosity distribution in the Devonian and Fusselman.

Only the Devonian will be shown because it will be the largest contributor to reservoir connectivity and storage.

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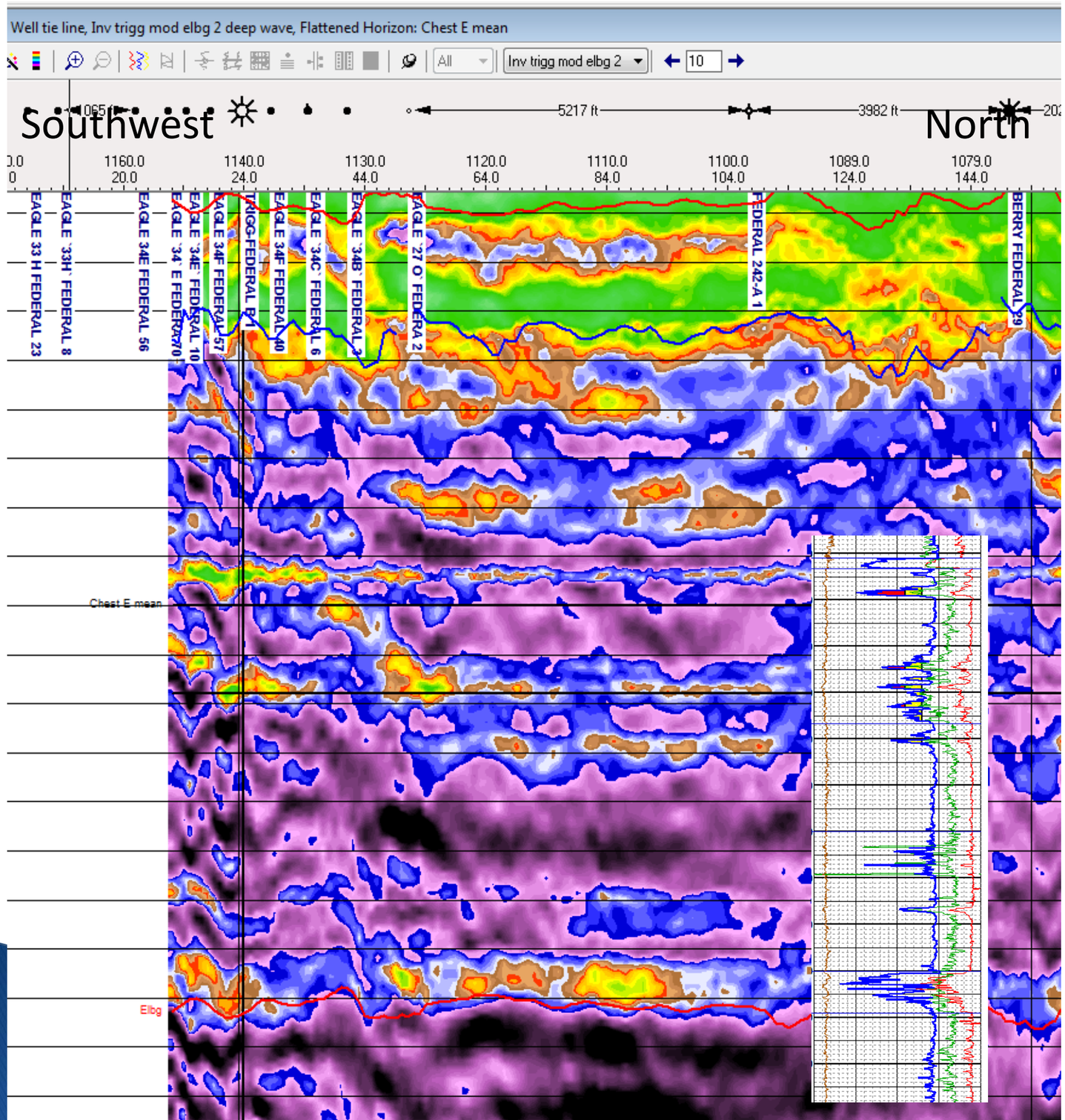
Inversion Interpretation From Chester Through Ellenburger



Chester

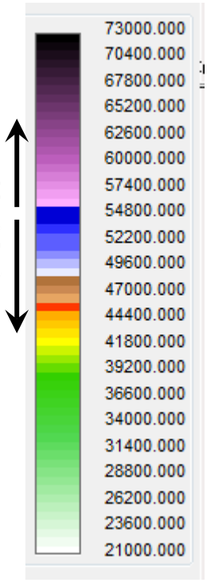
Osage

Woodford
Devonian

Lower D porosity

Fuss. Porosity

Simpson
Ellenburger



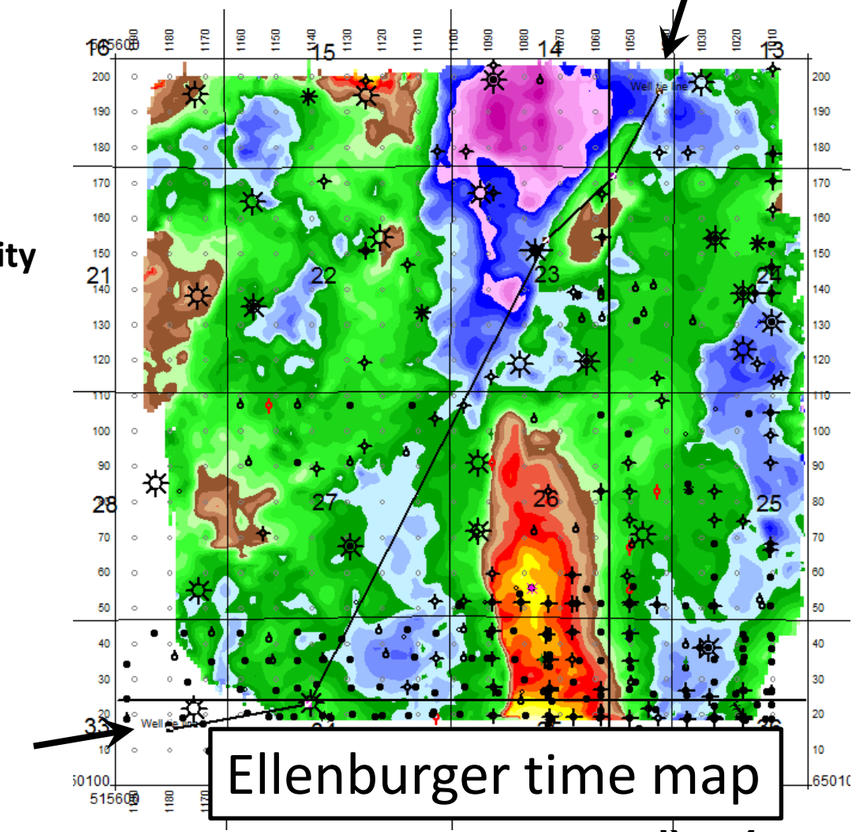
Tight

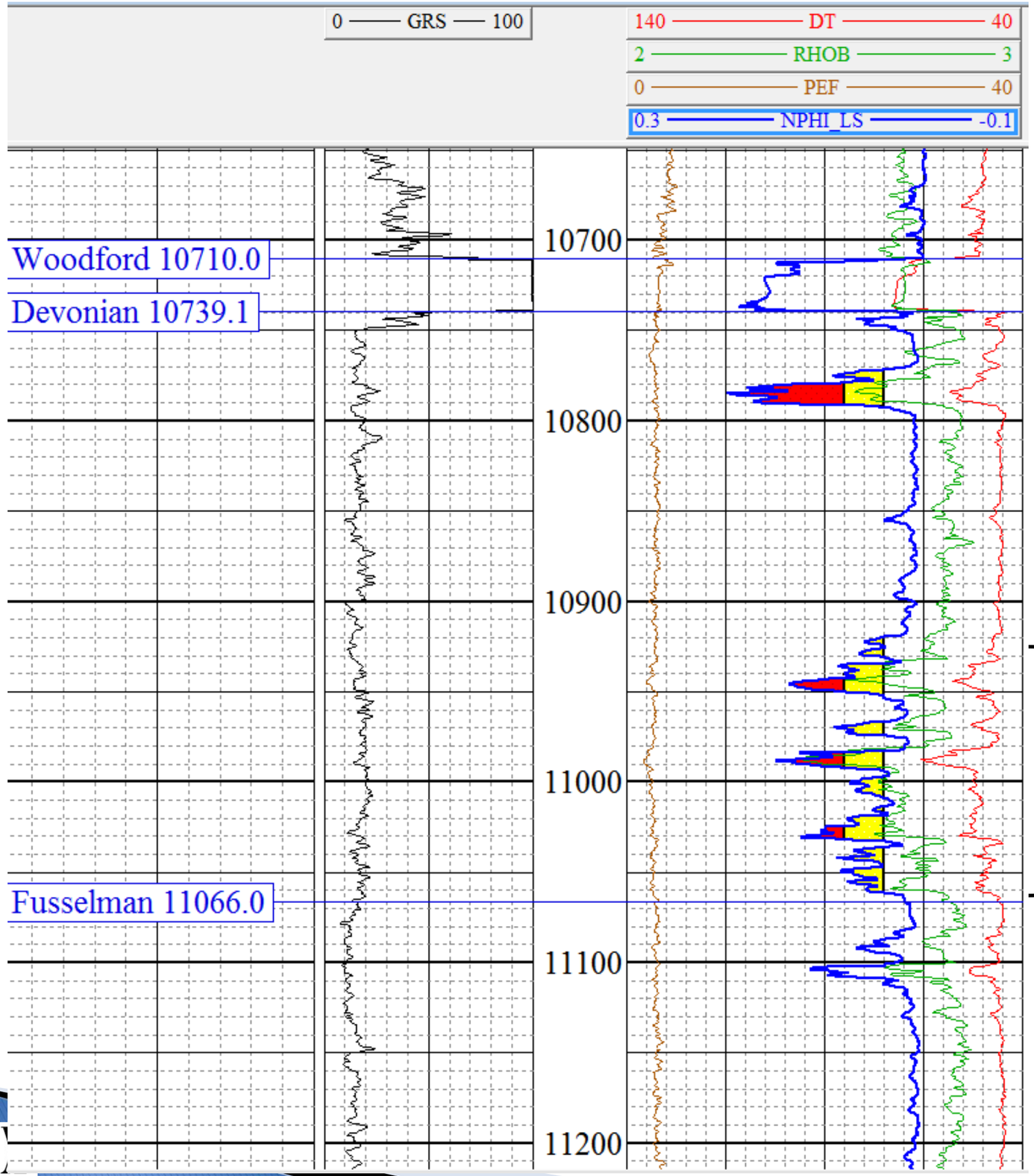
Increasing
Porosity

Shale

Well tie line

Flattened on Wdfd





24857 Fed DH #1

Model for the geologic section below the upper Devonian

Upper porosity Not included in model because the drilled wells penetrated the zone
20 ft of 4-8% porosity
12 ft of 8-19% porosity
26 bbl W in 2 hrs. swab

Lower Devonian
140 foot interval
100 ft of 4-8% porosity
32 ft of 8-14% porosity
No test

Fusselman porosity

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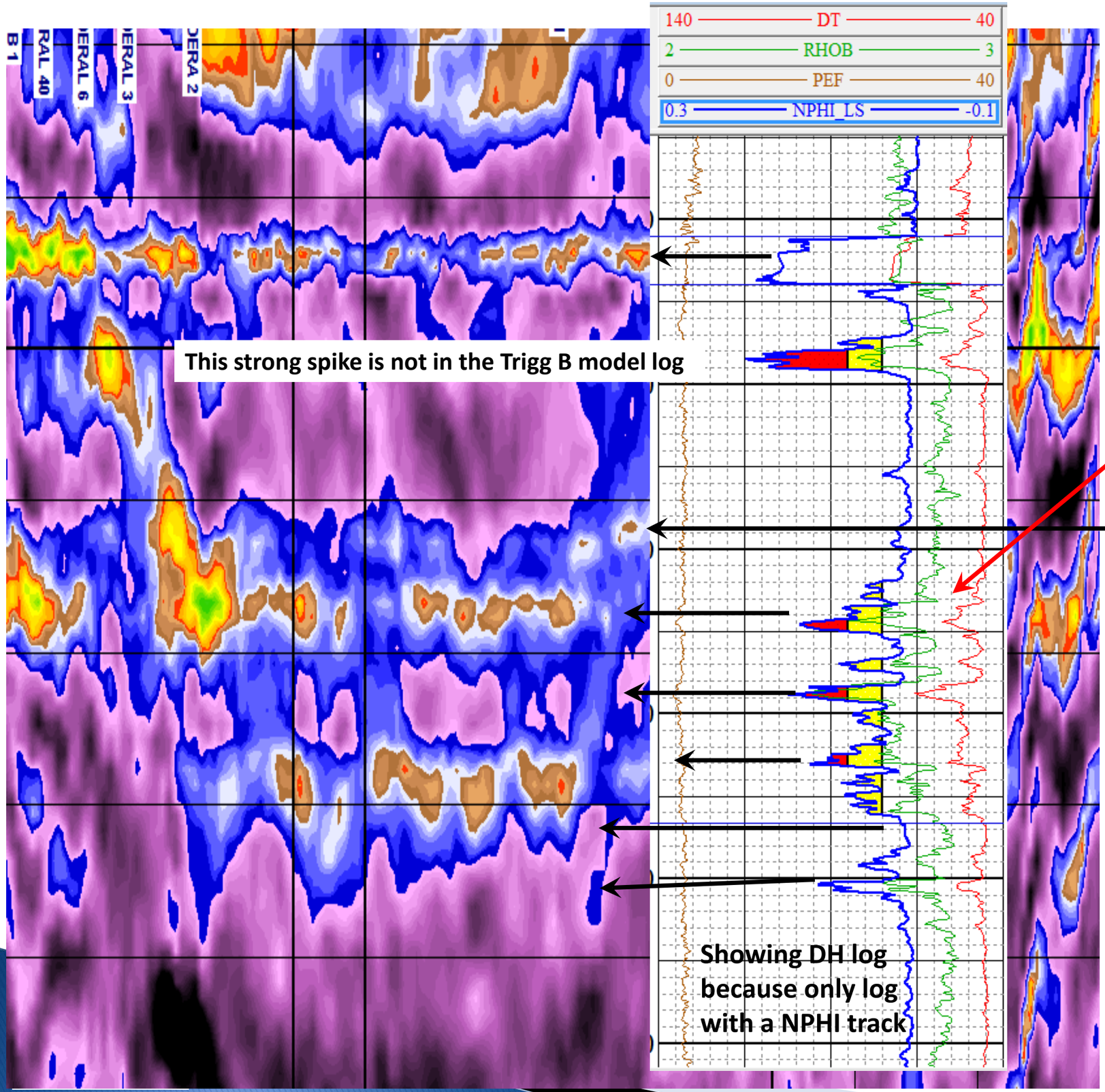
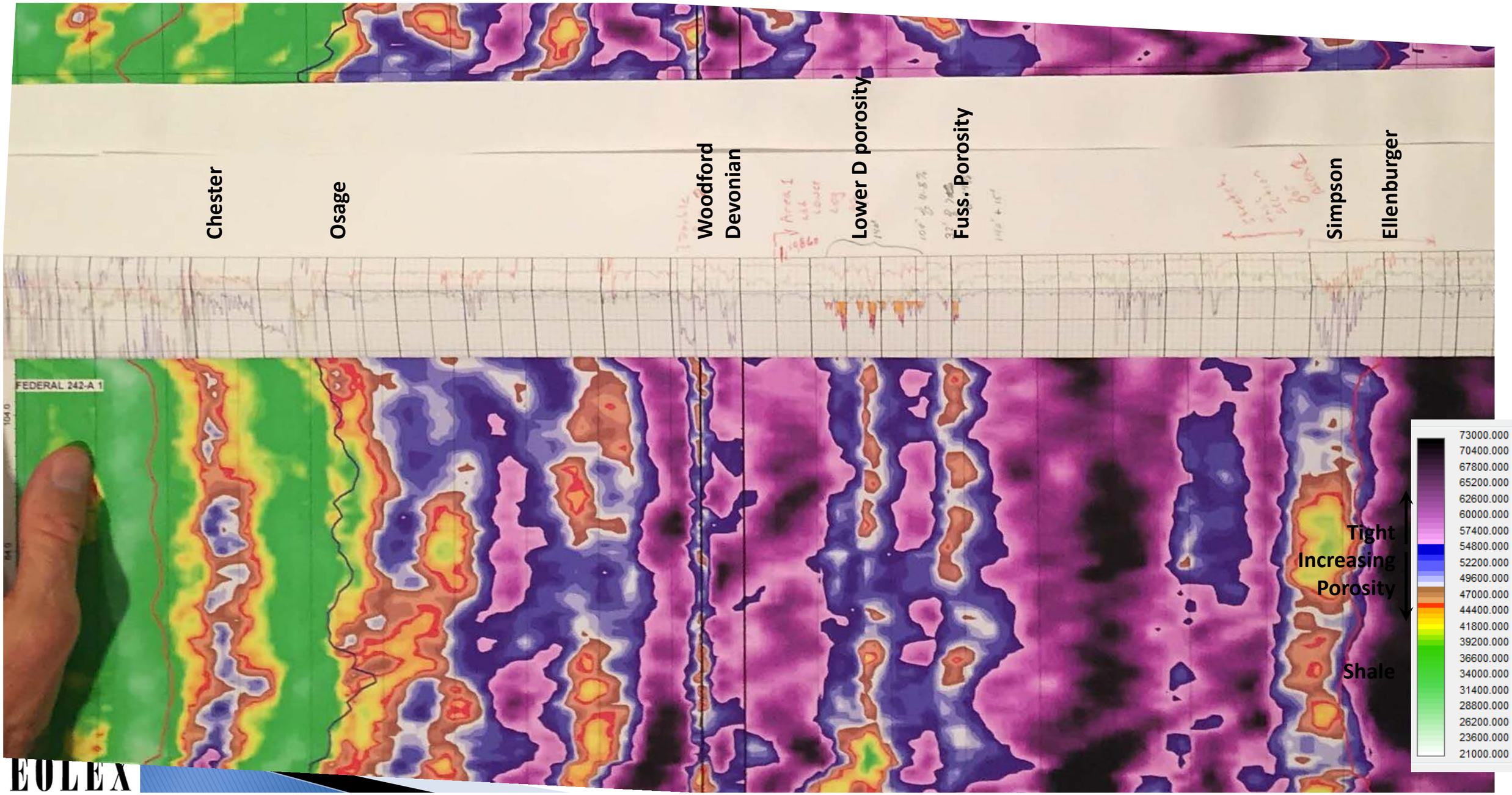


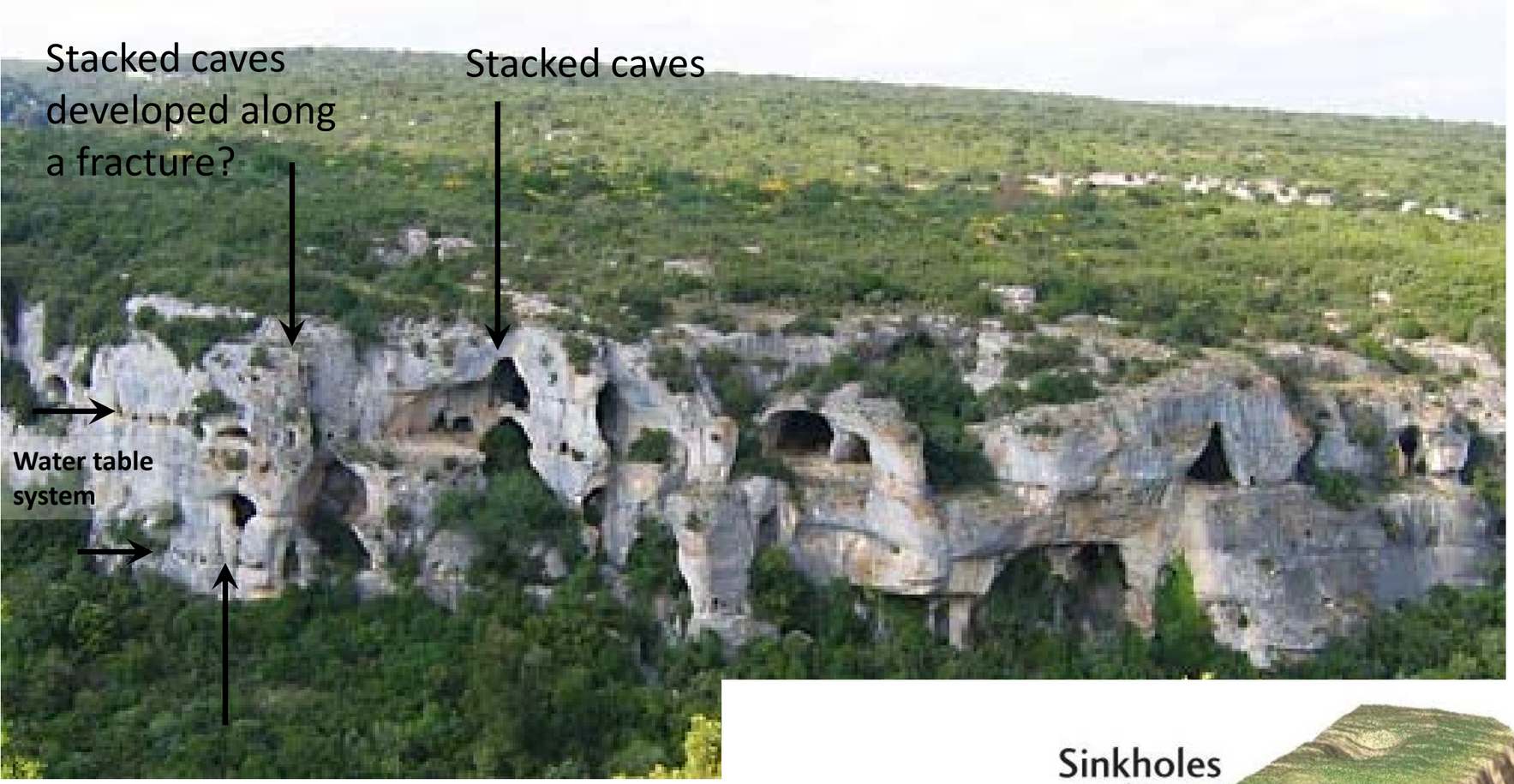
The model well ties fairly well. Resolution on the inversion is about 10-20 ft. Note that the massive Karst system has tremendously better porosity than that on the log shown on the previous page:

Lower Devonian
140 foot interval
100 ft of 4-8% porosity
32 ft of 8-14% porosity

To scale tying the 1” scale log to the inverted data

Porosity in the Devonian and Fusselman is thought to be created / modified by Karst and cave development



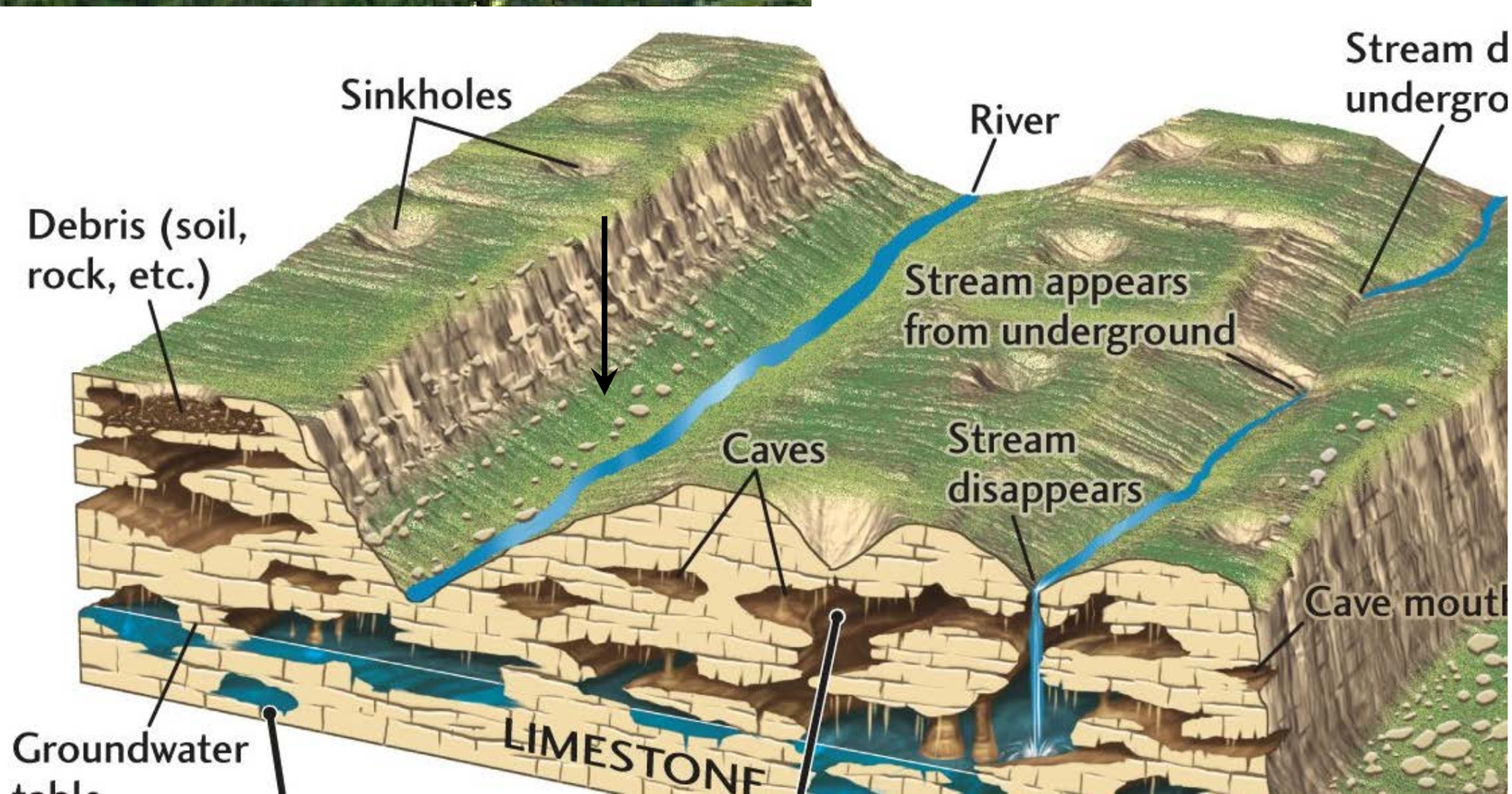


The caves of a karst landscape, Minerve, Hérault, France.
Hugo Soria

Porosity in the Devonian and Fusselman is thought to be created and/or modified by Karst and cave development.

Note: after the karsting episode, upon further burial, the open voids tend to fill with collapse from above, but retain significant enhanced porosity and permeability.

Karst images from Google



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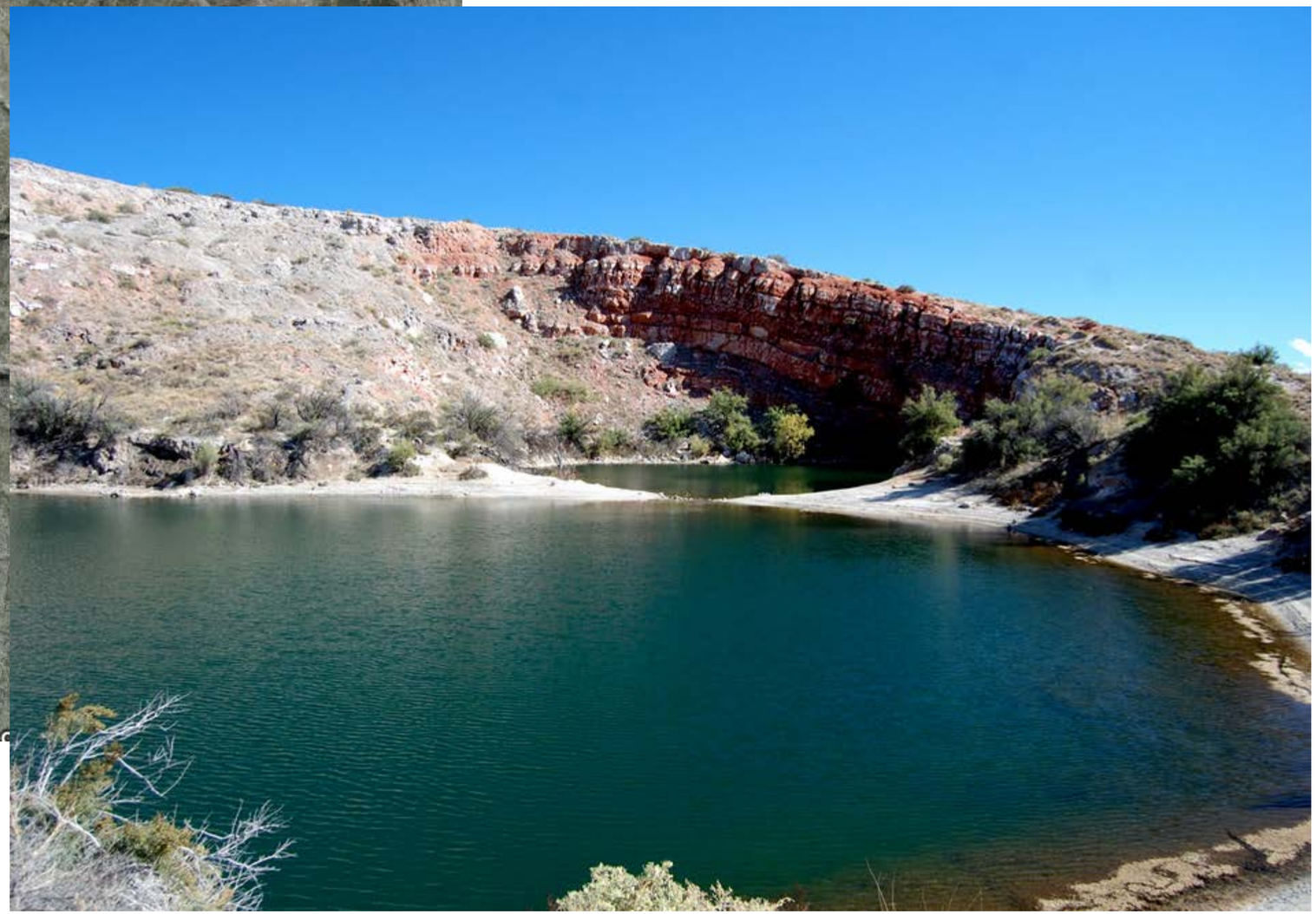
Modern day Karsting

Bottomless lakes New Mexico – sink holes in Karst system.

Google Earth

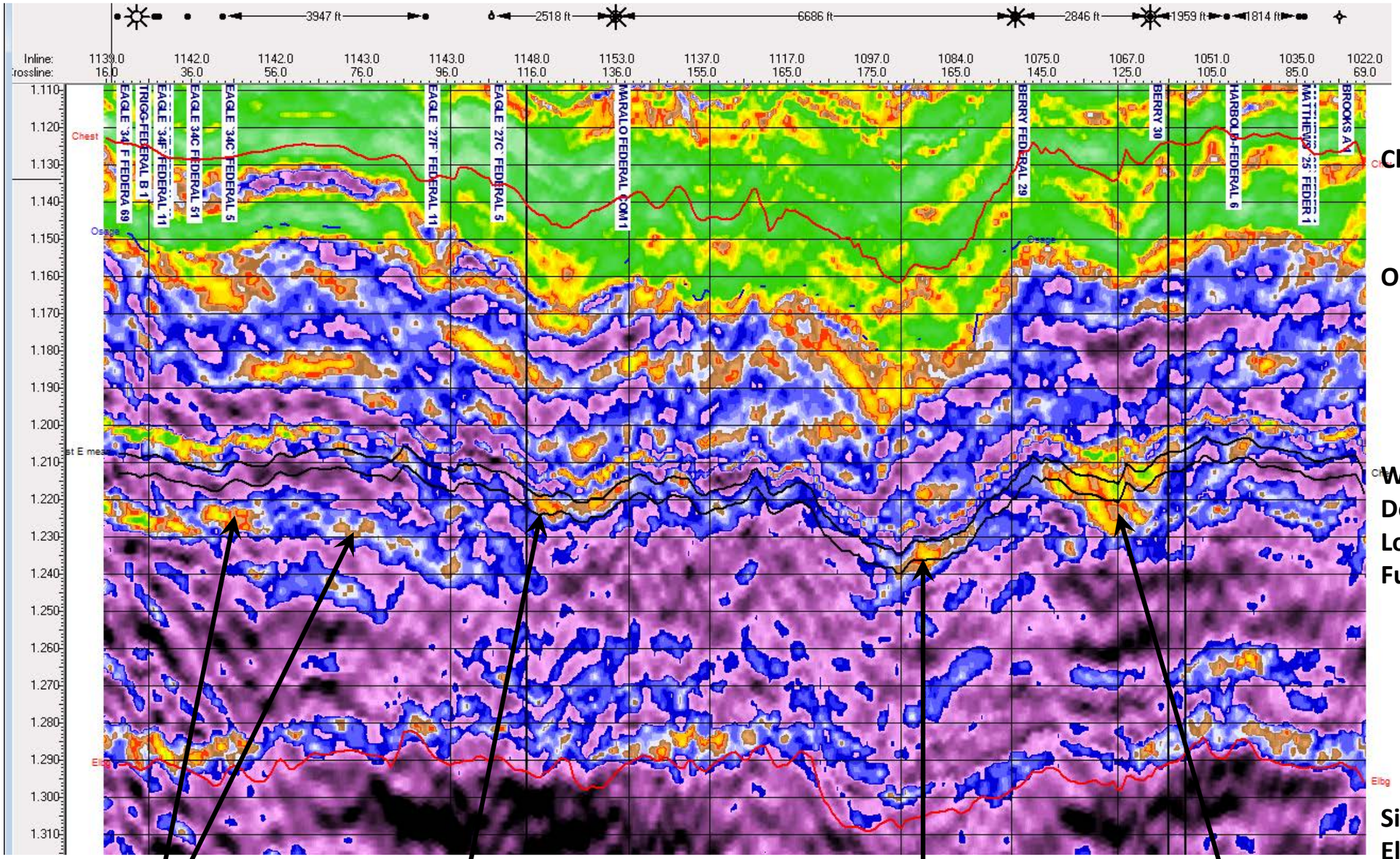


Cultreri

Seismic line, not flattened, showing some of the various Karst features – best porosity Yellow

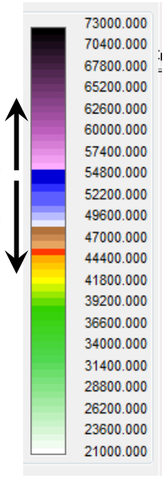
SW

SE



Tight

Increasing Porosity



Shale

Chester

Osage

Woodford

Devonian

Lower D porosity

Fuss. Porosity

Simpson

Ellenburger

L. Dev porosity

Karst system with collapse

Karst system in Graben

Major Karst system with collapse

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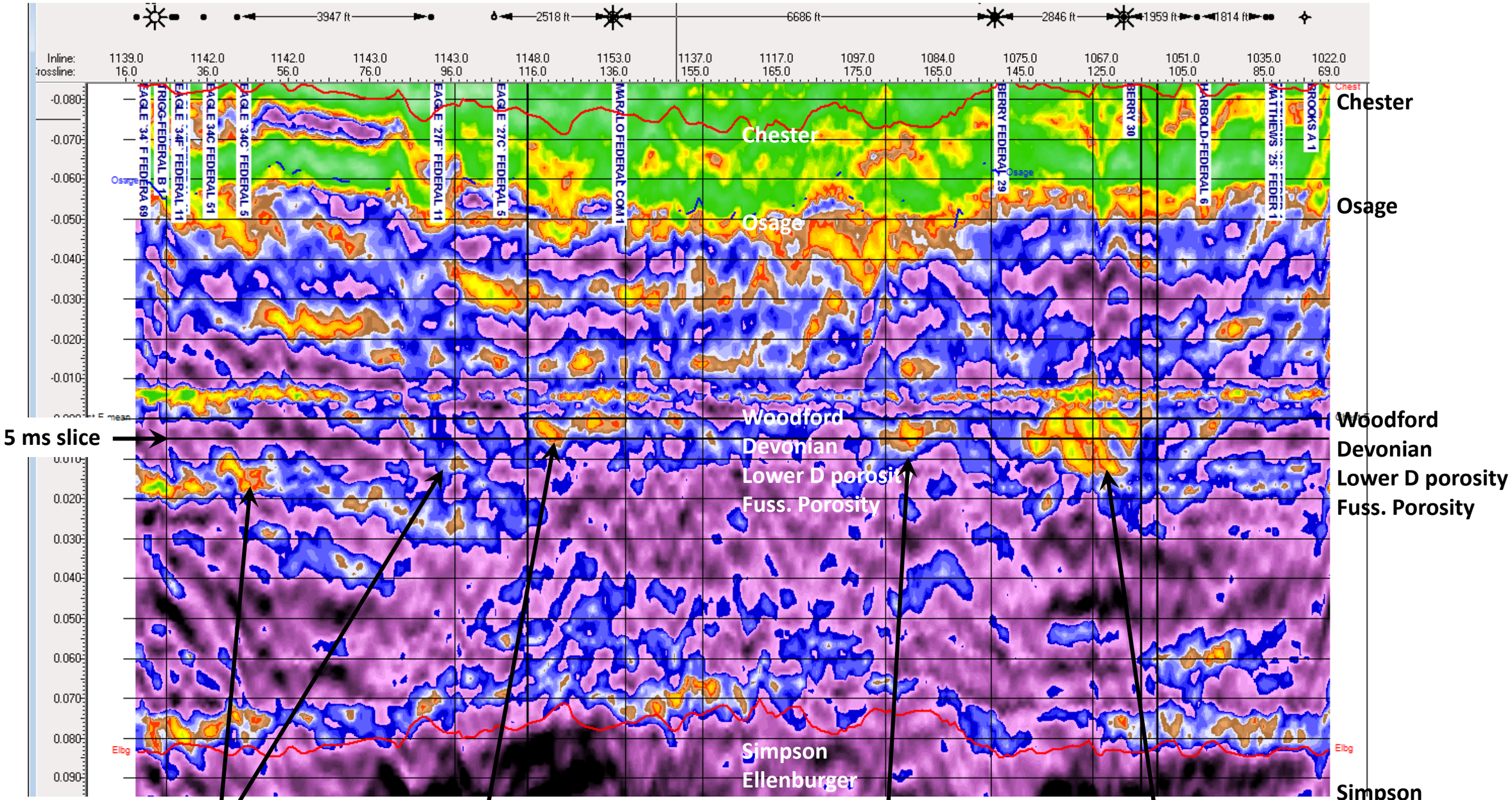
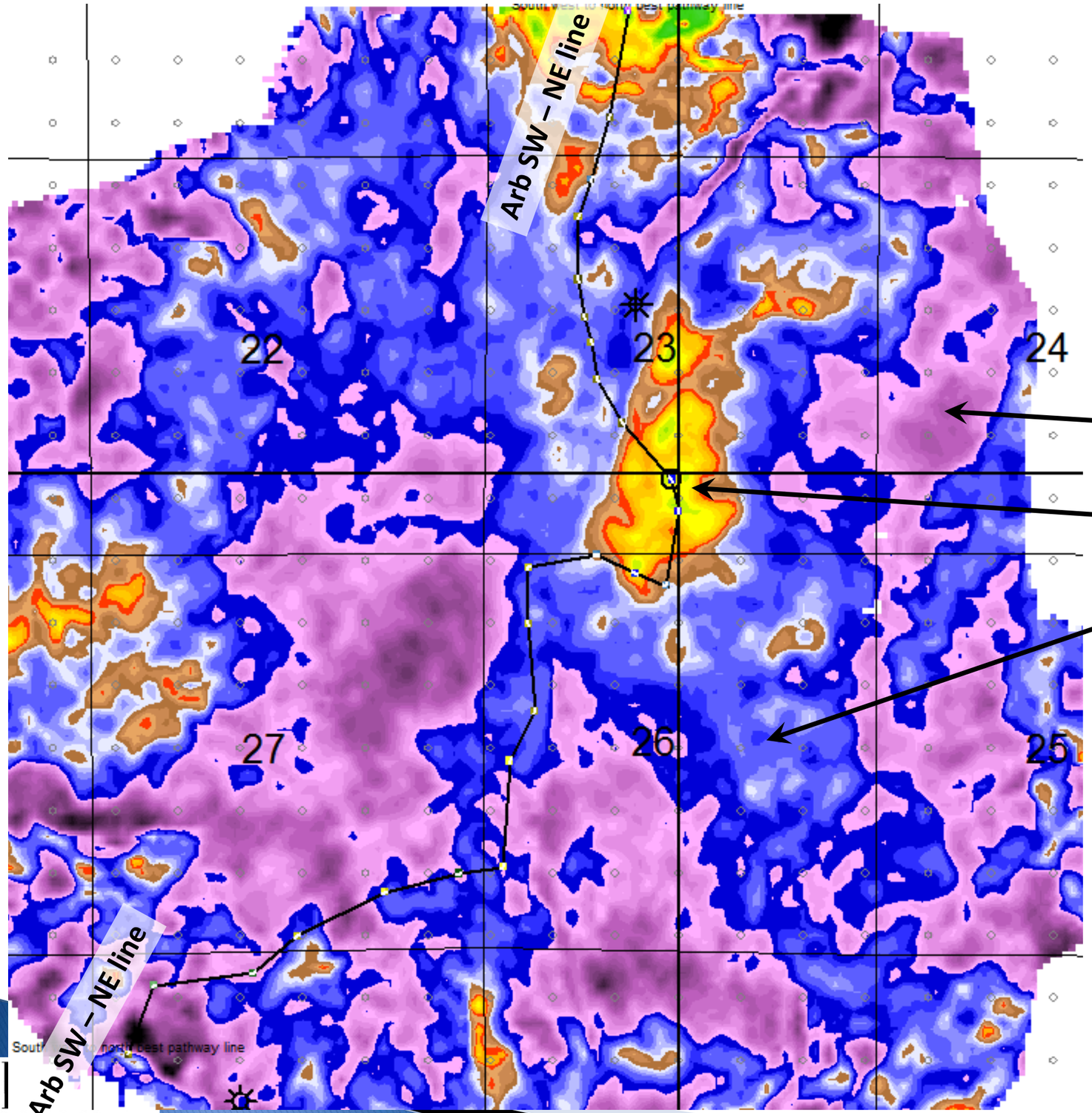
Seismic line, flattened showing some of the various Karst features – best porosity Yellow



Volume Average from 4ms to 11 ms below the Chester Datum



A Volume Average from 4ms to 11 ms below the Chester Datum shows the area of the major karst system and massive porosity as well as where and how it ties into the regional Devonian porosity.

Arbitrary Cross Section line SW to NE

massive Karst porosity Green – yellow – red to brown

Proposed Location

SW

NE

1125.0
53.0

1105.0
60.0

1097.0
74.0

1094.0
94.0

1089.0
110.0

1072.0
109.0

1076.0
129.0

1085.0
149.0

1085.0
169.0

Location Area 1

Flattened on Wdfd

Woodford

Devonian

Lower Devonian Porosity

Fussleman

The proposed well at the location indicated will tap into the massive porosity in the major karst system which connects well to both the upper, middle, and lower Devonian porosity as well as the Fusselman porosity

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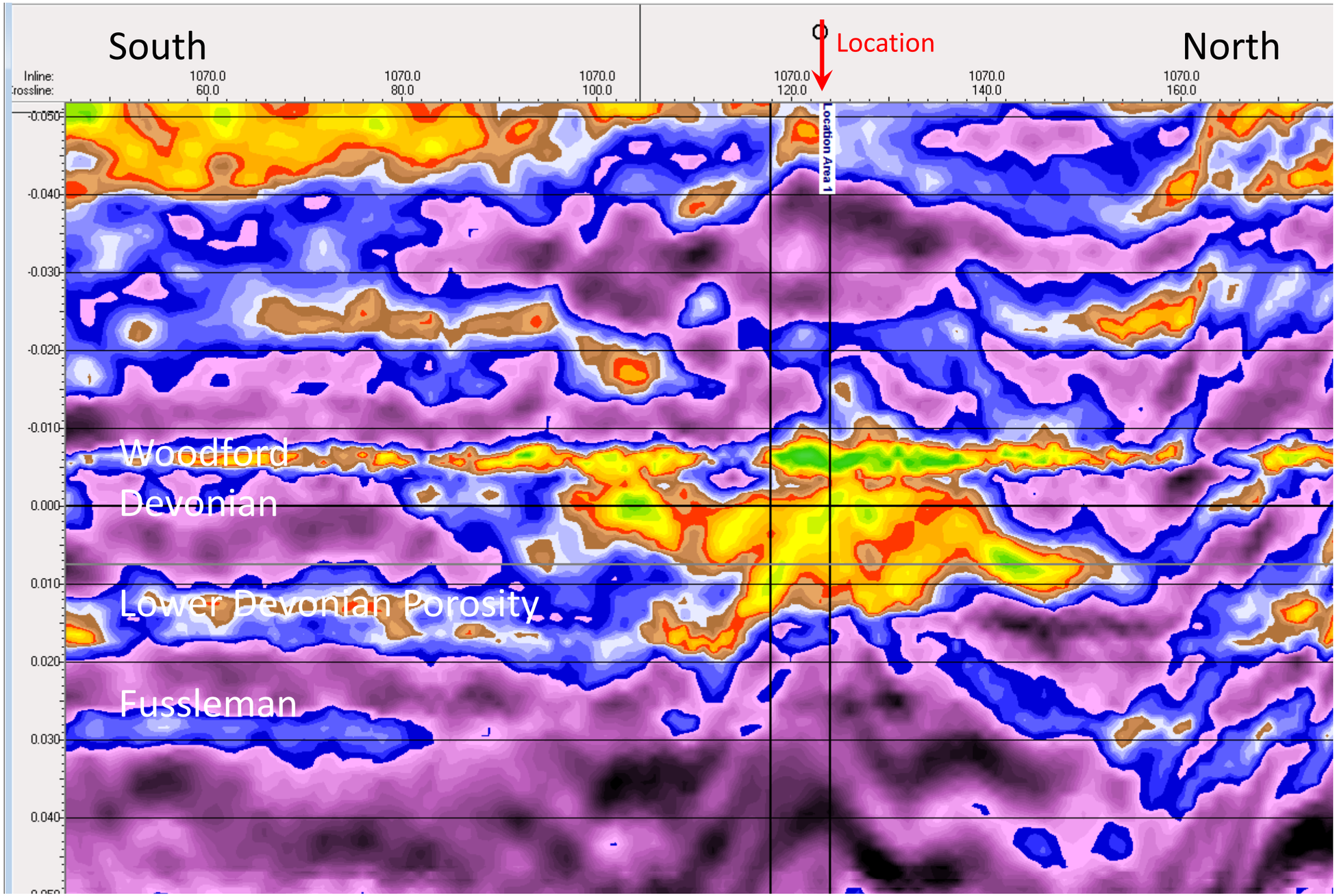
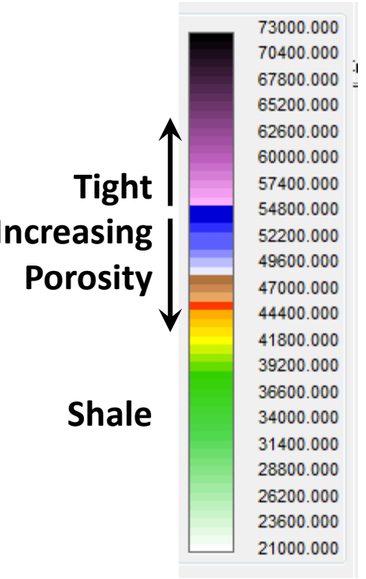
Line 1070 shows the massive porosity and its connection to upper and lower Devonian porosity



Flattened on Woodford



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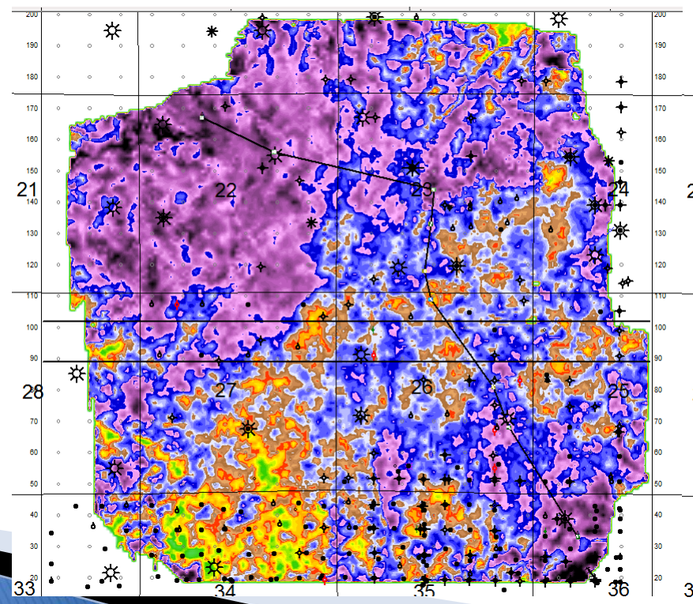
Eddy Area 1 porosity acreage					Net acreage				Gross acre feet
Horizon	**blue**	**brown**	**yellow**		**Yellow**	**Brown**	**Blue**	Isopach	
-3 +3	2658	243	66		66	177	2415	63	**167,454**
4-11	2716	395	182		182	213	2321	72	**195,552**
12-15	3146	1238	490		490	748	1908	36	**113,256**
16-20	3204	1368	567		567	801	1836	45	**144,180**
21-31	2516	395			0	395	2121	90	**226,440**
Total Acre Feet					1,305	2,334	10,601		**846,882**
Note that the Permian Basin is approximately 75000 square miles.									
It has been aruged that the Devonian is, at least somewhat, pressure connected across the basin.									
As of 1990 approximately 1 billion BBO has been produced from the Devonian reservoir. (Ruppel BEG)									

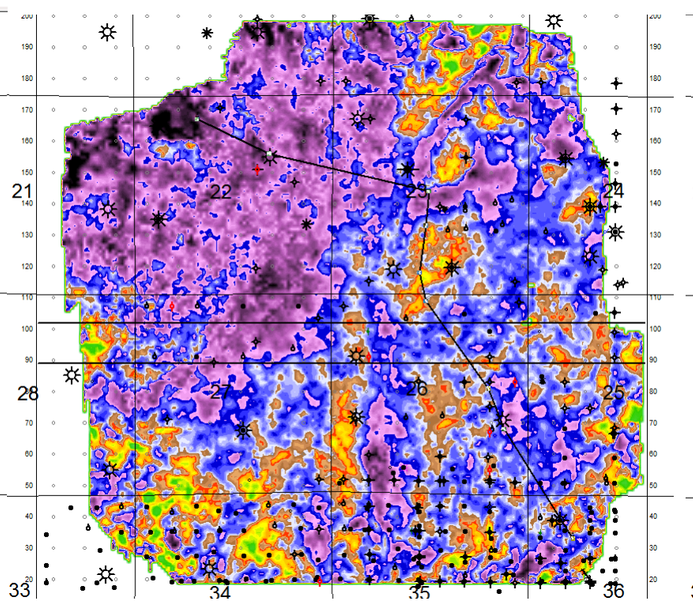
Perhaps more important is the connectivity in the best layers – Slices showing connectivity

Blue through Green is porous

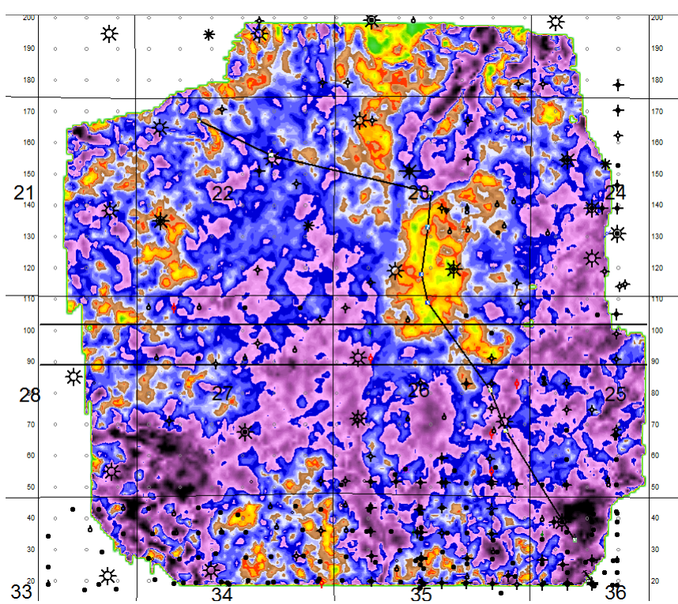
Slice datum +.017



Slice datum +.013



Slice datum +.002



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APPENDIX B-2

USGS EARTHQUAKE DATA

NEIC: Earthquake Search Results

U. S. GEOLOGICAL SURVEY

EARTHQUAKE DATA BASE

FILE CREATED: Mon Jun 4 16:13:25 2012
Circle Search Earthquakes= 225
Circle Center Point Latitude: 32.772N Longitude: 104.233W
Radius: 321.860 km
Catalog Used: PDE
Data Selection: Historical & Preliminary Data

CAT	YEAR	MO	DA	ORIG TIME	LAT	LONG	DEP	MAGNITUDE	IEM NFO TF	DTSVNWG	DIST km
PDE	1973	09	22	233835.80	34.47	-106.95	5	3.1 MLGS	...	.....	314
PDE	1974	11	28	033520.50	32.31	-104.14	5	3.7 MLGS	...	.....	51
PDE	1975	08	01	072757.30	31.42	-104.01	5	3.0 LgTUL	.F.	.....	150
PDE	1976	01	19	040330.50	31.90	-103.08	1	3.5 MDGS	.F.	.....	145
PDE	1976	01	22	072157	31.90	-103.07	1	2.8 MDGS	...	.....	145
PDE	1976	01	25	044827.90	31.90	-103.08	2	3.9 MDGS	5F.	.....	145
PDE	1977	01	04	183137.60	32.36	-106.92	5	3.2 MLGS	5F.	.....	256
PDE	1977	04	26	090307.30	31.90	-103.08	4	3.3 MLGS	.F.	.....	144
PDE	1977	11	28	014050.50	32.95	-100.84	5	3.5 MLGS	...	.....	318
PDE	1978	03	02	100452.70	31.56	-102.51	11	3.5 MLGS	.F.	.....	210
PDE	1979	07	05	010501	32.95	-100.89	4	2.7 UKTUL	.H.	.....	312
PDE	1980	03	22	004912.50	34.60	-105.92	5	3.4 MLGS	4F.	.....	255
PDE	1981	05	09	123550.80	33.99	-107.03	5	3.1 MLGS	5F.	.....	293
PDE	1982	01	04	165608.05	31.18	-102.49	5	3.9 LgTUL	3F.	.....	240
PDE	1982	03	16	110302.67	35.36	-103.27	5	3.1 LgTUL	3F.	.....	300
PDE	1982	04	26	083147.79	33.02	-100.84	5	2.8 LgGS	...	.....	318
PDE	1982	05	18	060008.50	34.17	-106.95	9	2.8 MLGS	.F.	.....	296
PDE	1982	05	18	060838.40	34.20	-106.90	6	2.8 MLGS	.F.	.....	293
PDE	1982	05	24	063251.70	34.17	-106.95	6	2.9 MLGS	.F.	.....	295
PDE	1982	09	20	035517.20	33.95	-107.06	11	3.5 LgTUL	4F.	.....	293
PDE	1982	10	07	124125.99	34.31	-106.82	4	2.4 MLGS	.F.	.....	294
PDE	1982	11	28	023648.51	33.00	-100.84	5	3.3 LgTUL	4F.	.....	318
PDE	1983	03	02	232219.40	34.30	-106.89	8	4.3 LgTUL	6D.	.....	299
PDE	1983	04	30	073420.18	33.32	-106.44	7	3.5 MLGS	...	.....	214
PDE	1983	09	15	232536.05	35.14	-104.39	5	3.2 LgTUL	5F.	.....	263
PDE	1983	09	29	074408.43	35.24	-104.30	5	2.7 MDGS	...	.....	274
PDE	1984	05	21	133113.54	35.07	-102.23	5	3.1 LgTUL	...	.....	314
PDE	1984	08	26	021954	34.31	-106.80	5	2.9 MLGS	.F.	.....	292
PDE	1984	12	04	203636.02	32.26	-103.56	5	2.9 MLGS	...	.....	84
PDE	1985	06	05	103600.60	32.56	-106.92	6	2.9 MLGLD	4F.	.....	252
PDE	1985	06	27	182000.03	33.62	-106.47	0	3.4 LgGS	...	....E..	229
PDE	1985	08	16	145652.96	34.13	-106.83	7	4.1 MLGS	6D.	.....	284

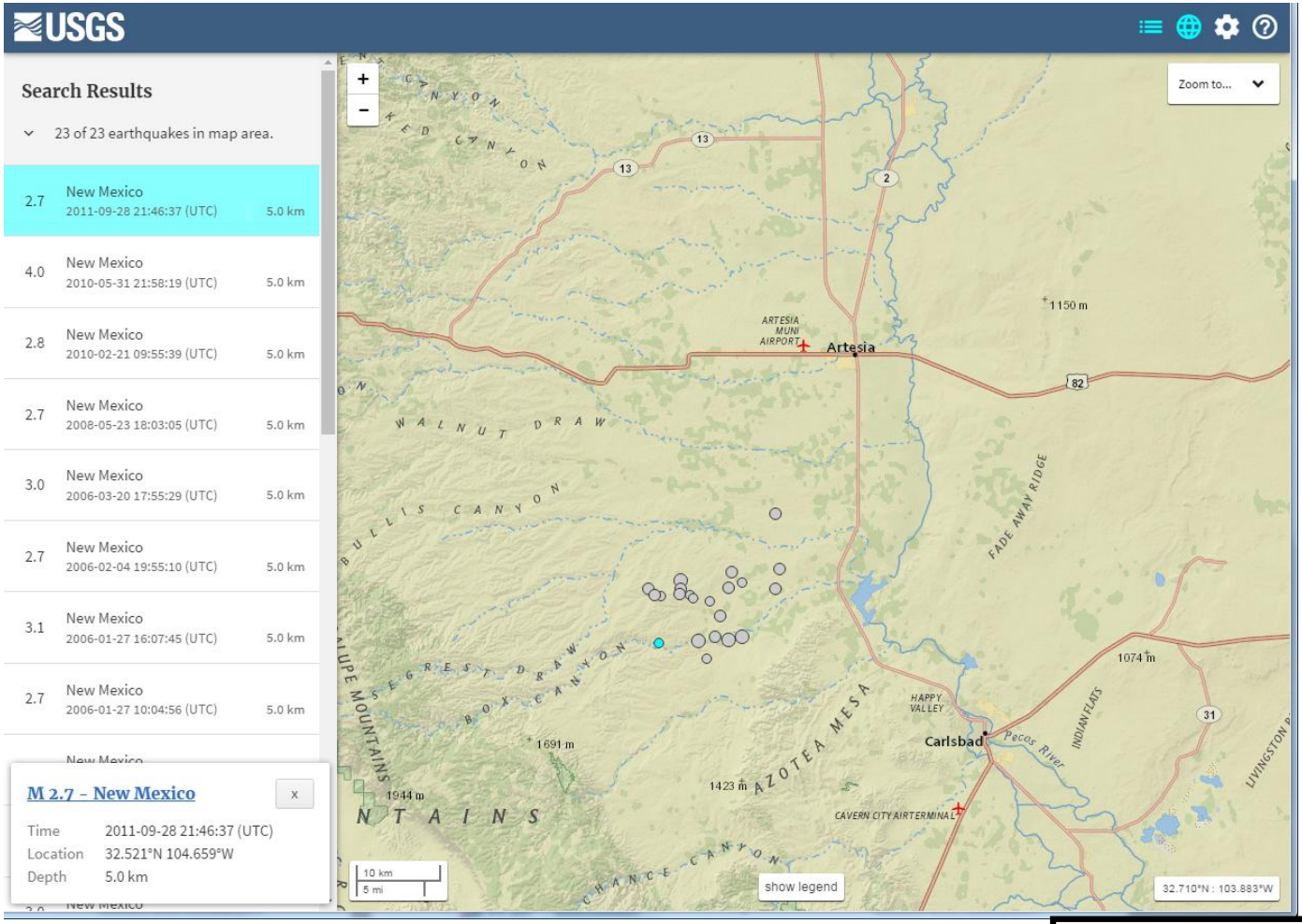
PDE	1985	09	06	052246.20	32.54	-106.94	5	2.6	MDGLD	.F. 255
PDE	1985	12	15	071452.23	35.28	-104.64	5	3.6	LgTUL	.F. 280
PDE	1986	04	17	210430.30	32.59	-106.91	5	2.7	MDGLD	.F. 251
PDE	1986	04	28	130016	34.01	-106.82	5	2.6	MDGLD	.F. 276
PDE	1986	08	27	180656.38	35.16	-105.09	5	3.2	MLGS	.F. 276
PDE	1987	05	14	155958.46	33.54	-106.52	0	2.9	MLGS	... .E.. 229
PDE	1988	12	25	075233.93	35.12	-105.96	0	2.8	MDSNM	.F. 304
PDE	1989	01	29	050715.33	35.22	-104.09	7	3.4	MDSNM	 271
PDE	1989	11	29	065438.50	34.46	-106.89	13	4.7	MDSNM	5F. 309
PDE	1990	01	29	131610.68	34.46	-106.88	12	4.8	LgTUL	6D. 308
PDE	1990	01	31	010819.29	34.44	-106.86	10	4.0	LgTUL	5F. 306
PDE	1990	02	21	120219.34	34.01	-106.54	5	3.6	MLGS	.F. 255
PDE	1990	02	27	132322	33.95	-106.59	5	3.9	MDSNM	4F. 255
PDE	1990	05	05	162622.89	34.45	-106.88	6	3.6	MDSNM	.F. 307
PDE	1990	07	21	192822.79	34.46	-106.86	11	3.0	MDSNM	 306
PDE	1990	07	21	203031.34	34.46	-106.86	7	3.1	MDSNM	 306
PDE	1990	07	21	234804.92	34.45	-106.85	7	3.2	MDSNM	 306
PDE	1990	07	22	212705.13	34.84	-106.01	10	3.7	MDSNM	 281
PDE	1990	07	31	073240.18	34.46	-106.86	7	3.3	MDSNM	.F. 307
PDE	1990	11	08	104653.77	34.45	-106.86	6	4.3	MDSNM	4F. 306
PDE	1990	11	08	110346.51	34.45	-106.86	8	3.1	MDSNM	.F. 306
PDE	1990	11	10	121816.85	34.45	-106.85	7	3.1	MDSNM	 305
PDE	1990	11	15	072524.38	34.46	-106.86	6	3.6	MDSNM	4F. 306
PDE	1990	12	05	033644.30	34.45	-106.86	8	2.6	MDSNM	 306
PDE	1991	03	05	201711.40	34.44	-106.87	9	2.9	MDSNM	3F. 306
PDE	1991	03	06	143659.07	34.44	-106.88	7	2.5	MDSNM	 307
PDE	1991	06	05	184414.90	34.45	-106.85	4	3.0	MDSNM	.F. 305
PDE	1991	06	20	1605	33.62	-106.47	0	3.5	MLGS	... .E.. 229
PDE	1991	12	09	124716.50	34.85	-106.55	14	3.1	LgTUL	3F. 314
PDE	1992	01	02	114535.61	32.33	-103.10	5	5.0	LgTUL	5F. 116
PDE	1992	02	23	161752.51	30.65	-105.51	5	3.4	LgTUL	 264
PDE	1992	08	24	012535.20	34.01	-106.86	5	2.6	MDSNM	.F. 280
PDE	1992	08	26	032452.67	32.17	-102.71	5	3.0	LgGS	 157
PDE	1993	03	24	023203.50	35.39	-104.19	5	3.0	LgGS	2F. 290
PDE	1993	06	10	1510	33.62	-106.47	0	3.2	MLGS	... .E.. 229
PDE	1993	06	23	032312.28	31.35	-102.51	5	2.8	MDSNM	 226
PDE	1993	12	22	192511.39	33.33	-105.68	10	3.2	MDSNM	 148
PDE	1994	01	01	025131.29	34.44	-106.98	10	2.5	MDSNM	 314
PDE	1995	03	19	183643.97	35.00	-104.21	5	3.3	LgGS	 246
PDE	1995	04	14	003256.17	30.28	-103.35	17	5.7	MwGS	6CM 287
PDE	1995	04	14	011148.40	30.30	-103.35	10	2.7	LgGS	 286
PDE	1995	04	14	021426	30.30	-103.35	10	2.8	LgGS	 286
PDE	1995	04	14	021938.50	30.30	-103.35	10	3.3	LgGS	.F. 286
PDE	1995	04	14	034842	30.30	-103.35	10	2.6	LgGS	.F. 286
PDE	1995	04	14	041116	30.30	-103.35	10	2.4	LgGS	.F. 286
PDE	1995	04	14	055339	30.30	-103.35	10	2.7	LgGS	 286
PDE	1995	04	14	073936.50	30.30	-103.35	10	2.4	LgGS	.F. 286
PDE	1995	04	14	082712.50	30.30	-103.35	10	2.8	LgGS	.F. 286
PDE	1995	04	14	100258	30.30	-103.35	10	2.9	LgGS	.F. 286
PDE	1995	04	14	105720.40	30.30	-103.35	10	2.3	LgGS	.F. 286
PDE	1995	04	15	031805	30.30	-103.35	10	2.4	LgGS	.F. 286
PDE	1995	04	15	143329.51	30.27	-103.32	10	4.0	LgGS	6D. 290
PDE	1995	04	16	004043.30	30.30	-103.35	10	2.3	LgGS	 286
PDE	1995	04	16	102625.50	30.30	-103.35	10	2.5	LgGS	 286
PDE	1995	04	16	161609.60	30.30	-103.35	10	2.4	LgGS	 286
PDE	1995	04	17	085000.50	30.30	-103.35	10	2.5	LgGS	 286
PDE	1995	04	21	044144	30.30	-103.35	10	2.9	LgGS	3F. 286
PDE	1995	06	01	010615.70	30.30	-103.35	10	3.5	LgGS	4F. 286
PDE	1995	07	06	024151	30.30	-103.35	10	2.7	LgGS	.F. 286
PDE	1995	07	06	024704	30.30	-103.35	10	2.6	LgGS	.F. 286

PDE	1995	08	28	151339.05	34.21	-106.94	3	2.8	LgGS	5F.	297
PDE	1995	11	12	174559.40	30.30	-103.35	10	3.6	LgGS	.F.	286
PDE	1996	03	15	131757.22	33.59	-105.69	10	2.9	LgGS	.F.	163
PDE	1996	03	24	201612.70	34.26	-105.68	10	3.5	LgGS	.F.	212
PDE	1996	03	24	201923.10	34.27	-105.69	10	3.7	LgGS	.F.	214
PDE	1996	07	22	100614.98	34.20	-105.71	10	3.5	LgGS	.F.	209
PDE	1997	05	20	094105.82	34.19	-105.74	10	3.2	LgGS	.F.	210
PDE	1997	12	31	132830.05	34.53	-106.15	5	3.5	MLGS	.F.	264
PDE	1997	12	31	133206.60	34.55	-106.15	5	3.5	MLGS	... .	265
PDE	1997	12	31	133358.90	34.55	-106.15	5	3.4	MLGS	... .	265
PDE	1998	01	04	080531.87	34.55	-106.19	5	4.0	MLGS	.F.	268
PDE	1998	04	15	103342.42	30.19	-103.30	10	3.6	LgGS	.F.	299
PDE	1998	07	14	053848.75	35.34	-103.47	5	3.0	MDSNM	.F.	293
PDE	1999	03	01	080023.50	32.57	-104.66	1	2.9	LgGS	... .	45
PDE	1999	03	14	224317.97	32.59	-104.63	1	4.0	MDSNM	.F.	42
PDE	1999	03	17	122923.11	32.58	-104.67	1	3.5	MDSNM	... .	46
PDE	1999	05	30	190425.60	32.58	-104.66	10	3.9	MDSNM	... .	45
PDE	1999	08	09	065122.97	32.57	-104.59	5	2.9	MDSNM	... .	40
PDE	2000	02	02	071420.26	32.58	-104.63	5	2.7	LgGS	... .	42
PDE	2000	02	26	030100.83	30.24	-103.61	5	2.8	LgGS	.F.	286
PDE	2001	06	02	015553.72	32.33	-103.14	5	3.3	LgGS	... .	113
PDE	2001	11	22	000708.02	31.79	-102.63	5	3.1	LgGS	... .	186
PDE	2002	09	17	154514.47	32.58	-104.63	10	3.5	LgGS	... .	42
PDE	2002	09	17	233419.35	32.58	-104.63	10	3.3	LgGS	... .	43
PDE	2003	06	21	020309.56	32.67	-104.50	5	3.6	LgGS	... .	28
PDE	2004	05	23	092205.28	32.53	-104.57	5	4.0	mbGS	3F.	41
PDE	2004	05	24	213628.56	34.47	-106.90	5	3.5	MLGS	.F.	310
PDE	2004	06	22	085528.23	32.53	-104.58	5	3.7	LgGS	.F.	42
PDE	2004	08	26	184518.62	32.58	-104.50	5	3.4	MLGS	... .	33
PDE	2004	10	28	025904.82	32.60	-104.50	5	3.0	LgGS	... .	31
PDE	2004	11	14	212749.90	33.25	-106.20	5	3.5	LgGS	... .	191
PDE	2005	10	30	025734.81	34.07	-106.98	5	2.4	MLGS	.F.	292
PDE	2005	12	19	202740.37	32.53	-104.55	5	4.1	MwSLM	3FM	40
PDE	2005	12	22	143011.67	32.58	-104.57	5	3.6	LgGS	.F.	37
PDE	2006	01	27	100456.45	32.59	-104.55	5	2.7	LgGS	... .	35
PDE	2006	01	27	160745.84	32.55	-104.58	5	3.1	LgGS	... .	40
PDE	2006	02	04	195510.68	32.58	-104.62	5	2.7	MLGS	... .	42
PDE	2006	03	04	171458.25	30.29	-103.67	5	2.7	LgGS	... .	280
PDE	2006	03	20	175529.12	32.60	-104.56	5	3.0	MLGS	... .	36
PDE	2006	04	08	180835.23	31.95	-101.42	5	2.9	MLGS	... .	279
PDE	2006	08	12	104909.67	32.90	-100.89	5	2.8	LgGS	.F.	312
PDE	2007	05	23	051655.15	34.07	-106.94	5	3.4	MLGS	3F.	289
PDE	2008	01	29	102453.24	32.90	-100.84	5	3.3	LgGS	.F.	317
PDE	2008	02	18	1415	32.27	-101.42	0	2.1	LgGS	.C. ....E..	269
PDE	2008	04	16	090604.36	33.66	-106.06	5	2.7	MLGS	... .	196
PDE	2008	05	23	180305.86	32.50	-104.60	5	2.7	LgGS	... .	45
PDE	2008	07	18	173109.40	32.89	-100.84	5	2.7	LgGS	... .	317
PDE	2008	12	28	205659.99	30.44	-103.36	5	2.6	MLGS	... .	271
PDE	2009	01	30	014121.66	32.50	-104.61	5	2.7	LgGS	... .	46
PDE	2009	06	05	171732.94	31.35	-105.98	0	2.4	MLEPT	.F.	227
PDE	2009	06	05	181023.63	31.35	-105.98	0	2.6	MLEPT	.F.	227
PDE	2009	08	20	015723.10	34.03	-106.87	5	2.7	MLGS	3F.	282
PDE	2009	08	30	003100.29	34.22	-106.89	5	2.5	MLGS	.F.	293
PDE	2009	08	30	063947.47	34.16	-106.86	5	2.6	MLGS	.F.	289
PDE	2009	08	30	070943.72	34.19	-106.88	5	2.1	MLGS	.F.	291
PDE	2009	11	17	185306.84	32.43	-104.64	5	3.0	LgGS	... .	54
PDE	2010	01	27	045933.05	32.90	-100.83	5	3.1	LgGS	.F.	318
PDE	2010	02	21	095539.77	32.57	-104.61	5	2.8	LgGS	... .	41
PDE	2010	03	28	000355.08	32.44	-104.50	4	4.1	MwRMT	3FM	44
PDE	2010	04	11	195632.67	32.41	-101.06	5	2.9	LgGS	... .	300

PDE	2010	04	12	002005.97	32.94	-100.88	5	2.8	LgGS	... .	314
PDE	2010	05	09	071807.37	34.04	-106.83	5	2.1	MLGS	.F.	279
PDE	2010	05	27	204721.87	31.11	-105.58	5	3.7	MLGS	... .	223
PDE	2010	05	31	215819.17	32.52	-104.61	5	4.0	MLGS	... .	44
PDE	2010	08	08	011238.07	32.90	-100.85	5	3.4	MwRMT	2FM	316
PDE	2010	08	25	020514.32	32.95	-100.86	5	2.8	LgGS	... .	315
PDE	2010	08	29	124836.61	32.91	-100.92	5	2.6	LgGS	... .	310
PDE-W	2010	10	09	074227.63	32.93	-100.89	5	3.1	LgGS	... .	313
PDE-W	2010	10	26	065629.79	32.92	-100.85	5	3.1	LgGS	... .	316
PDE-W	2010	11	01	091058.42	33.00	-100.82	5	2.8	LgGS	... .	320
PDE-W	2011	01	11	043415.77	34.39	-106.99	5	2.7	MLGS	... .	312
PDE-W	2011	02	17	182534.41	30.11	-103.30	5	3.3	LgGS	... .	307
PDE-W	2011	03	01	033012.76	32.88	-100.84	5	3.1	LgGS	2F.	317
PDE-W	2011	03	01	063159.89	32.84	-100.80	5	2.5	LgGS	... .	321
PDE-W	2011	03	12	152200.86	32.88	-100.90	5	3.0	LgGS	... .	312
PDE-W	2011	03	14	001948.80	32.96	-100.81	5	3.0	LgGS	... .	320
PDE-W	2011	03	28	091211.95	32.91	-100.82	5	3.0	LgGS	... .	320
PDE-W	2011	04	06	233835.45	34.40	-107.02	5	3.2	MLGS	... .	315
PDE-W	2011	04	25	165631.88	32.82	-100.84	5	2.5	LgGS	... .	317
PDE-W	2011	04	28	010341.97	30.74	-105.71	6	4.4	mbGS	.F.	264
PDE-W	2011	04	28	035625.61	30.74	-105.78	10	4.0	mbGS	... .	268
PDE-W	2011	04	28	045834.59	30.68	-105.75	9	3.6	MwRMT	.FM	272
PDE-W	2011	04	28	074903.45	30.82	-105.80	5	3.1	LgGS	... .	262
PDE-W	2011	04	28	075418.94	30.58	-105.85	5	2.7	LgGS	... .	286
PDE-W	2011	04	30	010716.82	30.76	-105.75	10	4.6	MDUNM	... .	265
PDE-W	2011	05	02	114328.24	30.73	-105.72	10	4.2	MwRMT	2FM	266
PDE-W	2011	05	02	115836.35	30.74	-105.70	10	3.3	MLGS	... .	264
PDE-W	2011	05	02	134032.64	30.69	-105.75	10	3.3	MLGS	... .	271
PDE-W	2011	05	02	135536.79	30.73	-105.67	5	4.4	mbGS	2F.	264
PDE-W	2011	05	03	025830.18	30.67	-105.73	10	3.8	MwRMT	.FM	273
PDE-W	2011	05	03	114203.84	30.49	-105.68	10	2.8	MLGS	... .	287
PDE-W	2011	05	04	162627.03	30.71	-105.79	10	3.7	MwRMT	..M	271
PDE-W	2011	05	05	052010.02	30.79	-105.76	10	3.6	MLGS	... .	262
PDE-W	2011	05	06	002426.09	30.75	-105.73	10	2.8	MLGS	... .	264
PDE-W	2011	05	06	004559.26	30.81	-105.71	10	2.8	MLGS	... .	258
PDE-W	2011	05	07	045100.88	30.64	-105.73	10	4.1	MDUNM	2F.	275
PDE-W	2011	05	08	132449.65	30.75	-105.81	10	3.1	MLGS	... .	269
PDE-W	2011	05	08	134616.49	30.72	-105.76	10	3.2	MLGS	... .	269
PDE-W	2011	05	08	135758.52	30.71	-105.75	10	2.9	MLGS	... .	269
PDE-W	2011	05	08	190732.13	30.81	-105.31	10	3.0	MLGS	... .	239
PDE-W	2011	05	08	225459.93	30.74	-105.74	10	3.3	MLGS	... .	266
PDE-W	2011	05	09	064019.15	30.76	-105.69	10	3.9	MDUNM	.F.	261
PDE-W	2011	05	10	184118.44	30.72	-105.72	10	3.4	MLGS	... .	267
PDE-W	2011	05	13	124916.26	30.76	-105.45	10	2.6	MLGS	... .	250
PDE-W	2011	05	14	220751.11	30.82	-105.74	10	3.9	MDUNM	.F.	259
PDE-W	2011	05	17	200820	30.75	-105.74	10	4.2	MDUNM	... .	265
PDE-W	2011	05	19	103523.51	30.80	-105.69	10	3.4	MwRMT	..M	258
PDE-W	2011	05	19	115649.90	30.72	-105.59	10	2.9	MLGS	... .	260
PDE-W	2011	05	20	231419.06	30.20	-105.55	10	2.7	MLGS	... .	310
PDE-W	2011	05	25	100301.09	30.70	-105.63	10	2.8	MLGS	... .	264
PDE-W	2011	05	27	014128.20	30.80	-105.76	10	3.6	MLGS	... .	261
PDE-W	2011	05	27	014908.92	30.98	-105.78	10	3.0	MLGS	... .	246
PDE-W	2011	07	14	102913.60	32.93	-100.81	5	2.5	LgGS	... .	321
PDE-W	2011	09	11	183635.11	32.74	-100.84	5	2.5	LgGS	3F.	318
PDE-W	2011	09	11	203158.11	32.89	-100.85	5	2.8	LgGS	2F.	316
PDE-W	2011	09	12	003149.11	32.80	-100.88	5	2.7	LgGS	2F.	314
PDE-W	2011	09	12	022931.34	32.73	-100.85	5	2.5	LgGS	.H.	317
PDE-W	2011	09	12	091946.71	32.85	-100.85	5	2.6	LgGS	... .	316
PDE-W	2011	09	12	092612.90	32.76	-100.84	5	2.7	LgGS	2F.	317
PDE-W	2011	09	12	141834.05	32.82	-100.87	7	3.4	LgGS	3F.	314

PDE-W	2011	09	28	214637.55	32.52	-104.66	5	2.7 LgGS	... .	48
PDE-W	2011	11	24	064959.99	32.95	-100.81	5	2.8 LgGS	... .	320
PDE-W	2011	11	24	231549.01	32.94	-100.85	5	3.1 LgGS	... .	317
PDE-W	2011	12	09	184733.24	32.94	-100.86	5	3.5 LgGS	3F.	315
PDE-W	2011	12	17	144658.46	32.81	-100.85	5	3.2 LgGS	3F.	316
PDE-W	2011	12	29	061907.64	32.81	-100.91	5	2.5 LgGS	... .	311
PDE-W	2011	12	29	114808.28	32.88	-100.83	5	2.5 LgGS	.F.	318
PDE-W	2012	01	15	092901.68	31.23	-103.61	5	2.7 LgGS	2F.	181
PDE-W	2012	01	24	182102.61	30.32	-103.38	5	3.6 LgGS	4F.	283
PDE-W	2012	02	06	040024.75	32.09	-104.91	5	2.7 LgGS	... .	98
PDE-W	2012	03	06	031149.71	31.81	-106.31	5	2.5 MLGS	3F.	223
PDE-W	2012	03	18	105722.43	32.28	-103.89	5	3.1 LgGS	... .	63
PDE-Q	2012	04	05	091115.95	31.57	-106.09	5	2.9 MLGS	.F.	219

USGS National Earthquake Information Center



Blue highlight indicates most recent seismic event.

Source: USGS, 2017. *Earthquake Catalog.* https://earthquake.usgs.gov/earthquakes/search

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Appendix B-2

SEISMIC ACTIVITY NEAR ARTESIA

DATED: 1/16/2017	APPROVED BY:	JOB NO. 50904E
DRAWN BY: GEM	CHECKED BY:	SCALE: N/A

Appendix B-2
Seismic Activity
1999 - 2011

time	latitude	longitude	depth	mag	magType	nst	gap	rms	net	id	updated	place	type	magNst	status	locationSource	magSource
2011-09-28T21:46:37.550Z	32.521	-104.659	5	2.7	mblg	8	102.1	0.83	us	usp000j8pv	2014-11-07T01:45:57.965Z	New Mexico	earthquake		reviewed	us	us
2010-05-31T21:58:19.170Z	32.524	-104.607	5	4	ml	16	83.8	1.09	us	usp000hdec	2014-11-07T01:41:34.416Z	New Mexico	earthquake		reviewed	us	us
2010-02-21T09:55:39.770Z	32.571	-104.613	5	2.8	mblg	21	51.7	1.07	us	usp000h7hr	2014-11-07T01:40:44.022Z	New Mexico	earthquake		reviewed	us	us
2008-05-23T18:03:05.860Z	32.504	-104.596	5	2.7	mblg	11	90.5	0.98	us	usp000g7k8	2014-11-07T01:36:04.867Z	New Mexico	earthquake		reviewed	us	us
2006-03-20T17:55:29.120Z	32.6	-104.563	5	3	ml	7	98	0.75	us	usp000ecjj	2014-11-07T01:28:33.765Z	New Mexico	earthquake		reviewed	us	us
2006-02-04T19:55:10.680Z	32.575	-104.617	5	2.7	ml	9	148.1	1.13	us	usp000e9fv	2014-11-07T01:28:16.284Z	New Mexico	earthquake		reviewed	us	us
2006-01-27T16:07:45.840Z	32.551	-104.577	5	3.1	mblg	9	148.3	0.91	us	usp000e8yn	2014-11-07T01:28:10.026Z	New Mexico	earthquake		reviewed	us	us
2006-01-27T10:04:56.450Z	32.589	-104.549	5	2.7	mblg	8	127.9	1.44	us	usp000e8ya	2014-11-07T01:28:10.009Z	New Mexico	earthquake		reviewed	us	us
2005-12-22T14:30:11.670Z	32.583	-104.566	5	3.6	mblg	15	52	0.98	us	usp000e6mh	2014-11-07T01:27:55.770Z	New Mexico	earthquake		reviewed	us	us
2005-12-19T20:27:40.370Z	32.528	-104.549	5	4.1	mwr	45	54.4	0.85	us	usp000e6f9	2015-03-24T01:48:26.590Z	New Mexico	earthquake		reviewed	us	slm
2004-10-28T02:59:04.820Z	32.604	-104.499	5	3	mblg	11	140.2	0.52	us	usp000d77p	2014-11-07T01:23:49.973Z	New Mexico	earthquake		reviewed	us	us
2004-08-26T18:45:18.620Z	32.582	-104.505	5	3.4	ml	11	131.8	0.67	us	usp000d2x7	2014-11-07T01:23:16.071Z	New Mexico	earthquake		reviewed	us	us
2004-06-22T08:55:28.230Z	32.528	-104.584	5	3.7	mblg	12	82.5	0.65	us	usp000cygp	2014-11-07T01:22:40.419Z	New Mexico	earthquake		reviewed	us	us
2004-05-23T09:22:05.280Z	32.525	-104.566	5	4	mb	19	68.2	0.74	us	usp000cvz7	2015-03-24T01:59:38.918Z	New Mexico	earthquake	2	reviewed	us	us
2003-06-21T02:03:09.560Z	32.665	-104.505	5	3.6	mblg	15	130.9	0.94	us	usp000c0e4	2014-11-07T01:18:58.170Z	New Mexico	earthquake		reviewed	us	us
2002-09-17T23:34:19.350Z	32.576	-104.631	10	3.1	md	17			us	usp000bchy	2014-11-07T01:16:32.406Z	New Mexico	earthquake		reviewed	snm	snm
2002-09-17T15:45:14.470Z	32.581	-104.63	10	3.4	md	23			us	usp000bcgs	2014-11-07T01:16:32.321Z	New Mexico	earthquake		reviewed	snm	snm
2000-02-02T07:14:20.260Z	32.582	-104.629	5	2.7	mblg			0.88	us	usp0009myc	2014-11-07T01:09:25.504Z	New Mexico	earthquake		reviewed	us	us
1999-08-09T06:51:22.970Z	32.568	-104.591	5	2.9	md			0.64	us	usp0009ctq	2014-11-07T01:08:15.290Z	New Mexico	earthquake		reviewed	us	snm
1999-05-30T19:04:25.600Z	32.575	-104.664	10	3.9	md				us	usp000991w	2014-11-07T01:07:44.921Z	New Mexico	earthquake		reviewed	snm	snm
1999-03-17T12:29:23.110Z	32.582	-104.672	1	3.5	md				us	usp00094ny	2014-11-07T01:07:14.229Z	New Mexico	earthquake		reviewed	snm	snm
1999-03-14T22:43:17.970Z	32.591	-104.63	1	4	md				us	usp00094hc	2014-11-07T01:07:13.801Z	New Mexico	earthquake		reviewed	snm	snm
1999-03-01T08:00:23.500Z	32.573	-104.656	1	2.7	md				us	usp00093nw	2014-11-07T01:07:07.639Z	New Mexico	earthquake		reviewed	snm	snm

APPENDIX C

INJECTION FLUID ANALYTICAL DATA

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

February 15, 2016

Micki Schultz

Navajo Refining Company
P.O. Box 159
Artesia, NM 88211-0159
TEL: (575) 746-5281
FAX

RE: Quarterly WDW-1, 2, & 3 Inj Well OrderNo.: 1601864

Dear Micki Schultz:

Hall Environmental Analysis Laboratory received 2 sample(s) on 1/22/2016 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: Navajo Refining Company
Client Sample ID: WDW-1,2,&3 Effluent
Project: Quarterly WDW-1, 2, & 3 Inj Well
Collection Date: 1/21/2016 7:35:00 AM
Lab ID: 1601864-001
Matrix: AQUEOUS
Received Date: 1/22/2016 9:40:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
IGNITABILITY METHOD 1010						Analyst: **SUB**	
Ignitability	>200	0		°F	1	1/29/2016	R32136
SULFIDE, REACTIVE						Analyst: **SUB**	
Reactive Sulfide	ND	1.0		mg/L	1	1/29/2016	R32136
SPECIFIC GRAVITY						Analyst: **JRR**	
Specific Gravity	1.006	0			1	1/27/2016 3:13:00 PM	R31723
EPA METHOD 300.0: ANIONS						Analyst: **LGT**	
Fluoride	20	2.0	*	mg/L	20	1/23/2016 12:57:44 AM	R31638
Chloride	570	25		mg/L	50	1/26/2016 11:44:39 PM	R31714
Nitrogen, Nitrite (As N)	ND	0.50		mg/L	5	1/23/2016 12:45:19 AM	R31638
Bromide	2.1	2.0		mg/L	20	1/23/2016 12:57:44 AM	R31638
Nitrogen, Nitrate (As N)	ND	0.50		mg/L	5	1/23/2016 12:45:19 AM	R31638
Phosphorus, Orthophosphate (As P)	ND	2.5		mg/L	5	1/23/2016 12:45:19 AM	R31638
Sulfate	2000	25		mg/L	50	1/26/2016 11:44:39 PM	R31714
SM2510B: SPECIFIC CONDUCTANCE						Analyst: **JRR**	
Conductivity	5600	0.010		µmhos/cm	1	1/25/2016 8:12:02 PM	R31664
SM2320B: ALKALINITY						Analyst: **JRR**	
Bicarbonate (As CaCO3)	220.4	20.00		mg/L CaCO3	1	1/25/2016 8:12:02 PM	R31664
Carbonate (As CaCO3)	ND	2.000		mg/L CaCO3	1	1/25/2016 8:12:02 PM	R31664
Total Alkalinity (as CaCO3)	220.4	20.00		mg/L CaCO3	1	1/25/2016 8:12:02 PM	R31664
SM2540C MOD: TOTAL DISSOLVED SOLIDS						Analyst: **KS**	
Total Dissolved Solids	3780	40.0	*D	mg/L	1	1/28/2016 6:43:00 PM	23428
CORROSIVITY						Analyst: **SUB**	
pH	7.16			pH Units	1	1/28/2016	R32136
CYANIDE, REACTIVE						Analyst: **SUB**	
Cyanide, Reactive	ND	1.00		mg/L	1	2/4/2016	R32136
EPA METHOD 7470: MERCURY						Analyst: **pmf**	
Mercury	ND	0.00020		mg/L	1	1/25/2016 4:48:50 PM	23378
MERCURY, TCLP						Analyst: **pmf**	
Mercury	ND	0.020		mg/L	1	1/28/2016 11:50:30 AM	23438
EPA METHOD 6010B: TCLP METALS						Analyst: **MED**	
Arsenic	ND	5.0		mg/L	1	1/25/2016 11:17:08 AM	23359
Barium	ND	100		mg/L	1	1/25/2016 11:17:08 AM	23359
Cadmium	ND	1.0		mg/L	1	1/25/2016 11:17:08 AM	23359
Chromium	ND	5.0		mg/L	1	1/25/2016 11:17:08 AM	23359

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Hall Environmental Analysis Laboratory, Inc.

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Client Sample ID: WDW-1,2,&3 Effluent
Project: Quarterly WDW-1, 2, & 3 Inj Well
Collection Date: 1/21/2016 7:35:00 AM
Lab ID: 1601864-001
Matrix: AQUEOUS
Received Date: 1/22/2016 9:40:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 6010B: TCLP METALS						Analyst: **MED**	
Lead	ND	5.0		mg/L	1	1/25/2016 11:17:08 AM	23359
Selenium	ND	1.0		mg/L	1	1/25/2016 11:17:08 AM	23359
Silver	ND	5.0		mg/L	1	1/25/2016 11:17:08 AM	23359
EPA 6010B: TOTAL METALS						Analyst: **MED**	
Aluminum	1.0	0.020		mg/L	1	1/27/2016 10:18:42 AM	23359
Antimony	ND	0.050		mg/L	1	1/27/2016 10:18:42 AM	23359
Arsenic	ND	0.020		mg/L	1	1/27/2016 10:18:42 AM	23359
Barium	ND	0.020		mg/L	1	1/27/2016 10:18:42 AM	23359
Beryllium	ND	0.0030		mg/L	1	1/27/2016 10:18:42 AM	23359
Cadmium	ND	0.0020		mg/L	1	1/27/2016 10:18:42 AM	23359
Calcium	39	1.0		mg/L	1	1/27/2016 10:18:42 AM	23359
Chromium	ND	0.0060		mg/L	1	1/27/2016 10:18:42 AM	23359
Cobalt	ND	0.0060		mg/L	1	1/28/2016 10:29:14 AM	23359
Copper	0.012	0.0060		mg/L	1	1/27/2016 10:18:42 AM	23359
Iron	7.6	0.25		mg/L	5	1/27/2016 10:20:32 AM	23359
Lead	ND	0.0050		mg/L	1	1/27/2016 10:18:42 AM	23359
Magnesium	13	1.0		mg/L	1	1/27/2016 10:18:42 AM	23359
Manganese	0.15	0.0020		mg/L	1	1/27/2016 10:18:42 AM	23359
Nickel	0.042	0.010		mg/L	1	1/27/2016 10:18:42 AM	23359
Potassium	72	1.0		mg/L	1	1/27/2016 10:18:42 AM	23359
Selenium	0.53	0.050		mg/L	1	1/27/2016 10:18:42 AM	23359
Silver	ND	0.0050		mg/L	1	1/27/2016 10:18:42 AM	23359
Sodium	1200	50		mg/L	50	1/29/2016 11:10:54 AM	23359
Thallium	ND	0.050		mg/L	1	1/27/2016 10:18:42 AM	23359
Vanadium	ND	0.050		mg/L	1	1/27/2016 10:18:42 AM	23359
Zinc	0.035	0.020		mg/L	1	1/27/2016 10:18:42 AM	23359
EPA METHOD 8260B: VOLATILES						Analyst: **SUB**	
Acetonitrile	ND	12		µg/L	1	2/2/2016	R32136
Allyl chloride	ND	2.5		µg/L	1	2/2/2016	R32136
Chloroprene	ND	2.5		µg/L	1	2/2/2016	R32136
Cyclohexane	ND	2.5		µg/L	1	2/2/2016	R32136
Diethyl ether	ND	2.5		µg/L	1	2/2/2016	R32136
Diisopropyl ether	ND	2.5		µg/L	1	2/2/2016	R32136
Epichlorohydrin	ND	25		µg/L	1	2/2/2016	R32136
Ethyl acetate	ND	2.5		µg/L	1	2/2/2016	R32136
Ethyl methacrylate	ND	12		µg/L	1	2/2/2016	R32136
Ethyl tert-butyl ether	ND	2.5		µg/L	1	2/2/2016	R32136
Freon-113	ND	2.5		µg/L	1	2/2/2016	R32136

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EPA METHOD 8260B: VOLATILES						Analyst: **SUB**	
Isobutanol	ND	25		µg/L	1	2/2/2016	R32136
Isopropyl acetate	ND	2.5		µg/L	1	2/2/2016	R32136
Methacrylonitrile	ND	12		µg/L	1	2/2/2016	R32136
Methyl acetate	ND	2.5		µg/L	1	2/2/2016	R32136
Methyl ethyl ketone	ND	12		µg/L	1	2/2/2016	R32136
Methyl isobutyl ketone	ND	12		µg/L	1	2/2/2016	R32136
Methyl methacrylate	ND	12		µg/L	1	2/2/2016	R32136
Methylcyclohexane	ND	5.0		µg/L	1	2/2/2016	R32136
n-Amyl acetate	ND	2.5		µg/L	1	2/2/2016	R32136
n-Hexane	ND	2.5		µg/L	1	2/2/2016	R32136
Nitrobenzene	ND	25		µg/L	1	2/2/2016	R32136
Pentachloroethane	ND	25		µg/L	1	2/2/2016	R32136
p-isopropyltoluene	ND	2.5		µg/L	1	2/2/2016	R32136
Propionitrile	ND	12		µg/L	1	2/2/2016	R32136
Tetrahydrofuran	ND	2.5		µg/L	1	2/2/2016	R32136
Benzene	ND	2.5		µg/L	1	2/2/2016	R32136
Toluene	ND	2.5		µg/L	1	2/2/2016	R32136
Ethylbenzene	ND	2.5		µg/L	1	2/2/2016	R32136
Methyl tert-butyl ether (MTBE)	3.2	2.5		µg/L	1	2/2/2016	R32136
1,2,4-Trimethylbenzene	ND	2.5		µg/L	1	2/2/2016	R32136
1,3,5-Trimethylbenzene	ND	2.5		µg/L	1	2/2/2016	R32136
1,2-Dichloroethane (EDC)	ND	2.5		µg/L	1	2/2/2016	R32136
1,2-Dibromoethane (EDB)	ND	2.5		µg/L	1	2/2/2016	R32136
Naphthalene	ND	2.5		µg/L	1	2/2/2016	R32136
Acetone	100	12		µg/L	1	2/2/2016	R32136
Bromobenzene	ND	2.5		µg/L	1	2/2/2016	R32136
Bromodichloromethane	ND	2.5		µg/L	1	2/2/2016	R32136
Bromoform	ND	2.5		µg/L	1	2/2/2016	R32136
Bromomethane	ND	2.5		µg/L	1	2/2/2016	R32136
Carbon disulfide	ND	2.5		µg/L	1	2/2/2016	R32136
Carbon Tetrachloride	ND	2.5		µg/L	1	2/2/2016	R32136
Chlorobenzene	ND	2.5		µg/L	1	2/2/2016	R32136
Chloroethane	ND	2.5		µg/L	1	2/2/2016	R32136
Chloroform	ND	2.5		µg/L	1	2/2/2016	R32136
Chloromethane	ND	2.5		µg/L	1	2/2/2016	R32136
2-Chlorotoluene	ND	2.5		µg/L	1	2/2/2016	R32136
4-Chlorotoluene	ND	2.5		µg/L	1	2/2/2016	R32136
cis-1,2-DCE	ND	2.5		µg/L	1	2/2/2016	R32136
cis-1,3-Dichloropropene	ND	2.5		µg/L	1	2/2/2016	R32136

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EPA METHOD 8260B: VOLATILES						Analyst: **SUB**	
1,2-Dibromo-3-chloropropane	ND	2.5		µg/L	1	2/2/2016	R32136
Dibromochloromethane	ND	2.5		µg/L	1	2/2/2016	R32136
Dibromomethane	ND	2.5		µg/L	1	2/2/2016	R32136
1,2-Dichlorobenzene	ND	2.5		µg/L	1	2/2/2016	R32136
1,3-Dichlorobenzene	ND	2.5		µg/L	1	2/2/2016	R32136
1,4-Dichlorobenzene	ND	2.5		µg/L	1	2/2/2016	R32136
Dichlorodifluoromethane	ND	2.5		µg/L	1	2/2/2016	R32136
1,1-Dichloroethane	ND	2.5		µg/L	1	2/2/2016	R32136
1,1-Dichloroethene	ND	2.5		µg/L	1	2/2/2016	R32136
1,2-Dichloropropane	ND	2.5		µg/L	1	2/2/2016	R32136
1,3-Dichloropropane	ND	2.5		µg/L	1	2/2/2016	R32136
2,2-Dichloropropane	ND	2.5		µg/L	1	2/2/2016	R32136
1,1-Dichloropropene	ND	2.5		µg/L	1	2/2/2016	R32136
Hexachlorobutadiene	ND	2.5		µg/L	1	2/2/2016	R32136
2-Hexanone	ND	2.5		µg/L	1	2/2/2016	R32136
Isopropylbenzene	ND	2.5		µg/L	1	2/2/2016	R32136
Methylene Chloride	ND	12		µg/L	1	2/2/2016	R32136
n-Butylbenzene	ND	2.5		µg/L	1	2/2/2016	R32136
n-Propylbenzene	ND	2.5		µg/L	1	2/2/2016	R32136
sec-Butylbenzene	ND	2.5		µg/L	1	2/2/2016	R32136
Styrene	ND	2.5		µg/L	1	2/2/2016	R32136
tert-Butylbenzene	ND	2.5		µg/L	1	2/2/2016	R32136
1,1,1,2-Tetrachloroethane	ND	2.5		µg/L	1	2/2/2016	R32136
1,1,2,2-Tetrachloroethane	ND	2.5		µg/L	1	2/2/2016	R32136
Tetrachloroethene (PCE)	ND	2.5		µg/L	1	2/2/2016	R32136
trans-1,2-DCE	ND	2.5		µg/L	1	2/2/2016	R32136
trans-1,3-Dichloropropene	ND	2.5		µg/L	1	2/2/2016	R32136
1,2,3-Trichlorobenzene	ND	2.5		µg/L	1	2/2/2016	R32136
1,2,4-Trichlorobenzene	ND	2.5		µg/L	1	2/2/2016	R32136
1,1,1-Trichloroethane	ND	2.5		µg/L	1	2/2/2016	R32136
1,1,2-Trichloroethane	ND	2.5		µg/L	1	2/2/2016	R32136
Trichloroethene (TCE)	ND	2.5		µg/L	1	2/2/2016	R32136
Trichlorofluoromethane	ND	2.5		µg/L	1	2/2/2016	R32136
1,2,3-Trichloropropane	ND	2.5		µg/L	1	2/2/2016	R32136
Vinyl chloride	ND	2.5		µg/L	1	2/2/2016	R32136
mp-Xylenes	ND	5.0		µg/L	1	2/2/2016	R32136
o-Xylene	ND	2.5		µg/L	1	2/2/2016	R32136
tert-Amyl methyl ether	ND	2.5		µg/L	1	2/2/2016	R32136
tert-Butyl alcohol	ND	25		µg/L	1	2/2/2016	R32136

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EPA METHOD 8260B: VOLATILES						Analyst: **SUB**	
Acrolein	ND	12		µg/L	1	2/2/2016	R32136
Acrylonitrile	ND	2.5		µg/L	1	2/2/2016	R32136
Bromochloromethane	ND	2.5		µg/L	1	2/2/2016	R32136
2-Chloroethyl vinyl ether	ND	2.5		µg/L	1	2/2/2016	R32136
Iodomethane	ND	2.5		µg/L	1	2/2/2016	R32136
trans-1,4-Dichloro-2-butene	ND	2.5		µg/L	1	2/2/2016	R32136
Vinyl acetate	ND	2.5		µg/L	1	2/2/2016	R32136
1,4-Dioxane	ND	100		µg/L	1	2/2/2016	R32136
Surr: 1,2-Dichlorobenzene-d4	89.2	70-130		%Rec	1	2/2/2016	R32136
Surr: 4-Bromofluorobenzene	94.0	70-130		%Rec	1	2/2/2016	R32136
Surr: Toluene-d8	99.6	70-130		%Rec	1	2/2/2016	R32136
EPA 8270D: SEMIVOLATILES						Analyst: **SUB**	
1,1-Biphenyl	ND	5.0		µg/L	1	2/2/2016	R32136
1,4-Dioxane	ND	5.0		µg/L	1	2/2/2016	R32136
Atrazine	ND	5.0		µg/L	1	2/2/2016	R32136
Benzaldehyde	ND	5.0		µg/L	1	2/2/2016	R32136
Caprolactam	ND	5.0		µg/L	1	2/2/2016	R32136
N-Nitroso-di-n-butylamine	ND	5.0		µg/L	1	2/2/2016	R32136
Acetophenone	ND	5.0		µg/L	1	2/2/2016	R32136
1-Methylnaphthalene	ND	5.0		µg/L	1	2/2/2016	R32136
2,3,4,6-Tetrachlorophenol	ND	5.0		µg/L	1	2/2/2016	R32136
2,4,5-Trichlorophenol	ND	5.0		µg/L	1	2/2/2016	R32136
2,4,6-Trichlorophenol	ND	5.0		µg/L	1	2/2/2016	R32136
2,4-Dichlorophenol	ND	5.0		µg/L	1	2/2/2016	R32136
2,4-Dimethylphenol	ND	5.0		µg/L	1	2/2/2016	R32136
2,4-Dinitrophenol	ND	5.0		µg/L	1	2/2/2016	R32136
2,4-Dinitrotoluene	ND	5.0		µg/L	1	2/2/2016	R32136
2,6-Dinitrotoluene	ND	5.0		µg/L	1	2/2/2016	R32136
2-Chloronaphthalene	ND	5.0		µg/L	1	2/2/2016	R32136
2-Chlorophenol	ND	5.0		µg/L	1	2/2/2016	R32136
2-Methylnaphthalene	ND	5.0		µg/L	1	2/2/2016	R32136
2-Methylphenol	ND	5.0		µg/L	1	2/2/2016	R32136
2-Nitroaniline	ND	5.0		µg/L	1	2/2/2016	R32136
2-Nitrophenol	ND	5.0		µg/L	1	2/2/2016	R32136
3,3´-Dichlorobenzidine	ND	5.0		µg/L	1	2/2/2016	R32136
3-Nitroaniline	ND	5.0		µg/L	1	2/2/2016	R32136
4,6-Dinitro-2-methylphenol	ND	5.0		µg/L	1	2/2/2016	R32136
4-Bromophenyl phenyl ether	ND	5.0		µg/L	1	2/2/2016	R32136
4-Chloro-3-methylphenol	ND	5.0		µg/L	1	2/2/2016	R32136

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EPA 8270D: SEMIVOLATILES						Analyst: **SUB**	
4-Chloroaniline	ND	5.0		µg/L	1	2/2/2016	R32136
4-Chlorophenyl phenyl ether	ND	5.0		µg/L	1	2/2/2016	R32136
4-Nitroaniline	ND	5.0		µg/L	1	2/2/2016	R32136
4-Nitrophenol	ND	5.0		µg/L	1	2/2/2016	R32136
Acenaphthene	ND	5.0		µg/L	1	2/2/2016	R32136
Acenaphthylene	ND	5.0		µg/L	1	2/2/2016	R32136
Anthracene	ND	5.0		µg/L	1	2/2/2016	R32136
Benzo(g,h,i)perylene	ND	5.0		µg/L	1	2/2/2016	R32136
Benz(a)anthracene	ND	0.50		µg/L	1	2/2/2016	R32136
Benzo(a)pyrene	ND	0.50		µg/L	1	2/2/2016	R32136
Benzo(b)fluoranthene	ND	0.50		µg/L	1	2/2/2016	R32136
Benzo(k)fluoranthene	ND	0.50		µg/L	1	2/2/2016	R32136
Bis(2-chloroethoxy)methane	ND	5.0		µg/L	1	2/2/2016	R32136
Bis(2-chloroethyl)ether	ND	5.0		µg/L	1	2/2/2016	R32136
Bis(2-chloroisopropyl)ether	ND	5.0		µg/L	1	2/2/2016	R32136
Bis(2-ethylhexyl)phthalate	ND	5.0		µg/L	1	2/2/2016	R32136
Butyl benzyl phthalate	ND	5.0		µg/L	1	2/2/2016	R32136
Carbazole	ND	5.0		µg/L	1	2/2/2016	R32136
Chrysene	ND	0.50		µg/L	1	2/2/2016	R32136
Dibenz(a,h)anthracene	ND	0.50		µg/L	1	2/2/2016	R32136
Dibenzofuran	ND	5.0		µg/L	1	2/2/2016	R32136
Diethyl phthalate	ND	5.0		µg/L	1	2/2/2016	R32136
Dimethyl phthalate	ND	5.0		µg/L	1	2/2/2016	R32136
Di-n-butyl phthalate	ND	5.0		µg/L	1	2/2/2016	R32136
Di-n-octyl phthalate	ND	5.0		µg/L	1	2/2/2016	R32136
Fluoranthene	ND	5.0		µg/L	1	2/2/2016	R32136
Fluorene	ND	5.0		µg/L	1	2/2/2016	R32136
Hexachlorobenzene	ND	5.0		µg/L	1	2/2/2016	R32136
Hexachlorobutadiene	ND	5.0		µg/L	1	2/2/2016	R32136
Hexachlorocyclopentadiene	ND	5.0		µg/L	1	2/2/2016	R32136
Hexachloroethane	ND	5.0		µg/L	1	2/2/2016	R32136
Indeno(1,2,3-cd)pyrene	ND	0.50		µg/L	1	2/2/2016	R32136
Isophorone	ND	5.0		µg/L	1	2/2/2016	R32136
Naphthalene	ND	5.0		µg/L	1	2/2/2016	R32136
Nitrobenzene	ND	5.0		µg/L	1	2/2/2016	R32136
N-Nitrosodi-n-propylamine	ND	5.0		µg/L	1	2/2/2016	R32136
N-Nitrosodiphenylamine	ND	5.0		µg/L	1	2/2/2016	R32136
Pentachlorophenol	ND	5.0		µg/L	1	2/2/2016	R32136
Phenanthrene	ND	5.0		µg/L	1	2/2/2016	R32136

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

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	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company
Client Sample ID: WDW-1,2,&3 Effluent
Project: Quarterly WDW-1, 2, & 3 Inj Well
Collection Date: 1/21/2016 7:35:00 AM
Lab ID: 1601864-001
Matrix: AQUEOUS
Received Date: 1/22/2016 9:40:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA 8270D: SEMIVOLATILES						Analyst: **SUB**	
Phenol	ND	5.0		µg/L	1	2/2/2016	R32136
Pyrene	ND	5.0		µg/L	1	2/2/2016	R32136
o-Toluidine	ND	5.0		µg/L	1	2/2/2016	R32136
Pyridine	ND	5.0		µg/L	1	2/2/2016	R32136
1,2,4,5-Tetrachlorobenzene	ND	5.0		µg/L	1	2/2/2016	R32136
Surr: 2,4,6-Tribromophenol	94.2	10-123		%Rec	1	2/2/2016	R32136
Surr: 2-Fluorobiphenyl	80.4	19-130		%Rec	1	2/2/2016	R32136
Surr: 2-Fluorophenol	82.8	21-120		%Rec	1	2/2/2016	R32136
Surr: Nitrobenzene-d5	89.6	25-130		%Rec	1	2/2/2016	R32136
Surr: Phenol-d5	86.0	10-130		%Rec	1	2/2/2016	R32136
Surr: Terphenyl-d14	32.8	20-137		%Rec	1	2/2/2016	R32136

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

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	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company
Client Sample ID: TRIP BLANK
Project: Quarterly WDW-1, 2, & 3 Inj Well
Collection Date:
Lab ID: 1601864-002
Matrix: TRIP BLANK
Received Date: 1/22/2016 9:40:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **SUB**	
Acetonitrile	ND	2.5		µg/L	1	2/2/2016	R32136
Allyl chloride	ND	0.50		µg/L	1	2/2/2016	R32136
Chloroprene	ND	0.50		µg/L	1	2/2/2016	R32136
Cyclohexane	ND	0.50		µg/L	1	2/2/2016	R32136
Diethyl ether	ND	0.50		µg/L	1	2/2/2016	R32136
Diisopropyl ether	ND	0.50		µg/L	1	2/2/2016	R32136
Epichlorohydrin	ND	5.0		µg/L	1	2/2/2016	R32136
Ethyl acetate	ND	0.50		µg/L	1	2/2/2016	R32136
Ethyl methacrylate	ND	2.5		µg/L	1	2/2/2016	R32136
Ethyl tert-butyl ether	ND	0.50		µg/L	1	2/2/2016	R32136
Freon-113	ND	0.50		µg/L	1	2/2/2016	R32136
Isobutanol	ND	5.0		µg/L	1	2/2/2016	R32136
Isopropyl acetate	ND	0.50		µg/L	1	2/2/2016	R32136
Methacrylonitrile	ND	2.5		µg/L	1	2/2/2016	R32136
Methyl acetate	ND	0.50		µg/L	1	2/2/2016	R32136
Methyl ethyl ketone	ND	2.5		µg/L	1	2/2/2016	R32136
Methyl isobutyl ketone	ND	2.5		µg/L	1	2/2/2016	R32136
Methyl methacrylate	ND	2.5		µg/L	1	2/2/2016	R32136
Methylcyclohexane	ND	1.0		µg/L	1	2/2/2016	R32136
n-Amyl acetate	ND	0.50		µg/L	1	2/2/2016	R32136
n-Hexane	ND	0.50		µg/L	1	2/2/2016	R32136
Nitrobenzene	ND	5.0		µg/L	1	2/2/2016	R32136
Pentachloroethane	ND	5.0		µg/L	1	2/2/2016	R32136
p-isopropyltoluene	ND	0.50		µg/L	1	2/2/2016	R32136
Propionitrile	ND	2.5		µg/L	1	2/2/2016	R32136
Tetrahydrofuran	ND	0.50		µg/L	1	2/2/2016	R32136
Benzene	ND	0.50		µg/L	1	2/2/2016	R32136
Toluene	ND	0.50		µg/L	1	2/2/2016	R32136
Ethylbenzene	ND	0.50		µg/L	1	2/2/2016	R32136
Methyl tert-butyl ether (MTBE)	ND	10		µg/L	1	2/2/2016	R32136
1,2,4-Trimethylbenzene	ND	0.50		µg/L	1	2/2/2016	R32136
1,3,5-Trimethylbenzene	ND	0.50		µg/L	1	2/2/2016	R32136
1,2-Dichloroethane (EDC)	ND	0.50		µg/L	1	2/2/2016	R32136
1,2-Dibromoethane (EDB)	ND	0.50		µg/L	1	2/2/2016	R32136
Naphthalene	ND	0.50		µg/L	1	2/2/2016	R32136
Acetone	ND	2.5		µg/L	1	2/2/2016	R32136
Bromobenzene	ND	0.50		µg/L	1	2/2/2016	R32136
Bromodichloromethane	ND	0.50		µg/L	1	2/2/2016	R32136
Bromoform	ND	0.50		µg/L	1	2/2/2016	R32136

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

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	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company
Client Sample ID: TRIP BLANK
Project: Quarterly WDW-1, 2, & 3 Inj Well
Collection Date:
Lab ID: 1601864-002
Matrix: TRIP BLANK
Received Date: 1/22/2016 9:40:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **SUB**	
Bromomethane	ND	0.50		µg/L	1	2/2/2016	R32136
Carbon disulfide	ND	0.50		µg/L	1	2/2/2016	R32136
Carbon Tetrachloride	ND	0.50		µg/L	1	2/2/2016	R32136
Chlorobenzene	ND	0.50		µg/L	1	2/2/2016	R32136
Chloroethane	ND	0.50		µg/L	1	2/2/2016	R32136
Chloroform	ND	0.50		µg/L	1	2/2/2016	R32136
Chloromethane	ND	0.50		µg/L	1	2/2/2016	R32136
2-Chlorotoluene	ND	0.50		µg/L	1	2/2/2016	R32136
4-Chlorotoluene	ND	0.50		µg/L	1	2/2/2016	R32136
cis-1,2-DCE	ND	0.50		µg/L	1	2/2/2016	R32136
cis-1,3-Dichloropropene	ND	0.50		µg/L	1	2/2/2016	R32136
1,2-Dibromo-3-chloropropane	ND	0.50		µg/L	1	2/2/2016	R32136
Dibromochloromethane	ND	0.50		µg/L	1	2/2/2016	R32136
Dibromomethane	ND	0.50		µg/L	1	2/2/2016	R32136
1,2-Dichlorobenzene	ND	0.50		µg/L	1	2/2/2016	R32136
1,3-Dichlorobenzene	ND	0.50		µg/L	1	2/2/2016	R32136
1,4-Dichlorobenzene	ND	0.50		µg/L	1	2/2/2016	R32136
Dichlorodifluoromethane	ND	0.50		µg/L	1	2/2/2016	R32136
1,1-Dichloroethane	ND	0.50		µg/L	1	2/2/2016	R32136
1,1-Dichloroethene	ND	0.50		µg/L	1	2/2/2016	R32136
1,2-Dichloropropane	ND	0.50		µg/L	1	2/2/2016	R32136
1,3-Dichloropropane	ND	0.50		µg/L	1	2/2/2016	R32136
2,2-Dichloropropane	ND	0.50		µg/L	1	2/2/2016	R32136
1,1-Dichloropropene	ND	0.50		µg/L	1	2/2/2016	R32136
Hexachlorobutadiene	ND	0.50		µg/L	1	2/2/2016	R32136
2-Hexanone	ND	0.50		µg/L	1	2/2/2016	R32136
Isopropylbenzene	ND	0.50		µg/L	1	2/2/2016	R32136
Methylene Chloride	ND	2.5		µg/L	1	2/2/2016	R32136
n-Butylbenzene	ND	0.50		µg/L	1	2/2/2016	R32136
n-Propylbenzene	ND	0.50		µg/L	1	2/2/2016	R32136
sec-Butylbenzene	ND	0.50		µg/L	1	2/2/2016	R32136
Styrene	ND	0.50		µg/L	1	2/2/2016	R32136
tert-Butylbenzene	ND	0.50		µg/L	1	2/2/2016	R32136
1,1,1,2-Tetrachloroethane	ND	0.50		µg/L	1	2/2/2016	R32136
1,1,2,2-Tetrachloroethane	ND	0.50		µg/L	1	2/2/2016	R32136
Tetrachloroethene (PCE)	ND	0.50		µg/L	1	2/2/2016	R32136
trans-1,2-DCE	ND	0.50		µg/L	1	2/2/2016	R32136
trans-1,3-Dichloropropene	ND	0.50		µg/L	1	2/2/2016	R32136
1,2,3-Trichlorobenzene	ND	0.50		µg/L	1	2/2/2016	R32136

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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	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company
Client Sample ID: TRIP BLANK
Project: Quarterly WDW-1, 2, & 3 Inj Well
Collection Date:
Lab ID: 1601864-002
Matrix: TRIP BLANK
Received Date: 1/22/2016 9:40:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **SUB**	
1,2,4-Trichlorobenzene	ND	0.50		µg/L	1	2/2/2016	R32136
1,1,1-Trichloroethane	ND	0.50		µg/L	1	2/2/2016	R32136
1,1,2-Trichloroethane	ND	0.50		µg/L	1	2/2/2016	R32136
Trichloroethene (TCE)	ND	0.50		µg/L	1	2/2/2016	R32136
Trichlorofluoromethane	ND	0.50		µg/L	1	2/2/2016	R32136
1,2,3-Trichloropropane	ND	0.50		µg/L	1	2/2/2016	R32136
Vinyl chloride	ND	0.50		µg/L	1	2/2/2016	R32136
mp-Xylenes	ND	1.0		µg/L	1	2/2/2016	R32136
o-Xylene	ND	0.50		µg/L	1	2/2/2016	R32136
tert-Amyl methyl ether	ND	0.50		µg/L	1	2/2/2016	R32136
tert-Butyl alcohol	ND	5.0		µg/L	1	2/2/2016	R32136
Acrolein	ND	2.5		µg/L	1	2/2/2016	R32136
Acrylonitrile	ND	0.50		µg/L	1	2/2/2016	R32136
Bromochloromethane	ND	0.50		µg/L	1	2/2/2016	R32136
2-Chloroethyl vinyl ether	ND	0.50		µg/L	1	2/2/2016	R32136
Iodomethane	ND	0.50		µg/L	1	2/2/2016	R32136
trans-1,4-Dichloro-2-butene	ND	0.50		µg/L	1	2/2/2016	R32136
Vinyl acetate	ND	0.50		µg/L	1	2/2/2016	R32136
1,4-Dioxane	ND	20		µg/L	1	2/2/2016	R32136
Surr: 1,2-Dichlorobenzene-d4	89.2	70-130		%Rec	1	2/2/2016	R32136
Surr: 4-Bromofluorobenzene	93.2	70-130		%Rec	1	2/2/2016	R32136
Surr: Toluene-d8	99.6	70-130		%Rec	1	2/2/2016	R32136

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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
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QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1601864**

15-Feb-16

Client: Navajo Refining Company

Project: Quarterly WDW-1, 2, & 3 Inj Well

Sample ID **MB**	SampType: **MBLK**	TestCode: **EPA Method 300.0: Anions**
Client ID: **PBW**	Batch ID: **R31638**	RunNo: **31638**
Prep Date:	Analysis Date: **1/22/2016**	SeqNo: **968134** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	ND	0.10								
Nitrogen, Nitrite (As N)	ND	0.10								
Bromide	ND	0.10								
Nitrogen, Nitrate (As N)	ND	0.10								
Phosphorus, Orthophosphate (As P	ND	0.50								

Sample ID **LCS**	SampType: **LCS**	TestCode: **EPA Method 300.0: Anions**
Client ID: **LCSW**	Batch ID: **R31638**	RunNo: **31638**
Prep Date:	Analysis Date: **1/22/2016**	SeqNo: **968135** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	0.49	0.10	0.5000	0	98.4	90	110			
Nitrogen, Nitrite (As N)	0.94	0.10	1.000	0	94.1	90	110			
Bromide	2.5	0.10	2.500	0	98.2	90	110			
Nitrogen, Nitrate (As N)	2.5	0.10	2.500	0	99.2	90	110			
Phosphorus, Orthophosphate (As P	4.7	0.50	5.000	0	93.3	90	110			

Sample ID **MB**	SampType: **MBLK**	TestCode: **EPA Method 300.0: Anions**
Client ID: **PBW**	Batch ID: **R31714**	RunNo: **31714**
Prep Date:	Analysis Date: **1/26/2016**	SeqNo: **970466** 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: **R31714**	RunNo: **31714**
Prep Date:	Analysis Date: **1/26/2016**	SeqNo: **970467** 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	96.5	90	110			
Sulfate	9.8	0.50	10.00	0	98.3	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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1601864**
15-Feb-16

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, & 3 Inj Well

Sample ID **MB-R32136**	SampType: **MBLK**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **PBW**	Batch ID: **R32136**	RunNo: **32136**
Prep Date:	Analysis Date: **2/2/2016**	SeqNo: **982421** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Acetonitrile	ND	0.50								
Allyl chloride	ND	0.50								
Chloroprene	ND	0.50								
Cyclohexane	ND	0.50								
Diethyl ether	ND	0.50								
Diisopropyl ether	ND	0.50								
Epichlorohydrin	ND	0.50								
Ethyl acetate	ND	0.50								
Ethyl methacrylate	ND	2.5								
Ethyl tert-butyl ether	ND	0.50								
Freon-113	ND	0.50								
Isobutanol	ND	10								
Isopropyl acetate	ND	0.50								
Methacrylonitrile	ND	2.5								
Methyl acetate	ND	0.50								
Methyl ethyl ketone	ND	2.5								
Methyl isobutyl ketone	ND	2.5								
Methyl methacrylate	ND	2.5								
Methylcyclohexane	ND	0.50								
n-Amyl acetate	ND	0.50								
n-Hexane	ND	0.50								
Nitrobenzene	ND	0.50								
Pentachloroethane	ND	0.50								
p-isopropyltoluene	ND	0.50								
Propionitrile	ND	2.5								
Tetrahydrofuran	ND	0.50								
Benzene	ND	0.50								
Toluene	ND	0.50								
Ethylbenzene	ND	0.50								
Methyl tert-butyl ether (MTBE)	ND	0.50								
1,2,4-Trimethylbenzene	ND	0.50								
1,3,5-Trimethylbenzene	ND	0.50								
1,2-Dichloroethane (EDC)	ND	0.50								
1,2-Dibromoethane (EDB)	ND	0.50								
Naphthalene	ND	0.50								
Acetone	ND	2.5								
Bromobenzene	ND	0.50								
Bromodichloromethane	ND	0.50								
Bromoform	ND	0.50								

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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1601864**

15-Feb-16

Client: Navajo Refining Company

Project: Quarterly WDW-1, 2, & 3 Inj Well

Sample ID **MB-R32136**	SampType: **MBLK**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **PBW**	Batch ID: **R32136**	RunNo: **32136**
Prep Date:	Analysis Date: **2/2/2016**	SeqNo: **982421** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Bromomethane	ND	0.50								
Carbon disulfide	ND	0.50								
Carbon Tetrachloride	ND	0.50								
Chlorobenzene	ND	0.50								
Chloroethane	ND	0.50								
Chloroform	ND	0.50								
Chloromethane	ND	0.50								
2-Chlorotoluene	ND	0.50								
4-Chlorotoluene	ND	0.50								
cis-1,2-DCE	ND	0.50								
cis-1,3-Dichloropropene	ND	0.50								
1,2-Dibromo-3-chloropropane	ND	0.50								
Dibromochloromethane	ND	0.50								
Dibromomethane	ND	0.50								
1,2-Dichlorobenzene	ND	0.50								
1,3-Dichlorobenzene	ND	0.50								
1,4-Dichlorobenzene	ND	0.50								
Dichlorodifluoromethane	ND	0.50								
1,1-Dichloroethane	ND	0.50								
1,1-Dichloroethene	ND	0.50								
1,2-Dichloropropane	ND	0.50								
1,3-Dichloropropane	ND	0.50								
2,2-Dichloropropane	ND	0.50								
1,1-Dichloropropene	ND	0.50								
Hexachlorobutadiene	ND	0.50								
2-Hexanone	ND	0.50								
Isopropylbenzene	ND	0.50								
Methylene Chloride	ND	2.5								
n-Butylbenzene	ND	0.50								
n-Propylbenzene	ND	0.50								
sec-Butylbenzene	ND	0.50								
Styrene	ND	0.50								
tert-Butylbenzene	ND	0.50								
1,1,1,2-Tetrachloroethane	ND	0.50								
1,1,2,2-Tetrachloroethane	ND	0.50								
Tetrachloroethene (PCE)	ND	0.50								
trans-1,2-DCE	ND	0.50								
trans-1,3-Dichloropropene	ND	0.50								
1,2,3-Trichlorobenzene	ND	0.50								

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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1601864**

15-Feb-16

Client: Navajo Refining Company

Project: Quarterly WDW-1, 2, & 3 Inj Well

Sample ID **MB-R32136**	SampType: **MBLK**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **PBW**	Batch ID: **R32136**	RunNo: **32136**
Prep Date:	Analysis Date: **2/2/2016**	SeqNo: **982421** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
1,2,4-Trichlorobenzene	ND	0.50								
1,1,1-Trichloroethane	ND	0.50								
1,1,2-Trichloroethane	ND	0.50								
Trichloroethene (TCE)	ND	0.50								
Trichlorofluoromethane	ND	0.50								
1,2,3-Trichloropropane	ND	0.50								
Vinyl chloride	ND	0.50								
mp-Xylenes	ND	1.0								
o-Xylene	ND	0.50								
tert-Amyl methyl ether	ND	0.50								
tert-Butyl alcohol	ND	0.50								
Acrolein	ND	2.5								
Acrylonitrile	ND	2.5								
Bromochloromethane	ND	0.50								
2-Chloroethyl vinyl ether	ND	0.50								
Iodomethane	ND	0.50								
trans-1,4-Dichloro-2-butene	ND	0.50								
Vinyl acetate	ND	0.50								
1,4-Dioxane	ND	0.50								

Sample ID **LCS-R32136**	SampType: **LCS**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **LCSW**	Batch ID: **R32136**	RunNo: **32136**
Prep Date:	Analysis Date: **2/2/2016**	SeqNo: **982422** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	9.8		10.00	0	97.7	80	120			
Toluene	9.8		10.00	0	98.4	80	120			
Ethylbenzene	10		10.00	0	102	80	120			
Chlorobenzene	9.6		10.00	0	96.0	80	120			
1,1-Dichloroethene	9.6		10.00	0	96.4	80	120			
Tetrachloroethene (PCE)	9.2		10.00	0	92.4	80	120			
Trichloroethene (TCE)	9.8		10.00	0	98.0	80	120			
o-Xylene	10		10.00	0	104	80	120			

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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1601864**
15-Feb-16

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, & 3 Inj Well

Sample ID **MB-R32136**	SampType: **MBLK**	TestCode: **EPA 8270D: Semivolatiles**
Client ID: **PBW**	Batch ID: **R32136**	RunNo: **32136**
Prep Date:	Analysis Date: **2/2/2016**	SeqNo: **982533** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
1,1-Biphenyl	ND	5.0								
1,4-Dioxane	ND	5.0								
Atrazine	ND	5.0								
Benzaldehyde	ND	5.0								
Caprolactam	ND	5.0								
N-Nitroso-di-n-butylamine	ND	5.0								
Acetophenone	ND	5.0								
1-Methylnaphthalene	ND	5.0								
2,3,4,6-Tetrachlorophenol	ND	5.0								
2,4,5-Trichlorophenol	ND	5.0								
2,4,6-Trichlorophenol	ND	5.0								
2,4-Dichlorophenol	ND	5.0								
2,4-Dimethylphenol	ND	5.0								
2,4-Dinitrophenol	ND	5.0								
2,4-Dinitrotoluene	ND	5.0								
2,6-Dinitrotoluene	ND	5.0								
2-Chloronaphthalene	ND	5.0								
2-Chlorophenol	ND	5.0								
2-Methylnaphthalene	ND	5.0								
2-Methylphenol	ND	5.0								
2-Nitroaniline	ND	5.0								
2-Nitrophenol	ND	5.0								
3,3´-Dichlorobenzidine	ND	5.0								
3-Nitroaniline	ND	5.0								
4,6-Dinitro-2-methylphenol	ND	5.0								
4-Bromophenyl phenyl ether	ND	5.0								
4-Chloro-3-methylphenol	ND	5.0								
4-Chloroaniline	ND	5.0								
4-Chlorophenyl phenyl ether	ND	5.0								
4-Nitroaniline	ND	5.0								
4-Nitrophenol	ND	5.0								
Acenaphthene	ND	5.0								
Acenaphthylene	ND	5.0								
Anthracene	ND	5.0								
Benzo(g,h,i)perylene	ND	5.0								
Benz(a)anthracene	ND	0.10								
Benzo(a)pyrene	ND	0.10								
Benzo(b)fluoranthene	ND	0.10								
Benzo(k)fluoranthene	ND	0.10								

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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1601864**

15-Feb-16

Client: Navajo Refining Company

Project: Quarterly WDW-1, 2, & 3 Inj Well

Sample ID **MB-R32136**	SampType: **MBLK**	TestCode: **EPA 8270D: Semivolatiles**
Client ID: **PBW**	Batch ID: **R32136**	RunNo: **32136**
Prep Date:	Analysis Date: **2/2/2016**	SeqNo: **982533** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Bis(2-chloroethoxy)methane	ND	5.0								
Bis(2-chloroethyl)ether	ND	5.0								
Bis(2-chloroisopropyl)ether	ND	5.0								
Bis(2-ethylhexyl)phthalate	ND	5.0								
Butyl benzyl phthalate	ND	5.0								
Carbazole	ND	5.0								
Chrysene	ND	0.10								
Dibenz(a,h)anthracene	ND	0.10								
Dibenzofuran	ND	5.0								
Diethyl phthalate	ND	5.0								
Dimethyl phthalate	ND	5.0								
Di-n-butyl phthalate	ND	5.0								
Di-n-octyl phthalate	ND	5.0								
Fluoranthene	ND	5.0								
Fluorene	ND	5.0								
Hexachlorobenzene	ND	1.0								
Hexachlorobutadiene	ND	5.0								
Hexachlorocyclopentadiene	ND	5.0								
Hexachloroethane	ND	5.0								
Indeno(1,2,3-cd)pyrene	ND	0.10								
Isophorone	ND	5.0								
Naphthalene	ND	5.0								
Nitrobenzene	ND	5.0								
N-Nitrosodi-n-propylamine	ND	5.0								
N-Nitrosodiphenylamine	ND	2.0								
Pentachlorophenol	ND	5.0								
Phenanthrene	ND	1.0								
Phenol	ND	5.0								
Pyrene	ND	5.0								
o-Toluidine	ND	2.0								
Pyridine	ND	5.0								
1,2,4,5-Tetrachlorobenzene	ND	5.0								

Sample ID **LCS-R32136**	SampType: **LCS**	TestCode: **EPA 8270D: Semivolatiles**
Client ID: **LCSW**	Batch ID: **R32136**	RunNo: **32136**
Prep Date:	Analysis Date: **2/2/2016**	SeqNo: **982534** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
2,4-Dinitrotoluene	4.6		5.000	0	93.0	49	134			

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
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QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1601864**

15-Feb-16

Client: Navajo Refining Company

Project: Quarterly WDW-1, 2, & 3 Inj Well

Sample ID **LCS-R32136**	SampType: **LCS**	TestCode: **EPA 8270D: Semivolatiles**
Client ID: **LCSW**	Batch ID: **R32136**	RunNo: **32136**
Prep Date:	Analysis Date: **2/2/2016**	SeqNo: **982534** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
2-Chlorophenol	4.6		5.000	0	91.6	50	131			
4-Chloro-3-methylphenol	4.7		5.000	0	94.4	42	139			
4-Nitrophenol	4.5		5.000	0	90.2	19	137			
Acenaphthene	5.0		5.000	0	100	36	122			
Bis(2-ethylhexyl)phthalate	5.2		5.000	0	105	50	150			
N-Nitrosodi-n-propylamine	4.7		5.000	0	93.6	46	135			
Pentachlorophenol	3.7		5.000	0	73.2	22	138			
Phenol	5.2		5.000	0	103	45	134			
Pyrene	4.7		5.000	0	93.2	45	139			

Qualifiers:

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H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
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QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1601864**

15-Feb-16

Client: Navajo Refining Company

Project: Quarterly WDW-1, 2, & 3 Inj Well

Sample ID	**MB-23378**	SampType: **MBLK**			TestCode: **EPA Method 7470: Mercury**					
Client ID:	**PBW**	Batch ID: **23378**			RunNo: **31658**					
Prep Date:	**1/25/2016**	Analysis Date: **1/25/2016**			SeqNo: **968855**		Units: **mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	ND	0.00020								

Sample ID	**LCS-23378**	SampType: **LCS**			TestCode: **EPA Method 7470: Mercury**					
Client ID:	**LCSW**	Batch ID: **23378**			RunNo: **31658**					
Prep Date:	**1/25/2016**	Analysis Date: **1/25/2016**			SeqNo: **968856**		Units: **mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0052	0.00020	0.005000	0	104	80	120			

Sample ID	**1601864-001BMS**	SampType: **MS**			TestCode: **EPA Method 7470: Mercury**					
Client ID:	**WDW-1,2,&3 Effluen**	Batch ID: **23378**			RunNo: **31658**					
Prep Date:	**1/25/2016**	Analysis Date: **1/25/2016**			SeqNo: **968858**		Units: **mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0040	0.00020	0.005000	.00006177	79.6	75	125			

Sample ID	**1601864-001BMSD**	SampType: **MSD**			TestCode: **EPA Method 7470: Mercury**					
Client ID:	**WDW-1,2,&3 Effluen**	Batch ID: **23378**			RunNo: **31658**					
Prep Date:	**1/25/2016**	Analysis Date: **1/25/2016**			SeqNo: **968859**		Units: **mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0041	0.00020	0.005000	.00006177	80.1	75	125	0.688	20	

Qualifiers:

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QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1601864**

15-Feb-16

Client: Navajo Refining Company

Project: Quarterly WDW-1, 2, & 3 Inj Well

Sample ID	**MB-23438**	SampType:	**MBLK**	TestCode:	**MERCURY, TCLP**					
Client ID:	**PBW**	Batch ID:	**23438**	RunNo:	**31746**					
Prep Date:	**1/27/2016**	Analysis Date:	**1/28/2016**	SeqNo:	**971551**	Units:	**mg/L**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	ND	0.020								

Sample ID	**LCS-23438**	SampType:	**LCS**	TestCode:	**MERCURY, TCLP**					
Client ID:	**LCSW**	Batch ID:	**23438**	RunNo:	**31746**					
Prep Date:	**1/27/2016**	Analysis Date:	**1/28/2016**	SeqNo:	**971552**	Units:	**mg/L**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	ND	0.020	0.005000	0	102	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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1601864**

15-Feb-16

Client: Navajo Refining Company

Project: Quarterly WDW-1, 2, & 3 Inj Well

Sample ID	**MB-23359**	SampType:	**MBLK**	TestCode:	**EPA Method 6010B: TCLP Metals**
Client ID:	**PBW**	Batch ID:	**23359**	RunNo:	**31646**
Prep Date:	**1/22/2016**	Analysis Date:	**1/25/2016**	SeqNo:	**968535** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	ND	5.0								
Barium	ND	100								
Cadmium	ND	1.0								
Chromium	ND	5.0								
Lead	ND	5.0								
Selenium	ND	1.0								
Silver	ND	5.0								

Sample ID	**LCS-23359**	SampType:	**LCS**	TestCode:	**EPA Method 6010B: TCLP Metals**
Client ID:	**LCSW**	Batch ID:	**23359**	RunNo:	**31646**
Prep Date:	**1/22/2016**	Analysis Date:	**1/25/2016**	SeqNo:	**968536** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	ND	5.0	0.5000	0	96.1	80	120			
Barium	ND	100	0.5000	0	94.0	80	120			
Cadmium	ND	1.0	0.5000	0	92.5	80	120			
Chromium	ND	5.0	0.5000	0	93.7	80	120			
Lead	ND	5.0	0.5000	0	92.9	80	120			
Selenium	ND	1.0	0.5000	0	95.8	80	120			
Silver	ND	5.0	0.1000	0	92.0	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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1601864**

15-Feb-16

Client: Navajo Refining Company

Project: Quarterly WDW-1, 2, & 3 Inj Well

Sample ID **MB-23359**	SampType: **MBLK**	TestCode: **EPA 6010B: Total Metals**
Client ID: **PBW**	Batch ID: **23359**	RunNo: **31646**
Prep Date: **1/22/2016**	Analysis Date: **1/25/2016**	SeqNo: **968316** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	ND	0.020								
Antimony	ND	0.050								
Arsenic	ND	0.020								
Barium	ND	0.020								
Beryllium	ND	0.0030								
Cadmium	ND	0.0020								
Chromium	ND	0.0060								
Copper	ND	0.0060								
Iron	ND	0.050								
Lead	ND	0.0050								
Manganese	ND	0.0020								
Nickel	ND	0.010								
Potassium	ND	1.0								
Selenium	ND	0.050								
Silver	ND	0.0050								
Thallium	ND	0.050								
Vanadium	ND	0.050								
Zinc	ND	0.020								

Sample ID **LCS-23359**	SampType: **LCS**	TestCode: **EPA 6010B: Total Metals**
Client ID: **LCSW**	Batch ID: **23359**	RunNo: **31646**
Prep Date: **1/22/2016**	Analysis Date: **1/25/2016**	SeqNo: **968317** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	0.46	0.020	0.5000	0	91.9	80	120			
Antimony	0.48	0.050	0.5000	0	95.5	80	120			
Arsenic	0.48	0.020	0.5000	0	96.1	80	120			
Barium	0.47	0.020	0.5000	0	94.0	80	120			
Beryllium	0.49	0.0030	0.5000	0	99.0	80	120			
Cadmium	0.46	0.0020	0.5000	0	92.5	80	120			
Chromium	0.47	0.0060	0.5000	0	93.7	80	120			
Copper	0.47	0.0060	0.5000	0	94.5	80	120			
Iron	0.48	0.050	0.5000	0	95.5	80	120			
Lead	0.46	0.0050	0.5000	0	92.9	80	120			
Manganese	0.47	0.0020	0.5000	0	93.5	80	120			
Nickel	0.46	0.010	0.5000	0	92.2	80	120			
Potassium	44	1.0	50.00	0	88.6	80	120			
Selenium	0.48	0.050	0.5000	0	95.8	80	120			
Silver	0.092	0.0050	0.1000	0	92.0	80	120			

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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1601864**

15-Feb-16

Client: Navajo Refining Company

Project: Quarterly WDW-1, 2, & 3 Inj Well

Sample ID	**LCS-23359**	SampType:	**LCS**		TestCode:	**EPA 6010B: Total Metals**				
Client ID:	**LCSW**	Batch ID:	**23359**		RunNo:	**31646**				
Prep Date:	**1/22/2016**	Analysis Date:	**1/25/2016**		SeqNo:	**968317**	Units:	**mg/L**		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Thallium	0.47	0.050	0.5000	0	93.8	80	120			
Vanadium	0.49	0.050	0.5000	0	98.1	80	120			
Zinc	0.48	0.020	0.5000	0	95.2	80	120			

Sample ID	**MB-23359**	SampType:	**MBLK**		TestCode:	**EPA 6010B: Total Metals**				
Client ID:	**PBW**	Batch ID:	**23359**		RunNo:	**31648**				
Prep Date:	**1/22/2016**	Analysis Date:	**1/25/2016**		SeqNo:	**968397**	Units:	**mg/L**		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	ND	1.0								
Magnesium	ND	1.0								
Sodium	ND	1.0								

Sample ID	**LCS-23359**	SampType:	**LCS**		TestCode:	**EPA 6010B: Total Metals**				
Client ID:	**LCSW**	Batch ID:	**23359**		RunNo:	**31648**				
Prep Date:	**1/22/2016**	Analysis Date:	**1/25/2016**		SeqNo:	**968398**	Units:	**mg/L**		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	50	1.0	50.00	0	99.1	80	120			
Magnesium	49	1.0	50.00	0	98.8	80	120			
Sodium	48	1.0	50.00	0	96.6	80	120			

Sample ID	**MB-23359**	SampType:	**MBLK**		TestCode:	**EPA 6010B: Total Metals**				
Client ID:	**PBW**	Batch ID:	**23359**		RunNo:	**31737**				
Prep Date:	**1/22/2016**	Analysis Date:	**1/28/2016**		SeqNo:	**971326**	Units:	**mg/L**		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cobalt	ND	0.0060								

Sample ID	**LCS-23359**	SampType:	**LCS**		TestCode:	**EPA 6010B: Total Metals**				
Client ID:	**LCSW**	Batch ID:	**23359**		RunNo:	**31737**				
Prep Date:	**1/22/2016**	Analysis Date:	**1/28/2016**		SeqNo:	**971327**	Units:	**mg/L**		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cobalt	0.46	0.0060	0.5000	0	91.5	80	120			

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
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QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1601864**

15-Feb-16

Client: Navajo Refining Company

Project: Quarterly WDW-1, 2, & 3 Inj Well

Sample ID	**MB-R32136**	SampType:	**MBLK**	TestCode:	**CYANIDE, Reactive**					
Client ID:	**PBW**	Batch ID:	**R32136**	RunNo:	**32136**					
Prep Date:		Analysis Date:	**2/4/2016**	SeqNo:	**982430**	Units:	**mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cyanide, Reactive	ND	1.00								

Sample ID	**LCS-R32136**	SampType:	**LCS**	TestCode:	**CYANIDE, Reactive**					
Client ID:	**LCSW**	Batch ID:	**R32136**	RunNo:	**32136**					
Prep Date:		Analysis Date:	**2/4/2016**	SeqNo:	**982431**	Units:	**mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cyanide, Reactive	0.542		0.5000	0	108	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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1601864**
15-Feb-16

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, & 3 Inj Well

Sample ID	**MB-R32136**	SampType:	**MBLK**	TestCode:	**SULFIDE, Reactive**					
Client ID:	**PBW**	Batch ID:	**R32136**	RunNo:	**32136**					
Prep Date:		Analysis Date:	**1/29/2016**	SeqNo:	**982433**	Units:	**mg/L**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Reactive Sulfide	ND	1.0								

Sample ID	**LCS-R32136**	SampType:	**LCS**	TestCode:	**SULFIDE, Reactive**					
Client ID:	**LCSW**	Batch ID:	**R32136**	RunNo:	**32136**					
Prep Date:		Analysis Date:	**1/29/2016**	SeqNo:	**982434**	Units:	**mg/L**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Reactive Sulfide	0.18		0.2000	0	90.0	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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1601864**
15-Feb-16

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, & 3 Inj Well

Sample ID **mb-1**	SampType: **MBLK**	TestCode: **SM2320B: Alkalinity**							
Client ID: **PBW**	Batch ID: **R31664**	RunNo: **31664**							
Prep Date:	Analysis Date: **1/25/2016**	SeqNo: **968939**	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: **R31664**	RunNo: **31664**							
Prep Date:	Analysis Date: **1/25/2016**	SeqNo: **968940**	Units: **mg/L CaCO3**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	75.44	20.00	80.00	0	94.3	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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1601864**
15-Feb-16

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, & 3 Inj Well

Sample ID **1601864-001ADUP** SampType: **DUP** TestCode: **Specific Gravity**
Client ID: **WDW-1,2,&3 Effluen** Batch ID: **R31723** RunNo: **31723**
Prep Date: Analysis Date: **1/27/2016** SeqNo: **970796** Units:

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Specific Gravity	1.004	0						0.179	20	

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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1601864**

15-Feb-16

Client: Navajo Refining Company

Project: Quarterly WDW-1, 2, & 3 Inj Well

Sample ID	**MB-23428**	SampType:	**MBLK**		TestCode:	**SM2540C MOD: Total Dissolved Solids**				
Client ID:	**PBW**	Batch ID:	**23428**		RunNo:	**31755**				
Prep Date:	**1/27/2016**	Analysis Date:	**1/28/2016**		SeqNo:	**971754**	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-23428**	SampType:	**LCS**		TestCode:	**SM2540C MOD: Total Dissolved Solids**				
Client ID:	**LCSW**	Batch ID:	**23428**		RunNo:	**31755**				
Prep Date:	**1/27/2016**	Analysis Date:	**1/28/2016**		SeqNo:	**971755**	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			

Sample ID	**1601864-001AMS**	SampType:	**MS**		TestCode:	**SM2540C MOD: Total Dissolved Solids**				
Client ID:	**WDW-1,2,&3 Effluen**	Batch ID:	**23428**		RunNo:	**31755**				
Prep Date:	**1/27/2016**	Analysis Date:	**1/28/2016**		SeqNo:	**971765**	Units:	**mg/L**		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	5800	40.0	2000	3784	101	80	120			D

Sample ID	**1601864-001AMSD**	SampType:	**MSD**		TestCode:	**SM2540C MOD: Total Dissolved Solids**				
Client ID:	**WDW-1,2,&3 Effluen**	Batch ID:	**23428**		RunNo:	**31755**				
Prep Date:	**1/27/2016**	Analysis Date:	**1/28/2016**		SeqNo:	**971766**	Units:	**mg/L**		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	5820	40.0	2000	3784	102	80	120	0.379	5	D

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	W	Sample container temperature is out of limit as specified

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: NAVAJO REFINING CO Work Order Number: 1601864 RcptNo: 1

Received by/date: LM 01/22/16

Logged By: **Michelle Garcia** 1/22/2016 9:40:00 AM Michelle Garcia

Completed By: **Michelle Garcia** 1/22/2016 11:23:27 AM Michelle Garcia

Reviewed By: IO 01/27/16

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? No

Checked by: MG

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	1.2	Good	Yes			

Chain-of-Custody Record

Client: Navajo Refining Co.

Mailing Address: P.O. Box 159 Artesia,

NM 88211-0159

Phone #: 575-748-3311

email or Fax#: 575-746-5451

QA/QC Package:

☐ Standard ☐ Level 4 (Full Validation)

☐ Other _____

☐ EDD (Type) _____

Turn-Around Time:

☐ Standar ☐ **Rush**

Project Name:

Quarterly WDW-1, 2, & 3 Inj Well

Project #: P.O. # 167796

Project Manager:

Micki Schultz / Scott Denton / Mike Holder

Sampler: Elizabeth Salsberry

On Ice: ☑ Yes ☐ No

Sample Temperature: 1.2

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. 1601864	Specific Gravity, HCO3, CO3, Cl, SO4, TDS, pH, cond., Fl, Cation/anion bal., Br, Eh/40	VOCs/SW-846 Method 8260C (see attached list 'VOCs')	SVOCs/SW-846 Method 8270D (see attached list 'SVOCs')	R,C,I/40 CFR part 261	Metals/SW-846 Mthd 6010, 7470 (see attached list 'Metals')	Ca, K, Mg, Na/40 CFR 136.3	TCLP Metals, only /40 CFR Part 261/ SW-845 Method 1311
1/21/16	7:35	Liquid	WDW-1, 2, & 3 Effluent	3	Neat/H2SO4	-001	X						X
1/21/16	7:35	Liquid	WDW-1, 2, & 3 Effluent	1	HNO3	-001					X	X	
1/21/16	7:35	Liquid	WDW-1, 2, & 3 Effluent	3	HCL	-001		X					
1/21/16	7:35	Liquid	WDW-1, 2, & 3 Effluent	2	Neat	-001			X				
1/21/16	7:35	Liquid	WDW-1, 2, & 3 Effluent	2	Neat	-001				X			
1/21/16	7:35	Liquid	Trip Blank	2	Neat	-002		X					
1/21/16	7:35	Liquid	Temperature Blank	1	Neat								

Date	Time	Relinquished by	Received by	Date	Time
1/21/2016	1:00	Elizabeth Salsberry			
Date:	Time:	Relinquished by:	Received by:	01/22/16	0740

Remarks: Send results to Scott Denton, Mike Holder, Micki Schultz, Robert Combs and Andrew Contreras.

Navajo Refining Company, LLC
501 E. Main
Artesia, NM 88210
(Tel) 575.748.3311
(Fax) 575.746.5451

Injection Well Quarterly Sample Details Attachment

HOLLYFRONTIER
The HollyFrontier Companies

Project Name	WDW-1,2, & 3 Qrtly Inj Well
Samplers Name	Elizabeth Salsberry
Samplers Affiliation	Navajo Refining Co. LLC
Start Date and Time	1/21/2016 @ 7:30 a.m.
End Date and Time	1/21/2016 @ 7:40 a.m.

Sample Type	
Grab	☑
Time Weighted Composite	☐
Flow Weighted Composite	☐

Physical Property	
Solid	☐
Liquid	☑
Sludge	☐

Parts / Sample Intervals	One
Type of Sampler	Directly to sample jars

Outfall / Sample Location: Waste water effluent pumps to injection wells.

☐ P-849 sample point (first from east)
☑ P-854 sample point (second from east)
☐ P-856 sample point (third from east)
☐ P-857 sample point (fourth from east)

				Preservatives								
Container	Size	Material	# of Containers	Neat (None)	HCL	HNO3	H2SO4	NaOH	Na2S2O3	NaHSO4	Other	Analysis and/or Method Requested
1			3	X			X					Specific Gravity,HCO3, CO3, Cl, SO4, TDS, pH, cond.,Fl, Cation/anion bal., Br, Eh/40 CFR 136.3
2			1			X						VOCs/SW-846 Method 8260C (see attached list 'VOCs')
3			3		X							SVOCs/SW-846 Method 8270D (see attached list 'SVOCs')
4			2	X								R,C,I/40 CFR part 261
5			2	X								Metals/SW-846 Mthd 6010, 7470 (see attached list 'Metals')
6			2	X								Ca, K, Mg, Na/40 CFR 136.3
7			1	X								TCLP Metals, only /40 CFR Part 261/ SW-846 Method 1311
8												
9												
10												

Field Data (Weather, Observations, Etc): 1/21/2016 Temp. 37.4 °F Humidity 70% Wind direction NW Wind Speed 11.5 mph Condition: Clear

Date and Time

Field Temp 40.7C Field pH 7.49

Storage Method	
Ice	☑
Refrigerated	☐
Other	☐

Shipping Media	
Ice	☑
Other	☐

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 01, 2016

Scott Denton

Navajo Refining Company
P.O. Box 159
Artesia, NM 88211-0159
TEL: (575) 748-3311
FAX

RE: Quarterly WDW-1, 2, &3 Inj Well OrderNo.: 1607300

Dear Scott Denton:

Hall Environmental Analysis Laboratory received 2 sample(s) on 7/7/2016 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: Navajo Refining Company
Client Sample ID: WDW-1,2,&3 Effluent
Project: Quarterly WDW-1, 2, &3 Inj Well
Collection Date: 7/5/2016 8:30:00 AM
Lab ID: 1607300-001
Matrix: AQUEOUS
Received Date: 7/7/2016 10:15:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 300.0: ANIONS						Analyst: **LGT**
Fluoride	8.9	2.0	*	mg/L	20	7/8/2016 1:28:08 AM
Chloride	400	10		mg/L	20	7/8/2016 1:28:08 AM
Bromide	0.78	0.10		mg/L	1	7/8/2016 1:15:44 AM
Phosphorus, Orthophosphate (As P)	ND	10	H	mg/L	20	7/8/2016 1:28:08 AM
Sulfate	1700	50		mg/L	100	7/8/2016 11:57:26 PM
Nitrate+Nitrite as N	ND	1.0		mg/L	5	7/8/2016 2:05:22 AM
EPA METHOD 7470: MERCURY						Analyst: **pmf**
Mercury	ND	0.00020		mg/L	1	7/15/2016 10:35:40 AM
MERCURY, TCLP						Analyst: **ELS**
Mercury	ND	0.020		mg/L	1	7/21/2016 2:26:41 PM
EPA METHOD 6010B: TCLP METALS						Analyst: **ELS**
Arsenic	ND	5.0		mg/L	1	7/20/2016 6:42:47 AM
Barium	ND	100		mg/L	1	7/20/2016 6:42:47 AM
Cadmium	ND	1.0		mg/L	1	7/20/2016 6:42:47 AM
Chromium	ND	5.0		mg/L	1	7/20/2016 6:42:47 AM
Lead	ND	5.0		mg/L	1	7/20/2016 6:42:47 AM
Selenium	ND	1.0		mg/L	1	7/20/2016 6:42:47 AM
Silver	ND	5.0		mg/L	1	7/20/2016 6:42:47 AM
EPA 6010B: TOTAL RECOVERABLE METALS						Analyst: **ELS**
Aluminum	0.87	0.10		mg/L	5	7/21/2016 11:41:44 AM
Antimony	ND	0.050		mg/L	1	7/21/2016 11:36:00 AM
Arsenic	0.038	0.020		mg/L	1	7/21/2016 11:36:00 AM
Barium	ND	0.020		mg/L	1	7/21/2016 11:36:00 AM
Beryllium	ND	0.0030		mg/L	1	7/21/2016 11:36:00 AM
Cadmium	ND	0.0020		mg/L	1	7/21/2016 11:36:00 AM
Calcium	150	20		mg/L	20	7/21/2016 11:48:56 AM
Chromium	ND	0.0060		mg/L	1	7/21/2016 11:36:00 AM
Cobalt	ND	0.0060		mg/L	1	7/21/2016 11:36:00 AM
Copper	ND	0.0060		mg/L	1	7/21/2016 11:36:00 AM
Iron	0.23	0.050		mg/L	1	7/21/2016 11:36:00 AM
Lead	ND	0.0050		mg/L	1	7/21/2016 11:36:00 AM
Magnesium	45	1.0		mg/L	1	7/21/2016 11:36:00 AM
Manganese	0.096	0.0020		mg/L	1	7/21/2016 11:36:00 AM
Nickel	ND	0.010		mg/L	1	7/21/2016 11:36:00 AM
Potassium	69	5.0		mg/L	5	7/21/2016 11:41:44 AM
Selenium	ND	0.050		mg/L	1	7/21/2016 11:36:00 AM
Silver	ND	0.0050		mg/L	1	7/21/2016 11:36:00 AM

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
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Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company
Client Sample ID: WDW-1,2,&3 Effluent
Project: Quarterly WDW-1, 2, &3 Inj Well
Collection Date: 7/5/2016 8:30:00 AM
Lab ID: 1607300-001
Matrix: AQUEOUS
Received Date: 7/7/2016 10:15:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA 6010B: TOTAL RECOVERABLE METALS						Analyst: **ELS**
Sodium	760	20		mg/L	20	7/21/2016 11:48:56 AM
Strontium	2.3	0.20		mg/L	20	7/21/2016 11:48:56 AM
Thallium	ND	0.25		mg/L	5	7/21/2016 11:41:44 AM
Zinc	0.042	0.020		mg/L	1	7/21/2016 11:36:00 AM
Silica	18	5.4		mg/L	5	7/21/2016 11:41:44 AM
EPA METHOD 8260B: VOLATILES						Analyst: **SUB**
Acetonitrile	110	0.50		µg/L	1	7/19/2016
Allyl chloride	ND	0.50		µg/L	1	7/19/2016
Chloroprene	ND	0.50		µg/L	1	7/19/2016
Cyclohexane	ND	0.50		µg/L	1	7/19/2016
Diethyl ether	ND	0.50		µg/L	1	7/19/2016
Diisopropyl ether	ND	0.50		µg/L	1	7/19/2016
Epichlorohydrin	ND	5.0		µg/L	1	7/19/2016
Ethyl acetate	ND	0.50		µg/L	1	7/19/2016
Ethyl methacrylate	ND	2.5		µg/L	1	7/19/2016
Ethyl tert-butyl ether	ND	0.50		µg/L	1	7/19/2016
Freon-113	ND	0.50		µg/L	1	7/19/2016
Isobutanol	ND	10		µg/L	1	7/19/2016
Isopropyl acetate	ND	0.50		µg/L	1	7/19/2016
Methacrylonitrile	ND	2.5		µg/L	1	7/19/2016
Methyl acetate	ND	0.50		µg/L	1	7/19/2016
Methyl ethyl ketone	ND	2.5		µg/L	1	7/19/2016
Methyl isobutyl ketone	ND	2.5		µg/L	1	7/19/2016
Methyl methacrylate	ND	2.5		µg/L	1	7/19/2016
Methylcyclohexane	ND	1.0		µg/L	1	7/19/2016
n-Amyl acetate	ND	0.50		µg/L	1	7/19/2016
n-Hexane	ND	0.50		µg/L	1	7/19/2016
Nitrobenzene	ND	5.0		µg/L	1	7/19/2016
Pentachloroethane	ND	5.0		µg/L	1	7/19/2016
p-isopropyltoluene	ND	0.50		µg/L	1	7/19/2016
Propionitrile	ND	2.5		µg/L	1	7/19/2016
Tetrahydrofuran	ND	0.50		µg/L	1	7/19/2016
Benzene	ND	0.50		µg/L	1	7/19/2016
Toluene	2.4	0.50		µg/L	1	7/19/2016
Ethylbenzene	ND	0.50		µg/L	1	7/19/2016
Methyl tert-butyl ether (MTBE)	ND	10		µg/L	1	7/19/2016
1,2,4-Trimethylbenzene	ND	0.50		µg/L	1	7/19/2016
1,3,5-Trimethylbenzene	ND	0.50		µg/L	1	7/19/2016
1,2-Dichloroethane (EDC)	ND	0.50		µg/L	1	7/19/2016

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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	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company
Client Sample ID: WDW-1,2,&3 Effluent
Project: Quarterly WDW-1, 2, &3 Inj Well
Collection Date: 7/5/2016 8:30:00 AM
Lab ID: 1607300-001
Matrix: AQUEOUS
Received Date: 7/7/2016 10:15:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: **SUB**
1,2-Dibromoethane (EDB)	ND	0.50		µg/L	1	7/19/2016
Naphthalene	ND	0.50		µg/L	1	7/19/2016
Acetone	4.6	2.5		µg/L	1	7/19/2016
Bromobenzene	ND	0.50		µg/L	1	7/19/2016
Bromodichloromethane	ND	0.50		µg/L	1	7/19/2016
Bromoform	ND	0.50		µg/L	1	7/19/2016
Bromomethane	ND	0.50		µg/L	1	7/19/2016
2-Butanone	ND	2.5		µg/L	1	7/19/2016
Carbon disulfide	ND	0.50		µg/L	1	7/19/2016
Carbon Tetrachloride	ND	0.50		µg/L	1	7/19/2016
Chlorobenzene	ND	0.50		µg/L	1	7/19/2016
Chloroethane	ND	0.50		µg/L	1	7/19/2016
Chloroform	ND	0.50		µg/L	1	7/19/2016
Chloromethane	1.4	0.50		µg/L	1	7/19/2016
2-Chlorotoluene	ND	0.50		µg/L	1	7/19/2016
4-Chlorotoluene	ND	0.50		µg/L	1	7/19/2016
cis-1,2-DCE	ND	0.50		µg/L	1	7/19/2016
cis-1,3-Dichloropropene	ND	0.50		µg/L	1	7/19/2016
1,2-Dibromo-3-chloropropane	ND	0.50		µg/L	1	7/19/2016
Dibromochloromethane	ND	0.50		µg/L	1	7/19/2016
Dibromomethane	ND	0.50		µg/L	1	7/19/2016
1,2-Dichlorobenzene	ND	0.50		µg/L	1	7/19/2016
1,3-Dichlorobenzene	ND	0.50		µg/L	1	7/19/2016
1,4-Dichlorobenzene	ND	0.50		µg/L	1	7/19/2016
Dichlorodifluoromethane	ND	0.50		µg/L	1	7/19/2016
1,1-Dichloroethane	ND	0.50		µg/L	1	7/19/2016
1,1-Dichloroethene	ND	0.50		µg/L	1	7/19/2016
1,2-Dichloropropane	ND	0.50		µg/L	1	7/19/2016
1,3-Dichloropropane	ND	0.50		µg/L	1	7/19/2016
2,2-Dichloropropane	ND	0.50		µg/L	1	7/19/2016
1,1-Dichloropropene	ND	0.50		µg/L	1	7/19/2016
Hexachlorobutadiene	ND	0.50		µg/L	1	7/19/2016
2-Hexanone	ND	0.50		µg/L	1	7/19/2016
Isopropylbenzene	ND	0.50		µg/L	1	7/19/2016
Methylene Chloride	ND	2.5		µg/L	1	7/19/2016
n-Butylbenzene	ND	0.50		µg/L	1	7/19/2016
n-Propylbenzene	ND	0.50		µg/L	1	7/19/2016
sec-Butylbenzene	ND	0.50		µg/L	1	7/19/2016
Styrene	ND	0.50		µg/L	1	7/19/2016

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	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company
Client Sample ID: WDW-1,2,&3 Effluent
Project: Quarterly WDW-1, 2, &3 Inj Well
Collection Date: 7/5/2016 8:30:00 AM
Lab ID: 1607300-001
Matrix: AQUEOUS
Received Date: 7/7/2016 10:15:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: **SUB**
tert-Butylbenzene	ND	0.50		µg/L	1	7/19/2016
1,1,1,2-Tetrachloroethane	ND	0.50		µg/L	1	7/19/2016
1,1,2,2-Tetrachloroethane	ND	0.50		µg/L	1	7/19/2016
Tetrachloroethene (PCE)	ND	0.50		µg/L	1	7/19/2016
trans-1,2-DCE	ND	0.50		µg/L	1	7/19/2016
trans-1,3-Dichloropropene	ND	0.50		µg/L	1	7/19/2016
1,2,3-Trichlorobenzene	ND	0.50		µg/L	1	7/19/2016
1,2,4-Trichlorobenzene	ND	0.50		µg/L	1	7/19/2016
1,1,1-Trichloroethane	ND	0.50		µg/L	1	7/19/2016
1,1,2-Trichloroethane	ND	0.50		µg/L	1	7/19/2016
Trichloroethene (TCE)	ND	0.50		µg/L	1	7/19/2016
Trichlorofluoromethane	ND	0.50		µg/L	1	7/19/2016
1,2,3-Trichloropropane	ND	0.50		µg/L	1	7/19/2016
Vinyl chloride	ND	0.50		µg/L	1	7/19/2016
mp-Xylenes	ND	1.0		µg/L	1	7/19/2016
o-Xylene	ND	0.50		µg/L	1	7/19/2016
tert-Amyl methyl ether	ND	0.50		µg/L	1	7/19/2016
tert-Butyl alcohol	ND	0.50		µg/L	1	7/19/2016
Acrolein	ND	2.5		µg/L	1	7/19/2016
Acrylonitrile	ND	2.5		µg/L	1	7/19/2016
Bromochloromethane	ND	0.50		µg/L	1	7/19/2016
2-Chloroethyl vinyl ether	ND	0.50		µg/L	1	7/19/2016
Iodomethane	ND	0.50		µg/L	1	7/19/2016
trans-1,4-Dichloro-2-butene	ND	0.50		µg/L	1	7/19/2016
Vinyl acetate	ND	0.50		µg/L	1	7/19/2016
1,4-Dioxane	ND	20		µg/L	1	7/19/2016
Surr: 1,2-Dichlorobenzene-d4	98.8	70-130		%Rec	1	7/19/2016
Surr: 4-Bromofluorobenzene	95.6	70-130		%Rec	1	7/19/2016
Surr: Toluene-d8	101	70-130		%Rec	1	7/19/2016
EPA 8270C: SEMIVOLATILES/MOD						Analyst: **SUB**
1,1-Biphenyl	ND	2.5		µg/L	1	7/15/2016
Atrazine	ND	2.5		µg/L	1	7/15/2016
Benzaldehyde	ND	2.5		µg/L	1	7/15/2016
Caprolactam	ND	2.5		µg/L	1	7/15/2016
N-Nitroso-di-n-butylamine	ND	2.5		µg/L	1	7/15/2016
Acetophenone	ND	25		µg/L	1	7/15/2016
1-Methylnaphthalene	ND	25		µg/L	1	7/15/2016
2,3,4,6-Tetrachlorophenol	ND	25		µg/L	1	7/15/2016
2,4,5-Trichlorophenol	ND	25		µg/L	1	7/15/2016

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Qualifiers:

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Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company
Client Sample ID: WDW-1,2,&3 Effluent
Project: Quarterly WDW-1, 2, &3 Inj Well
Collection Date: 7/5/2016 8:30:00 AM
Lab ID: 1607300-001
Matrix: AQUEOUS
Received Date: 7/7/2016 10:15:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA 8270C: SEMIVOLATILES/MOD						Analyst: **SUB**
2,4,6-Trichlorophenol	ND	25		µg/L	1	7/15/2016
2,4-Dichlorophenol	ND	25		µg/L	1	7/15/2016
2,4-Dimethylphenol	ND	25		µg/L	1	7/15/2016
2,4-Dinitrophenol	ND	25		µg/L	1	7/15/2016
2,4-Dinitrotoluene	ND	25		µg/L	1	7/15/2016
2,6-Dinitrotoluene	ND	25		µg/L	1	7/15/2016
2-Chloronaphthalene	ND	25		µg/L	1	7/15/2016
2-Chlorophenol	ND	25		µg/L	1	7/15/2016
2-Methylnaphthalene	ND	25		µg/L	1	7/15/2016
2-Methylphenol	ND	25		µg/L	1	7/15/2016
2-Nitroaniline	ND	25		µg/L	1	7/15/2016
2-Nitrophenol	ND	25		µg/L	1	7/15/2016
3,3´-Dichlorobenzidine	ND	25		µg/L	1	7/15/2016
3-Nitroaniline	ND	25		µg/L	1	7/15/2016
4,6-Dinitro-2-methylphenol	ND	25		µg/L	1	7/15/2016
4-Bromophenyl phenyl ether	ND	25		µg/L	1	7/15/2016
4-Chloro-3-methylphenol	ND	25		µg/L	1	7/15/2016
4-Chloroaniline	ND	25		µg/L	1	7/15/2016
4-Chlorophenyl phenyl ether	ND	25		µg/L	1	7/15/2016
4-Nitroaniline	ND	25		µg/L	1	7/15/2016
4-Nitrophenol	ND	25		µg/L	1	7/15/2016
Acenaphthene	ND	25		µg/L	1	7/15/2016
Acenaphthylene	ND	25		µg/L	1	7/15/2016
Anthracene	ND	25		µg/L	1	7/15/2016
Benzo(g,h,i)perylene	ND	25		µg/L	1	7/15/2016
Benz(a)anthracene	ND	0.50		µg/L	1	7/15/2016
Benzo(a)pyrene	ND	0.50		µg/L	1	7/15/2016
Benzo(b)fluoranthene	ND	0.50		µg/L	1	7/15/2016
Benzo(k)fluoranthene	ND	0.50		µg/L	1	7/15/2016
Bis(2-chloroethoxy)methane	ND	25		µg/L	1	7/15/2016
Bis(2-chloroethyl)ether	ND	25		µg/L	1	7/15/2016
Bis(2-chloroisopropyl)ether	ND	25		µg/L	1	7/15/2016
Bis(2-ethylhexyl)phthalate	ND	25		µg/L	1	7/15/2016
Butyl benzyl phthalate	ND	25		µg/L	1	7/15/2016
Carbazole	ND	25		µg/L	1	7/15/2016
Chrysene	ND	0.50		µg/L	1	7/15/2016
Dibenz(a,h)anthracene	ND	0.50		µg/L	1	7/15/2016
Dibenzofuran	ND	25		µg/L	1	7/15/2016
Diethyl phthalate	ND	25		µg/L	1	7/15/2016

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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
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Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company
Client Sample ID: WDW-1,2,&3 Effluent
Project: Quarterly WDW-1, 2, &3 Inj Well
Collection Date: 7/5/2016 8:30:00 AM
Lab ID: 1607300-001
Matrix: AQUEOUS
Received Date: 7/7/2016 10:15:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA 8270C: SEMIVOLATILES/MOD						Analyst: **SUB**
Dimethyl phthalate	ND	25		µg/L	1	7/15/2016
Di-n-butyl phthalate	ND	25		µg/L	1	7/15/2016
Di-n-octyl phthalate	ND	25		µg/L	1	7/15/2016
Fluoranthene	ND	25		µg/L	1	7/15/2016
Fluorene	ND	25		µg/L	1	7/15/2016
Hexachlorobenzene	ND	5.0		µg/L	1	7/15/2016
Hexachlorobutadiene	ND	25		µg/L	1	7/15/2016
Hexachlorocyclopentadiene	ND	25		µg/L	1	7/15/2016
Hexachloroethane	ND	25		µg/L	1	7/15/2016
Indeno(1,2,3-cd)pyrene	ND	0.50		µg/L	1	7/15/2016
Isophorone	ND	25		µg/L	1	7/15/2016
Naphthalene	ND	25		µg/L	1	7/15/2016
Nitrobenzene	ND	25		µg/L	1	7/15/2016
N-Nitrosodi-n-propylamine	ND	25		µg/L	1	7/15/2016
N-Nitrosodiphenylamine	ND	10		µg/L	1	7/15/2016
Pentachlorophenol	ND	25		µg/L	1	7/15/2016
Phenanthrene	ND	25		µg/L	1	7/15/2016
Phenol	ND	25		µg/L	1	7/15/2016
Pyrene	ND	25		µg/L	1	7/15/2016
o-Toluidine	ND	10		µg/L	1	7/15/2016
Pyridine	ND	25		µg/L	1	7/15/2016
1,2,4,5-Tetrachlorobenzene	ND	25		µg/L	1	7/15/2016
Surr: 2,4,6-Tribromophenol	98.8	63-110		%Rec	1	7/15/2016
Surr: 2-Fluorobiphenyl	83.2	58-112		%Rec	1	7/15/2016
Surr: 2-Fluorophenol	61.0	47-109		%Rec	1	7/15/2016
Surr: Nitrobenzene-d5	91.2	58-110		%Rec	1	7/15/2016
Surr: Phenol-d5	75.6	52-105		%Rec	1	7/15/2016
Surr: Terphenyl-d14	51.2	22-133		%Rec	1	7/15/2016
CORROSIVITY						Analyst: **SUB**
pH	7.54			pH Units	1	7/13/2016
IGNITABILITY METHOD 1010						Analyst: **SUB**
Ignitability	>200	0		°F	1	7/21/2016
CYANIDE, REACTIVE						Analyst: **SUB**
Cyanide, Reactive	ND	0.0100		mg/L	1	7/19/2016
SULFIDE, REACTIVE						Analyst: **SUB**
Reactive Sulfide	ND	0.46		mg/L	1	7/14/2016
SM2510B: SPECIFIC CONDUCTANCE						Analyst: **JRR**

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Qualifiers:

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Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company
Client Sample ID: WDW-1,2,&3 Effluent
Project: Quarterly WDW-1, 2, &3 Inj Well
Collection Date: 7/5/2016 8:30:00 AM
Lab ID: 1607300-001
Matrix: AQUEOUS
Received Date: 7/7/2016 10:15:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
SM2510B: SPECIFIC CONDUCTANCE						Analyst: **JRR**
Conductivity	4600	1.0		µmhos/cm	1	7/8/2016 12:37:31 PM
SM4500-H+B: PH						Analyst: **JRR**
pH	7.61	1.68	H	pH units	1	7/8/2016 12:37:31 PM
SM2320B: ALKALINITY						Analyst: **JRR**
Bicarbonate (As CaCO3)	271.4	20.00		mg/L CaCO3	1	7/8/2016 12:37:31 PM
Carbonate (As CaCO3)	ND	2.000		mg/L CaCO3	1	7/8/2016 12:37:31 PM
Total Alkalinity (as CaCO3)	271.4	20.00		mg/L CaCO3	1	7/8/2016 12:37:31 PM
SPECIFIC GRAVITY						Analyst: **JRR**
Specific Gravity	1.004	0			1	7/8/2016 12:11:00 PM
SM2540C MOD: TOTAL DISSOLVED SOLIDS						Analyst: **KS**
Total Dissolved Solids	3160	20.0	*	mg/L	1	7/8/2016 4:07:00 PM

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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	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company
Client Sample ID: TRIP BLANK
Project: Quarterly WDW-1, 2, &3 Inj Well
Collection Date:
Lab ID: 1607300-002
Matrix: TRIP BLANK
Received Date: 7/7/2016 10:15:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: **SUB**
Acetonitrile	ND	0.50		µg/L	1	7/19/2016
Allyl chloride	ND	0.50		µg/L	1	7/19/2016
Chloroprene	ND	0.50		µg/L	1	7/19/2016
Cyclohexane	ND	0.50		µg/L	1	7/19/2016
Diethyl ether	ND	0.50		µg/L	1	7/19/2016
Diisopropyl ether	ND	0.50		µg/L	1	7/19/2016
Epichlorohydrin	ND	5.0		µg/L	1	7/19/2016
Ethyl acetate	ND	0.50		µg/L	1	7/19/2016
Ethyl methacrylate	ND	2.5		µg/L	1	7/19/2016
Ethyl tert-butyl ether	ND	0.50		µg/L	1	7/19/2016
Freon-113	ND	0.50		µg/L	1	7/19/2016
Isobutanol	ND	10		µg/L	1	7/19/2016
Isopropyl acetate	ND	0.50		µg/L	1	7/19/2016
Methacrylonitrile	ND	2.5		µg/L	1	7/19/2016
Methyl acetate	ND	0.50		µg/L	1	7/19/2016
Methyl ethyl ketone	ND	2.5		µg/L	1	7/19/2016
Methyl isobutyl ketone	ND	2.5		µg/L	1	7/19/2016
Methyl methacrylate	ND	2.5		µg/L	1	7/19/2016
Methylcyclohexane	ND	1.0		µg/L	1	7/19/2016
n-Amyl acetate	ND	0.50		µg/L	1	7/19/2016
n-Hexane	ND	0.50		µg/L	1	7/19/2016
Nitrobenzene	ND	5.0		µg/L	1	7/19/2016
Pentachloroethane	ND	5.0		µg/L	1	7/19/2016
p-isopropyltoluene	ND	0.50		µg/L	1	7/19/2016
Propionitrile	ND	2.5		µg/L	1	7/19/2016
Tetrahydrofuran	ND	0.50		µg/L	1	7/19/2016
Benzene	ND	0.50		µg/L	1	7/19/2016
Toluene	ND	0.50		µg/L	1	7/19/2016
Ethylbenzene	ND	0.50		µg/L	1	7/19/2016
Methyl tert-butyl ether (MTBE)	ND	10		µg/L	1	7/19/2016
1,2,4-Trimethylbenzene	ND	0.50		µg/L	1	7/19/2016
1,3,5-Trimethylbenzene	ND	0.50		µg/L	1	7/19/2016
1,2-Dichloroethane (EDC)	ND	0.50		µg/L	1	7/19/2016
1,2-Dibromoethane (EDB)	ND	0.50		µg/L	1	7/19/2016
Naphthalene	ND	0.50		µg/L	1	7/19/2016
Acetone	ND	2.5		µg/L	1	7/19/2016
Bromobenzene	ND	0.50		µg/L	1	7/19/2016
Bromodichloromethane	ND	0.50		µg/L	1	7/19/2016
Bromoform	ND	0.50		µg/L	1	7/19/2016

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Qualifiers:

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D	Sample Diluted Due to Matrix	E	Value above quantitation range
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Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company
Client Sample ID: TRIP BLANK
Project: Quarterly WDW-1, 2, &3 Inj Well
Collection Date:
Lab ID: 1607300-002
Matrix: TRIP BLANK
Received Date: 7/7/2016 10:15:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: **SUB**
Bromomethane	ND	0.50		µg/L	1	7/19/2016
2-Butanone	ND	2.5		µg/L	1	7/19/2016
Carbon disulfide	ND	0.50		µg/L	1	7/19/2016
Carbon Tetrachloride	ND	0.50		µg/L	1	7/19/2016
Chlorobenzene	ND	0.50		µg/L	1	7/19/2016
Chloroethane	ND	0.50		µg/L	1	7/19/2016
Chloroform	ND	0.50		µg/L	1	7/19/2016
Chloromethane	ND	0.50		µg/L	1	7/19/2016
2-Chlorotoluene	ND	0.50		µg/L	1	7/19/2016
4-Chlorotoluene	ND	0.50		µg/L	1	7/19/2016
cis-1,2-DCE	ND	0.50		µg/L	1	7/19/2016
cis-1,3-Dichloropropene	ND	0.50		µg/L	1	7/19/2016
1,2-Dibromo-3-chloropropane	ND	0.50		µg/L	1	7/19/2016
Dibromochloromethane	ND	0.50		µg/L	1	7/19/2016
Dibromomethane	ND	0.50		µg/L	1	7/19/2016
1,2-Dichlorobenzene	ND	0.50		µg/L	1	7/19/2016
1,3-Dichlorobenzene	ND	0.50		µg/L	1	7/19/2016
1,4-Dichlorobenzene	ND	0.50		µg/L	1	7/19/2016
Dichlorodifluoromethane	ND	0.50		µg/L	1	7/19/2016
1,1-Dichloroethane	ND	0.50		µg/L	1	7/19/2016
1,1-Dichloroethene	ND	0.50		µg/L	1	7/19/2016
1,2-Dichloropropane	ND	0.50		µg/L	1	7/19/2016
1,3-Dichloropropane	ND	0.50		µg/L	1	7/19/2016
2,2-Dichloropropane	ND	0.50		µg/L	1	7/19/2016
1,1-Dichloropropene	ND	0.50		µg/L	1	7/19/2016
Hexachlorobutadiene	ND	0.50		µg/L	1	7/19/2016
2-Hexanone	ND	0.50		µg/L	1	7/19/2016
Isopropylbenzene	ND	0.50		µg/L	1	7/19/2016
Methylene Chloride	ND	2.5		µg/L	1	7/19/2016
n-Butylbenzene	ND	0.50		µg/L	1	7/19/2016
n-Propylbenzene	ND	0.50		µg/L	1	7/19/2016
sec-Butylbenzene	ND	0.50		µg/L	1	7/19/2016
Styrene	ND	0.50		µg/L	1	7/19/2016
tert-Butylbenzene	ND	0.50		µg/L	1	7/19/2016
1,1,1,2-Tetrachloroethane	ND	0.50		µg/L	1	7/19/2016
1,1,2,2-Tetrachloroethane	ND	0.50		µg/L	1	7/19/2016
Tetrachloroethene (PCE)	ND	0.50		µg/L	1	7/19/2016
trans-1,2-DCE	ND	0.50		µg/L	1	7/19/2016
trans-1,3-Dichloropropene	ND	0.50		µg/L	1	7/19/2016

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

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	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company
Client Sample ID: TRIP BLANK
Project: Quarterly WDW-1, 2, &3 Inj Well
Collection Date:
Lab ID: 1607300-002
Matrix: TRIP BLANK
Received Date: 7/7/2016 10:15:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed
EPA METHOD 8260B: VOLATILES						Analyst: **SUB**
1,2,3-Trichlorobenzene	ND	0.50		µg/L	1	7/19/2016
1,2,4-Trichlorobenzene	ND	0.50		µg/L	1	7/19/2016
1,1,1-Trichloroethane	ND	0.50		µg/L	1	7/19/2016
1,1,2-Trichloroethane	ND	0.50		µg/L	1	7/19/2016
Trichloroethene (TCE)	ND	0.50		µg/L	1	7/19/2016
Trichlorofluoromethane	ND	0.50		µg/L	1	7/19/2016
1,2,3-Trichloropropane	ND	0.50		µg/L	1	7/19/2016
Vinyl chloride	ND	0.50		µg/L	1	7/19/2016
mp-Xylenes	ND	1.0		µg/L	1	7/19/2016
o-Xylene	ND	0.50		µg/L	1	7/19/2016
tert-Amyl methyl ether	ND	0.50		µg/L	1	7/19/2016
tert-Butyl alcohol	ND	0.50		µg/L	1	7/19/2016
Acrolein	ND	2.5		µg/L	1	7/19/2016
Acrylonitrile	ND	2.5		µg/L	1	7/19/2016
Bromochloromethane	ND	0.50		µg/L	1	7/19/2016
2-Chloroethyl vinyl ether	ND	0.50		µg/L	1	7/19/2016
Iodomethane	ND	0.50		µg/L	1	7/19/2016
trans-1,4-Dichloro-2-butene	ND	0.50		µg/L	1	7/19/2016
Vinyl acetate	ND	0.50		µg/L	1	7/19/2016
1,4-Dioxane	ND	20		µg/L	1	7/19/2016
Surr: 1,2-Dichlorobenzene-d4	99.6	70-130		%Rec	1	7/19/2016
Surr: 4-Bromofluorobenzene	94.0	70-130		%Rec	1	7/19/2016
Surr: Toluene-d8	100	70-130		%Rec	1	7/19/2016

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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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1607300**

01-Aug-16

Client: Navajo Refining Company

Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID **MB**	SampType: **MBLK**	TestCode: **EPA Method 300.0: Anions**
Client ID: **PBW**	Batch ID: **R35519**	RunNo: **35519**
Prep Date:	Analysis Date: **7/7/2016**	SeqNo: **1099779** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	ND	0.10								
Chloride	ND	0.50								
Bromide	ND	0.10								
Phosphorus, Orthophosphate (As P	ND	0.50								
Nitrate+Nitrite as N	ND	0.20								

Sample ID **LCS**	SampType: **LCS**	TestCode: **EPA Method 300.0: Anions**
Client ID: **LCSW**	Batch ID: **R35519**	RunNo: **35519**
Prep Date:	Analysis Date: **7/7/2016**	SeqNo: **1099780** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	0.50	0.10	0.5000	0	100	90	110			
Chloride	4.7	0.50	5.000	0	93.8	90	110			
Bromide	2.4	0.10	2.500	0	96.6	90	110			
Phosphorus, Orthophosphate (As P	4.8	0.50	5.000	0	96.3	90	110			
Nitrate+Nitrite as N	3.4	0.20	3.500	0	97.1	90	110			

Sample ID **MB**	SampType: **MBLK**	TestCode: **EPA Method 300.0: Anions**
Client ID: **PBW**	Batch ID: **A35552**	RunNo: **35552**
Prep Date:	Analysis Date: **7/8/2016**	SeqNo: **1100904** Units: **mg/L**

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

Sample ID **LCS**	SampType: **LCS**	TestCode: **EPA Method 300.0: Anions**
Client ID: **LCSW**	Batch ID: **A35552**	RunNo: **35552**
Prep Date:	Analysis Date: **7/8/2016**	SeqNo: **1100905** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	9.7	0.50	10.00	0	96.9	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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1607300**

01-Aug-16

Client: Navajo Refining Company

Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID **MB-R36111**	SampType: **MBLK**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **PBW**	Batch ID: **R36111**	RunNo: **36111**
Prep Date:	Analysis Date: **7/19/2016**	SeqNo: **1118577** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Acetonitrile	ND	0.50								
Allyl chloride	ND	0.50								
Chloroprene	ND	0.50								
Ethyl methacrylate	ND	2.5								
Isobutanol	ND	10								
Methacrylonitrile	ND	2.5								
Methyl ethyl ketone	ND	2.5								
Methyl isobutyl ketone	ND	2.5								
Methyl methacrylate	ND	2.5								
Propionitrile	ND	2.5								
Benzene	ND	0.50								
Toluene	ND	0.50								
Ethylbenzene	ND	0.50								
1,2-Dichloroethane (EDC)	ND	0.50								
1,2-Dibromoethane (EDB)	ND	0.50								
Acetone	ND	2.5								
Bromodichloromethane	ND	0.50								
Bromoform	ND	0.50								
Bromomethane	ND	0.50								
2-Butanone	ND	2.5								
Carbon disulfide	ND	0.50								
Carbon Tetrachloride	ND	0.50								
Chlorobenzene	ND	0.50								
Chloroethane	ND	0.50								
Chloroform	ND	0.50								
Chloromethane	ND	0.50								
cis-1,2-DCE	ND	0.50								
cis-1,3-Dichloropropene	ND	0.50								
1,2-Dibromo-3-chloropropane	ND	0.50								
Dibromochloromethane	ND	0.50								
Dibromomethane	ND	0.50								
1,2-Dichlorobenzene	ND	0.50								
1,4-Dichlorobenzene	ND	0.50								
Dichlorodifluoromethane	ND	0.50								
1,1-Dichloroethane	ND	0.50								
1,1-Dichloroethene	ND	0.50								
1,2-Dichloropropane	ND	0.50								
1,3-Dichloropropane	ND	0.50								
2,2-Dichloropropane	ND	0.50								

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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QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1607300**

01-Aug-16

Client: Navajo Refining Company

Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID **MB-R36111**	SampType: **MBLK**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **PBW**	Batch ID: **R36111**	RunNo: **36111**
Prep Date:	Analysis Date: **7/19/2016**	SeqNo: **1118577** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
1,1-Dichloropropene	ND	0.50								
2-Hexanone	ND	0.50								
Methylene Chloride	ND	2.5								
Styrene	ND	0.50								
1,1,1,2-Tetrachloroethane	ND	0.50								
1,1,2,2-Tetrachloroethane	ND	0.50								
Tetrachloroethene (PCE)	ND	0.50								
trans-1,2-DCE	ND	0.50								
trans-1,3-Dichloropropene	ND	0.50								
1,1,1-Trichloroethane	ND	0.50								
1,1,2-Trichloroethane	ND	0.50								
Trichloroethene (TCE)	ND	0.50								
Trichlorofluoromethane	ND	0.50								
1,2,3-Trichloropropane	ND	0.50								
Vinyl chloride	ND	0.50								
mp-Xylenes	ND	1.0								
o-Xylene	ND	0.50								
Acrolein	ND	2.5								
Acrylonitrile	ND	2.5								
Bromochloromethane	ND	0.50								
Iodomethane	ND	0.50								
trans-1,4-Dichloro-2-butene	ND	0.50								
Vinyl acetate	ND	0.50								

Sample ID **LCS-R36111**	SampType: **LCS**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **LCSW**	Batch ID: **R36111**	RunNo: **36111**
Prep Date:	Analysis Date: **7/19/2016**	SeqNo: **1118578** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	9.6	0	10.00	0	95.9	80	120			
Toluene	9.9	0	10.00	0	98.8	80	120			
Ethylbenzene	9.8	0	10.00	0	98.4	80	120			
Chlorobenzene	9.6	0	10.00	0	96.2	80	120			
1,1-Dichloroethene	9.8	0	10.00	0	98.3	80	120			
Tetrachloroethene (PCE)	9.2	0	10.00	0	92.5	80	120			
Trichloroethene (TCE)	9.5	0	10.00	0	95.2	80	120			
o-Xylene	11	0	10.00	0	107	80	120			

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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1607300**
01-Aug-16

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID **MB-R36111**	SampType: **MBLK**	TestCode: **EPA 8270C: Semivolatiles/Mod**
Client ID: **PBW**	Batch ID: **R36111**	RunNo: **36111**
Prep Date:	Analysis Date: **7/15/2016**	SeqNo: **1118582** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Acetophenone	ND	5.0								
1-Methylnaphthalene	ND	5.0								
2,3,4,6-Tetrachlorophenol	ND	5.0								
2,4,5-Trichlorophenol	ND	5.0								
2,4,6-Trichlorophenol	ND	5.0								
2,4-Dichlorophenol	ND	5.0								
2,4-Dimethylphenol	ND	5.0								
2,4-Dinitrophenol	ND	5.0								
2,4-Dinitrotoluene	ND	5.0								
2,6-Dinitrotoluene	ND	5.0								
2-Chloronaphthalene	ND	5.0								
2-Chlorophenol	ND	5.0								
2-Methylnaphthalene	ND	5.0								
2-Methylphenol	ND	5.0								
2-Nitroaniline	ND	5.0								
2-Nitrophenol	ND	5.0								
3,3´-Dichlorobenzidine	ND	5.0								
3-Nitroaniline	ND	5.0								
4,6-Dinitro-2-methylphenol	ND	5.0								
4-Bromophenyl phenyl ether	ND	5.0								
4-Chloro-3-methylphenol	ND	5.0								
4-Chloroaniline	ND	5.0								
4-Chlorophenyl phenyl ether	ND	5.0								
4-Nitroaniline	ND	5.0								
4-Nitrophenol	ND	5.0								
Acenaphthene	ND	5.0								
Acenaphthylene	ND	5.0								
Anthracene	ND	5.0								
Benzo(g,h,i)perylene	ND	5.0								
Benz(a)anthracene	ND	0.10								
Benzo(a)pyrene	ND	0.10								
Benzo(b)fluoranthene	ND	0.10								
Benzo(k)fluoranthene	ND	0.10								
Bis(2-chloroethoxy)methane	ND	5.0								
Bis(2-chloroethyl)ether	ND	5.0								
Bis(2-chloroisopropyl)ether	ND	5.0								
Bis(2-ethylhexyl)phthalate	ND	5.0								
Butyl benzyl phthalate	ND	5.0								
Carbazole	ND	5.0								

Qualifiers:

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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#: **1607300**

01-Aug-16

Client: Navajo Refining Company

Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID **MB-R36111**	SampType: **MBLK**	TestCode: **EPA 8270C: Semivolatiles/Mod**
Client ID: **PBW**	Batch ID: **R36111**	RunNo: **36111**
Prep Date:	Analysis Date: **7/15/2016**	SeqNo: **1118582** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chrysene	ND	0.10								
Dibenz(a,h)anthracene	ND	0.10								
Dibenzofuran	ND	5.0								
Diethyl phthalate	ND	5.0								
Dimethyl phthalate	ND	5.0								
Di-n-butyl phthalate	ND	5.0								
Di-n-octyl phthalate	ND	5.0								
Fluoranthene	ND	5.0								
Fluorene	ND	5.0								
Hexachlorobenzene	ND	1.0								
Hexachlorobutadiene	ND	5.0								
Hexachlorocyclopentadiene	ND	5.0								
Hexachloroethane	ND	5.0								
Indeno(1,2,3-cd)pyrene	ND	0.10								
Isophorone	ND	5.0								
Naphthalene	ND	5.0								
Nitrobenzene	ND	5.0								
N-Nitrosodi-n-propylamine	ND	5.0								
N-Nitrosodiphenylamine	ND	2.0								
Pentachlorophenol	ND	5.0								
Phenanthrene	ND	1.0								
Phenol	ND	5.0								
Pyrene	ND	5.0								
o-Toluidine	ND	2.0								
Pyridine	ND	5.0								
1,2,4,5-Tetrachlorobenzene	ND	5.0								

Sample ID **LCS-R36111**	SampType: **LCS**	TestCode: **EPA 8270C: Semivolatiles/Mod**
Client ID: **LCSW**	Batch ID: **R36111**	RunNo: **36111**
Prep Date:	Analysis Date: **7/15/2016**	SeqNo: **1118583** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
2,4-Dinitrotoluene	5.4	0	5.000	0	107	49	134			
2-Chlorophenol	3.2	0	5.000	0	64.6	50	131			
4-Chloro-3-methylphenol	3.5	0	5.000	0	69.4	42	139			
4-Nitrophenol	1.9	0	5.000	0	38.2	19	137			
Acenaphthene	4.9	0	5.000	0	97.4	36	122			
Bis(2-ethylhexyl)phthalate	6.2	0	5.000	0	124	43	142			
N-Nitrosodi-n-propylamine	4.2	0	5.000	0	84.4	46	140			

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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1607300**

01-Aug-16

Client: Navajo Refining Company

Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID	**LCS-R36111**	SampType:	**LCS**	TestCode:	**EPA 8270C: Semivolatiles/Mod**					
Client ID:	**LCSW**	Batch ID:	**R36111**	RunNo:	**36111**					
Prep Date:		Analysis Date:	**7/15/2016**	SeqNo:	**1118583**	Units:	**µg/L**			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Pentachlorophenol		3.4	0	5.000	0	68.6	22	138			
Phenol		3.8	0	5.000	0	75.8	45	134			
Pyrene		5.2	0	5.000	0	105	45	138			

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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1607300**
01-Aug-16

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID **1607300-001a dup**	SampType: **dup**			TestCode: **SM2510B: Specific Conductance**					
Client ID: **WDW-1,2,&3 Effluen**	Batch ID: **R35550**			RunNo: **35550**					
Prep Date:	Analysis Date: **7/8/2016**			SeqNo: **1100752**	Units: **µmhos/cm**				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Conductivity	4700	1.0						0.603	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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1607300**

01-Aug-16

Client: Navajo Refining Company

Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID	**MB-26407**	SampType:	**MBLK**	TestCode:	**EPA Method 7470: Mercury**					
Client ID:	**PBW**	Batch ID:	**26407**	RunNo:	**35726**					
Prep Date:	**7/14/2016**	Analysis Date:	**7/15/2016**	SeqNo:	**1105600**	Units:	**mg/L**			

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

Sample ID	**LCS-26407**	SampType:	**LCS**	TestCode:	**EPA Method 7470: Mercury**					
Client ID:	**LCSW**	Batch ID:	**26407**	RunNo:	**35726**					
Prep Date:	**7/14/2016**	Analysis Date:	**7/15/2016**	SeqNo:	**1105601**	Units:	**mg/L**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0052	0.00020	0.005000	0	103	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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1607300**

01-Aug-16

Client: Navajo Refining Company

Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID	**MB-26510**	SampType:	**MBLK**	TestCode:	**MERCURY, TCLP**					
Client ID:	**PBW**	Batch ID:	**26510**	RunNo:	**35874**					
Prep Date:	**7/20/2016**	Analysis Date:	**7/21/2016**	SeqNo:	**1110461**	Units:	**mg/L**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	ND	0.020								

Sample ID	**LCS-26510**	SampType:	**LCS**	TestCode:	**MERCURY, TCLP**					
Client ID:	**LCSW**	Batch ID:	**26510**	RunNo:	**35874**					
Prep Date:	**7/20/2016**	Analysis Date:	**7/21/2016**	SeqNo:	**1110462**	Units:	**mg/L**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	ND	0.020	0.005000	0	104	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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1607300**

01-Aug-16

Client: Navajo Refining Company

Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID	**MB-26475**	SampType:	**MBLK**	TestCode:	**EPA Method 6010B: TCLP Metals**
Client ID:	**PBW**	Batch ID:	**26475**	RunNo:	**35810**
Prep Date:	**7/19/2016**	Analysis Date:	**7/20/2016**	SeqNo:	**1108224** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	ND	5.0								
Barium	ND	100								
Cadmium	ND	1.0								
Chromium	ND	5.0								
Lead	ND	5.0								
Selenium	ND	1.0								
Silver	ND	5.0								

Sample ID	**LCS-26475**	SampType:	**LCS**	TestCode:	**EPA Method 6010B: TCLP Metals**
Client ID:	**LCSW**	Batch ID:	**26475**	RunNo:	**35810**
Prep Date:	**7/19/2016**	Analysis Date:	**7/20/2016**	SeqNo:	**1108225** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	ND	5.0	0.5000	0	105	80	120			
Barium	ND	100	0.5000	0	95.4	80	120			
Cadmium	ND	1.0	0.5000	0	99.9	80	120			
Chromium	ND	5.0	0.5000	0	95.8	80	120			
Lead	ND	5.0	0.5000	0	93.5	80	120			
Selenium	ND	1.0	0.5000	0	107	80	120			
Silver	ND	5.0	0.1000	0	98.7	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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1607300**

01-Aug-16

Client: Navajo Refining Company

Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID **MB-26511**	SampType: **MBLK**	TestCode: **EPA 6010B: Total Recoverable Metals**
Client ID: **PBW**	Batch ID: **26511**	RunNo: **35864**
Prep Date: **7/20/2016**	Analysis Date: **7/21/2016**	SeqNo: **1110316** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	ND	0.020								
Antimony	ND	0.050								
Arsenic	ND	0.020								
Barium	ND	0.020								
Beryllium	ND	0.0030								
Cadmium	ND	0.0020								
Calcium	ND	1.0								
Chromium	ND	0.0060								
Cobalt	ND	0.0060								
Copper	ND	0.0060								
Iron	ND	0.050								
Lead	ND	0.0050								
Magnesium	ND	1.0								
Manganese	ND	0.0020								
Nickel	ND	0.010								
Potassium	ND	1.0								
Selenium	ND	0.050								
Silver	ND	0.0050								
Sodium	ND	1.0								
Strontium	ND	0.010								
Thallium	ND	0.050								
Zinc	ND	0.020								
Silica	ND	1.1								

Sample ID **LCS-26511**	SampType: **LCS**	TestCode: **EPA 6010B: Total Recoverable Metals**
Client ID: **LCSW**	Batch ID: **26511**	RunNo: **35864**
Prep Date: **7/20/2016**	Analysis Date: **7/21/2016**	SeqNo: **1110317** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	0.53	0.020	0.5000	0	106	80	120			
Antimony	0.52	0.050	0.5000	0	103	80	120			
Arsenic	0.50	0.020	0.5000	0	100	80	120			
Barium	0.50	0.020	0.5000	0	99.6	80	120			
Beryllium	0.52	0.0030	0.5000	0	103	80	120			
Cadmium	0.49	0.0020	0.5000	0	97.5	80	120			
Calcium	50	1.0	50.00	0	99.2	80	120			
Chromium	0.49	0.0060	0.5000	0	98.1	80	120			
Cobalt	0.47	0.0060	0.5000	0	94.8	80	120			
Copper	0.51	0.0060	0.5000	0	102	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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1607300**

01-Aug-16

Client: Navajo Refining Company

Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID	**LCS-26511**	SampType: **LCS**		TestCode: **EPA 6010B: Total Recoverable Metals**						
Client ID:	**LCSW**	Batch ID: **26511**		RunNo: **35864**						
Prep Date:	**7/20/2016**	Analysis Date: **7/21/2016**		SeqNo: **1110317**		Units: **mg/L**				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Iron	0.48	0.050	0.5000	0	96.1	80	120			
Lead	0.48	0.0050	0.5000	0	95.7	80	120			
Magnesium	50	1.0	50.00	0	99.2	80	120			
Manganese	0.49	0.0020	0.5000	0	98.2	80	120			
Nickel	0.48	0.010	0.5000	0	95.8	80	120			
Potassium	48	1.0	50.00	0	95.3	80	120			
Selenium	0.48	0.050	0.5000	0	97.0	80	120			
Silver	0.10	0.0050	0.1000	0	100	80	120			
Sodium	48	1.0	50.00	0	96.1	80	120			
Strontium	0.11	0.010	0.1000	0	112	80	120			
Thallium	0.49	0.050	0.5000	0	98.7	80	120			
Zinc	0.48	0.020	0.5000	0	96.4	80	120			
Silica	5.6	1.1	5.350	0	105	80	120			

Sample ID	**1607300-001BMS**	SampType: **MS**		TestCode: **EPA 6010B: Total Recoverable Metals**						
Client ID:	**WDW-1,2,&3 Effluen**	Batch ID: **26511**		RunNo: **35864**						
Prep Date:	**7/20/2016**	Analysis Date: **7/21/2016**		SeqNo: **1110319**		Units: **mg/L**				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.50	0.050	0.5000	0	101	75	125			
Arsenic	0.54	0.020	0.5000	0.03838	99.6	75	125			
Barium	0.49	0.020	0.5000	0.01824	95.1	75	125			
Beryllium	0.49	0.0030	0.5000	0.0001500	97.2	75	125			
Cadmium	0.48	0.0020	0.5000	0	95.7	75	125			
Chromium	0.47	0.0060	0.5000	0	94.2	75	125			
Cobalt	0.47	0.0060	0.5000	0.002470	92.9	75	125			
Copper	0.54	0.0060	0.5000	0.001890	107	75	125			
Iron	0.68	0.050	0.5000	0.2264	90.4	75	125			
Lead	0.46	0.0050	0.5000	0	92.8	75	125			
Magnesium	90	1.0	50.00	45.07	90.4	75	125			
Manganese	0.56	0.0020	0.5000	0.09587	93.0	75	125			
Nickel	0.46	0.010	0.5000	0.003580	91.1	75	125			
Selenium	0.48	0.050	0.5000	0	96.3	75	125			
Silver	0.097	0.0050	0.1000	0	96.9	75	125			
Zinc	0.50	0.020	0.5000	0.04167	90.8	75	125			

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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1607300**

01-Aug-16

Client: Navajo Refining Company

Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID **1607300-001BMSD** SampType: **MSD** TestCode: **EPA 6010B: Total Recoverable Metals**

Client ID: **WDW-1,2,&3 Effluen** Batch ID: **26511** RunNo: **35864**

Prep Date: **7/20/2016** Analysis Date: **7/21/2016** SeqNo: **1110320** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Antimony	0.50	0.050	0.5000	0	100	75	125	0.483	20	
Arsenic	0.54	0.020	0.5000	0.03838	99.9	75	125	0.203	20	
Barium	0.49	0.020	0.5000	0.01824	95.0	75	125	0.111	20	
Beryllium	0.49	0.0030	0.5000	0.0001500	97.3	75	125	0.0781	20	
Cadmium	0.47	0.0020	0.5000	0	94.4	75	125	1.32	20	
Chromium	0.46	0.0060	0.5000	0	92.8	75	125	1.49	20	
Cobalt	0.46	0.0060	0.5000	0.002470	91.5	75	125	1.51	20	
Copper	0.54	0.0060	0.5000	0.001890	108	75	125	0.211	20	
Iron	0.71	0.050	0.5000	0.2264	96.0	75	125	4.06	20	
Lead	0.46	0.0050	0.5000	0	91.8	75	125	1.00	20	
Magnesium	91	1.0	50.00	45.07	92.8	75	125	1.31	20	
Manganese	0.56	0.0020	0.5000	0.09587	93.5	75	125	0.393	20	
Nickel	0.46	0.010	0.5000	0.003580	91.3	75	125	0.194	20	
Selenium	0.49	0.050	0.5000	0	97.8	75	125	1.56	20	
Silver	0.097	0.0050	0.1000	0	97.3	75	125	0.350	20	
Zinc	0.50	0.020	0.5000	0.04167	92.4	75	125	1.56	20	

Sample ID **1607300-001BMS** SampType: **MS** TestCode: **EPA 6010B: Total Recoverable Metals**

Client ID: **WDW-1,2,&3 Effluen** Batch ID: **26511** RunNo: **35864**

Prep Date: **7/20/2016** Analysis Date: **7/21/2016** SeqNo: **1110322** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	1.4	0.10	0.5000	0.8700	99.2	75	125			
Potassium	110	5.0	50.00	68.56	86.8	75	125			
Thallium	0.58	0.25	0.5000	0	116	75	125			

Sample ID **1607300-001BMSD** SampType: **MSD** TestCode: **EPA 6010B: Total Recoverable Metals**

Client ID: **WDW-1,2,&3 Effluen** Batch ID: **26511** RunNo: **35864**

Prep Date: **7/20/2016** Analysis Date: **7/21/2016** SeqNo: **1110323** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	1.4	0.10	0.5000	0.8700	96.3	75	125	1.09	20	
Potassium	110	5.0	50.00	68.56	82.1	75	125	2.13	20	
Thallium	0.57	0.25	0.5000	0	114	75	125	1.89	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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1607300**
01-Aug-16

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID **1607300-001a dup**	SampType: **dup**			TestCode: **SM4500-H+B: pH**						
Client ID: **WDW-1,2,&3 Effluen**	Batch ID: **R35550**			RunNo: **35550**						
Prep Date:	Analysis Date: **7/8/2016**			SeqNo: **1100761**	Units: **pH units**					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
pH	7.62	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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1607300**

01-Aug-16

Client: Navajo Refining Company

Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID	**MB-R36111**	SampType:	**MBLK**	TestCode:	**CYANIDE, Reactive**					
Client ID:	**PBW**	Batch ID:	**R36111**	RunNo:	**36111**					
Prep Date:		Analysis Date:	**7/19/2016**	SeqNo:	**1118586**	Units:	**mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cyanide, Reactive	ND	1.00								

Sample ID	**LCS-R36111**	SampType:	**LCS**	TestCode:	**CYANIDE, Reactive**					
Client ID:	**LCSW**	Batch ID:	**R36111**	RunNo:	**36111**					
Prep Date:		Analysis Date:	**7/19/2016**	SeqNo:	**1118587**	Units:	**mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cyanide, Reactive	0.551		0.5000	0	110	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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1607300**
01-Aug-16

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID	**MB-R36111**	SampType:	**MBLK**	TestCode:	**SULFIDE, Reactive**					
Client ID:	**PBW**	Batch ID:	**R36111**	RunNo:	**36111**					
Prep Date:		Analysis Date:	**7/14/2016**	SeqNo:	**1118597**	Units:	**mg/L**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Reactive Sulfide	ND	1.0								

Sample ID	**LCS-R36111**	SampType:	**LCS**	TestCode:	**SULFIDE, Reactive**					
Client ID:	**LCSW**	Batch ID:	**R36111**	RunNo:	**36111**					
Prep Date:		Analysis Date:	**7/14/2016**	SeqNo:	**1118598**	Units:	**mg/L**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Reactive Sulfide	0.18		0.2000	0	90.0	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
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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1607300**
01-Aug-16

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID **mb-1**	SampType: **mblk**	TestCode: **SM2320B: Alkalinity**							
Client ID: **PBW**	Batch ID: **R35550**	RunNo: **35550**							
Prep Date:	Analysis Date: **7/8/2016**	SeqNo: **1100788**	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: **R35550**	RunNo: **35550**							
Prep Date:	Analysis Date: **7/8/2016**	SeqNo: **1100789**	Units: **mg/L CaCO3**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	77.36	20.00	80.00	0	96.7	90	110			

Sample ID **mb-2**	SampType: **mblk**	TestCode: **SM2320B: Alkalinity**							
Client ID: **PBW**	Batch ID: **R35550**	RunNo: **35550**							
Prep Date:	Analysis Date: **7/8/2016**	SeqNo: **1100812**	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: **R35550**	RunNo: **35550**							
Prep Date:	Analysis Date: **7/8/2016**	SeqNo: **1100813**	Units: **mg/L CaCO3**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	78.56	20.00	80.00	0	98.2	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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1607300**
01-Aug-16

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID **1607300-001ADUP**	SampType: **DUP**			TestCode: **Specific Gravity**						
Client ID: **WDW-1,2,&3 Effluen**	Batch ID: **R35525**			RunNo: **35525**						
Prep Date:	Analysis Date: **7/8/2016**			SeqNo: **1100039**	Units:					
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Specific Gravity	0.9991	0						0.489	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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1607300**

01-Aug-16

Client: Navajo Refining Company

Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID **MB-26273**	SampType: **MBLK**	TestCode: **SM2540C MOD: Total Dissolved Solids**
Client ID: **PBW**	Batch ID: **26273**	RunNo: **35537**
Prep Date: **7/7/2016**	Analysis Date: **7/8/2016**	SeqNo: **1100261** 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-26273**	SampType: **LCS**	TestCode: **SM2540C MOD: Total Dissolved Solids**
Client ID: **LCSW**	Batch ID: **26273**	RunNo: **35537**
Prep Date: **7/7/2016**	Analysis Date: **7/8/2016**	SeqNo: **1100262** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	1000	20.0	1000	0	100	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	W	Sample container temperature is out of limit as specified

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: NAVAJO REFINING CO Work Order Number: 1607300 RcptNo: 1

Received by/date: AS 07/07/16

Logged By: Lindsay Mangin 7/7/2016 10:15:00 AM

Completed By: Lindsay Mangin 7/7/2016 12:11:31 PM

Reviewed By: 07/07/16

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 or >12 unless noted)

Adjusted? No

Checked by: AJ

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: Navajo Refining Co.

Mailing Address: P.O. Box 159 Artesia,

NM 88211-0159

Phone #: 575-748-3311

email or Fax#: 575-746-5451

QA/QC Package:

☐ Standard ☐ Level 4 (Full Validation)

☐ Other _____

☐ EDD (Type) _____

Turn-Around Time:

X Standard ☐ Rush

Project Name:

Quarterly WDW-1, 2, & 3 Inj Well

Project #: P.O. # 167796

Project Manager:

Micki Schultz / Scott Denton / Mike Holder

Sampler: Brady Hubbard

On Ice: ☑ Yes ☐ No

Sample Temperature: 1.0°C

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. 1607300	Specific Gravity,HCO3, CO3, Cl, SO4, TDS, pH, cond.,Fl, Cation/anion bal., Br, Eh/40	VOCs/SW-846 Method 8260C (see attached list 'VOCs')	SVOCs/SW-846 Method 8270D (see attached list 'SVOCs')	R,C,I/40 CFR part 261	Metals/SW-846 Mthd 6010, 7470 (see attached list 'Metals')	Ca, K, Mg, Na/40 CFR 136.3	TCLP Metals, only /40 CFR Part 261/ SW-846 Method 1311
7/5/16	8:30	Liquid	WDW-1, 2, & 3 Effluent	3	Neat/H2SO4	-001	X						X
7/5/16	8:30	Liquid	WDW-1, 2, & 3 Effluent	1	HNO3	-001					X	X	
7/5/16	8:30	Liquid	WDW-1, 2, & 3 Effluent	3	HCL	-001		X					
7/5/16	8:30	Liquid	WDW-1, 2, & 3 Effluent	2	Neat	-001			X				
7/5/16	8:30	Liquid	WDW-1, 2, & 3 Effluent	2	Neat	-001				X			
7/5/16	8:30	Liquid	Trip Blank	2	Neat	-002		X					
7/5/16	8:30	Liquid	Temperature Blank	1	Neat								

Analysis Request

Date:	Time:	Relinquished by:	Received by:	Date	Time
7-6-16	10:30	Brady Hubbard		7-7-16	1015
Date:	Time:	Relinquished by:	Received by:	Date	Time

Remarks: Send results to Scott Denton, Mike Holder, Robert Combs and Andrew Contreras.

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

November 16, 2016

Scott Denton

Navajo Refining Company
P.O. Box 159
Artesia, NM 88211-0159
TEL: (575) 748-3311
FAX

RE: Quarterly WDW-1, 2, &3 Inj Well OrderNo.: 1610612

Dear Scott Denton:

Hall Environmental Analysis Laboratory received 2 sample(s) on 10/13/2016 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

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

Case Narrative

WO#: **1610612**
Date: **11/16/2016**

CLIENT: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

Analytical Comments for WDW-1,2, & 3 Effluent:
The above referenced water sample was analyzed by EPA 8260C and the corresponding analytical report is attached in the following pages. The analyst also performed an NIST library review of the sample and the tentatively identified compounds (TIC's) are listed with estimated concentrations; 3-chloro-2-methyl-1-propene (~1 ppb), dibromofluoromethane (~9 ppb) and dimethyl disulfide (~1 ppb).
The above referenced water sample was also analyzed by EPA 8270D and the corresponding analytical report is attached in the following pages.

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company
Client Sample ID: WDW-1,2,&3 Effluent
Project: Quarterly WDW-1, 2, &3 Inj Well
Collection Date: 10/11/2016 9:00:00 AM
Lab ID: 1610612-001
Matrix: AQUEOUS
Received Date: 10/13/2016 8:30:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
IGNITABILITY METHOD 1010						Analyst: **SUB**	
Ignitability	>200	0		°F	1	10/18/2016	R38745
SULFIDE, REACTIVE						Analyst: **SUB**	
Reactive Sulfide	ND	0.40		mg/L	1	10/18/2016	R38745
SPECIFIC GRAVITY						Analyst: **LGT**	
Specific Gravity	0.9997	0			1	10/27/2016 10:52:00 AM	R38258
EPA METHOD 300.0: ANIONS						Analyst: **LGT**	
Fluoride	35	2.0	*	mg/L	20	10/14/2016 12:19:11 AM	R37942
Chloride	360	25		mg/L	50	10/25/2016 9:50:38 PM	R38187
Bromide	0.72	0.10		mg/L	1	10/14/2016 12:06:47 AM	R37942
Phosphorus, Orthophosphate (As P)	ND	10	H	mg/L	20	10/14/2016 12:19:11 AM	R37942
Sulfate	1500	25		mg/L	50	10/25/2016 9:50:38 PM	R38187
Nitrate+Nitrite as N	ND	1.0		mg/L	5	10/14/2016 1:21:13 AM	R37942
SM2510B: SPECIFIC CONDUCTANCE						Analyst: **JRR**	
Conductivity	4900	1.0		µmhos/cm	1	10/18/2016 4:54:00 PM	R38048
SM2320B: ALKALINITY						Analyst: **JRR**	
Bicarbonate (As CaCO3)	288.8	20.00		mg/L CaCO3	1	10/18/2016 4:54:00 PM	R38048
Carbonate (As CaCO3)	ND	2.000		mg/L CaCO3	1	10/18/2016 4:54:00 PM	R38048
Total Alkalinity (as CaCO3)	288.8	20.00		mg/L CaCO3	1	10/18/2016 4:54:00 PM	R38048
SM2540C MOD: TOTAL DISSOLVED SOLIDS						Analyst: **KS**	
Total Dissolved Solids	3210	20.0	*	mg/L	1	10/18/2016 6:58:00 PM	28098
CORROSIVITY						Analyst: **SUB**	
pH	8.23			pH Units	1	10/17/2016	R38745
CYANIDE, REACTIVE						Analyst: **SUB**	
Cyanide, Reactive	0.0250	0.0100		mg/L	1	10/25/2016	R38745
SM4500-H+B: PH						Analyst: **JRR**	
pH	8.10	1.68	H	pH units	1	10/18/2016 4:54:00 PM	R38048
EPA METHOD 7470: MERCURY						Analyst: **DBD**	
Mercury	ND	0.00020		mg/L	1	10/18/2016 5:17:17 PM	28113
MERCURY, TCLP						Analyst: **DBD**	
Mercury	ND	0.020		mg/L	1	10/19/2016 5:06:28 PM	28165
EPA METHOD 6010B: TCLP METALS						Analyst: **MED**	
Arsenic	ND	5.0		mg/L	1	10/24/2016 8:45:55 AM	28191
Barium	ND	100		mg/L	1	10/24/2016 8:45:55 AM	28191

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

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
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Hall Environmental Analysis Laboratory, Inc.

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Client Sample ID: WDW-1,2,&3 Effluent
Project: Quarterly WDW-1, 2, &3 Inj Well
Collection Date: 10/11/2016 9:00:00 AM
Lab ID: 1610612-001
Matrix: AQUEOUS
Received Date: 10/13/2016 8:30:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 6010B: TCLP METALS						Analyst: **MED**	
Cadmium	ND	1.0		mg/L	1	10/24/2016 8:45:55 AM	28191
Chromium	ND	5.0		mg/L	1	10/24/2016 8:45:55 AM	28191
Lead	ND	5.0		mg/L	1	10/24/2016 8:45:55 AM	28191
Selenium	ND	1.0		mg/L	1	10/24/2016 8:45:55 AM	28191
Silver	ND	5.0		mg/L	1	10/24/2016 8:45:55 AM	28191
EPA 6010B: METALS						Analyst: **MED**	
Aluminum	0.31	0.020		mg/L	1	10/31/2016 10:15:38 AM	28190
Antimony	ND	0.050		mg/L	1	10/31/2016 10:15:38 AM	28190
Arsenic	0.040	0.020		mg/L	1	10/31/2016 10:15:38 AM	28190
Barium	ND	0.020		mg/L	1	10/31/2016 10:15:38 AM	28190
Beryllium	ND	0.0030		mg/L	1	10/31/2016 10:15:38 AM	28190
Cadmium	ND	0.0020		mg/L	1	10/31/2016 10:15:38 AM	28190
Calcium	96	5.0		mg/L	5	11/7/2016 12:08:14 PM	28190
Chromium	ND	0.0060		mg/L	1	10/31/2016 10:15:38 AM	28190
Cobalt	ND	0.0060		mg/L	1	10/31/2016 10:15:38 AM	28190
Copper	0.017	0.0060		mg/L	1	10/31/2016 10:15:38 AM	28190
Iron	0.14	0.050		mg/L	1	10/31/2016 10:15:38 AM	28190
Lead	ND	0.0050		mg/L	1	10/31/2016 10:15:38 AM	28190
Magnesium	36	1.0		mg/L	1	11/7/2016 12:04:39 PM	28190
Manganese	0.052	0.0020		mg/L	1	10/31/2016 10:15:38 AM	28190
Nickel	ND	0.010		mg/L	1	10/31/2016 10:15:38 AM	28190
Potassium	120	5.0		mg/L	5	10/31/2016 10:22:16 AM	28190
Selenium	ND	0.050		mg/L	1	10/31/2016 10:15:38 AM	28190
Silver	ND	0.0050		mg/L	1	10/31/2016 10:15:38 AM	28190
Sodium	800	10		mg/L	10	11/7/2016 12:15:14 PM	28190
Thallium	ND	0.050		mg/L	1	10/31/2016 10:15:38 AM	28190
Vanadium	ND	0.050		mg/L	1	10/31/2016 10:15:38 AM	28190
Zinc	0.027	0.020		mg/L	1	10/31/2016 10:15:38 AM	28190
EPA METHOD 8260B: VOLATILES						Analyst: **SUB**	
2-isopropyltoluene	ND	0.50		µg/L	1	10/20/2016	R38745
Acetonitrile	58	5.0		µg/L	1	10/20/2016	R38745
Allyl chloride	ND	0.50		µg/L	1	10/20/2016	R38745
Chloroprene	ND	0.50		µg/L	1	10/20/2016	R38745
Cyclohexane	ND	0.50		µg/L	1	10/20/2016	R38745
Diethyl ether	ND	0.50		µg/L	1	10/20/2016	R38745
Epichlorohydrin	ND	100		µg/L	1	10/20/2016	R38745
Ethyl acetate	ND	0.50		µg/L	1	10/20/2016	R38745
Ethyl methacrylate	ND	2.5		µg/L	1	10/20/2016	R38745

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

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	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company
Client Sample ID: WDW-1,2,&3 Effluent
Project: Quarterly WDW-1, 2, &3 Inj Well
Collection Date: 10/11/2016 9:00:00 AM
Lab ID: 1610612-001
Matrix: AQUEOUS
Received Date: 10/13/2016 8:30:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **SUB**	
Ethyl tert-butyl ether	ND	0.50		µg/L	1	10/20/2016	R38745
Freon-113	ND	0.50		µg/L	1	10/20/2016	R38745
Isobutanol	ND	100		µg/L	1	10/20/2016	R38745
Isopropyl acetate	ND	0.50		µg/L	1	10/20/2016	R38745
Methacrylonitrile	ND	2.5		µg/L	1	10/20/2016	R38745
Methyl acetate	ND	0.50		µg/L	1	10/20/2016	R38745
Methyl ethyl ketone	ND	2.5		µg/L	1	10/20/2016	R38745
Methyl isobutyl ketone	ND	2.5		µg/L	1	10/20/2016	R38745
Methyl methacrylate	ND	2.5		µg/L	1	10/20/2016	R38745
Methylcyclohexane	ND	1.0		µg/L	1	10/20/2016	R38745
n-Amyl acetate	ND	0.50		µg/L	1	10/20/2016	R38745
n-Hexane	ND	0.50		µg/L	1	10/20/2016	R38745
Nitrobenzene	ND	5.0		µg/L	1	10/20/2016	R38745
Pentachloroethane	ND	5.0		µg/L	1	10/20/2016	R38745
p-isopropyltoluene	ND	0.50		µg/L	1	10/20/2016	R38745
Propionitrile	ND	2.5		µg/L	1	10/20/2016	R38745
Tetrahydrofuran	ND	0.50		µg/L	1	10/20/2016	R38745
Benzene	ND	0.50		µg/L	1	10/20/2016	R38745
Toluene	ND	0.50		µg/L	1	10/20/2016	R38745
Ethylbenzene	ND	0.50		µg/L	1	10/20/2016	R38745
Methyl tert-butyl ether (MTBE)	ND	10		µg/L	1	10/20/2016	R38745
1,2,4-Trimethylbenzene	ND	0.50		µg/L	1	10/20/2016	R38745
1,3,5-Trimethylbenzene	ND	0.50		µg/L	1	10/20/2016	R38745
1,2-Dichloroethane (EDC)	ND	0.50		µg/L	1	10/20/2016	R38745
1,2-Dibromoethane (EDB)	ND	0.50		µg/L	1	10/20/2016	R38745
Naphthalene	ND	0.50		µg/L	1	10/20/2016	R38745
Acetone	4.2	2.5		µg/L	1	10/20/2016	R38745
Bromobenzene	ND	0.50		µg/L	1	10/20/2016	R38745
Bromodichloromethane	ND	0.50		µg/L	1	10/20/2016	R38745
Bromoform	ND	0.50		µg/L	1	10/20/2016	R38745
Bromomethane	ND	0.50		µg/L	1	10/20/2016	R38745
2-Butanone	ND	2.5		µg/L	1	10/20/2016	R38745
Carbon disulfide	0.96	0.50		µg/L	1	10/20/2016	R38745
Carbon Tetrachloride	ND	0.50		µg/L	1	10/20/2016	R38745
Chlorobenzene	ND	0.50		µg/L	1	10/20/2016	R38745
Chloroethane	ND	0.50		µg/L	1	10/20/2016	R38745
Chloroform	ND	0.50		µg/L	1	10/20/2016	R38745
Chloromethane	1.1	0.50		µg/L	1	10/20/2016	R38745
2-Chlorotoluene	ND	0.50		µg/L	1	10/20/2016	R38745

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

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	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company
Client Sample ID: WDW-1,2,&3 Effluent
Project: Quarterly WDW-1, 2, &3 Inj Well
Collection Date: 10/11/2016 9:00:00 AM
Lab ID: 1610612-001
Matrix: AQUEOUS
Received Date: 10/13/2016 8:30:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **SUB**	
4-Chlorotoluene	ND	0.50		µg/L	1	10/20/2016	R38745
cis-1,2-DCE	ND	0.50		µg/L	1	10/20/2016	R38745
cis-1,3-Dichloropropene	ND	0.50		µg/L	1	10/20/2016	R38745
1,2-Dibromo-3-chloropropane	ND	0.50		µg/L	1	10/20/2016	R38745
Dibromochloromethane	ND	0.50		µg/L	1	10/20/2016	R38745
Dibromomethane	ND	0.50		µg/L	1	10/20/2016	R38745
1,2-Dichlorobenzene	ND	0.50		µg/L	1	10/20/2016	R38745
1,3-Dichlorobenzene	ND	0.50		µg/L	1	10/20/2016	R38745
1,4-Dichlorobenzene	ND	0.50		µg/L	1	10/20/2016	R38745
Dichlorodifluoromethane	ND	0.50		µg/L	1	10/20/2016	R38745
1,1-Dichloroethane	ND	0.50		µg/L	1	10/20/2016	R38745
1,1-Dichloroethene	ND	0.50		µg/L	1	10/20/2016	R38745
1,2-Dichloropropane	ND	0.50		µg/L	1	10/20/2016	R38745
1,3-Dichloropropane	ND	0.50		µg/L	1	10/20/2016	R38745
2,2-Dichloropropane	ND	0.50		µg/L	1	10/20/2016	R38745
1,1-Dichloropropene	ND	0.50		µg/L	1	10/20/2016	R38745
Hexachlorobutadiene	ND	0.50		µg/L	1	10/20/2016	R38745
2-Hexanone	ND	0.50		µg/L	1	10/20/2016	R38745
Isopropylbenzene	ND	0.50		µg/L	1	10/20/2016	R38745
Methylene Chloride	ND	2.5		µg/L	1	10/20/2016	R38745
n-Butylbenzene	ND	0.50		µg/L	1	10/20/2016	R38745
n-Propylbenzene	ND	0.50		µg/L	1	10/20/2016	R38745
sec-Butylbenzene	ND	0.50		µg/L	1	10/20/2016	R38745
Styrene	ND	0.50		µg/L	1	10/20/2016	R38745
tert-Butylbenzene	ND	0.50		µg/L	1	10/20/2016	R38745
1,1,1,2-Tetrachloroethane	ND	0.50		µg/L	1	10/20/2016	R38745
1,1,2,2-Tetrachloroethane	ND	0.50		µg/L	1	10/20/2016	R38745
Tetrachloroethene (PCE)	ND	0.50		µg/L	1	10/20/2016	R38745
trans-1,2-DCE	ND	0.50		µg/L	1	10/20/2016	R38745
trans-1,3-Dichloropropene	ND	0.50		µg/L	1	10/20/2016	R38745
1,2,3-Trichlorobenzene	ND	0.50		µg/L	1	10/20/2016	R38745
1,2,4-Trichlorobenzene	ND	0.50		µg/L	1	10/20/2016	R38745
1,1,1-Trichloroethane	ND	0.50		µg/L	1	10/20/2016	R38745
1,1,2-Trichloroethane	ND	0.50		µg/L	1	10/20/2016	R38745
Trichloroethene (TCE)	ND	0.50		µg/L	1	10/20/2016	R38745
Trichlorofluoromethane	ND	0.50		µg/L	1	10/20/2016	R38745
1,2,3-Trichloropropane	ND	0.50		µg/L	1	10/20/2016	R38745
Vinyl chloride	ND	0.50		µg/L	1	10/20/2016	R38745
mp-Xylenes	ND	1.0		µg/L	1	10/20/2016	R38745

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Lab ID: 1610612-001
Matrix: AQUEOUS
Received Date: 10/13/2016 8:30:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **SUB**	
o-Xylene	ND	0.50		µg/L	1	10/20/2016	R38745
tert-Amyl methyl ether	ND	0.50		µg/L	1	10/20/2016	R38745
tert-Butyl alcohol	ND	0.50		µg/L	1	10/20/2016	R38745
Acrolein	ND	2.5		µg/L	1	10/20/2016	R38745
Acrylonitrile	ND	2.5		µg/L	1	10/20/2016	R38745
Bromochloromethane	ND	0.50		µg/L	1	10/20/2016	R38745
2-Chloroethyl vinyl ether	ND	0.50		µg/L	1	10/20/2016	R38745
Iodomethane	ND	0.50		µg/L	1	10/20/2016	R38745
trans-1,4-Dichloro-2-butene	ND	0.50		µg/L	1	10/20/2016	R38745
Vinyl acetate	ND	0.50		µg/L	1	10/20/2016	R38745
Surr: 1,2-Dichlorobenzene-d4	105	0-0	S	%Rec	1	10/20/2016	R38745
Surr: 4-Bromofluorobenzene	96.8	70-130		%Rec	1	10/20/2016	R38745
Surr: Toluene-d8	100	70-130		%Rec	1	10/20/2016	R38745
EPA 8270C: SEMIVOLATILES/MOD						Analyst: **SUB**	
1,1-Biphenyl	ND	1.0		µg/L	1	10/29/2016	R38745
Atrazine	ND	1.0		µg/L	1	10/29/2016	R38745
Benzaldehyde	2.5	1.0		µg/L	1	10/29/2016	R38745
Caprolactam	ND	1.0		µg/L	1	10/29/2016	R38745
N-Nitroso-di-n-butylamine	ND	1.0		µg/L	1	10/29/2016	R38745
Acetophenone	ND	5.0		µg/L	1	10/29/2016	R38745
1-Methylnaphthalene	ND	5.0		µg/L	1	10/29/2016	R38745
2,3,4,6-Tetrachlorophenol	ND	5.0		µg/L	1	10/29/2016	R38745
2,4,5-Trichlorophenol	ND	5.0		µg/L	1	10/29/2016	R38745
2,4,6-Trichlorophenol	ND	5.0		µg/L	1	10/29/2016	R38745
2,4-Dichlorophenol	ND	5.0		µg/L	1	10/29/2016	R38745
2,4-Dimethylphenol	ND	5.0		µg/L	1	10/29/2016	R38745
2,4-Dinitrophenol	ND	5.0		µg/L	1	10/29/2016	R38745
2,4-Dinitrotoluene	ND	5.0		µg/L	1	10/29/2016	R38745
2,6-Dinitrotoluene	ND	5.0		µg/L	1	10/29/2016	R38745
2-Chloronaphthalene	ND	5.0		µg/L	1	10/29/2016	R38745
2-Chlorophenol	ND	5.0		µg/L	1	10/29/2016	R38745
2-Methylnaphthalene	ND	5.0		µg/L	1	10/29/2016	R38745
2-Methylphenol	ND	5.0		µg/L	1	10/29/2016	R38745
2-Nitroaniline	ND	5.0		µg/L	1	10/29/2016	R38745
2-Nitrophenol	ND	5.0		µg/L	1	10/29/2016	R38745
3,3´-Dichlorobenzidine	ND	5.0		µg/L	1	10/29/2016	R38745
3-Nitroaniline	ND	5.0		µg/L	1	10/29/2016	R38745
4,6-Dinitro-2-methylphenol	ND	5.0		µg/L	1	10/29/2016	R38745
4-Bromophenyl phenyl ether	ND	5.0		µg/L	1	10/29/2016	R38745

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Qualifiers:

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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	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company
Client Sample ID: WDW-1,2,&3 Effluent
Project: Quarterly WDW-1, 2, &3 Inj Well
Collection Date: 10/11/2016 9:00:00 AM
Lab ID: 1610612-001
Matrix: AQUEOUS
Received Date: 10/13/2016 8:30:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA 8270C: SEMIVOLATILES/MOD						Analyst: **SUB**	
4-Chloro-3-methylphenol	ND	5.0		µg/L	1	10/29/2016	R38745
4-Chloroaniline	ND	5.0		µg/L	1	10/29/2016	R38745
4-Chlorophenyl phenyl ether	ND	5.0		µg/L	1	10/29/2016	R38745
4-Nitroaniline	ND	5.0		µg/L	1	10/29/2016	R38745
4-Nitrophenol	ND	5.0		µg/L	1	10/29/2016	R38745
Acenaphthene	ND	5.0		µg/L	1	10/29/2016	R38745
Acenaphthylene	ND	5.0		µg/L	1	10/29/2016	R38745
Anthracene	ND	5.0		µg/L	1	10/29/2016	R38745
Benzo(g,h,i)perylene	ND	5.0		µg/L	1	10/29/2016	R38745
Benz(a)anthracene	ND	0.10		µg/L	1	10/29/2016	R38745
Benzo(a)pyrene	ND	0.10		µg/L	1	10/29/2016	R38745
Benzo(b)fluoranthene	ND	0.10		µg/L	1	10/29/2016	R38745
Benzo(k)fluoranthene	ND	0.10		µg/L	1	10/29/2016	R38745
Bis(2-chloroethoxy)methane	ND	5.0		µg/L	1	10/29/2016	R38745
Bis(2-chloroethyl)ether	ND	5.0		µg/L	1	10/29/2016	R38745
Bis(2-chloroisopropyl)ether	ND	5.0		µg/L	1	10/29/2016	R38745
Bis(2-ethylhexyl)phthalate	ND	5.0		µg/L	1	10/29/2016	R38745
Butyl benzyl phthalate	ND	5.0		µg/L	1	10/29/2016	R38745
Carbazole	ND	5.0		µg/L	1	10/29/2016	R38745
Chrysene	ND	0.10		µg/L	1	10/29/2016	R38745
Dibenz(a,h)anthracene	ND	0.10		µg/L	1	10/29/2016	R38745
Dibenzofuran	ND	5.0		µg/L	1	10/29/2016	R38745
Diethyl phthalate	ND	5.0		µg/L	1	10/29/2016	R38745
Dimethyl phthalate	ND	5.0		µg/L	1	10/29/2016	R38745
Di-n-butyl phthalate	ND	5.0		µg/L	1	10/29/2016	R38745
Di-n-octyl phthalate	ND	5.0		µg/L	1	10/29/2016	R38745
Fluoranthene	ND	5.0		µg/L	1	10/29/2016	R38745
Fluorene	ND	5.0		µg/L	1	10/29/2016	R38745
Hexachlorobenzene	ND	1.0		µg/L	1	10/29/2016	R38745
Hexachlorobutadiene	ND	5.0		µg/L	1	10/29/2016	R38745
Hexachlorocyclopentadiene	ND	5.0		µg/L	1	10/29/2016	R38745
Hexachloroethane	ND	5.0		µg/L	1	10/29/2016	R38745
Indeno(1,2,3-cd)pyrene	ND	0.10		µg/L	1	10/29/2016	R38745
Isophorone	ND	5.0		µg/L	1	10/29/2016	R38745
Naphthalene	ND	5.0		µg/L	1	10/29/2016	R38745
Nitrobenzene	ND	5.0		µg/L	1	10/29/2016	R38745
N-Nitrosodi-n-propylamine	ND	5.0		µg/L	1	10/29/2016	R38745
N-Nitrosodiphenylamine	ND	2.0		µg/L	1	10/29/2016	R38745
Pentachlorophenol	ND	5.0		µg/L	1	10/29/2016	R38745

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Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company
Client Sample ID: WDW-1,2,&3 Effluent
Project: Quarterly WDW-1, 2, &3 Inj Well
Collection Date: 10/11/2016 9:00:00 AM
Lab ID: 1610612-001
Matrix: AQUEOUS
Received Date: 10/13/2016 8:30:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA 8270C: SEMIVOLATILES/MOD						Analyst: **SUB**	
Phenanthrene	ND	5.0		µg/L	1	10/29/2016	R38745
Phenol	ND	5.0		µg/L	1	10/29/2016	R38745
Pyrene	ND	5.0		µg/L	1	10/29/2016	R38745
o-Toluidine	ND	2.0		µg/L	1	10/29/2016	R38745
Pyridine	ND	5.0		µg/L	1	10/29/2016	R38745
1,2,4,5-Tetrachlorobenzene	ND	5.0		µg/L	1	10/29/2016	R38745
Surr: 2,4,6-Tribromophenol	103	63-110		%Rec	1	10/29/2016	R38745
Surr: 2-Fluorobiphenyl	92.4	58-112		%Rec	1	10/29/2016	R38745
Surr: 2-Fluorophenol	87.2	47-109		%Rec	1	10/29/2016	R38745
Surr: Nitrobenzene-d5	83.6	58-110		%Rec	1	10/29/2016	R38745
Surr: Phenol-d5	85.4	52-105		%Rec	1	10/29/2016	R38745
Surr: Terphenyl-d14	46.0	22-133		%Rec	1	10/29/2016	R38745

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Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company
Client Sample ID: TRIP BLANK
Project: Quarterly WDW-1, 2, &3 Inj Well
Collection Date:
Lab ID: 1610612-002
Matrix: TRIP BLANK
Received Date: 10/13/2016 8:30:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **SUB**	
Acetonitrile	ND	5.0		µg/L	1	10/20/2016	R38745
Allyl chloride	ND	0.50		µg/L	1	10/20/2016	R38745
Chloroprene	ND	0.50		µg/L	1	10/20/2016	R38745
Cyclohexane	ND	0.50		µg/L	1	10/20/2016	R38745
Diethyl ether	ND	0.50		µg/L	1	10/20/2016	R38745
Epichlorohydrin	ND	100		µg/L	1	10/20/2016	R38745
Ethyl acetate	ND	0.50		µg/L	1	10/20/2016	R38745
Ethyl methacrylate	ND	2.5		µg/L	1	10/20/2016	R38745
Ethyl tert-butyl ether	ND	0.50		µg/L	1	10/20/2016	R38745
Freon-113	ND	0.50		µg/L	1	10/20/2016	R38745
Isobutanol	ND	100		µg/L	1	10/20/2016	R38745
Isopropyl acetate	ND	0.50		µg/L	1	10/20/2016	R38745
Methacrylonitrile	ND	2.5		µg/L	1	10/20/2016	R38745
Methyl acetate	ND	0.50		µg/L	1	10/20/2016	R38745
Methyl ethyl ketone	ND	2.5		µg/L	1	10/20/2016	R38745
Methyl isobutyl ketone	ND	2.5		µg/L	1	10/20/2016	R38745
Methyl methacrylate	ND	2.5		µg/L	1	10/20/2016	R38745
Methylcyclohexane	ND	1.0		µg/L	1	10/20/2016	R38745
n-Amyl acetate	ND	0.50		µg/L	1	10/20/2016	R38745
n-Hexane	ND	0.50		µg/L	1	10/20/2016	R38745
Nitrobenzene	ND	5.0		µg/L	1	10/20/2016	R38745
Pentachloroethane	ND	5.0		µg/L	1	10/20/2016	R38745
p-isopropyltoluene	ND	0.50		µg/L	1	10/20/2016	R38745
Propionitrile	ND	2.5		µg/L	1	10/20/2016	R38745
Tetrahydrofuran	ND	0.50		µg/L	1	10/20/2016	R38745
Benzene	ND	0.50		µg/L	1	10/20/2016	R38745
Toluene	ND	0.50		µg/L	1	10/20/2016	R38745
Ethylbenzene	ND	0.50		µg/L	1	10/20/2016	R38745
Methyl tert-butyl ether (MTBE)	ND	10		µg/L	1	10/20/2016	R38745
1,2,4-Trimethylbenzene	ND	0.50		µg/L	1	10/20/2016	R38745
1,3,5-Trimethylbenzene	ND	0.50		µg/L	1	10/20/2016	R38745
1,2-Dichloroethane (EDC)	ND	0.50		µg/L	1	10/20/2016	R38745
1,2-Dibromoethane (EDB)	ND	0.50		µg/L	1	10/20/2016	R38745
Naphthalene	ND	0.50		µg/L	1	10/20/2016	R38745
Acetone	ND	2.5		µg/L	1	10/20/2016	R38745
Bromobenzene	ND	0.50		µg/L	1	10/20/2016	R38745
Bromodichloromethane	ND	0.50		µg/L	1	10/20/2016	R38745
Bromoform	ND	0.50		µg/L	1	10/20/2016	R38745
Bromomethane	ND	0.50		µg/L	1	10/20/2016	R38745

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Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company
Client Sample ID: TRIP BLANK
Project: Quarterly WDW-1, 2, &3 Inj Well
Collection Date:
Lab ID: 1610612-002
Matrix: TRIP BLANK
Received Date: 10/13/2016 8:30:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **SUB**	
2-Butanone	ND	2.5		µg/L	1	10/20/2016	R38745
Carbon disulfide	ND	0.50		µg/L	1	10/20/2016	R38745
Carbon Tetrachloride	ND	0.50		µg/L	1	10/20/2016	R38745
Chlorobenzene	ND	0.50		µg/L	1	10/20/2016	R38745
Chloroethane	ND	0.50		µg/L	1	10/20/2016	R38745
Chloroform	ND	0.50		µg/L	1	10/20/2016	R38745
Chloromethane	ND	0.50		µg/L	1	10/20/2016	R38745
2-Chlorotoluene	ND	0.50		µg/L	1	10/20/2016	R38745
4-Chlorotoluene	ND	0.50		µg/L	1	10/20/2016	R38745
cis-1,2-DCE	ND	0.50		µg/L	1	10/20/2016	R38745
cis-1,3-Dichloropropene	ND	0.50		µg/L	1	10/20/2016	R38745
1,2-Dibromo-3-chloropropane	ND	0.50		µg/L	1	10/20/2016	R38745
Dibromochloromethane	ND	0.50		µg/L	1	10/20/2016	R38745
Dibromomethane	ND	0.50		µg/L	1	10/20/2016	R38745
1,2-Dichlorobenzene	ND	0.50		µg/L	1	10/20/2016	R38745
1,3-Dichlorobenzene	ND	0.50		µg/L	1	10/20/2016	R38745
1,4-Dichlorobenzene	ND	0.50		µg/L	1	10/20/2016	R38745
Dichlorodifluoromethane	ND	0.50		µg/L	1	10/20/2016	R38745
1,1-Dichloroethane	ND	0.50		µg/L	1	10/20/2016	R38745
1,1-Dichloroethene	ND	0.50		µg/L	1	10/20/2016	R38745
1,2-Dichloropropane	ND	0.50		µg/L	1	10/20/2016	R38745
1,3-Dichloropropane	ND	0.50		µg/L	1	10/20/2016	R38745
2,2-Dichloropropane	ND	0.50		µg/L	1	10/20/2016	R38745
1,1-Dichloropropene	ND	0.50		µg/L	1	10/20/2016	R38745
Hexachlorobutadiene	ND	0.50		µg/L	1	10/20/2016	R38745
2-Hexanone	ND	0.50		µg/L	1	10/20/2016	R38745
Isopropylbenzene	ND	0.50		µg/L	1	10/20/2016	R38745
Methylene Chloride	ND	2.5		µg/L	1	10/20/2016	R38745
n-Butylbenzene	ND	0.50		µg/L	1	10/20/2016	R38745
n-Propylbenzene	ND	0.50		µg/L	1	10/20/2016	R38745
sec-Butylbenzene	ND	0.50		µg/L	1	10/20/2016	R38745
Styrene	ND	0.50		µg/L	1	10/20/2016	R38745
tert-Butylbenzene	ND	0.50		µg/L	1	10/20/2016	R38745
1,1,1,2-Tetrachloroethane	ND	0.50		µg/L	1	10/20/2016	R38745
1,1,2,2-Tetrachloroethane	ND	0.50		µg/L	1	10/20/2016	R38745
Tetrachloroethene (PCE)	ND	0.50		µg/L	1	10/20/2016	R38745
trans-1,2-DCE	ND	0.50		µg/L	1	10/20/2016	R38745
trans-1,3-Dichloropropene	ND	0.50		µg/L	1	10/20/2016	R38745
1,2,3-Trichlorobenzene	ND	0.50		µg/L	1	10/20/2016	R38745

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Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company
Client Sample ID: TRIP BLANK
Project: Quarterly WDW-1, 2, &3 Inj Well
Collection Date:
Lab ID: 1610612-002
Matrix: TRIP BLANK
Received Date: 10/13/2016 8:30:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **SUB**	
1,2,4-Trichlorobenzene	ND	0.50		µg/L	1	10/20/2016	R38745
1,1,1-Trichloroethane	ND	0.50		µg/L	1	10/20/2016	R38745
1,1,2-Trichloroethane	ND	0.50		µg/L	1	10/20/2016	R38745
Trichloroethene (TCE)	ND	0.50		µg/L	1	10/20/2016	R38745
Trichlorofluoromethane	ND	0.50		µg/L	1	10/20/2016	R38745
1,2,3-Trichloropropane	ND	0.50		µg/L	1	10/20/2016	R38745
Vinyl chloride	ND	0.50		µg/L	1	10/20/2016	R38745
mp-Xylenes	ND	1.0		µg/L	1	10/20/2016	R38745
o-Xylene	ND	0.50		µg/L	1	10/20/2016	R38745
tert-Amyl methyl ether	ND	0.50		µg/L	1	10/20/2016	R38745
tert-Butyl alcohol	ND	0.50		µg/L	1	10/20/2016	R38745
Acrolein	ND	2.5		µg/L	1	10/20/2016	R38745
Acrylonitrile	ND	2.5		µg/L	1	10/20/2016	R38745
Bromochloromethane	ND	0.50		µg/L	1	10/20/2016	R38745
2-Chloroethyl vinyl ether	ND	0.50		µg/L	1	10/20/2016	R38745
Iodomethane	ND	0.50		µg/L	1	10/20/2016	R38745
trans-1,4-Dichloro-2-butene	ND	0.50		µg/L	1	10/20/2016	R38745
Vinyl acetate	ND	0.50		µg/L	1	10/20/2016	R38745
Surr: 1,2-Dichlorobenzene-d4	102	0-0	S	%Rec	1	10/20/2016	R38745
Surr: 4-Bromofluorobenzene	96.4	70-130		%Rec	1	10/20/2016	R38745
Surr: Toluene-d8	98.0	70-130		%Rec	1	10/20/2016	R38745

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QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1610612**
16-Nov-16

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID **MB**	SampType: **MBLK**	TestCode: **EPA Method 300.0: Anions**							
Client ID: **PBW**	Batch ID: **R37942**	RunNo: **37942**							
Prep Date:	Analysis Date: **10/13/2016**	SeqNo: **1182401**	Units: **mg/L**						

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	ND	0.10								
Bromide	ND	0.10								
Phosphorus, Orthophosphate (As P	ND	0.50								
Nitrate+Nitrite as N	ND	0.20								

Sample ID **LCS**	SampType: **LCS**	TestCode: **EPA Method 300.0: Anions**							
Client ID: **LCSW**	Batch ID: **R37942**	RunNo: **37942**							
Prep Date:	Analysis Date: **10/13/2016**	SeqNo: **1182402**	Units: **mg/L**						

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	0.54	0.10	0.5000	0	107	90	110			
Bromide	2.6	0.10	2.500	0	103	90	110			
Phosphorus, Orthophosphate (As P	4.7	0.50	5.000	0	93.6	90	110			
Nitrate+Nitrite as N	3.4	0.20	3.500	0	97.3	90	110			

Sample ID **MB**	SampType: **MBLK**	TestCode: **EPA Method 300.0: Anions**							
Client ID: **PBW**	Batch ID: **R38187**	RunNo: **38187**							
Prep Date:	Analysis Date: **10/25/2016**	SeqNo: **1193019**	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: **R38187**	RunNo: **38187**							
Prep Date:	Analysis Date: **10/25/2016**	SeqNo: **1193020**	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	96.7	90	110			
Sulfate	9.9	0.50	10.00	0	99.1	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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1610612**
16-Nov-16

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID **MB-R38745**	SampType: **MBLK**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **PBW**	Batch ID: **R38745**	RunNo: **38745**
Prep Date:	Analysis Date: **10/20/2016**	SeqNo: **1210379** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Acetonitrile	ND	0.50								
Allyl chloride	ND	0.50								
Chloroprene	ND	0.50								
Ethyl methacrylate	ND	2.5								
Isobutanol	ND	10								
Methacrylonitrile	ND	2.5								
Methyl ethyl ketone	ND	2.5								
Methyl isobutyl ketone	ND	2.5								
Methyl methacrylate	ND	2.5								
Propionitrile	ND	2.5								
Benzene	ND	0.50								
Toluene	ND	0.50								
Ethylbenzene	ND	0.50								
1,2-Dichloroethane (EDC)	ND	0.50								
1,2-Dibromoethane (EDB)	ND	0.50								
Acetone	ND	2.5								
Bromodichloromethane	ND	0.50								
Bromoform	ND	0.50								
Bromomethane	ND	0.50								
2-Butanone	ND	2.5								
Carbon disulfide	ND	0.50								
Carbon Tetrachloride	ND	0.50								
Chlorobenzene	ND	0.50								
Chloroethane	ND	0.50								
Chloroform	ND	0.50								
Chloromethane	ND	0.50								
cis-1,2-DCE	ND	0.50								
cis-1,3-Dichloropropene	ND	0.50								
1,2-Dibromo-3-chloropropane	ND	0.50								
Dibromochloromethane	ND	0.50								
Dibromomethane	ND	0.50								
1,2-Dichlorobenzene	ND	0.50								
1,4-Dichlorobenzene	ND	0.50								
Dichlorodifluoromethane	ND	0.50								
1,1-Dichloroethane	ND	0.50								
1,1-Dichloroethene	ND	0.50								
1,2-Dichloropropane	ND	0.50								
1,3-Dichloropropane	ND	0.50								
2,2-Dichloropropane	ND	0.50								

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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1610612**

16-Nov-16

Client: Navajo Refining Company

Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID **MB-R38745**	SampType: **MBLK**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **PBW**	Batch ID: **R38745**	RunNo: **38745**
Prep Date:	Analysis Date: **10/20/2016**	SeqNo: **1210379** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
1,1-Dichloropropene	ND	0.50								
2-Hexanone	ND	0.50								
Methylene Chloride	ND	2.5								
Styrene	ND	0.50								
1,1,1,2-Tetrachloroethane	ND	0.50								
1,1,2,2-Tetrachloroethane	ND	0.50								
Tetrachloroethene (PCE)	ND	0.50								
trans-1,2-DCE	ND	0.50								
trans-1,3-Dichloropropene	ND	0.50								
1,1,1-Trichloroethane	ND	0.50								
1,1,2-Trichloroethane	ND	0.50								
Trichloroethene (TCE)	ND	0.50								
Trichlorofluoromethane	ND	0.50								
1,2,3-Trichloropropane	ND	0.50								
Vinyl chloride	ND	0.50								
mp-Xylenes	ND	1.0								
o-Xylene	ND	0.50								
Acrolein	ND	2.5								
Acrylonitrile	ND	2.5								
Bromochloromethane	ND	0.50								
Iodomethane	ND	0.50								
trans-1,4-Dichloro-2-butene	ND	0.50								
Vinyl acetate	ND	0.50								

Sample ID **LCS-R38745**	SampType: **LCS**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **LCSW**	Batch ID: **R38745**	RunNo: **38745**
Prep Date:	Analysis Date: **10/20/2016**	SeqNo: **1210380** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	9.7	0	10.00	0	96.7	80	120			
Toluene	9.7	0	10.00	0	97.2	80	120			
Ethylbenzene	9.8	0	10.00	0	98.0	80	120			
Chlorobenzene	9.8	0	10.00	0	97.8	80	120			
1,1-Dichloroethene	9.7	0	10.00	0	96.7	80	120			
Tetrachloroethene (PCE)	9.5	0	10.00	0	95.0	80	120			
Trichloroethene (TCE)	9.7	0	10.00	0	96.6	80	120			
o-Xylene	10	0	10.00	0	102	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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1610612**
16-Nov-16

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID **MB-R38745**	SampType: **MBLK**	TestCode: **EPA 8270C: Semivolatiles/Mod**
Client ID: **PBW**	Batch ID: **R38745**	RunNo: **38745**
Prep Date:	Analysis Date: **10/29/2016**	SeqNo: **1210383** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Acetophenone	ND	5.0								
1-Methylnaphthalene	ND	5.0								
2,3,4,6-Tetrachlorophenol	ND	5.0								
2,4,5-Trichlorophenol	ND	5.0								
2,4,6-Trichlorophenol	ND	5.0								
2,4-Dichlorophenol	ND	5.0								
2,4-Dimethylphenol	ND	5.0								
2,4-Dinitrophenol	ND	5.0								
2,4-Dinitrotoluene	ND	5.0								
2,6-Dinitrotoluene	ND	5.0								
2-Chloronaphthalene	ND	5.0								
2-Chlorophenol	ND	5.0								
2-Methylnaphthalene	ND	5.0								
2-Methylphenol	ND	5.0								
2-Nitroaniline	ND	5.0								
2-Nitrophenol	ND	5.0								
3,3´-Dichlorobenzidine	ND	5.0								
3-Nitroaniline	ND	5.0								
4,6-Dinitro-2-methylphenol	ND	5.0								
4-Bromophenyl phenyl ether	ND	5.0								
4-Chloro-3-methylphenol	ND	5.0								
4-Chloroaniline	ND	5.0								
4-Chlorophenyl phenyl ether	ND	5.0								
4-Nitroaniline	ND	5.0								
4-Nitrophenol	ND	5.0								
Acenaphthene	ND	5.0								
Acenaphthylene	ND	5.0								
Anthracene	ND	5.0								
Benzo(g,h,i)perylene	ND	5.0								
Benz(a)anthracene	ND	0.10								
Benzo(a)pyrene	ND	0.10								
Benzo(b)fluoranthene	ND	0.10								
Benzo(k)fluoranthene	ND	0.10								
Bis(2-chloroethoxy)methane	ND	5.0								
Bis(2-chloroethyl)ether	ND	5.0								
Bis(2-chloroisopropyl)ether	ND	5.0								
Bis(2-ethylhexyl)phthalate	ND	5.0								
Butyl benzyl phthalate	ND	5.0								
Carbazole	ND	5.0								

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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1610612**
16-Nov-16

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID **MB-R38745**	SampType: **MBLK**	TestCode: **EPA 8270C: Semivolatiles/Mod**
Client ID: **PBW**	Batch ID: **R38745**	RunNo: **38745**
Prep Date:	Analysis Date: **10/29/2016**	SeqNo: **1210383** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chrysene	ND	0.10								
Dibenz(a,h)anthracene	ND	0.10								
Dibenzofuran	ND	5.0								
Diethyl phthalate	ND	5.0								
Dimethyl phthalate	ND	5.0								
Di-n-butyl phthalate	ND	5.0								
Di-n-octyl phthalate	ND	5.0								
Fluoranthene	ND	5.0								
Fluorene	ND	5.0								
Hexachlorobenzene	ND	1.0								
Hexachlorobutadiene	ND	5.0								
Hexachlorocyclopentadiene	ND	5.0								
Hexachloroethane	ND	5.0								
Indeno(1,2,3-cd)pyrene	ND	0.10								
Isophorone	ND	5.0								
Naphthalene	ND	5.0								
Nitrobenzene	ND	5.0								
N-Nitrosodi-n-propylamine	ND	2.0								
N-Nitrosodiphenylamine	ND	2.0								
Pentachlorophenol	ND	5.0								
Phenanthrene	ND	1.0								
Phenol	ND	5.0								
Pyrene	ND	5.0								
o-Toluidine	ND	5.0								
Pyridine	ND	5.0								
1,2,4,5-Tetrachlorobenzene	ND	5.0								

Sample ID **LCS-R38745**	SampType: **LCS**	TestCode: **EPA 8270C: Semivolatiles/Mod**
Client ID: **LCSW**	Batch ID: **R38745**	RunNo: **38745**
Prep Date:	Analysis Date: **10/29/2016**	SeqNo: **1210384** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
2,4-Dinitrotoluene	5.5	0	5.000	0	110	49	134			
2-Chlorophenol	4.6	0	5.000	0	91.4	50	131			
4-Chloro-3-methylphenol	5.1	0	5.000	0	102	42	139			
4-Nitrophenol	5.5	0	5.000	0	110	19	137			
Acenaphthene	5.0	0	5.000	0	101	36	122			
Bis(2-ethylhexyl)phthalate	4.9	0	5.000	0	98.6	43	142			
N-Nitrosodi-n-propylamine	4.3	0	5.000	0	86.8	46	140			

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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1610612**

16-Nov-16

Client: Navajo Refining Company

Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID	**LCS-R38745**	SampType:	**LCS**	TestCode:	**EPA 8270C: Semivolatiles/Mod**					
Client ID:	**LCSW**	Batch ID:	**R38745**	RunNo:	**38745**					
Prep Date:		Analysis Date:	**10/29/2016**	SeqNo:	**1210384**	Units:	**µg/L**			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Pentachlorophenol		5.5	0	5.000	0	111	22	138			
Phenol		4.7	0	5.000	0	94.4	45	134			
Pyrene		4.5	0	5.000	0	90.8	45	138			

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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1610612**

16-Nov-16

Client: Navajo Refining Company

Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID	**MB-28113**	SampType: **MBLK**			TestCode: **EPA Method 7470: Mercury**					
Client ID:	**PBW**	Batch ID: **28113**			RunNo: **38030**					
Prep Date:	**10/17/2016**	Analysis Date: **10/18/2016**			SeqNo: **1185736**		Units: **mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	ND	0.00020								

Sample ID	**LCS-28113**	SampType: **LCS**			TestCode: **EPA Method 7470: Mercury**					
Client ID:	**LCSW**	Batch ID: **28113**			RunNo: **38030**					
Prep Date:	**10/17/2016**	Analysis Date: **10/18/2016**			SeqNo: **1185737**		Units: **mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0047	0.00020	0.005000	0	93.6	80	120			

Sample ID	**1610612-001BMS**	SampType: **MS**			TestCode: **EPA Method 7470: Mercury**					
Client ID:	**WDW-1,2,&3 Effluen**	Batch ID: **28113**			RunNo: **38030**					
Prep Date:	**10/17/2016**	Analysis Date: **10/18/2016**			SeqNo: **1185804**		Units: **mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0061	0.00020	0.005000	0.0001625	118	75	125			

Sample ID	**1610612-001BMSD**	SampType: **MSD**			TestCode: **EPA Method 7470: Mercury**					
Client ID:	**WDW-1,2,&3 Effluen**	Batch ID: **28113**			RunNo: **38030**					
Prep Date:	**10/17/2016**	Analysis Date: **10/18/2016**			SeqNo: **1185805**		Units: **mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0059	0.00020	0.005000	0.0001625	114	75	125	3.16	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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1610612**

16-Nov-16

Client: Navajo Refining Company

Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID	**MB-28165**	SampType:	**MBLK**	TestCode:	**MERCURY, TCLP**					
Client ID:	**PBW**	Batch ID:	**28165**	RunNo:	**38056**					
Prep Date:	**10/19/2016**	Analysis Date:	**10/19/2016**	SeqNo:	**1186813**	Units:	**mg/L**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	ND	0.020								

Sample ID	**LCS-28165**	SampType:	**LCS**	TestCode:	**MERCURY, TCLP**					
Client ID:	**LCSW**	Batch ID:	**28165**	RunNo:	**38056**					
Prep Date:	**10/19/2016**	Analysis Date:	**10/19/2016**	SeqNo:	**1186814**	Units:	**mg/L**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	ND	0.020	0.005000	0	104	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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1610612**

16-Nov-16

Client: Navajo Refining Company

Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID **MB-28191**	SampType: **MBLK**	TestCode: **EPA Method 6010B: TCLP Metals**
Client ID: **PBW**	Batch ID: **28191**	RunNo: **38144**
Prep Date: **10/20/2016**	Analysis Date: **10/24/2016**	SeqNo: **1190360** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	ND	5.0								
Barium	ND	100								
Cadmium	ND	1.0								
Chromium	ND	5.0								
Lead	ND	5.0								
Selenium	ND	1.0								
Silver	ND	5.0								

Sample ID **LCS-28191**	SampType: **LCS**	TestCode: **EPA Method 6010B: TCLP Metals**
Client ID: **LCSW**	Batch ID: **28191**	RunNo: **38144**
Prep Date: **10/20/2016**	Analysis Date: **10/24/2016**	SeqNo: **1190361** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	ND	5.0	0.5000	0	108	80	120			
Barium	ND	100	0.5000	0	96.0	80	120			
Cadmium	ND	1.0	0.5000	0	101	80	120			
Chromium	ND	5.0	0.5000	0	97.0	80	120			
Lead	ND	5.0	0.5000	0	93.2	80	120			
Selenium	ND	1.0	0.5000	0	106	80	120			
Silver	ND	5.0	0.1000	0	106	80	120			

Sample ID **TCLP FL#2-2661**	SampType: **MBLK**	TestCode: **EPA Method 6010B: TCLP Metals**
Client ID: **PBW**	Batch ID: **28191**	RunNo: **38144**
Prep Date: **10/20/2016**	Analysis Date: **10/24/2016**	SeqNo: **1190451** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	ND	5.0								
Barium	ND	100								
Cadmium	ND	1.0								
Chromium	ND	5.0								
Lead	ND	5.0								
Selenium	ND	1.0								
Silver	ND	5.0								

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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1610612**

16-Nov-16

Client: Navajo Refining Company

Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID **MB-28190**	SampType: **MBLK**	TestCode: **EPA 6010B: Metals**
Client ID: **PBW**	Batch ID: **28190**	RunNo: **38332**
Prep Date: **10/20/2016**	Analysis Date: **10/31/2016**	SeqNo: **1196520** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	ND	0.020								
Antimony	ND	0.050								
Arsenic	ND	0.020								
Barium	ND	0.020								
Beryllium	ND	0.0030								
Cadmium	ND	0.0020								
Chromium	ND	0.0060								
Cobalt	ND	0.0060								
Copper	ND	0.0060								
Iron	ND	0.050								
Lead	ND	0.0050								
Manganese	ND	0.0020								
Nickel	ND	0.010								
Potassium	ND	1.0								
Selenium	ND	0.050								
Silver	ND	0.0050								
Thallium	ND	0.050								
Vanadium	ND	0.050								
Zinc	ND	0.020								

Sample ID **LCS-28190**	SampType: **LCS**	TestCode: **EPA 6010B: Metals**
Client ID: **LCSW**	Batch ID: **28190**	RunNo: **38332**
Prep Date: **10/20/2016**	Analysis Date: **10/31/2016**	SeqNo: **1196521** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	0.55	0.020	0.5000	0	109	80	120			
Antimony	0.49	0.050	0.5000	0	98.4	80	120			
Arsenic	0.52	0.020	0.5000	0	104	80	120			
Barium	0.50	0.020	0.5000	0	100	80	120			
Beryllium	0.53	0.0030	0.5000	0	106	80	120			
Cadmium	0.51	0.0020	0.5000	0	101	80	120			
Chromium	0.50	0.0060	0.5000	0	99.5	80	120			
Cobalt	0.49	0.0060	0.5000	0	97.7	80	120			
Copper	0.50	0.0060	0.5000	0	99.6	80	120			
Iron	0.50	0.050	0.5000	0	101	80	120			
Lead	0.50	0.0050	0.5000	0	99.5	80	120			
Manganese	0.50	0.0020	0.5000	0	100	80	120			
Nickel	0.50	0.010	0.5000	0	99.9	80	120			
Potassium	50	1.0	50.00	0	100	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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1610612**

16-Nov-16

Client: Navajo Refining Company

Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID	**LCS-28190**	SampType: **LCS**		TestCode: **EPA 6010B: Metals**						
Client ID:	**LCSW**	Batch ID: **28190**		RunNo: **38332**						
Prep Date:	**10/20/2016**	Analysis Date: **10/31/2016**		SeqNo: **1196521**		Units: **mg/L**				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Selenium	0.49	0.050	0.5000	0	99.0	80	120			
Silver	0.10	0.0050	0.1000	0	103	80	120			
Thallium	0.49	0.050	0.5000	0	98.9	80	120			
Vanadium	0.53	0.050	0.5000	0	105	80	120			
Zinc	0.50	0.020	0.5000	0	101	80	120			

Sample ID	**1610612-001BMS**	SampType: **MS**		TestCode: **EPA 6010B: Metals**						
Client ID:	**WDW-1,2,&3 Effluen**	Batch ID: **28190**		RunNo: **38332**						
Prep Date:	**10/20/2016**	Analysis Date: **10/31/2016**		SeqNo: **1196523**		Units: **mg/L**				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	0.89	0.020	0.5000	0.3134	115	75	125			
Antimony	0.47	0.050	0.5000	0	94.3	75	125			
Arsenic	0.57	0.020	0.5000	0.04017	106	75	125			
Barium	0.50	0.020	0.5000	0.01602	96.0	75	125			
Beryllium	0.51	0.0030	0.5000	0	102	75	125			
Cadmium	0.50	0.0020	0.5000	0	99.7	75	125			
Chromium	0.47	0.0060	0.5000	0	94.3	75	125			
Cobalt	0.47	0.0060	0.5000	0.003260	93.6	75	125			
Copper	0.53	0.0060	0.5000	0.01704	103	75	125			
Iron	0.63	0.050	0.5000	0.1353	98.3	75	125			
Lead	0.47	0.0050	0.5000	0	94.8	75	125			
Manganese	0.53	0.0020	0.5000	0.05227	95.7	75	125			
Nickel	0.49	0.010	0.5000	0.006520	95.7	75	125			
Selenium	0.52	0.050	0.5000	0	103	75	125			
Silver	0.10	0.0050	0.1000	0	104	75	125			
Thallium	0.46	0.050	0.5000	0.01260	89.8	75	125			
Vanadium	0.52	0.050	0.5000	0.006120	103	75	125			
Zinc	0.53	0.020	0.5000	0.02719	99.6	75	125			

Sample ID	**1610612-001BMSD**	SampType: **MSD**		TestCode: **EPA 6010B: Metals**						
Client ID:	**WDW-1,2,&3 Effluen**	Batch ID: **28190**		RunNo: **38332**						
Prep Date:	**10/20/2016**	Analysis Date: **10/31/2016**		SeqNo: **1196524**		Units: **mg/L**				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	0.88	0.020	0.5000	0.3134	114	75	125	0.858	20	
Antimony	0.45	0.050	0.5000	0	90.8	75	125	3.77	20	
Arsenic	0.55	0.020	0.5000	0.04017	103	75	125	2.57	20	
Barium	0.49	0.020	0.5000	0.01602	94.6	75	125	1.42	20	
Beryllium	0.51	0.0030	0.5000	0	101	75	125	1.17	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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1610612**

16-Nov-16

Client: Navajo Refining Company

Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID	**1610612-001BMSD**	SampType:	**MSD**		TestCode:	**EPA 6010B: Metals**				
Client ID:	**WDW-1,2,&3 Effluen**	Batch ID:	**28190**		RunNo:	**38332**				
Prep Date:	**10/20/2016**	Analysis Date:	**10/31/2016**		SeqNo:	**1196524**	Units:	**mg/L**		

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cadmium	0.49	0.0020	0.5000	0	98.2	75	125	1.47	20	
Chromium	0.46	0.0060	0.5000	0	92.6	75	125	1.81	20	
Cobalt	0.46	0.0060	0.5000	0.003260	91.8	75	125	1.92	20	
Copper	0.54	0.0060	0.5000	0.01704	104	75	125	0.996	20	
Iron	0.64	0.050	0.5000	0.1353	102	75	125	2.59	20	
Lead	0.47	0.0050	0.5000	0	93.8	75	125	1.05	20	
Manganese	0.52	0.0020	0.5000	0.05227	94.4	75	125	1.23	20	
Nickel	0.48	0.010	0.5000	0.006520	94.3	75	125	1.45	20	
Selenium	0.51	0.050	0.5000	0	102	75	125	1.76	20	
Silver	0.10	0.0050	0.1000	0	103	75	125	1.49	20	
Thallium	0.45	0.050	0.5000	0.01260	86.9	75	125	3.22	20	
Vanadium	0.51	0.050	0.5000	0.006120	101	75	125	1.60	20	
Zinc	0.52	0.020	0.5000	0.02719	98.2	75	125	1.35	20	

Sample ID	**1610612-001BMS**	SampType:	**MS**		TestCode:	**EPA 6010B: Metals**				
Client ID:	**WDW-1,2,&3 Effluen**	Batch ID:	**28190**		RunNo:	**38332**				
Prep Date:	**10/20/2016**	Analysis Date:	**10/31/2016**		SeqNo:	**1196526**	Units:	**mg/L**		

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Potassium	180	5.0	50.00	123.0	104	75	125			

Sample ID	**1610612-001BMSD**	SampType:	**MSD**		TestCode:	**EPA 6010B: Metals**				
Client ID:	**WDW-1,2,&3 Effluen**	Batch ID:	**28190**		RunNo:	**38332**				
Prep Date:	**10/20/2016**	Analysis Date:	**10/31/2016**		SeqNo:	**1196527**	Units:	**mg/L**		

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Potassium	180	5.0	50.00	123.0	123	75	125	5.31	20	

Sample ID	**MB-28190**	SampType:	**MBLK**		TestCode:	**EPA 6010B: Metals**				
Client ID:	**PBW**	Batch ID:	**28190**		RunNo:	**38490**				
Prep Date:	**10/20/2016**	Analysis Date:	**11/7/2016**		SeqNo:	**1202197**	Units:	**mg/L**		

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	ND	1.0								
Magnesium	ND	1.0								
Sodium	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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1610612**

16-Nov-16

Client: Navajo Refining Company

Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID	**LCS-28190**	SampType:	**LCS**		TestCode:	**EPA 6010B: Metals**				
Client ID:	**LCSW**	Batch ID:	**28190**		RunNo:	**38490**				
Prep Date:	**10/20/2016**	Analysis Date:	**11/7/2016**		SeqNo:	**1202198**	Units:	**mg/L**		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	51	1.0	50.00	0	102	80	120			
Magnesium	52	1.0	50.00	0	103	80	120			
Sodium	51	1.0	50.00	0	102	80	120			

Sample ID	**1610612-001BMS**	SampType:	**MS**		TestCode:	**EPA 6010B: Metals**				
Client ID:	**WDW-1,2,&3 Effluen**	Batch ID:	**28190**		RunNo:	**38490**				
Prep Date:	**10/20/2016**	Analysis Date:	**11/7/2016**		SeqNo:	**1202200**	Units:	**mg/L**		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Magnesium	86	1.0	50.00	35.82	100	75	125			

Sample ID	**1610612-001BMSD**	SampType:	**MSD**		TestCode:	**EPA 6010B: Metals**				
Client ID:	**WDW-1,2,&3 Effluen**	Batch ID:	**28190**		RunNo:	**38490**				
Prep Date:	**10/20/2016**	Analysis Date:	**11/7/2016**		SeqNo:	**1202201**	Units:	**mg/L**		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Magnesium	86	1.0	50.00	35.82	101	75	125	0.560	20	

Sample ID	**1610612-001BMS**	SampType:	**MS**		TestCode:	**EPA 6010B: Metals**				
Client ID:	**WDW-1,2,&3 Effluen**	Batch ID:	**28190**		RunNo:	**38490**				
Prep Date:	**10/20/2016**	Analysis Date:	**11/7/2016**		SeqNo:	**1202203**	Units:	**mg/L**		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	140	5.0	50.00	95.77	95.5	75	125			

Sample ID	**1610612-001BMSD**	SampType:	**MSD**		TestCode:	**EPA 6010B: Metals**				
Client ID:	**WDW-1,2,&3 Effluen**	Batch ID:	**28190**		RunNo:	**38490**				
Prep Date:	**10/20/2016**	Analysis Date:	**11/7/2016**		SeqNo:	**1202211**	Units:	**mg/L**		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	150	5.0	50.00	95.77	105	75	125	3.14	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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1610612**

16-Nov-16

Client: Navajo Refining Company

Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID	**MB-R38745**	SampType:	**MBLK**	TestCode:	**CYANIDE, Reactive**					
Client ID:	**PBW**	Batch ID:	**R38745**	RunNo:	**38745**					
Prep Date:		Analysis Date:	**10/25/2016**	SeqNo:	**1210388**	Units:	**mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cyanide, Reactive	ND	1.00								

Sample ID	**LCS-R38745**	SampType:	**LCS**	TestCode:	**CYANIDE, Reactive**					
Client ID:	**LCSW**	Batch ID:	**R38745**	RunNo:	**38745**					
Prep Date:		Analysis Date:	**10/25/2016**	SeqNo:	**1210389**	Units:	**mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cyanide, Reactive	0.542		0.5000	0	108	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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1610612**

16-Nov-16

Client: Navajo Refining Company

Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID	**MB-R38745**	SampType:	**MBLK**	TestCode:	**SULFIDE, Reactive**					
Client ID:	**PBW**	Batch ID:	**R38745**	RunNo:	**38745**					
Prep Date:		Analysis Date:	**10/18/2016**	SeqNo:	**1210391**	Units:	**mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Reactive Sulfide	ND	1.0								

Sample ID	**LCS-R38745**	SampType:	**LCS**	TestCode:	**SULFIDE, Reactive**					
Client ID:	**LCSW**	Batch ID:	**R38745**	RunNo:	**38745**					
Prep Date:		Analysis Date:	**10/18/2016**	SeqNo:	**1210392**	Units:	**mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Reactive Sulfide	0.16		0.2000	0	80.0	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
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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1610612**

16-Nov-16

Client: Navajo Refining Company

Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID	**mb-1**	SampType: **mblk**			TestCode: **SM2320B: Alkalinity**					
Client ID:	**PBW**	Batch ID: **R38048**			RunNo: **38048**					
Prep Date:		Analysis Date: **10/18/2016**			SeqNo: **1186486**		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: **R38048**			RunNo: **38048**					
Prep Date:		Analysis Date: **10/18/2016**			SeqNo: **1186487**		Units: **mg/L CaCO3**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	80.60	20.00	80.00	0	101	90	110			

Sample ID	**mb-2**	SampType: **mblk**			TestCode: **SM2320B: Alkalinity**					
Client ID:	**PBW**	Batch ID: **R38048**			RunNo: **38048**					
Prep Date:		Analysis Date: **10/18/2016**			SeqNo: **1186510**		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: **R38048**			RunNo: **38048**					
Prep Date:		Analysis Date: **10/18/2016**			SeqNo: **1186511**		Units: **mg/L CaCO3**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	81.52	20.00	80.00	0	102	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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1610612**
16-Nov-16

Client: Navajo Refining Company
Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID **1610612-001ADUP** SampType: **DUP** TestCode: **Specific Gravity**
Client ID: **WDW-1,2,&3 Effluen** Batch ID: **R38258** RunNo: **38258**
Prep Date: Analysis Date: **10/27/2016** SeqNo: **1193976** Units:

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Specific Gravity	0.9993	0						0.0400	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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1610612**

16-Nov-16

Client: Navajo Refining Company

Project: Quarterly WDW-1, 2, &3 Inj Well

Sample ID **MB-28098**	SampType: **MBLK**	TestCode: **SM2540C MOD: Total Dissolved Solids**
Client ID: **PBW**	Batch ID: **28098**	RunNo: **38034**
Prep Date: **10/17/2016**	Analysis Date: **10/18/2016**	SeqNo: **1185818** 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-28098**	SampType: **LCS**	TestCode: **SM2540C MOD: Total Dissolved Solids**
Client ID: **LCSW**	Batch ID: **28098**	RunNo: **38034**
Prep Date: **10/17/2016**	Analysis Date: **10/18/2016**	SeqNo: **1185819** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	1050	20.0	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	W	Sample container temperature is out of limit as specified

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: NAVAJO REFINING CO Work Order Number: 1610612 RcptNo: 1

Received by/date: AC 10/13/16

Logged By: Ashley Gallegos 10/13/2016 8:30:00 AM

Completed By: Ashley Gallegos 10/13/2016 11:20:49 AM

Reviewed By: JC 10/23/16 JC 10/13/16

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? No

Checked by: AJS

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: Navajo Refining Co.

Mailing Address: P.O. Box 159 Artesia,

NM 88211-0159

Phone #: 575-748-3311

email or Fax#: 575-746-5451

QA/QC Package:

☐ Standard ☐ Level 4 (Full Validation)

☐ Other _____

☐ EDD (Type) _____

Turn-Around Time:

X Standard ☐ Rush

Project Name:

Quarterly WDW-1, 2, & 3 Inj Well

Project #: P.O. # 167796

Project Manager:

Micki Schultz / Scott Denton / Mike Holder

Sampler: Brady Hubbard

On Ice: X 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. 1610612	Specific Gravity,HCO3, CO3, Cl, SO4, TDS, pH, cond.,Fl, Cation/anion bal., Br, Eh/40	VOCs/SW-846 Method 8260C (see attached list 'VOCs')	SVOCs/SW-846 Method 8270D (see attached list 'SVOCs')	R,C,I/40 CFR part 261	Metals/SW-846 Mthd 6010, 7470 (see attached list 'Metals')	Ca, K, Mg, Na/40 CFR 136.3	TCLP Metals, only /40 CFR Part 261/ SW-846 Method 1311
10/11/16	9:00	Liquid	WDW-1, 2, & 3 Effluent	3	Neat/H2SO4	-001	X						X
10/11/16	9:00	Liquid	WDW-1, 2, & 3 Effluent	1	HNO3						X	X	
10/11/16	9:00	Liquid	WDW-1, 2, & 3 Effluent	3	HCL			X					
10/11/16	9:00	Liquid	WDW-1, 2, & 3 Effluent	2	Neat				X				
10/11/16	9:00	Liquid	WDW-1, 2, & 3 Effluent	2	Neat					X			
10/11/16	9:00	Liquid	Trip Blank	2	Neat	-002		X					
10/11/16	9:00	Liquid	Temperature Blank	1	Neat								

Date:	Time:	Relinquished by:	Received by:	Date	Time
10-11-16	11:00	Brady Hubbard	Lindsey Coneha	10/13/16	0830
Date:	Time:	Relinquished by:	Received by:	Date	Time

Remarks: Send results to Scott Denton, Mike Holder, Robert Combs and Andrew Contreras.

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

November 16, 2016

Robert Combs

Navajo Refining Company
P.O. Box 159
Artesia, NM 88211-0159
TEL: (575) 748-3311
FAX

RE: Quarterly RO Reject OrderNo.: 1610613

Dear Robert Combs:

Hall Environmental Analysis Laboratory received 2 sample(s) on 10/13/2016 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: Navajo Refining Company
Client Sample ID: R.O. Reject
Project: Quarterly RO Reject
Collection Date: 10/11/2016 11:00:00 AM
Lab ID: 1610613-001
Matrix: AQUEOUS
Received Date: 10/13/2016 8:30:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA 200.8: DISSOLVED METALS						Analyst: **JLF**	
Arsenic	ND	0.0050		mg/L	5	10/28/2016 2:36:13 PM	A38300
Lead	ND	0.00050		mg/L	1	10/25/2016 7:44:19 PM	B38214
Selenium	0.0089	0.0010		mg/L	1	10/25/2016 7:44:19 PM	B38214
Uranium	0.0064	0.00050		mg/L	1	10/25/2016 7:44:19 PM	B38214
EPA 903.1: RA 226 AND EPA 904.0: RA 228-SUBBED						Analyst: **SUB**	
Radium-226	0.525	0.552		pCi/L	1	11/16/2016	R38749
Radium-226 ±	0.445	0.552		pCi/L	1	11/16/2016	R38749
Radium-228	0.442	0.785		pCi/L	1	11/16/2016	R38749
Radium-228 ±	0.389	0.785		pCi/L	1	11/16/2016	R38749
EPA METHOD 300.0: ANIONS						Analyst: **LGT**	
Fluoride	3.6	2.0		mg/L	20	10/14/2016 12:43:59 AM	R37942
Chloride	280	10		mg/L	20	10/14/2016 12:43:59 AM	R37942
Sulfate	1900	50		mg/L	100	10/25/2016 4:52:17 PM	R38212
Nitrate+Nitrite as N	1.9	1.0		mg/L	5	10/14/2016 1:33:37 AM	R37942
SM2540C MOD: TOTAL DISSOLVED SOLIDS						Analyst: **KS**	
Total Dissolved Solids	3960	20.0	*	mg/L	1	10/20/2016 2:01:00 PM	28134
EPA 335.4: TOTAL CYANIDE SUBBED						Analyst: **SUB**	
Cyanide	ND	0.0100		mg/L	1	10/19/2016	R38749
SM4500-H+B: PH						Analyst: **JRR**	
pH	7.82	1.68	H	pH units	1	10/18/2016 1:22:12 PM	R38048
EPA METHOD 200.7: DISSOLVED METALS						Analyst: **MED**	
Aluminum	ND	0.020		mg/L	1	10/25/2016 12:47:24 PM	A38197
Barium	0.079	0.0020		mg/L	1	10/21/2016 6:01:00 PM	B38141
Boron	0.092	0.040		mg/L	1	10/21/2016 6:01:00 PM	B38141
Cadmium	ND	0.0020		mg/L	1	10/21/2016 6:01:00 PM	B38141
Chromium	ND	0.0060		mg/L	1	10/21/2016 6:01:00 PM	B38141
Cobalt	ND	0.0060		mg/L	1	10/21/2016 6:01:00 PM	B38141
Copper	ND	0.0060		mg/L	1	10/25/2016 12:47:24 PM	A38197
Iron	ND	0.020		mg/L	1	10/25/2016 12:47:24 PM	A38197
Manganese	ND	0.0020		mg/L	1	10/21/2016 6:01:00 PM	B38141
Molybdenum	ND	0.0080		mg/L	1	10/21/2016 6:01:00 PM	B38141
Nickel	ND	0.010		mg/L	1	10/21/2016 6:01:00 PM	B38141
Silver	ND	0.0050		mg/L	1	10/21/2016 6:01:00 PM	B38141
Zinc	0.014	0.010		mg/L	1	10/21/2016 6:01:00 PM	B38141
EPA METHOD 245.1: MERCURY						Analyst: **JLF**	
Mercury	ND	0.00020		mg/L	1	10/21/2016 12:15:12 PM	28201

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	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company
Client Sample ID: R.O. Reject
Project: Quarterly RO Reject
Collection Date: 10/11/2016 11:00:00 AM
Lab ID: 1610613-001 **Matrix:** AQUEOUS **Received Date:** 10/13/2016 8:30:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **AG**	
Gasoline Range Organics (GRO)	ND	0.050		mg/L	1	10/19/2016 9:14:28 PM	W38060
Surr: BFB	90.7	70-130		%Rec	1	10/19/2016 9:14:28 PM	W38060
EPA METHOD 8011/504.1: EDB						Analyst: **JME**	
1,2-Dibromoethane	ND	0.010		µg/L	1	10/17/2016 4:51:55 PM	28082
EPA METHOD 8082: PCB'S						Analyst: **SCC**	
Aroclor 1016	ND	1.0		µg/L	1	10/19/2016 8:28:00 AM	28040
Aroclor 1221	ND	1.0		µg/L	1	10/19/2016 8:28:00 AM	28040
Aroclor 1232	ND	1.0		µg/L	1	10/19/2016 8:28:00 AM	28040
Aroclor 1242	ND	1.0		µg/L	1	10/19/2016 8:28:00 AM	28040
Aroclor 1248	ND	1.0		µg/L	1	10/19/2016 8:28:00 AM	28040
Aroclor 1254	ND	1.0		µg/L	1	10/19/2016 8:28:00 AM	28040
Aroclor 1260	ND	1.0		µg/L	1	10/19/2016 8:28:00 AM	28040
Surr: Decachlorobiphenyl	117	26.1-140		%Rec	1	10/19/2016 8:28:00 AM	28040
Surr: Tetrachloro-m-xylene	112	15-123		%Rec	1	10/19/2016 8:28:00 AM	28040
EPA METHOD 8015M/D: DIESEL RANGE						Analyst: **TOM**	
Diesel Range Organics (DRO)	ND	1.0		mg/L	1	10/14/2016 10:46:55 PM	28063
Motor Oil Range Organics (MRO)	ND	5.0		mg/L	1	10/14/2016 10:46:55 PM	28063
Surr: DNOP	117	77.1-144		%Rec	1	10/14/2016 10:46:55 PM	28063
EPA METHOD 8310: PAHS						Analyst: **SCC**	
Naphthalene	ND	2.0		µg/L	1	10/20/2016 3:19:37 PM	28041
1-Methylnaphthalene	ND	2.0		µg/L	1	10/20/2016 3:19:37 PM	28041
2-Methylnaphthalene	ND	2.0		µg/L	1	10/20/2016 3:19:37 PM	28041
Benzo(a)pyrene	ND	0.070		µg/L	1	10/20/2016 3:19:37 PM	28041
Surr: Benzo(e)pyrene	80.6	20-153		%Rec	1	10/20/2016 3:19:37 PM	28041
EPA METHOD 8260B: VOLATILES						Analyst: **AG**	
Benzene	ND	1.0		µg/L	1	10/14/2016 10:07:29 AM	R37973
Toluene	ND	1.0		µg/L	1	10/14/2016 10:07:29 AM	R37973
Ethylbenzene	ND	1.0		µg/L	1	10/14/2016 10:07:29 AM	R37973
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	10/14/2016 10:07:29 AM	R37973
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	10/14/2016 10:07:29 AM	R37973
Carbon Tetrachloride	ND	1.0		µg/L	1	10/14/2016 10:07:29 AM	R37973
Chloroform	ND	1.0		µg/L	1	10/14/2016 10:07:29 AM	R37973
1,1-Dichloroethane	ND	1.0		µg/L	1	10/14/2016 10:07:29 AM	R37973
1,1-Dichloroethene	ND	1.0		µg/L	1	10/14/2016 10:07:29 AM	R37973
Methylene Chloride	ND	3.0		µg/L	1	10/14/2016 10:07:29 AM	R37973
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	10/14/2016 10:07:29 AM	R37973
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	10/14/2016 10:07:29 AM	R37973

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	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company
Client Sample ID: R.O. Reject
Project: Quarterly RO Reject
Collection Date: 10/11/2016 11:00:00 AM
Lab ID: 1610613-001
Matrix: AQUEOUS
Received Date: 10/13/2016 8:30:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **AG**	
1,1,1-Trichloroethane	ND	1.0		µg/L	1	10/14/2016 10:07:29 AM	R37973
1,1,2-Trichloroethane	ND	1.0		µg/L	1	10/14/2016 10:07:29 AM	R37973
Trichloroethene (TCE)	ND	1.0		µg/L	1	10/14/2016 10:07:29 AM	R37973
Vinyl chloride	ND	1.0		µg/L	1	10/14/2016 10:07:29 AM	R37973
Xylenes, Total	ND	1.5		µg/L	1	10/14/2016 10:07:29 AM	R37973
Surr: 1,2-Dichloroethane-d4	96.3	70-130		%Rec	1	10/14/2016 10:07:29 AM	R37973
Surr: 4-Bromofluorobenzene	100	70-130		%Rec	1	10/14/2016 10:07:29 AM	R37973
Surr: Dibromofluoromethane	103	70-130		%Rec	1	10/14/2016 10:07:29 AM	R37973
Surr: Toluene-d8	97.8	70-130		%Rec	1	10/14/2016 10:07:29 AM	R37973
TOTAL PHENOLICS BY SW-846 9067						Analyst: **SCC**	
Phenolics, Total Recoverable	ND	2.5		µg/L	1	10/18/2016	28115

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
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R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company
Client Sample ID: Trip Blank
Project: Quarterly RO Reject
Collection Date:
Lab ID: 1610613-002
Matrix: TRIP BLANK
Received Date: 10/13/2016 8:30:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8011/504.1: EDB						Analyst: **JME**	
1,2-Dibromoethane	ND	0.010		µg/L	1	10/17/2016 5:07:17 PM	28082
EPA METHOD 8260B: VOLATILES						Analyst: **AG**	
Benzene	ND	1.0		µg/L	1	10/14/2016 11:33:59 AM	R37973
Toluene	ND	1.0		µg/L	1	10/14/2016 11:33:59 AM	R37973
Ethylbenzene	ND	1.0		µg/L	1	10/14/2016 11:33:59 AM	R37973
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	10/14/2016 11:33:59 AM	R37973
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	10/14/2016 11:33:59 AM	R37973
Carbon Tetrachloride	ND	1.0		µg/L	1	10/14/2016 11:33:59 AM	R37973
Chloroform	ND	1.0		µg/L	1	10/14/2016 11:33:59 AM	R37973
1,1-Dichloroethane	ND	1.0		µg/L	1	10/14/2016 11:33:59 AM	R37973
1,1-Dichloroethene	ND	1.0		µg/L	1	10/14/2016 11:33:59 AM	R37973
Methylene Chloride	ND	3.0		µg/L	1	10/14/2016 11:33:59 AM	R37973
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	10/14/2016 11:33:59 AM	R37973
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	10/14/2016 11:33:59 AM	R37973
1,1,1-Trichloroethane	ND	1.0		µg/L	1	10/14/2016 11:33:59 AM	R37973
1,1,2-Trichloroethane	ND	1.0		µg/L	1	10/14/2016 11:33:59 AM	R37973
Trichloroethene (TCE)	ND	1.0		µg/L	1	10/14/2016 11:33:59 AM	R37973
Vinyl chloride	ND	1.0		µg/L	1	10/14/2016 11:33:59 AM	R37973
Xylenes, Total	ND	1.5		µg/L	1	10/14/2016 11:33:59 AM	R37973
Surr: 1,2-Dichloroethane-d4	93.1	70-130		%Rec	1	10/14/2016 11:33:59 AM	R37973
Surr: 4-Bromofluorobenzene	95.7	70-130		%Rec	1	10/14/2016 11:33:59 AM	R37973
Surr: Dibromofluoromethane	98.5	70-130		%Rec	1	10/14/2016 11:33:59 AM	R37973
Surr: Toluene-d8	104	70-130		%Rec	1	10/14/2016 11:33:59 AM	R37973

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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1610613**

16-Nov-16

Client: Navajo Refining Company

Project: Quarterly RO Reject

Sample ID **MB-B**	SampType: **MBLK**	TestCode: **EPA Method 200.7: Dissolved Metals**
Client ID: **PBW**	Batch ID: **B38141**	RunNo: **38141**
Prep Date:	Analysis Date: **10/21/2016**	SeqNo: **1190207** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Barium	ND	0.0020								
Boron	ND	0.040								
Cadmium	ND	0.0020								
Chromium	ND	0.0060								
Cobalt	ND	0.0060								
Manganese	ND	0.0020								
Molybdenum	ND	0.0080								
Nickel	ND	0.010								
Silver	ND	0.0050								
Zinc	ND	0.010								

Sample ID **LLLCS-B**	SampType: **LCSLL**	TestCode: **EPA Method 200.7: Dissolved Metals**
Client ID: **BatchQC**	Batch ID: **B38141**	RunNo: **38141**
Prep Date:	Analysis Date: **10/21/2016**	SeqNo: **1190211** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Barium	0.0026	0.0020	0.002000	0	130	50	150			
Boron	0.040	0.040	0.04000	0	101	50	150			
Cadmium	ND	0.0020	0.002000	0	84.5	50	150			
Chromium	0.0062	0.0060	0.006000	0	103	50	150			
Cobalt	0.0064	0.0060	0.006000	0	106	50	150			
Manganese	0.0021	0.0020	0.002000	0	106	50	150			
Molybdenum	ND	0.0080	0.008000	0	97.5	50	150			
Nickel	ND	0.010	0.005000	0	96.6	50	150			
Silver	ND	0.0050	0.005000	0	99.4	50	150			
Zinc	ND	0.010	0.005000	0	105	50	150			

Sample ID **LCS-B**	SampType: **LCS**	TestCode: **EPA Method 200.7: Dissolved Metals**
Client ID: **LCSW**	Batch ID: **B38141**	RunNo: **38141**
Prep Date:	Analysis Date: **10/21/2016**	SeqNo: **1190212** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Barium	0.51	0.0020	0.5000	0	101	85	115			
Boron	0.53	0.040	0.5000	0	106	85	115			
Cadmium	0.52	0.0020	0.5000	0	104	85	115			
Chromium	0.50	0.0060	0.5000	0	101	85	115			
Cobalt	0.49	0.0060	0.5000	0	97.8	85	115			
Manganese	0.50	0.0020	0.5000	0	100	85	115			
Molybdenum	0.53	0.0080	0.5000	0	105	85	115			
Nickel	0.48	0.010	0.5000	0	96.3	85	115			

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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1610613**

16-Nov-16

Client: Navajo Refining Company

Project: Quarterly RO Reject

Sample ID	**LCS-B**	SampType:	**LCS**		TestCode:	**EPA Method 200.7: Dissolved Metals**				
Client ID:	**LCSW**	Batch ID:	**B38141**		RunNo:	**38141**				
Prep Date:		Analysis Date:	**10/21/2016**		SeqNo:	**1190212**	Units:	**mg/L**		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Silver	0.10	0.0050	0.1000	0	99.9	85	115			
Zinc	0.49	0.010	0.5000	0	97.9	85	115			

Sample ID	**MB-A**	SampType:	**MBLK**		TestCode:	**EPA Method 200.7: Dissolved Metals**				
Client ID:	**PBW**	Batch ID:	**A38197**		RunNo:	**38197**				
Prep Date:		Analysis Date:	**10/25/2016**		SeqNo:	**1192092**	Units:	**mg/L**		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	ND	0.020								
Copper	ND	0.0060								
Iron	ND	0.020								

Sample ID	**LCS-A**	SampType:	**LCS**		TestCode:	**EPA Method 200.7: Dissolved Metals**				
Client ID:	**LCSW**	Batch ID:	**A38197**		RunNo:	**38197**				
Prep Date:		Analysis Date:	**10/25/2016**		SeqNo:	**1192093**	Units:	**mg/L**		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	0.57	0.020	0.5000	0	114	85	115			
Copper	0.49	0.0060	0.5000	0	97.8	85	115			
Iron	0.50	0.020	0.5000	0	99.1	85	115			

Sample ID	**LLLCS-A**	SampType:	**LCSLL**		TestCode:	**EPA Method 200.7: Dissolved Metals**				
Client ID:	**BatchQC**	Batch ID:	**A38197**		RunNo:	**38197**				
Prep Date:		Analysis Date:	**10/25/2016**		SeqNo:	**1192094**	Units:	**mg/L**		
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	ND	0.020	0.01000	0	123	50	150			
Copper	0.0064	0.0060	0.006000	0	106	50	150			
Iron	0.021	0.020	0.02000	0	107	50	150			

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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1610613**

16-Nov-16

Client: Navajo Refining Company

Project: Quarterly RO Reject

Sample ID	**LCS**	SampType: **LCS**			TestCode: **EPA 200.8: Dissolved Metals**				
Client ID:	**LCSW**	Batch ID: **B38214**			RunNo: **38214**				
Prep Date:		Analysis Date: **10/25/2016**			SeqNo: **1192768**		Units: **mg/L**		

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Lead	0.012	0.00050	0.01250	0	95.6	85	115			
Selenium	0.025	0.0010	0.02500	0	99.1	85	115			
Uranium	0.012	0.00050	0.01250	0	96.0	85	115			

Sample ID	**LLLCS**	SampType: **LCSLL**			TestCode: **EPA 200.8: Dissolved Metals**				
Client ID:	**BatchQC**	Batch ID: **B38214**			RunNo: **38214**				
Prep Date:		Analysis Date: **10/25/2016**			SeqNo: **1192770**		Units: **mg/L**		

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Lead	0.00051	0.00050	0.0005000	0	101	50	150			
Selenium	0.0011	0.0010	0.001000	0	113	50	150			
Uranium	ND	0.00050	0.0005000	0	97.5	50	150			

Sample ID	**MB**	SampType: **MBLK**			TestCode: **EPA 200.8: Dissolved Metals**				
Client ID:	**PBW**	Batch ID: **B38214**			RunNo: **38214**				
Prep Date:		Analysis Date: **10/25/2016**			SeqNo: **1192772**		Units: **mg/L**		

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Lead	ND	0.00050								
Selenium	ND	0.0010								
Uranium	ND	0.00050								

Sample ID	**LCS**	SampType: **LCS**			TestCode: **EPA 200.8: Dissolved Metals**				
Client ID:	**LCSW**	Batch ID: **A38300**			RunNo: **38300**				
Prep Date:		Analysis Date: **10/28/2016**			SeqNo: **1195760**		Units: **mg/L**		

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	0.025	0.0010	0.02500	0	98.3	85	115			

Sample ID	**LLLCS**	SampType: **LCSLL**			TestCode: **EPA 200.8: Dissolved Metals**				
Client ID:	**BatchQC**	Batch ID: **A38300**			RunNo: **38300**				
Prep Date:		Analysis Date: **10/28/2016**			SeqNo: **1195761**		Units: **mg/L**		

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	ND	0.0010	0.001000	0	99.2	50	150			

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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1610613**

16-Nov-16

Client: Navajo Refining Company

Project: Quarterly RO Reject

Sample ID **MB**	SampType: **MBLK**	TestCode: **EPA 200.8: Dissolved Metals**
Client ID: **PBW**	Batch ID: **A38300**	RunNo: **38300**
Prep Date:	Analysis Date: **10/28/2016**	SeqNo: **1195762** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	ND	0.0010								

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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1610613**

16-Nov-16

Client: Navajo Refining Company

Project: Quarterly RO Reject

Sample ID	**MB-28201**	SampType:	**MBLK**	TestCode:	**EPA Method 245.1: Mercury**					
Client ID:	**PBW**	Batch ID:	**28201**	RunNo:	**38122**					
Prep Date:	**10/20/2016**	Analysis Date:	**10/21/2016**	SeqNo:	**1189575**	Units:	**mg/L**			

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

Sample ID	**LCS-28201**	SampType:	**LCS**	TestCode:	**EPA Method 245.1: Mercury**					
Client ID:	**LCSW**	Batch ID:	**28201**	RunNo:	**38122**					
Prep Date:	**10/20/2016**	Analysis Date:	**10/21/2016**	SeqNo:	**1189576**	Units:	**mg/L**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0049	0.00020	0.005000	0	97.4	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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1610613**

16-Nov-16

Client: Navajo Refining Company

Project: Quarterly RO Reject

Sample ID **MB**	SampType: **MBLK**	TestCode: **EPA Method 300.0: Anions**
Client ID: **PBW**	Batch ID: **R37942**	RunNo: **37942**
Prep Date:	Analysis Date: **10/13/2016**	SeqNo: **1182401** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	ND	0.10								
Chloride	ND	0.50								
Nitrate+Nitrite as N	ND	0.20								

Sample ID **LCS**	SampType: **LCS**	TestCode: **EPA Method 300.0: Anions**
Client ID: **LCSW**	Batch ID: **R37942**	RunNo: **37942**
Prep Date:	Analysis Date: **10/13/2016**	SeqNo: **1182402** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	0.54	0.10	0.5000	0	107	90	110			
Chloride	4.7	0.50	5.000	0	93.9	90	110			
Nitrate+Nitrite as N	3.4	0.20	3.500	0	97.3	90	110			

Sample ID **MB**	SampType: **MBLK**	TestCode: **EPA Method 300.0: Anions**
Client ID: **PBW**	Batch ID: **R38212**	RunNo: **38212**
Prep Date:	Analysis Date: **10/25/2016**	SeqNo: **1192608** Units: **mg/L**

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

Sample ID **LCS**	SampType: **LCS**	TestCode: **EPA Method 300.0: Anions**
Client ID: **LCSW**	Batch ID: **R38212**	RunNo: **38212**
Prep Date:	Analysis Date: **10/25/2016**	SeqNo: **1192609** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	9.7	0.50	10.00	0	96.9	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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1610613**

16-Nov-16

Client: Navajo Refining Company

Project: Quarterly RO Reject

Sample ID	**MB-28082**	SampType:	**MBLK**	TestCode:	**EPA Method 8011/504.1: EDB**					
Client ID:	**PBW**	Batch ID:	**28082**	RunNo:	**37992**					
Prep Date:	**10/17/2016**	Analysis Date:	**10/17/2016**	SeqNo:	**1183982**	Units:	**µg/L**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
1,2-Dibromoethane	ND	0.010								

Sample ID	**LCS-28082**	SampType:	**LCS**	TestCode:	**EPA Method 8011/504.1: EDB**					
Client ID:	**LCSW**	Batch ID:	**28082**	RunNo:	**37992**					
Prep Date:	**10/17/2016**	Analysis Date:	**10/17/2016**	SeqNo:	**1183984**	Units:	**µg/L**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
1,2-Dibromoethane	0.093	0.010	0.1000	0	93.2	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
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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1610613**

16-Nov-16

Client: Navajo Refining Company

Project: Quarterly RO Reject

Sample ID **1610613-001AMS**	SampType: **MS**	TestCode: **EPA Method 8015M/D: Diesel Range**
Client ID: **R.O. Reject**	Batch ID: **28063**	RunNo: **37940**
Prep Date: **10/14/2016**	Analysis Date: **10/14/2016**	SeqNo: **1183256** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	6.1	1.0	5.000	0	121	79.6	148			
Surr: DNOP	0.51		0.5000		103	77.1	144			

Sample ID **1610613-001AMSD**	SampType: **MSD**	TestCode: **EPA Method 8015M/D: Diesel Range**
Client ID: **R.O. Reject**	Batch ID: **28063**	RunNo: **37940**
Prep Date: **10/14/2016**	Analysis Date: **10/14/2016**	SeqNo: **1183257** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	5.8	1.0	5.000	0	115	79.6	148	5.02	20	
Surr: DNOP	0.49		0.5000		98.6	77.1	144	0	0	

Sample ID **LCS-28063**	SampType: **LCS**	TestCode: **EPA Method 8015M/D: Diesel Range**
Client ID: **LCSW**	Batch ID: **28063**	RunNo: **37940**
Prep Date: **10/14/2016**	Analysis Date: **10/14/2016**	SeqNo: **1183264** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	5.8	1.0	5.000	0	116	63.2	155			
Surr: DNOP	0.49		0.5000		97.8	77.1	144			

Sample ID **MB-28063**	SampType: **MBLK**	TestCode: **EPA Method 8015M/D: Diesel Range**
Client ID: **PBW**	Batch ID: **28063**	RunNo: **37940**
Prep Date: **10/14/2016**	Analysis Date: **10/14/2016**	SeqNo: **1183265** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	ND	1.0								
Motor Oil Range Organics (MRO)	ND	5.0								
Surr: DNOP	1.1		1.000		114	77.1	144			

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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1610613**

16-Nov-16

Client: Navajo Refining Company

Project: Quarterly RO Reject

Sample ID **MB-28040**	SampType: **MBLK**	TestCode: **EPA Method 8082: PCB's**							
Client ID: **PBW**	Batch ID: **28040**	RunNo: **38063**							
Prep Date: **10/13/2016**	Analysis Date: **10/18/2016**	SeqNo: **1187392**	Units: **µg/L**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aroclor 1016	ND	1.0								
Aroclor 1221	ND	1.0								
Aroclor 1232	ND	1.0								
Aroclor 1242	ND	1.0								
Aroclor 1248	ND	1.0								
Aroclor 1254	ND	1.0								
Aroclor 1260	ND	1.0								
Surr: Decachlorobiphenyl	2.7		2.500		110	26.1	140			
Surr: Tetrachloro-m-xylene	2.7		2.500		108	15	123			

Sample ID **LCS-28040**	SampType: **LCS**	TestCode: **EPA Method 8082: PCB's**							
Client ID: **LCSW**	Batch ID: **28040**	RunNo: **38063**							
Prep Date: **10/13/2016**	Analysis Date: **10/18/2016**	SeqNo: **1187408**	Units: **µg/L**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aroclor 1016	5.2	1.0	5.000	0	103	15	147			
Aroclor 1260	5.2	1.0	5.000	0	105	15	200			
Surr: Decachlorobiphenyl	2.8		2.500		112	26.1	140			
Surr: Tetrachloro-m-xylene	2.8		2.500		112	15	123			

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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1610613**

16-Nov-16

Client: Navajo Refining Company

Project: Quarterly RO Reject

Sample ID **100ng lcs**	SampType: **LCS**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **LCSW**	Batch ID: **R37973**	RunNo: **37973**
Prep Date:	Analysis Date: **10/14/2016**	SeqNo: **1183336** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	20	1.0	20.00	0	100	70	130			
Toluene	20	1.0	20.00	0	98.9	70	130			
1,1-Dichloroethene	18	1.0	20.00	0	90.7	70	130			
Trichloroethene (TCE)	16	1.0	20.00	0	78.5	70	130			
Surr: 1,2-Dichloroethane-d4	9.6		10.00		96.5	70	130			
Surr: 4-Bromofluorobenzene	10		10.00		102	70	130			
Surr: Dibromofluoromethane	9.7		10.00		97.1	70	130			
Surr: Toluene-d8	10		10.00		103	70	130			

Sample ID **1610613-001bms**	SampType: **MS**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **R.O. Reject**	Batch ID: **R37973**	RunNo: **37973**
Prep Date:	Analysis Date: **10/14/2016**	SeqNo: **1183339** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	20	1.0	20.00	0	98.2	70	130			
Toluene	19	1.0	20.00	0	97.4	70	130			
1,1-Dichloroethene	18	1.0	20.00	0	88.0	70	130			
Trichloroethene (TCE)	16	1.0	20.00	0	77.8	70	130			
Surr: 1,2-Dichloroethane-d4	9.9		10.00		98.7	70	130			
Surr: 4-Bromofluorobenzene	9.6		10.00		96.3	70	130			
Surr: Dibromofluoromethane	9.9		10.00		99.3	70	130			
Surr: Toluene-d8	10		10.00		100	70	130			

Sample ID **1610613-001bmsd**	SampType: **MSD**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **R.O. Reject**	Batch ID: **R37973**	RunNo: **37973**
Prep Date:	Analysis Date: **10/14/2016**	SeqNo: **1183340** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	19	1.0	20.00	0	97.0	70	130	1.25	20	
Toluene	18	1.0	20.00	0	92.4	70	130	5.28	20	
1,1-Dichloroethene	17	1.0	20.00	0	86.1	70	130	2.18	20	
Trichloroethene (TCE)	15	1.0	20.00	0	76.1	70	130	2.11	20	
Surr: 1,2-Dichloroethane-d4	9.9		10.00		98.9	70	130	0	0	
Surr: 4-Bromofluorobenzene	9.9		10.00		99.2	70	130	0	0	
Surr: Dibromofluoromethane	9.9		10.00		98.9	70	130	0	0	
Surr: Toluene-d8	9.7		10.00		97.3	70	130	0	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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1610613**

16-Nov-16

Client: Navajo Refining Company

Project: Quarterly RO Reject

Sample ID **rb**	SampType: **MBLK**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **PBW**	Batch ID: **R37973**	RunNo: **37973**
Prep Date:	Analysis Date: **10/14/2016**	SeqNo: **1183360** 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								
1,2-Dichloroethane (EDC)	ND	1.0								
1,2-Dibromoethane (EDB)	ND	1.0								
Carbon Tetrachloride	ND	1.0								
Chloroform	ND	1.0								
1,1-Dichloroethane	ND	1.0								
1,1-Dichloroethene	ND	1.0								
Methylene Chloride	ND	3.0								
1,1,2,2-Tetrachloroethane	ND	2.0								
Tetrachloroethene (PCE)	ND	1.0								
1,1,1-Trichloroethane	ND	1.0								
1,1,2-Trichloroethane	ND	1.0								
Trichloroethene (TCE)	ND	1.0								
Vinyl chloride	ND	1.0								
Xylenes, Total	ND	1.5								
Surr: 1,2-Dichloroethane-d4	9.8		10.00		97.6	70	130			
Surr: 4-Bromofluorobenzene	9.8		10.00		97.6	70	130			
Surr: Dibromofluoromethane	10		10.00		105	70	130			
Surr: Toluene-d8	9.9		10.00		99.2	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
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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1610613**

16-Nov-16

Client: Navajo Refining Company

Project: Quarterly RO Reject

Sample ID **MB-28041**	SampType: **MBLK**	TestCode: **EPA Method 8310: PAHs**
Client ID: **PBW**	Batch ID: **28041**	RunNo: **38100**
Prep Date: **10/13/2016**	Analysis Date: **10/20/2016**	SeqNo: **1188744** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Naphthalene	ND	2.0								
1-Methylnaphthalene	ND	2.0								
2-Methylnaphthalene	ND	2.0								
Acenaphthylene	ND	2.5								
Acenaphthene	ND	2.0								
Fluorene	ND	0.80								
Phenanthrene	ND	0.60								
Anthracene	ND	0.60								
Fluoranthene	ND	0.30								
Pyrene	ND	0.30								
Benz(a)anthracene	ND	0.070								
Chrysene	ND	0.20								
Benzo(b)fluoranthene	ND	0.10								
Benzo(k)fluoranthene	ND	0.070								
Benzo(a)pyrene	ND	0.070								
Dibenz(a,h)anthracene	ND	0.12								
Benzo(g,h,i)perylene	ND	0.12								
Indeno(1,2,3-cd)pyrene	ND	0.25								
Surr: Benzo(e)pyrene	13		20.00		64.1	20	153			

Sample ID **LCS-28041**	SampType: **LCS**	TestCode: **EPA Method 8310: PAHs**
Client ID: **LCSW**	Batch ID: **28041**	RunNo: **38100**
Prep Date: **10/13/2016**	Analysis Date: **10/20/2016**	SeqNo: **1188746** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Naphthalene	81	2.0	80.00	0	101	55.6	124			
1-Methylnaphthalene	82	2.0	80.20	0	102	55.3	124			
2-Methylnaphthalene	79	2.0	80.00	0	99.2	55.4	124			
Acenaphthylene	85	2.5	80.20	0	106	60.2	119			
Acenaphthene	81	2.0	80.00	0	101	56	126			
Fluorene	7.5	0.80	8.020	0	93.9	51.6	129			
Phenanthrene	3.4	0.60	4.020	0	84.6	58.8	129			
Anthracene	4.0	0.60	4.020	0	98.8	59.9	121			
Fluoranthene	7.4	0.30	8.020	0	92.4	48	145			
Pyrene	8.2	0.30	8.020	0	102	56.2	130			
Benz(a)anthracene	0.81	0.070	0.8020	0	101	50.4	142			
Chrysene	3.9	0.20	4.020	0	95.8	54.7	134			
Benzo(b)fluoranthene	0.93	0.10	1.002	0	92.8	61.8	120			
Benzo(k)fluoranthene	0.49	0.070	0.5000	0	98.0	55.9	134			

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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1610613**

16-Nov-16

Client: Navajo Refining Company

Project: Quarterly RO Reject

Sample ID **LCS-28041**	SampType: **LCS**	TestCode: **EPA Method 8310: PAHs**								
Client ID: **LCSW**	Batch ID: **28041**	RunNo: **38100**								
Prep Date: **10/13/2016**	Analysis Date: **10/20/2016**	SeqNo: **1188746**	Units: **µg/L**							
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzo(a)pyrene	0.51	0.070	0.5020	0	102	51.3	137			
Dibenz(a,h)anthracene	0.98	0.12	1.002	0	97.8	57.8	134			
Benzo(g,h,i)perylene	1.0	0.12	1.000	0	100	57.2	134			
Indeno(1,2,3-cd)pyrene	2.2	0.25	2.004	0	108	58.2	137			
Surr: Benzo(e)pyrene	20		20.00		100	20	153			

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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1610613**

16-Nov-16

Client: Navajo Refining Company

Project: Quarterly RO Reject

Sample ID	**MB-28115**	SampType:	**MBLK**	TestCode:	**Total Phenolics by SW-846 9067**					
Client ID:	**PBW**	Batch ID:	**28115**	RunNo:	**38004**					
Prep Date:	**10/18/2016**	Analysis Date:	**10/18/2016**	SeqNo:	**1184471**	Units:	**µg/L**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Phenolics, Total Recoverable	ND	2.5								

Sample ID	**LCS-28115**	SampType:	**LCS**	TestCode:	**Total Phenolics by SW-846 9067**					
Client ID:	**LCSW**	Batch ID:	**28115**	RunNo:	**38004**					
Prep Date:	**10/18/2016**	Analysis Date:	**10/18/2016**	SeqNo:	**1184472**	Units:	**µg/L**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Phenolics, Total Recoverable	22	2.5	20.00	0	109	64.4	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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1610613**
16-Nov-16

Client: Navajo Refining Company
Project: Quarterly RO Reject

Sample ID	**MB-R38749**	SampType: **MBLK**		TestCode: **EPA 335.4: Total Cyanide Subbed**					
Client ID:	**PBW**	Batch ID: **R38749**		RunNo: **38749**					
Prep Date:		Analysis Date: **10/19/2016**		SeqNo: **1210509**		Units: **mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cyanide	ND	0.0100								

Sample ID	**LCS-R38749**	SampType: **LCS**		TestCode: **EPA 335.4: Total Cyanide Subbed**					
Client ID:	**LCSW**	Batch ID: **R38749**		RunNo: **38749**					
Prep Date:		Analysis Date: **10/19/2016**		SeqNo: **1210510**		Units: **mg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cyanide	0.543		0.5000	0	109	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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1610613**

16-Nov-16

Client: Navajo Refining Company

Project: Quarterly RO Reject

Sample ID **1610613-001bms**	SampType: **MS**	TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **R.O. Reject**	Batch ID: **W38060**	RunNo: **38060**
Prep Date:	Analysis Date: **10/20/2016**	SeqNo: **1187259** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	0.49	0.050	0.5000	0	97.8	53.8	128			
Surr: BFB	9.2		10.00		92.3	70	130			

Sample ID **1610613-001bmsd**	SampType: **MSD**	TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **R.O. Reject**	Batch ID: **W38060**	RunNo: **38060**
Prep Date:	Analysis Date: **10/20/2016**	SeqNo: **1187260** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	0.44	0.050	0.5000	0	88.0	53.8	128	10.6	20	
Surr: BFB	8.6		10.00		86.5	70	130	0	0	

Sample ID **rb**	SampType: **MBLK**	TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **PBW**	Batch ID: **W38060**	RunNo: **38060**
Prep Date:	Analysis Date: **10/19/2016**	SeqNo: **1187443** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	ND	0.050								
Surr: BFB	8.9		10.00		88.8	70	130			

Sample ID **2.5ug gro lcs**	SampType: **LCS**	TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **LCSW**	Batch ID: **W38060**	RunNo: **38060**
Prep Date:	Analysis Date: **10/19/2016**	SeqNo: **1188464** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	0.53	0.050	0.5000	0	105	75.4	118			
Surr: BFB	9.3		10.00		93.3	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
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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: **1610613**
16-Nov-16

Client: Navajo Refining Company
Project: Quarterly RO Reject

Sample ID	**MB-R38749**	SampType:	**MBLK**	TestCode:	**EPA 903.1: Ra 226 and EPA 904.0: Ra 228-Subbed**
Client ID:	**PBW**	Batch ID:	**R38749**	RunNo:	**38749**
Prep Date:		Analysis Date:	**11/16/2016**	SeqNo:	**1210512** Units: **pCi/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Radium-226	0	0.518								
Radium-226 ±	0.321	0.518								
Radium-228	0.2	0.627								
Radium-228 ±	0.292	0.627								

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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1610613**

16-Nov-16

Client: Navajo Refining Company

Project: Quarterly RO Reject

Sample ID	**MB-28134**	SampType:	**MBLK**	TestCode:	**SM2540C MOD: Total Dissolved Solids**					
Client ID:	**PBW**	Batch ID:	**28134**	RunNo:	**38086**					
Prep Date:	**10/18/2016**	Analysis Date:	**10/20/2016**	SeqNo:	**1188295**	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-28134**	SampType:	**LCS**	TestCode:	**SM2540C MOD: Total Dissolved Solids**					
Client ID:	**LCSW**	Batch ID:	**28134**	RunNo:	**38086**					
Prep Date:	**10/18/2016**	Analysis Date:	**10/20/2016**	SeqNo:	**1188296**	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	W	Sample container temperature is out of limit as specified

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: NAVAJO REFINING CO Work Order Number: 1610613 RcptNo: 1

Received by/date: JC 10/13/16

Logged By: **Ashley Gallegos** 10/13/2016 8:30:00 AM

Completed By: **Ashley Gallegos** 10/13/2016 11:53:15 AM

Reviewed By: JC 10/13/16

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: 5 1 (<2 or >12 unless noted)

Adjusted? No

Checked by: AJ

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: Navajo Refinery

Mailing Address: P.O. Box 159 Artesia, NM 88211-0159

Phone #: 575-748-3311

email or Fax#: 575-746-5451

QA/QC Package:

X Standard ☐ Level 4 (Full Validation)

☐ Other _____

☐ EDD (Type) _____

X Standard ☐ Rush _____

Project Name: Quarterly R.O. Reject

Project #: P.O. # 167796

Project Manager: Robert Combs

Sampler: Brady Hubbard

On Ice: X Yes ☐ No

Sample Temperature: 2.6

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. 1610013	8260B:WQCC List VOCs	8270C: WQCC list SVOCs	6010B: WQCC Metals	335.4: Total Cyanide	7470: Mercury	8015: GRO, DRO, ORO	8082: PCBs	Radioactivity (Ra-226+Ra-228)	Sulfate Chloride	Phenols	Fluoride	Nitrate/Nitrite	Total Dissolved Solids	PH	504.1:EDB	Air Bubbles (Y or N)
10-11	10:00	liquid	R.O. Reject	2 - 500ml P	1-unpres 1-H2SO4	-001									X		X	X	X	X		Y
10-11	10:00	liquid	R.O. Reject	3-40ml VOA	HCL		X															
10-11	10:00	liquid	R.O. Reject	1-500ml P	HNO3						X											
10-11	10:00	liquid	R.O. Reject	1-125ml P	HNO3				X													
10-11	10:00	liquid	R.O. Reject	1-500ml P	NaOH					X												
10-11	10:00	liquid	R.O. Reject	2- 1L P	HNO3									X								
10-11	10:00	liquid	R.O. Reject	3-40ml VOA	Na2S2O3																X	
10-11	10:00	liquid	R.O. Reject	2 - 1L Glass	unpres								X									
10-11	10:00	liquid	R.O. Reject	1 - 1L Glass	unpres			X														
10-11	10:00	liquid	R.O. Reject	3-40ml VOA	HCl							X										
10/11	10:00	liquid	R.O. Reject	1-250mlGlass	unpres							X										
10-11	10:00	liquid	R.O. Reject	1 - 1L Glass	H2SO4											X						
10-11	10:00	liquid	Trip Blank	2-40ml VOA	HCL	-002																

Date:	Time:	Relinquished by:	Received by:	Date	Time
10-12	11:00	Brady Hubbard	Lindsay Concha	10/13/16	0830
Date:	Time:	Relinquished by:	Received by:	Date	Time

Remarks:

Metals: As, Al, Ba, B, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, U, Zn

VOCs: 1,1,1-Trichloroethane; 1,1,2,2-Tetrachloroethane; 1,1,2,2-Tetrachloroethylene; 1,1,2-Trichloroethane; 1,1,2-Trichloroethylene; 1,1-Dichloroethane; 1,1-Dichloroethene; 1,2-Dibromoethane; 1,2-Dichloroethane; Benzene; Carbon Tetrachloride; Chloroform; Dichloromethane; Ethylbenzene; Toluene; Total Xylenes; Vinyl Chloride

SVOCs: benzo(a)pyrene, phenol, 1-methylnaphthalene, 2-methylnaphthalene, naphthalene

HOLLYFRONTIER

February 15, 2017

Submitted electronically via email to jim.griswold@state.nm.us and carlj.chavez@state.nm.us

Oil Conservation Division
New Mexico Energy, Minerals & Natural Resources Department
1220 South St. Francis Drive
Santa Fe, NM 87505

RE: Discharge Permit GW-028
Monthly Report – January 2017 Reporting Period

Dear Sirs:

In accordance with Condition 4.B.7 of Discharge Permit GW-028 (the Permit), the HollyFrontier Navajo Refining LLC (Navajo), Artesia, New Mexico, Refinery (the Refinery) hereby submits the required monthly report to the New Mexico Energy, Minerals, and Natural Resources Department, Oil Conservation Division (OCD). This letter and all attachments provided herein constitute Navajo's January 2016 monthly report, for the period of January 1-31, 2017, under the Permit.

Specifically, this report covers the January 2017 reporting period and includes the following data and information as required by Condition 4.B.7:

- Daily discharge flow measurements for each reverse osmosis (RO) unit, which were collected as required by Condition 4.B.4.

Flow rates, volumes, and discharge locations for the RO reject fluid is monitored from the three permanent RO units on a daily basis. Daily discharge rates and volumes are provided in Attachment 1. Per Mr. Chavez' request, the total discharge for the month is also shown in Attachment 1.

To satisfy the quarterly sampling requirement of Condition 4.B.1 of the Permit for the fourth quarter, samples were collected for the RO reject streams from the permanent units on January 5, 2017. The samples were analyzed for the constituents listed in sections 20.6.2.3103A, B, and C of the New Mexico Administrative Code (NMAC) and using the methods specified in Navajo's Facility Wide Groundwater Monitoring Program (FWGWMP). The corresponding analytical results are provided in Attachment 2.

On October 21, 2016, Navajo notified OCD of its selection of a Class 1 disposal well as an alternative disposal method for the RO reject. Navajo submitted a revised application to renew and modify Discharge Permit GW-028 on January 13, 2017, to reflect this selection.

Navajo is committed to proactively meeting the requirements of the Permit and working cooperatively with OCD. If you have any questions or comments, please contact me at 575-746-5487.

Sincerely,

Scott M. Denton
Environmental Manager

Enclosures:

Attachment 1: Daily Discharge Flowrates and Volumes
Attachment 2: Analytical Lab Report

cc. HFC: D. McWatters, R. O'Brien, M. Holder
OCD: A. Marks, B. Brancard

Attachment 1
Daily Discharge Flowrates and Volumes

Daily RO Reject Discharge Flow Rate Measurements and Calculated Daily Discharge

	Permanent RO Units				Daily Discharge Volume
	Metered Data			Combined RO Reject Discharge (Calculated)	
	GPM SOUTH	GPM NORTH	GPM MIDDLE	GPM	BBL/DAY
1/1/2017	0.00	128.70	125.72	254.42	8,722.97
1/2/2017	0.00	128.90	125.67	254.57	8,728.11
1/3/2017	0.00	128.73	125.77	254.50	8,725.71
1/4/2017	0.00	128.72	125.61	254.33	8,719.89
1/5/2017	0.15	128.90	125.86	254.90	8,739.43
1/6/2017	0.00	126.99	125.41	252.40	8,653.71
1/7/2017	0.00	124.68	124.50	249.19	8,543.66
1/8/2017	0.00	124.60	124.03	248.63	8,524.46
1/9/2017	0.00	115.64	116.60	232.25	7,962.86
1/10/2017	0.00	121.95	125.59	247.54	8,487.09
1/11/2017	0.00	122.38	126.03	248.41	8,516.91
1/12/2017	0.00	122.27	127.79	250.06	8,573.49
1/13/2017	21.23	107.10	128.94	257.27	8,820.69
1/14/2017	134.75	38.19	129.63	302.57	10,373.83
1/15/2017	136.47	39.28	130.72	306.47	10,507.54
1/16/2017	135.08	38.13	130.27	303.48	10,405.03
1/17/2017	135.69	38.65	130.06	304.40	10,436.57
1/18/2017	138.87	10.23	132.21	281.31	9,644.91
1/19/2017	123.39	64.66	131.14	319.18	10,943.31
1/20/2017	100.50	123.69	129.28	353.46	12,118.63
1/21/2017	97.46	122.80	129.00	349.26	11,974.63
1/22/2017	110.04	72.43	130.03	312.49	10,713.94
1/23/2017	125.38	42.27	131.51	299.15	10,256.57
1/24/2017	126.09	44.09	131.21	301.39	10,333.37
1/25/2017	126.86	43.15	131.16	301.16	10,325.49
1/26/2017	127.32	42.46	131.19	300.98	10,319.31
1/27/2017	127.20	42.55	130.96	300.72	10,310.40
1/28/2017	127.16	40.74	130.99	298.89	10,247.66
1/29/2017	127.49	16.81	131.11	275.41	9,442.63
1/30/2017	127.90	0.10	131.11	259.11	8,883.77
1/31/2017	127.71	0.07	130.88	258.66	8,868.34
TOTAL (bbls/month)					**297,824.91**

Attachment 2
Analytical Lab 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

February 14, 2017

Mike Holder
Navajo Refining Company
P.O. Box 159
Artesia, NM 88211-0159
TEL: (575) 748-3311
FAX

RE: Quarterly R.O. Reject

OrderNo.: 1701253

Dear Mike Holder:

Hall Environmental Analysis Laboratory received 2 sample(s) on 1/9/2017 for the analyses presented in the following report.

This report is a revised report and it replaces the original report issued February 06, 2017.

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. 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. All samples are reported as received unless otherwise indicated.

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

Sincerely,

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Hall Environmental Analysis Laboratory, Inc.

Analytical Report
Lab Order **1701253**
Date Reported: **2/14/2017**

CLIENT: Navajo Refining Company
Project: Quarterly R.O. Reject
Lab ID: 1701253-001 **Matrix:** AQUEOUS

Client Sample ID: R.O. Reject
Collection Date: 1/5/2017 4:30:00 PM
Received Date: 1/9/2017 9:20:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA 200.8: DISSOLVED METALS						Analyst: **JLF**	
Arsenic	ND	0.0050		mg/L	5	1/13/2017 5:17:37 PM	C40026
Lead	ND	0.0025		mg/L	5	1/13/2017 5:17:37 PM	C40026
Selenium	0.010	0.0050		mg/L	5	1/13/2017 5:17:37 PM	C40026
Uranium	0.0052	0.0025		mg/L	5	1/13/2017 5:17:37 PM	C40026
EPA 903.1: RA 226 AND EPA 904.0: RA 228-SUBBED						Analyst: **SUB**	
Radium-226	1.29	0.662		pCi/L	1	2/2/2017	R40526
Radium-226 ±	0.644	0.662		pCi/L	1	2/2/2017	R40526
Radium-228	0.624	1.02		pCi/L	1	2/2/2017	R40526
Radium-228 ±	0.507	1.02		pCi/L	1	2/2/2017	R40526
EPA METHOD 300.0: ANIONS						Analyst: **LGT**	
Fluoride	3.5	2.0		mg/L	20	1/9/2017 10:08:12 PM	R39919
Chloride	74	10		mg/L	20	1/9/2017 10:08:12 PM	R39919
Sulfate	1400	50		mg/L	100	1/11/2017 1:08:20 AM	R39952
Nitrate+Nitrite as N	2.3	1.0		mg/L	5	1/10/2017 12:12:18 AM	R39919
SM2540C MOD: TOTAL DISSOLVED SOLIDS						Analyst: **KS**	
Total Dissolved Solids	3410	20.0	*	mg/L	1	1/11/2017 5:59:00 PM	29623
EPA 335.4: TOTAL CYANIDE SUBBED						Analyst: **LSB**	
Cyanide	ND	0.0100		mg/L	1	1/16/2017	R40523
SM4500-H+B: PH						Analyst: **JRR**	
pH	7.87	1.68	H	pH units	1	1/9/2017 3:34:06 PM	R39934
EPA METHOD 200.7: DISSOLVED METALS						Analyst: **TES**	
Aluminum	ND	0.020		mg/L	1	1/22/2017 9:55:24 PM	A40181
Barium	0.066	0.0020		mg/L	1	1/24/2017 11:12:53 AM	A40223
Boron	0.10	0.040		mg/L	1	1/24/2017 11:12:53 AM	A40223
Cadmium	ND	0.0020		mg/L	1	1/24/2017 11:12:53 AM	A40223
Chromium	ND	0.0060		mg/L	1	1/24/2017 11:12:53 AM	A40223
Cobalt	ND	0.0060		mg/L	1	1/24/2017 11:12:53 AM	A40223
Copper	ND	0.0060		mg/L	1	1/26/2017 9:36:42 AM	A40288
Iron	ND	0.020		mg/L	1	1/24/2017 11:12:53 AM	A40223
Manganese	ND	0.0020		mg/L	1	1/24/2017 11:12:53 AM	A40223
Molybdenum	0.0088	0.0080		mg/L	1	1/24/2017 11:12:53 AM	A40223
Nickel	ND	0.010		mg/L	1	1/24/2017 11:12:53 AM	A40223
Silver	ND	0.0050		mg/L	1	1/24/2017 11:12:53 AM	A40223
Zinc	0.023	0.010		mg/L	1	1/24/2017 11:40:30 AM	A40223
EPA METHOD 245.1: MERCURY						Analyst: **MED**	
Mercury	ND	0.00020		mg/L	1	1/10/2017 12:14:44 PM	29608

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	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company
Project: Quarterly R.O. Reject
Lab ID: 1701253-001 **Matrix:** AQUEOUS

Client Sample ID: R.O. Reject
Collection Date: 1/5/2017 4:30:00 PM
Received Date: 1/9/2017 9:20:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **DJF**	
Gasoline Range Organics (GRO)	ND	0.050		mg/L	1	1/12/2017 2:15:17 PM	G39990
Surr: BFB	87.6	70-130		%Rec	1	1/12/2017 2:15:17 PM	G39990
EPA METHOD 8011/504.1: EDB						Analyst: **JME**	
1,2-Dibromoethane	ND	0.010		µg/L	1	1/10/2017 10:10:43 AM	29609
EPA METHOD 8082: PCB'S						Analyst: **SCC**	
Aroclor 1016	ND	1.0		µg/L	1	1/11/2017 10:44:00 AM	29618
Aroclor 1221	ND	1.0		µg/L	1	1/11/2017 10:44:00 AM	29618
Aroclor 1232	ND	1.0		µg/L	1	1/11/2017 10:44:00 AM	29618
Aroclor 1242	ND	1.0		µg/L	1	1/11/2017 10:44:00 AM	29618
Aroclor 1248	ND	1.0		µg/L	1	1/11/2017 10:44:00 AM	29618
Aroclor 1254	ND	1.0		µg/L	1	1/11/2017 10:44:00 AM	29618
Aroclor 1260	ND	1.0		µg/L	1	1/11/2017 10:44:00 AM	29618
Surr: Decachlorobiphenyl	60.4	26.1-140		%Rec	1	1/11/2017 10:44:00 AM	29618
Surr: Tetrachloro-m-xylene	53.2	15-123		%Rec	1	1/11/2017 10:44:00 AM	29618
EPA METHOD 8015M/D: DIESEL RANGE						Analyst: **TOM**	
Diesel Range Organics (DRO)	ND	1.0		mg/L	1	1/12/2017 4:33:48 PM	29657
Motor Oil Range Organics (MRO)	ND	5.0		mg/L	1	1/12/2017 4:33:48 PM	29657
Surr: DNOP	115	77.1-144		%Rec	1	1/12/2017 4:33:48 PM	29657
EPA METHOD 8310: PAHS						Analyst: **SCC**	
Naphthalene	ND	2.0		µg/L	1	1/11/2017 12:16:05 PM	29615
1-Methylnaphthalene	ND	2.0		µg/L	1	1/11/2017 12:16:05 PM	29615
2-Methylnaphthalene	ND	2.0		µg/L	1	1/11/2017 12:16:05 PM	29615
Benzo(a)pyrene	ND	0.070		µg/L	1	1/11/2017 12:16:05 PM	29615
Surr: Benzo(e)pyrene	81.0	24.4-130		%Rec	1	1/11/2017 12:16:05 PM	29615
EPA METHOD 8260B: VOLATILES						Analyst: **DJF**	
Benzene	ND	1.0		µg/L	1	1/9/2017 5:53:01 PM	W39912
Toluene	ND	1.0		µg/L	1	1/9/2017 5:53:01 PM	W39912
Ethylbenzene	ND	1.0		µg/L	1	1/9/2017 5:53:01 PM	W39912
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	1/9/2017 5:53:01 PM	W39912
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	1/9/2017 5:53:01 PM	W39912
Carbon Tetrachloride	ND	1.0		µg/L	1	1/9/2017 5:53:01 PM	W39912
Chloroform	ND	1.0		µg/L	1	1/9/2017 5:53:01 PM	W39912
1,1-Dichloroethane	ND	1.0		µg/L	1	1/9/2017 5:53:01 PM	W39912
1,1-Dichloroethene	ND	1.0		µg/L	1	1/9/2017 5:53:01 PM	W39912
Methylene Chloride	ND	3.0		µg/L	1	1/9/2017 5:53:01 PM	W39912
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	1/9/2017 5:53:01 PM	W39912
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	1/9/2017 5:53:01 PM	W39912

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

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
W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company
Project: Quarterly R.O. Reject
Lab ID: 1701253-001 **Matrix:** AQUEOUS

Client Sample ID: R.O. Reject
Collection Date: 1/5/2017 4:30:00 PM
Received Date: 1/9/2017 9:20:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **DJF**	
1,1,1-Trichloroethane	ND	1.0		µg/L	1	1/9/2017 5:53:01 PM	W39912
1,1,2-Trichloroethane	ND	1.0		µg/L	1	1/9/2017 5:53:01 PM	W39912
Trichloroethene (TCE)	ND	1.0		µg/L	1	1/9/2017 5:53:01 PM	W39912
Vinyl chloride	ND	1.0		µg/L	1	1/9/2017 5:53:01 PM	W39912
Xylenes, Total	ND	1.5		µg/L	1	1/9/2017 5:53:01 PM	W39912
Surr: 1,2-Dichloroethane-d4	107	70-130		%Rec	1	1/9/2017 5:53:01 PM	W39912
Surr: 4-Bromofluorobenzene	86.6	70-130		%Rec	1	1/9/2017 5:53:01 PM	W39912
Surr: Dibromofluoromethane	118	70-130		%Rec	1	1/9/2017 5:53:01 PM	W39912
Surr: Toluene-d8	87.9	70-130		%Rec	1	1/9/2017 5:53:01 PM	W39912
TOTAL PHENOLICS BY SW-846 9067						Analyst: **SCC**	
Phenolics, Total Recoverable	ND	2.5		µg/L	1	1/25/2017	29866

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	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company
Project: Quarterly R.O. Reject
Lab ID: 1701253-002

Client Sample ID: Trip Blank
Collection Date:
Matrix: TRIP BLANK
Received Date: 1/9/2017 9:20:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8015D: GASOLINE RANGE						Analyst: **DJF**	
Gasoline Range Organics (GRO)	ND	0.050		mg/L	1	1/12/2017 3:43:50 PM	G39990
Surr: BFB	83.7	70-130		%Rec	1	1/12/2017 3:43:50 PM	G39990
EPA METHOD 8011/504.1: EDB						Analyst: **JME**	
1,2-Dibromoethane	ND	0.010		µg/L	1	1/10/2017 10:25:50 AM	29609
EPA METHOD 8260B: VOLATILES						Analyst: **DJF**	
Benzene	ND	1.0		µg/L	1	1/9/2017 6:22:09 PM	W39912
Toluene	ND	1.0		µg/L	1	1/9/2017 6:22:09 PM	W39912
Ethylbenzene	ND	1.0		µg/L	1	1/9/2017 6:22:09 PM	W39912
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	1/9/2017 6:22:09 PM	W39912
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	1/9/2017 6:22:09 PM	W39912
Carbon Tetrachloride	ND	1.0		µg/L	1	1/9/2017 6:22:09 PM	W39912
Chloroform	ND	1.0		µg/L	1	1/9/2017 6:22:09 PM	W39912
1,1-Dichloroethane	ND	1.0		µg/L	1	1/9/2017 6:22:09 PM	W39912
1,1-Dichloroethene	ND	1.0		µg/L	1	1/9/2017 6:22:09 PM	W39912
Methylene Chloride	ND	3.0		µg/L	1	1/9/2017 6:22:09 PM	W39912
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	1/9/2017 6:22:09 PM	W39912
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	1/9/2017 6:22:09 PM	W39912
1,1,1-Trichloroethane	ND	1.0		µg/L	1	1/9/2017 6:22:09 PM	W39912
1,1,2-Trichloroethane	ND	1.0		µg/L	1	1/9/2017 6:22:09 PM	W39912
Trichloroethene (TCE)	ND	1.0		µg/L	1	1/9/2017 6:22:09 PM	W39912
Vinyl chloride	ND	1.0		µg/L	1	1/9/2017 6:22:09 PM	W39912
Xylenes, Total	ND	1.5		µg/L	1	1/9/2017 6:22:09 PM	W39912
Surr: 1,2-Dichloroethane-d4	103	70-130		%Rec	1	1/9/2017 6:22:09 PM	W39912
Surr: 4-Bromofluorobenzene	86.8	70-130		%Rec	1	1/9/2017 6:22:09 PM	W39912
Surr: Dibromofluoromethane	116	70-130		%Rec	1	1/9/2017 6:22:09 PM	W39912
Surr: Toluene-d8	88.9	70-130		%Rec	1	1/9/2017 6:22:09 PM	W39912

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

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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1701253**

14-Feb-17

Client: Navajo Refining Company
Project: Quarterly R.O. Reject

Sample ID **MB-A**	SampType: **MBLK**	TestCode: **EPA Method 200.7: Dissolved Metals**
Client ID: **PBW**	Batch ID: **A40181**	RunNo: **40181**
Prep Date:	Analysis Date: **1/22/2017**	SeqNo: **1259966** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	ND	0.020								

Sample ID **LLLCS-A**	SampType: **LCSLL**	TestCode: **EPA Method 200.7: Dissolved Metals**
Client ID: **BatchQC**	Batch ID: **A40181**	RunNo: **40181**
Prep Date:	Analysis Date: **1/22/2017**	SeqNo: **1259967** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	ND	0.020	0.01000	0	104	50	150			

Sample ID **LCS-A**	SampType: **LCS**	TestCode: **EPA Method 200.7: Dissolved Metals**
Client ID: **LCSW**	Batch ID: **A40181**	RunNo: **40181**
Prep Date:	Analysis Date: **1/22/2017**	SeqNo: **1259968** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum	0.53	0.020	0.5000	0	106	85	115			

Sample ID **MB-A**	SampType: **MBLK**	TestCode: **EPA Method 200.7: Dissolved Metals**
Client ID: **PBW**	Batch ID: **A40223**	RunNo: **40223**
Prep Date:	Analysis Date: **1/24/2017**	SeqNo: **1261933** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Barium	ND	0.0020								
Boron	ND	0.040								
Cadmium	ND	0.0020								
Chromium	ND	0.0060								
Cobalt	ND	0.0060								
Iron	ND	0.020								
Manganese	ND	0.0020								
Molybdenum	ND	0.0080								
Nickel	ND	0.010								
Silver	ND	0.0050								
Zinc	ND	0.010								

Sample ID **LCS-A**	SampType: **LCS**	TestCode: **EPA Method 200.7: Dissolved Metals**
Client ID: **LCSW**	Batch ID: **A40223**	RunNo: **40223**
Prep Date:	Analysis Date: **1/24/2017**	SeqNo: **1261934** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Barium	0.48	0.0020	0.5000	0	96.4	85	115			
Boron	0.50	0.040	0.5000	0	99.6	85	115			

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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1701253**

14-Feb-17

Client: Navajo Refining Company

Project: Quarterly R.O. Reject

Sample ID **LCS-A**	SampType: **LCS**	TestCode: **EPA Method 200.7: Dissolved Metals**
Client ID: **LCSW**	Batch ID: **A40223**	RunNo: **40223**
Prep Date:	Analysis Date: **1/24/2017**	SeqNo: **1261934** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cadmium	0.49	0.0020	0.5000	0	97.1	85	115			
Chromium	0.48	0.0060	0.5000	0	95.4	85	115			
Cobalt	0.46	0.0060	0.5000	0	91.8	85	115			
Iron	0.47	0.020	0.5000	0	93.5	85	115			
Manganese	0.47	0.0020	0.5000	0	94.2	85	115			
Molybdenum	0.50	0.0080	0.5000	0	101	85	115			
Nickel	0.45	0.010	0.5000	0	90.4	85	115			
Silver	0.098	0.0050	0.1000	0	97.9	85	115			
Zinc	0.47	0.010	0.5000	0	93.5	85	115			

Sample ID **LLLCS-A**	SampType: **LCSLL**	TestCode: **EPA Method 200.7: Dissolved Metals**
Client ID: **BatchQC**	Batch ID: **A40223**	RunNo: **40223**
Prep Date:	Analysis Date: **1/24/2017**	SeqNo: **1261935** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Barium	0.0022	0.0020	0.002000	0	112	50	150			
Boron	0.040	0.040	0.04000	0	101	50	150			
Cadmium	ND	0.0020	0.002000	0	98.5	50	150			
Chromium	0.0060	0.0060	0.006000	0	101	50	150			
Cobalt	ND	0.0060	0.006000	0	98.5	50	150			
Iron	ND	0.020	0.02000	0	99.3	50	150			
Manganese	ND	0.0020	0.002000	0	92.5	50	150			
Molybdenum	0.0092	0.0080	0.008000	0	115	50	150			
Nickel	ND	0.010	0.005000	0	110	50	150			
Silver	0.0052	0.0050	0.005000	0	105	50	150			
Zinc	ND	0.010	0.005000	0	109	50	150			

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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1701253**

14-Feb-17

Client: Navajo Refining Company
Project: Quarterly R.O. Reject

Sample ID **1701253-001GMSDL** SampType: **MSD** TestCode: **EPA 200.8: Dissolved Metals**
Client ID: **R.O. Reject** Batch ID: **C40026** RunNo: **40026**
Prep Date: Analysis Date: **1/13/2017** SeqNo: **1254502** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	0.14	0.0050	0.1250	0.002183	108	70	130	0.715	20	
Lead	0.064	0.0025	0.06250	0	102	70	130	0.187	20	
Selenium	0.14	0.0050	0.1250	0.01048	106	70	130	1.86	20	
Uranium	0.071	0.0025	0.06250	0.005175	105	70	130	0.245	20	

Sample ID **1701253-001GMSLL** SampType: **MS** TestCode: **EPA 200.8: Dissolved Metals**
Client ID: **R.O. Reject** Batch ID: **C40026** RunNo: **40026**
Prep Date: Analysis Date: **1/13/2017** SeqNo: **1254503** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	0.14	0.0050	0.1250	0.002183	107	70	130			
Lead	0.064	0.0025	0.06250	0	102	70	130			
Selenium	0.14	0.0050	0.1250	0.01048	104	70	130			
Uranium	0.071	0.0025	0.06250	0.005175	105	70	130			

Sample ID **LCS** SampType: **LCS** TestCode: **EPA 200.8: Dissolved Metals**
Client ID: **LCSW** Batch ID: **C40026** RunNo: **40026**
Prep Date: Analysis Date: **1/13/2017** SeqNo: **1254506** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	0.025	0.0010	0.02500	0	98.8	85	115			
Lead	0.013	0.00050	0.01250	0	100	85	115			
Selenium	0.026	0.0010	0.02500	0	103	85	115			
Uranium	0.012	0.00050	0.01250	0	98.4	85	115			

Sample ID **LLLCS** SampType: **LCSLL** TestCode: **EPA 200.8: Dissolved Metals**
Client ID: **BatchQC** Batch ID: **C40026** RunNo: **40026**
Prep Date: Analysis Date: **1/13/2017** SeqNo: **1254507** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	ND	0.0010	0.001000	0	98.2	50	150			
Lead	0.00052	0.00050	0.0005000	0	104	50	150			
Selenium	0.0010	0.0010	0.001000	0	102	50	150			
Uranium	0.00050	0.00050	0.0005000	0	100	50	150			

Sample ID **MB** SampType: **MBLK** TestCode: **EPA 200.8: Dissolved Metals**
Client ID: **PBW** Batch ID: **C40026** RunNo: **40026**
Prep Date: Analysis Date: **1/13/2017** SeqNo: **1254508** Units: **mg/L**

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

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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1701253**

14-Feb-17

Client: Navajo Refining Company

Project: Quarterly R.O. Reject

Sample ID **MB**	SampType: **MBLK**	TestCode: **EPA 200.8: Dissolved Metals**
Client ID: **PBW**	Batch ID: **C40026**	RunNo: **40026**
Prep Date:	Analysis Date: **1/13/2017**	SeqNo: **1254508** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	ND	0.0010								
Lead	ND	0.00050								
Selenium	ND	0.0010								
Uranium	ND	0.00050								

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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1701253**

14-Feb-17

Client: Navajo Refining Company

Project: Quarterly R.O. Reject

Sample ID **MB-29608**	SampType: **MBLK**	TestCode: **EPA Method 245.1: Mercury**
Client ID: **PBW**	Batch ID: **29608**	RunNo: **39928**
Prep Date: **1/9/2017**	Analysis Date: **1/10/2017**	SeqNo: **1251284** Units: **mg/L**

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

Sample ID **LCS-29608**	SampType: **LCS**	TestCode: **EPA Method 245.1: Mercury**
Client ID: **LCSW**	Batch ID: **29608**	RunNo: **39928**
Prep Date: **1/9/2017**	Analysis Date: **1/10/2017**	SeqNo: **1251285** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0049	0.00020	0.005000	0	98.3	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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1701253**

14-Feb-17

Client: Navajo Refining Company

Project: Quarterly R.O. Reject

Sample ID **MB**	SampType: **MBLK**	TestCode: **EPA Method 300.0: Anions**
Client ID: **PBW**	Batch ID: **R39919**	RunNo: **39919**
Prep Date:	Analysis Date: **1/9/2017**	SeqNo: **1251098** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	ND	0.10								
Chloride	ND	0.50								
Nitrate+Nitrite as N	ND	0.20								

Sample ID **LCS**	SampType: **LCS**	TestCode: **EPA Method 300.0: Anions**
Client ID: **LCSW**	Batch ID: **R39919**	RunNo: **39919**
Prep Date:	Analysis Date: **1/9/2017**	SeqNo: **1251099** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	0.49	0.10	0.5000	0	97.8	90	110			
Chloride	4.8	0.50	5.000	0	96.8	90	110			
Nitrate+Nitrite as N	3.5	0.20	3.500	0	101	90	110			

Sample ID **MB**	SampType: **MBLK**	TestCode: **EPA Method 300.0: Anions**
Client ID: **PBW**	Batch ID: **R39952**	RunNo: **39952**
Prep Date:	Analysis Date: **1/10/2017**	SeqNo: **1251860** Units: **mg/L**

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

Sample ID **LCS**	SampType: **LCS**	TestCode: **EPA Method 300.0: Anions**
Client ID: **LCSW**	Batch ID: **R39952**	RunNo: **39952**
Prep Date:	Analysis Date: **1/10/2017**	SeqNo: **1251861** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate	9.4	0.50	10.00	0	94.5	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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1701253**

14-Feb-17

Client: Navajo Refining Company

Project: Quarterly R.O. Reject

Sample ID **MB-29609**	SampType: **MBLK**	TestCode: **EPA Method 8011/504.1: EDB**
Client ID: **PBW**	Batch ID: **29609**	RunNo: **39918**
Prep Date: **1/10/2017**	Analysis Date: **1/10/2017**	SeqNo: **1251243** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
1,2-Dibromoethane	ND	0.010								

Sample ID **LCS-29609**	SampType: **LCS**	TestCode: **EPA Method 8011/504.1: EDB**
Client ID: **LCSW**	Batch ID: **29609**	RunNo: **39918**
Prep Date: **1/10/2017**	Analysis Date: **1/10/2017**	SeqNo: **1251245** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
1,2-Dibromoethane	0.094	0.010	0.1000	0	93.8	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
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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1701253**

14-Feb-17

Client: Navajo Refining Company

Project: Quarterly R.O. Reject

Sample ID **LCS-29657**	SampType: **LCS**	TestCode: **EPA Method 8015M/D: Diesel Range**
Client ID: **LCSW**	Batch ID: **29657**	RunNo: **39973**
Prep Date: **1/12/2017**	Analysis Date: **1/12/2017**	SeqNo: **1252916** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	5.5	1.0	5.000	0	110	63.2	155			
Surr: DNOP	0.56		0.5000		111	77.1	144			

Sample ID **MB-29657**	SampType: **MBLK**	TestCode: **EPA Method 8015M/D: Diesel Range**
Client ID: **PBW**	Batch ID: **29657**	RunNo: **39973**
Prep Date: **1/12/2017**	Analysis Date: **1/12/2017**	SeqNo: **1252917** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Diesel Range Organics (DRO)	ND	1.0								
Motor Oil Range Organics (MRO)	ND	5.0								
Surr: DNOP	1.1		1.000		108	77.1	144			

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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1701253**

14-Feb-17

Client: Navajo Refining Company
Project: Quarterly R.O. Reject

Sample ID **MB-29618** SampType: **MBLK** TestCode: **EPA Method 8082: PCB's**
Client ID: **PBW** Batch ID: **29618** RunNo: **39949**
Prep Date: **1/10/2017** Analysis Date: **1/11/2017** SeqNo: **1251667** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aroclor 1016	ND	1.0								
Aroclor 1221	ND	1.0								
Aroclor 1232	ND	1.0								
Aroclor 1242	ND	1.0								
Aroclor 1248	ND	1.0								
Aroclor 1254	ND	1.0								
Aroclor 1260	ND	1.0								
Surr: Decachlorobiphenyl	1.6		2.500		63.2	26.1	140			
Surr: Tetrachloro-m-xylene	1.4		2.500		55.2	15	123			

Sample ID **LCS-29618(1221)** SampType: **LCS** TestCode: **EPA Method 8082: PCB's**
Client ID: **LCSW** Batch ID: **29618** RunNo: **39949**
Prep Date: **1/10/2017** Analysis Date: **1/11/2017** SeqNo: **1251690** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aroclor 1221	3.1	1.0	5.000	0	61.8	15	200			
Surr: Decachlorobiphenyl	1.8		2.500		71.6	26.1	140			
Surr: Tetrachloro-m-xylene	1.2		2.500		48.0	15	123			

Sample ID **LCSD-29618(1221)** SampType: **LCSD** TestCode: **EPA Method 8082: PCB's**
Client ID: **LCSS02** Batch ID: **29618** RunNo: **39949**
Prep Date: **1/10/2017** Analysis Date: **1/11/2017** SeqNo: **1252020** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aroclor 1221	3.4	1.0	5.000	0	68.4	15	200	10.1	0	
Surr: Decachlorobiphenyl	1.8		2.500		72.8	26.1	140	0	0	
Surr: Tetrachloro-m-xylene	1.3		2.500		50.8	15	123	0	0	

Sample ID **LCS-29618(1232)** SampType: **LCS** TestCode: **EPA Method 8082: PCB's**
Client ID: **LCSW** Batch ID: **29618** RunNo: **39949**
Prep Date: **1/10/2017** Analysis Date: **1/11/2017** SeqNo: **1252021** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aroclor 1232	3.6	1.0	5.000	0	73.0	15	200			
Surr: Decachlorobiphenyl	1.8		2.500		70.4	26.1	140			
Surr: Tetrachloro-m-xylene	1.6		2.500		62.4	15	123			

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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1701253**

14-Feb-17

Client: Navajo Refining Company

Project: Quarterly R.O. Reject

Sample ID	**LCSD-29618(1232)**	SampType: **LCSD**		TestCode: **EPA Method 8082: PCB's**					
Client ID:	**LCSS02**	Batch ID: **29618**		RunNo: **39949**					
Prep Date:	**1/10/2017**	Analysis Date: **1/11/2017**		SeqNo: **1252022**		Units: **µg/L**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aroclor 1232	3.6	1.0	5.000	0	72.0	15	200	1.38	0	
Surr: Decachlorobiphenyl	1.7		2.500		68.8	26.1	140	0	0	
Surr: Tetrachloro-m-xylene	1.5		2.500		61.6	15	123	0	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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1701253**

14-Feb-17

Client: Navajo Refining Company

Project: Quarterly R.O. Reject

Sample ID **rb**	SampType: **MBLK**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **PBW**	Batch ID: **W39912**	RunNo: **39912**
Prep Date:	Analysis Date: **1/9/2017**	SeqNo: **1250932** 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								
1,2-Dichloroethane (EDC)	ND	1.0								
1,2-Dibromoethane (EDB)	ND	1.0								
Carbon Tetrachloride	ND	1.0								
Chloroform	ND	1.0								
1,1-Dichloroethane	ND	1.0								
1,1-Dichloroethene	ND	1.0								
Methylene Chloride	ND	3.0								
1,1,2,2-Tetrachloroethane	ND	2.0								
Tetrachloroethene (PCE)	ND	1.0								
1,1,1-Trichloroethane	ND	1.0								
1,1,2-Trichloroethane	ND	1.0								
Trichloroethene (TCE)	ND	1.0								
Vinyl chloride	ND	1.0								
Xylenes, Total	ND	1.5								
Surr: 1,2-Dichloroethane-d4	9.1		10.00		91.4	70	130			
Surr: 4-Bromofluorobenzene	9.1		10.00		91.2	70	130			
Surr: Dibromofluoromethane	9.7		10.00		97.5	70	130			
Surr: Toluene-d8	8.9		10.00		88.9	70	130			

Sample ID **100ng lcs**	SampType: **LCS**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **LCSW**	Batch ID: **W39912**	RunNo: **39912**
Prep Date:	Analysis Date: **1/9/2017**	SeqNo: **1250933** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	23	1.0	20.00	0	115	70	130			
Toluene	19	1.0	20.00	0	97.2	70	130			
1,1-Dichloroethene	20	1.0	20.00	0	102	70	130			
Trichloroethene (TCE)	22	1.0	20.00	0	109	70	130			
Surr: 1,2-Dichloroethane-d4	9.4		10.00		93.8	70	130			
Surr: 4-Bromofluorobenzene	9.0		10.00		89.5	70	130			
Surr: Dibromofluoromethane	9.8		10.00		98.4	70	130			
Surr: Toluene-d8	9.1		10.00		91.5	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
- 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
- W Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1701253**

14-Feb-17

Client: Navajo Refining Company

Project: Quarterly R.O. Reject

Sample ID **MB-29615**	SampType: **MBLK**	TestCode: **EPA Method 8310: PAHs**							
Client ID: **PBW**	Batch ID: **29615**	RunNo: **39968**							
Prep Date: **1/10/2017**	Analysis Date: **1/11/2017**	SeqNo: **1252566**	Units: **µg/L**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Naphthalene	ND	2.0								
1-Methylnaphthalene	ND	2.0								
2-Methylnaphthalene	ND	2.0								
Acenaphthylene	ND	2.5								
Acenaphthene	ND	2.0								
Fluorene	ND	0.80								
Phenanthrene	ND	0.60								
Anthracene	ND	0.60								
Fluoranthene	ND	0.30								
Pyrene	ND	0.30								
Benz(a)anthracene	ND	0.070								
Chrysene	ND	0.20								
Benzo(b)fluoranthene	ND	0.10								
Benzo(k)fluoranthene	ND	0.070								
Benzo(a)pyrene	ND	0.070								
Dibenz(a,h)anthracene	ND	0.12								
Benzo(g,h,i)perylene	ND	0.12								
Indeno(1,2,3-cd)pyrene	ND	0.25								
Surr: Benzo(e)pyrene	17		20.00		83.8	24.4	130			

Sample ID **LCS-29615**	SampType: **LCS**	TestCode: **EPA Method 8310: PAHs**							
Client ID: **LCSW**	Batch ID: **29615**	RunNo: **39968**							
Prep Date: **1/10/2017**	Analysis Date: **1/11/2017**	SeqNo: **1252567**	Units: **µg/L**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Naphthalene	47	2.0	80.00	0	59.0	33.3	141			
1-Methylnaphthalene	45	2.0	80.20	0	56.4	35.5	139			
2-Methylnaphthalene	43	2.0	80.00	0	54.1	30.7	139			
Acenaphthylene	53	2.5	80.20	0	65.8	60.2	119			
Acenaphthene	49	2.0	80.00	0	61.9	56	126			
Fluorene	5.0	0.80	8.020	0	61.7	51.6	129			
Phenanthrene	2.8	0.60	4.020	0	69.7	58.8	129			
Anthracene	2.7	0.60	4.020	0	66.9	59.9	121			
Fluoranthene	5.9	0.30	8.020	0	72.9	48	145			
Pyrene	6.3	0.30	8.020	0	78.7	56.2	130			
Benz(a)anthracene	0.58	0.070	0.8020	0	72.3	50.4	142			
Chrysene	3.0	0.20	4.020	0	73.9	54.7	134			
Benzo(b)fluoranthene	0.73	0.10	1.002	0	72.9	61.8	120			
Benzo(k)fluoranthene	0.37	0.070	0.5000	0	74.0	55.9	134			

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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1701253**

14-Feb-17

Client: Navajo Refining Company
Project: Quarterly R.O. Reject

Sample ID **LCS-29615**	SampType: **LCS**	TestCode: **EPA Method 8310: PAHs**
Client ID: **LCSW**	Batch ID: **29615**	RunNo: **39968**
Prep Date: **1/10/2017**	Analysis Date: **1/11/2017**	SeqNo: **1252567** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzo(a)pyrene	0.36	0.070	0.5020	0	71.7	49.1	142			
Dibenz(a,h)anthracene	0.76	0.12	1.002	0	75.8	57.8	134			
Benzo(g,h,i)perylene	0.77	0.12	1.000	0	77.0	57.2	134			
Indeno(1,2,3-cd)pyrene	1.4	0.25	2.004	0	68.9	58.2	137			
Surr: Benzo(e)pyrene	15		20.00		75.3	24.4	130			

Sample ID **LCSD-29615**	SampType: **LCSD**	TestCode: **EPA Method 8310: PAHs**
Client ID: **LCSS02**	Batch ID: **29615**	RunNo: **39968**
Prep Date: **1/10/2017**	Analysis Date: **1/11/2017**	SeqNo: **1252568** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Naphthalene	43	2.0	80.00	0	53.3	33.3	141	10.2	20.3	
1-Methylnaphthalene	41	2.0	80.20	0	51.0	35.5	139	10.0	22.7	
2-Methylnaphthalene	39	2.0	80.00	0	49.0	30.7	139	9.91	22.6	
Acenaphthylene	48	2.5	80.20	0	59.6	60.2	119	9.90	22.6	S
Acenaphthene	45	2.0	80.00	0	56.1	56	126	9.70	21.4	
Fluorene	4.6	0.80	8.020	0	57.1	51.6	129	7.76	23.6	
Phenanthrene	2.5	0.60	4.020	0	62.2	58.8	129	11.3	24.7	
Anthracene	2.4	0.60	4.020	0	59.5	59.9	121	11.8	23.9	S
Fluoranthene	5.3	0.30	8.020	0	65.6	48	145	10.6	25.1	
Pyrene	5.7	0.30	8.020	0	70.8	56.2	130	10.5	23.7	
Benz(a)anthracene	0.52	0.070	0.8020	0	64.8	50.4	142	10.9	19.2	
Chrysene	2.6	0.20	4.020	0	65.7	54.7	134	11.8	19.8	
Benzo(b)fluoranthene	0.66	0.10	1.002	0	65.9	61.8	120	10.1	22.1	
Benzo(k)fluoranthene	0.33	0.070	0.5000	0	66.0	55.9	134	11.4	27.2	
Benzo(a)pyrene	0.32	0.070	0.5020	0	63.7	49.1	142	11.8	30.2	
Dibenz(a,h)anthracene	0.69	0.12	1.002	0	68.9	57.8	134	9.66	23.8	
Benzo(g,h,i)perylene	0.69	0.12	1.000	0	69.0	57.2	134	11.0	19.1	
Indeno(1,2,3-cd)pyrene	1.2	0.25	2.004	0	61.4	58.2	137	11.5	19.6	
Surr: Benzo(e)pyrene	14		20.00		67.6	24.4	130	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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1701253**

14-Feb-17

Client: Navajo Refining Company

Project: Quarterly R.O. Reject

Sample ID **MB-29866**	SampType: **MBLK**	TestCode: **Total Phenolics by SW-846 9067**
Client ID: **PBW**	Batch ID: **29866**	RunNo: **40252**
Prep Date: **1/25/2017**	Analysis Date: **1/25/2017**	SeqNo: **1262095** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Phenolics, Total Recoverable	ND	2.5								

Sample ID **LCS-29866**	SampType: **LCS**	TestCode: **Total Phenolics by SW-846 9067**
Client ID: **LCSW**	Batch ID: **29866**	RunNo: **40252**
Prep Date: **1/25/2017**	Analysis Date: **1/25/2017**	SeqNo: **1262096** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Phenolics, Total Recoverable	21	2.5	20.00	0	104	62.4	146			

Sample ID **LCSD-29866**	SampType: **LCSD**	TestCode: **Total Phenolics by SW-846 9067**
Client ID: **LCSS02**	Batch ID: **29866**	RunNo: **40252**
Prep Date: **1/25/2017**	Analysis Date: **1/25/2017**	SeqNo: **1262097** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Phenolics, Total Recoverable	23	2.5	20.00	0	113	62.4	146	8.32	21	

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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1701253**

14-Feb-17

Client: Navajo Refining Company

Project: Quarterly R.O. Reject

Sample ID	**MB-R40523**	SampType:	**MBLK**	TestCode:	**EPA 335.4: Total Cyanide Subbed**					
Client ID:	**PBW**	Batch ID:	**R40523**	RunNo:	**40523**					
Prep Date:		Analysis Date:	**1/16/2017**	SeqNo:	**1269895**	Units:	**mg/L**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cyanide	ND	0.0100								

Sample ID	**LCS-R40523**	SampType:	**LCS**	TestCode:	**EPA 335.4: Total Cyanide Subbed**					
Client ID:	**LCSW**	Batch ID:	**R40523**	RunNo:	**40523**					
Prep Date:		Analysis Date:	**1/16/2017**	SeqNo:	**1269896**	Units:	**mg/L**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cyanide	0.485		0.5000	0	97.0	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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1701253**

14-Feb-17

Client: Navajo Refining Company
Project: Quarterly R.O. Reject

Sample ID **rb**	SampType: **MBLK**	TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **PBW**	Batch ID: **G39990**	RunNo: **39990**
Prep Date:	Analysis Date: **1/12/2017**	SeqNo: **1253120** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	ND	0.050								
Surr: BFB	8.8		10.00		87.5	70	130			

Sample ID **2.5ug gro lcs**	SampType: **LCS**	TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **LCSW**	Batch ID: **G39990**	RunNo: **39990**
Prep Date:	Analysis Date: **1/12/2017**	SeqNo: **1253121** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	0.55	0.050	0.5000	0	110	75.4	118			
Surr: BFB	9.2		10.00		92.5	70	130			

Sample ID **1701253-001a msd**	SampType: **MSD**	TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **R.O. Reject**	Batch ID: **G39990**	RunNo: **39990**
Prep Date:	Analysis Date: **1/12/2017**	SeqNo: **1253124** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	0.46	0.050	0.5000	0.01760	89.1	70	130	12.9	20	
Surr: BFB	9.0		10.00		89.7	70	130	0	0	

Sample ID **1701253-001a ms g**	SampType: **MS**	TestCode: **EPA Method 8015D: Gasoline Range**
Client ID: **R.O. Reject**	Batch ID: **G39990**	RunNo: **40004**
Prep Date:	Analysis Date: **1/13/2017**	SeqNo: **1254101** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Range Organics (GRO)	0.53	0.050	0.5000	0.01760	102	70	130			
Surr: BFB	8.8		10.00		87.8	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
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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1701253**

14-Feb-17

Client: Navajo Refining Company

Project: Quarterly R.O. Reject

Sample ID **MB-R40526**	SampType: **MBLK**	TestCode: **EPA 903.1: Ra 226 and EPA 904.0: Ra 228-Subbed**
Client ID: **PBW**	Batch ID: **R40526**	RunNo: **40526**
Prep Date:	Analysis Date: **2/2/2017**	SeqNo: **1269905** Units: **pCi/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Radium-226	0.127	0.468								
Radium-226 ±	0.291	0.468								
Radium-228	0.0949	0.653								
Radium-228 ±	0.29	0.653								

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	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1701253**

14-Feb-17

Client: Navajo Refining Company

Project: Quarterly R.O. Reject

Sample ID **MB-29623**	SampType: **MBLK**	TestCode: **SM2540C MOD: Total Dissolved Solids**
Client ID: **PBW**	Batch ID: **29623**	RunNo: **39966**
Prep Date: **1/10/2017**	Analysis Date: **1/11/2017**	SeqNo: **1252489** 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-29623**	SampType: **LCS**	TestCode: **SM2540C MOD: Total Dissolved Solids**
Client ID: **LCSW**	Batch ID: **29623**	RunNo: **39966**
Prep Date: **1/10/2017**	Analysis Date: **1/11/2017**	SeqNo: **1252490** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	1060	20.0	1000	0	106	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	W	Sample container temperature is out of limit as specified

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: NAVAJO REFINING CO Work Order Number: 1701253 RcptNo: 1

Received by/date: RE 01/09/17

Logged By: Ashley Gallegos 1/9/2017 9:20:00 AM

Completed By: Ashley Gallegos 1/9/2017 9:54:08 AM

Reviewed By: 01/09/17

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: 6 (1) (<2 or >12 unless noted)

Adjusted? No

Checked by: Re

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

Client: Navajo Refinery

Mailing Address: P.O. Box 159 Artesia, NM 88211-0159

Phone #: 575-748-3311

email or Fax#: 575-746-5451

QA/QC Package:

X Standard ☐ Level 4 (Full Validation)

☐ Other _____

☐ EDD (Type) _____

Turn-Around Time:

X Standard ☐ Rush _____

Project Name:

Quarterly ~~Monthly~~ R.O. Reject

Project #: P.O. # 167796

Project Manager:

Robert Combs

Sampler: Brady Hubbard

On Ice: X Yes ☐ No

Sample Temperature: 1.7

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. 1701253	8260B:WQCC List VOCs	8270C: WQCC list SVOCs	6010B: WQCC Metals	335.4: Total Cyanide	7470: Mercury	8015: GRO, DRO, ORO	8082: PCBs	Radioactivity (Ra-226+Ra-228)	Sulfate Chloride	Phenols	Fluoride	Nitrate/Nitrite	Total Dissolved Solids	PH	504.1:EDB	Air Bubbles (Y or N)
1/5/17	4:30	liquid	R.O. Reject	2 - 500ml P	1-unpres 1-H2SO4	-001									X		X	X	X	X		Y
1/5/17	4:30	liquid	R.O. Reject	3-40ml VOA	HCL		X															
1/5/17	4:30	liquid	R.O. Reject	1-500ml P	HNO3						X											
1/5/17	4:30	liquid	R.O. Reject	1-125ml P	HNO3				X													
1/5/17	4:30	liquid	R.O. Reject	1-500ml P	NaOH					X												
1/5/17	4:30	liquid	R.O. Reject	2- 1L P	HNO3									X								
1/5/17	4:30	liquid	R.O. Reject	3-40ml VOA	Na2S2O3																X	
1/5/17	4:30	liquid	R.O. Reject	2 - 1L Glass	unpres								X									
1/5/17	4:30	liquid	R.O. Reject	1 - 1L Glass	unpres			X														
1/5/17	4:30	liquid	R.O. Reject	3-40ml VOA	HCl							X										
1/5/17	4:30	liquid	R.O. Reject	1-250mlGlas	unpres							X										
1/5/17	4:30	liquid	R.O. Reject	1 - 1L Glass	H2SO4											X						
1/5/17	XXX	liquid	Trip Blank	2-40ml VOA	HCL	-002																

Date:	Time:	Relinquished by:	Received by:	Date	Time
1-6-17	1:30	Brady Hubbard		1/9/17	0920
Date:	Time:	Relinquished by:	Received by:	Date	Time

Remarks:

Metals: As, Al, Ba, B, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, U, Zn

VOCs: 1,1,1-Trichloroethane; 1,1,2,2-Tetrachloroethane; 1,1,2,2-Tetrachloroethylene; 1,1,2-Trichloroethane; 1,1,2-Trichloroethylene; 1,1-Dichloroethane; 1,1-Dichloroethene; 1,2-Dibromoethane; 1,2-Dichloroethane; Benzene; Carbon Tetrachloride; Chloroform; Dichloromethane; Ethylbenzene; Toluene; Total Xylenes; Vinyl Chloride

SVOCs: benzo(a)pyrene, phenol, 1-methylnaphthalene, 2-methylnaphthalene, naphthalene

Navajo Refining Company, LLC
501 E. Main
Artesia, NM 88210
(Tel) 575.748.3311
(Fax) 575.746.5451

Quarterly RO Reject Sample Details Attachment

HOLLYFRONTIER
The HollyFrontier Companies

Project Name	Quarterly RO Reject
Samplers Name	Brady Hubbard
Samplers Affiliation	Navajo Refining Co. LLC
Start Date and Time	1/5/17 @ 4:23 pm
End Date and Time	1/5/17 @ 4:51 pm

Sample Type:	
Grab	☑
Time Weighted Composite	☐
Flow Weighted Composite	☐

Physical Property:	
Solid	☐
Liquid	☑
Sludge	☐

Parts / Sample Intervals	One

Type of Sampler	Directly to sample jars

Outfall / Sample Location: ☐ North Field R.O. Reject Discarge ☑ South Field R.O. Reject Discarge

				Preservatives							
Container	Size	Material	# of Containers	Neat (None)	HCL	HNO3	H2SO4	NaOH	Na2S2O3	NaHSO4	Other	Analysis and/or Method Requested
1	500ml	Plastic	2	X			X					pH, Cl, F, S04, NO2/NO3, TDS
2	40ml	VOA	3		X							8015 GRO
3	500ml	Plastic	1			X						6020 total metals, 7470 Hg
4	125ml	Plastic	1			X						6020 Dissolved Metals
5	500ml	Plastic	2					X				Cyanide
6	1L	Plastic	3			X						Radium 226/228
7	40ml	VOA	2		X							8260 see attached list
8	1L	Glass	1	X								8270 see attached list
9	1L	Glass	2	X								8082 PCBs
10	40ml	VOA	2	X								8015 DRO
11	40ml	VOA	2		X							Radium 226/228

Field Data (Weather Observations, Etc): 1/5/17 Tmp.42.8°F, Humidity 42% , Wind Dir. East, Wind Speed 10.4 mph, Conditions Clear
Date and Time:

Field Temp. 17.1C Field pH 7.69

Storage Method:	
Ice	☑
Refrigerated	☐
Other	☐

Shipping Media:	
Ice	☑
Other	☐

APPENDIX D

FLUIDS AND PRESSURE CALCULATIONS

APPENDIX D-1

PREDICTW EQUATIONS

Mathematical Basis of Equations Used in Modeling Pressure Buildup

The following discussion reviews the mathematical and physical basis of determining reservoir pressure buildup. The model presented is based on the line source solution to the radial diffusivity equation for pressure behavior in a homogeneous reservoir. The model was implemented using the Visual Basic program PredictW.

Exponential-Integral Formulation

The pressure response for radial flow of a slightly compressible fluid in a planar (porous) injection layer with spatially-constant properties is determined by the well known diffusivity equation (Lee, 1982):

$$\frac{\partial^2 p}{\partial r^2} + \frac{1}{r}\frac{\partial p}{\partial r} = \frac{\phi \mu c_t}{0.000264\, k}\frac{\partial p}{\partial t} \qquad \text{Equation 1}$$

where ϕ, μ, c_t, and k refer to porosity, viscosity (cp), compressibility (psi^{-1}), and permeability (md), respectively. The pressure, p, is expressed in psi; radial distance, r, is in feet; and time, t, is indicated in days. For an infinite reservoir of thickness h (ft) with $p \rightarrow p_o$ (initial pressure) as $r \rightarrow \infty$, the transient pressure, p (r, t), for a single line source injector at r = 0 is determined from Equation 1 as (Muskat, 1982):

$$p(r,t) = p_o - \frac{70.6\, q\mu}{kh}\, Ei\left(\frac{-39.5\phi\mu c_t r^2}{kt}\right), \qquad \text{Equation 2}$$

where Ei represents the exponential integral defined by:

$$Ei(-x) = -\int_x^\infty \frac{e^{-\varepsilon}}{\varepsilon}\, d\varepsilon \qquad \text{Equation 3}$$

and q represents the (constant) injection rate in barrels per day.

For the general case of multiple wells in a single layer, in which injection from each is represented by a succession of piece-wise constant flow rate intervals, the pressure response is readily obtained by superposition of elementary solutions

given by Equation 2. In terms of Cartesian coordinates, the pressure transient at an arbitrary point (x, y) at time "t" is given by:

$$p(x,y,t) = p_o + \sum_{j=1}^{N} \frac{70.6 q_1^j \mu}{kh} \mathrm{Ei}\left(\frac{-39.5\phi\mu c_t[(x-x_j)^2 + (y-y_j)^2]}{kt}\right)$$
$$+ \sum_{j=1}^{N} \sum_{i=1}^{n_{j-1}} 70.6[(q_{i-1}^j - q_i^j)\mu/kh] \mathrm{Ei}\left(\frac{-39.5\phi\mu c_t[(x-x_j)^2 + (y-y_j)^2]}{k(t-t_i^j)}\right)$$

Equation 4

for all $t_i^j < t$. In Equation 4, the following notation is employed:

N	=	number of wells injecting into the reservoir
n_j	=	number of constant flow rate increments for well j operative over time t
i	=	flow rate summation index ($1 < i < n_j$)
j	=	well number summation index ($1 < j < N$)
t_i	=	cumulative time corresponding to the end of injection rate interval i for well j
x_j, y_j	=	cartesian coordinates of well j
q_i^j	=	flow rate from well j during flow increment i

Equation 4 forms the basis for determining the COI for a general multi-well system.

To determine shutin or flowing pressures at a generic wellbore location, Equation 4 is modified to include a dimensionless skin factor, s_b, which reflects the effects of altered properties in the near-wellbore region (Van Everdingen, 1953). The associated augmentation, Δp_{skin}^b, of the theoretical flowing pressure is assumed to be of the form:

$$\Delta p_{skin}^b \text{ (psi)} = 141.2 \frac{q_i^b \mu}{kh} s_b$$

Equation 5

Incorporation of Equation 5 into Equation 4 and replacement of the quantity $[(x-x_b)^2 + (y-y_b)^2]$ in the Ei-function argument by $r^2_{w,b}$ (wellbore radius squared) leads to the following expression for the transient flowing pressure at a generic wellbore (b):

$$p^b_{wf}(x_b,y_b,t) = p_o + \sum_{j=1}^{N} \frac{70.6q^j_1\mu}{kh} Ei\left(\frac{-39.5\phi\mu c_t[(x_b-x_j)^2+(y_b-y_j)^2]}{kt}\right)$$
$$+ \sum_{j=1(j\neq b)}^{N} \sum_{i=1}^{n_{j-1}} \frac{70.6(q^j_{i+1}-q^j_i)\mu}{kh} Ei\left(\frac{-39.5\phi\mu c_t[x_b-x_j)^2+(y_b-y_j)^2]}{k(t-t^j_i)}\right)$$
$$+ \frac{70.6q^b_1\mu}{kh}\left[Ei\left(\frac{-39.5\phi\mu c_t r^2_{w,b}}{kt}\right) - 2s_b\right]$$
$$+ \sum_{i=1}^{n_{j-1}} \frac{70.6(q^b_{i+1}-q^b_i)\mu}{kh}\left[Ei\left(\frac{-39.5\phi\mu c_t r^2_{w,b}}{k(t-t^b_i)}\right) - 2s_b\right]$$

Equation 6

where x_b, y_b denote the wellbore coordinates at well b where the pressure response is evaluated.

Application of Equations 4 and 6 to address actual operational conditions often requires inclusion of many wells (including image injectors), each having several hundred flow rate increments. Accordingly, a Visual Basic computer program, PredictW, was created to evaluate these equations. The exponential integral is determined utilizing numerical methods (Abramowitz and Stegun, 1972). When isobaric contours at a given time in a given injection zone (unit) are desired, then Equation 4, actually $p - p_o$, is evaluated at each node of a predefined uniform grid. The resulting Δp-x-y array is then plotted to visualize the COI using Surfer (®Golden Software, Inc.). When the transient wellbore response is desired, Equation 6 is utilized by PredictW. The output in this case consists of a record of $\Delta p = p - p_o$ at a single well location over a specified time interval.

TECHNICAL REFERENCES

Lee, J., Well Testing, SPE Textbook Series, Vol. 1., Dallas, TX, 1982.

Muskat, M., The Flow of Homogeneous Fluids Through Porous Media, International Human Resources Development Corporation, 2nd Ed., Boston, 1982.

Van Everdingen, A.F., "The Skin Effect and its Influence on the Productive Capacity of a Well," Transactions, AIME, 1953.

Abramowitz, M., and Stegun, I.A., Handbook of Mathematical Functions, Dover, New York, 1972.

APPENDIX D-2

VISCOSITY CORRELATIONS

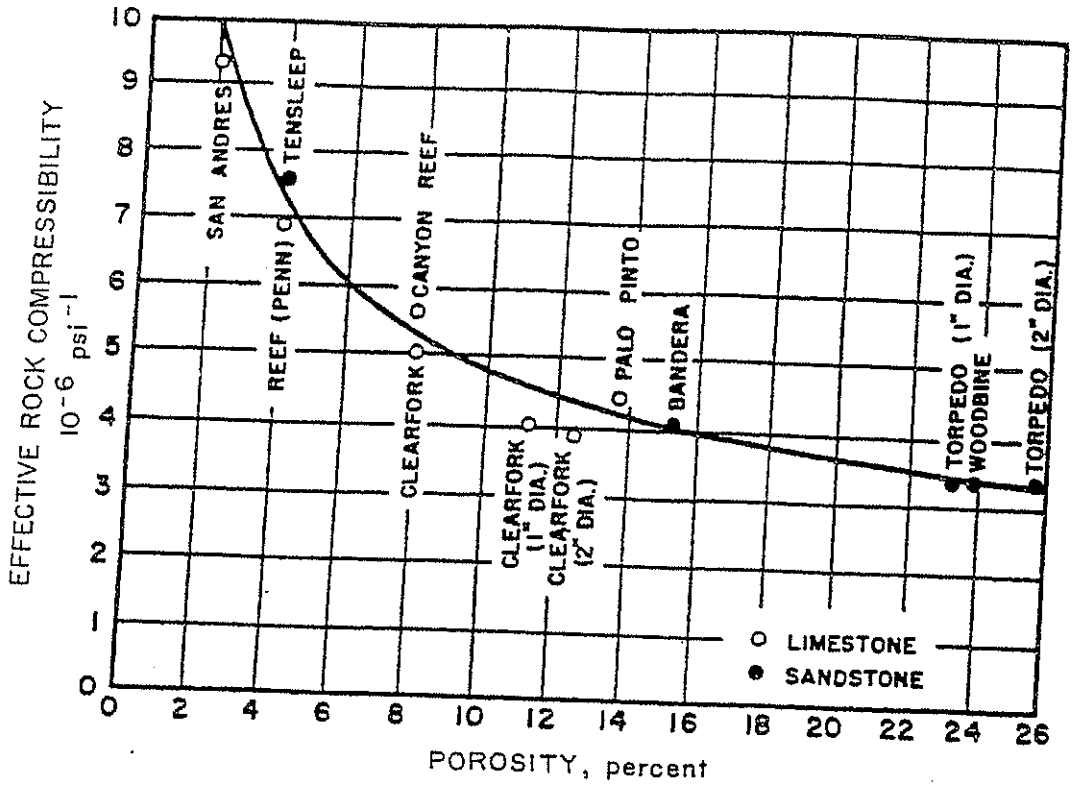

Fig. G.5 Effective formation (rock) compressibility. From Hall, *Trans.*, AIME (1953) **198**, 309.

Source: Matthews and Russell, 1967, Pressure Buildup and Flow Tests in Wells

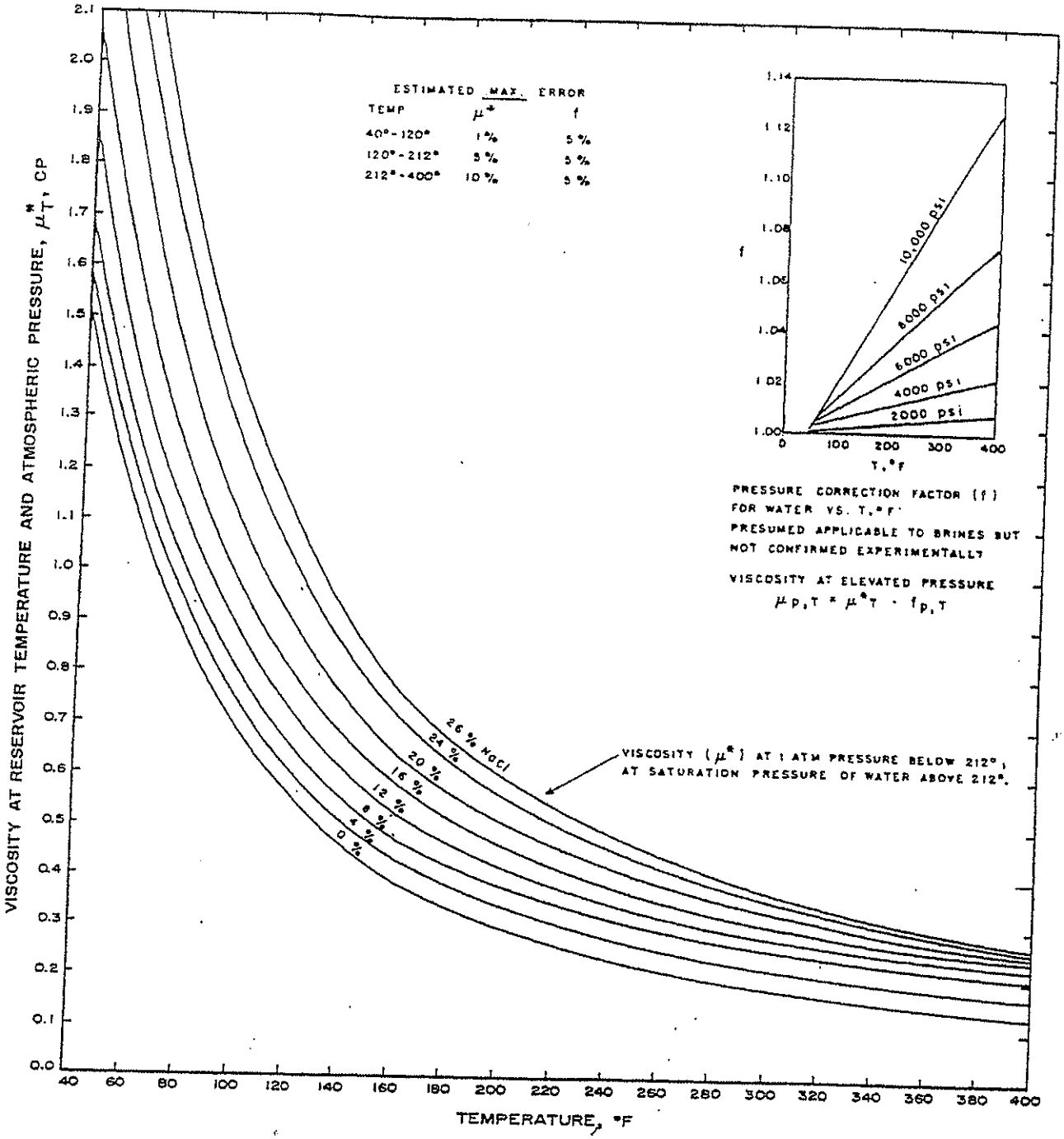

Fig. D-35 Water viscosity at various salinities and temperatures. After Matthews and Russell, data of Chesnut.[18]

FROM: Earlougher, R.C.,1977, "Advances in Well Test Analysis", SPE of AIME,Dallas,Texas

APPENDIX D-3

COMPRESSIBILITY CORRELATIONS

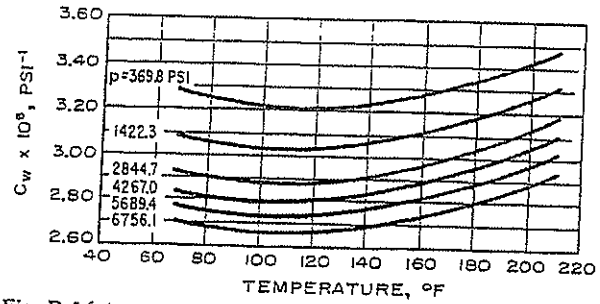

Fig. D.16 Average compressibility of distilled water. After Long and Chierici.[13]

Source: Earlougher, 1977, Advances in Well Test Analysis

COMPRESSIBILITY OF PORE VOLUME AND DISTILLED WATER

APPENDIX D-4

PREDICTED PRESSURE RISE CALCULATIONS

Appendix D-4

Predicted Pressure Increase Calculations

Navajo Refining Company, L.L.C.

Permeability (md) =	32	Compressibility (psi^{-1}) =	8.40E-06
Porosity (%) =	8.5	Viscosity (cp) =	0.57
Thickness (feet) =	75	Wellbore Radius (feet) =	0.51042

Modeled Rate = 150 gpm

Date		Time (days)	Pressure Increase (psi)		
			Wellbore	1-mile	2.5-miles
2017					
	06/01	0	0.00	0.00	0.00
	07/01	30	1610.22	51.92	1.25
	08/01	61	1671.42	95.83	9.51
	09/01	92	1706.85	125.19	20.54
	10/01	122	1731.19	146.51	31.18
	11/01	153	1750.72	164.13	41.47
	12/01	183	1766.16	178.32	50.62
2018	01/01	214	1779.65	190.90	59.28
	02/01	245	1791.32	201.87	67.24
	03/01	273	1800.65	210.71	73.89
	04/01	304	1809.92	219.54	80.74
	05/01	334	1818.04	227.31	86.90
	06/01	365	1825.69	234.66	92.86
	07/01	395	1832.50	241.23	98.27
	08/01	426	1839.02	247.52	103.53
	09/01	457	1845.08	253.39	108.50
	10/01	487	1850.56	258.71	113.05
	11/01	518	1855.88	263.89	117.52
	12/01	548	1860.74	268.62	121.64
2019	01/01	579	1865.48	273.25	125.70
	02/01	610	1869.98	277.64	129.59
	03/01	638	1873.85	281.42	132.95
	04/01	669	1877.94	285.43	136.53
	05/01	699	1881.72	289.13	139.86
	06/01	730	1885.46	292.80	143.17
	07/01	760	1888.94	296.21	146.25
	08/01	791	1892.39	299.60	149.33
	09/01	822	1895.70	302.86	152.31
	10/01	852	1898.79	305.90	155.09
	11/01	883	1901.87	308.93	157.88
	12/01	913	1904.75	311.76	160.49
2020	01/01	944	1907.63	314.60	163.11
	02/01	975	1910.42	317.35	165.65
	03/01	1004	1912.95	319.84	167.97
	04/01	1035	1915.57	322.42	170.37
	05/01	1065	1918.03	324.86	172.64
	06/01	1096	1920.51	327.30	174.92
	07/01	1126	1922.84	329.60	177.08
	08/01	1157	1925.18	331.91	179.24
	09/01	1188	1927.46	334.16	181.36
	10/01	1218	1929.61	336.29	183.36
	11/01	1249	1931.78	338.43	185.38
	12/01	1279	1933.82	340.46	187.29

Date		Time (days)	Pressure Increase (psi)		
			Wellbore	1-mile	2.5-miles
2021	01/01	1310	1935.89	342.50	189.22
	02/01	1341	1937.91	344.50	191.11
	03/01	1369	1939.69	346.26	192.78
	04/01	1400	1941.62	348.17	194.59
	05/01	1430	1943.45	349.98	196.31
	06/01	1461	1945.30	351.81	198.05
	07/01	1491	1947.05	353.55	199.70
	08/01	1522	1948.82	355.31	201.38
	09/01	1553	1950.56	357.03	203.02
	10/01	1583	1952.21	358.67	204.58
	11/01	1614	1953.88	360.32	206.16
	12/01	1644	1955.47	361.90	207.67
2022	01/01	1675	1957.08	363.49	209.19
	02/01	1706	1958.66	365.06	210.70
	03/01	1734	1960.07	366.46	212.03
	04/01	1765	1961.60	367.97	213.48
	05/01	1795	1963.05	369.41	214.87
	06/01	1826	1964.53	370.88	216.27
	07/01	1856	1965.93	372.27	217.61
	08/01	1887	1967.36	373.69	218.98
	09/01	1918	1968.77	375.09	220.32
	10/01	1948	1970.10	376.41	221.60
	11/01	1979	1971.47	377.77	222.90
	12/01	2009	1972.76	379.05	224.14
2023	01/01	2040	1974.08	380.37	225.41
	02/01	2071	1975.38	381.66	226.65
	03/01	2099	1976.54	382.81	227.76
	04/01	2130	1977.81	384.06	228.98
	05/01	2160	1979.01	385.26	230.13
	06/01	2191	1980.24	386.48	231.32
	07/01	2221	1981.41	387.65	232.44
	08/01	2252	1982.61	388.84	233.59
	09/01	2283	1983.79	390.01	234.73
	10/01	2313	1984.91	391.13	235.81
	11/01	2344	1986.06	392.27	236.92
	12/01	2374	1987.16	393.36	237.97
2024	01/01	2405	1988.28	394.47	239.05
	02/01	2436	1989.38	395.57	240.12
	03/01	2465	1990.40	396.58	241.10
	04/01	2496	1991.48	397.65	242.14
	05/01	2526	1992.51	398.68	243.14
	06/01	2557	1993.56	399.73	244.15
	07/01	2587	1994.57	400.73	245.12
	08/01	2618	1995.59	401.75	246.12
	09/01	2649	1996.61	402.76	247.10
	10/01	2679	1997.58	403.72	248.04
	11/01	2710	1998.57	404.71	249.00
	12/01	2740	1999.52	405.65	249.92

Appendix D-4

Predicted Pressure Increase Calculations

Navajo Refining Company, L.L.C.

Permeability (md) =	32	Compressibility (psi^{-1}) =	8.40E-06
Porosity (%) =	8.5	Viscosity (cp) =	0.57
Thickness (feet) =	75	Wellbore Radius (feet) =	0.51042

Modeled Rate = 150 gpm

	Date	Time (days)	Pressure Increase (psi) Wellbore	1-mile	2.5-miles
2025	01/01	2771	2000.49	406.62	250.86
	02/01	2802	2001.45	407.57	251.79
	03/01	2830	2002.31	408.43	252.62
	04/01	2861	2003.25	409.36	253.53
	05/01	2891	2004.15	410.26	254.40
	06/01	2922	2005.07	411.17	255.30
	07/01	2952	2005.95	412.05	256.15
	08/01	2983	2006.85	412.95	257.02
	09/01	3014	2007.74	413.83	257.89
	10/01	3044	2008.60	414.68	258.72
	11/01	3075	2009.47	415.55	259.57
	12/01	3105	2010.31	416.39	260.38
2026	01/01	3136	2011.16	417.24	261.22
	02/01	3167	2012.01	418.08	262.04
	03/01	3195	2012.77	418.84	262.78
	04/01	3226	2013.60	419.67	263.59
	05/01	3256	2014.40	420.46	264.37
	06/01	3287	2015.22	421.28	265.16
	07/01	3317	2016.00	422.06	265.93
	08/01	3348	2016.80	422.86	266.71
	09/01	3379	2017.60	423.65	267.48
	10/01	3409	2018.36	424.41	268.22
	11/01	3440	2019.14	425.18	268.99
	12/01	3470	2019.89	425.93	269.72
2027	01/01	3501	2020.66	426.69	270.46
	02/01	3532	2021.42	427.45	271.20
	03/01	3560	2022.10	428.13	271.87
	04/01	3591	2022.85	428.87	272.60
	05/01	3621	2023.56	429.59	273.30
	06/01	3652	2024.30	430.32	274.02
	07/01	3682	2025.00	431.02	274.71
	08/01	3713	2025.73	431.74	275.41
	09/01	3744	2026.44	432.46	276.11
	10/01	3774	2027.13	433.14	276.78
	11/01	3805	2027.84	433.85	277.47
	12/01	3835	2028.51	434.52	278.14
2028	01/01	3866	2029.21	435.21	278.81
	02/01	3897	2029.90	435.90	279.49
	03/01	3926	2030.54	436.54	280.11
	04/01	3957	2031.22	437.21	280.78
	05/01	3987	2031.87	437.86	281.41
	06/01	4018	2032.53	438.53	282.07
	07/01	4048	2033.18	439.17	282.69
	08/01	4079	2033.83	439.82	283.34
	09/01	4110	2034.49	440.47	283.98
	10/01	4140	2035.11	441.10	284.59
	11/01	4171	2035.76	441.74	285.22
	12/01	4201	2036.38	442.35	285.83

	Date	Time (days)	Pressure Increase (psi) Wellbore	1-mile	2.5-miles
2029	01/01	4232	2037.01	442.99	286.45
	02/01	4263	2037.64	443.61	287.06
	03/01	4291	2038.20	444.18	287.62
	04/01	4322	2038.82	444.80	288.22
	05/01	4352	2039.42	445.39	288.81
	06/01	4383	2040.03	446.00	289.41
	07/01	4413	2040.62	446.59	289.99
	08/01	4444	2041.22	447.19	290.58
	09/01	4475	2041.82	447.79	291.17
	10/01	4505	2042.40	448.36	291.73
	11/01	4536	2042.99	448.95	292.31
	12/01	4566	2043.56	449.52	292.87
2030	01/01	4597	2044.14	450.10	293.44
	02/01	4628	2044.72	450.68	294.01
	03/01	4656	2045.24	451.19	294.52
	04/01	4687	2045.82	451.76	295.08
	05/01	4717	2046.37	452.31	295.62
	06/01	4748	2046.93	452.88	296.18
	07/01	4778	2047.47	453.42	296.71
	08/01	4809	2048.03	453.97	297.26
	09/01	4840	2048.59	454.53	297.80
	10/01	4870	2049.12	455.06	298.32
	11/01	4901	2049.67	455.60	298.86
	12/01	4931	2050.19	456.13	299.38
2031	01/01	4962	2050.73	456.67	299.91
	02/01	4993	2051.27	457.20	300.44
	03/01	5021	2051.75	457.68	300.91
	04/01	5052	2052.28	458.21	301.43
	05/01	5082	2052.79	458.72	301.93
	06/01	5113	2053.32	459.24	302.45
	07/01	5143	2053.82	459.75	302.95
	08/01	5174	2054.34	460.26	303.46
	09/01	5205	2054.85	460.78	303.96
	10/01	5235	2055.35	461.27	304.45
	11/01	5266	2055.86	461.78	304.95
	12/01	5296	2056.35	462.27	305.43
2032	01/01	5327	2056.85	462.77	305.93
	02/01	5358	2057.35	463.27	306.42
	03/01	5387	2057.82	463.73	306.88
	04/01	5418	2058.31	464.23	307.36
	05/01	5448	2058.79	464.70	307.83
	06/01	5479	2059.28	465.19	308.31
	07/01	5509	2059.75	465.66	308.78
	08/01	5540	2060.23	466.14	309.25
	09/01	5571	2060.71	466.62	309.73
	10/01	5601	2061.18	467.09	310.18
	11/01	5632	2061.65	467.56	310.65
	12/01	5662	2062.11	468.02	311.10

Appendix D-4

Predicted Pressure Increase Calculations

Navajo Refining Company, L.L.C.

Permeability (md) =	32	Compressibility (psi^{-1}) =	8.40E-06
Porosity (%) =	8.5	Viscosity (cp) =	0.57
Thickness (feet) =	75	Wellbore Radius (feet) =	0.51042

Modeled Rate = 150 gpm

	Date	Time (days)	Pressure Increase (psi) Wellbore	1-mile	2.5-miles
2033	01/01	5693	2062.58	468.49	311.57
	02/01	5724	2063.05	468.95	312.03
	03/01	5752	2063.47	469.37	312.44
	04/01	5783	2063.94	469.84	312.90
	05/01	5813	2064.38	470.28	313.34
	06/01	5844	2064.84	470.74	313.79
	07/01	5874	2065.28	471.18	314.23
	08/01	5905	2065.74	471.63	314.67
	09/01	5936	2066.19	472.08	315.12
	10/01	5966	2066.62	472.52	315.55
	11/01	5997	2067.07	472.96	315.99
	12/01	6027	2067.50	473.39	316.41
2034	01/01	6058	2067.94	473.83	316.85
	02/01	6089	2068.38	474.27	317.28
	03/01	6117	2068.78	474.67	317.67
	04/01	6148	2069.21	475.10	318.10
	05/01	6178	2069.63	475.52	318.51
	06/01	6209	2070.06	475.95	318.94
	07/01	6239	2070.48	476.37	319.35
	08/01	6270	2070.91	476.79	319.77
	09/01	6301	2071.33	477.22	320.19
	10/01	6331	2071.74	477.63	320.59
	11/01	6362	2072.16	478.05	321.01
	12/01	6392	2072.57	478.45	321.41
2035	01/01	6423	2072.99	478.87	321.82
	02/01	6454	2073.40	479.28	322.23
	03/01	6482	2073.78	479.65	322.60
	04/01	6513	2074.19	480.06	323.00
	05/01	6543	2074.58	480.46	323.40
	06/01	6574	2074.99	480.87	323.80
	07/01	6604	2075.38	481.26	324.19
	08/01	6635	2075.79	481.66	324.58
	09/01	6666	2076.19	482.06	324.98
	10/01	6696	2076.58	482.45	325.36
	11/01	6727	2076.97	482.85	325.76
	12/01	6757	2077.36	483.23	326.13
2036	01/01	6788	2077.75	483.62	326.52
	02/01	6819	2078.15	484.01	326.91
	03/01	6848	2078.51	484.38	327.27
	04/01	6879	2078.90	484.77	327.66
	05/01	6909	2079.28	485.14	328.03
	06/01	6940	2079.66	485.53	328.41
	07/01	6970	2080.03	485.90	328.78
	08/01	7001	2080.42	486.28	329.16
	09/01	7032	2080.80	486.66	329.53
	10/01	7062	2081.17	487.03	329.89
	11/01	7093	2081.54	487.41	330.27
	12/01	7123	2081.91	487.77	330.63

	Date	Time (days)	Pressure Increase (psi) Wellbore	1-mile	2.5-miles
2037	01/01	7154	2082.28	488.14	331.00
	02/01	7185	2082.65	488.51	331.36
	03/01	7213	2082.99	488.85	331.70
	04/01	7244	2083.36	489.22	332.06
	05/01	7274	2083.72	489.57	332.41
	06/01	7305	2084.08	489.94	332.78
	07/01	7335	2084.44	490.29	333.13
	08/01	7366	2084.80	490.66	333.48
	09/01	7397	2085.16	491.02	333.84
	10/01	7427	2085.51	491.37	334.19
	11/01	7458	2085.87	491.72	334.54
	12/01	7488	2086.22	492.07	334.88
2038	01/01	7519	2086.57	492.42	335.24
	02/01	7550	2086.93	492.78	335.59
	03/01	7578	2087.25	493.10	335.90
	04/01	7609	2087.60	493.45	336.25
	05/01	7639	2087.94	493.79	336.59
	06/01	7670	2088.29	494.14	336.93
	07/01	7700	2088.62	494.47	337.26
	08/01	7731	2088.97	494.82	337.61
	09/01	7762	2089.32	495.16	337.95
	10/01	7792	2089.65	495.49	338.28
	11/01	7823	2089.99	495.84	338.62
	12/01	7853	2090.32	496.17	338.94
2039	01/01	7884	2090.66	496.51	339.28
	02/01	7915	2091.00	496.84	339.61
	03/01	7943	2091.30	497.15	339.91
	04/01	7974	2091.64	497.48	340.25
	05/01	8004	2091.96	497.81	340.57
	06/01	8035	2092.30	498.14	340.90
	07/01	8065	2092.62	498.46	341.21
	08/01	8096	2092.95	498.79	341.54
	09/01	8127	2093.28	499.12	341.87
	10/01	8157	2093.60	499.44	342.18
	11/01	8188	2093.92	499.76	342.51
	12/01	8218	2094.24	500.08	342.82
2040	01/01	8249	2094.56	500.40	343.14
	02/01	8280	2094.89	500.72	343.46
	03/01	8309	2095.19	501.02	343.76
	04/01	8340	2095.51	501.35	344.07
	05/01	8370	2095.82	501.65	344.38
	06/01	8401	2096.14	501.97	344.70
	07/01	8431	2096.44	502.28	345.00
	08/01	8462	2096.76	502.60	345.31
	09/01	8493	2097.08	502.91	345.63
	10/01	8523	2097.38	503.21	345.93
	11/01	8554	2097.69	503.53	346.24
	12/01	8584	2098.00	503.83	346.54

Appendix D-4

Predicted Pressure Increase Calculations

Navajo Refining Company, L.L.C.

Permeability (md) =	32	Compressibility (psi^{-1}) =	8.40E-06
Porosity (%) =	8.5	Viscosity (cp) =	0.57
Thickness (feet) =	75	Wellbore Radius (feet) =	0.51042

Modeled Rate = 150 gpm

	Date	Time (days)	Pressure Increase (psi) Wellbore	1-mile	2.5-miles
2041	01/01	8615	2098.31	504.14	346.84
	02/01	8646	2098.62	504.45	347.15
	03/01	8674	2098.89	504.73	347.43
	04/01	8705	2099.20	505.03	347.73
	05/01	8735	2099.50	505.33	348.02
	06/01	8766	2099.80	505.63	348.33
	07/01	8796	2100.10	505.93	348.62
	08/01	8827	2100.40	506.23	348.92
	09/01	8858	2100.70	506.53	349.22
	10/01	8888	2101.00	506.82	349.51
	11/01	8919	2101.30	507.12	349.80
	12/01	8949	2101.59	507.41	350.09
2042	01/01	8980	2101.88	507.71	350.39
	02/01	9011	2102.18	508.01	350.68
	03/01	9039	2102.45	508.27	350.95
	04/01	9070	2102.74	508.57	351.24
	05/01	9100	2103.03	508.85	351.52
	06/01	9131	2103.32	509.15	351.81
	07/01	9161	2103.61	509.43	352.09
	08/01	9192	2103.90	509.72	352.38
	09/01	9223	2104.19	510.01	352.67
	10/01	9253	2104.47	510.29	352.94
	11/01	9284	2104.76	510.58	353.23
	12/01	9314	2105.03	510.86	353.51
2043	01/01	9345	2105.32	511.14	353.79
	02/01	9376	2105.61	511.43	354.07
	03/01	9404	2105.86	511.68	354.33
	04/01	9435	2106.15	511.97	354.61
	05/01	9465	2106.42	512.24	354.88
	06/01	9496	2106.70	512.52	355.16
	07/01	9526	2106.97	512.79	355.43
	08/01	9557	2107.25	513.07	355.71
	09/01	9588	2107.53	513.35	355.98
	10/01	9618	2107.80	513.62	356.25
	11/01	9649	2108.08	513.90	356.52
	12/01	9679	2108.35	514.17	356.79
2044	01/01	9710	2108.62	514.44	357.06
	02/01	9741	2108.90	514.71	357.34
	03/01	9770	2109.16	514.97	357.59
	04/01	9801	2109.43	515.24	357.86
	05/01	9831	2109.69	515.51	358.12
	06/01	9862	2109.96	515.78	358.39
	07/01	9892	2110.23	516.04	358.65
	08/01	9923	2110.50	516.31	358.92
	09/01	9954	2110.76	516.58	359.18
	10/01	9984	2111.02	516.84	359.44
	11/01	10015	2111.29	517.10	359.71
	12/01	10045	2111.55	517.36	359.96

	Date	Time (days)	Pressure Increase (psi) Wellbore	1-mile	2.5-miles
2045	01/01	10076	2111.81	517.63	360.23
	02/01	10107	2112.08	517.89	360.49
	03/01	10135	2112.32	518.13	360.72
	04/01	10166	2112.58	518.39	360.99
	05/01	10196	2112.84	518.65	361.24
	06/01	10227	2113.10	518.91	361.50
	07/01	10257	2113.35	519.16	361.75
	08/01	10288	2113.61	519.42	362.01
	09/01	10319	2113.87	519.68	362.26
	10/01	10349	2114.12	519.93	362.51
	11/01	10380	2114.38	520.19	362.77
	12/01	10410	2114.63	520.43	363.01
2046	01/01	10441	2114.88	520.69	363.27
	02/01	10472	2115.14	520.95	363.52
	03/01	10500	2115.37	521.18	363.75
	04/01	10531	2115.62	521.43	364.00
	05/01	10561	2115.87	521.67	364.25
	06/01	10592	2116.12	521.93	364.50
	07/01	10622	2116.37	522.17	364.74
	08/01	10653	2116.62	522.42	364.99
	09/01	10684	2116.87	522.67	365.24
	10/01	10714	2117.11	522.91	365.48
	11/01	10745	2117.36	523.16	365.72
	12/01	10775	2117.60	523.40	365.96
2047	01/01	10806	2117.85	523.65	366.21
	02/01	10837	2118.09	523.90	366.45
	03/01	10865	2118.32	524.12	366.67
	04/01	10896	2118.56	524.36	366.92
	05/01	10926	2118.80	524.60	367.15
	06/01	10957	2119.04	524.85	367.39

APPENDIX D-5

PREDICTED PLUME MIGRATION CALCULATIONS

APPENDIX D-5

Plume Calculations — Navajo Well WDW-4

Radius of Concentrated Plume

$$r_C = \sqrt{\frac{0.1337 \quad V}{0.8 \ \pi \phi \, h}}$$

where:

r_C	=	Radius to concentrated plume front, feet
V	=	Total volume injected, gallons
ϕ	=	Porosity of formation, fraction
h	=	Thickness of formation, feet
0.1337	=	Conversion factior (cubic feet / gallon)
0.8	=	Factor to compensate for immovable connate water

Radius of Dispersed Plume

$$r_D = 2.3 \sqrt{C_D r_C} + r_C$$

where:

r_D	=	Radius to dispersed plume front, feet
C_D	=	Coefficient of dispersion (SS=3; LS = 65)

Parameters	Symbol	Value
Porosity of Formation (fraction)	ϕ	0.085
Thickness of Formation (feet)	h	75
Dispersion Coefficient Limestone	D	65
Injection Rate (gpm)	q	150

Time Period t (years)	Total Injection Volume V (gallons)	Radial Distance to Concentrated Plume Front r_C (feet)	Radial Distance to Dispersed Plume Front r_D (feet)
5	394,470,000	1814	2604
30	2,366,820,000	4444	5680

APPENDIX E

WDW-4 CONSTRUCTION PROCEDURES

APPENDIX E

HollyFrontier Navajo Refining LLC
Artesia, New Mexico

WDW-4 CONSTRUCTION PROCEDURE

(Depths referenced to Ground Level)

1. Survey and stake well location.
2. Level and grade the location with caliche or comparable material, as required.
3. Install a corrugated steel cellar around well location.
4. Drill a fresh water supply well near the well location capable of delivering 50 gpm.
5. Auger a 24 inch hole to approximately 80 feet and set 20 inch, 129.33 lb/ft (0.625 inch wall), API 5LX-56, plain-end, beveled conductor pipe. Cement conductor pipe to the surface using approximately 3 yd^3 of redi-mix cement.
6. Install a 4 inch outlet for draining the conductor pipe after cementing the surface casing.
7. Excavate a rathole and mousehole with an auger.
8. Move in and rig up drilling rig and associated equipment.
9. Move in and rig up a closed-loop system for handling drill cuttings and drilling fluid.
10. Weld a flange to the 20 inch conductor pipe and install an annular blowout preventer (BOP). Install 20 inch riser pipe with bell nipple and flowline to the BOP.
11. Mix a spud mud for the surface hole.
12. Make up a bottomhole assembly (BHA) with a 17½ inch drill bit and drill ahead to 1,500 feet taking deviation surveys at approximately 250 feet intervals and maintaining hole deviation below 2°. Circulate and condition mud for running logs.
13. Move in and rig up an open hole wireline unit. Run the following open hole logs from 1,500 feet to the base of conductor pipe: gamma ray, induction resistivity, compensated neutron, formation density and caliper. Run a 4-arm caliper and revise cement volumes accordingly with 20% excess included for the open hole section.
14. Move in and rig up a casing crew and run centralized 13⅜", 54.50 lb/ft, K-55, ST&C, surface casing to approximately 1,500 feet. Run two bow spring centralizers on the float joint (1 in center of joint on a stop ring and 1 on collar), and 1 centralizer per every third joint at the collars back to surface. The float

joint will consist of a float shoe, 1 joint of casing, and a float collar. Circulate and condition the mud for cementing.

Dimensional data and minimum performance properties of the surface casing are presented below:

Wall Thickness, inches	0.380
Internal Diameter, inches	12.615
Drift ID, inches	12.459
Coupling OD, inches	14.375
Collapse Pressure, psi	1,130
Internal Yield Pressure, psi	2,730
Pipe Body Strength, lb	853,000
Joint Strength, lb	547,000
Capacity, bbl/ft	0.15459

15. Move in and rig up cementing equipment. Cement the surface casing to the surface as follows: pump a freshwater spacer followed by a tuned spacer designed for the rheology of the drilling fluid and lead cement; pump 1,092 ft^3 of a Class A light-weight lead cement blend followed by 206 ft^3 of a Class A tail cement blend. Drop wiper plug, and displace with 226 bbls of drilling fluid. Bump wiper plug and pressurize over final circulating pressure. Monitor pressure for 5 minutes, and bleed off to cement unit to ensure floats are holding. Wait on cement at least 24 hours. (Cement volumes presented above are based on bit size, plus 20% excess for open hole section. Actual cement volumes will be based on calipered hole volume, plus 20% excess.)
16. After waiting at least 24 hours for cement to set, release the 13⅜ inch surface casing and lift the stack to make a rough cut on the 13⅜ inch protection casing. Nipple down the bell nipple, flow line and BOP. If necessary, perform a top out operation between the 20-inch and 13⅜-inch casings using 1-inch tremie pipe to place up to 200 sacks of standard cement. Cut the 20 inch conductor and make a final cut on the 13⅜ inch casing. Weld on a temporary flange to the 13⅜ inch casing. Re-install the BOP. Nipple up the bell nipple with flow line and riser pipe to the top of the BOP and test. Pressure test and function test the BOP.
17. Make up a 12¼ inch drill bit and trip in the hole to the float collar. Drill out the float collar and approximately 30 feet of cement in the shoe track joint.
18. Pull out of the hole and run a cement evaluation log from the top of cement in the surface casing to the surface.

19. Trip in the hole with a 12¼ inch bit and BHA which includes straight-hole motor and MWD system. Pressure test the 13⅜ inch surface casing to 1,000 psi for at least 30 minutes and record the test on a chart recorder. Drill the remainder of the shoe track cement and the float shoe. Drill 10 feet of formation and perform a Formation Integrity Test to 100 psi for 30 minutes. Continue drilling a 12¼ inch hole to the Confining Zone core point in the Mississippian Formation between 9,900 feet and 10,400 feet. Circulate and condition mud for coring. Pull the 12¼ inch drilling assembly out of the hole and pick up an 8½-inch by 4-inch by 30-foot core barrel.
20. Trip in well and cut a 30-foot Confining Zone core. Pull out of the hole and lay down core. Mark core and prepare for shipment to core laboratory.
21. Trip back in the hole with the 12¼ inch drilling assembly and ream the 8½-inch core hole. Continue drilling a 12¼ inch hole to the top of the Injection Zone core point in the Silurian-Devonian at approximately 10,400 feet, maintaining a low fluid loss mud system.
22. Move in and rig up an open hole wireline unit. Run the following open hole logs from 10,400 feet to the base of surface casing at 1,500 feet: gamma ray, laterolog resistivity, compensated neutron, formation density, caliper, sonic log, and mineralogy log (approximately 100 feet over cored interval). Run a 6-arm caliper and revise cement volumes to include calipered annular volume, plus 20% excess for the open hole section.
23. Move in and rig up a casing crew and run centralized 9⅝ inch, 47 lb/ft, N-80, LT&C protection to 10,400 feet. Run two bow spring centralizers on the float joint (1 in center of joint on a stop ring and 1 on collar), and 1 centralizer per every third joint at the collars back to surface. The float joint will consist of a float shoe, 1 joint of casing, and a float collar. A stage collar will be positioned in the casing string at approximately 5,800 feet for the second cement stage. Circulate and condition the mud for cementing.

    Dimensional data and minimum performance properties of the protection casing are presented below:

Wall Thickness, inches	0.472
Internal Diameter, inches	8.681
Drift ID, inches	8.525
Coupling OD, inches	10.625
Collapse Pressure, psi	4,760
Internal Yield Pressure, psi	6,870
Pipe Body Strength, lb	1,086,000

Joint Strength, lb.....905,000
Capacity, bbl/ft.....0.073206

24. Cement the 9⅝ inch casing back to the surface in the following two stages:
    Stage One – Establish circulation and condition the mud for optimum cementing conditions: pump a freshwater spacer followed by a tuned spacer designed for the rheology of the drilling fluid and lead cement; pump 1,578 ft^3 of a Class H light-weight lead cement blend followed by 173 ft^3 of a Class H tail cement blend. Drop wiper plug, and displace with ~761 bbls of drilling fluid. Bump wiper plug and pressurize over final circulating pressure. Monitor pressure for 5 minutes, and bleed off to cement unit to ensure floats are holding.
    Stage Two – Drop stage collar opening plug and wait for it reach stage collar. Pressure up on casing until stage collar opens. Establish circulation through the stage collar and continue circulating for 8 to 12 hours. Pump a freshwater spacer followed by a tuned spacer designed for the rheology of the drilling fluid and lead cement; pump 2,010 ft^3 of a Class H light-weight lead cement blend followed by 150 ft^3 of a Class H tail cement blend. Drop stage collar wiper/closing plug, and displace with 450 bbls of drilling fluid. Bump wiper/closing plug and close stage collar with required pressure over final circulating pressure. Release pressure and assure that stage collar is holding. Flush and drain surface equipment. Wait on cement at least 24 hours. (Cement volumes presented above are based on bit size, plus 20% excess for open hole section. Actual cement volumes will be based on calipered hole volume, plus 20% excess.)
25. After waiting at least 24 hours for cement to set, release the 9⅝ inch protection casing and lift the stack to make a rough cut on the 9⅝ inch protection casing. Nipple down the bell nipple, flow line and BOP. If necessary, perform a top out operation between the 13⅜ inch and 9⅝ inch casings using 1-inch tremie pipe to place up to 200 sacks of standard cement. Cut the 13⅜ inch surface casing and make a final cut on the 9⅝ inch casing. Weld on a 9⅝ inch by 11 inch, 3,000 psi, Slip-on-Weld (SOW) casing head with a hanger bowl for 7 inch tubing to the 9⅝ inch protection casing. Nipple up an 11 inch by 13⅝ inch DSA to the casing head and re-install the BOP. Nipple up the bell nipple with flow line and riser pipe to the top of the BOP and test.
26. Make up an 8½ inch bit to the BHA and trip in the hole to the stage collar. Perform a pressure test to 1,500 psi for at least 30 minutes and record the test on a chart recorder. Drill out the stage collar and trip down the float collar at approximately 10,400 feet. Trip out with 81/2-inch BHA.
27. Pick up an 8½-inch by 4-inch by 60-foot core barrel and core BHA.

28. Trip in well to approximately 10,400 feet and cut an Injection Zone core from approximately 10,400 feet to 10,460 feet. Pull out of the hole and lay down core. Mark core and prepare for shipment to core laboratory.
29. Trip back in the hole with the 8-1/2 inch drilling assembly and continue drilling to the total depth of the well at 11,000 feet. Circulate and condition the mud for running logs.
30. Move in and rig up an open hole wireline unit. Run the following open hole logs from 11,000 feet to 10,400 feet: gamma ray, laterolog resistivity, compensated neutron, formation density, caliper, and sonic log, borehole image, and mineralogy.
31. Make up a casing scraper for 9⅝ inch, 47 lb/ft casing and trip in the hole to approximately 10,400 feet. Circulate the hole clean and pull out of the hole, laying down the BHA.
32. Move in and rig up a cased hole wireline unit. Run the following cased hole logs from approximately 10,400 feet to the surface: cement evaluation log with gamma ray and casing inspection log. Rig down and move out the wireline unit.
33. Clean the rig mud tanks and displace the drilling mud in the casing with approximately 760 bbl of 9.0 lb/gal brine water. Pull out of the hole.
34. Move in and rig up a casing crew to run the injection tubing. Make up an injection packer to the first joint of tubing. Run 7 inch, 26 lb/ft, K-55, LT&C injection tubing in the hole top approximately 10,300 feet or 100 feet above the top of the injection interval. Fill the tubing annulus with approximately 264 bbl of 9.0 lb/gal brine water containing a corrosion inhibitor, a bactericide and an oxygen scavenger. Set the injection packer and set the slips in the casing head after distributing the tubing weight appropriately between the packer and casing head. Rig down and move out the casing crew and equipment.

    Dimensional data and minimum performance properties of the injection tubing are presented below:

Wall Thickness, inches	0.362
Internal Diameter, inches	6.276
Drift ID, inches	6.151
Coupling OD, inches	7.656
Collapse Pressure, psi	4,320
Internal Yield Pressure, psi	4,980
Pipe Body Strength, lb	415,000
Joint Strength, lb	401,000

Capacity, bbl/ft.....0.038263

34. Cut the 7 inch injection tubing and install an adapter flange with P-seals for the 7 inch tubing. Conduct a preliminary pressure test on the 7 inch tubing annulus to 1,000 psi.
35. Install the upper wellhead assembly.
36. Rig down and move out the drilling rig and associated equipment.

APPENDIX F

WDW-4 COMPLETION AND TESTING PROCEDURES

APPENDIX F

HollyFrontier Navajo Refining LLC
Artesia, New Mexico

WDW-4 COMPLETION & TESTING PROCEDURE

(Depths referenced to Ground Level)

1. Move in and rig up a cased hole wireline unit with pressure control equipment and a crane.
2. Run a temperature survey with pressure gauge from the surface to the total depth of the well at approximately 10,955 feet. Pull pressure gauge up to 10,500 feet and record a static bottomhole pressure for one hour. Pull out of hole with wireline tools and move out the wireline unit and crane.
3. Move in a 2 inch coil tubing unit and associated equipment. Trip in the hole with the 2 inch coil tubing, and nitrogen backwash the well across the perforated interval until a representative sample of formation fluid has been obtained. Rig down and move out the nitrogen truck. Send a sample of the formation fluid to a laboratory for analysis (physical and chemical properties).
4. Move in acid transport trucks. Spot approximately 20 bbl of 15% HCl across the completion interval using the coil tubing unit. Acidize the completion interval with an additional 218 bbl of 15% HCl while moving the end of the coil tubing across the entire openhole injection interval. Flush the coil tubing and pull out of the hole with coil tubing. Flush the 7 inch tubing and formation with approximately 200 bbl of clean brine water. Rig down and move out coil tubing unit and associated equipment.
5. Move in and rig up a wireline unit, mast truck and pressure control lubricator. Rig up 8 frac tanks and fill each tank with 9.0 lb/gal brine water. Move in a pump truck capable of injecting into the well at approximately 12 bpm.
6. Connect a certified pressure gauge to the annulus and pressurize the casing – tubing annulus to approximately 1,200 psi. Record an annulus pressure test for at least 1 hour. A State representative will be notified at least 48 hours prior to conducting the Annulus Pressure Test for witnessing the test and inspecting the well.
7. Conduct a Radioactive Tracer Survey per regulatory guidelines.
8. Run in the hole with a bottomhole pressure gauge and position the gauge at approximately 10,500 feet or at the top perforation and record the static pressure for approximately 30 minutes.

9. Initiate injection into the well at approximately 12 bpm or at a rate appropriate for the injectivity of the perforated injection interval. Continue injecting at a constant rate until the 4,000 bbl of 9.0 lb/gal brine water have been injected. Terminate injection and record the pressure falloff for at least 24 hour. Rig down and move out the pump truck and frac tanks.
10. At the conclusion of the pressure falloff test, pull out of hole with pressure gauge, making 5 minute gradient stops at 1,000-foot intervals. Rig down the wireline unit, pressure control lubricator and crane or mast unit.
11. Restore location.
12. Prepare a Completion Report for submittal to the State Regulatory Agency.

APPENDIX G

INJECTED FLUID MONITORING PLAN

APPENDIX G

INJECTED FLUID MONITORING PLAN

HOLLYFRONTIER NAVAJO REFINING LLC
ARTESIA, NEW MEXICO

PROJECT NO. 50904E

SUBMITTED
MARCH 2017

WSP | PARSONS BRINCKERHOFF
HOUSTON, TEXAS

TABLE OF CONTENTS

1.0 INTRODUCTION

This injected fluid monitoring plan (plan) has been prepared per the requirements of 20.6.2.5207B NMAC. This plan allows for consistent characterization of the injected fluids that are being injected into the nonhazardous waste injection wells operated by HollyFrontier Navajo Refining LLC (Navajo) at their refinery in Artesia, New Mexico. The plan shall be updated as necessary to remain accurate and the analysis remains representative of the fluids being injected into the three nonhazardous waste injection wells.

2.0 INJECTED FLUID DESCRIPTION

The fluid injected into all Navajo injection wells is comprised of exempt and nonexempt nonhazardous oilfield waste that is generated in the refining process. Waste waters from process units, cooling towers, boilers, streams from water purification units, desalting units, recovered and treated ground water, and general waste waters, all waters will be blended to form the injected fluid into the injection wells.

Navajo anticipates the addition of a new waste stream to be added to the existing waste stream. The new waste stream will originate from a reverse osmosis (RO) unit to be constructed at the refinery. The characteristics of this waste stream will be similar to that already being injected.

3.0 INJECTED FLUID CHARACTERIZATION SAMPLING PROGRAM

The following sampling program shall be used to collect a representative sample of the injected fluid for chemical analysis to demonstrate the consistency of the fluid composition.

3.1 Sampling Frequency

The injected fluid shall be sampled on a quarterly basis unless a change in the injected fluid composition occurs as a result of operating changes at the Navajo refinery. If the injected fluid composition does change, a representative sample of the waste stream shall be collected at that time and reported to OCD.

3.2 Sampling Location

A representative sample of the injected fluid shall be obtained from the discharge side of the wastewater transfer pump that sends wastewater to the wellheads. The sample port is located at the refinery's wastewater treatment unit.

3.3 Sample Collection Equipment

The fluid samples shall be collected directly from the sample port on the wastewater transfer line into appropriately prepared sample containers required for specific analyses.

3.4 Sample Containers

The injected fluid sample shall be collected in new and previously unused sample containers as provided by the off-site commercial laboratory performing the analyses.

3.5 Sampling Methodology

The injected fluid sample shall be poured directly into the new and previously unused sample containers provided by the off-site commercial laboratory performing the analyses.

3.6 Sample Preservation

EPA and/or ASTM sampling protocols shall be used, including provisions for preserving samples when required. Sampling personnel shall verify that appropriate preservatives are present in sample containers if required by analytical protocol.

3.7 Field Measurements

Field measurements of pH, specific conductance, and temperature shall be recorded on a representative sample of the injected fluid during each quarterly monitoring event.

3.8 Sampling Personnel

Navajo environmental staff or qualified contractor sampling personnel shall be responsible for collecting the injected fluid samples in accordance with the procedures presented in this plan.

4.0 FIELD DOCUMENTATION

The following procedures shall be implemented to properly document each injected fluid characterization sampling event as described in Section 3.0.

4.1 Water Sampling Log

A water sampling log shall be completed at the time the sample is collected. The type of information to be recorded on the water sampling log includes, but is not limited to, the following:

- Date and time of sampling
- Weather conditions
- Sampling location
- Sampling method
- Sample identification
- Field measurements
- Laboratory analyses
- Sampling personnel

4.2 Sample Container Label

Each laboratory provided sample container shall have a label adhered to the outside of the container providing pertinent information identifying the sample,

location and time the sample was collected, analytical parameters, preservatives, and sampler identification.

4.3 Chain-of-Custody Form

A chain-of-custody form shall be completed and accompany each shipment of samples to the off-site commercial laboratory. Each transfer of sample custody shall be signed by both parties on the chain-of-custody form.

4.4 Custody Seal

A custody seal shall be affixed over the opening of the ice chest used to store and transport samples to the receiving laboratory. The laboratory shall note in their Check-In Form that the seal is properly attached and has not been broken.

4.5 Field Equipment Calibration Log

Calibration and maintenance of field equipment (pH, specific conductance, turbidity, and temperature meters) shall be in compliance with the manufacturers' recommended calibration or maintenance procedures. Field logs shall be completed in the field to properly document all calibration and maintenance activities to field equipment.

5.0 QUALITY ASSURANCE/QUALITY CONTROL

A trip blank will be prepared during each waste stream characterization sampling event as described in Section 3.0.

6.0 SAMPLE CUSTODY AND TRANSPORT

Injected fluid characterization samples shall be maintained in the custody of the sampling personnel until the samples are transported to the laboratory or transferred to a representative of the receiving laboratory. Upon transfer of custody, the chain-of-custody record shall be completed and signed by the sampling personnel. The signed chain-of-custody record shall be placed in a plastic bag inside the shipment cooler containing the properly labeled injected fluid

samples. A signed and dated custody seal shall be placed over the lid of the opening of the sample cooler to indicate if the cooler has been opened during delivery prior to receipt by the laboratory.

The chain-of-custody record shall be signed and returned by the laboratory no later than the date the analytical results are available. If the samples are delivered in person by the sampling personnel or picked up by a laboratory employee, the chain-of-custody record shall be signed by the laboratory representative immediately upon relinquishment of the samples by the sampling personnel. One of the copies shall be maintained by the sampling personnel and the remaining copies kept with the samples.

7.0 WASTE STREAM ANALYTICAL PROGRAM

The following describes the injected fluid characterization analytical program.

7.1 Laboratory Requirements

The laboratory performing the analytical services for this project shall be an accredited laboratory. The laboratory shall possess a quality control/ quality assurance (QA/QC) manual prepared in accordance with the requirements of the NELAC certification program. A current copy of the plan shall be sent by the laboratory to the project manager in charge. When the manual is updated by the laboratory the updated version of the manual shall be sent to the project manager. The previously issued copy of the manual must be archived by the project manager to insure traceability of the data generated using the applicable QA/QC manual.

Navajo is currently utilizing ALS Environmental, a commercial laboratory located in Houston, Texas. ALS is a NELAC accredited laboratory.

7.2 Analytical Parameters and Methods

The injected fluid samples are analyzed for the following listing of parameters that are representative of the injected fluid:

- pH
- Specific Conductance
- Temperature
- Redox Potential
- Specific Gravity
- Chloride
- Sulfate
- TDS
- Fluoride
- Calcium
- Potassium
- Magnesium
- Sodium Bicarbonate
- Carbonate
- Bromide
- Cations and Anions
- Cation / Anion Balance

The parameter listing shall be updated as necessary to remain accurate and the waste analysis remains representative of the injected fluid being injected.

8.0 REPORTING

The laboratory performing the injected fluid characterization analyses shall generate a report of the analytical results. These analytical results shall be compiled with the field measurement results and tabularized. The results of each waste stream characterization sampling event, including tabularization of analytical results, copies of laboratory reports, and copies of water sampling logs, shall be provided to OCD within 90 days following each sampling episode. The report shall document any obvious fluctuations in the injected fluid composition.

APPENDIX H

INJECTION WELL CLOSURE PLAN

APPENDIX H

INJECTION WELL CLOSURE PLAN
HOLLYFRONTIER NAVAJO REFINING LLC
(WDW-4)

Final Testing Program

After ceasing injection in the well and prior to commencing physical closure procedures of the injection well, a pressure falloff test will be conducted in order to determine if the transient pressure data have conformed with predicted values within the injection interval. The brine injected for the falloff test will be nonhazardous and will also act as a buffer between the injectate and the well. Appropriate mechanical integrity testing shall also be conducted to ensure the integrity of the long casing string and cement that will remain in the ground after closure. Notify the OCD of mechanical integrity and pressure falloff testing procedures of the long casing string and cement that will remain.

Mechanical Integrity Testing

An annular pressure test and radioactive tracer survey will be conducted prior to removing the injection tubing and packer. Subsequent to tubing and packer removal, a casing inspection and a cement bond/variable density log will be conducted from total depth to the surface.

Pressure Falloff Testing

A wireline unit with pressure control equipment will be rigged up to run in the hole with a surface recording bottom-hole pressure transducer with temperature capabilities to position the transducer at the top of the injection interval. The transducer will be stabilized prior to injecting brine.

Two thousand barrels of brine will be injected at a constant rate. The brine will be compatible with the injection zone reservoir fluid as determined by compatibility testing. The pressure buildup will be recorded. After pumping is ceased, the pressure falloff will be recorded for a minimum of 24 hours after shut in. The pressure derivative curve to will be monitored confirm the test has investigated beyond the wellbore storage effect.

APPENDIX H (Continued)

Regulatory Notification

Navajo will notify OCD at least 60 days before commencing plugging and abandonment procedures on any waste disposal well.

Plug and Abandonment Procedures

The balance plug method will be employed to plug and abandon this well. This technique involves displacing the cement through a work string which has been run into the casing. The cement slurry is pumped down the work string and up the annulus to a calculated height which would balance the cement inside and outside the work string. The work string is then slowly pulled out of the cement leaving a solid, uniform plug. After all cement plugs are set, the well casings will be cut off 3 feet below grade and capped by welding a ½ inch steel plate to the outermost casing string.

The plugging and abandonment procedures for a typical well are described as follows:

1. Prepare the well and location for plugging. Remove the well monitoring equipment and wellhead injection piping.
2. Notify the OCD of the MIT schedule. Conduct an annulus pressure test and a radioactive tracer survey to satisfy OCD mechanical integrity requirements.
3. Move in and rig up the frac tanks and pump for the pressure falloff test. Fill frac tanks with 2,000 barrels of brine.
4. Rig up the wireline unit with pressure control equipment. Run into the hole with a surface recording bottom-hole pressure transducer with temperature capabilities and position the transducer at the top of the perforated injection interval. Allow the transducer to stabilize prior to injecting brine.
5. Commence injecting 2,000 barrels of brine at a constant rate. The brine will be compatible with the injection zone reservoir fluid, as determined by compatibility testing. Record the pressure buildup. Cease pumping and record the pressure falloff. Measure the pressure falloff for a minimum of 24 hours after shut in. Monitor the pressure derivative curve to confirm the test has investigated beyond the wellbore storage effect.
6. Rig down the wireline unit.

APPENDIX H (Continued)

7. Move in and rig up the well service unit with BOP equipment and a 2 7/8 inch work string.
8. Remove the wellhead and install the BOP equipment and stripper head.
9. Spear the 7 inch injection tubing and unseat the injection packer. Trip out of the hole laying down the 7-inch injection tubing.
10. Rig up the wireline unit and run a casing inspection log and a cement bond/variable density log from approximately 10,400 feet to the surface. Pick up and run a wireline set cement retainer at 10,350 feet. Rig down the wireline unit.
11. Rig up cement service equipment. Cement shall be Class "A" (or comparable), weighing 15.6 pounds/gallon. Pressure test the surface lines as required.
12. Run in the well with the work string and sting into the cement retainer at 10,350 feet. Establish a pump-in rate into the openhole interval and pump 350 sx of Class “A” cement below the retainer. Pull out of the retainer and spot sufficient Class "A" (or comparable) cement slurry to develop a 100-foot plug above the cement retainer (10,250 – 10,350 feet). Pull the tubing up above the top of cement and reverse out excess cement. Catch a sample of cement to check curing time and compressive strength. Allow the cement to set overnight (8-hour minimum) before tagging top of plug to confirm proper setup and location. Pressure test the plug to the pressure recommended by the OCD.
13. Set a balanced cement plug using Class “A” cement from the top of cement at approximately 10,250 feet to approximately three (3) feet below land surface.
14. Allow cement to set overnight (8-hour minimum), then “top off” cement as needed until the entire top of cement remains approximately three (3) feet below land surface.
15. Cut casing strings ±3 feet below ground level.
16. Weld a ½ inch steel plate across the 13⅜-inch casing. Inscribe on plate, in a permanent manner, the following information: (1) operator name, (2) P&A date, and (3) API number.
17. Release all equipment and clean up the location.
18. Submit closure data to the OCD.

APPENDIX H (Continued)

Once closure operations are complete and the well is officially plugged and abandoned, a closure report certifying that the well or wells were closed in accordance with applicable requirements, will be submitted to the OCD within 30 days. The report will include any newly constructed or discovered wells or information, including proposed well data, within the area of review. When plugging and abandonment is complete, Navajo will submit certification to the OCD that the injection well has been closed in accordance with applicable OCD regulations.

APPENDIX I

FINANCIAL ASSURANCE DOCUMENTATION

Form ___WQCC-1____
Adopted 5-24-2011

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION (OCD)
WATER QUALITY CONTROL COMMISSION (WQCC) OCD DISCHARGE PERMIT BOND

BOND NO. **_____6186996**
OCD PERMIT **___UICI-008-1**
AMOUNT OF BOND **___$95,000.00**
COUNTY **__Eddy County**

File with the Oil Conservation Division, 1220 South St. Francis Drive, Santa Fe, NM 87505

KNOW ALL MEN BY THESE PRESENTS:

That Navajo Refining Company, (~~an individual~~ **if dba must read Example: John Doe dba ABC Services**) (~~a general partnership~~) (a corporation), (limited liability company) (limited partnership) organized in the State of New Mexico, and authorized to do business in the State of New Mexico, as PRINCIPAL, and Safeco Insurance Company of America, a corporation organized and existing under the laws of the State of Delaware and authorized to do business in the State of New Mexico, as SURETY, are firmly bound unto the State of New Mexico, for the use and benefit of the Oil Conservation Division of the Energy, Minerals and Natural Resources Department (or successor agency) (the DIVISION), pursuant to 20.6.2.5210.B(17) NMAC, 20.6.2.5006 NMAC, and 20.6.2.3107.A(11) NMAC, in the sum of $95,000.00, for the payment of which the PRINCIPAL and SURETY hereby bind themselves, their successors and assigns, jointly and severally, firmly by these presents.

The conditions of this obligation are such that:

WHEREAS, the PRINCIPAL does or may own or operate a "Facility" (identified by location only below) and/or one or more wells (identified by location(s) below) for the injection of fresh and non-fresh water, remediation fluids (i.e., Class I (NH) Disposal Well or Class V Pump & Treat Injection Well), oilfield exempt, non-exempt and/or geothermal produced fluid waste(s) into the subsurface for use in connection with oil, gas and/or geothermal activities, which well is classified as a Division Underground Injection Control Class I, III or V Injection Well pursuant to the 20.6.2.5002 et seq. NMAC, the identification and location(s) of said well(s) being:

_____WDW-4_____API No. _____, located___1,000___feet from the
(**Name of Well**)
____South_____ (~~North~~/**South**) line and _____2,500_____feet from the _____West_____ (~~East~~/**West**) line

of Section___23_____ Township_____17S_____ (~~North~~) (**South**), Range_____27_____ (**East**) (~~West~~),

NMPM, and Latitude 32.815065_ Longitude -104.249687°_ County _____Eddy_____, New Mexico.

NOW, THEREFORE, if the PRINCIPAL and SURETY or either of them, or their successors or assigns or any of them, shall: (a) cause said well(s) to be properly plugged and abandoned when no longer productive or useful for other beneficial purpose in accordance with the WQCC rules and/or orders of the DIVISION; and (b) take all measures necessary, as required by the DIVISION by OCD Permit No. UICI-008-1 pursuant to 20.6.2 and 20.6.4 NMAC, as such rules now exist or may hereafter be amended, to prevent contamination of ground water having 10,000 milligrams per liter (mg/l) or less concentration of total dissolved solids (TDS), including, but not limited to, surface and ground water restoration if applicable, and post-operational monitoring.

THEN AND IN THAT EVENT, this obligation shall be null and void; otherwise and in default of complete compliance with any and all of said obligations, the same shall remain in full force and effect.

_____	_____
PRINCIPAL	**SURETY**
_____	_____
Address	**Address**
By_____	_____
Signature	**Attorney-in-Fact**
_____	
Title	
If PRINCIPAL is a corporation, affix Corporate seal here	**Corporate surety affix Corporate seal here**

Form WQCC-1

ACKNOWLEDGMENT FORM FOR INDIVIDUAL

(If dba, must read – Example: John Doe dba Well Services)

STATE OF _____)
ss.
COUNTY OF_____)

This instrument was acknowledged before me on this _____ day of _____20_____

by_____.
(Name of Individual)

_____
Notary Public

SEAL

_____
My Commission Expires

ACKNOWLEDGMENT FORM FOR PARTNERSHIP, CORPORATION, OR LIMITED LIABILITY COMPANY

STATE OF_____)
ss.
COUNTY OF_____)

This instrument was acknowledged before me on _____day of _____20____by_____
(Name of Person Signing Instrument)

as _____of_____
(**Capacity, e.g., partner, president, manager, member**) (**Name of partnership, corporation or limited liability company**)

_____
Notary Public

SEAL

_____
My Commission Expires

ACKNOWLEDGMENT FORM FOR CORPORATE SURETY

STATE OF _____)
ss.
COUNTY OF_____)

This instrument was acknowledged before me on this _____day of _____, 20____,

by_____, as Attorney-in-Fact for _____
(Name of Attorney-in-Fact) (Name of Corporate Surety)

_____
Notary Public

SEAL

_____
My Commission Expires

<u>Corporate Surety attach Power of Attorney</u>

APPROVED BY:

OIL CONSERVATION DIVISION OF NEW MEXICO

By_____

Date_____

APPENDIX J

DRAFT PUBLIC NOTICE

PUBLIC NOTICE

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

In accordance with 20.6.2.3108.F NMAC, HollyFrontier Navajo Refining LLC, hereby gives public notice of its application to the New Mexico Oil Conservation Division (OCD) for a discharge permit to inject treated nonhazardous waste water effluent from the refinery's on-site wastewater treatment plant into a Class I (nonhazardous) injection well, WDW-4. The well will be located in the SE/4, SW/4, Section 23, Township 17 South, Range 27 East, NMPM, Eddy County, New Mexico. The WDW-4 location is approximately 8.5 miles E-SE of the intersection of Hwy 285 and Hwy 82 on the north side of Hwy 82. The Navajo Refinery is located at 501 E. Main Street, Artesia, New Mexico.

Waste water from the refinery is generated from the treatment of waters from the processing of crude oil and recovered oil, including the removal of water entrained in these oils, the washing of these oils to remove salts and sediment, other process unit waters, water used for heating and cooling during refining, boiler blowdown, recovered and treated groundwater, general wash waters, and stormwater collected from process portions of the refinery.

Underground injection at WDW-4 will occur into undifferentiated Silurian-Devonian age strata within the injection interval from approximately 10,400 to 10,900 feet below ground surface (log depth). The injection rate into WDW-4 will not exceed 150 gallons per minute (gpm) and the maximum allowable surface injection pressure is 2,080 pounds per square inch gauge (psig).

The injected refinery waste water quality is approximately 3,000 mg/L total dissolved solids (TDS). Naturally occurring formation fluid within the proposed injection interval exceeds 10,000 milligrams per liter (mg/L) TDS. The base of the Underground Source of Drinking Water (USDW), groundwater with total dissolved solids concentration with less than 10,000 mg/L, is projected to occur at a depth of approximately 450 to 500 feet below land surface in the area of WDW-4 location The naturally occurring groundwater quality at this depth ranges from about 1,500 to 2,200 mg/L TDS.

Persons interested in obtaining further information, submitting comments, or requesting to be on a facility-specific mailing list for future notices may contact the Environmental Bureau Chief of the New Mexico Oil Conservation Division.

Comments and inquiries on regulations should be directed to:

Director
Conservation Division
Energy Minerals and Natural Resources Department
1220 South St. Francis Drive
Santa Fe, New Mexico 87505
Telephone: (505) 476-3440

When corresponding, please reference the name of the applicant and the well name.