UICI - 8 - 4

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

2017

APPENDIX A

SURROUNDING LAND OWNERSHIP INFORMATION

ArcGIS Web Map



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





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.

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.







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
 - of 8-14% porosity No test

Fusselman porosity



```
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

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





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



NCORPORATED





Seismic line, <u>flattened</u> 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.

Location in Massive Porosity





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



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



Flattened on Woodford



E	ddy Area 1 p	orosity acrea	age		Net acreage			Isopach	Gross acre feet
Horizon	blue	brown	yellow		Yellow	Brown	Blue		
-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 Image: Mark and Mar									846,882
Note that th	e Permian Basin	is approximate	ly 75000 square	miles.					
It has been	aruged that the D	Devonian is, at l	east somewhat	, pressure	connected	across the	basin.		
As of 1990 a	pproximately 1 b	oillion BBO has b	peen produced	from the [Devonian re	eservoir. (R	uppel BE	G)	

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

Blue through Green is porous

NCORPORATED



APPENDIX B-2

USGS EARTHQUAKE DATA



(13 m

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

	YEAR	MO E	DA ORIG TI	IME LAT LO	ONG DEP MAGNITU	DE IEM DTSVNWG NFO TF	DIST km
PDE PDE PDE PDE PDE PDE PDE PDE PDE PDE	1973 1974 1975 1976 1976 1977 1977 1977 1977 1977 1978 1979 1980 1981 1982 1982 1982 1982 1982 1982 1982	09 2 11 2 08 0 01 2 01 2 01 2 01 2 01 2 01 2 01 2 01 2 01 2 01 2 03 02 05 03 05 18 05 24 09 20 10 27 11 28 03 02 10 07 12 20 03 02 04 30 05 24 09 15 20 29 01 28 02 04 20 05 20 05 20 05 20 05 20 05 20 05 20 05	2 233835.8 8 033520.5 1 072757.3 9 040330.5 2 072157 5 044827.90 183137.60 5 090307.30 100452.70 014050.50 100452.70 014050.50 123550.80 165608.05 110302.67 083147.79 060008.50 060838.40 063251.70 035517.20 124125.99 023648.51 232219.40 073420.18 232536.05 074408.43 133113.54 03636.02 03600.60 82000.03	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	95 5 3.1 MLGS 14 5 3.7 MLGS 01 5 3.0 LgTUI 08 1 3.5 MDGS 07 1 2.8 MDGS 08 2 3.9 MDGS 02 5 3.2 MLGS 04 3.3 MLGS 05 3.2 MLGS 11 3.5 MLGS 9 4 2.7 UKTUL 2 5 3.4 MLGS 9 5 3.9 LgTUL 4 5 3.1 LgTUL 5 3.1 LgTUL 4 5 3.1 LgTUL 4 4 2.4 MLGS 5 5 3.2 LgTUL 4 7 3.5 MLGS 5 5 3.2 LgTUL 5 5 3.2 LgTUL 5 5 3.2 LgTUL 5 5 3.1 </td <td>TF .F. .F. </td> <td>km 314 51 150 145 145 256 144 318 210 312 255 293 240 300 318 295 293 295 293 294 318 295 293 294 295 295 295 295 295 295 295 295</td>	TF .F. .F.	km 314 51 150 145 145 256 144 318 210 312 255 293 240 300 318 295 293 295 293 294 318 295 293 294 295 295 295 295 295 295 295 295
					, A.T WIGS	6D	284

P	DE 1985 09 0	6 050046 00					
) P	DE 1985 10 1	6 052246.20	32.54 -106.9	4 5 2.0	6 MDGLD	F	0.5.5
D		5 071452.23	35.28 -104.6	1 5 3.0	LOTTIL.		. 255
1	DE 1986 04 1	7 210430.30 3	2.59 -106.9	5 2.			. 280
E.	DE 1986 04 2	8 130016 3	4.01 -106.8	5 2.6	MDGLD .F	/* *******	251
E1	1986 08 2	7 180656.38 3	5.16 -105.09	5 3 2	MICC	• • • • • • • • • •	276
PI	DE 1987 05 14	155958.46 3	3.54 -106 52		MLGS .F		276
PI	DE 1988 12 25	075233.93 3	5 12 -105 00	0 2.9	MLGS	·	229
PI	E 1989 01 29	050715 33 3	5.12 -105.96	0 2.8	MDSNM .F		304
PI	E 1989 11 29	065439 50 3	5.22 -104.09	7 3.4	MDSNM		271
PL	E 1990 01 29	121610 60 3	4.46 -106.89	13 4.7	MDSNM 5F		200
PD	E 1990 01 21	131610.68 3	4.46 -106.88	12 4.8	LGTUL 6D		309
PD	E 1990 02 31	010819.29 34	4.44 -106.86	10 4.0	LOTUL SE	• • • • • • • • • •	308
		120219.34 34	4.01 -106.54	5 3.6	MLCC P	• • • • • • • • •	306
PD	E 1990 02 27	132322 33	8.95 -106.59	5 3 9	MDCMM 47	• • • • • • • • •	255
PD	1990 05 05	162622.89 34	45 -106 88	6 3 6	MDGINK 4F.	• • • • • • • • •	255
PD.	E 1990 07 21	192822.79 34	46 -106 96	0 3.0	MDSNM .F.		307
PD	I990 07 21	203031 34 24	46 106.86	11 3.0	MDSNM		306
PDI	1990 07 21	234804 02 24	.46 -106.86	7 3.1	MDSNM		306
PDI	1990 07 22	212705 12 24	.45 -106.85	7 3.2	MDSNM		300
PDI	1990 07 31	414/05.13 34	.84 -106.01	10 3.7	MDSNM		201
PDF	1990 11 00	073240.18 34	.46 -106.86	7 3.3	MDSNM F	••••••	201
PDR		104653.77 34	.45 -106.86	6 4.3	MDSNM 4F	•••••	307
DDE	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	MDCMM .F.	•••••	306
PDE	1990 11 15	072524.38 34	46 -106.86	6 3 6		• • • • • • • •	305
PDE	1990 12 05	033644.30 34	45 -106 86	0 3.0	MDSNM 4F.		306
PDE	1991 03 05	201711.40 34	44 -106.07	0 2.6	MDSNM		306
PDE	1991 03 06	143659 07 24	44 106.87	9 2.9 1	MDSNM 3F.		306
PDE	1991 06 05	184414 00 34	44 -106.88	7 2.5 1	IDSNM		307
PDE	1991 06 20	1605 34.	45 -106.85	4 3.0 M	IDSNM .F.		305
PDE	1991 12 00 20	33.	62 -106.47	0 3.5 M	ILGS	 F	305
PDE		124716.50 34.	85 -106.55	14 3.1 1	מדוד. שד	•••••	229
DDE		.14535.61 32.	33 -103.10	5 5.0 T		•••••	314
PDE	1992 02 23 1	.61752.51 30.	65 -105.51	5 3 4 1	grun Sr.	•••••	116
PDE	1992 08 24 0	12535.20 34.	01 -106.86	5 2 6 M		•••••	264
PDE	1992 08 26 0	32452.67 32.	17 -102 71	5 2.0 M	DSIMM .F.	• • • • • • •	280
PDE	1993 03 24 0	23203.50 35	39 -104 10	5 3.0 1	ggs	• • • • • • •	157
PDE	1993 06 10 1	510 33	52 106.49	5 3.0 L	gGS 2F.		290
PDE	1993 06 23 0	32312 20 21	52 -106.47	0 3.2 M	lgs	E	229
PDE	1993 12 22 1	92511 20 31.3	35 -102.51	5 2.8 M	DSNM		226
PDE	1994 01 01 01	92511.39 33.3	33 -105.68	10 3.2 M	DSNM		140
PDE		25131.29 34.4	4 -106.98	LO 2.5 MI	DSNM		148
DDE		33643.97 35.0	0 -104.21	5 3.3 LC	TGS		314
DDE	1995 04 14 00	3256.17 30.2	8 -103.35 1	7 5 7 M		• • • • • • •	246
PDE	1995 04 14 01	1148.40 30.3	0 -103.35		GS 6CM.	•••••	287
PDE	1995 04 14 02	1426 30.3	0 -103 35 1		GS	••••	286
PDE	1995 04 14 02	1938.50 30.3	0 -103.35 1		GS		286
PDE	1995 04 14 03	4842 30 3	0 -103.35 1	0 3.3 Lg	GS .F		286
PDE	1995 04 14 04	1116 30.3	0 -103.35 1	0 2.6 Lg	GS .F		286
PDE	1995 04 14 05	5320 30.3	0 -103.35 1	0 2.4 Lg	GS .F		286
PDE	1995 04 14 07	30.30	0 -103.35 1	0 2.7 Lg	GŚ		200
PDE	1995 04 14 07	3936.50 30.30) -103.35 1	0 2.4 Lg	GS F		400
PDE	1995 04 14 08	2712.50 30.30) -103.35 1	0 2.8 La	GS F	•••••	286
שתם		0258 30.30	-103.35 1) 2.9 Lat		•••••	286
FDE	1995 04 14 10	5720.40 30.30	-103.35 10	23 Lg(•••••	286
PDE	1995 04 15 031	1805 30.30	-103 35 10		· · · · · ·	2	286
PDE	1995 04 15 143	329.51 30.27	-103 32 10		·S .F	••••• 2	286
PDE	1995 04 16 004	043.30 30 30	-103.32 10	4.0 LgG	S 6D	2	290
PDE	1995 04 16 102	625.50 30.30	-103.35 10	2.3 LgC	s	2	86
PDE	1995 04 16 161	609 60 30.30	-103.35 10	2.5 LgG	s	2	86
PDE	1995 04 17 005	000 50 50.30	-103.35 10	2.4 LgG	s		86
PDE	1995 04 21 085	30.30	-103.35 10	2.5 LgG	S		00
PDE	1995 06 01 044	144 30.30	-103.35 10	2.9 LaG	S 3F	2	00
PDE	1995 06 01 010	615.70 30.30	-103.35 10	3.5 Lac	S 4F	2	86
שתם	1005 07 06 024	151 30.30	-103.35 10	2.7 1.00	g 12	••••• 2	86
FDE	1995 07 06 024	704 30.30	-103.35 10		· · · · · ·	••••• 2	86
				are rad	• • F. • •	2	86

http://neic.usgs.gov/cgi-bin/epic/epic.cgi?SEARCHMETHOD=3&FILEFORMAT=4&SEA... 6/4/2012

ŝ

PI	DE 199	5 08 20 151220					
PI	DE 1995	5 11 12 174550	.05 34.21 -106.	94 3	2.8 LgGS	5F	297
PI	DE 1996		.40 30.30 -103.	35 10	3.6 LgGS	.F.	297
PI)E 1996	03 15 131757	.22 33.59 -105.	69 10	2.9 LgGS	ч	•• 400
זק	E 1990	03 24 201612	.70 34.26 -105.	68 10	3.5 Logs	· ਸ	163
DE	1996	03 24 201923	.10 34.27 -105.	69 10	3.7 Lags	17	. 212
PL	E 1996	07 22 100614	.98 34.20 -105.	71 10	3 5 Lace		. 214
PD	E 1997	05 20 094105	.82 34.19 -105.	74 10	3 2 Lace	· P · · · · · · ·	- 209
PD	E 1997	12 31 132830	.05 34.53 -106.	15 5	3 5 MLCC	· F. · · · · · ·	. 210
PD	E 1997	12 31 133206	.60 34.55 -106	15 5	3.5 MLGS	· F. · · · · · ·	. 264
PD.	E 1997	12 31 133358	.90 34.55 -106	5 5	3.5 MLGS	••• ••••••	. 265
PD.	E 1998	01 04 080531.	87 34.55 -106 1	9 5	J.4 MLGS	••• •••••	. 265
PD	E 1998	04 15 103342.	42 30.19 -103 3	0 10	4.0 MLGS	.F	. 268
PDI	E 1998	07 14 053848.	75 35.34 -103 4	7 5	3.6 LIGGS	. F	- 299
PDI	E 1999	03 01 080023.	50 32.57 -104 6	6 1	2 9 Tag	· F	- 293
PDE	I 1999	03 14 224317.	97 32.59 -104 6	2 1	4.9 LgGS	••• ••••••	• 45
PDE	1999	03 17 122923.	11 32 58 -104.0	5 I	4.0 MDSNM	.F	• 42
PDE	1999	05 30 190425	60 32 59 104.6		3.5 MDSNM	••• ••••••	. 46
PDE	1999	08 09 065122	97 32 57 104.6	6 10	3.9 MDSNM	••• •••••	45
PDE	2000	02 02 071420	26 32 59 104.5	9 5	2.9 MDSNM	••• ••••••	40
PDE	2000	02 26 030100	20 32.38 -104.6	3 5	2.7 LgGS	••• ••••••	42
PDE	2001	06 02 015553	72 20.24 -103.6	L 5	2.8 LgGS	.F	286
PDE	2001	11 22 000709		£ 5	3.3 LgGS		113
PDE	2002	09 17 154514	31.79 -102.6	3 5	3.1 LgGS		186
PDE	2002	09 17 233/10	±7 32.58 -104.63	10	3.5 LgGS		42
PDE	2003	06 21 020200 5	32.58 -104.63	10	3.3 LgGS		43
PDE	2004	05 23 000005	32.67 -104.50	5	3.6 LgGS	••• •••••	28
PDE	2004	05 23 092205.2	8 32.53 -104.57	5	4.0 mbGS	3F	41
PDE	2004	05 24 213628.5	6 34.47 -106.90	5	3.5 MLGS	.F	310
PDE	2004	08 22 085528.2	3 32.53 -104.58	5	3.7 LgGS	.F	42
PDE	2004	10 20 184518.6	2 32.58 -104.50	5	3.4 MLGS		44
PDE	2004	10 28 025904.8	2 32.60 -104.50	5	3.0 LgGS		33
PDE	2004	10 20 202749.9	0 33.25 -106.20	5 :	3.5 LgGS		101
PDE	2005	10 30 025734.8	1 34.07 -106.98	5 2	2.4 MLGS	.F.	191
PDE	2005	12 19 202740.3	7 32.53 -104.55	5 4	4.1 MwSLM	3FM	492
PDE	2005	12 22 143011.6	7 32.58 -104.57	5 3	3.6 LgGS	. F	40
שתם	2006	01 27 100456.4	5 32.59 -104.55	5 2	2.7 LgGS		37
PDE	2006 (01 27 160745.84	4 32.55 -104.58	53	1 Lags	•••• ••••••	35
PDE	2006 (02 04 195510.68	32.58 -104.62	5 2	.7 MLGS	••• ••••••	40
PDE	2006 (03 04 171458.25	30.29 -103.67	5 2	7 Lags	••• ••••••	42
PDE	2006 0	03 20 175529.12	32.60 -104.56	5 3	0 MLGS	••• ••••••	280
PDE	2006 0	04 08 180835.23	31.95 -101.42	5 2	9 MLGS	••• ••••••	36
PDE	2006 0	08 12 104909.67	32.90 -100.89	5 2	8 Lags	··· ·····.	279
PDE	2007 0	5 23 051655.15	34.07 -106.94	5 3	4 MLGS	· · · · · · · · · · · · · · · · · · ·	312
PDE	2008 0	1 29 102453.24	32.90 -100.84	5 3	3 Locs	JF	289
PDE	2008 0	2 18 1415	32.27 -101.42	0 2	1 Locs	·······	317
PDE	2008 0	4 16 090604.36	33.66 -106.06	5 2	7 MLCS	.CE	269
PDE	2008 0	5 23 180305.86	32.50 -104.60	5 2	7 1 000	••• ••••	196
PDE	2008 0	7 18 173109.40	32.89 -100 84	5 2		••• ••••••	45
PDE	2008 12	2 28 205659.99	30.44 -103 36	5 2.	C MIGGS	••• ••••••	317
PDE	2009 01	1 30 014121.66	32.50 -104 61	5 2.	6 MLGS	••• ••••••	271
PDE	2009 06	5 05 171732.94	31.35 -105 99	5 4.	/ LgGS	••• ••••••	46
PDE	2009 06	5 05 181023.63	31 35 -105 99	0 2.	4 MLEPT	.F	227
PDE	2009 08	3 20 015723.10	34 03 -106 97	0 2.	6 MLEPT	.F	227
PDE	2009 08	30 003100.29	34.22 -106.00	5 2.	/ MLGS	3F	282
PDE	2009 08	30 063947 47	34 16 -106.89	5 2.	5 MLGS	.F	293
PDE	2009 08	30 070943.72	34 19 -106.86	5 2.	6 MLGS	.F	289
PDE	2009 11	17 185306 84	33 43 -106.88	5 2.1	1 MLGS	.F	291
PDE	2010 01	27 045933 05	32.43 -104.64	5 3.0	0 LgGS		54
PDE	2010 02	21 095539 77	32.50 -100.83	5 3.2	l LgGS	.F	318
PDE	2010 03	28 000355 00	32.57 -104.61	5 2.8	3 LgGS	••• ••••	41
PDE?	2010 04	11 195632 67	32.44 -104.50	4 4.1	L MWRMT	BFM	44
			52.41 -101.06	5 2.9	J LgGS	••• ••••••	300

http://neic.usgs.gov/cgi-bin/epic/epic.cgi?SEARCHMETHOD=3&FILEFORMAT=4&SEA... 6/4/2012

	DDF	20	10 0										
1	DDT	40	10 0	4 I.	2 002005	.97 32	2.94	-100.	88	5	2.8 Lags	5	214
)	PDE	20	10 0	5 0 9	071807	.37 34	1.04	-106.8	83	5	2 1 ML.CO	2 10	314
	PDE	20	10 0	5 27	7 204721.	87 31	. 11	-105	58	F	2 7 MT CO	• • • • • • • • • • • • • • • • • • • •	279
	PDE	20	10 0	5 31	215819	17 32	52	-104	50	5	J./ MLGS	••• ••••	223
	PDE	20	10 0	3 08	011238	07 22		-104.6	ЪТ	5	4.0 MLGS		44
	PDE	20	10 00	2 25	022230.	07 32	.90	-100.8	35	5	3.4 MwRM	T 2FM	316
	שתם	20		23	020514.	32 32	.95	-100.8	36	5	2.8 LgGS		315
	PDE	20.	10 08	3 29	124836.	61 32	.91	-100.9	2	5	2.6 Logs		. 310
	PDE-	W 20.	10 10	09	074227.	63 32	.93	-100.8	9	5	3 1 Lages	••• ••••	. 310
	PDE-	W 20.	10 10	26	065629.	79 32	.92	-100 8	5	5	2 1 Logo	• • • • • • • • • •	. 313
	PDE-	W 20:	10 11	. 01	091058.	42 33	00	-100 9	2	5	J.L LYGS	••• •••••	. 316
	PDE-	W 201	1 01	11	043415	77 24	20	100.8	4	5	4.8 LgGS	• • • • • • • • • • • • • • • • • • • •	. 320
	PDE-	W 201	1 02	17	192524	11 34	. 39	-106.9	9	5	2.7 MLGS		. 312
	PDE-	¥ 201	1 02	01	102334.	41 30	.11	-103.3	0	5	3.3 LgGS		. 307
	קבים	1 201	1 03	01	033012.	76 32	.88	-100.8	4	5	3.1 LgGS	2F.	317
	FDE-V	201	L 03	01	063159.	89 32	.84	-100.8	0	5 3	2.5 Lags		· 31/
	PDE-V	v 201	.1 03	12	152200.	86 32.	88	-100.9	0	5	S O Lags	••• ••••••	. 321
	PDE-W	V 201	1 03	14	001948.8	30 32	96	-100 8	1	5		••• ••••••	. 312
	PDE-W	V 201	1 03	28	091211	25 32	91	-100.0	-	5 3	5.0 LgGS	• • • • • • • • • •	. 320
	PDE-W	I · 201	1 04	06	233925	J J4.	21	-100.82	4	5 3	.0 LgGS	••• ••••••	. 320
	PDE-W	I 201	1 04	25	165601.4	10 34.	40	-107.02	2	5 3	1.2 MLGS	••• •••••	. 315
	PDE-W	201	1 04	20	102031.8	38 32.	82	-100.84	ł	52	.5 LgGS		317
		201	1 04	28	010341.9	7 30.	74	-105.71	L	6 4	.4 mbGS	.F.	264
	FDE-W	201	1 04	28	035625.6	1 30.	74	-105.78	3 1	0 4	.0 mbGS		. 204
	PDE-W	201	1 04	28	045834.5	9 30.	68	-105.75	5	9 3	6 MWPMT	T2M	268
	PDE-W	201:	1 04	28	074903.4	5 30.	82	-105.80			1 Loca	.FM	. 272
	PDE-W	201:	L 04	28	075418.9	4 30	58	-105.05			.I LYGS	••• •••••	262
	PDE-W	2011	L 04	30	010716 8	2 20	70	105.05		2	.7 Lggs	••• ••••••	286
	PDE-W	2011	05	02	114220.0	4 30.	10	-105.75	1() 4	.6 MDUNM	••• ••••••	265
	PDE-W	2011	05	02	115026.2	4 30.	73	-105.72	10) 4	.2 MWRMT	2FM	266
	DDEW	2011	. 05	02.	112836.3	5 30.	74 ·	-105.70	10) 3	.3 MLGS		264
	PDE-W	2011	. 05	02 3	134032.6	4 30.0	59 -	-105.75	10	3	.3 MLGS		204
	PDE-W	2011	. 05	02 1	135536.7	9 30.	73 -	-105.67	5	4	4 mbGS	・・・・・・・・・・ 2 F	271
	PDE-W	2011	05	03 (25830.18	30.6	57 -	105.73	10	2	9 MurDMI	45	264
	PDE-W	2011	05	03 1	14203.84	1 30.4	19 -	105 68	10	2	0 MIGG	.FM	273
	PDE-W	2011	05	04 1	62627 D	30 5	11	105.00	10	4	8 MLGS	• • • • • • • • • • •	287
	PDE-W	2011	05	05 0	52010 02	20.1		105.79	10	3.	7 MWRMT	M	271
	PDE-W	2011	05 (02426.02	50.7	9 -	105.76	10	3.	6 MLGS		262
	PDE-W	2011	05 (04426.05	30.7	5 -	105.73	10	2.	8 MLGS		264
	DDE	2011	05 (0 0	04559.26	30.8	1 -	105.71	10	2.	8 MLGS		258
	FDE-W	2011	05 (07 0	45100.88	30.6	4 -	105.73	10	4.	1 MDUNM	25	230
	PDE-W	2011	05 0	8 1	32449.65	30.7	5 -	105.81	10	3	1 MLCS		275
	PDE-W	2011	05 0	8 1	34616.49	30.7	2 -	105.76	10	3	2 MLCC	••• ••••••	269
	PDE-W	2011	05 0	8 1	35758.52	30.7	1 -	105 75	10	5.		••• ••••••	269
1	PDE-W	2011	05 0	8 1	90732 13	30 0	1 .	105.75	10	4.	9 MLGS	••• ••••••	269
]	PDE-W	2011	05 0	8 2	25459 92	20.0	L	105.31	TO	3.	0 MLGS	••• ••••••	239
1	PDE-W	2011	05 0	9 04		30.7	±	105.74	10	3.	3 MLGS	· · · · · · · · · · · ·	266
Ţ	DE-W	2011	05 0		54019.15	30.7	b -1	105.69	10	3.	9 MDUNM	.F	261
τ	W-HCIC	2011	OF 1	0 10	54118.44	30.72	2 -1	L05.72	10	3.4	4 MLGS		267
- -		2011	05 1	3 12	4916.26	30.76	5 -1	.05.45	10	2.0	5 MLGS		250
-	DE-W	2011	05 1	4 22	20751.11	30.82	2 -1	.05.74	10	3.9	MIDITINM	F	250
Ę	DE-W	2011	05 1	7 20	0820	30.75	5 -1	05.74	10	4	MININ		259
P	DE-W	2011	05 19) 10	3523.51	30.80	-1	05 69	10	2.4		••• ••••••	265
P	DE-W	2011	05 19	11	5649 90	30 72	- 1	05.05	10	3.4	MWRMT.	M	258
P	DE-W	2011	05 20) 23	1419 06	20.72	-1	05.59	10	2.9	MLGS	••• ••••••	260
P	DE-W	2011	05 25	10	1113.00	30.20	-1	05.55	10	2.7	MLGS	· · · · · · · · · · · ·	310
D	DE-W	2011	05 25	1 10	0301.09	30.70	-1	05.63	10	2.8	MLGS		264
		2011	05 27	01	4128.20	30.80	-1	05.76	10	3.6	MLGS		261
P.		ZUTT	05 27	01	4908.92	30.98	-1	05.78	10	3.0	MLGS		201
51	DR-W 3	2011	07 14	10	2913.60	32.93	-1	00.81	5	2.5	Lags	••• ••••••	240
PI	DE-W 2	2011	09 11	18	3635.11	32.74	-1	00.84	5	2 5	Lace	··· ·····	321
PI	DE-W 2	2011	09 11	20:	3158.11	32.89	-10	0 85	5	2.0	1995	SF	318
PI	DE-W 2	2011	09 12	001	3149 11	32 00		0.05	5	4.8	пдев	2F	316
PI	DE-W 2	2011	09 12	020	2931 24	32.00	-1(10.88	5	2.7	LgGS	2F	314
PI	DE-W 2	2011	09 12	001	946 71	34.73	-10	0.85	5	2.5	LgGS	.H	317
PL)E-W 2	011	09 10	091	1940./L	32.85	-10	0.85	5	2.6	LgGS		316
Pr	E-W 2	011	00 10	1.4-	612.90	32.76	-10	0.84	5	2.7	LgGS	2F	317
EL	4	O'TT	09 13	141	.834.05	32.82	-10	0.87	7	3.4	LgGS	3F.	314
													774

USGS National Earthquake Information Center USGS Privacy Statement | Disclaimer

i .

)

FIRSTGOV



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

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

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 <u>www.hallenvironmental.com</u> 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,

andis

Andy Freeman Laboratory Manager 4901 Hawkins NE Albuquerque, NM 87109

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining CompanyProject:Quarterly WDW-1, 2, & 3 Inj WellLab ID:1601864-001Matrix: AQUEOUS

Client Sample ID: WDW-1,2,&3 Effluent Collection Date: 1/21/2016 7:35:00 AM 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						Analvst	LGT
Fluoride	20	2.0	*	ma/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 SC	LIDS					Analyst	KS
Total Dissolved Solids	3780	40.0	*D	mg/L	1	1/28/2016 6:43:00 PM	23428
CORROSIVITY						Analyst	SUB
рН	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

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 Page 1 of 27
- P Sample pH Not In Range
- RL Reporting Detection Limit
- W Sample container temperature is out of limit as specified

TLAIL	Environmental	Analysia	Laboratory Inc
пап	Environmental	Allarysis	Laboratory, Inc.

CLIENT: Navajo Refining CompanyProject:Quarterly WDW-1, 2, & 3 Inj WellLab ID:1601864-001Matrix: AQUEOUS

Client Sample ID: WDW-1,2,&3 Effluent Collection Date: 1/21/2016 7:35:00 AM Received Date: 1/22/2016 9:40:00 AM

Analyses	Result	PQL Qu	al 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

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 Page 2 of 27
- 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 WDW-1, 2, & 3 Inj Well 1601864-001 Lab ID: Matrix: AQUEOUS

_

Client Sample ID: WDW-1,2,&3 Effluent Collection Date: 1/21/2016 7:35:00 AM Received Date: 1/22/2016 9:40:00 AM

Analyses	Result	PQL Qu	al Units	DF	Date Analyze	ed Batch
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

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

Oualifiers: * Value exceeds Maximum Contaminant Level.

- D Sample Diluted Due to Matrix
 - Н 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
- В Analyte detected in the associated Method Blank
- Е Value above quantitation range
- Analyte detected below quantitation limits Page 3 of 27 J
- Р Sample pH Not In Range
- RL Reporting Detection Limit

Sample container temperature is out of limit as specified W

Hall Environmental Analysis Laboratory, Inc.

Quarterly WDW-1, 2, & 3 Inj Well

CLIENT: Navajo Refining Company

1601864-001

Project:

Lab ID:

1

Client Sample ID: WDW-1,2,&3 Effluent Collection Date: 1/21/2016 7:35:00 AM Received Date: 1/22/2016 9:40:00 AM

Analyses	Result	PQL Qu	al Units	DF	Date Analyze	d Batch
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

Matrix: AQUEOUS

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 Page 4 of 27
- 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 WDW-1, 2, & 3 Inj Well 1601864-001 Lab ID: Matrix: AQUEOUS

_

Client Sample ID: WDW-1,2,&3 Effluent Collection Date: 1/21/2016 7:35:00 AM Received Date: 1/22/2016 9:40:00 AM

Analyses	Result	PQL Qu	al Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES					A	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
lodomethane	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					A	Analyst: SUB
1.1-Biphenyl	ND	5.0	ua/L	1	2/2/2016	- R32136
1.4-Dioxane	ND	5.0	ua/L	1	2/2/2016	R32136
Atrazine	ND	5.0	ua/L	1	2/2/2016	R32136
Benzaldehyde	ND	5.0	µg/L	1	2/2/2016	R32136
Caprolactam	ND	5.0	µq/L	1	2/2/2016	R32136
N-Nitroso-di-n-butvlamine	ND	5.0	ua/L	1	2/2/2016	R32136
Acetophenone	ND	5.0	µq/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	µq/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

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

Oualifiers: * Value exceeds Maximum Contaminant Level.

- D Sample Diluted Due to Matrix
- Н 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
- Analyte detected in the associated Method Blank В
- Е Value above quantitation range
- Analyte detected below quantitation limits Page 5 of 27 J
- Р Sample pH Not In Range
- RL Reporting Detection Limit

Sample container temperature is out of limit as specified W

Hall Environmental Analysis Laboratory, Inc.

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

Lab ID:1601864-001Matrix: AQUEOUS

Client Sample ID: WDW-1,2,&3 Effluent Collection Date: 1/21/2016 7:35:00 AM Received Date: 1/22/2016 9:40:00 AM

Analyses	Result	PQL 0	Qual Units	DF	Date Analyze	d Batch
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: * 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 Page 6 of 27
- 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.

Quarterly WDW-1, 2, & 3 Inj Well

CLIENT: Navajo Refining Company

Project:

Client Sample ID: WDW-1,2,&3 Effluent Collection Date: 1/21/2016 7:35:00 AM Pageived Date: 1/22/2016 0.40.00 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	h	
EPA 8270D: SEMIVOLATILES				Analyst: SUB	;	
Phenol	ND	5.0	µg/L	1 2/2/2016 R321	36	
Pyrene	ND	5.0	µg/L	1 2/2/2016 R321	36	
o-Toluidine	ND	5.0	µg/L	1 2/2/2016 R321	36	
Pyridine	ND	5.0	µg/L	1 2/2/2016 R321	36	
1,2,4,5-Tetrachlorobenzene	ND	5.0	µg/L	1 2/2/2016 R321	36	
Surr: 2,4,6-Tribromophenol	94.2	10-123	%Rec	1 2/2/2016 R321	36	
Surr: 2-Fluorobiphenyl	80.4	19-130	%Rec	1 2/2/2016 R321	36	
Surr: 2-Fluorophenol	82.8	21-120	%Rec	1 2/2/2016 R321	36	
Surr: Nitrobenzene-d5	89.6	25-130	%Rec	1 2/2/2016 R321	36	
Surr: Phenol-d5	86.0	10-130	%Rec	1 2/2/2016 R321	36	
Surr: Terphenyl-d14	32.8	20-137	%Rec	1 2/2/2016 R321	36	

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

Qualifiers: * Value exceeds Maximum Contaminant Lev	vel.
---	------

- D Sample Diluted Due to Matrix
- Н 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
- В Analyte detected in the associated Method Blank
- Е Value above quantitation range
- Analyte detected below quantitation limits Page 7 of 27 J
- Р Sample pH Not In Range
- RL Reporting Detection Limit
- Sample container temperature is out of limit as specified W
Date Reported: 2/15/2016

Hall Environmental Analysis Laboratory, Inc.

Client Sample ID: TRIP BLANK Collection Date:

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

 Lab ID:
 1601864-002
 M

CLIENT: Navajo Refining Company

Matrix: TRIP BLANK Received Date: 1/22/2016 9:40:00 AM

Analyses	Result	PQL	Qual Units	DF	Date Analyze	d 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: * 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 Page 8 of 27
- 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.

Date Reported: 2/15/2016

Client Sample ID: TRIP BLANK Collection Date:

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

 Lab ID:
 1601864-002
 M

CLIENT: Navajo Refining Company

Matrix: TRIP BLANK Received Date: 1/22/2016 9:40:00 AM

Analyses	Result	PQL Q	ial Units	DF	Date Analyze	d 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

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 Page 9 of 27
- 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.

Date Reported: 2/15/2016

Client Sample ID: TRIP BLANK Collection Date:

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

 Lab ID:
 1601864-002
 M

CLIENT: Navajo Refining Company

Matrix: TRIP BLANK Received Date: 1/22/2016 9:40:00 AM

Analyses	Result	PQL Qu	al Units	DF	Date Analyze	d 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
lodomethane	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

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 dete

- 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
- 3 Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits Page 10 of 27
- P Sample pH Not In Range
- RL Reporting Detection Limit
- W Sample container temperature is out of limit as specified

QC SUM Hall Envir	MARY onment	' REP(al Anal	ORT ysis I	Laborat	ory, Inc.					WO#:	1601864 15-Feb-16
Client:	Navajo F	Refining Co	ompany								
Project:	Quarterly	y WDW-1,	, 2, & 3	Inj Well							
Sample ID MB		Samp	Гуре: МІ	BLK	Tes	tCode: E	PA Method	300.0: Anion	5		
Client ID: PBW	1	Batc	h ID: R3	31638	F	RunNo: 31638					
Prep Date:		Analysis [Date: 1	22/2016	S	SeqNo: 9	68134	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	4)	ND	0.10								
Phosphorus, Orthopho	osphate (As P	ND	0.50								
Sample ID LCS		Samp	Гуре: LC	s	Tes	tCode: E	PA Method	300.0: Anions	5		
Client ID: LCS	N	Batc	h ID: R3	31638	F	RunNo: 3	1638				
Prep Date:		Analysis [Date: 1	22/2016	S	SeqNo: 9	68135	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	1)	2.5	0.10	2.500	0	99.2	90	110			
Phosphorus, Orthopho	osphate (As P	4.7	0.50	5.000	0	93.3	90	110			
Sample ID MB		Samp	Гуре: МІ	BLK	Tes	tCode: E	PA Method	300.0: Anions	6		
Client ID: PBW	1	Batc	h ID: R3	31714	F	RunNo: 3	1714				
Prep Date:		Analysis [Date: 1	26/2016	S	SeqNo: 9	70466	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		Samp	Гуре: LC	s	Tes	tCode: E	PA Method	300.0: Anion	6		
Client ID: LCS	N	Batc	h ID: R3	31714	F	RunNo: 3	1714				
Prep Date:		Analysis [Date: 1	/26/2016	S	SeqNo: 9	70467	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			

- * 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

Page 11 of 27

QC SUMMARY REPORT Hall Environmental Analysis Laboratory, Inc.

WO#: 1601864

15-Feb-16	,
-----------	---

Client: Project:	Navajo Refining Quarterly WDW	Company -1, 2, & 3	Inj Well									
Sample ID MB-R32	136 San	npType: M	BLK	Tes	tCode: E	PA Method	8260B: VOL	ATILES				
Client ID: PBW	Ba	atch ID: R3	32136	F	RunNo: 3	2136						
Prep Date:	Analysi	s Date: 2	/2/2016	Ş	SeqNo: 9	82421	Units: µg/L					
Analyte	Resul	t PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual		
Acetonitrile	NE	0.50					0					
Allyl chloride	NE	0.50										
Chloroprene	NE	0.50										
Cyclohexane	NE	0.50										
Diethyl ether	NE	0.50										
Diisopropyl ether	NE	0.50										
Epichlorohydrin	NE	0.50										
Ethyl acetate	NE	0.50										
Ethyl methacrylate	NE	2.5										
Ethyl tert-butyl ether	NE	0.50										
Freon-113	NE	0.50										
Isobutanol	NE) 10										
Isopropyl acetate	NE	0.50										
Methacrylonitrile	NE	2.5										
Methyl acetate	NE	0.50										
Methyl ethyl ketone	NE	2.5										
Methyl isobutyl ketone	NE	2.5										
Methyl methacrylate	NE) 2.5										
Methylcyclohexane	NE	0.50										
n-Amyl acetate	NE	0.50										
n-Hexane	NE	0.50										
Nitrobenzene	NE	0.50										
Pentachloroethane	NE	0.50										
p-isopropyltoluene	NE	0.50										
Propionitrile	NE) 2.5										
Tetrahydrofuran	NE	0.50										
Benzene	NE	0.50										
Toluene	NE	0.50										
Ethylbenzene	NE	0.50										
Methyl tert-butyl ether (MT	rbe) Ne	0.50										
1,2,4-Trimethylbenzene	NE	0.50										
1,3,5-Trimethylbenzene	NE	0.50										
1,2-Dichloroethane (EDC)	NE	0.50										
1,2-Dibromoethane (EDB)) NE	0.50										
Naphthalene	NE	0.50										
Acetone	NE	2.5										
Bromobenzene	NE	0.50										
Bromodichloromethane	NE	0.50										
Bromoform	NE	0.50										

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

Page 12 of 27

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc

WO#: 1601864 15-Feb-16

Client:NavajoProject:Quarter	o Refining Co erly WDW-1,	ompany 2, & 3	Inj Well										
Sample ID MB-R32136	SampT	ype: M	BLK	Tes	tCode: E	PA Method	8260B: VOL	ATILES					
Client ID: PBW	Batch	n ID: R 3	2136	F	RunNo: 3	2136							
Prep Date:	Analysis D	Date: 2	/2/2016	S	SeqNo: 9	82421	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-Pronvlbenzene	ND	0.50											
sec-Butylbenzene	ND	0.00											
Styrene	ND	0.50											
tort.Butylhenzene		0.50											
1 1 1 2-Tetrachloroethane		0.50											
1 1 2 2 Tetrachloroethane		0.50											
		0.50											
	ט או חוא	0.50											
trans 1.2 Dichlerensens		0.50											
		0.50											
1,2,3-1richioropenzene	ND	0.50											

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

Page 13 of 27

QC SUMMARY REPORT Hall Environmental Analysis Laboratory, Inc.

WO#: 1601864

15-Feb-16

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

Sample ID MB-R32136	SampT	Гуре: МГ	3LK	Tes	tCode: E	PA Method	8260B: VOL/	ATILES		
Client ID: PBW	Batch	h ID: R3	2136	F	≀unNo: 3	2136				
Prep Date:	Analysis D)ate: 2/	2/2016	٤	SeqNo: 9	82421	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								
lodomethane	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	Samp7	Гуре: LC	;s	Tes	tCode: E	PA Method	8260B: VOL/	ATILES		

	Sampry	pe. LC	.5	165		Amethou	0200B. VOL	ATILES		
Client ID: LCSW	Batch	ID: R3	2136	R	RunNo: 3	2136				
Prep Date:	Analysis Da	ate: 2/	2/2016	S	SeqNo: 9	82422	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:

- * 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

Page 14 of 27

QC SUMMARY REPORT Hall Environmental Analysis Laboratory, Inc.

WO#: 1601864

15-Feb-16

Client: Navajo	o Refining Co	mpany	Ini Well							
	CompT	2, 00 5		Tee	tCada, F	DA 0070D. (1
	Sampi	ype. wir		res		PA 02/UD: 3	Semivolatiles			
Client ID: PBW	Batch	1D: R3	2136	ŀ	RunNo: 3	32136				
Prep Date:	Analysis D	ate: 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.
- 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

Page 15 of 27

QC SUMMARY REPORT
Hall Environmental Analysis Laboratory, Inc.

WO#: 1601864

15-Feb-16

Client ID: PBW Prep Date: Analy Analyte Res Bis(2-chloroethoxy)methane M Bis(2-chloroethyl)ether M Bis(2-chloroethyl)ether M Bis(2-chlorosopropyl)ether M Bis(2-ethylhexyl)phthalate M Butyl benzyl phthalate M Carbazole M Chrysene M Dibenz(a,h)anthracene M Dibenzofuran M Dientyl phthalate M Din-n-butyl phthalate M Di-n-butyl phthalate M Pluoranthene M Fluoranthene M Fluorene M Hexachlorobenzene M Hexachlorobetadiene M Hexachloroethane M Indeno(1,2,3-cd)pyrene M Naphthalene M	Batch ID vsis Date ult P ND ND ND ND ND ND ND ND ND ND	R32136 2/2/2016 S.0 5.0	6 value	SPK Ref Val	RunNo: 3 SeqNo: 9 %REC	2136 82533 LowLimit	Units: µg/L HighLimit	%RPD	RPDLimit	Qual
Prep Date: Analysis Analyte Ress Bis(2-chloroethoxy)methane M Bis(2-chloroethyl)ether M Bis(2-chloroisopropyl)ether M Bis(2-ethylhexyl)phthalate M Butyl benzyl phthalate M Carbazole M Chrysene M Dibenz(a,h)anthracene M Dibenzofuran M Diethyl phthalate M Din-butyl phthalate M Di-n-butyl phthalate M Fluoranthene M Fluorene M Hexachlorobenzene M Hexachlorobenzene M Hexachlorobenzene M Hexachlorobylogentadiene M Hexachlorobylogentadiene M Hexachloroethane M Indeno(1,2,3-cd)pyrene M Naphthalene M	rsis Date ult P VD VD VD VD VD VD VD VD VD VD	2/2/2016 QL SPK 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0	6 value	SPK Ref Val	SeqNo: 9 %REC	82533 LowLimit	Units: µg/L HighLimit	%RPD	RPDLimit	Qual
AnalyteResBis(2-chloroethoxy)methaneMBis(2-chloroethyl)etherMBis(2-chloroisopropyl)etherMBis(2-ethylhexyl)phthalateMButyl benzyl phthalateMCarbazoleMChryseneMDibenz(a,h)anthraceneMDiethyl phthalateMDin-butyl phthalateMDi-n-butyl phthalateMFluorantheneMFluorantheneMHexachlorobenzeneMHexachlorobenzeneMHexachlorocyclopentadieneMHexachloroethaneMIndeno(1,2,3-cd)pyreneMNaphthaleneM	ult P ND ND ND ND ND ND ND ND ND ND ND ND ND	QL SPK 5.0 5.0	value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Bis(2-chloroethoxy)methane M Bis(2-chloroisopropyl)ether M Bis(2-chlorosopropyl)ether M Dibenzofuran M Dibenzofuran M Dientyl phthalate M Di-n-octyl phthalate M Fluorene M Hexachlorobenzene M Hexachlorobutadiene M Hexachloroethane M Indeno(1,2,3-cd)pyrene M Isophorone M	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	5.0 5.0 5.0 5.0 5.0 5.0 0.10 0.10 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.								
Bis(2-chloroethyl)ether N Bis(2-chloroisopropyl)ether N Bis(2-ethylhexyl)phthalate N Butyl benzyl phthalate N Carbazole N Carbazole N Dibenz(a,h)anthracene N Dibenzofuran N Dientyl phthalate N Dinethyl phthalate N Din-n-butyl phthalate N Pluoranthene N Fluoranthene N Hexachlorobenzene N Hexachlorobenzene N Hexachlorobetadiene N Hexachlorobethane N Indeno(1,2,3-cd)pyrene N Naphthalene N	10 10 10 10 10 10 10 10 10 10 10 10 10 1	5.0 5.0 5.0 5.0 0.10 0.10 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.								
Bis(2-chloroisopropyl)ether N Bis(2-ethylhexyl)phthalate N Butyl benzyl phthalate N Carbazole N Chrysene N Dibenz(a,h)anthracene N Dibenz(a,h)anthracene N Dibenzofuran N Dimethyl phthalate N Din-butyl phthalate N Din-n-octyl phthalate N Fluoranthene N Fluorene N Hexachlorobenzene N Hexachlorobenzene N Hexachlorobenzene N Indeno(1,2,3-cd)pyrene N Isophorone N Naphthalene N	10 10 10 10 10 10 10 10 10 10 10 10 10	5.0 5.0 5.0 0.10 0.10 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.								
Bis(2-ethylhexyl)phthalate N Butyl benzyl phthalate N Carbazole N Chrysene N Dibenz(a,h)anthracene N Dibenzofuran N Diethyl phthalate N Dinethyl phthalate N Din-n-butyl phthalate N Pi-n-octyl phthalate N Fluoranthene N Fluoranthene N Hexachlorobenzene N Hexachlorocyclopentadiene N Hexachloroethane N Indeno(1,2,3-cd)pyrene N Naphthalene N	10 10 10 10 10 10 10 10 10 10 10 10 10 1	5.0 5.0 5.0 0.10 0.10 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.								
Butyl benzyl phthalate M Carbazole M Chrysene M Dibenz(a,h)anthracene M Dibenzofuran M Diethyl phthalate M Dinethyl phthalate M Din-butyl phthalate M Di-n-butyl phthalate M Fluoranthene M Fluorene M Hexachlorobenzene M Hexachlorocyclopentadiene M Hexachloroethane M Indeno(1,2,3-cd)pyrene M Naphthalene M	10 10 10 10 10 10 10 10 10 10 10 10	5.0 5.0 0.10 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.								
CarbazoleMChryseneMDibenz(a,h)anthraceneMDibenzofuranMDiethyl phthalateMDinethyl phthalateMDi-n-butyl phthalateMDi-n-octyl phthalateMFluorantheneMFluoreneMHexachlorobenzeneMHexachlorobutadieneMHexachlorocyclopentadieneMIndeno(1,2,3-cd)pyreneMNaphthaleneM	10 10 10 10 10 10 10 10 10 10 10 10	5.0 0.10 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.								
ChryseneNDibenz(a,h)anthraceneNDibenzofuranNDiethyl phthalateNDin-butyl phthalateNDi-n-butyl phthalateNDi-n-octyl phthalateNFluorantheneNFluorantheneNHexachlorobenzeneNHexachlorobutadieneNHexachloroethaneNIndeno(1,2,3-cd)pyreneNNaphthaleneN	ND (1 ND (1 ND (1 ND (1 ND (1 ND (1) ND (1) ND (1) ND (1) ND (1) ND (1)	0.10 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.								
Dibenz(a,h)anthraceneDibenzofuranDiethyl phthalateDimethyl phthalateDin-butyl phthalateDi-n-otyl phthalateDi-n-otyl phthalatePluoreneFluorantheneFluoreneHexachlorobenzeneHexachlorobutadieneHexachlorocyclopentadieneHexachloroethaneIndeno(1,2,3-cd)pyreneNaphthalene	VD (VD VD VD VD VD VD VD VD VD	0.10 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 1.0 5.0								
DibenzofuranNDiethyl phthalateNDimethyl phthalateNDin-butyl phthalateNDi-n-octyl phthalateNFluorantheneNFluoreneNHexachlorobenzeneNHexachlorobutadieneNHexachlorocyclopentadieneNHexachloroethaneNIndeno(1,2,3-cd)pyreneNNaphthaleneN	ND ND ND ND ND ND ND ND	5.0 5.0 5.0 5.0 5.0 5.0 5.0 5.0 1.0 5.0								
Diethyl phthalateMDimethyl phthalateMDi-n-butyl phthalateMDi-n-octyl phthalateMFluorantheneMFluoreneMHexachlorobenzeneMHexachlorobutadieneMHexachlorocyclopentadieneMHexachloroethaneMIndeno(1,2,3-cd)pyreneMNaphthaleneM	ND ND ND ND ND ND ND	5.0 5.0 5.0 5.0 5.0 5.0 1.0 5.0								
Dimethyl phthalateMDi-n-butyl phthalateMDi-n-octyl phthalateMFluorantheneMFluoreneMHexachlorobenzeneMHexachlorobutadieneMHexachlorocyclopentadieneMHexachloroethaneMIndeno(1,2,3-cd)pyreneMNaphthaleneM		5.0 5.0 5.0 5.0 5.0 1.0								
Di-n-butyl phthalateNDi-n-octyl phthalateNFluorantheneNFluoreneNHexachlorobenzeneNHexachlorobutadieneNHexachlorocyclopentadieneNHexachloroethaneNIndeno(1,2,3-cd)pyreneNIsophoroneNNaphthaleneN		5.0 5.0 5.0 5.0 1.0								
Di-n-octyl phthalate N Fluoranthene N Fluorene N Hexachlorobenzene N Hexachlorobutadiene N Hexachlorocyclopentadiene N Hexachloroethane N Indeno(1,2,3-cd)pyrene N Isophorone N	ND ND ND ND	5.0 5.0 5.0 1.0								
Fluoranthene M Fluorene M Hexachlorobenzene M Hexachlorocyclopentadiene M Hexachlorocyclopentadiene M Indeno(1,2,3-cd)pyrene M Isophorone M Naphthalene M		5.0 5.0 1.0								
Fluorene M Hexachlorobenzene M Hexachlorobutadiene M Hexachlorocyclopentadiene M Hexachloroethane M Indeno(1,2,3-cd)pyrene M Isophorone M Naphthalene M		5.0 1.0 5.0								
HexachlorobenzeneMHexachlorobutadieneMHexachlorocyclopentadieneMHexachloroethaneMIndeno(1,2,3-cd)pyreneMIsophoroneMNaphthaleneM		1.0 5.0								
Hexachlorobutadiene M Hexachlorocyclopentadiene M Hexachlorocyclopentadiene M Indeno(1,2,3-cd)pyrene M Isophorone M Naphthalene M	ND	50								
HexachlorocyclopentadieneNHexachloroethaneNIndeno(1,2,3-cd)pyreneNIsophoroneNNaphthaleneN		0.0								
HexachloroethaneMIndeno(1,2,3-cd)pyreneMIsophoroneMNaphthaleneM	ND	5.0								
Indeno(1,2,3-cd)pyrene M Isophorone M Naphthalene M	ND	5.0								
Isophorone Naphthalene N	ND (0.10								
Naphthalene N	ND	5.0								
	ND	5.0								
Nitrobenzene	ND	5.0								
N-Nitrosodi-n-propylamine	ND	5.0								
N-Nitrosodiphenylamine	ND	2.0								
Pentachlorophenol	ND	5.0								
Phenanthrene N	ND	1.0								
Phenol N	ND	5.0								
Pyrene N	ND	5.0								
o-Toluidine	ND	2.0								
Pyridine N	ND	5.0								
1,2,4,5-Tetrachlorobenzene	ND	5.0								

Sample ID	LCS-R32136	SampType:	LCS	Test	tCode: EF	PA 8270D: \$	Semivolatiles			
Client ID:	LCSW	Batch ID:	R32136	R	unNo: 32	2136				
Prep Date:		Analysis Date:	2/2/2016	S	eqNo: 98	32534	Units: µg/L			
Analyte		Result PC	QL SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
2,4-Dinitrotolue	ne	4.6	5.000	0	93.0	49	134			

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

Page 16 of 27

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	SampT	ype: LC	s	Tes	tCode: E	PA 8270D:	Semivolatiles	;		
Client ID: LCSW	Batcl	h ID: R3	32136	F	RunNo: 3	2136				
Prep Date:	Analysis E	Date: 2/	/2/2016	S	SeqNo: 9	82534	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			
Pvrene	4.7		5.000	0	93.2	45	139			

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

Page 17 of 27

QC SUMMARY REPORT	
Hall Environmental Analysis Laboratory, Inc.	

WO#:	1601864
	15-Feb-16

Client: Project:	Navajo F Quarterly	Refining Co y WDW-1,	ompany , 2, & 3	Inj Well							
Sample ID	MB-23378	SampT	Гуре: МЕ	BLK	Test	Code: EF	PA Method	7470: Mercur	y		
Client ID:	PBW	Batcl	h ID: 23	378	R	unNo: 3	1658				
Prep Date:	1/25/2016	Analysis E	Date: 1/	25/2016	S	eqNo: 9	68855	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	SampT	Гуре: LC	s	Test	Code: EF	PA Method	7470: Mercur	y		
Client ID:	LCSW	Batcl	h ID: 23	378	R	unNo: 3	1658				
Prep Date:	1/25/2016	Analysis D	Date: 1/	25/2016	S	eqNo: 9	68856	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	SampT	Гуре: М	6	Test	Code: EF	PA Method	7470: Mercur	y		
Client ID:	WDW-1,2,&3 Effle	Jen Batcl	h ID: 23	378	R	unNo: 3	1658				
Prep Date:	1/25/2016	Analysis D	Date: 1/	25/2016	S	eqNo: 90	68858	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	1601864-001BMS	D Samp1	Гуре: М	SD	Test	Code: EF	PA Method	7470: Mercur	y		
Client ID:	WDW-1,2,&3 Effle	Jen Batcl	h ID: 23	378	R	unNo: 3	1658				
Prep Date:	1/25/2016	Analysis D	Date: 1/	25/2016	S	eqNo: 9	68859	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	

- * 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

Page 18 of 27

WO#:	1601864
	15.Feb.16

Client: Project:	Navajo Quarte	o Refining Co erly WDW-1,	Inj Well								
Sample ID Client ID: Prep Date:	MB-23438 PBW 1/27/2016	SampT Batch Analysis D	ype: ME ID: 23 4 ate: 1/	BLK 438 28/2016	Tes F	tCode: M RunNo: 3 SegNo: 9	ERCURY, 1 1746 71551	CLP			
Analyte Mercury		Result ND	PQL 0.020	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sample ID Client ID:	LCS-23438 LCSW	SampT Batch	ype: LC	S 438	Tes F	tCode: M RunNo: 3 [,]	ERCURY, 1 1746	TCLP			
Prep Date: Analyte	1/27/2016	Analysis D Result	ate: 1/ PQL	28/2016 SPK value	SPK Ref Val	SeqNo: 9 %REC	71552 LowLimit	Units: mg/L HighLimit	%RPD	RPDLimit	Qual
Mercury		ND	0.020	0.005000	0	102	80	120			

- * 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
- Page 19 of 27

QC SU Hall Ei	JMMAR	Y REP ntal Anal	ORT lysis I	Laborat	ory, Inc.					WO#:	1601864 15-Feb-16
Client: Project:	Navaj Quarte	o Refining Co erly WDW-1,	ompany , 2, & 3	Inj Well							
Sample ID Client ID: Prep Date:	MB-23359 PBW 1/22/2016	Samp ⁻ Batc Analysis [Type: MI h ID: 23 Date: 1 /	BLK 359 /25/2016	Tes F S	tCode: E RunNo: 3 SeqNo: 9	PA Method 1646 68535	6010B: TCLI Units: mg/L	P Metals		
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	Samp	Type: LC	s	Tes	tCode: E	PA Method	6010B: TCL	P Metals		
Client ID:	LCSW	Batc	h ID: 23	359	F	RunNo: 3	1646				
Prep Date:	1/22/2016	Analysis [Date: 1	25/2016	5	SeqNo: 9	68536	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			

92.5

93.7

92.9

95.8

92.0

80

80

80

80

80

120

120

120

120

120

0

0

0

0

0

Qualifiers:

Cadmium

Chromium

Selenium

Lead

Silver

- * Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded

ND

ND

ND

ND

ND

1.0

5.0

5.0

1.0

5.0

0.5000

0.5000

0.5000

0.5000

0.1000

- 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

Page 20 of 27

QC SUMMARY REPORT Hall Environmental Analysis Laboratory, Inc.

WO#: 1601864

15-Feb-16

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

Sample ID	MB-23359	Samp	Type: ME	BLK	Tes	tCode: El	PA 6010B:	Total Metals			
Client ID:	PBW	Bato	ch ID: 23	359	R	RunNo: 3	1646				
Prep Date:	1/22/2016	Analysis	Date: 1/	25/2016	S	SeqNo: 9	68316	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								
Zinc Sample ID	LCS-23359	ND Samp	0.020 Type: LC	S	Tes	tCode: El	PA 6010B: ⁻	Total Metals			
Zinc Sample ID Client ID:	LCS-23359 LCSW	ND Samp Bato	0.020 Type: LC ch ID: 23	S 359	Tes	tCode: El RunNo: 3	PA 6010B: ⁻ 1646	Total Metals			
Zinc Sample ID Client ID: Prep Date:	LCS-23359 LCSW 1/22/2016	ND Samp Bato Analysis	0.020 Type: LC ch ID: 23 Date: 1/	S 359 25/2016	Tes R S	tCode: El RunNo: 3 SeqNo: 9	PA 6010B: ⁻ 1646 68317	Total Metals Units: mg/L			
Zinc Sample ID Client ID: Prep Date: Analyte	LCS-23359 LCSW 1/22/2016	ND Samp Bato Analysis Result	0.020 Type: LC ch ID: 23 Date: 1/ PQL	S 359 25/2016 SPK value	Tes R S SPK Ref Val	tCode: El RunNo: 3 SeqNo: 9 %REC	PA 6010B: ⁻ 1646 68317 LowLimit	Total Metals Units: mg/L HighLimit	%RPD	RPDLimit	Qual
Zinc Sample ID Client ID: Prep Date: Analyte Aluminum	LCS-23359 LCSW 1/22/2016	ND Samp Bato Analysis Result 0.46	0.020 Type: LC ch ID: 23 Date: 1/ PQL 0.020	S 359 25/2016 SPK value 0.5000	Tes R S SPK Ref Val 0	tCode: El RunNo: 3 SeqNo: 9 %REC 91.9	PA 6010B: ⁻ 1646 68317 LowLimit 80	Total Metals Units: mg/L HighLimit 120	%RPD	RPDLimit	Qual
Zinc Sample ID Client ID: Prep Date: Analyte Aluminum Antimony	LCS-23359 LCSW 1/22/2016	ND Samp Bato Analysis Result 0.46 0.48	0.020 Type: LC ch ID: 23 Date: 1/ PQL 0.020 0.050	S 359 25/2016 SPK value 0.5000 0.5000	Tes R SPK Ref Val 0 0	tCode: El RunNo: 3 SeqNo: 9 %REC 91.9 95.5	PA 6010B: ⁻ 1646 68317 LowLimit 80 80	Total Metals Units: mg/L HighLimit 120 120	%RPD	RPDLimit	Qual
Zinc Sample ID Client ID: Prep Date: Analyte Aluminum Antimony Arsenic	LCS-23359 LCSW 1/22/2016	ND Samp Bato Analysis Result 0.46 0.48 0.48	0.020 Type: LC ch ID: 23: Date: 1/ PQL 0.020 0.050 0.020	S 359 25/2016 SPK value 0.5000 0.5000 0.5000	Tes F SPK Ref Val 0 0 0 0	tCode: E l RunNo: 3 SeqNo: 9 %REC 91.9 95.5 96.1	PA 6010B: 1646 68317 LowLimit 80 80 80 80	Total Metals Units: mg/L HighLimit 120 120 120	%RPD	RPDLimit	Qual
Zinc Sample ID Client ID: Prep Date: Analyte Aluminum Arsenic Barium	LCS-23359 LCSW 1/22/2016	ND Samp Bate Analysis Result 0.46 0.48 0.48 0.48 0.47	0.020 Type: LC ch ID: 23: Date: 1/ PQL 0.020 0.050 0.020 0.020	S 359 25/2016 SPK value 0.5000 0.5000 0.5000 0.5000	Tes F SPK Ref Val 0 0 0 0 0	tCode: E l RunNo: 3 SeqNo: 9 <u>%REC</u> 91.9 95.5 96.1 94.0	PA 6010B: 1646 68317 LowLimit 80 80 80 80 80 80	Total Metals Units: mg/L HighLimit 120 120 120 120 120	%RPD	RPDLimit	Qual
Zinc Sample ID Client ID: Prep Date: Analyte Aluminum Antimony Arsenic Barium Beryllium	LCS-23359 LCSW 1/22/2016	ND Samp Bate Analysis Result 0.46 0.48 0.48 0.48 0.47 0.49	0.020 Type: LC ch ID: 23: Date: 1/ PQL 0.020 0.020 0.020 0.020 0.020 0.020	S 359 25/2016 SPK value 0.5000 0.5000 0.5000 0.5000 0.5000	Tes F SPK Ref Val 0 0 0 0 0 0 0 0	tCode: E l RunNo: 3 SeqNo: 9 %REC 91.9 95.5 96.1 94.0 99.0	PA 6010B: 1646 68317 LowLimit 80 80 80 80 80 80 80	Total Metals Units: mg/L HighLimit 120 120 120 120 120 120	%RPD	RPDLimit	Qual
Zinc Sample ID Client ID: Prep Date: Analyte Aluminum Antimony Arsenic Barium Beryllium Cadmium	LCS-23359 LCSW 1/22/2016	ND Samp Bate Analysis Result 0.46 0.48 0.48 0.47 0.49 0.46	0.020 Type: LC ch ID: 23 Date: 1/ PQL 0.020 0.050 0.020 0.020 0.0030 0.0020	S 359 25/2016 SPK value 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000	Tes R SPK Ref Val 0 0 0 0 0 0 0 0 0 0 0	tCode: El RunNo: 3 SeqNo: 9 %REC 91.9 95.5 96.1 94.0 99.0 92.5	PA 6010B: ⁻ 1646 68317 LowLimit 80 80 80 80 80 80 80 80 80	Total Metals Units: mg/L HighLimit 120 120 120 120 120 120 120	%RPD	RPDLimit	Qual
Zinc Sample ID Client ID: Prep Date: Analyte Aluminum Aluminum Antimony Arsenic Barium Beryllium Cadmium Chromium	LCS-23359 LCSW 1/22/2016	ND Samp Bate Analysis Result 0.46 0.48 0.48 0.47 0.49 0.46 0.47	0.020 Type: LC ch ID: 23 Date: 1/ PQL 0.020 0.020 0.020 0.020 0.0020 0.0020 0.0020 0.0020 0.0060	S 359 25/2016 SPK value 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000	Tes R SPK Ref Val 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	tCode: El RunNo: 3 SeqNo: 9 %REC 91.9 95.5 96.1 94.0 99.0 92.5 93.7	PA 6010B: ⁻ 1646 68317 LowLimit 80 80 80 80 80 80 80 80 80 80 80	Total Metals Units: mg/L HighLimit 120 120 120 120 120 120 120 120	%RPD	RPDLimit	Qual
Zinc Sample ID Client ID: Prep Date: Analyte Aluminum Antimony Arsenic Barium Beryllium Cadmium Chromium Copper	LCS-23359 LCSW 1/22/2016	ND Samp Bate Analysis Result 0.46 0.48 0.48 0.48 0.47 0.49 0.46 0.47 0.47	0.020 Type: LC ch ID: 23: Date: 1/ PQL 0.020 0.020 0.020 0.0020 0.0020 0.0020 0.0020 0.0060 0.0060	S 359 25/2016 SPK value 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000	Tes F SPK Ref Val 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	tCode: E l RunNo: 3 %REC 91.9 95.5 96.1 94.0 99.0 92.5 93.7 94.5	PA 6010B: ⁻ 1646 68317 LowLimit 80 80 80 80 80 80 80 80 80 80 80 80	Total Metals Units: mg/L HighLimit 120 120 120 120 120 120 120 120 120	%RPD	RPDLimit	Qual
Zinc Sample ID Client ID: Prep Date: Analyte Aluminum Antimony Arsenic Barium Beryllium Cadmium Chromium Copper Iron	LCS-23359 LCSW 1/22/2016	ND Samp Bate Analysis Result 0.46 0.48 0.48 0.47 0.49 0.46 0.47 0.47 0.47 0.47	0.020 Type: LC ch ID: 23: Date: 1/ PQL 0.020 0.020 0.020 0.020 0.0020 0.0020 0.0020 0.0060 0.0060 0.050	S 359 25/2016 SPK value 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000	Tes F SPK Ref Val 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	tCode: E l RunNo: 3 %REC 91.9 95.5 96.1 94.0 99.0 92.5 93.7 94.5 95.5	PA 6010B: 1646 68317 LowLimit 80 80 80 80 80 80 80 80 80 80	Total Metals Units: mg/L HighLimit 120 120 120 120 120 120 120 120 120 120	%RPD	RPDLimit	Qual
Zinc Sample ID Client ID: Prep Date: Analyte Aluminum Antimony Arsenic Barium Barium Beryllium Cadmium Chromium Copper Iron Lead	LCS-23359 LCSW 1/22/2016	ND Samp Bate Analysis Result 0.46 0.48 0.48 0.47 0.49 0.46 0.47 0.47 0.47 0.48 0.47	0.020 Type: LC ch ID: 23: Date: 1/ PQL 0.020 0.020 0.020 0.020 0.020 0.0030 0.0020 0.0060 0.0060 0.050 0.050 0.050	S 359 25/2016 SPK value 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000	Tes F S SPK Ref Val 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	tCode: E l RunNo: 3 %REC 91.9 95.5 96.1 94.0 99.0 92.5 93.7 94.5 95.5 92.9	PA 6010B: 1646 68317 LowLimit 80 80 80 80 80 80 80 80 80 80	Total Metals Units: mg/L HighLimit 120 120 120 120 120 120 120 120 120 120	%RPD	RPDLimit	Qual
Zinc Sample ID Client ID: Prep Date: Analyte Aluminum Antimony Arsenic Barium Barium Barium Cadmium Chromium Copper Iron Lead Manganese	LCS-23359 LCSW 1/22/2016	ND Samp Bate Analysis Result 0.46 0.48 0.48 0.47 0.49 0.46 0.47 0.47 0.48 0.46 0.47	0.020 Type: LC ch ID: 23: Date: 1/ PQL 0.020 0.020 0.020 0.020 0.0020 0.0020 0.0060 0.0060 0.0050 0.0050 0.0050 0.0020	S 359 25/2016 SPK value 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000	Tes F SPK Ref Val 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	tCode: E l RunNo: 3 %REC 91.9 95.5 96.1 94.0 99.0 92.5 93.7 94.5 95.5 92.9 93.5	PA 6010B: 1646 68317 LowLimit 80 80 80 80 80 80 80 80 80 80	Total Metals Units: mg/L HighLimit 120 120 120 120 120 120 120 120 120 120	%RPD	RPDLimit	Qual
Zinc Sample ID Client ID: Prep Date: Analyte Aluminum Antimony Arsenic Barium Barium Barium Cadmium Cadmium Chromium Copper Iron Lead Manganese Nickel	LCS-23359 LCSW 1/22/2016	ND Samp Bate Analysis Result 0.46 0.48 0.48 0.47 0.49 0.46 0.47 0.47 0.47 0.48 0.46 0.47 0.48	0.020 Type: LC ch ID: 23: Date: 1/ PQL 0.020 0.020 0.020 0.020 0.0020 0.0020 0.0060 0.0060 0.0050 0.0050 0.0050 0.0020 0.0020 0.0020 0.0020 0.0020 0.0020 0.0020	S 359 25/2016 SPK value 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000	Tes F S SPK Ref Val 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	tCode: E l RunNo: 3 SeqNo: 9 %REC 91.9 95.5 96.1 94.0 99.0 92.5 93.7 94.5 95.5 92.9 93.5 92.2	PA 6010B: 1646 68317 LowLimit 80 80 80 80 80 80 80 80 80 80	Total Metals Units: mg/L HighLimit 120 120 120 120 120 120 120 120 120 120	%RPD	RPDLimit	Qual
Zinc Sample ID Client ID: Prep Date: Analyte Aluminum Antimony Arsenic Barium Barium Baryllium Cadmium Chromium Copper Iron Lead Manganese Nickel Potassium	LCS-23359 LCSW 1/22/2016	ND Samp Bate Analysis Result 0.46 0.48 0.48 0.47 0.49 0.46 0.47 0.47 0.47 0.47 0.46 0.47 0.46 44	0.020 Type: LC ch ID: 23: Date: 1/ PQL 0.020 0.020 0.020 0.0030 0.0020 0.0020 0.0060 0.0060 0.0050 0.0050 0.0050 0.0050 0.0020 0.0050 0.0050 0.0050 0.0050 0.0050 0.0050 0.0050 0.0050 0.0050 0.0050 0.0050 0.0050 0.0050 0.0050 0.0020 0.0050 0.0020 0.0050 0.0020 0.0050 0.0020 0.0050 0.0020 0.0050 0.0020 0.0050 0.0020 0.0050 0.0020 0.0050 0.0020 0.0050 0.0050 0.0020 0.0050 0.0020 0.0050 0.0010 0.0050 0.0010 0.0050 0.0010 0.0000 0.0010 0.0000 0.0000 0.0000 0.0000 0.0000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.000000 0.00000000	S 359 25/2016 SPK value 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000	Tes R SPK Ref Val 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	tCode: E l RunNo: 3 %REC 91.9 95.5 96.1 94.0 99.0 92.5 93.7 94.5 95.5 92.9 93.5 92.9 93.5 92.2 88.6	PA 6010B: 1646 68317 LowLimit 80 80 80 80 80 80 80 80 80 80	Total Metals Units: mg/L HighLimit 120 120 120 120 120 120 120 120 120 120	%RPD	RPDLimit	Qual
Zinc Sample ID Client ID: Prep Date: Analyte Aluminum Antimony Arsenic Barium Beryllium Cadmium Chromium Copper Iron Lead Manganese Nickel Potassium Selenium	LCS-23359 LCSW 1/22/2016	ND Samp Bate Analysis Result 0.46 0.48 0.48 0.47 0.49 0.46 0.47 0.47 0.47 0.47 0.46 0.47 0.46 0.47 0.46 0.47	0.020 Type: LC ch ID: 23: Date: 1/ PQL 0.020 0.020 0.020 0.0020 0.0020 0.0020 0.0060 0.0060 0.0050 0.0050 0.0050 0.0020 0.0050 0.0020 0.0050 0.0050 0.0020 0.0050 0.0020 0.0050 0.0050 0.0050 0.0050 0.0050 0.0050 0.0050 0.0050 0.0050 0.0050 0.0020 0.005	S 359 25/2016 SPK value 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000	Tes F SPK Ref Val 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	tCode: E l RunNo: 3 %REC 91.9 95.5 96.1 94.0 99.0 92.5 93.7 94.5 95.5 92.9 93.5 92.2 88.6 95.8	PA 6010B: 1646 68317 LowLimit 80 80 80 80 80 80 80 80 80 80	Total Metals Units: mg/L HighLimit 120 120 120 120 120 120 120 120 120 120	%RPD	RPDLimit	Qual

Qualifiers:

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

Page 21 of 27

QC SUMMARY REPORT Hall Environmen

Result

ND

PQL

1.0

SPK value SPK Ref Val

nmenta	al Analy	ysis L	Laborat	ory, Inc.						15-Feb-16
Navajo R Quarterly	Refining Co y WDW-1,	mpany 2, & 3	Inj Well							
359	SampT	ype: LC	S	Tes	tCode: El	PA 6010B: "	Total Metals			
	Batch	1D: 23	359	F	1646					
016	Analysis D	ate: 1/	25/2016	S	SeqNo: 96	68317	Units: mg/L			
	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
	0.47	0.050	0.5000	0	93.8	80	120			
	0.49	0.050	0.5000	0	98.1	80	120			
	0.48	0.020	0.5000	0	95.2	80	120			
59	SampT	ype: ME	BLK	Tes	tCode: El	PA 6010B: "	Total Metals			
	Batch ID: 23359			RunNo: 31648						
016	Analysis D	ate: 1/	25/2016	S	eqNo: 9	68397	Units: mg/L			

LowLimit

HighLimit

%RPD

RPDLimit

Page 22 of 27

Qual

%REC

Magnesium Sodium	ND 1.0 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	D RPDLimit Qual	1
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					
7 11 101) 10	Result PQL SPK value	SPK Ref Val %REC LowLimit	HighLimit %RPD	RPDLimit Qual	1
Cobalt	ND 0.0060	SPK Ref Val %REC LowLimit	HighLimit %RPD	D RPDLimit Qual	
Cobalt Sample ID LCS-23359	ND 0.0060 SampType: LCS	SPK Ref Val %REC LowLimit TestCode: EPA 6010B:	HighLimit %RPD	D RPDLimit Qual	
Cobalt Sample ID LCS-23359 Client ID: LCSW	Result PQL SPK Value ND 0.0060 SampType: LCS Batch ID: 23359	SPK Ref Val %REC LowLimit TestCode: EPA 6010B: RunNo: 31737	HighLimit %RPD	D RPDLimit Qual	. <u></u>
Cobalt Sample ID LCS-23359 Client ID: LCSW Prep Date: 1/22/2016	Result PQL SPK Value ND 0.0060 SampType: LCS Batch ID: 23359 Analysis Date: 1/28/2016	SPK Ref Val %REC LowLimit TestCode: EPA 6010B: RunNo: 31737 SeqNo: 971327	HighLimit %RPD Total Metals Units: mg/L	D RPDLimit Qual	I
Cobalt Sample ID LCS-23359 Client ID: LCSW Prep Date: 1/22/2016 Analyte Image: Comparison of the second	Result PQL SPK Value ND 0.0060 SampType: LCS Batch ID: 23359 Analysis Date: 1/28/2016 Result PQL	SPK Ref Val %REC LowLimit TestCode: EPA 6010B: RunNo: 31737 SeqNo: 971327 SPK Ref Val %REC LowLimit	HighLimit %RPD Total Metals Units: mg/L HighLimit %RPD	D RPDLimit Qual	

Qualifiers:

Client:

Project:

Client ID:

Prep Date: Analyte Thallium Vanadium Zinc

Client ID:

Prep Date:

Analyte

Calcium

Sample ID LCS-23359 LCSW

Sample ID MB-23359

PBW

1/22/2016

1/22/2016

- Value exceeds Maximum Contaminant Level. *
- Sample Diluted Due to Matrix D
- Н Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- RPD outside accepted recovery limits R
- S % Recovery outside of range due to dilution or matrix
- В Analyte detected in the associated Method Blank
- Е Value above quantitation range
- J Analyte detected below quantitation limits
- Р Sample pH Not In Range
- Reporting Detection Limit RL
- W Sample container temperature is out of limit as specified

WO#: 1601864

WO#:	1601864
	15-Feb-16

Client: Project:	Navajo R Quarterly	efining Co WDW-1,	mpany 2, & 3	Inj Well							
Sample ID MB Client ID: PB	-R32136 W	SampT Batch Analysis D	ype: MI ID: R3 ate: 2	BLK 32136 /4/2016	Tes F	tCode: C' RunNo: 3 SeaNo: 9	YANIDE, Re 2136 82430	eactive Units: ma/L			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cyanide, Reactive		ND	1.00								
Sample ID LCS	S-R32136	SampT	ype: LC	s	Tes	tCode: C	YANIDE, Re	eactive			
Client ID: LCS	SW	Batch	ID: R3	32136	F	RunNo: 3	2136				
Prep Date:		Analysis D	ate: 2/	4/2016	S	SeqNo: 9	82431	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			

- * 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
- Page 23 of 27

WO#:	1601864
	15-Feb-16

Client:	Navajo I	Refining Co	mpany								
Project:	Quarterl	y WDW-1,	2, & 3	Inj Well							
Sample ID	MB-R32136	SampTy	/pe: M I	BLK	Tes	tCode: SI	JLFIDE, Re	active			
Client ID:	PBW	Batch	ID: R3	32136	F	RunNo: 3 2	2136				
Prep Date:		Analysis Da	ate: 1/	/29/2016	S	SeqNo: 9	82433	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	SampTy	pe: LC	s	Tes	tCode: Sl	JLFIDE, Re	active			
Client ID:	LCSW	Batch	ID: R3	32136	F	RunNo: 3	2136				
Prep Date:		Analysis Da	ate: 1	/29/2016	5	SeqNo: 9	82434	Units: mg/L			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Reactive Sulfide	1	0.18		0.2000	0	90.0	80	120			

- * 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
- Page 24 of 27

WO#:	1601864
	15-Feb-16

Client: Project:	Navajo Refining Comp Quarterly WDW-1, 2, 4	any & 3 Inj Well						
Sample ID mb-1	SampType	MBLK	Test	tCode: SM2320B: A	Ikalinity			
Client ID: PBW	Batch ID:	R31664	R	RunNo: 31664				
Prep Date:	Analysis Date:	1/25/2016	S	GeqNo: 968939	Units: mg/L C	aCO3		
Analyte	Result P	QL SPK value	SPK Ref Val	%REC LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCo	D3) ND 20	0.00						
Sample ID Ics-1	SampType	LCS	Test	tCode: SM2320B: A	Ikalinity			
Client ID: LCSW	Batch ID:	R31664	R	RunNo: 31664				
Prep Date:	Analysis Date:	1/25/2016	S	GeqNo: 968940	Units: mg/L C	aCO3		
Analyte	Result P	QL SPK value	SPK Ref Val	%REC LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCo	03) 75.44 20	.00 80.00	0	94.3 90	110			

- * Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- Н 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
- В Analyte detected in the associated Method Blank
- Е Value above quantitation range
- J Analyte detected below quantitation limits
- Sample pH Not In Range Р
- RL Reporting Detection Limit
- W Sample container temperature is out of limit as specified
- Page 25 of 27

Client:	Navajo Refi	ning Compa	ny							
Project:	Quarterly W	DW-1, 2, &	3 Inj Well							
Sample ID	1601864-001ADUP	SampType:	DUP	Tes	tCode: Sp	pecific Grav	vity			
Client ID:	WDW-1,2,&3 Effluen	Batch ID:	R31723	F	RunNo: 3	1723				
Prep Date:	An	alysis Date:	1/27/2016	5	SeqNo: 9	70796	Units:			
Analyte	F	Result PG	L SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Specific Gravity	,	1.004	0					0.179	20	

- * 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

Page 26 of 27

WO#: 1601864 15-Feb-16

WO#:	1601864
	15-Feb-16

Client:	Navajo I	Refining Co	mpany										
Project:	Quarterl	y WDW-1,	2, & 3	Inj Well									
Sample ID	MB-23428	SampT	ype: ME	BLK	Tes	tCode: SI	M2540C MC	D: Total Diss	olved So	lids			
Client ID:	PBW	Batch	ID: 23	428	R	RunNo: 31755							
Prep Date:	1/27/2016	Analysis D	ate: 1/	28/2016	S	SeqNo: 9	71754	Units: mg/L					
Analyte Total Dissolved	d Solids	Result ND	PQL 20.0	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual		
Sample ID	LCS-23428	SampT	ype: LC	s	Tes	tCode: SI	M2540C MC	D: Total Diss	olved So	lids			
Client ID:	LCSW	Batch	ID: 23	428	R	aunNo: 3	1755						
Prep Date:	1/27/2016	Analysis D	ate: 1/	28/2016	S	eqNo: 9	71755	Units: mg/L					
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual		
Total Dissolved	d Solids	1020	20.0	1000	0	102	80	120					
Sample ID	1601864-001AMS	s SampT	уре: М	6	Tes	tCode: SI	M2540C MC	D: Total Diss	olved So	lids			
Client ID:	WDW-1,2,&3 Effl	uen Batch	ID: 23	428	R	unNo: 3	1755						
Prep Date:	1/27/2016	Analysis D	ate: 1/	28/2016	S	SeqNo: 9	71765	Units: mg/L					
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual		
Total Dissolved	d Solids	5800	40.0	2000	3784	101	80	120			D		
Sample ID	1601864-001AMS	D SampT	уре: М	SD	Tes	tCode: SI	M2540C MC	D: Total Diss	olved So	lids			
Client ID:	WDW-1,2,&3 Effl	uen Batch	ID: 23	428	R	anNo: 3	1755						
Prep Date:	1/27/2016	Analysis D	ate: 1/	28/2016	S	SeqNo: 9	71766	Units: mg/L					
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual		
Total Dissolved	d Solids	5820	40.0	2000	3784	102	80	120	0.379	5	D		

- * 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

Page 27 of 27

ENVIRONMENTAL ANALYSIS LABORATORY	4901 Haw Albuquerque, N TEL: 505-345-3975 FAX: 505-3 Website: www.hallenvironme	kins NE M 87109 Sam 45-4107 ntal.com	ple Log-In Chec	k List
Client Name: NAVAJO REFINING CO	Nork Order Number: 1601864		RcptNo: 1	
Received by/date: LM	01/22/10			
Logged By: Michelle Garcia 1/2	2/2016 9:40:00 AM	Minul Go	nuin	
Completed By: Michelle Garcia 1/2	2/2016 11:23:27 AM	Minul Go	nue	
Reviewed By: 01	27/14			
Chain of Custody	1			
1. Custody seals intact on sample bottles?	Yes 🛄	No 🗌	Not Present V	
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 🗌		
5. Were all samples received at a temperature of	>0° C to 6.0°C Yes 🔽	No 🗌		
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 p	reserved? 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 🗸	# of preserved	
12 Does panetwork match bottle labels?	Yes 🗸	No 🗌	for pH:	2
(Note discrepancies on chain of custody)			(2) or 13	unless noted)
13. Are matrices correctly identified on Chain of Cu	stody? Yes 🗹	No 🗌	Adjusted? No	
14. Is it clear what analyses were requested?	Yes 🗹	No 🗌	marked by boo	
 Were all holding times able to be met? (If no, notify customer for authorization.) 	Yes 🗹	No 🗔	Checked by: 1110	
Special Handling (IT applicable)				
16. Was client notified of all discrepancies with this	order? Yes	NO L	NA 🗹	
Person Notified:	Date			
By Wham:	Via: 📋 eMail	Phone E 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 1.2 Good Yes			1	

O	hain	-of-Cu	stody Record	I URN-Around	ilme.			HALLE	INVIROR	MENTAL	
Client Nav	vajo Refi	ning Co.		□ Standar	D Rush			ANALY	SIS LAB	ORATORY	
				Project Nam	aj			www.hai	lenvironmental.com		
Mailing Ad	Idress: P	O. Box 1	59 Artesia,	Quarterly W	DW-1, 2, & 3 l	nj Well	4901 Ha	vkins NE - Alb	uquerque, NM 8710	6	
NM 88211	-0159			Project #: P.	0.#167796		Tel. 505	-345-3975 F	ax 505-345-4107		-
Phone #: E	575-748-	3311						A	alysis Request		
email or Fa	ax#: 575	-746-545		Project Man	ager:		oD C Cl'	(,s	he		
QA/QC Pax	skage: rd		Level 4 (Full Validation)	Micki Schult	z / Scott Dento	n / Mike Holder	oq 853 Ca,) q 85600 EP/40 3' CO3'	(soc 6010, stem tal	1311 3 CER F 3 136.3		
D Other				Sampler:	Elizabeth Sals	berry	VO(Br, UO VO(Metho	q lis thd 26	hod / /4(
D EDD (T	(ype)			On Ice:	Z Yes	O No	y,H(co al., bMé list '	che 6 M part	(Ino Veti		
				Sample Teh	iperature: /	2	Hq Hq d uc b9 b9 b9 b9 b9 b9	ER	isk I 84		
Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL NO.	Specific Gr SO4, TDS, (see attach (see attach (see attach	(see attach Metals/SW 7470 (see	261/ SW-8 TCLP Мек Са, К, Мg,		
1/21/16	7:35	Liquid	WDW-1, 2, & 3 Effluent	e S	Neat/H2SO4	- 001	×		×		
1/21/16	7:35	Liquid	WDW-1, 2, & 3 Effluent	٣	HN03	190-		×	×		
1/21/16	7:35	Liquid	WDW-1, 2, & 3 Effluent	3	HCL	100-	×				_
1/21/16	7:35	Liquid	WDW-1, 2, & 3 Effluent	2	Neat	100-	×				_
1/21/16	7:35	Liquid	WDW-1, 2, & 3 Effluent	2	Neat	-001		×			-
1/21/16	7:35	Liquid	Trip Blank	2	Neat	- 002	×				-
1/21/16	7:35	Liquid	Temperature Blank	~	Neat			-			-
								-			-
											-
Date 1/21/2016	Time:	Relinquis	albert Soleth Solstern	Received by:	A	91 72 16 04	Remarks: Send re	sults to Scott De eras.	anton, Mike Holder, I	Micki Schultz, Robert Combs	
Date:	Time:	Relinqui	hed by:	Received by:	+	Date Time					
	If necas	sery, samples	submitted to Hall Environmental may be subor	ontracted to other	accredited laboratorie	s. This serves as notice of thi	a possibility. Any sub-contract	ted data will be clearly	notated on the analytical rep	ot	

YFRONTIER BelyFronter Companies	Type of Sampler Directly to sample jars	P-856 sample point (third from east) P-857 sample point (fourth from east)		Analysis and/o Method Requested	Specific Gravity,HCO3, CO3, CI, SO4, TDS, pH, cond, FI, Cation/anion bal., Br, Eh/40 CFR 136.3	VOCs/SW-845 Method 8260C (see attached list 'VOCs')	SVOCs/SWV-546 Method 8270D (see attached list "SVOCs")	R,C,I/40 CFR part 261	Metals/SW-845 Mithor 5010, 7470 (see attached list 'Metals')	Ca, K, Mg, Na/40 CFR 136.3	TCLP Metals, cnly /40 CFR Part 261/ SW- 846 Method 1311				Storage Method	Refrigerated Other Other Ice Ice	Other
HOLI		st) 🛛 🗍	The second s	04 Other											Condition. Clear		
		st from ea	Contraction of the	NaHSC											11.5 mph		
Vell Imple		nple point (fire nple point (se	ives	Na25203											Wind Speed		
on V ly Sa etails chme	Domposite Composite Composite e Intervals	P-849 sar P-854 sar	Preservat	NaOH											ction NW		
njecti larter De Attac	Veighted (Weighted (11000	H2SO4	×										6 Wind dire		
-g	Flow			HNOG		×									nidity 70%		
311		on wells.	SUICE	HCL		-	×		_				-		4 °F Hur		
, Yunofano,		to injecti	SALE NO	Neat	×			×	×	×	×				Temp. 37		
vs.jo. Refining (E. Main tesia, NM 88210 el) 575.746.5451 bx) 575.746.5451	Inj Weit LLC 	r effluent pumps		# of Containers	n	~	e	2	5	2	+				1/21/2016		
ARACE	v-1.2. & 3 Orthy beth Salsberry jo Refining Co 2016 @ 7.40 a 2016 @ 7.40 a	Waste wate		Material											vations, Etc)	Field pH 7.45	
S. P.	Name WDW Name Elizat Illation Nava 1 Time 1/210	ple Location.		Size											ather, Observ	70	
	Project Samplers AT Start Date and End Date and	Outfall / Sam		Container	1	21	6)	4	ş	6	7	8	01	10	Field Data (Wea Date and Time	Field Temp. 40	



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

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 <u>www.hallenvironmental.com</u> 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,

andis

Andy Freeman Laboratory Manager 4901 Hawkins NE Albuquerque, NM 87109

Hall Environmental Analysis Laboratory, Inc.

Quarterly WDW-1, 2, &3 Inj Well

CLIENT: Navajo Refining Company

1607300-001

Project:

Lab ID:

Client Sample ID: WDW-1,2,&3 Effluent Collection Date: 7/5/2016 8:30:00 AM Received Date: 7/7/2016 10:15:00 AM

Analyses	Result	PQL Qu	al 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 I	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 METAL	S				Analyst: ELS
Arsenic	ND	5.0	ma/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

Matrix: AQUEOUS

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	В	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	Е	Value above quantitation range
	Н	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits Page 1 of 29
	ND	Not Detected at the Reporting Limit	Р	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 CompanyProject:Quarterly WDW-1, 2, &3 Inj WellLab ID:1607300-001Matrix: AQUEOUS

Client Sample ID: WDW-1,2,&3 Effluent Collection Date: 7/5/2016 8:30:00 AM 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				

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		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 Page 2 of 29
- 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 WDW-1, 2, &3 Inj Well

Lab ID: 160

 Information
 Matrix:
 AQUEOUS

Client Sample ID: WDW-1,2,&3 Effluent Collection Date: 7/5/2016 8:30:00 AM Received Date: 7/7/2016 10:15:00 AM

Analyses	Result	PQL Qu	al 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

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	В	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	Е	Value above quantitation range
	Н	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits Page 3 of 29
	ND	Not Detected at the Reporting Limit	Р	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 WDW-1, 2, &3 Inj

Project:Quarterly WDW-1, 2, &3 Inj WellLab ID:1607300-001Matrix: AQUEOUS

Client Sample ID: WDW-1,2,&3 Effluent Collection Date: 7/5/2016 8:30:00 AM Received Date: 7/7/2016 10:15:00 AM

Analyses	Result	PQL Qu	al 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
lodomethane	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

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 Page 4 of 29

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 WDW-1, 2, &3 Inj Well

1607300-001

Lab ID:

Client Sample ID: WDW-1,2,&3 Effluent Collection Date: 7/5/2016 8:30:00 AM Received Date: 7/7/2016 10:15:00 AM

Analyses	Result	PQL Qua	d 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

Matrix: AQUEOUS

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	В	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	Е	Value above quantitation range
	Н	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits Page 5 of 29
	ND	Not Detected at the Reporting Limit	Р	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 CompanyProject: Quarterly WDW-1, 2, &3 Inj Well

1607300-001

Lab ID:

Client Sample ID: WDW-1,2,&3 Effluent Collection Date: 7/5/2016 8:30:00 AM Received Date: 7/7/2016 10:15:00 AM

Analyses	Result	PQL Qu	al 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
рН	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

Matrix: AQUEOUS

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	В	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	Е	Value above quantitation range
	Н	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits Page 6 of 29
	ND	Not Detected at the Reporting Limit	Р	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 CompanyProject:Quarterly WDW-1, 2, &3 Inj WellLab ID:1607300-001Matrix: AQUEOUS

Client Sample ID: WDW-1,2,&3 Effluent Collection Date: 7/5/2016 8:30:00 AM Received Date: 7/7/2016 10:15:00 AM

Analyses	Result	PQL Q	ual	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
рН	7.61	1.68	Н	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 SC	LIDS					Analyst: KS
Total Dissolved Solids	3160	20.0	*	mg/L	1	7/8/2016 4:07:00 PM

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	В	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	Е	Value above quantitation range
	Н	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits Page 7 of 29
	ND	Not Detected at the Reporting Limit	Р	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

Date Reported: 8/1/2016

Hall Environmental Analysis Laboratory, Inc.

Client Sample ID: TRIP BLANK Collection Date:

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

 Lab ID:
 1607300-002
 M

CLIENT: Navajo Refining Company

Matrix: TRIP BLANK Received Date: 7/7/2016 10:15:00 AM

Analyses	Result	PQL Qu	al 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

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	В	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	Е	Value above quantitation range
	Н	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits Page 8 of 29
	ND	Not Detected at the Reporting Limit	Р	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

Date Reported: 8/1/2016

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining CompanyProject:Quarterly WDW-1, 2, &3 Inj WellLab ID:1607300-002M

Client Sample ID: TRIP BLANK Collection Date:

Matrix: TRIP BLANK Received Date: 7/7/2016 10:15:00 AM

Analyses	Result	PQL Qu	al 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

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	В	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	Е	Value above quantitation range
	Н	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits Page 9 of 29
	ND	Not Detected at the Reporting Limit	Р	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

Date Reported: 8/1/2016

Hall Environmental Analysis Laboratory, Inc.

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

1607300-002

Lab ID:

Collection Date:

Client Sample ID: TRIP BLANK

Matrix: TRIP BLANK Received Date: 7/7/2016 10:15:00 AM

Analyses	Result	PQL Qu	al 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
lodomethane	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

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	В	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	Е	Value above quantitation range
	Н	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limit Page 10 of 29
	ND	Not Detected at the Reporting Limit	Р	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 Er	vironment	al Anal	ysis I	Laborat	ory, Inc.					WO#:	1607300 01-Aug-16
Client: Project:	Navajo I Quarterl	Refining Company y WDW-1, 2, &3 Inj Well									
Sample ID	MB	Samp	Гуре: МЕ	BLK	Tes	tCode: El	PA Method	300.0: Anion	S		
Client ID:	PBW	Batc	h ID: R3	5519	F	RunNo: 3	5519				
Prep Date:		Analysis [Date: 7/	7/2016	S	SeqNo: 1	099779	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, C	orthophosphate (As P	ND	0.50								
Nitrate+Nitrite	as N	ND	0.20								
Sample ID	LCS	Samp	Гуре: LC	s	TestCode: EPA Method 300.0: Anions						
Client ID:	LCSW	Batc	h ID: R3	5519	RunNo: 35519						
Prep Date:		Analysis [Date: 7/	7/2016	S	SeqNo: 1	099780	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, C	Prthophosphate (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	Samp	Гуре: МЕ	BLK	TestCode: EPA Method 300.0: Anions						
Client ID:	PBW	Batc	h ID: A3	5552	F	RunNo: 3	5552				
Prep Date:		Analysis [Date: 7/	8/2016	S	SeqNo: 1	100904	Units: mg/L			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate		ND	0.50								
Sample ID	LCS	Samp	Гуре: LC	s	Tes	tCode: El	PA Method	300.0: Anion	s		
Client ID:	LCSW	Batc	h ID: A3	5552	F	RunNo: 3	5552				
Prep Date:		Analysis [Date: 7/	8/2016	S	SeqNo: 1	100905	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			

* Value exceeds Maximum Contaminant Level.

QC SUMMARY REPORT

- 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
- ation range
 - Page 11 of 29

QC SUMMARY REPORT Hall Environmental Analysis Laboratory, Inc.

WO#: **1607300**

Client: Navaj	o Refining Co	ompany											
Project: Quarte	erly WDW-1,	2, &3	Inj Well										
Sample ID MB-R36111	R36111 SampType: MBLK				TestCode: EPA Method 8260B: VOLATILES								
Client ID: PBW	Batch	Batch ID: R36111			RunNo: 36111								
Prep Date:	Analysis D	Date: 7	/19/2016	:	SeqNo: 1	118577	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											
Fthylbenzene	ND	0.50											
1.2-Dichloroethane (FDC)	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	0.00											
Chlorobenzene		0.50											
Chloroothano		0.50											
Chloroform		0.50											
Chloromothano		0.50											
		0.50											
cis 1 2 Dichlarantanana		0.50											
1.2 Dibromo 2 chloropropano		0.50											
Dibromochloromothono		0.50											
Dibromomethene		0.50											
		0.50											
1,2-Dichlorobenzene	ND	0.50											
1,4-DICHIOLODENZENE		0.50											
Dichlorodifiuoromethane	ND	0.50											
1, 1-Dichloroethane	ND	0.50											
I, I-Dichloroethene	ND	0.50											
I,2-Dichloropropane	ND	0.50											
1,3-Dichloropropane	ND	0.50											
2,2-Dichloropropane	ND	0.50											

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

Page 12 of 29
WO#: 1607300 6

01-Aug-1

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

Sample ID MB-R36111	B-R36111 SampType: MBLK				TestCode: EPA Method 8260B: VOLATILES					
Client ID: PBW	Batch	1 ID: R3	6111	RunNo: 36111						
Prep Date:	Analysis D	ate: 7/	19/2016	S	SeqNo: 1	118577	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								
lodomethane	ND	0.50								
trans-1,4-Dichloro-2-butene	ND	0.50								
Vinyl acetate	ND	0.50								
Sample ID LCS-R36111	SampT	ype: LC	:S	Test	tCode: EF	PA Method	8260B: VOL	ATILES		
Client ID: LCSW	Batch	1 ID: R3	6111	R	lunNo: 3	6111				
Prep Date:	Analysis D	ate: 7/	19/2016	S	SeqNo: 1 [.]	118578	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			

Qualifiers:

o-Xylene

- * Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- Н Holding times for preparation or analysis exceeded

11

0

10.00

- ND Not Detected at the Reporting Limit
- R RPD outside accepted recovery limits
- S % Recovery outside of range due to dilution or matrix
- В Analyte detected in the associated Method Blank
- Е Value above quantitation range

107

- J Analyte detected below quantitation limits
- Sample pH Not In Range Р

0

- RL Reporting Detection Limit
- W Sample container temperature is out of limit as specified

80

120

Page 13 of 29

WO#: 1607300

Client:	Navajo Refining C	Company	7									
Project:	Quarterly WDW-1	, 2, &3	Inj Well									
Sample ID MB-R36	S111 Samp	Туре: М	BLK	Tes								
Client ID: PBW	Bate	ch ID: R	36111	RunNo: 36111								
Prep Date:	Analysis	Date: 7	/15/2016	S	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	I 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-methylpheno	ND	5.0										
4-Bromophenyl phenyl eth	her ND	5.0										
4-Chloro-3-methylphenol	ND	5.0										
4-Chloroaniline	ND	5.0										
4-Chlorophenyl phenyl eth	her 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(a,h,i)pervlene	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)metha	ine ND	5.10										
Bis(2-chloroethyl)ether		5.0										
Ris(2-chlornisonronyl)ethe		5.0										
Ris(2_othylbevyl)nhtholato		5.0										
Butyl honzyl obtalato	, חוא	5.0										
Carbazolo	םא חוא	5.0										
CalDazole	ND	5.U										

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

Page 14 of 29

QC SUMMARY REPORT	
Hall Environmental Analysis Laboratory, Inc	C.

Navajo Refining Company

WO#: 1607300 01-Aug-16

Project:	Quarterly WD	W-1, 2, 8	&3 II	nj Well							
Sample ID MB-R36	111 S	ampType	: MBI	LK	Test						
Client ID: PBW		Batch ID:	R36	111	R	unNo: 36	6111				
Prep Date:	Anal	ysis Date:	7/1	5/2016	S	eqNo: 11	118582	Units: µg/L			
Analyte	Re	sult P	QL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chrysene		ND ().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								
Hexachlorocyclopentadien	e	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-Tetrachlorobenzen	e	ND	5.0								

Sample ID LCS-R36111	TestCode: EPA 8270C: Semivolatiles/Mod									
Client ID: LCSW	Batch	ID: R3	6111	R	unNo: 30	6111				
Prep Date:	Analysis D	ate: 7/	15/2016	S	eqNo: 1	118583	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:

Client:

- * 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

Page 15 of 29

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

Sample ID LCS-R36111	SampT	ype: LC	S	TestCode: EPA 8270C: Semivolatiles/Mod						
Client ID: LCSW	Batch	ID: R3	6111	R	lunNo: 3	6111				
Prep Date:	Analysis D	ate: 7/	15/2016	S	SeqNo: 1	118583	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.
- 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

Page 16 of 29

4700

1.0

Qual

20

0.603

Client: Project:	Navajo Refining Quarterly WDW	; Company 7-1, 2, &3 Inj Well			
Sample ID	1607300-001a dup Sar	трТуре: dup	TestCode: SM2510B: S	pecific Conductance	
Client ID:	WDW-1,2,&3 Effluen B	atch ID: R35550	RunNo: 35550		
Prep Date:	Analys	is Date: 7/8/2016	SeqNo: 1100752	Units: µmhos/cm	
Analyte	Resu	It PQL SPK value	SPK Ref Val %REC LowLimit	HighLimit %RPD	RPDLimit

Qualifiers:

Conductivity

- * 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

Page 17 of 29

WO#:	1607300
	01-Aug-16

Client: Project:	Nava Quar	jo Refining Company terly WDW-1, 2, &3	Inj Well							
Sample ID	ple ID MB-26407 SampType: MBLK				tCode: EF	PA Method	7470: Mercur	у		
Client ID:	PBW	Batch ID: 264	407	R	lunNo: 35	5726				
Prep Date:	7/14/2016	Analysis Date: 7/	15/2016	S	SeqNo: 11	05600	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: LC	S	Test	tCode: EF	PA Method	7470: Mercur	у		
Client ID:	LCSW	Batch ID: 264	407	R	unNo: 35	5726				
Prep Date:	7/14/2016	Analysis Date: 7/	15/2016	S	SeqNo: 11	105601	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.
- D Sample Diluted Due to Matrix
- Н 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
- В Analyte detected in the associated Method Blank
- Е Value above quantitation range
- J Analyte detected below quantitation limits
- Р Sample pH Not In Range
- RL Reporting Detection Limit
- Sample container temperature is out of limit as specified W
- Page 18 of 29

WO#:	1607300
	01.Aug.16

Client: Project:	Nava Quar	jo Refining Compa terly WDW-1, 2, 8	any z3 Inj Well							
Sample ID	MB-26510	SampType:	MBLK	Tes	tCode: MERC	CURY, T	CLP			
Client ID:	PBW	Batch ID:	26510	F	RunNo: 35874	4				
Prep Date:	7/20/2016	Analysis Date:	7/21/2016	S	SeqNo: 11104	461	Units: mg/L			
Analyte		Result PC	L SPK value	SPK Ref Val	%REC Lo	owLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury		ND 0.0)20							
Sample ID	LCS-26510	SampType:	LCS	Tes	tCode: MERC	CURY, T	CLP			
Client ID:	LCSW	Batch ID:	26510	F	RunNo: 3587 4	4				
Prep Date:	7/20/2016	Analysis Date:	7/21/2016	5	SeqNo: 11104	462	Units: mg/L			
Analyte		Result PC	L SPK value	SPK Ref Val	%REC Lo	owLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury		ND 0.0	0.005000	0	104	80	120			

- * Value exceeds Maximum Contaminant Level.
- Sample Diluted Due to Matrix D
- Н 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
- В Analyte detected in the associated Method Blank
- Е Value above quantitation range
- J Analyte detected below quantitation limits
- Р Sample pH Not In Range
- RL Reporting Detection Limit
- W Sample container temperature is out of limit as specified
- Page 19 of 29

QC SUN	QC SUMMARY REPORT						
Hall Env	Hall Environmental Analysis Laboratory, Inc.						
Client:	Client: Navajo Refining Company						
Project:	Project: Ouarterly WDW-1 2 & 3 Ini Well						
Sample ID M	B-26475	SampType: MBLK	TestCode: EPA Method 6010B: TCLP Metals				

_

Client ID: PBW	Batch	n ID: 26	475	R	anNo: 3	5810				
Prep Date: 7/19/2016	Analysis D	ate: 7/	20/2016	S	SeqNo: 1	108224	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	SampT	ype: LC	S	Test	tCode: El	PA Method	6010B: TCLI	P Metals		
Sample ID LCS-26475 Client ID: LCSW	SampT Batch	ype: LC 1 ID: 26	:S 475	Tesi R	tCode: El RunNo: 3	PA Method 5810	6010B: TCLI	P Metals		
Sample ID LCS-26475 Client ID: LCSW Prep Date: 7/19/2016	SampT Batch Analysis D	ÿpe: LC n ID: 26 Date: 7/	:S 475 20/2016	Test R S	tCode: El RunNo: 3 SeqNo: 1	PA Method 5810 108225	6010B: TCLI Units: mg/L	P Metals		
Sample ID LCS-26475 Client ID: LCSW Prep Date: 7/19/2016 Analyte	SampT Batch Analysis D Result	ÿpe: LC n ID: 26 Date: 7/ PQL	: S 475 20/2016 SPK value	Test R S SPK Ref Val	tCode: El RunNo: 3 SeqNo: 1 %REC	PA Method 5810 108225 LowLimit	6010B: TCLI Units: mg/L HighLimit	P Metals %RPD	RPDLimit	Qual
Sample ID LCS-26475 Client ID: LCSW Prep Date: 7/19/2016 Analyte Arsenic	SampT Batch Analysis D Result ND	Type: LC n ID: 26 Date: 7/ PQL 5.0	S 475 20/2016 SPK value 0.5000	Test R SPK Ref Val 0	tCode: El RunNo: 3 SeqNo: 1 <u>%REC</u> 105	PA Method 5810 108225 LowLimit 80	6010B: TCLI Units: mg/L HighLimit 120	P Metals %RPD	RPDLimit	Qual
Sample ID LCS-26475 Client ID: LCSW Prep Date: 7/19/2016 Analyte Arsenic Barium	SampT Batch Analysis D Result ND ND	Type: LC n ID: 26 Date: 7/ PQL 5.0 100	S 475 20/2016 <u>SPK value</u> 0.5000 0.5000	Tesi R SPK Ref Val 0 0	tCode: El RunNo: 3 GeqNo: 1 <u>%REC</u> 105 95.4	PA Method 5810 108225 LowLimit 80 80	6010B: TCLI Units: mg/L HighLimit 120 120	P Metals %RPD	RPDLimit	Qual
Sample ID LCS-26475 Client ID: LCSW Prep Date: 7/19/2016 Analyte Arsenic Barium Cadmium	SampT Batch Analysis D Result ND ND ND	Type: LC n ID: 26 Date: 7/ PQL 5.0 100 1.0	S 20/2016 SPK value 0.5000 0.5000 0.5000	Test R SPK Ref Val 0 0 0 0	tCode: El RunNo: 3 SeqNo: 1 <u>%REC</u> 105 95.4 99.9	PA Method 5810 108225 LowLimit 80 80 80	6010B: TCLI Units: mg/L HighLimit 120 120 120	P Metals %RPD	RPDLimit	Qual
Sample ID LCS-26475 Client ID: LCSW Prep Date: 7/19/2016 Analyte Arsenic Barium Cadmium Chromium	SampT Batch Analysis D Result ND ND ND ND	Type: LC Date: 7/ PQL 5.0 100 1.0 5.0	S 20/2016 SPK value 0.5000 0.5000 0.5000 0.5000	Test R SPK Ref Val 0 0 0 0 0	tCode: El RunNo: 3 SeqNo: 1 %REC 105 95.4 99.9 95.8	PA Method 5810 108225 LowLimit 80 80 80 80 80	6010B: TCLI Units: mg/L HighLimit 120 120 120 120	P Metals %RPD	RPDLimit	Qual
Sample ID LCS-26475 Client ID: LCSW Prep Date: 7/19/2016 Analyte Arsenic Barium Cadmium Chromium Lead	SampT Batch Analysis D Result ND ND ND ND ND	ype: LC n ID: 26 Date: 7/ PQL 5.0 100 1.0 5.0 5.0 5.0	S 20/2016 SPK value 0.5000 0.5000 0.5000 0.5000 0.5000	Tesi R SPK Ref Val 0 0 0 0 0 0	tCode: El RunNo: 3 SeqNo: 1 %REC 105 95.4 99.9 95.8 93.5	PA Method 5810 108225 LowLimit 80 80 80 80 80	6010B: TCLI Units: mg/L HighLimit 120 120 120 120 120 120	P Metals %RPD	RPDLimit	Qual
Sample ID LCS-26475 Client ID: LCSW Prep Date: 7/19/2016 Analyte Arsenic Barium Cadmium Chromium Lead Selenium	SampT Batch Analysis D Result ND ND ND ND ND ND ND	ype: LC pate: 7/ PQL 5.0 1.00 1.0 5.0 5.0 1.0	S 20/2016 SPK value 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000	Tesi R SPK Ref Val 0 0 0 0 0 0 0 0 0	tCode: El RunNo: 3 SeqNo: 1 %REC 105 95.4 99.9 95.8 93.5 107	PA Method 5810 108225 LowLimit 80 80 80 80 80 80 80	6010B: TCLI Units: mg/L HighLimit 120 120 120 120 120 120 120	P Metals %RPD	RPDLimit	Qual

Qualifiers:

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

 \mathbf{P}_{0} and $\mathbf{20}$ of

Page 20 of 29

WO#: 1607300 01-Aug-16

Client:	Navajo R	lefining C	ompany								
Project:	Quarterly	WDW-1	, 2, &3	Inj Well							
Sample ID ME	B-26511	26511 SampType: MBLK			TestCode: EPA 6010B: Total Recoverable Metals						
Client ID: PB	зw	Bato	h ID: 26	511	RunNo: 35864						
Prep Date: 7	/20/2016	Analysis	Date: 7/	21/2016	S	SeqNo: 1	110316	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 LC	CS-26511	Samp	Type: LC	S	Tes	tCode: E	PA 6010B: ⁻	Total Recover	able Meta	als	
Client ID: LC	sw	Bato	h ID: 26	511	R	RunNo: 3	5864				
Prep Date: 7	/20/2016	Analysis	Date: 7/	21/2016	S	SeqNo: 1	110317	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.
- 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

Page 21 of 29

WO#: 1607300

01-Aug-16

Client: Navajo Refining Company

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

Sample ID	LCS-26511	SampType: LCS			Tes	TestCode: EPA 6010B: Total Recoverable Metals					
Client ID:	LCSW	Bato	ch ID: 26	511	F	RunNo: 35864					
Prep Date:	7/20/2016	Analysis	Date: 7/	21/2016	S	SeqNo: 1	110317	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	Samp	Туре: М	6	Tes	tCode: El	PA 6010B: "	Total Recover	able Meta	als	
Client ID:	WDW-1,2,&3 Efflu	ien Bato	ch ID: 26	511	F	RunNo: 3	5864				
Client ID: Prep Date:	WDW-1,2,&3 Efflu 7/20/2016	ien Bato Analysis I	ch ID: 26 Date: 7/	511 21/2016	F	RunNo: 3 SeqNo: 1	5864 110319	Units: mg/L			
Client ID: Prep Date: Analyte	WDW-1,2,&3 Efflu 7/20/2016	ien Bato Analysis∃ Result	ch ID: 26 Date: 7/ PQL	511 21/2016 SPK value	F S SPK Ref Val	RunNo: 3 SeqNo: 1 %REC	5864 110319 LowLimit	Units: mg/L HighLimit	%RPD	RPDLimit	Qual
Client ID: Prep Date: Analyte Antimony	WDW-1,2,&3 Efflu 7/20/2016	ien Bato Analysis Result 0.50	ch ID: 26 Date: 7/ PQL 0.050	511 21/2016 SPK value 0.5000	F S SPK Ref Val 0	RunNo: 3 SeqNo: 1 <u>%REC</u> 101	5864 110319 LowLimit 75	Units: mg/L HighLimit 125	%RPD	RPDLimit	Qual
Client ID: Prep Date: Analyte Antimony Arsenic	WDW-1,2,&3 Efflu 7/20/2016	Analysis Analysis Result 0.50 0.54	ch ID: 26 Date: 7/ PQL 0.050 0.020	511 21/2016 SPK value 0.5000 0.5000	F SPK Ref Val 0 0.03838	RunNo: 3 SeqNo: 1 <u>%REC</u> 101 99.6	5864 110319 LowLimit 75 75	Units: mg/L HighLimit 125 125	%RPD	RPDLimit	Qual
Client ID: Prep Date: Analyte Antimony Arsenic Barium	WDW-1,2,&3 Efflu 7/20/2016	Ien Bato Analysis Result 0.50 0.54 0.49	ch ID: 26 Date: 7/ PQL 0.050 0.020 0.020	511 21/2016 SPK value 0.5000 0.5000 0.5000	F SPK Ref Val 0 0.03838 0.01824	RunNo: 3 SeqNo: 1 <u>%REC</u> 101 99.6 95.1	5864 110319 LowLimit 75 75 75	Units: mg/L HighLimit 125 125 125	%RPD	RPDLimit	Qual
Client ID: Prep Date: Analyte Antimony Arsenic Barium Beryllium	WDW-1,2,&3 Efflu 7/20/2016	Analysis Result 0.50 0.54 0.49 0.49	ch ID: 26 Date: 7/ PQL 0.050 0.020 0.020 0.0030	511 21/2016 SPK value 0.5000 0.5000 0.5000 0.5000	F SPK Ref Val 0 0.03838 0.01824 0.0001500	RunNo: 3 SeqNo: 1 %REC 101 99.6 95.1 97.2	5864 110319 LowLimit 75 75 75 75 75	Units: mg/L HighLimit 125 125 125 125	%RPD	RPDLimit	Qual
Client ID: Prep Date: Analyte Antimony Arsenic Barium Barium Cadmium	WDW-1,2,&3 Efflu 7/20/2016	Image Bate Analysis Result 0.50 0.54 0.49 0.49 0.48 0.48	ch ID: 26 Date: 7/ PQL 0.050 0.020 0.020 0.0030 0.0020	511 21/2016 SPK value 0.5000 0.5000 0.5000 0.5000 0.5000	F SPK Ref Val 0 0.03838 0.01824 0.0001500 0	RunNo: 3 SeqNo: 1 <u>%REC</u> 101 99.6 95.1 97.2 95.7	5864 110319 LowLimit 75 75 75 75 75 75	Units: mg/L HighLimit 125 125 125 125 125	%RPD	RPDLimit	Qual
Client ID: Prep Date: Analyte Antimony Arsenic Barium Beryllium Cadmium Chromium	WDW-1,2,&3 Efflu 7/20/2016	Image Bate Analysis Result 0.50 0.54 0.49 0.49 0.48 0.47	ch ID: 26 Date: 7/ PQL 0.050 0.020 0.020 0.0030 0.0020 0.0060	511 21/2016 SPK value 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000	F SPK Ref Val 0 0.03838 0.01824 0.0001500 0 0 0	RunNo: 3 SeqNo: 1 <u>%REC</u> 101 99.6 95.1 97.2 95.7 94.2	5864 110319 LowLimit 75 75 75 75 75 75 75 75	Units: mg/L HighLimit 125 125 125 125 125 125 125	%RPD	RPDLimit	Qual
Client ID: Prep Date: Analyte Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt	WDW-1,2,&3 Efflu 7/20/2016	Image Bate Analysis Result 0.50 0.54 0.49 0.49 0.48 0.47	ch ID: 26 Date: 7/ PQL 0.050 0.020 0.020 0.0030 0.0020 0.0060 0.0060	511 21/2016 SPK value 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000	F SPK Ref Val 0 0.03838 0.01824 0.0001500 0 0 0 0.002470	RunNo: 3 SeqNo: 1 <u>%REC</u> 101 99.6 95.1 97.2 95.7 94.2 92.9	5864 110319 LowLimit 75 75 75 75 75 75 75 75 75	Units: mg/L HighLimit 125 125 125 125 125 125 125 125	%RPD	RPDLimit	Qual
Client ID: Prep Date: Analyte Antimony Arsenic Barium Baryllium Cadmium Chromium Cobalt Copper	WDW-1,2,&3 Efflu 7/20/2016	Jen Bato Analysis Result 0.50 0.54 0.49 0.49 0.48 0.47 0.47 0.54	ch ID: 26 Date: 7/ PQL 0.050 0.020 0.0020 0.0030 0.0020 0.0060 0.0060 0.0060	511 21/2016 SPK value 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000	F SPK Ref Val 0 0.03838 0.01824 0.0001500 0 0 0.002470 0.001890	RunNo: 3 SeqNo: 1 <u>%REC</u> 101 99.6 95.1 97.2 95.7 94.2 92.9 107	5864 110319 LowLimit 75 75 75 75 75 75 75 75 75 75	Units: mg/L HighLimit 125 125 125 125 125 125 125 125 125	%RPD	RPDLimit	Qual
Client ID: Prep Date: Analyte Antimony Arsenic Barium Barium Cadmium Cadmium Chromium Cobalt Copper Iron	WDW-1,2,&3 Efflu 7/20/2016	Image Bate Analysis Result 0.50 0.54 0.49 0.49 0.48 0.47 0.54 0.68	ch ID: 26 Date: 7/ PQL 0.050 0.020 0.0020 0.0030 0.0060 0.0060 0.0060 0.0060 0.0050	511 21/2016 SPK value 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000	F SPK Ref Val 0 0.03838 0.01824 0.0001500 0 0 0.002470 0.001890 0.2264	RunNo: 3 SeqNo: 1 %REC 101 99.6 95.1 97.2 95.7 94.2 92.9 107 90.4	5864 110319 LowLimit 75 75 75 75 75 75 75 75 75 75 75	Units: mg/L HighLimit 125 125 125 125 125 125 125 125 125 125	%RPD	RPDLimit	Qual
Client ID: Prep Date: Analyte Antimony Arsenic Barium Baryllium Cadmium Cadmium Chromium Cobalt Copper Iron Lead	WDW-1,2,&3 Efflu 7/20/2016	Image Bate Analysis Result 0.50 0.54 0.49 0.49 0.47 0.47 0.54 0.68	ch ID: 26 Date: 7/ PQL 0.050 0.020 0.020 0.0020 0.0030 0.0060 0.0060 0.0060 0.0060 0.050 0.0050	511 21/2016 SPK value 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000	F SPK Ref Val 0 0.03838 0.01824 0.0001500 0 0 0.002470 0.002470 0.001890 0.2264 0	RunNo: 3 SeqNo: 1 %REC 101 99.6 95.1 97.2 95.7 94.2 92.9 107 90.4 92.8	5864 110319 2004 2005 2005 2005 2005 2005 2005 2005	Units: mg/L HighLimit 125 125 125 125 125 125 125 125 125 125	%RPD	RPDLimit	Qual
Client ID: Prep Date: Analyte Antimony Arsenic Barium Baryllium Cadmium Cadmium Chromium Cobalt Copper Iron Lead Magnesium	WDW-1,2,&3 Efflu 7/20/2016	Image: New Year Bate Analysis Result 0.50 0.54 0.49 0.49 0.49 0.49 0.47 0.47 0.54 0.68 0.46 90	ch ID: 26: Date: 7/ PQL 0.050 0.020 0.020 0.0030 0.0020 0.0060 0.0060 0.0060 0.0060 0.0050 0.0050 1.0	511 21/2016 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000	F SPK Ref Val 0 0.03838 0.01824 0.001500 0 0 0.001890 0.2264 0 45.07	RunNo: 3 SeqNo: 1 %REC 101 99.6 95.1 97.2 95.7 94.2 92.9 107 90.4 92.8 90.4	5864 110319 LowLimit 75 75 75 75 75 75 75 75 75 75 75 75 75	Units: mg/L HighLimit 125 125 125 125 125 125 125 125 125 125	%RPD	RPDLimit	Qual
Client ID: Prep Date: Analyte Antimony Arsenic Barium Beryllium Cadmium Chromium Cobalt Copper Iron Lead Magnesium Manganese	WDW-1,2,&3 Efflu 7/20/2016	Image Bate Analysis Result 0.50 0.54 0.49 0.49 0.49 0.49 0.47 0.54 0.68 0.46 90 0.56	ch ID: 26 Date: 7/ PQL 0.050 0.020 0.0020 0.0020 0.0060 0.0060 0.0060 0.0060 0.0050 1.0 0.0020	511 21/2016 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000	F SPK Ref Val 0 0.03838 0.01824 0.0001500 0 0 0.002470 0.001890 0.00287 0.001890 0.2264 0 45.07 0.09587	RunNo: 3 SeqNo: 1 <u>%REC</u> 101 99.6 95.1 97.2 95.7 94.2 92.9 107 90.4 92.8 90.4 93.0	5864 110319 25 75 75 75 75 75 75 75 75 75 75 75 75 75	Units: mg/L HighLimit 125 125 125 125 125 125 125 125 125 125	%RPD	RPDLimit	Qual
Client ID: Prep Date: Analyte Antimony Arsenic Barium Beryllium Cadmium Cadmium Chromium Cobalt Copper Iron Lead Magnesium Manganese Nickel	WDW-1,2,&3 Efflu 7/20/2016	Jen Bato Analysis Result 0.50 0.54 0.49 0.49 0.49 0.49 0.47 0.54 0.54 0.68 0.46 90 0.56 0.46	ch ID: 26 Date: 7/ PQL 0.050 0.020 0.0020 0.0020 0.0060 0.0060 0.0060 0.0060 0.0050 1.0 0.0020 0.0020 0.0020 0.0020	511 21/2016 SPK value 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000	F SPK Ref Val 0 0.03838 0.01824 0.0001500 0 0 0.002470 0.002470 0.001890 0.2264 0 45.07 0.09587 0.003580	RunNo: 3 SeqNo: 1 %REC 101 99.6 95.1 97.2 95.7 94.2 92.9 107 90.4 92.8 90.4 93.0 91.1	5864 110319 255 75 75 75 75 75 75 75 75 75 75 75 75 7	Units: mg/L HighLimit 125 125 125 125 125 125 125 125 125 125	%RPD	RPDLimit	Qual
Client ID: Prep Date: Analyte Antimony Arsenic Barium Cadmium Cadmium Cadmium Cobalt Copper Iron Lead Magnesium Manganese Nickel Selenium	WDW-1,2,&3 Efflu 7/20/2016	Jen Bato Analysis Result 0.50 0.54 0.49 0.49 0.48 0.47 0.54 0.68 0.46 90 0.56 0.46	ch ID: 26 Date: 7/ PQL 0.050 0.020 0.0020 0.0020 0.0060 0.0060 0.0060 0.0060 0.0050 1.0 0.0020 0.0020 0.010 0.050	511 21/2016 SPK value 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000	F SPK Ref Val 0 0.03838 0.01824 0.0001500 0 0 0.002470 0.001890 0.2264 0 45.07 0.09587 0.09587 0.003580 0	RunNo: 3 SeqNo: 1 %REC 101 99.6 95.1 97.2 95.7 94.2 92.9 107 90.4 92.8 90.4 92.8 90.4 93.0 91.1 96.3	5864 110319 255 75 75 75 75 75 75 75 75 75 75 75 75 7	Units: mg/L HighLimit 125 125 125 125 125 125 125 125 125 125	%RPD	RPDLimit	Qual
Client ID: Prep Date: Analyte Antimony Arsenic Barium Beryllium Cadmium Cadmium Cadmium Chromium Cobalt Copper Iron Lead Magnesium Manganese Nickel Selenium Silver	WDW-1,2,&3 Efflu 7/20/2016	Image Bate Analysis Result 0.50 0.54 0.49 0.49 0.47 0.47 0.54 0.68 0.46 90 0.56 0.46 0.097 0.54	ch ID: 26 Date: 7/ PQL 0.050 0.020 0.0020 0.0020 0.0060 0.0060 0.0060 0.0060 0.0050 1.0 0.0020 0.0020 0.0020 0.010 0.050 0.0050	511 21/2016 SPK value 0.5000	F SPK Ref Val 0 0.03838 0.01824 0.0001500 0 0.002470 0.002470 0.001890 0.2264 0 45.07 0.09587 0.09587 0.003580 0 0	RunNo: 3 SeqNo: 1 %REC 101 99.6 95.1 97.2 95.7 94.2 92.9 107 90.4 92.8 90.4 92.8 90.4 93.0 91.1 96.3 96.9	5864 110319 255 75 75 75 75 75 75 75 75 75 75 75 75 7	Units: mg/L HighLimit 125 125 125 125 125 125 125 125 125 125	%RPD	RPDLimit	Qual

- * 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
- Page 22 of 29

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 Efflu	Jen Bato	ch ID: 26	511	RunNo: 35864						
Prep Date:	7/20/2016	Analysis	Date: 7/	21/2016	S	SeqNo: 1	110320	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	Samp	Туре: М	6	Tes	tCode: E	PA 6010B: ⁻	Total Recover	able Meta	als	
Client ID:	WDW-1,2,&3 Efflu	Jen Bato	ch ID: 26	511	RunNo: 35864						
Prep Date:	7/20/2016	Analysis	Date: 7/	21/2016	S	SeqNo: 1	110322	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	1607300-001BMS	D Samp	Туре: М	SD	Tes	tCode: E	PA 6010B: ⁻	Total Recover	able Meta	als	
Client ID:	WDW-1,2,&3 Efflu	Jen Bato	ch ID: 26	511	F	RunNo: 3	5864				
Prep Date:	7/20/2016	Analysis	Date: 7/	21/2016	S	SeqNo: 1	110323	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.
- 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

Page 23 of 29

Page 24 of 29

Client: Project:	Navajo Re Quarterly V	fining Cor WDW-1, 2	npany 2, &3	Inj Well							
Sample ID	1607300-001a dup	SampTy	pe: dı	р	Tes	tCode: SI	M4500-H+B	: pH			
Client ID:	WDW-1,2,&3 Efflue	n Batch	ID: R3	35550	R	lunNo: 3	5550				
Prep Date:		Analysis Da	ate: 7	/8/2016	S	SeqNo: 1	100761	Units: pH u	nits		
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
pН		7.62	1.68								Н

- * 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

WO#:	1607300
	01.Aug.16

Client: Project:	Navajo 1 Quarterl	Refining Comp y WDW-1, 2, 8	any &3 Inj Well						
Sample ID	MB-R36111	SampType	MBLK	Tes	tCode: CYANIDE, R	eactive			
Client ID:	PBW	Batch ID:	R36111	F	RunNo: 36111				
Prep Date:		Analysis Date:	7/19/2016	S	SeqNo: 1118586	Units: mg/L			
Analyte		Result P	QL SPK value	SPK Ref Val	%REC LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cyanide, Reactiv	ve	ND 1	.00						
Sample ID	LCS-R36111	SampType	LCS	Tes	tCode: CYANIDE, R	eactive			
Client ID:	LCSW	Batch ID:	R36111	F	RunNo: 36111				
Prep Date:		Analysis Date:	7/19/2016	S	SeqNo: 1118587	Units: mg/L			
Analyte		Result P	QL SPK value	SPK Ref Val	%REC LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cyanide, Reactiv	ve	0.551	0.5000	0	110 80	120			

- * Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- Н 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
- В Analyte detected in the associated Method Blank
- Е Value above quantitation range
- J Analyte detected below quantitation limits
- Sample pH Not In Range Р
- RL Reporting Detection Limit
- W Sample container temperature is out of limit as specified
- Page 25 of 29

WO#:	1607300
	01.Aug.16

Client: Navajo Project: Quarter	Refining Company ly WDW-1, 2, &3 Inj Well			
Sample ID MB-R36111	SampType: MBLK	TestCode: SULFIDE, Re	eactive	
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	

- * Value exceeds Maximum Contaminant Level.
- Sample Diluted Due to Matrix D
- Н 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
- В Analyte detected in the associated Method Blank
- Е Value above quantitation range
- J Analyte detected below quantitation limits
- Sample pH Not In Range Р
- RL Reporting Detection Limit
- W Sample container temperature is out of limit as specified
- Page 26 of 29

WO#:	1607300
	01-Aug-16

Client:		Navajo Refining Co	ompan	у							
Project:		Quarterly WDW-1,	2, &3	Inj Well							
Sample ID	mb-1	Samp	ype: n	nblk	Tes	tCode: SI	M2320B: AI	kalinity			
Client ID:	PBW	Batc	n ID: R	35550	F	RunNo: 3	5550				
Prep Date:		Analysis E	Date: 7	7/8/2016	S	SeqNo: 1	100788	Units: mg/L	CaCO3		
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity	(as CaCO	3) ND	20.00)							
Sample ID	lcs-1	Samp	ype: Ic	s	Tes	tCode: SI	M2320B: AI	kalinity			
Client ID:	LCSW	Batc	n ID: R	35550	F	RunNo: 3	5550	-			
Prep Date:		Analysis E	Date:	7/8/2016	S	SeqNo: 1	100789	Units: mg/L	. CaCO3		
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity	i (as CaCO	3) 77.36	20.00) 80.00	0	96.7	90	110			
	(o) 11.00			•						
Sample ID	mb-2	Samp1	ype: m	nblk	Tes	tCode: SI	W2320B: AI	kalinity			
Sample ID Client ID:	mb-2 PBW	Samp Batc	ype: m n ID: R	nblk 35550	Tes F	tCode: SI RunNo: 3	M2320B: AI 5550	kalinity			
Sample ID Client ID: Prep Date:	mb-2 PBW	Samp Batc Analysis [ype: m n ID: R Date: 7	nblk 35550 7/8/2016	Tes F S	tCode: SI RunNo: 3 SeqNo: 1 ⁴	M2320B: AI 5550 100812	kalinity Units: mg/L	. CaCO3		
Sample ID Client ID: Prep Date: Analyte	mb-2 PBW	Sampī Batcl Analysis I Result	ype: m ID: R Date: 7	nblk 35550 7/8/2016 SPK value	Tes F SPK Ref Val	tCode: SI RunNo: 3 SeqNo: 1 [,] %REC	M2320B: AI 5550 100812 LowLimit	kalinity Units: mg/L HighLimit	CaCO3 %RPD	RPDLimit	Qual
Sample ID Client ID: Prep Date: Analyte Total Alkalinity	mb-2 PBW	Samp Samp Batcl Analysis E Result 3) ND	ype: m n ID: R Date: 7 PQL 20.00	nblk 35550 7/8/2016 SPK value	Tes F SPK Ref Val	tCode: SI RunNo: 3 SeqNo: 1 %REC	M2320B: AI 5550 100812 LowLimit	kalinity Units: mg/L HighLimit	. CaCO3 %RPD	RPDLimit	Qual
Sample ID Client ID: Prep Date: Analyte Total Alkalinity Sample ID	mb-2 PBW (as CaCO Ics-2	Samp Samp Batcl Analysis E Result 3) ND Samp	ype: n Date: 7 PQL 20.00	nblk 35550 7/8/2016 SPK value	Tes F SPK Ref Val Tes	tCode: SI RunNo: 3 SeqNo: 1 %REC tCode: SI	M2320B: AI 5550 100812 LowLimit M2320B: AI	kalinity Units: mg/L HighLimit kalinity	. CaCO3 %RPD	RPDLimit	Qual
Sample ID Client ID: Prep Date: Analyte Total Alkalinity Sample ID Client ID:	mb-2 PBW (as CaCO ics-2 LCSW	3) ND Sampī Batci Analysis I Result 3) ND Sampī Batci	Type: m n ID: R Date: 7 PQL 20.00 Type: Ic Type: Ic n ID: R	nblk 35550 7/8/2016 SPK value) :s 35550	Tes F SPK Ref Val Tes F	tCode: SI RunNo: 3 SeqNo: 1 %REC tCode: SI RunNo: 3	M2320B: AI 5550 100812 LowLimit M2320B: AI 5550	kalinity Units: mg/L HighLimit kalinity	. CaCO3 %RPD	RPDLimit	Qual
Sample ID Client ID: Prep Date: Analyte Total Alkalinity Sample ID Client ID: Prep Date:	mb-2 PBW (as CaCO Ics-2 LCSW	3) Samp Batcl Analysis I Result 3) ND Samp Batcl Analysis I	Type: m n ID: R Date: 7 20.00 Type: Ic n ID: R Date: 7	nblk 35550 7/8/2016 SPK value) :s 35550 7/8/2016	Tes F SPK Ref Val Tes F	tCode: SI RunNo: 3 SeqNo: 1 %REC tCode: SI RunNo: 3 SeqNo: 1	M2320B: AI 5550 100812 LowLimit M2320B: AI 5550 100813	kalinity Units: mg/L HighLimit kalinity Units: mg/L	. CaCO3 %RPD	RPDLimit	Qual
Sample ID Client ID: Prep Date: Analyte Total Alkalinity Sample ID Client ID: Prep Date: Analyte	mb-2 PBW (as CaCO Ics-2 LCSW	3) ND SampT Batcl Analysis E Result 3) ND SampT Batcl Analysis E Result	Type: m Date: 7 PQL 20.00 Type: 10 Date: 7 PQL PQL	nblk 35550 7/8/2016 SPK value) :s 35550 7/8/2016 SPK value	Tes F SPK Ref Val Tes F SPK Ref Val	tCode: SI RunNo: 3 SeqNo: 1 %REC tCode: SI RunNo: 3 SeqNo: 1 %REC	M2320B: AI 5550 100812 LowLimit M2320B: AI 5550 100813 LowLimit	kalinity Units: mg/L HighLimit kalinity Units: mg/L HighLimit	. CaCO3 %RPD . CaCO3 %RPD	RPDLimit	Qual

- * 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
- Page 27 of 29

0.9991

0

Client: Project:	Navajo Refining Company 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

Analyte Specific Gravity

I

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

0

0.489

20

Page 28 of 29

Client: Project:	Nava Quai	ajo Refining Co terly WDW-1,	mpany 2, &3	Inj Well							
Sample ID	MB-26273	SampTy	ype: ME	BLK	Tes	tCode: SN	M2540C MC	D: Total Diss	olved Sol	lids	
Client ID:	PBW	Batch	ID: 26	273	F	RunNo: 35	5537				
Prep Date:	7/7/2016	Analysis Da	ate: 7/	8/2016	S	SeqNo: 11	100261	Units: mg/L			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved	d Solids	ND	20.0								
Sample ID	LCS-26273	SampTy	ype: LC	S	Tes	tCode: SN	M2540C MC	D: Total Diss	olved Sol	lids	
Client ID:	LCSW	Batch	ID: 26	273	F	unNo: 35	5537				
Prep Date:	7/7/2016	Analysis Da	ate: 7/	8/2016	S	SeqNo: 11	100262	Units: mg/L			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved	d Solids	1000	20.0	1000	0	100	80	120			

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

Page 29 of 29

Client Name: NAVAJO REFINING CO Work	k Order Number: 160	073	00		RcptNo:	1
Received by/date: AS 07/0	7/16					
Logged By: Lindsay Mangin 7/7/201	16 10:15:00 AM			Andyther		
Correlated Brandinger Managin 7/7/20	16 12:11:31 DM			ctudettheor		
Devidend D. Lindsay margin	1/.7/			0.9.00		
Reviewed By: 0.1	10///6					
Chain of Custody					N	
 Custody seals intact on sample bottles? 	Y	es		No 🗆	Not Present	
2. Is Chain of Custody complete?	Y	es	•	No	Not Present	
How was the sample delivered?	<u>C</u>	ouri	er			
Log In						
4 Was an attempt made to cool the samples?	Y	es		No 🗆		
		~~				
5. Were all samples received at a temperature of >0°	C to 6.0°C Ye	es	V	No 🗌		
6. Sample(s) in proper container(s)?	Y	'es	V	No 🗌		
7. Sufficient sample volume for indicated test(s)?	Y	65	V	No 🗌		
8. Are samples (except VOA and ONG) properly prese	erved? Y	es	V	No 🗌		
9. Was preservative added to bottles?	Y	es		No 🗹	NA 🗌	
10 VOA viale have zero headsnace?	Y	es	~	No 🗆	No VOA Vials 🗌	
11 Were any sample containers received broken?		(es		No 🗹	N. ASS	
TT, were any sample containers received proton.					# of preserved bottles checked	\sim
12. Does paperwork match bottle labels?	Y	es	~	No 🗌	for pH:	1
(Note discrepancies on chain of custody)				No 🗖	Adjusted?	NO
13. Are matrices correctly identified on Chain of Custod	iy? Y	es				
14. Is it clear what analyses were requested?	, v	es			Checked by:	as
(If no, notify customer for authorization.)		63	(21			
Special Handling (if applicable)						
16. Was client notified of all discrepancies with this ord	ler? Y	'es		No 🗌	NA 🗹	
Person Notified:	Date D					
Person Notileo.				Dhana - Eav	In Person	

- 17. Additional remarks:
- 18. Cooler Information

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

		5	actional income				and the second s		CITAVIA -	Current and a state of the stat	
Client N	avajo Ret	fining Co.		Xs	tandard	Rush		ANAL	STS	ABORATO	
				Project Nan	te:			ed www	llenvironments		2
Mailing A	ddress: F	O. Box	159 Artesia,	Quarterly M	DW-1, 2, 8, 3	ni Well	4901 Hav	vkins NE - Alt	No anonecone NN	187109	
NM 8821	1-0159			Project #: P	0.#167796		Tel. 505-	345-3975	Tax 505-345-4	107	
Phone #;	575-748	-3311		-				A	nalysis Reque	st	
email or	^c ax#: 575	5-746-545		Project Mar	ager.		0 10	(,	11		-
QA/QC Pt	ackage: ard		Level 4 (Full Validation)	Micki Schul	z / Scott Dente	on / Mike Holder	22, 23, 23, 23, 24, 25, 20, 20, 20, 20, 20, 20, 20, 20, 20, 20	(so 010, sletals	1311 CEK b ^s 136.3		
□ Other			30	Sampler.	Brady Hubbar	9	1,00 3r, E thoc 700 00 203 203 203 203 203 203 203 203 20	182 192 19 br	04. 040 815		
C EDD	Type)			On Ice:	Pres -	O No	, HC 201, 1 Mei 8 M 5 M	hed Mth bed	etpi uly 10 C		_
				Sample Ter	nperature:	1.000	Ho Ho Ho He Ho Ho Ho Ho Ho Ho Ho Ho Ho Ho Ho Ho Ho	R p	9/6) M 9		
Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL NO.	Specific Gra SO4, TDS, I VOCs/SW-8 (see attache VOCs/SW-8 (see attache	R,C,I/40 CF Metals/SW-8 7470 (see al	Ca, K, Mg, N TCLP Metal TCLP Metal		
7/5/16	8:30	Liquid	WDW-1, 2, & 3 Effluent	3	Neat/H2SO4	100-	×		×		
7/5/16	8:30	Liquid	WDW-1, 2, & 3 Effluent	٣	HN03	100-		×	×		
7/5/16	8:30	Liquid	WDW-1, 2, & 3 Effluent	3	HCL	121	×		2		
7/5/16	8:30	Liquid	WDW-1, 2, & 3 Effluent	2	Neat	102-	×				
7/5/16	8:30	Liquid	WDW-1, 2, & 3 Effluent	2	Neat	100-		×			
7/5/16	8:30	Liquid	Trip Blank	2	Neat	-002	×				
7/5/16	8:30	Liquid	Temperature Blank	~	Neat						
Date: 7-6-16	Time: Io :30	Relinquist	nedly Brady Hudrow	Received by	hert	Date Time	Remarks: Send resu Contreras.	Its to Scott Der	nton, Mike Hol	der, Robert Combs and A	Andrew
Date:	Time:	Relinquist	o kg per	Received by:		Date Time					
	If necess.	ary, samples s	submitted to Hall Environmental may be subo	ontracted to other a	coredited leboratories	. This serves as notice of this	ossibility. Any sub-contracted	data will be clearly n	clated on the analyti	cal report.	



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

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 <u>www.hallenvironmental.com</u> 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,

andis

Andy Freeman Laboratory Manager 4901 Hawkins NE Albuquerque, NM 87109



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

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 CompanyProject:Quarterly WDW-1, 2, &3 Inj WellLab ID:1610612-001

Client Sample ID: WDW-1,2,&3 Effluent Collection Date: 10/11/2016 9:00:00 AM 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 A	M R38258
FPA METHOD 300.0 ANIONS						Analysi	LGT
Fluoride	35	2.0	*	ma/l	20	10/14/2016 12·19·11 A	M R37942
Chloride	360	25		mg/L	50	10/25/2016 9:50:38 PM	1 R38187
Bromide	0.72	0.10		mg/L	1	10/14/2016 12:06:47 A	M R37942
Phosphorus, Orthophosphate (As P)	ND	10	н	mg/L	20	10/14/2016 12:19:11 A	M R37942
Sulfate	1500	25		mg/L	50	10/25/2016 9:50:38 PN	I R38187
Nitrate+Nitrite as N	ND	1.0		mg/L	5	10/14/2016 1:21:13 AN	R37942
SM2510B: SPECIFIC CONDUCTANCE						Analyst	: JRR
Conductivity	4900	1.0		µmhos/cm	1	10/18/2016 4:54:00 PN	R38048
SM2320B: ALKALINITY						Analyst	: JRR
Bicarbonate (As CaCO3)	288.8	20.00		mg/L CaCO3	1	10/18/2016 4:54:00 PN	R38048
Carbonate (As CaCO3)	ND	2.000		mg/L CaCO3	1	10/18/2016 4:54:00 PN	I R38048
Total Alkalinity (as CaCO3)	288.8	20.00		mg/L CaCO3	1	10/18/2016 4:54:00 PN	R38048
SM2540C MOD: TOTAL DISSOLVED SO	OLIDS					Analyst	t: KS
Total Dissolved Solids	3210	20.0	*	mg/L	1	10/18/2016 6:58:00 PN	28098
CORROSIVITY						Analyst	: SUB
рН	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
рН	8.10	1.68	Н	pH units	1	10/18/2016 4:54:00 PN	R38048
EPA METHOD 7470: MERCURY						Analyst	: DBD
Mercury	ND	0.00020		mg/L	1	10/18/2016 5:17:17 PN	1 28113
MERCURY, TCLP						Analyst	: DBD
Mercury	ND	0.020		mg/L	1	10/19/2016 5:06:28 PN	28165
EPA METHOD 6010B: TCLP METALS						Analyst	: MED
Arsenic	ND	5.0		mg/L	1	10/24/2016 8:45:55 AN	1 28191
Barium	ND	100		mg/L	1	10/24/2016 8:45:55 AN	1 28191

Matrix: AQUEOUS

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 Page 2 of 29
- P Sample pH Not In Range
- RL Reporting Detection Limit

W Sample container temperature is out of limit as specified

Hall Environmenta	l Analy	ysis Lal	boratory,	Inc.

CLIENT: Navajo Refining CompanyProject:Quarterly WDW-1, 2, &3 Inj WellLab ID:1610612-001Matrix: AQUEOUS

11 17

Client Sample ID: WDW-1,2,&3 Effluent Collection Date: 10/11/2016 9:00:00 AM 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	1 28190
Antimony	ND	0.050	mg/L	1	10/31/2016 10:15:38 AM	1 28190
Arsenic	0.040	0.020	mg/L	1	10/31/2016 10:15:38 AM	1 28190
Barium	ND	0.020	mg/L	1	10/31/2016 10:15:38 AM	1 28190
Beryllium	ND	0.0030	mg/L	1	10/31/2016 10:15:38 AM	1 28190
Cadmium	ND	0.0020	mg/L	1	10/31/2016 10:15:38 AM	1 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	1 28190
Cobalt	ND	0.0060	mg/L	1	10/31/2016 10:15:38 AM	1 28190
Copper	0.017	0.0060	mg/L	1	10/31/2016 10:15:38 AN	1 28190
Iron	0.14	0.050	mg/L	1	10/31/2016 10:15:38 AN	1 28190
Lead	ND	0.0050	mg/L	1	10/31/2016 10:15:38 AN	1 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 AN	1 28190
Nickel	ND	0.010	mg/L	1	10/31/2016 10:15:38 AN	1 28190
Potassium	120	5.0	mg/L	5	10/31/2016 10:22:16 AM	1 28190
Selenium	ND	0.050	mg/L	1	10/31/2016 10:15:38 AM	1 28190
Silver	ND	0.0050	mg/L	1	10/31/2016 10:15:38 AM	1 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	1 28190
Vanadium	ND	0.050	mg/L	1	10/31/2016 10:15:38 AN	1 28190
Zinc	0.027	0.020	mg/L	1	10/31/2016 10:15:38 AN	1 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: * 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 Page 3 of 29
- 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 CompanyProject:Quarterly WDW-1, 2, &3 Inj WellLab ID:1610612-001

Client Sample ID: WDW-1,2,&3 Effluent Collection Date: 10/11/2016 9:00:00 AM Received Date: 10/13/2016 8:30:00 AM

Analyses	Result	PQL Q	ual Units	DF	Date Analyze	d 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

Matrix: AQUEOUS

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 Page 4 of 29
- 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 CompanyProject: Quarterly WDW-1, 2, &3 Inj WellLab ID: 1610612-001 Matrix: AQUEOUS

Client Sample ID: WDW-1,2,&3 Effluent Collection Date: 10/11/2016 9:00:00 AM Received Date: 10/13/2016 8:30:00 AM

Analyses	Result	PQL Qu	al Units	DF	Date Analyze	d 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

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 Page 5 of 29
- 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 CompanyProject:Quarterly WDW-1, 2, &3 Inj WellLab ID:1610612-001Matrix: AQUEOUS

Client Sample ID: WDW-1,2,&3 Effluent Collection Date: 10/11/2016 9:00:00 AM Received Date: 10/13/2016 8:30:00 AM

Analyses	Result	PQL Qu	al Units	DF	Date Analyze	ed 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

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 Page 6 of 29
- 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 WDW-1, 2, &3 Inj Well

1610612-001

Lab ID:

1

Client Sample ID: WDW-1,2,&3 Effluent Collection Date: 10/11/2016 9:00:00 AM Received Date: 10/13/2016 8:30:00 AM

Analyses	Result	PQL Q	ual Units	DF Date Analyzed	Batch
EPA 8270C: SEMIVOLATILES/MOD				Anal	yst: 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

Matrix: AQUEOUS

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 Page 7 of 29
- 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.

Quarterly WDW-1, 2, &3 Inj Well

CLIENT: Navajo Refining Company

Project:

Client Sample ID: WDW-1,2,&3 Effluent Collection Date: 10/11/2016 9:00:00 AM Received Date: 10/13/2016 8:30:00 AM

Lab ID: 1610612-001	Matrix: AQUEOUS		Received	Received Date: 10/13/2016 8:30:00 AM				
Analyses	Result	PQL Qua	l Units	DF	Date Analyzed	Batch		
EPA 8270C: SEMIVOLATILES/MOD					A	nalyst: 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		

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
	Н	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

- В Analyte detected in the associated Method Blank
- Е Value above quantitation range
- Analyte detected below quantitation limits Page 8 of 29 J
- Р Sample pH Not In Range
- Reporting Detection Limit RL
- Sample container temperature is out of limit as specified W

Analyses Result PQL Qual Units DF Date Analyzed Batch Analyses Analyst: SUB Analyst: SUB Acetonitrile ND 5.0 µg/L 1 10/20/2016 R38745 Ally chloride ND 0.50 µg/L 1 10/20/2016 R38745 Chloroprene ND 0.50 µg/L 1 10/20/2016 R38745 Diethyl ether ND 0.50 µg/L 1 10/20/2016 R38745 Eipchlorohydrin ND 0.50 µg/L 1 10/20/2016 R38745 Eithyl acetate ND 0.50 µg/L 1 10/20/2016 R38745 Ethyl methacrylate ND 0.50 µg/L 1 10/20/2016 R38745 Isobutanol ND 0.50 µg/L 1 10/20/2016 R38745 Isoporpyl acetate ND 0.50 µg/L 1 10/20/2016 R38745 Methy	Lab ID: 1610612-002	Matrix: TRIP BLANK		Received Date: 10/13/2016 8:30:00 AM				
EPA METHOD 82608: VOLATILES Analyst: SUB Acetonitrile ND 5.0 µg/L 1 10/20/2016 R38745 Ally 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 Ethyl acetata ND 0.50 µg/L 1 10/20/2016 R38745 Ethyl methacrylate ND 0.50 µg/L 1 10/20/2016 R38745 Isobutanol ND 0.50 µg/L 1 10/20/2016 R38745 Isobutanol ND 0.50 µg/L 1 10/20/2016 R38745 Isobutanol ND 0.50 µg/L 1 10/20/2016 R38745 Methyl acetate ND 0.50 µg/L	Analyses	Result	PQL Qual	Units	DF	Date Analyze	d Batch	
Acetonitrile ND 5.0 µg/L 1 10/20/2016 R38745 Ally choride ND 0.50 µg/L 1 10/20/2016 R38745 Chloroprene ND 0.50 µg/L 1 10/20/2016 R38745 Diethyl ether ND 0.50 µg/L 1 10/20/2016 R38745 Ethyl acetate ND 0.50 µg/L 1 10/20/2016 R38745 Ethyl methacrylate ND 0.50 µg/L 1 10/20/2016 R38745 Ethyl methacrylate ND 0.50 µg/L 1 10/20/2016 R38745 Ethyl methacrylate ND 0.50 µg/L 1 10/20/2016 R38745 Isobutanol ND 0.50 µg/L 1 10/20/2016 R38745 Methyl acetate ND 0.50 µg/L 1 10/20/2016 R38745 Methyl acetate ND 2.5 µg/L 1 10/20/2016 R38745	EPA METHOD 8260B: VOLATILES						Analyst: SUB	
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 Eipichlorohydrin ND 0.50 µg/L 1 10/20/2016 R38745 Ethyl acteatae ND 0.50 µg/L 1 10/20/2016 R38745 Ethyl acteatae ND 0.50 µg/L 1 10/20/2016 R38745 Ethyl acteatae ND 0.50 µg/L 1 10/20/2016 R38745 Isobutanol ND 0.50 µg/L 1 10/20/2016 R38745 Isobutanol ND 0.50 µg/L 1 10/20/2016 R38745 Methyl acetate ND 0.50 µg/L 1 10/20/2016 R38745 Methyl acetate ND 0.50 µg/L 1 10/20/2016 R38745	Acetonitrile	ND	5.0	µg/L	1	10/20/2016	R38745	
Chioroprene ND 0.50 µg/L 1 10/20/2016 R33745 Cyclohexane ND 0.50 µg/L 1 10/20/2016 R33745 Diethyl ether ND 0.50 µg/L 1 10/20/2016 R33745 Ethyl acetate ND 0.50 µg/L 1 10/20/2016 R33745 Ethyl methacrylate ND 0.50 µg/L 1 10/20/2016 R33745 Ethyl methacrylate ND 0.50 µg/L 1 10/20/2016 R33745 Isobutanol ND 0.50 µg/L 1 10/20/2016 R33745 Isoporyl acetate ND 0.50 µg/L 1 10/20/2016 R33745 Methyl acetate ND 0.50 µg/L 1 10/20/2016 R33745 Methyl acetate ND 0.50 µg/L 1 10/20/2016 R33745 Methyl isobutyl ketone ND 2.5 µg/L 1 10/20/2016 R33745	Allyl chloride	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 Ethyl actetate ND 0.50 µg/L 1 10/20/2016 R38745 Ethyl methacrylate ND 0.50 µg/L 1 10/20/2016 R38745 Ethyl itert-butyl ether ND 0.50 µg/L 1 10/20/2016 R38745 Freon-113 ND 0.50 µg/L 1 10/20/2016 R38745 Isoptorpyl acetate ND 0.50 µg/L 1 10/20/2016 R38745 Methyl ethyl ethone ND 0.50 µg/L 1 10/20/2016 R38745 Isoptorpyl 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	Chloroprene	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 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 0.50 µg/L 1 10/20/2016 R38745 Isobutanol ND 0.50 µg/L 1 10/20/2016 R38745 Methyl acetate ND 0.50 µg/L 1 10/20/2016 R38745 Methyl acetate ND 0.50 µg/L 1 10/20/2016 R38745 Methyl restours ND 2.5 µg/L 1 10/20/2016 R38745 Methyl colours/acetate ND 2.5 µg/L 1 10/20/2016 R38745 <td>Cyclohexane</td> <td>ND</td> <td>0.50</td> <td>µg/L</td> <td>1</td> <td>10/20/2016</td> <td>R38745</td>	Cyclohexane	ND	0.50	µg/L	1	10/20/2016	R38745	
Epichlorohydrin ND 100 µg/L 1 10/20/2016 R38745 Ethyl acetale ND 0.50 µg/L 1 10/20/2016 R38745 Ethyl methacylate ND 2.5 µg/L 1 10/20/2016 R38745 Ethyl tert-butyl ether ND 0.50 µg/L 1 10/20/2016 R38745 Isobutanol ND 0.50 µg/L 1 10/20/2016 R38745 Isobutanol ND 0.50 µg/L 1 10/20/2016 R38745 Methayl acetate ND 0.50 µg/L 1 10/20/2016 R38745 Methyl acetate ND 2.5 µg/L 1 10/20/2016 R38745	Diethyl ether	ND	0.50	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 0.50 µg/L 1 10/20/2016 R38745 Isobutanol ND 0.50 µg/L 1 10/20/2016 R38745 Methyl acetate ND 0.50 µg/L 1 10/20/2016 R38745 Methyl acetate ND 2.5 µg/L 1 10/20/2016 R38745 Methyl isobutyl 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 jockohexane ND 0.50 µg/L 1 10/20/2016 R38745	Epichlorohydrin	ND	100	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 0.50 µg/L 1 10/20/2016 R38745 Isobutanol ND 0.50 µg/L 1 10/20/2016 R38745 Methyl acetate ND 0.50 µg/L 1 10/20/2016 R38745 Methyl acetate ND 2.5 µg/L 1 10/20/2016 R38745 Methyl acetate ND 2.5 µg/L 1 10/20/2016 R38745 Methyl acetate ND 2.5 µg/L 1 10/20/2016 R38745 Methyl acetate ND 0.50 µg/L 1 10/20/2016 R38745 n-Amyl acetate ND 0.50 µg/L 1 10/20/2016 R38745	Ethyl acetate	ND	0.50	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 Isobropyl acetate ND 0.50 µg/L 1 10/20/2016 R38745 Methacrytonitrile ND 0.50 µg/L 1 10/20/2016 R38745 Methacrytonitrile ND 2.5 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 isobutyl ketone ND 2.5 µg/L 1 10/20/2016 R38745 Methyl isobutyl ketone ND 0.50 µg/L 1 10/20/2016 R38745 Methyl isobutyl ketone ND 0.50 µg/L 1 10/20/2016 R38745 n-Hexane ND 0.50 µg/L 1 10/20/201	Ethyl methacrylate	ND	2.5	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 Methyl acetate ND 2.5 µg/L 1 10/20/2016 R38745 Methyl acetate ND 2.5 µg/L 1 10/20/2016 R38745 Methyl acetate 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 Methyl acetate ND 0.50 µg/L 1 10/20/2016 R38745 n-Hexane ND 0.50 µg/L 1 10/20/2016 R38745 prisopropyloluene ND 5.0 µg/L 1 10/20/2016 R38745	Ethyl tert-butyl ether	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 acetate ND 2.5 µg/L 1 10/20/2016 R38745 Methyl ethyl ketone ND 2.5 µg/L 1 10/20/2016 R38745 Methyl operate ND 2.5 µg/L 1 10/20/2016 R38745 Methyl cyclohexane ND 1.0 µg/L 1 10/20/2016 R38745 n-Arnyl acetate ND 0.50 µg/L 1 10/20/2016 R38745 n-Hexane ND 0.50 µg/L 1 10/20/2016 R38745 Protointrile ND 0.50 µg/L 1 10/20/2016 R38745	Freon-113	ND	0.50	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 Methyl ketone ND 2.5 µg/L 1 10/20/2016 R38745 Methyl acetate ND 0.50 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 Prisopropyltoluene ND 0.50 µg/L 1 10/20/2016 R387	Isobutanol	ND	100	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 isobutyl 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 isobutyl ketone ND 2.5 µg/L 1 10/20/2016 R38745 Methacrylacetate ND 0.50 µg/L 1 10/20/2016 R38745 n-Hexane ND 0.50 µg/L 1 10/20/2016 R38745 Prentachloroethane ND 0.50 µg/L 1 10/20/2016 R38745 Propionitrile ND 0.50 µg/L 1 10/20/2016	Isopropyl acetate	ND	0.50	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 Methyl methacrylate ND 2.5 µg/L 1 10/20/2016 R38745 Methyl cyclohexane ND 1.0 µg/L 1 10/20/2016 R38745 n-Hexane ND 0.50 µg/L 1 10/20/2016 R38745 Pisopropylotluene ND 5.0 µg/L 1 10/20/2016 R38745 Propionitrile 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	Methacrylonitrile	ND	2.5	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 Methyl cyclohexane 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 Propionitrile ND 0.50 µg/L 1 10/20/2016 R38745 Tetrahydrofuran ND 0.50 µg/L 1 10/20/2016 R38745 Folione ND 0.50 µg/L 1 10/20/2016 R38745	Methyl acetate	ND	0.50	ua/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 Methyl cyclohexane 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 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	Methyl ethyl ketone	ND	2.5	ua/L	1	10/20/2016	R38745	
Methyl methacrylate ND 2.5 µg/L 1 10/20/2016 R38745 Methyl methacrylate ND 1.0 µg/L 1 10/20/2016 R38745 Methyl methacrylate ND 0.50 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 Pentachloroethane ND 5.0 µg/L 1 10/20/2016 R38745 Propionitrile ND 0.50 µg/L 1 10/20/2016 R38745 Propionitrile ND 0.50 µg/L 1 10/20/2016 R38745 Tetrahydrofuran 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 isobutyl ketone	ND	2.5	ua/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 5.0 µg/L 1 10/20/2016 R38745 Propionitrile ND 0.50 µg/L 1 10/20/2016 R38745 Tetrahydrofuran 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 1,2,4-Trimethylbenzene ND 0.50 µg/L 1 10/20/2016 R38745	Methyl methacrylate	ND	2.5	ua/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 0.50 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 Methyl tert-butyl ether (MTBE) ND 0 50 µg/L 1 10/20/2016 R38745 1,2,4-Trimethylbenzene ND 0.50 µg/L 1 10/20/2016	Methylcvclohexane	ND	1.0	ua/L	1	10/20/2016	R38745	
Introduction Internation Internation <thinternation< th=""> <thinternation< th=""></thinternation<></thinternation<>	n-Amyl acetate	ND	0.50	ua/l	1	10/20/2016	R38745	
Nitobare 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 0.50 µg/L 1 10/20/2016 R38745 Tetrahydrofuran ND 2.5 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 1,2,4-Trimethylbenzene ND 0.50 µg/L 1 10/20/2016 R38745 1,2,4-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	n-Hexane	ND	0.50	ua/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 2.5 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 0.50 µg/L 1 10/20/2016 R38745 1,2,4-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-Dichloroethane (EDB) ND 0.50 µg/L 1 10/20/2016<	Nitrobenzene	ND	5.0	ua/l	1	10/20/2016	R38745	
bit distribution ND O.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 0.50 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 Naphthalene ND 0.50 µg/L 1 10/20/2016 R38745 Romobenzene ND 0.50 µg/L 1 <	Pentachloroethane	ND	5.0	ua/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 0.50 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 Bromobenzene ND 0.50 μg/L 1 <td>n-isopropyltoluene</td> <td>ND</td> <td>0.50</td> <td>μα/l</td> <td>1</td> <td>10/20/2016</td> <td>R38745</td>	n-isopropyltoluene	ND	0.50	μα/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 0.50 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 Bromobenzene ND 0.50 µg/L 1 10/20/2016 R38745 Bromodishloromethane ND 0.50 µg/L <t< td=""><td>Propionitrile</td><td>ND</td><td>2.5</td><td>µg/L</td><td>1</td><td>10/20/2016</td><td>R38745</td></t<>	Propionitrile	ND	2.5	µg/L	1	10/20/2016	R38745	
Hor of National Action Hor of Notice pg/L Hor of Notice Hor of Notice 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/	Tetrahydrofuran	ND	0.50	μα/l	1	10/20/2016	R38745	
Dollario ND 0.00 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 Bromobenzene ND 0.50 µg/L 1 <td< td=""><td>Benzene</td><td>ND</td><td>0.50</td><td>µg/L</td><td>1</td><td>10/20/2016</td><td>R38745</td></td<>	Benzene	ND	0.50	µg/L	1	10/20/2016	R38745	
Folderic 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	Toluene	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	Fthylbenzene	ND	0.50	µg/L 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	Methyl tert-butyl ether (MTBE)	ND	10	µg/L µg/l	1	10/20/2016	R38745	
1,2,4 minutividenzence 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	1.2.4-Trimethylbenzene	ND	0.50	µg/⊑ ⊔a/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	1 3 5-Trimethylbenzene	ND	0.50	µg/L µg/l	1	10/20/2016	R38745	
1,2-Diblocentatic (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	1,3,5- Trimetrybenzene 1,2-Dichloroethane (EDC)	ND	0.50	µg/L ug/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	1,2-Dibrioroethane (EDB)		0.50	µg/L	1	10/20/2016	R30743	
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 Bromodichloromethape ND 0.50 μg/L 1 10/20/2016 R38745	Nanhthalana		0.50	µg/L	1	10/20/2016	D29745	
ND 2.5 μg/L 1 10/20/2016 R36/45 Bromobenzene ND 0.50 μg/L 1 10/20/2016 R38745 Bromodichloromethane ND 0.50 μg/L 1 10/20/2016 R38745	Acetone		25	µy/∟ ug/l	1	10/20/2010	D20745	
Bromodichloromethape ND 0.50 μg/L 1 10/20/2016 R30/45	Riomobonzono		2.0 0.50	µg/∟ ug/l	1	10/20/2010	R30143	
	Bromodichloromethane		0.50	µg/⊏ ug/l	1	10/20/2016	R30743	

Hall Environmental Analysis Laboratory, Inc.

Client Sample ID: TRIP BLANK Collection Date:

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

CLIENT: Navajo Refining Company

-

_

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

0.50

0.50

µg/L

µg/L

ND

ND

Oualifiers: * Value exceeds Maximum Contaminant Level.

> D Sample Diluted Due to Matrix

Bromoform

Bromomethane

- Н 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
- В Analyte detected in the associated Method Blank

1

1

- Е Value above quantitation range
- Analyte detected below quantitation limits Page 9 of 29 J

10/20/2016

10/20/2016

R38745

R38745

- Р Sample pH Not In Range
- RL Reporting Detection Limit
- Sample container temperature is out of limit as specified W

Analytical Report Lab Order 1610612

Hall Environmental Analysis Laboratory, Inc.

Date Reported: 11/16/2016

Client Sample ID: TRIP BLANK Collection Date:

Project: Quarterly WDW-1, 2, &3 Inj Well Lab ID: 1610612-002

CLIENT: Navajo Refining Company

Matrix: TRIP BLANK Received Date: 10/13/2016 8:30:00 AM

Analyses	Result	PQL Qu	al Units	DF	Date Analyze	d 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

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

Oualifiers: * Value exceeds Maximum Contaminant Level.

- D Sample Diluted Due to Matrix
- Н 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
- В Analyte detected in the associated Method Blank
- Е Value above quantitation range
- Analyte detected below quantitation limits Page 10 of 29 J
- Р Sample pH Not In Range
- RL Reporting Detection Limit

Sample container temperature is out of limit as specified W

CLIENT: Navajo Refining Company	Client Sample ID: TRIP BLANK Collection Date:					
Project: Quarterly WDW-1, 2, &3 Inj						
Lab ID: 1610612-002	Matrix:	TRIP BLAN	K Received	Date: 10	/13/2016 8:30:0	00 AM
Analyses	Result	PQL Q	ual Units	DF	Date Analyze	ed 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
lodomethane	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

Hall Environmental Analysis Laboratory, Inc.

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

Qualifiers: * Value exceeds Maximum Contaminant Lev	vel.
---	------

- D Sample Diluted Due to Matrix
- Н 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
- В Analyte detected in the associated Method Blank
- Е Value above quantitation range
- Analyte detected below quantitation limits Page 11 of 29 J
- Р Sample pH Not In Range
- RL Reporting Detection Limit
- Sample container temperature is out of limit as specified W

QC SUMMARY REPORT	
Hall Environmental Analysis Laboratory, Inc.	

WO#:	1610612
	16-Nov-16

Client: Project:	Navajo R Quarterly	efining Co WDW-1,	mpany 2, &3	Inj Well								
Sample ID	MB	SampT	ype: ME	BLK	TestCode: EPA Method 300.0: Anions							
Client ID:	PBW	Batch	n ID: R3	7942	F	RunNo: 3	7942					
Prep Date:		Analysis D	ate: 10	0/13/2016	S	SeqNo: 1	182401	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, Ort	hophosphate (As P	ND	0.50									
Nitrate+Nitrite as	N	ND	0.20									
Sample ID	_CS	SampT	ype: LC	s	Tes	tCode: El	PA Method	300.0: Anions	;			
Client ID:	_CSW	Batch	n ID: R3	7942	F	RunNo: 3	7942					
Prep Date:		Analysis D	ate: 10	0/13/2016	S	SeqNo: 1	182402	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, Ort	hophosphate (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	SampT	ype: ME	BLK	Tes	PA Method	;					
Client ID:	PBW	Batch	n ID: R3	8187	F	8187						
Prep Date:		Analysis D	ate: 10	0/25/2016	S	SeqNo: 1	193019	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	_CS	SampT	ype: LC	s	Tes	tCode: El	e: EPA Method 300.0: Anions					
Client ID: I	_CSW	Batch	n ID: R3	8187	RunNo: 38187							
Prep Date:		Analysis D	ate: 10	0/25/2016	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				

- * 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
- Page 12 of 29

WO#: 1610612 16-Nov-16

Client: Nava Project: Quar	ajo Refining Co rterly WDW-1,	ompany 2, &3	Inj Well									
Sample ID MB-R38745	SampT	SampType: MBLK			TestCode: EPA Method 8260B: VOLATILES							
Client ID: PBW	Batcl	n ID: R3	8745	F	RunNo: 3	8745						
Prep Date:	Analysis E	Date: 10)/20/2016	S	SeqNo: 1	210379	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										

- * 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
- Page 13 of 29

WO#: 1610612

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

Sample ID MB-R38745	SampT	Гуре: М	BLK	TestCode: EPA Method 8260B: VOLATILES						
Client ID: PBW	Batcl	h ID: R3	8745	F	RunNo: 3	88745				
Prep Date:	Analysis D	Date: 1	0/20/2016	S	SeqNo: 1	210379	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								
lodomethane	ND	0.50								
trans-1,4-Dichloro-2-butene	ND	0.50								
Vinyl acetate	ND	0.50								
Sample ID LCS-R38745	SampT	Гуре: LC	S	Tes						
Client ID: LCSW	Batcl	h ID: R3	8745	F	RunNo: 3	88745				
Prep Date:	Analysis E	Date: 1	0/20/2016	S	SeqNo: 1	210380	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			

Qualifiers:

o-Xylene

Trichloroethene (TCE)

- * Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded

9.7

10

0

0

10.00

10.00

- 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

96.6

102

- J Analyte detected below quantitation limits
- P Sample pH Not In Range

0

0

- RL Reporting Detection Limit
- W Sample container temperature is out of limit as specified

80

80

120

120

Page 14 of 29

WO#: 1610612 16-Nov-16

Client: Project:	Navajo Refining C Quarterly WDW-1	company , 2, &3	Inj Well							
Sample ID MB-R38	Sample ID MB-R38745 SampType: MBLK		TestCode: EPA 8270C: Semivolatiles/Mod							
Client ID: PBW	Bate	ch ID: R3	8745	F	RunNo:	38745				
Prep Date:	Analysis	Date: 1	0/29/2016	\$	SeqNo:	1210383	Units: µg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	C LowLimit	HighLimit	%RPD	RPDLimit	Qual
Acetophenone	ND	5.0								
1-Methylnaphthalene	ND	5.0								
2,3,4,6-Tetrachloropheno	I 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-methylpheno	ND ND	5.0								
4-Bromophenyl phenyl etl	her ND	5.0								
4-Chloro-3-methylphenol	ND	5.0								
4-Chloroaniline	ND	5.0								
4-Chlorophenyl phenyl etl	her 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)metha	ne ND	5.0								
Bis(2-chloroethyl)ether	ND	5.0								
Bis(2-chloroisopropyl)ethe	er ND	5.0								
Bis(2-ethylhexyl)phthalate	e ND	5.0								
Butyl benzyl phthalate	ND	5.0								
Carbazole	ND	5.0								

- * 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
- Page 15 of 29

QC SUMMARY REPORT	
Hall Environmental Analysis Laboratory, Inc	C.

WO#: 1610612 16-Nov-16

Client: Project:	Navajo Ro Quarterly	efining Co WDW-1,	ompany 2, &3	Inj Well								
Sample ID MB-R38	Sample ID MB-R38745 SampType: MBLK			TestCode: EPA 8270C: Semivolatiles/Mod								
Client ID: PBW		Batch ID: R38745		R	unNo: 3	8745						
Prep Date:		Analysis D	Date: 10	0/29/2016	S	eqNo: 1	210383	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									
Hexachlorocyclopentadie	ne	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-propylamin	е	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-Tetrachlorobenze	ene	ND	5.0									

Sample ID LCS-R38745	SampType: LCS			Test	Code: EF					
Client ID: LCSW	Batch ID: R38745			R	unNo: 38	3745				
Prep Date:	Analysis Date: 10/29/2016		/29/2016	S	eqNo: 12	210384	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.
- 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

Page 16 of 29
Client:Navajo Refining CompanyProject:Quarterly WDW-1, 2, &3 Inj Well

Sample ID LCS-R38745	SampT	ype: LC	S	Test						
Client ID: LCSW	Batch ID: R38745 RunNo: 38745									
Prep Date:	Analysis D	ate: 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			

- * 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
- Page 17 of 29

WO#:	1610612

Client: Project:	Navajo R Quarterly	efining Compa WDW-1, 2, 8	nny 23 Inj Well								
Sample ID	MB-28113	SampType:	MBLK	TestCode: EPA Method 7470: Mercury							
Client ID:	PBW	Batch ID:	28113	R	unNo: 380)30					
Prep Date:	10/17/2016	Analysis Date:	10/18/2016	S	eqNo: 118	35736	Units: mg/L				
Analyte		Result PC	L SPK value	SPK Ref Val	%REC I	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Mercury		ND 0.000	20								
Sample ID	LCS-28113	SampType:	LCS	Test	Code: EPA	A Method	7470: Mercury	y			
Client ID:	LCSW	Batch ID:	28113	R	RunNo: 38030						
Prep Date:	10/17/2016	Analysis Date:	10/18/2016	S	eqNo: 118	35737	Units: mg/L				
Analyte		Result PC	L SPK value	SPK Ref Val	%REC I	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Mercury		0.0047 0.000	0.005000	0	93.6	80	120				
Sample ID	1610612-001BMS	SampType:	MS	Test	Code: EPA	A Method	7470: Mercury	y			
Client ID:	WDW-1,2,&3 Efflu	en Batch ID:	28113	RunNo: 38030							
Prep Date:	10/17/2016	Analysis Date:	10/18/2016	S	eqNo: 118	35804	Units: mg/L				
Analyte		Result PC	L SPK value	SPK Ref Val	%REC I	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Mercury		0.0061 0.000	0.005000	0.0001625	118	75	125				
Sample ID	1610612-001BMS	D SampType:	MSD	Test	Code: EPA	A Method	7470: Mercury	y			
Client ID:	WDW-1,2,&3 Efflu	en Batch ID:	28113	R	unNo: 380	030					
Prep Date:	10/17/2016	Analysis Date:	10/18/2016	S	eqNo: 118	35805	Units: mg/L				
Analyte		Result PC	L SPK value	SPK Ref Val	%REC I	LowLimit	HighLimit	%RPD	RPDLimit	Qual	
Mercury		0.0059 0.000	0.005000	0.0001625	114	75	125	3.16	20		

- * 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
- Page 18 of 29

WO#:	1610612
	16-Nov-16

Client: Project:	Navaj Quart	o Refining Compa erly WDW-1, 2, 8	ny z3 Inj Well						
Sample ID	MB-28165	SampType:	MBLK	Test	Code: MERCURY,	TCLP			
Client ID:	PBW	Batch ID:	28165	R	unino: 38056	liniter menul			
Prep Date:	10/19/2016	Analysis Date:	10/19/2016	5	eqino: 1186813	Units: mg/L			
Analyte		Result PC	L SPK value	SPK Ref Val	%REC LowLimit	t HighLimit	%RPD	RPDLimit	Qual
Mercury		ND 0.0	20						
Sample ID	LCS-28165	SampType:	LCS	Test	Code: MERCURY,	TCLP			
Client ID:	LCSW	Batch ID:	28165	R	unNo: 38056				
Prep Date:	10/19/2016	Analysis Date:	10/19/2016	S	eqNo: 1186814	Units: mg/L			
Analyte		Result PC	L SPK value	SPK Ref Val	%REC LowLimi	t HighLimit	%RPD	RPDLimit	Qual
Mercury		ND 0.0	0.005000	0	104 80) 120			

- * 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
- Page 19 of 29

Hall Er	nvironment	REPU al Analy	ysis I	Laborat	ory, Inc.					WO#:	1610612 16-Nov-16	
Client: Project:	Navajo F Quarterly	Refining Co y WDW-1,	ining Company VDW-1, 2, &3 Inj Well									
Sample ID	MB-28191	SampT	ype: MI	BLK	Tes							
Client ID:	PBW	Batch	n ID: 28	191	F	RunNo: 38144						
Prep Date:	10/20/2016	Analysis D	ate: 1	0/24/2016	:	SeqNo: 1	190360	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	SampT	SampType: LCS			tCode: E	PA Method	6010B: TCL	P Metals			
Client ID:	LCSW	Batch	n ID: 28	191	F	RunNo: 3	8144					
Prep Date:	10/20/2016	Analysis Date: 10/24/2016			:	SeqNo: 1	190361	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	SampT	ype: MI	BLK	TestCode: EPA Method 6010B: TCLP Metals							
Client ID:	PBW	Batch	n ID: 28	191	F	RunNo: 3	8144					
Prep Date:	10/20/2016	Analysis D	ate: 1	0/24/2016	:	SeqNo: 1	190451	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									

* Value exceeds Maximum Contaminant Level.

OC SUMMARY REPORT

- D Sample Diluted Due to Matrix
- Holding times for preparation or analysis exceeded Н
- ND Not Detected at the Reporting Limit
- R RPD outside accepted recovery limits
- S % Recovery outside of range due to dilution or matrix
- В Analyte detected in the associated Method Blank
- Е Value above quantitation range
- Analyte detected below quantitation limits J
- Р Sample pH Not In Range
- RL Reporting Detection Limit
- W Sample container temperature is out of limit as specified

Page 20 of 29

QC SUMMARY REPORT	
Hall Environmental Analysis Laboratory, Inc	

WO#: 1610612

Qual

%RPD

RPDLimit

Page 21 of 29

Client: Project:	Navajo Quarte						
Sample ID	MB-28190	SampType: N	MBLK	Test	Code: El	PA 6010B:	Metals
Client ID:	PBW	Batch ID: 2	28190	R	unNo: 3	8332	
Prep Date:	10/20/2016	Analysis Date:	10/31/2016	S	eqNo: 1	196520	Units: mg/L
Analyte		Result PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit
Aluminum		ND 0.02	0				

	ND 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	Samp	Type: LC	S	Test								
Client ID: LCSW	Batc	h ID: 28	190	R	lunNo: 3	8332						
Prep Date: 10/20/2016	Analysis Date: 10/31/2016			S	SeqNo: 1	196521	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					

- Value exceeds Maximum Contaminant Level. *
- D Sample Diluted Due to Matrix
- Η 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
- В Analyte detected in the associated Method Blank
- Е Value above quantitation range
- J Analyte detected below quantitation limits
- Р Sample pH Not In Range
- RL Reporting Detection Limit
- Sample container temperature is out of limit as specified W

UC SU	vironmont	I KEF	UKI Iveie I	aharat	ory Inc					WO#:	1610612
		lai Alla	19515 1		ory, me.						16-Nov-16
Client:	Navajo	Refining C	Company								
Project:	Quarter	ly WDW-1	1, 2, &3	Inj Well							
Sample ID	LCS-28190	Samp	Type: LC	s	TestCode: EPA 6010B: Metals						
Client ID:	LCSW	Bate	ch ID: 28	190	F	RunNo: 3	8332				
Prep Date:	10/20/2016	Analysis	Date: 1	0/31/2016	S	SeqNo: 1196521					
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	1610612-001BM	S Samp	туре: М	S	Tes	tCode: E	PA 6010B:	Metals			
Client ID:	WDW-1,2,&3 Eff	luen Bate	ch ID: 28	190	F	RunNo: 3	8332				
Prep Date:	e: 10/20/2016 Analysis Date: 10/31/2016						196523	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	1610612-001BM	SD Samp	Туре: М	SD	Tes	tCode: E	PA 6010B:	Metals			
Client ID:	WDW-1,2,&3 Eff	luen Bate	ch ID: 28	190	F	RunNo: 3	8332				
Prep Date:	10/20/2016	Analysis	Date: 1	0/31/2016	5	SeqNo: 1	196524	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.
- D Sample Diluted Due to Matrix
- Holding times for preparation or analysis exceeded Η
- ND Not Detected at the Reporting Limit
- R RPD outside accepted recovery limits
- S % Recovery outside of range due to dilution or matrix
- В Analyte detected in the associated Method Blank
- Е Value above quantitation range
- J Analyte detected below quantitation limits
- Р Sample pH Not In Range
- RL Reporting Detection Limit
- W Sample container temperature is out of limit as specified

Page 22 of 29

Navajo Refining Company

WO#: 1610612

16-Nov-16

Sample ID 1610612-001BMSD SampType: MSD TestCode: EP4 6010B: Metals Client ID: WDW-1,2,43 Effluen Batch ID: 28190 RunNo: 38332 Prep Date: 10/20/2016 Analysis Date: 10/31/2016 SeqNo: 1196524 Units: mg/L Analysic Result POL SPK value SPK Ref Val %REC LowLimit HighLimit &RPD Imit Qual Cohanium 0.46 0.0060 0.5000 0 98.2 75 125 1.47 20 Cobali 0.46 0.0060 0.5000 0 93.8 75 125 1.92 20 Copper 0.54 0.0060 0.5000 0 93.8 75 125 1.45 20 Manganese 0.52 0.0020 0.5000 0 103 75 125 1.49 20 Skerium 0.45 0.050 0.5000 0.01260 86.9 75 125 1.4	Project:	Quarterl	y WDW-1	, 2, &3	Inj Well							
Client ID: WDW-1.2, Å3 Effluer Bach ID: 2819 Run N: 3832 Prep Date: 10/20/2016 Analysis Date: 10/31/2016 Seq No: 119652 Units: mg/L PRDLimit Qual Cadmium 0.490 0.0020 0.5000 0 98.2 775 125 1.47 20 Cadmium 0.46 0.0060 0.5000 0.00280 91.8 775 125 1.92 2.00 Cohenium 0.64 0.050 0.5000 0.01733 102 775 125 2.59 2.00 Cohenium 0.64 0.050 0.5000 0.01733 102 775 125 1.45 2.00 Kanganese 0.52 0.500 0.01260 93.8 75 125 1.45 2.00 Nickel 0.51 0.500 0.0100 0 103 75 125 1.45 2.00 Manganese 0.52 0.500 0.0102 101 75 125 1.45 2.00 Sinfer 0.10 0.50 0.50	Sample ID	1610612-001BMS	SD Samp	Туре: М	SD	Tes	tCode: El	PA 6010B:	Metals			
Prep Date: 10/20/2016 Analysis Dets: 10/31/2016 SPK Ref Val % Ref Val % Ref C LowLimit HighLimit % RPD RPDLimit Qual Cadmium 0.49 0.002 0.5000 0 92.2 75 125 1.47 20 Commum 0.46 0.0060 0.5000 0.00326 91.8 75 125 1.81 20 Commum 0.46 0.0060 0.5000 0.01704 104 75 125 0.996 20 Copper 0.644 0.050 0.5000 0.01333 102 75 125 1.05 20 Manganese 0.62 0.5000 0.0102 75 125 1.45 20 Steenlum 0.61 0.050 0.5000 0.00620 94.3 75 125 1.45 20 Steenlum 0.61 0.050 0.05000 0.0102 75 125 1.45 20 Steenlum 0.61 0.050 0.00170 101 75 125 1.45 20 V	Client ID:	WDW-1,2,&3 Effl	uen Bato	h ID: 28	190	RunNo: 38332						
Analyte Result PQL SPK value SPK Ref Val %REC LowLinit HighLinit %RPD RPDLinit Qual Cadmium 0.46 0.0020 0.5000 0 98.2 75 125 1.47 20 Commium 0.46 0.0060 0.5000 0.00226 91.8 75 125 1.91 200 Cobalt 0.46 0.0060 0.5000 0.01704 104 75 125 9.98 200 Coper 0.64 0.060 0.5000 0.01733 102 75 125 1.65 200 tead 0.47 0.0500 0.0500 0.0527 94.4 75 125 1.45 200 Mikel 0.48 0.010 0.5000 0.0500 0.0123 75 125 1.45 20 Sher 0.51 0.0500 0.5000 0.01620 101 75 125 1.60 20 Vanadum 0.51	Prep Date:	10/20/2016	Analysis I	Date: 10	0/31/2016	SeqNo: 1196524 Units: mg/L						
Cadmium 0.46 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 Copper 0.54 0.0060 0.5000 0.01704 104 75 125 1.92 2.99 20 Copper 0.54 0.0060 0.5000 0.01353 102 75 125 1.05 2.09 Itead 0.47 0.0500 0.00522 94.3 75 125 1.45 20 Maganese 0.51 0.050 0.5000 0 102 75 125 1.45 20 Steinum 0.51 0.050 0.5000 0.0102 75 125 1.48 20 Steinum 0.51 0.050 0.5000 0.02160 86.9 75 125 1.30 20 Steinum 0.52 0.200 0.5000 0.00120 1	Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
$ \begin{array}{ c c c c c c } \begin{tabular}{ c c c c c c } \begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	Cadmium		0.49	0.0020	0.5000	0	98.2	75	125	1.47	20	
Cabalit 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 Iton 0.644 0.050 0.5000 0.01704 104 75 125 1.25 2.0 Lead 0.47 0.0050 0.5000 0.03227 94.4 75 125 1.45 20 Manganese 0.51 0.050 0.5000 0.00620 94.3 75 125 1.45 20 Selenium 0.51 0.050 0.5000 0.006120 101 75 125 1.49 20 Silver 0.051 0.050 0.5000 0.00120 101 75 125 1.60 20 Vanadium 0.51 0.050 0.000120 101 75 125 1.35 20 Sample ID 1610612-001BMS SampType: MSD TestCode: EP	Chromium		0.46	0.0060	0.5000	0	92.6	75	125	1.81	20	
Copper 0.54 0.0500 0.5000 0.01704 104 75 125 0.996 20 toon 0.64 0.050 0.5000 0.1353 102 75 125 2.59 20 Manganese 0.52 0.0020 0.5000 0 93.8 75 125 1.45 20 Nekel 0.48 0.010 0.5000 0 102 75 125 1.45 20 Nekel 0.48 0.010 0.5000 0 102 75 125 1.49 20 Selenium 0.51 0.050 0.5000 0.01260 86.9 75 125 3.22 20 Vanadium 0.51 0.50 0.5000 0.02719 98.2 75 125 1.60 20 Zinc 0.52 0.020 0.5000 0.02612 101 75 125 1.60 20 Sample ID 1610612-001BMSS SampType: MS TestCode: EPA 6010	Cobalt		0.46	0.0060	0.5000	0.003260	91.8	75	125	1.92	20	
$ \begin{array}{ $	Copper		0.54	0.0060	0.5000	0.01704	104	75	125	0.996	20	
Lead 0.47 0.050 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 Nikel 0.48 0.010 0.5000 0.05227 94.3 75 125 1.45 20 Selenium 0.51 0.050 0.5000 0 102 75 125 1.49 20 Silver 0.10 0.050 0.1000 0 103 75 125 1.49 20 Vanadium 0.45 0.050 0.5000 0.01260 86.9 75 125 1.30 20 Vanadium 0.51 0.500 0.000120 101 75 125 1.35 20 Sample ID 1610612-001BMS SampType: MS TestCode: EPA 6010B: Metals 1.05 20	Iron		0.64	0.050	0.5000	0.1353	102	75	125	2.59	20	
Marganese 0.52 0.0020 0.5000 0.05227 94.4 75 125 1.23 20 Nickel 0.48 0.010 0.000520 94.3 75 125 1.45 20 Selenium 0.051 0.050 0.5000 0 102 75 125 1.49 20 Selenium 0.051 0.050 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 0.02719 98.2 75 125 1.35 20 Sample ID 1610612-001BMS SampType: MS TestCode: EPA 6010B: Metals E 20<	Lead		0.47	0.0050	0.5000	0	93.8	75	125	1.05	20	
Nickel 0.48 0.010 0.500 0.006520 94.3 75 125 1.45 20 Selenium 0.51 0.050 0.500 0 102 75 125 1.49 20 Silver 0.10 0.050 0.5000 0.01260 86.9 75 125 3.22 20 Vanadium 0.45 0.050 0.5000 0.02120 101 75 125 1.60 20 Vanadium 0.51 0.050 0.5000 0.02719 98.2 75 125 1.60 20 Zinc 0.52 0.02 0.5000 0.02719 98.2 75 125 1.60 20 Zinc 0.52 0.02 0.500 0.02719 98.2 75 125 1.35 20 Sample ID 1610612-001BMS SampType: MS TestCode: EPA 6010B: Metals EVE Vee	Manganese		0.52	0.0020	0.5000	0.05227	94.4	75	125	1.23	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 Thallum 0.45 0.050 0.5000 0.01260 86.9 75 125 3.22 20 Vanadium 0.52 0.020 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 20 <	Nickel		0.48	0.010	0.5000	0.006520	94.3	75	125	1.45	20	
Silver 0.10 0.0050 0.1000 0 103 75 125 1.49 20 Thallum 0.45 0.050 0.0500 0.01260 86.9 75 125 3.22 20 Vanadium 0.51 0.050 0.5000 0.006120 101 75 125 1.60 20 Sample ID 1610612-001BMS SampType: MS TestCode: EPA 6010B: Metals 20 Client ID: WDW-1,2,&3 Effluen Batch ID: 28190 RunNo: 38332 V	Selenium		0.51	0.050	0.5000	0	102	75	125	1.76	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 0.02 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 Analytis 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 5.31 20 Sample ID 1610612-001BMSD SampType: MSL TestCode: EPA 6010B: Metals Client ID: WDW-1,2,&3 Effluen Batch ID: <t< td=""><td>Silver</td><td></td><td>0.10</td><td>0.0050</td><td>0.1000</td><td>0</td><td>103</td><td>75</td><td>125</td><td>1.49</td><td>20</td><td></td></t<>	Silver		0.10	0.0050	0.1000	0	103	75	125	1.49	20	
Vanadium 0.51 0.050 0.500 0.000120 101 75 125 1.60 20 Zinc 0.52 0.020 0.500 0.02719 98.2 75 125 1.35 20 Sample ID 1610612-001BMS SampType: MS TestCode: EPA 6010B: Metals Vetals	Thallium		0.45	0.050	0.5000	0.01260	86.9	75	125	3.22	20	
Zinc 0.52 0.020 0.500 0.02719 98.2 75 125 1.35 20 Sample ID 1610612-001BMS SampType: MS TestCode: EPA 6010B: Metals Image: Content of the test of test	Vanadium		0.51	0.050	0.5000	0.006120	101	75	125	1.60	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 Kef 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 EVE Volume POL MM 75 125 Sample ID 1610612-001BMSD SampType: MSD TestCode: EPA 6010B: Metals EVE Volume POL MM Qual Sample ID 1610612-001BMSD SampType: MSD TestCode: EPA 6010B: Metals Units: mg/L Client ID: WDW-1,2,&3 Effluen Batch ID: 28190 RunNo: 38332 Volume POL init MignLimit %RPD RPDLimit Qual	Zinc		0.52	0.020	0.5000	0.02719	98.2	75	125	1.35	20	
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 Ref Val %REC LowLimit HighLimit %RPD RPDLimit Qual Polassium 180 5.0 50.00 123.0 104 75 125 125 125 Sample ID 1610612-001BMSD SampType: MS TestCode: EPA 6010B: Metals 125	Sample ID	1610612-001BMS	Samp	Туре: М	5	Tes	tCode: El	PA 6010B:	Metals			
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 75 125 105 Sample ID 1610612-001BMSD SampType: MSD TestCode: EPA 6010B: Metals Client ID: WDW-1,2,&3 Effluen Batch ID: 28190 RunNo: 38332 104 75 125 105 105 Analyte Result PQL SPK value SPK Ref Val %REC LowLimit HighLimit %RPD RPDLimit Qual Prep Date: 10/20/2016 Analysis Date: 10/31/2016 SeqNo: 1196527 Units: mg/L Analyte Result PQL SPK Neef Val %REC LowLimit HighLimit %RPD RPDLimit Qual Potassium 180 5.0 50.00 123.0 123 75 125	Client ID:	WDW-1,2,&3 Effl	uen Bato	h ID: 28	190	F	RunNo: 3	8332				
Analyte Result PQL SPK value SPK Ref Val %REC LowLimit HighLimit %RPD RPDLimit Qual Potassium 180 5.0 50.00 123.0 104 75 125 104 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 <td>Prep Date:</td> <td>10/20/2016</td> <td>Analysis I</td> <td>Date: 1</td> <td>0/31/2016</td> <td>Ş</td> <td>SeqNo: 1</td> <td>196526</td> <td>Units: mg/L</td> <td></td> <td></td> <td></td>	Prep Date:	10/20/2016	Analysis I	Date: 1	0/31/2016	Ş	SeqNo: 1	196526	Units: mg/L			
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	Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
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 ND 1.0 SeqNo: 1.0 <	Potassium		180	5.0	50.00	123.0	104	75	125			
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 ND 1.0 ND 1.0 Sequeree Sequeree Sequeree Sequeree Sequeree Sequeree Sequeree Sequeree S	Sample ID	1610612-001BM	SD Samp	Туре: М	SD	Tes	tCode: El	PA 6010B:	Metals			
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 Units: mg/L 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 Magnesium ND 1.0 ND 1.0 ND 1.0 ND ND 1.0	Client ID:	WDW-1,2,&3 Effl	uen Bato	h ID: 28	190	F	RunNo: 3	8332				
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 Analyte Result PQL SPK value SPK Ref Val %REC LowLimit HighLimit %RPD RPDLimit Qual Calcium ND 1.0 Sequence Seque	Prep Date:	10/20/2016	Analysis I	Date: 10	0/31/2016	S	SeqNo: 1	196527	Units: mg/L			
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 ND 1.0 ND 1.0	Analyte		Result	POI	SPK value	SPK Ref Val	%RFC	l owl imit	Highl imit	%RPD	RPDI imit	Qual
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 ND 1.0 Sedium ND 1.0	Potassium		180	5.0	50.00	123.0	123	75	125	5.31	20	
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	Sample ID	MB-28190	Samp	Tvpe: MB	BLK	Tes	tCode: El	PA 6010B:	Metals			
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	Client ID:	PBW	Bato	h ID: 28	190	F	RunNo: 3	8490				
Analyte Result PQL SPK value SPK Ref Val %REC LowLimit HighLimit %RPD RPDLimit Qual Calcium ND 1.0 Magnesium ND 1.0 Sedium ND 1.0	Prep Date:	10/20/2016	Analysis I	Date: 1	1/7/2016	Ş	SeqNo: 1	202197	Units: mg/L			
Calcium ND 1.0 Magnesium ND 1.0	Analyte		Result	POI	SPK value	SPK Ref Val	%RFC	l owl imit	u Highl imit	%RPD	RPDI imit	Qual
Magnesium ND 1.0	Calcium		ND	10			,	Lonemat	7.19.12.11.11	, or of D		હતવા
	Magnesium		ND	1.0								
Sodum ND 1.0	Sodium		ND	1.0								

Qualifiers:

Client:

- * 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

Page 23 of 29

Client: Project:	Navajo R Quarterly	efining Co WDW-1,	ompany 2, &3	Inj Well							
Sample ID	LCS-28190	Samp	Type: LC	s	Tes	tCode: El	PA 6010B:	Metals			
Client ID:	LCSW	Batc	h ID: 28	190	F	RunNo: 3	8490				
Prep Date:	10/20/2016	Analysis [Date: 1'	1/7/2016	S	SeaNo: 1	202198	Units: ma/L			
Analyta		Desult							0/ 000		Qual
Calcium		Result	PQL	SPK value	SPK Ref Val	%REC	LOWLIMIT	HighLimit	%RPD	RPDLIMIt	Quai
Magnesium		52	1.0	50.00	0	102	80	120			
Sodium		51	1.0	50.00	0	100	80	120			
Sample ID	1610612-001BMS	Samp	Type: MS	5	Tes	tCode: El	PA 6010B:	Metals			
Client ID:	WDW-1,2,&3 Efflu	en Batc	h ID: 28	190	F	RunNo: 3	8490				
Prep Date:	10/20/2016	Analysis [Date: 1'	1/7/2016	5	SeqNo: 12	202200	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	1610612-001BMS	o Samp⊺	Гуре: М	SD	Tes	tCode: El	PA 6010B:	Metals			
Client ID:	WDW-1,2,&3 Efflu	en Batc	h ID: 28	190	F	RunNo: 3	8490				
Prep Date:	10/20/2016	Analysis [Date: 1	1/7/2016	S	SeqNo: 1	202201	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	Samo	Type MS	3	Tes	tCode: FI	PA 6010B·	Metals			
Client ID:	WDW-1 2 &3 Efflu	en Batc	h ID: 28	190	F		8490	inotaio			
Pron Date:	10/20/2016)ato: 11	1/7/2016	, i		202203	Unite: ma/l			
TTOP Date.	10/20/2010	-						01113. 111g/			. .
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
		140	5.0	50.00	95.77	95.5	75	125			
Sample ID	1610612-001BMS	Samp	Гуре: М	SD	Tes	tCode: El	PA 6010B:	Metals			
Client ID:	WDW-1,2,&3 Efflu	en Batc	h ID: 28	190	F	RunNo: 3	8490				
Prep Date:	10/20/2016	Analysis [Date: 1	1/7/2016	S	SeqNo: 12	202211	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.
- 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

1610612

WO#:

Page 24 of 29

WO#:	1610612
	16-Nov-16

Client: Project:	Navajo Quarter	Refining Co ly WDW-1,	mpany 2, &3	Inj Well							
Sample ID	MB-R38745 PBW	SampTy	/pe: MI	BLK	Tes	tCode: C	YANIDE, Re	eactive			
Prep Date:		Analysis Daten	ate: 10	0/25/2016	S	SeqNo: 1	210388	Units: mg/L			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cyanide, Read	tive	ND	1.00								
Sample ID Client ID:	LCS-R38745 LCSW	SampTy Batch	/pe: LC ID: R3	CS 38745	Tes F	tCode: C	YANIDE, Re 8745	eactive			
Prep Date:		Analysis Da	ate: 1	0/25/2016	5	SeqNo: 12	210389	Units: mg/L			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cyanide, Read	tive	0.542		0.5000	0	108	80	120			

- * Value exceeds Maximum Contaminant Level.
- Sample Diluted Due to Matrix D
- Н 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
- В Analyte detected in the associated Method Blank
- Е Value above quantitation range
- J Analyte detected below quantitation limits
- Sample pH Not In Range Р
- RL Reporting Detection Limit
- W Sample container temperature is out of limit as specified
- Page 25 of 29

WO#:	1610612
	16-Nov-16

Client: Project:	Nav Qua	ajo Refining C arterly WDW-1	ompany , 2, &3	Inj Well							
Sample ID	MB-R38745	Samp	Туре: М	BLK	Tes	tCode: SI	JLFIDE, Re	active			
Client ID:	PBW	Bato	h ID: R	38745	F	RunNo: 3	8745				
Prep Date:		Analysis I	Date: 1	0/18/2016	S	SeqNo: 12	210391	Units: mg/L			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Reactive Sulfide	e	ND	1.0								
Sample ID	LCS-R3874	5 Samp	Type: LO	cs	Tes	tCode: SI	JLFIDE, Re	active			
Client ID:	LCSW	Bato	h ID: R	38745	F	RunNo: 3	8745				
Prep Date:		Analysis I	Date: 1	0/18/2016	5	SeqNo: 12	210392	Units: mg/L			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Reactive Sulfide	9	0.16		0.2000	0	80.0	70	130			

- * 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
- Page 26 of 29

WO#:	1610612
	16-Nov-16

Client: Project:	Navajo Refining Comp Quarterly WDW-1, 2, a	any &3 Inj Well						
Sample ID mb Client ID: PB	-1 SampType W Batch ID: Analysis Date	mblk R38048	TestCode: SI RunNo: 3 SegNo: 1	M2320B: All 8048 186486	kalinity	CaCO3		
Analyte Total Alkalinity (as (Result P CaCO3) ND 20	QL SPK value SP	K Ref Val %REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sample ID Ics Client ID: LC Prep Date:	-1 SampType SW Batch ID: Analysis Date:	Elcs R38048 10/18/2016	TestCode: SI RunNo: 3 SeqNo: 1	M2320B: All 8048 186487	kalinity Units: mg/L	CaCO3		
Analyte Total Alkalinity (as (Result P CaCO3) 80.60 20	QL SPK value SP	K Ref Val %REC 0 101	LowLimit 90	HighLimit 110	%RPD	RPDLimit	Qual
Sample ID mb Client ID: PB Prep Date: Analyte	-2 SampType W Batch ID: Analysis Date: Result P	mblk R38048 10/18/2016 QL SPK value SP	TestCode: SI RunNo: 3 SeqNo: 1 K Ref Val %REC	M2320B: All 8048 186510 LowLimit	kalinity Units: mg/L HighLimit	CaCO3 %RPD	RPDLimit	Qual
Sample ID Ics Client ID: LC Prep Date:	-2 SampType SW Batch ID: Analysis Date:	E ICS R38048 10/18/2016	TestCode: SI RunNo: 3 SeqNo: 1	M2320B: All 8048 186511	kalinity Units: mg/L	CaCO3		

- * 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

Page 27 of 29

imental Analysis Laboratory, Inc.	16-Nov-16
Navajo Refining Company	
Quarterly WDW-1, 2, &3 Inj Well	

Ū			5						
Sample ID	1610612-001ADUP	SampType:	DUP	TestC	ode: Specific (Gravity			
Client ID:	WDW-1,2,&3 Effluen	Batch ID:	R38258	Ru	nNo: 38258				
Prep Date:	An	alysis Date:	10/27/2016	See	qNo: 1193976	Units:			
Analyte	R	esult PC	L SPK value	SPK Ref Val	%REC LowLir	mit HighLimit	%RPD	RPDLimit	Qual
Specific Gravity	/ 0.	9993	0				0.0400	20	

Qualifiers:

Client:

Project:

- Value exceeds Maximum Contaminant Level. *
- Sample Diluted Due to Matrix D
- Н 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
- В Analyte detected in the associated Method Blank
- Е Value above quantitation range
- J Analyte detected below quantitation limits
- Р Sample pH Not In Range
- RL Reporting Detection Limit
- W Sample container temperature is out of limit as specified

Page 28 of 29

1610612

WO#:

Client: Project:	Navajo Quarte	o Refining Cor erly WDW-1, 2	mpany 2, &3	Inj Well							
Sample ID	MB-28098	SampTy	/pe: ME	BLK	Tes	tCode: SI	M2540C MC	D: Total Diss	olved Sol	lids	
Client ID:	PBM	Batch	ID: 28	098	F	anno: 3	8034				
Prep Date:	10/17/2016	Analysis Da	ate: 10	0/18/2016	S	SeqNo: 1	185818	Units: mg/L			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved	l Solids	ND	20.0								
Sample ID	LCS-28098	SampTy	vpe: LC	s	Tes	tCode: SI	M2540C MC	D: Total Diss	olved Sol	lids	
Client ID:	LCSW	Batch	ID: 28	098	R	RunNo: 38	8034				
Prep Date:	10/17/2016	Analysis Da	ate: 10	0/18/2016	S	SeqNo: 1'	185819	Units: mg/L			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved	l Solids	1050	20.0	1000	0	105	80	120			

Qualifiers:

- * Value exceeds Maximum Contaminant Level.
- Sample Diluted Due to Matrix D
- Н 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
- В Analyte detected in the associated Method Blank
- Е Value above quantitation range
- J Analyte detected below quantitation limits
- Р Sample pH Not In Range
- RL Reporting Detection Limit
- W Sample container temperature is out of limit as specified

Page 29 of 29

HALL Hall Environme ENVIRONMENTAL ANALYSIS LABORATORY TEL: 505-345- Website: ww	ental Analysis Laboratory 4901 Hawkins NE Albuquerque, NM 87109 3975 FAX: 505-345-4107 w.hallenvironmental.com	Sam	nple Log-In Check List
Client Name: NAVAJO REFINING CO Work Ofder Nun	ber: 1610612		RcptNo: 1
Received by/date:	$\square \square$	N	
Logged By: Ashley Gallegos 10/13/2016 8:30:0	0 AM 🦻	Ŧ	
Completed By: Ashley Gallegos 10/13/2016 11:20:	49 AM 🔊	€₹	
Reviewed By: $\int \mathcal{E} \frac{12}{23 / 16} \frac{10}{10 / 13 / 16}$.	
1. Custody seals intact on sample bottles?	Yes 🛄	No 🗆	
2. Is chain of custody complete?	Yes 🔽		
3. How was the sample delivered?	Courier		
Log In			
4. Was an attempt made to cool the samples?	Yes 🔽	No 🗆	
5. Were all samples received at a temperature of >0° C to 6.0°C	Yes 🗹	No 🗌	
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 🔽	# of preserved
12. Does paperwork match bottle labels? (Note discrepancies on chain of custody)	Yes 🔽	No 🗌	for pH: 22 (C2)or (12)unless noted)
13 Are matrices correctly identified on Chain of Custody?	Yes 🗸	No 🗌	Adjusted? NO
14, Is it clear what analyses were requested?	Yes 🖌	No 🗌	
15. Were all holding times able to be met? (If no, notify customer for authorization.)	Yes 🗹	No 🗌	Checked by:
Special Handling (if applicable)			
16. Was client notified of all discrepancies with this order?	Yes	No 🗌	NA 🗹
Person Notified: Dat	e		
By Whom: Via:	🗌 eMail 🔄 Phone	e 🗌 Fax	🗋 In Person
Regarding:			
Client Instructions:			
18. <u>Cooler Information</u>			1
1 1.0 Good Yes	Sea, Date Sig	nea By	
	<u> </u>	-	

С О	hain-	of-Cu	stody Record	Turn-Aroun	d Time:		territoria de la construcción de la	Ì		NN		222	Z	T A		
Client: Nav	ajo Refir	ning Co.		X Standard	□ Rush					SIS	ľ		N I I	20	,),	
				Project Name	ini ini				www.hall	environm	ental.cor					
Mailing Ad	dress: P.	O. Box 1	59 Artesia,	Quarterly W	(DW-1, 2, & 3 Inj	Well	490	1 Hawkins	s NE - Albi	anbıənbr	, NM 871	60				
VM 88211	-0159			Project #: P	.O. # 167796		Te	. 505-345-	3975 F	ax 505-3	45-4107					
2 hone #: 5	75-748-0	3311							An	alysis Re	equest					
∋mail or Fa	tx#: 575-	746-545		Project Man	lager:		ci [:]	a	(,s	ця						
2A/QC Pac	kage:						7090 5000 100 503'	857(letal	6.35 96.3						
☐ Standar	ą		Level 4 (Full Validation)	Micki Schul	tz / Scott Denton	/ Mike Holder	(,s) 8 po 74 8 /43 /43 /43 /43 /43 /43 /43 /43 /43 /43		r09 N' Ja	א א ני ני ני	<u> </u>					
				Sampler:	Brady Hubbard		Br, Br, Dd. CO	SV SV	il b brit	/ / 4 (noi					
I EDD (T	(bde)			On Ice Sample Ter	X Yes E	D No	//ty,H Dal., bal., 16 Mé 16 Mé	N 846 N ' Jeil b Tisa S	ache 46 M	9/ 4 0						
Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative	HEAL NO UPUPIZ	Specific Gray SO4, TDS, p VOCs/SW-8 VOCs/SW-8	R.C.I/40 CFF (see attached SVOCs/SW-	8-WS\slsis 7470 (see at	Ca, K, Mg, N TCLP Metals						
10/11/16	00:6	Liquid	WDW-1, 2, & 3 Effluent	3	Neat/H2SO4	-001	×			×						
10/11/16	00:6	Liquid	WDW-1, 2, & 3 Effluent	~	HNO3				×	×						
10/11/16	00:6	Liquid	WDW-1, 2, & 3 Effluent	ю	HCL		×									
10/11/16	9:00	Liquid	WDW-1, 2, & 3 Effluent	2	Neat			×								
10/11/16	00:6	Liquid	WDW-1, 2, & 3 Effluent	7	Neat			×								
10/11/16	9:00	Liquid	Trip Blank	2	Neat	-002	×									
10/11/16	9:00	Liquid	Temperature Blank	-	Neat							_			_	
																
-																<u> </u>
				¢												
Jate: 0-11-16	Time: 11:00	Relinquist	red by Erzely Hisbord	Redeved by	24 Conch	Date Time 2 10/13 116 0830	Remarks: Ser Contreras.	id results t	o Scott Der	iton, Mike	e Holder,	Robert	Combs	and An	drew	
-aler	<u>1</u>	Keiniquisi	An nei	received by.	0											
	If necess	ary, samples	submitted to Hall Environmental may be subox	ontracted to other	accredited laboratories.	This serves as notice of this p	ossibility. Any sub-	contracted data	will be clearly n	otated on the	analytical re	port				
τ.																



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

November 16, 2016

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

OrderNo.: 1610613

RE: Quarterly RO Reject

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 <u>www.hallenvironmental.com</u> 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,

andis

Andy Freeman Laboratory Manager 4901 Hawkins NE Albuquerque, NM 87109

Analytical Report Lab Order 1610613 Date Reported: 11/16/2016

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company

Quarterly RO Reject

Project:

Client Sample ID: R.O. Reject Collection Date: 10/11/2016 11:00:00 AM Received Date: 10/13/2016 8:30:00 AM

Lab ID: 1610613-001	Matrix:	AQUEOUS	S	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-SUBBE	D				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	1 R37942		
Chloride	280	10		mg/L	20	10/14/2016 12:43:59 AM	1 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 SO	LIDS					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		
рН	7.82	1.68	н	pH units	1	10/18/2016 1:22:12 PM	R38048		
EPA METHOD 200.7: DISSOLVED META	ALS					Analyst:	MED		
Aluminum	ND	0.020		mg/L	1	10/25/2016 12:47:24 PM	1 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	1 A38197		
Iron	ND	0.020		mg/L	1	10/25/2016 12:47:24 PM	1 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	1 28201		
Refer to the QC Summary report an	d sample log	gin checklis	t for fl	agged QC da	ta and pi	reservation information	1.		
Oualifiers: * Value exceeds Maximum Co	ntaminant Leve	1.		B Analyte de	tected in th	ne associated Method Blank			

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
- % Recovery outside of range due to dilution or matrix S
- yte detected in the associated Method Blank
- E Value above quantitation range
- Analyte detected below quantitation limits Page 1 of 22 J
- Р Sample pH Not In Range
- RL Reporting Detection Limit

Sample container temperature is out of limit as specified W

Analytical Report Lab Order 1610613

Date Reported: 11/16/2016

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company

Quarterly RO Reject

Project:

Client Sample ID: R.O. Reject Collection Date: 10/11/2016 11:00:00 AM Received Date: 10/13/2016 8:30:00 AM

Lab ID: 1610613-001	Matrix:	AQUEOUS	Received	Date: 10	/13/2016 8:30:00 AM	
Analyses	Result	PQL Qu	al Units	DF	Date Analyzed	Batch
EPA METHOD 8015D: GASOLINE RA	NGE				Analys	st: AG
Gasoline Range Organics (GRO)	ND	0.050	mg/L	1	10/19/2016 9:14:28 PM	M W38060
Surr: BFB	90.7	70-130	%Rec	1	10/19/2016 9:14:28 PM	M W38060
EPA METHOD 8011/504.1: EDB					Analys	st: JME
1,2-Dibromoethane	ND	0.010	µg/L	1	10/17/2016 4:51:55 PM	M 28082
EPA METHOD 8082: PCB'S					Analys	st: SCC
Aroclor 1016	ND	1.0	µg/L	1	10/19/2016 8:28:00 AM	M 28040
Aroclor 1221	ND	1.0	µg/L	1	10/19/2016 8:28:00 AM	A 28040
Aroclor 1232	ND	1.0	µg/L	1	10/19/2016 8:28:00 AM	A 28040
Aroclor 1242	ND	1.0	μg/L	1	10/19/2016 8:28:00 AM	M 28040
Aroclor 1248	ND	1.0	μg/L	1	10/19/2016 8:28:00 AM	M 28040
Aroclor 1254	ND	1.0	μg/L	1	10/19/2016 8:28:00 AM	M 28040
Aroclor 1260	ND	1.0	μg/L	1	10/19/2016 8:28:00 AM	M 28040
Surr: Decachlorobiphenyl	117	26.1-140	%Rec	1	10/19/2016 8:28:00 AM	A 28040
Surr: Tetrachloro-m-xylene	112	15-123	%Rec	1	10/19/2016 8:28:00 AM	M 28040
EPA METHOD 8015M/D: DIESEL RAI	NGE				Analys	st: TOM
Diesel Range Organics (DRO)	ND	1.0	mg/L	1	10/14/2016 10:46:55 F	PM 28063
Motor Oil Range Organics (MRO)	ND	5.0	mg/L	1	10/14/2016 10:46:55 F	PM 28063
Surr: DNOP	117	77.1-144	%Rec	1	10/14/2016 10:46:55 F	PM 28063
EPA METHOD 8310: PAHS					Analys	st: SCC
Naphthalene	ND	2.0	µg/L	1	10/20/2016 3:19:37 PM	VI 28041
1-Methylnaphthalene	ND	2.0	μg/L	1	10/20/2016 3:19:37 PM	VI 28041
2-Methylnaphthalene	ND	2.0	µg/L	1	10/20/2016 3:19:37 PM	M 28041
Benzo(a)pyrene	ND	0.070	μg/L	1	10/20/2016 3:19:37 PM	M 28041
Surr: Benzo(e)pyrene	80.6	20-153	%Rec	1	10/20/2016 3:19:37 PM	A 28041
EPA METHOD 8260B: VOLATILES					Analys	st: AG
Benzene	ND	1.0	µg/L	1	10/14/2016 10:07:29 A	M R37973
Toluene	ND	1.0	µg/L	1	10/14/2016 10:07:29 A	M R37973
Ethylbenzene	ND	1.0	µg/L	1	10/14/2016 10:07:29 A	M R37973
1,2-Dichloroethane (EDC)	ND	1.0	µg/L	1	10/14/2016 10:07:29 A	M R37973
1,2-Dibromoethane (EDB)	ND	1.0	µg/L	1	10/14/2016 10:07:29 A	M R37973
Carbon Tetrachloride	ND	1.0	µg/L	1	10/14/2016 10:07:29 A	M R37973
Chloroform	ND	1.0	µg/L	1	10/14/2016 10:07:29 A	M R37973
1,1-Dichloroethane	ND	1.0	µg/L	1	10/14/2016 10:07:29 A	M R37973
1,1-Dichloroethene	ND	1.0	µg/L	1	10/14/2016 10:07:29 A	M R37973
Methylene Chloride	ND	3.0	µg/L	1	10/14/2016 10:07:29 A	M R37973
1,1,2,2-Tetrachloroethane	ND	2.0	µg/L	1	10/14/2016 10:07:29 A	M R37973
Tetrachloroethene (PCE)	ND	1.0	µg/L	1	10/14/2016 10:07:29 A	M R37973

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

* 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 Page 2 of 22
- P Sample pH Not In Range
- RL Reporting Detection Limit
- W Sample container temperature is out of limit as specified

Analytical Report Lab Order 1610613

Date Reported: 11/16/2016

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Navajo Refining Company

Quarterly RO Reject

Project:

Client Sample ID: R.O. Reject Collection Date: 10/11/2016 11:00:00 AM Received Date: 10/13/2016 8:30:00 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					Anal	yst: 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					Anal	yst: 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.
	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 Page 3 of 22
- P Sample pH Not In Range
- RL Reporting Detection Limit
- W Sample container temperature is out of limit as specified

Analytical Report Lab Order 1610613 Date Reported: 11/16/2016

10/14/2016 11:33:59 AM R37973

CLIENT: Navajo Refining Company Project: Quarterly RO Reject Lab ID: 1610613-002	Matrix: 7	TRIP BLANK	Client Samj Collection Received	ple ID: Tri Date: Date: 10/	p Blank /13/2016 8:30:00 AM	[
Analyses	Result	PQL Qua	Units	DF	Date Analyzed	Batch
EPA METHOD 8011/504.1: EDB					Analys	st: JME
1,2-Dibromoethane	ND	0.010	µg/L	1	10/17/2016 5:07:17 P	M 28082
EPA METHOD 8260B: VOLATILES					Analys	st: 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

ND

93.1

95.7

98.5

104

1.0

1.0

1.0

1.0

3.0

2.0

1.0

1.0

1.0

1.0

1.0

1.5

70-130

70-130

70-130

70-130

µg/L

%Rec

%Rec

%Rec

%Rec

Hall Environmental Analysis Laboratory, Inc.

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

1

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

Carbon Tetrachloride

1,1-Dichloroethane

1,1-Dichloroethene

Methylene Chloride

1,1,2,2-Tetrachloroethane

Tetrachloroethene (PCE)

1,1,1-Trichloroethane

1,1,2-Trichloroethane

Trichloroethene (TCE)

Surr: Toluene-d8

Surr: 1.2-Dichloroethane-d4

Surr: 4-Bromofluorobenzene

Surr: Dibromofluoromethane

Vinyl chloride

Xylenes, Total

Chloroform

- Sample Diluted Due to Matrix D
- Н Holding times for preparation or analysis exceeded
- Not Detected at the Reporting Limit ND
- R RPD outside accepted recovery limits
- S % Recovery outside of range due to dilution or matrix
- Analyte detected in the associated Method Blank В
- Е Value above quantitation range
- Analyte detected below quantitation limits Page 4 of 22 J
- Р Sample pH Not In Range
- RL Reporting Detection Limit
- W Sample container temperature is out of limit as specified

Client:		Navajo Refining	Compa	ny							
Project:		Quarterly RO Re	eject								
Sample ID	MB-B	Sar	npType:	MBLK	Те	stCode: E	PA Method	200.7: Disso	ved Meta	ls	
Client ID:	PBW	В	atch ID:	B38141		RunNo: 3	8141				
Prep Date:		Analys	is Date:	10/21/2016		SeqNo: 1	190207	Units: mg/L	1		
Analyte		Resu	lt PQ	L SPK valu	ue SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Barium		NI	0.00	20							
Boron		N	D 0.0	40							
Cadmium		N	0.00	20							
Chromium		N	0.00	60							
Cobalt		N	0.00	60							
Manganese		N	0.00	20							
Molybdenum		N	0.00	80							
Nickel		N	D 0.0	10							
Silver		N	0.00	50							
Zinc		NI	0.0	10							
Sample ID	LLLCS	-B Sar	npType:	LCSLL	Te	stCode: E	PA Method	200.7: Disso	lved Meta	ls	
Client ID:	Batch	C B	atch ID:	B38141		RunNo: 3	8141				
Prep Date:		Analys	is Date:	10/21/2016		SeqNo: 1	190211	Units: mg/L	1		
Analyte		Resu	lt PQ	L SPK valu	ue SPK Ref Val	NREC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Barium		0.002	6 0.00	20 0.00200	0 00	130	50	150			
Boron		0.04	0.0	40 0.0400	0 0	101	50	150			
Cadmium		N	0.00	20 0.00200	0 0	84.5	50	150			
Chromium		0.006	2 0.00	60 0.00600	0 0	103	50	150			
Cobalt		0.006	4 0.00	60 0.00600	0 0	106	50	150			
Manganese		0.002	1 0.00	20 0.00200	0 0	106	50	150			
Molybdenum		N	0.00	0.00800	0 0	97.5	50	150			
Nickel		N	D 0.0	10 0.00500	0 0	96.6	50	150			
Silver		N	0.00	50 0.00500	0 0	99.4	50	150			
Zinc		NI	D 0.0	10 0.00500	0 0	105	50	150			
Sample ID	LCS-B	Sar	npType:	LCS	Те	stCode: E	PA Method	200.7: Disso	lved Meta	ls	
Client ID:	LCSW	В	atch ID:	B38141		RunNo: 3	8141				
Prep Date:		Analys	is Date:	10/21/2016		SeqNo: 1	190212	Units: mg/L			
Analyte		Resu	lt PQ	L SPK valu	ue SPK Ref Val	8 %REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Barium		0.5	1 0.00	20 0.500	0 0	101	85	115			
Boron		0.5	3 0.0	40 0.500	0 0	106	85	115			
Cadmium		0.5	2 0.00	20 0.500	0 0	104	85	115			
Chromium		0.5	0.00	60 0.500	0 0	101	85	115			
Cobalt		0.4	9 0.00	60 0.500	0 0	97.8	85	115			
Manganese		0.5	0.00	20 0.500	0 0	100	85	115			
Molybdenum		0.5	3 0.00	80 0.500	0 0	105	85	115			

Qualifiers:

Nickel

- Value exceeds Maximum Contaminant Level. *
- Sample Diluted Due to Matrix D
- Н Holding times for preparation or analysis exceeded

0.010

0.48

0.5000

- ND Not Detected at the Reporting Limit
- RPD outside accepted recovery limits R
- S % Recovery outside of range due to dilution or matrix
- В Analyte detected in the associated Method Blank
- Е Value above quantitation range

96.3

- J Analyte detected below quantitation limits
- Р Sample pH Not In Range
- Reporting Detection Limit RL

0

W Sample container temperature is out of limit as specified

85

115

Page 5 of 22

WO#: 1610613 16-Nov-16

0.49

0.50

Result

0.0064

0.021

ND

0.0060

SampType: LCSLL

Batch ID: A38197

Analysis Date: 10/25/2016

PQL

0.020

0.0060

0.020

0.020

0.5000

0.5000

0.01000

0.006000

0.02000

SPK value SPK Ref Val

0

0

0

0

0

97.8

99.1

RunNo: 38197

%REC

123

106

107

SeqNo: 1192094

85

85

LowLimit

50

50

50

TestCode: EPA Method 200.7: Dissolved Metals

115

115

Units: mg/L

HighLimit

150

150

150

%RPD

RPDLimit

Page 6 of 22

Qual

Client: Project:		Navajo Refining Co Quarterly RO Rejec	mpany t	у							
Sample ID	LCS-B	SampT	ype: L	cs	Tes	tCode: EF	PA Method	200.7: Dissol	ved Metal	s	
Client ID:	LCSW	Batch	ו ID: B	38141	F	RunNo: 38	8141				
Prep Date:		Analysis D	ate: 1	10/21/2016	S	SeqNo: 1	190212	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	SampT	ype: M	IBLK	Tes	tCode: EF	PA Method	200.7: Dissol	ved Metal	s	
Client ID:	PBW	Batch	ו ID: א	38197	F	RunNo: 38	8197				
Prep Date:		Analysis D	ate: 1	10/25/2016	S	SeqNo: 1	192092	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)							
ron		ND	0.020)							
Sample ID	LCS-A	SampT	ype: L	cs	Tes	tCode: EF	PA Method	200.7: Dissol	ved Metal	S	
Client ID:	LCSW	Batch	ו ID: א	38197	F	RunNo: 38	8197				
Prep Date:		Analysis D	ate: 1	10/25/2016	S	SeqNo: 1	192093	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			

Qualifiers:

Client: Project:

Analyte Silver Zinc

Analyte Aluminum Copper Iron

Analyte Aluminum

Prep Date:

Analyte

Aluminum

Copper

Iron

Sample ID LLLCS-A

Client ID: BatchQC

Copper

Iron

- * Value exceeds Maximum Contaminant Level.
- Sample Diluted Due to Matrix D
- Н Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- RPD outside accepted recovery limits R
- S % Recovery outside of range due to dilution or matrix
- В Analyte detected in the associated Method Blank
- Е Value above quantitation range
- J Analyte detected below quantitation limits
- Р Sample pH Not In Range
- Reporting Detection Limit RL
- W Sample container temperature is out of limit as specified

Chent: Project:		Navajo Refining C Quarterly RO Reje	company ect	ý							
Sample ID	LCS	Samp	Type: L	cs	Tes	tCode: E	PA 200.8: [Dissolved Met	als		
Client ID:	LCSW	Bate	ch ID: B	38214	F	RunNo: 3	8214				
Prep Date:		Analysis	Date: 1	0/25/2016	S	SeqNo: 1	192768	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	Samp	Type: L	CSLL	Tes	tCode: E	PA 200.8: [Dissolved Met	als		
Client ID:	BatchQ	C Bate	ch ID: B	38214	F	RunNo: 3	8214				
Prep Date:		Analysis	Date: 1	0/25/2016	5	SeqNo: 1	192770	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	Samp	оТуре: М	IBLK	Tes	tCode: E	PA 200.8: [Dissolved Met	als		
Client ID:	PBW	Bate	ch ID: B	38214	F	RunNo: 3	8214				
Prep Date:		Analysis	Date: 1	0/25/2016	5	SeqNo: 1	192772	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	Samp	Type: L	cs	Tes	tCode: E	PA 200.8: [Dissolved Met	als		
Client ID:	LCSW	Bate	ch ID: A	38300	F	RunNo: 3	8300				
Prep Date:		Analysis	Date: 1	0/28/2016	S	SeqNo: 1	195760	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	Samp	Type: L	CSLL	Tes	tCode: E	PA 200.8: [Dissolved Met	als		
Client ID:	BatchQ	C Bate	ch ID: A	38300	F	RunNo: 3	8300				
Prep Date:		Analysis	Date: 1	0/28/2016	S	SeqNo: 1	195761	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.
- 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

Page 7 of 22

Client: Project:		Navajo Refining Cor Quarterly RO Reject	npany								
Sample ID	MB	SampTy	pe: ME	BLK	Tes	tCode: El	PA 200.8:	Dissolved Me	als		
Client ID:	PBW	Batch	ID: A3	8300	R	RunNo: 3	8300				
Prep Date:		Analysis Da	ate: 10)/28/2016	S	SeqNo: 1	195762	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.
- 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

Page 8 of 22

Client: Project:	Navajo Quarter	Refining Company ly RO Reject						
Sample ID	MB-28201	SampType: MBLK	TestCode: El	PA Method	245.1: Mercu	ry		
Client ID:	PBW	Batch ID: 28201	RunNo: 3	8122				
Prep Date:	10/20/2016	Analysis Date: 10/21/2016	189575	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: El	PA Method	245.1: Mercu	ry		
Client ID:	LCSW	Batch ID: 28201	RunNo: 3	8122				
Prep Date:	10/20/2016	Analysis Date: 10/21/2016	SeqNo: 1	189576	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.
- 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

Page 9 of 22

9.7

0.50

10.00

Client: Project:		Navajo Refining Cor Quarterly RO Reject	npany								
Sample ID	MB	SampTy	pe: M I	BLK	Tes	tCode: E	PA Method	300.0: Anions	5		
Client ID:	PBW	Batch	ID: R3	37942	F	RunNo: 3	7942				
Prep Date:		Analysis Da	te: 1	0/13/2016	S	SeqNo: 1	182401	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	SampTy	pe: LC	s	Tes	tCode: E	PA Method	300.0: Anions	5		
Client ID:	LCSW	Batch	ID: R3	37942	F	RunNo: 3	7942				
Prep Date:		Analysis Da	te: 1	0/13/2016	S	SeqNo: 1	182402	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	МВ	SampTy	pe: M I	BLK	Tes	tCode: E	PA Method	300.0: Anions	5		
Client ID:	PBW	Batch	ID: R3	8212	F	RunNo: 3	8212				
Prep Date:		Analysis Da	te: 1	0/25/2016	5	SeqNo: 1	192608	Units: mg/L			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate		ND	0.50								
Sample ID	LCS	SampTy	pe: LC	s	Tes	tCode: E	PA Method	300.0: Anions	5		
Client ID:	LCSW	Batch	ID: R3	8212	F	RunNo: 3	8212				
Prep Date:		Analysis Da	te: 1	0/25/2016	S	SeqNo: 1	192609	Units: mg/L			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

0

96.9

90

110

Page 10 of 22

Qualifiers:

Sulfate

- * 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

0.093

0.010

0.1000

Client: Project:	Navajo F Quarterly	Refining Company y 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	D RPDLimit	Qual
1,2-Dibromoet	hane	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	D RPDLimit	Qual

0

93.2

70

130

1,2-Dibromoethane

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

Page 11 of 22

Client: Project:	Navajo R Quarterly	efining Co RO Rejec	ompany t								
Sample ID	1610613-001AMS	SampT	ype: M \$	3	Tes	tCode: E	PA Method	8015M/D: Die	sel Rang	e	
Client ID:	R.O. Reject	Batch	n ID: 28	063	F	RunNo: 3	7940				
Prep Date:	10/14/2016	Analysis D	ate: 10	0/14/2016	S	SeqNo: 1	183256	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	1610613-001AMS	SampT	ype: M \$	SD	Tes	tCode: E	PA Method	8015M/D: Die	sel Rang	e	
Client ID:	R.O. Reject	Batch	n ID: 28	063	F	RunNo: 3	7940				
Prep Date:	10/14/2016	Analysis D	ate: 10	0/14/2016	5	SeqNo: 1	183257	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	SampT	ype: LC	S	Tes	tCode: E	PA Method	8015M/D: Die	sel Rang	e	
Client ID:	LCSW	Batch	n ID: 28	063	F	RunNo: 3	7940				
Prep Date:	10/14/2016	Analysis D	ate: 10	0/14/2016	S	SeqNo: 1	183264	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	SampT	ype: ME	BLK	Tes	tCode: E	PA Method	8015M/D: Die	sel Rang	е	
Client ID:	PBW	Batch	n ID: 28	063	F	RunNo: 3	7940				
Prep Date:	10/14/2016	Analysis D	ate: 10	0/14/2016	5	SeqNo: 1	183265	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 Rang	ge Organics (MRO)	ND	5.0								
Surr: DNOP		1.1		1.000		114	77.1	144			

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

Page 12 of 22

1610613

Client: N	avajo Refining Co	ompany								
Project: Q	uarterly RO Reje	ct								
Sample ID MB-28040	Samp	Type: MI	BLK	Tes	PA Method					
Client ID: PBW	Batc	h ID: 28	040	RunNo: 38063						
Prep Date: 10/13/20	16 Analysis [Date: 1	0/18/2016	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	e 2.7		2.500		108	15	123			
Sample ID LCS-2804	0 Samp	Type: LC	s	Tes	tCode: E	PA Method	8082: PCB's			
Client ID: LCSW	Batc	h ID: 28	040	F	RunNo: 3	8063				
Prep Date: 10/13/20	16 Analysis [Date: 1	0/18/2016	S	SeqNo: 1	187408	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-xvlene	2.8		2.500		112	15	123			

- * Value exceeds Maximum Contaminant Level.
- Sample Diluted Due to Matrix D
- Н 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
- В Analyte detected in the associated Method Blank
- Е Value above quantitation range
- J Analyte detected below quantitation limits
- Р Sample pH Not In Range
- RL Reporting Detection Limit
- W Sample container temperature is out of limit as specified
- Page 13 of 22

Navajo Refining Company

Quarterly RO Reject

Sample ID 100ng lcs	SampT	ype: LC	S	Tes	tCode: El	PA Method	8260B: VOL	ATILES		
Client ID: LCSW	Batch	n ID: R3	7973	F	RunNo: 3	7973				
Prep Date:	Analysis D	Date: 10	0/14/2016	S	SeqNo: 1	183336	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	SampT	уре: М	6	Tes	tCode: El	PA Method	8260B: VOL	ATILES		
Client ID: R.O. Reject	Batch	n ID: R3	7973	F	RunNo: 3 '	7973				
Prep Date:	Analysis D	Date: 10	0/14/2016	5	SeqNo: 1	183339	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	I SampT	уре: М	SD	Tes	tCode: El	PA Method	8260B: VOL	ATILES		
Client ID: R.O. Reject	Batch	n ID: R3	7973	F	RunNo: 3 '	7973				
Prep Date:	Analysis D	Date: 10	0/14/2016	S	SeqNo: 1	183340	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:

Client:

Project:

- Value exceeds Maximum Contaminant Level. *
- Sample Diluted Due to Matrix D
- Н Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- R RPD outside accepted recovery limits
- В Analyte detected in the associated Method Blank
- Е Value above quantitation range
- J Analyte detected below quantitation limits
- Р Sample pH Not In Range
- RL Reporting Detection Limit
- W Sample container temperature is out of limit as specified

Page 14 of 22

WO#: 1610613

16-Nov-1	6
----------	---

Client: 1 Project: (Navajo Refini Quarterly RO	ng Comp Reject	any										
Sample ID rb	S	SampType: MBLK			TestCode: EPA Method 8260B: VOLATILES								
Client ID: PBW		Batch ID	: R3	7973	RunNo: 37973								
Prep Date:	Anal	ysis Date	: 10	0/14/2016	SeqNo: 1183360			Units: µg/L					
Analyte	Re	sult P	QL	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	e-d4	9.8		10.00		97.6	70	130					
Surr: 4-Bromofluorobenz	zene	9.8		10.00		97.6	70	130					
Surr: Dibromofluorometh	nane	10		10.00		105	70	130					
Surr: Toluene-d8		9.9		10.00		99.2	70	130					

Qualifiers:

- Value exceeds Maximum Contaminant Level. *
- Sample Diluted Due to Matrix D
- Н 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
- В Analyte detected in the associated Method Blank
- Е Value above quantitation range
- J Analyte detected below quantitation limits
- Sample pH Not In Range Р
- RL Reporting Detection Limit
- W Sample container temperature is out of limit as specified

Page 15 of 22

WO#: 1610613

16-Nov-16

Client: Navajo	Refining C	ompany								
Project: Quarter	rly RO Reje	ct								
Sample ID MB-28041	Samp	Type: ME	BLK	Tes	tCode: E	PA Method	8310: PAHs			
Client ID: PBW	Batc	h ID: 28	041	F	RunNo: 3	38100				
Prep Date: 10/13/2016	Analysis I	Date: 10	0/20/2016	S	SeqNo: 1	188744	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(a h i)pervlene	ND	0.12								
Indeno(1,2,3-cd)pyrene	ND	0.25								
Surr: Benzo(e)pyrene	13	0.20	20.00		64 1	20	153			
Sample ID LCS-28041	Samp	Type: LC	;S	TestCode: EPA Method 8310: PAHs						
	Batc	n ID: 28	041	F	RunNo: 3	38100				
Prep Date: 10/13/2016	Analysis I	Jate: 10	0/20/2016	2	seqivo: 1	188746	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			
T-Methylnaphtnalene	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			

Qualifiers:

Benzo(k)fluoranthene

- * Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded

0.49

0.070

0.5000

- 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

98.0

- J Analyte detected below quantitation limits
- P Sample pH Not In Range
- RL Reporting Detection Limit

0

W Sample container temperature is out of limit as specified

55.9

134

Page 16 of 22

Client:Navajo Refining CompanyProject:Quarterly RO Reject

	Comm		0	Т						
Sample ID LC3-20041 Samprype. LC3			3	Tes		-A method	0310: PARS			
Client ID: LCSW	Batch	h ID: 28	041	R	lunNo: 3	8100				
Prep Date: 10/13/2016	Analysis D	Date: 10)/20/2016	S	SeqNo: 1	188746	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.
- 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

Page 17 of 22

Client: Project:	Navajo Quarter										
Sample ID	MB-28115	SampT	ype: M	BLK	Tes	tCode: To	otal Phenol	ics by SW-84	6 9067		
Client ID:	Client ID: PBW Batch ID: 28115			115	F	RunNo: 3	8004				
Prep Date:	10/18/2016	Analysis D	ate: 1	0/18/2016	S	SeqNo: 1	184471	Units: µg/L			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Phenolics, Tota	al Recoverable	ND	2.5								
Sample ID	LCS-28115	SampT	ype: LC	S	Tes	tCode: To	otal Phenol	ics by SW-84	6 9067		
Client ID:	LCSW	Batch	n ID: 28	115	F	RunNo: 3	8004				
Prep Date:	10/18/2016	Analysis D	ate: 1	0/18/2016	5	SeqNo: 1	184472	Units: µg/L			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Phenolics, Tota	al Recoverable	22	2.5	20.00	0	109	64.4	135			

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

Page 18 of 22

0.543

Client: Project:	Nav Qua	vajo Refining Compa arterly RO Reject	any							
Sample ID	MB-R38749	SampType:	MBLK	TestCo	ode: EPA 335.4:	Total Cyanide	Subbed			
Client ID:	PBW	Batch ID:	R38749	Run	No: 38749					
Prep Date:		Analysis Date:	10/19/2016	Seq	No: 1210509	Units: mg/L				
Analyte		Result PC	L SPK value	SPK Ref Val %	REC LowLimi	it HighLimit	%RPD	RPDLimit	Qual	
Cyanide		ND 0.01	00							
Sample ID	LCS-R38749	SampType:	LCS	TestCo	ode: EPA 335.4:	Total Cyanide	Subbed			
Client ID:	LCSW	Batch ID:	R38749	Run	No: 38749					
Prep Date:		Analysis Date:	10/19/2016	Seq	No: 1210510	Units: mg/L				
Analyte		Result PC		SPK Ref Val %	REC Lowlini	it Highlimit	%RPD	RPDI imit	Qual	

0

109

90

110

0.5000

Cyanide

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

Page 19 of 22

Client:	Navajo R	efining Cor	mpany								
Project:	Quarterly	RO Reject	, ,								
Sample ID	1610613-001bms	SampTy	/pe: M \$	S	Tes	tCode: E	PA Method	8015D: Gasol	ine Rang	e	
Client ID:	R.O. Reject	Batch	ID: W	38060	R	≀unNo: 3	8060				
Prep Date:		Analysis Da	ate: 1	0/20/2016	S	SeqNo: 1	187259	Units: mg/L			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Rang	je 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	I SampTy	/pe: M	SD	Tes	tCode: E	PA Method	8015D: Gasol	ine Rang	e	
Client ID:	R.O. Reject	Batch	ID: W	38060	R	≀unNo: 3	8060				
Prep Date:		Analysis Da	ate: 1	0/20/2016	S	SeqNo: 1	187260	Units: mg/L			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Rang	je 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	SampTy	/pe: M I	BLK	Tes	tCode: E	PA Method	8015D: Gasol	ine Rang	e	
Client ID:	PBW	Batch	ID: W	38060	R	≀unNo: 3	8060				
Prep Date:		Analysis Da	ate: 1	0/19/2016	S	eqNo: 1	187443	Units: mg/L			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Rang	je Organics (GRO)	ND	0.050								
Surr: BFB		8.9		10.00		88.8	70	130			
Sample ID	2.5ug gro Ics	SampTy	/pe: LC	s	Tes	tCode: E	PA Method	8015D: Gasol	ine Rang	e	
Client ID:	LCSW	Batch	ID: W	38060	F	≀unNo: 3	8060				
Prep Date:		Analysis Da	ate: 10	0/19/2016	S	eqNo: 1	188464	Units: mg/L			

SPK value SPK Ref Val LowLimit HighLimit %RPD RPDLimit Analyte Result PQL %REC 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. *
- Sample Diluted Due to Matrix D
- Н Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- RPD outside accepted recovery limits R
- S % Recovery outside of range due to dilution or matrix
- В Analyte detected in the associated Method Blank
- Е Value above quantitation range
- J Analyte detected below quantitation limits
- Р Sample pH Not In Range
- Reporting Detection Limit RL
- W Sample container temperature is out of limit as specified

Page 20 of 22
WO#:	1610613
	16-Nov-16

Client: Project:	Navajo F Quarterly	Refining Cor y RO Reject	mpany t								
Sample ID	MB-R38749	SampTy	/pe: M	BLK	Test	tCode:	EPA 903.1: R	a 226 and EP	A 904.0: F	Ra 228-Subbe	d
Client ID:	PBW	Batch	ID: R3	8749	R	unNo:	38749				
Prep Date:		Analysis Da	ate: 1 ′	1/16/2016	S	eqNo:	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.
- 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

Page 21 of 22

Client: Project:	Navajo Quarter	Refining Co ly RO Rejec	ompany st								
Sample ID	MB-28134	SampT	ype: MI	BLK	Tes	tCode: SI	M2540C MC	DD: Total Dis	solved So	lids	
Client ID:	PBW	Batch	n ID: 28	134	RunNo: 38086						
Prep Date:	10/18/2016	Analysis D	ate: 1	0/20/2016	S	SeqNo: 1	188295	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	SampT	ype: LC	s	Tes	tCode: SI	M2540C MC	DD: Total Dis	solved So	lids	
Client ID:	LCSW	Batch	n ID: 28	134	F	RunNo: 3	8086				
Prep Date:	10/18/2016	Analysis D	ate: 1	0/20/2016	5	SeqNo: 1	188296	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.
- 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

Page 22 of 22

HALL
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 Numb	er: 1610613		RcptNo:	1
Received by/date:				
Logged By: Ashley Gallegos 10/13/2016 8:30:00	AM	AZ		
Completed By: Ashley Gallegos 10/13/2016 11:53:15	5 AM	A		
Reviewed By: 10/10/16		<u> </u>		
Chain of Custody				j
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 🗌		
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 🗹	# of proponted	
			bottles checked	i
12. Does paperwork match bottle labels? (Note discrepancies on chain of custody)	Yes ⊻	NO 🗆	tor p⊓.	12 unless noted)
13. Are matrices correctly identified on Chain of Custody?	Yes 🖌	No 🗌	Adjusted?	0
14, Is it clear what analyses were requested?	Yes 🗹	No 🗌		- 7
15. Were all holding times able to be met? (If no, notify customer for authorization.)	Yes 🔽	No 🗌	Checked by: _ C	
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:				
17. Additional remarks:				
18. <u>Cooler Information</u>		. I		
Cooler No Temp °C Condition Seal Intact Seal No	Seal Date	Signed By		
	·			

	sport.
	calre
	nalyti
	the a
	uo pa
	notate
	sarly r
	be cle
	lliw e
	d data
	racte
	cont
	iy sub
	y. An
	sibilit
	sod s
	of thi
	notice
	s as r
	serve
	This
	ories.
	orato
	ed lat
	credit
	er ao
	to Off
	icted
	contra
	e subc
	tay be
	ntal rr
	nme
	Envire
	Hall
	ed to
	npmit
	tes su
•	samp
	sary, :
	eces

Project Name. Project Name. Project Name. Project Name. BX 155 Artesia. Outerfery R. O. Reject # 0.0		Refinery	שורישו אברטות	X Standard		-			I	A	E L		RO RO	NA (Ē	Ē		
Berlinking Number Reservation Number And Bubbles (Y or N) Berlinking Dubited # (Full Validation) Dubited # (Full Validation) Horder # (Full Validation) Berlinking Project # PO # 17796 Horder # (Full Validation) Reader All the Markins Nr All updaterque. NM #7105 Barnoller Berlinkin Kinsternen all com Reader All the Markins Nr All updaterque. NM #7105 Horder # (Full Validation) Sampler Berlinkin Kinsternen all com Reader All the Markins Nr All the Markins				A Statituatu Droject Name						Z			5		2		Z	
Diametery. R.O. Reject Cutatrery. R.O. Reject And table and the sector is a formation. And table and				Project Name					-	ý.ww	allenv	ironm	ental.c	ШQ				
Project # P. 0. # 167766 Tol. 505-365-307 Fax 605-365-307 Fax 605-365-307 Project # P. 0. # 167766 Project # P. 0. # 167766 Tel. 505-365-307 Fax 605-365-307 Project # P. 0. # 167766 Project # Brady Hitcherd Sampler: Brady Hitcherd Sampler: Brady Hitcherd Sampler: Brady Hitcherd	s: P.O. Box	×	159 Artesia,	Quarterly R.C). Reject			4901	Hawkir	is NE	- Alb	nquer	que. N	1M 87	109			
151 Project Manager. 151 Project Manager. 151 Level 4 (Full Validation) Rample Request ID Sampler. Brady Hubbard Sample Request ID Type and # Type and # Type and # Type and # Type and # Type Rolect 1.500ml P R.O. Reject 3.40ml VOA HCL R.O. Reject 1.10 Glass Unpres R.O. Reject 2.11 L R.O. Reject 1.11 Glass Unpres R.O. Reject 1.1 - 11 Glass Unpres R.O. Reject 1.1 - 11 Glass Unpres R.O. Reject 1.1 - 11 Glass Unpres R.O. Reject 1.1 -	(Project #: P.C). # 167796		r	Tel. 5	05-34	5-397		ax 51	5-34£	410	2			
Bit Project Manager. 1 Level 4 (Full Validation) Resolv Houbard Resolv Houbard Sample Freehrative Resolv Houbard Sample Router Comba Sample Router Compect Sample Router Compect Samop Router Como	48-3311										Analy	sis R	sənbə	it				
□ Level 4 (Full Validation) Robert Combs Sampler Brady Hubard Sampler Bradoeotwik R.O. Reject 1-10 Gene Sampler Sadoff Nock R.O. Reject 1-10 Gene Sadoff Nock Sadoff Nock R.O. Reject 1-10 Gene R.O. Reject 1-10 Gene R.O. Reject 1-10 Gene R.O. Reject 1-10 Gene R.O. Reject	575-746-5		451	Project Mana	ger:							(
Container		1										822 [.]						
Sampler: Bandler: Brandler: Brandler: Preservative An Bubbles (Y or N) On Kie Sample Request ID Container Preservative An Bubbles (Y or N) On Kie Sample Request ID Container Preservative An Bubbles (Y or N) On Kie Sample Request ID Container Preservative An Original Statistic Resolved Solids R.O. Reject 2 - 500ml P Haclon Adomi VoA HCL X N N R.O. Reject 1 - 1500ml P HNO3 N N N N N R.O. Reject 1 - 1500ml P HNO3 N N N N N N R.O. Reject 1 - 1000ml P HNO3 N N N N N N N R.O. Reject 1 - 1000ml P HNO3 N			🗆 Level 4 (Full Validation)	Robert Comb	s		sO	500		00		-6A-						
Christian Arten Name Sample Request ID Container Preservative Ex. No. Sample Request ID Type and # Type Type Type and # Type Type Function Type and # Type Type Ex. No. Ex. No. R.O. Reject 2 - 500ml P Humptes -				Sampler:	Brady Hubb	ard	οΛ	sisi VS	әр			+97				spi		(
Sample Request ID Container Preservative IEAA No EAA No EAA No R.O. Reject 2 - 500ml P 1-100ml P				On Ice Sample Tem	X Yes betalitie "7	the No	tsiJ C	C Me	inevO	DBU LÀ	1011G	2-5Я)	ap			loS be		Y or N
Sample Request ID Type and # Type a				Containar	Precentative		MGCI	MOC	IstoT	Mercu	bCB ²	ctivity	e Culor	e	Nitrite	Nlossi	803) səlq
R.O. Reject 2 - 500ml P Hundres 1 00 X X	Matrix		Sample Request ID	Type and #	Type	HEAL NO.	8260B	6010B: 8270C:	336.4	I :0747	3082: 1	Radioa	Phenols	elionia	Nitrate/I	PH FH	3:1.408	Air Bubl
R.O. Reject 340mi VOA HCL X I <td>liquid</td> <td></td> <td>R.O. Reject</td> <td>2 - 500ml P</td> <td>1-unpres 1 H2SO4</td> <td>-001</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>×</td> <td>×</td> <td>×</td> <td></td> <td>′ ≻</td>	liquid		R.O. Reject	2 - 500ml P	1-unpres 1 H2SO4	-001								×	×	×		′ ≻
R.O. Reject1-500mi pHNO3HNO3NOHR.O. Reject1-125mi pHNO3NaCHNaCHR.O. Reject1-500mi pNaCHNaCHNaCHR.O. Reject2-1L pHNO3NaCHNaCHR.O. Reject2-1L pHNO3NaCHNaCHR.O. Reject2-1L pHNO3NaCHNaCHR.O. Reject2-1L ClassUnpresNaCHNaCHR.O. Reject2-1L ClassUnpresNaCHNaCHR.O. Reject2-1L ClassUnpresNaCHNaCHR.O. Reject2-1L ClassUnpresNaCHNaCHR.O. Reject2-1L ClassUnpresNaCHNaCHR.O. Reject2-1L ClassUnpresNaCHNaCHR.O. Reject1-1L ClassUnpresNaCHNaCHR.O. Reject1-1L ClassUnpresNaCHNaCHR.O. Reject1-1L ClassUnpresNaCHNaCHR.O. Reject1-1L ClassNaCHNaCHNaCHR.O. Reject1-1L C	liquiđ		R.O. Reject	3-40ml VOA	HCL		×								<u> </u>	<u> </u>		
R.O. Reject 1-125mi P HNO3 X <td>liquid</td> <td></td> <td>R.O. Reject</td> <td>1-500ml P</td> <td>HNO3</td> <td></td> <td></td> <td> </td> <td></td> <td>$_{\times}$</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	liquid		R.O. Reject	1-500ml P	HNO3					$ _{\times}$								
R.O. Reject 1-500ml P NaOH NaOH <td>liquid</td> <td></td> <td>R.O. Reject</td> <td>1-125mi P</td> <td>HNO3</td> <td>· · ·</td> <td></td> <td>×</td> <td></td>	liquid		R.O. Reject	1-125mi P	HNO3	· · ·		×										
R.O. Reject2-1L PHNO3HNO3IIXIXXR.O. Reject3-40ml VOANa2S2O3IIIXIXXR.O. Reject2 - 1L GlassImpresXIIXIXXR.O. Reject2 - 1L GlassImpresXIIXIXXR.O. Reject1 - 1L GlassImpresXIXIXIXR.O. Reject1 - 1L GlassImpresXIXIXIXR.O. Reject1 - 1L GlassImpresXIXIXIXR.O. Reject1 - 260mlClassImpresXIXIXIIIR.O. Reject1 - 1L GlassH2SO4XIIXIXIIIR.O. Reject1 - 1L GlassH2SO4XIIXIXIIIR.O. Reject1 - 1L GlassH2SO4XIIXII	liquid		R.O. Reject	1-500mi P	NaOH				×				-					
R.O. Reject3-40ml VOANa2S2O3IIIIXR.O. Reject2 - 1L Glass unpresImpres<	liquid		R.O. Reject	2-1L P	HNO3							×						
R.O. Reject2 - 1L GlassunpresNXNXNXR.O. Reject1 - 1L GlassunpresXXXXXXXXR.O. Reject3-40ml VOAHCIXXX <t< td=""><td>liquid</td><td></td><td>R.O. Reject</td><td>3-40ml VOA</td><td>Na2S2O3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>×</td><td></td></t<>	liquid		R.O. Reject	3-40ml VOA	Na2S2O3												×	
R.O. Reject1 - 1L GlassunpresXIIIR.O. Reject3.40ml VOAHClXIXIIR.O. Reject1-250mlGlass unpresXIXIIIR.O. Reject1 - 1L GlassH2SO4XIXIIIIntrip Blank2-40ml VOAHCL-OO2IXIXIIIntrip Blank2-40ml VOAHCL-OO2IIXIIIIntrip Blank2-40ml VOAHCL-OO2IIXIIIIntrip Blank2-40ml VOAHCL-OO2IIXIIIIntrip Blank2-40ml VOAHCL-OO2Intrip Remarks:XIXIIIIntrip Blank2-40ml VOAHCL-OO2InterestantIXIIIIntrip Blank2-40ml VOAHCL-OO2InterestantIXIIIIntrip Blank2-40ml VOAHCL-OO2InterestantIntrip Remarks:IIIIIIIIIntrip Blank2-40ml VOAHCL-OO2InterestantIntrip Remarks:IIIIIIIIIIIIIIIIIIIIIIIIIIIII <td>liquíd</td> <td></td> <td>R.O. Reject</td> <td>2 - 1L Glass</td> <td>unpres</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>×</td> <td></td> <td></td> <td></td> <td>-</td> <td>-</td> <td></td> <td></td>	liquíd		R.O. Reject	2 - 1L Glass	unpres						×				-	-		
R.O. Reject3-40ml VOAHClXIXIXIXR.O. Reject1-250mlGlass unpres1-250mlGlass unpresXXXXXXR.O. Reject1 - 1L GlassH2SO4XXXXXXXXR.O. Reject1 - 1L GlassH2SO4XXXXXXXXR.O. Reject1 - 1L GlassH2SO4XXXXXXXXSted by: Xrad, HUbbardRepeived by:DateTimeRemarks:XXXXXXXSted by: Xrad, HUbbardRepeived by:DateTimeNm. Hg. Mo. Ni. Se, Ag. U, ZnXXXXXXSted by: Xrad, HUbbardReceived by:DateTimeNm. Hg. Mo. Ni. Se, Ag. U, ZnXXXXXSted by: Xrad, HUbbardReceived by:DateTimeNo. Soc. 1,1,1-Trichloroethane; 1,1,2-Tetrachloroethane; 1,1	liquid		R.O. Reject	1 - 1L Glass	unpres			×										
R.O. Reject 1-250mlGlas unpres X <th< td=""><td>liquid</td><td></td><td>R.O. Reject</td><td>3-40ml VOA</td><td>HCI</td><td>•</td><td></td><td></td><td></td><td>×</td><td></td><td></td><td></td><td></td><td></td><td>[</td><td></td><td></td></th<>	liquid		R.O. Reject	3-40ml VOA	HCI	•				×						[
R.O. Reject 1 - 1L Glass H2SO4 X	liquid		R.O. Reject	1-250mlGlass	unpres					×								
Trip Blank 2-40ml VOA HCL OO2 Remarks: shed by: Krad, Hubbard Redeived by: Date Time Retails: As, Al, Ba, B, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, U, Zn Metals: As, Al, Ba, B, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, U, Zn Mode VM/N/N/N VOCs: 1,1,1-Trichloroethane; Incloroethane; 1,1,2-Tetrachloroethane; 1,1,2:2-Tetrachloroethane; Keceived by/ Date Time Date Date Time Dibromoethane; 1,1-2-Tetrachloroethane; Shed by/ Mode 1,1,2-Tetrachloroethane; 1,1-2-Tetrachloroethane; Received by/ Date Time Dibromoethane; 1,1,2-Dichloroethane; Shed by/ Received by/ Date Date Date Date	liquid		R.O. Reject	1 - 1L Glass	H2SO4								$ \times$			-		
shed by: Krad, Hubbard Repeived by: Date Time Remarks: Metals: As, AI, Ba, B, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, U, Zn Metals: As, AI, Ba, B, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, U, Zn Mou 2, Lubbard Man 11,2,2-Tetrachloroethane; 1,1,2-Trichloroethane; 1,1,2-Tetrachloroethane; 1,1,2,2-Tetrachloroethane; 1,1,2,2,2-Tetrachloroethane; 1,1,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,2	liquid		Trip Blank	2-40ml VOA	HCL	-002									┢	-		
we de by W.	Relinquis	Ĕ	id by: Srach, Hubbard	Received by:		Date Time	Remar	KS:	Č									
Shed by Weekeived by Date Time Dibromoethane; 1, 1-1-10100000000000000000000000000000	22	8	der Hubberl	Ymraber (moha	10/13/16 DB30	VOCS: 1	45, Ai, Do 1, 1, 1-Tric	hloroetha	רט, יוט ne; 1,1, רובהמלו	lu, re, r 2,2-Tetra	р, IVIII, п chloroetl Слаьва	3, IMU, M Iane; 1,1	1, 56, Ay 2,2-Tet	l, ∪, ∠ii irachlor	bethylen	e; 1,1,2-	
	Rélinquís	Ť.		Received by))	Date Time	Dibromo	ethane; 1 methane;	Ethylber	roethan zene; T	yicure, ., e; Benze oluene; T	ne; Carb otal Xyle	oeulaire, on Tetrai nes; Vin	chloride; yl Chlori	Chloro de	lerie, 1,4 form;	<i>I</i> .	



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.

OCD Febuary 15, 2017 Page 2 of 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 Discharge Volume		
		Metered Data		Combined RO Reject Discharge (Calculated)	
	GPM	GPM	GPM	GPM	BBL/DAY
	SOUTH	NORTH	MIDDLE		
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/mo	onth)				297,824.91

Daily RO Reject Discharge Flow Rate Measurements and Calculated Daily Discharge

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: <u>www.hallenvironmental.com</u>

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 <u>www.hallenvironmental.com</u> 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,

andig

Andy Freeman Laboratory Manager 4901 Hawkins NE Albuquerque, NM 87109

Hall En	iviro	nmental Analysi	s Labora	tory, In	c.			Date Reported: 2/14/20	17
CLIENT: Project: Lab ID:	Navaj Quarte	o Refining Company erly R.O. Reject 53-001	Matriv		C	Client Sample Collection D	ID: R.C ate: 1/5	D. Reject /2017 4:30:00 PM	
Analyses	17012		Decult		, 	Luite	DE		
Anaryses			Kesult	rqr	Quai	Units	DF	Date Analyzed	Batch
EPA 200.8	8: DIS	SOLVED METALS						Analyst	t: 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	I		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 2	26 AND EPA 904.0: RA	228-SUBBED)				Analyst	: SUB
Radium-2	226		1.29	0.662		pCi/L	1	2/2/2017	R40526
Radium-2	226 ±		0.644	0.662		pCi/L	1	2/2/2017	R40526
Radium-2	228		0.624	1.02		pCi/L	1	2/2/2017	R40526
Radium-2	228 ±		0.507	1.02		pCi/L	1	2/2/2017	R40526
EPA MET	HOD 3	00.0: 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+N	litrite as	N	2.3	1.0		mg/L	5	1/10/2017 12:12:18 AM	I R39919
SM2540C	MOD:	TOTAL DISSOLVED SC	DLIDS					Analyst	: KS
Total Dise	solved S	Solids	3410	20.0	*	mg/L	1	1/11/2017 5:59:00 PM	29623
EPA 335.4	4: TOT	AL CYANIDE SUBBED						Analyst	LSB
Cyanide			ND	0.0100		mg/L	1	1/16/2017	R40523
SM4500-H	H+B: PI	Н						Analyst	: JRR
pН			7.87	1.68	н	pH units	1	1/9/2017 3:34:06 PM	R39934
EPA MET	HOD 2	00.7: DISSOLVED MET	ALS					Analyst	TES
Aluminum	n		ND	0.020		ma/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	i i		ND	0.0020		mg/L	1	1/24/2017 11:12:53 AM	A40223
Chromiun	n		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
Mangane	se		ND	0.0020		mg/L	1	1/24/2017 11:12:53 AM	A40223
Molybden	num		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 MET	HOD 24	45.1: MERCURY						Analyst	: MED
Mercury			ND	0.00020		mg/L	1	1/10/2017 12:14:44 PM	29608
Ref	er to th	e QC Summary report an	nd sample logi	in checklist	for fl	agged QC dat	ta and p	reservation informatio	n.
Oualifiers:	*	Value exceeds Maximum Co	ntaminant Level			B Analyte dat	ected in t	he associated Mathed D11	
· · · · · · · · · · · · · · · · · · ·	D	Sample Diluted Due to Matr	ix			E Value abov	e quantita	tion range	n.
	Н	Holding times for preparation	n or analysis exce	eded		J Analyte det	ected belo	ow quantitation limits -	1 000
	ND	Not Detected at the Reportin	g Limit			P Sample pH	Not In Ra	ange	e 1 of 22
	R	RPD outside accepted recove	ery limits		F	RL Reporting I	Detection	Limit	
	S	% Recovery outside of range	due to dilution o	r matrix		W Sample con	tainer ten	perature is out of limit as s	specified

tal Analysia I ak Hall Engin **.**w.

W Sample container temperature is out of limit as specified

CLIENT: Navajo Refining Company Project: Quarterly R.O. Reject Lab ID: 1701253-001	Matrix:	AQUEOUS	Client Samp Collection Received	le ID: R.O. Reject Date: 1/5/2017 4:30:00 PM Date: 1/9/2017 9:20:00 AM
Analyses	Result	PQL Q	ual Units	DF Date Analyzed Batch
EPA METHOD 8015D: GASOLINE RAN	GE			Analyst: DJF
Gasoline Range Organics (GRO)	ND	0.050	ma/L	1 1/12/2017 2:15:17 PM G3999
Surr: BFB	87.6	70-130	%Rec	1 1/12/2017 2:15:17 PM G3999
EPA METHOD 8011/504.1: EDB				Analyst: JMF
1,2-Dibromoethane	ND	0.010	µg/L	1 1/10/2017 10:10:43 AM 29609
EPA METHOD 8082: PCB'S			13	Analyst: SCC
Aroclor 1016		1.0	uo/I	1 1/11/2017 10:44:00 AM 20040
Aroclor 1221		1.0	µg/L	1 1/11/2017 10:44:00 AM 20618
Aroclor 1221		1.0	µg/L	1 1/11/2017 10:44:00 AM 20618
Aroclor 1242	ND	1.0	µg/L	1 1/11/2017 10:44:00 AM 29618
Aroclor 1248		1.0	µg/L	1 1/11/2017 10:44:00 AM 29618
Aroclor 1254	ND	1.0	µg/L ug/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 RANG	ε			Analyst: TOM
Diesel Range Organics (DRO)		1.0	mall	1 1/12/2017 4:22:49 DM 20057
Motor Oil Bange Organics (MRO)	ND	5.0	mg/L	1 1/12/2017 4:33:48 PM 29057
Surr DNOP	115	77 1-144	%Pec	1 1/12/2017 4:33:48 PM 29037
EPA METHOD 8310. PAHS	110	77.1 144	701100	Applyet: 500
Nanhthalana		0.0		Analyst. SCC
1 Methylpenhthalone		2.0	µg/L	1 1/11/2017 12:16:05 PM 29615
2 Methylnaphthalene		2.0	µg/L	1 1/11/2017 12:16:05 PM 29615
Z-methymaphthalene Benzo(a)nyrene		2.0	µg/L	1 1/11/2017 12:16:05 PM 29615
Surr: Benzo(e)nyrene	ND 81.0	24 4 120	μg/L % Rea	1 1/11/2017 12:16:05 PM 29615
	01.0	24.4-130	70 Rec	1 1/11/2017 12:10:05 PM 29615
EPA METHOD 6260B: VOLATILES				Analyst: DJF
Benzene	ND	1.0	µg/L	1 1/9/2017 5:53:01 PM W399
l oluene	ND	1.0	µg/L	1 1/9/2017 5:53:01 PM W399
Ethylbenzene	ND	1.0	µg/L	1 1/9/2017 5:53:01 PM W399
1,2-Dichloroethane (EDC)	ND	1.0	µg/L	1 1/9/2017 5:53:01 PM W399 ⁴
1,2-Dibromoethane (EDB)	ND	1.0	µg/L	1 1/9/2017 5:53:01 PM W399
Carbon Tetrachloride	ND	1.0	µg/L	1 1/9/2017 5:53:01 PM W399
	ND	1.0	µg/L	1 1/9/2017 5:53:01 PM W399
	ND	1.0	µg/L	1 1/9/2017 5:53:01 PM W399
	ND	1.0	µg/L	1 1/9/2017 5:53:01 PM W399
	ND	3.0	µg/L	1 1/9/2017 5:53:01 PM W399
1,1,2,2-1 etrachloroethane	ND	2.0	µg/L	1 1/9/2017 5:53:01 PM W399
i etrachioroethene (PCE)	ND	1.0	μg/L	1 1/9/2017 5:53:01 PM W399

Hall Environmental Analysis Laboratory, Inc.

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

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	В	Analyte detected in the associated Method Blank		
	D	Sample Diluted Due to Matrix	Е	Value above quantitation range		
	Н	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits Page 2 of 2		
	ND	Not Detected at the Reporting Limit	Р	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		

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

CLIENT: Navajo Refining Company Project: Quarterly R.O. Reject			Client Samp Collection	le ID: R.(Date: 1/5	D. Reject 5/2017 4:30:00 PM	
Lab ID: 1701253-001	Matrix:	AQUEOUS	Received	Date: 1/9	0/2017 9:20:00 AM	
Analyses	Result	PQL Qua	l Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES					Analys	t: 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					Analys	t: SCC
Phenolics, Total Recoverable	ND	2.5	µg/L	1	1/25/2017	29866

Hall Environmental Analysis Laboratory, Inc.

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

		· · · · ·		
Qualifiers:	*	Value exceeds Maximum Contaminant Level.	В	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	Е	Value above quantitation range
	Н	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits Page 3 of 22
	ND	Not Detected at the Reporting Limit	Р	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

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

Han Environmental Analys	IS LADOF	ttory, mc.			Date Reported: 2/14/201	17				
CLIENT: Navajo Refining Company Project: Quarterly R.O. Reject	Motiv	Client Sample ID: Trip Blank Collection Date:								
Lab ID . 1701233-002	wiatrix:	I KIP BLANK	Received	Date: 1/9	7/2017 9:20:00 AM					
Analyses	Result	PQL Qua	Units	DF	Date Analyzed	Batch				
EPA METHOD 8015D: GASOLINE RAN	IGE				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				

Hall Environmental Analysis Laboratory, Inc.

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

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	В	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	Н	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits $P_{2000} 4 \text{ of } 22$
	ND	Not Detected at the Reporting Limit	Р	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

Analytical Report
Lab Order 1701253

Client:

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

Sample ID	MB-A	SampType: MI	3LK	Tes	tCode: E	PA Method	200.7: Dissolv	ved Metal	S	
Client ID:	PBW	Batch ID: A4	0181	F	unNo: 4	0181				
Prep Date:		Analysis Date: 1/	22/2017	S	eqNo: 1	259966	Units: mg/L			
Analyte		Result PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Aluminum		ND 0.020						772		
Sample ID	LLLCS-A	SampType: LC	SLL	Tes	tCode: E	PA Method	200.7: Dissolv	ved Metal	S	
Client ID:	BatchQC	Batch ID: A4	0181	F	unNo: 4	0181				
Prep Date:		Analysis Date: 1/	22/2017	S	eqNo: 1	259967	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			I
Sample ID	LCS-A	SampType: LC	s	Tes	Code: E	PA Method	200.7: Dissolv	ved Metal	S	
Client ID:	LCSW	Batch ID: A4	0181	F	unNo: 4	0181				
Prep Date:		Analysis Date: 1/	22/2017	S	eqNo: 1	259968	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: MI	BLK	Tes	Code: E	PA Method	200.7: Dissolv	ved Metal	s	
Client ID:	PBW	Batch ID: A4	0223	R	unNo: 4	0223				
Prep Date:		Analysis Date: 1/	24/2017	S	eqNo: 1	261933	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								
		ND 0.010								
Sample ID	LCS-A	SampType: LC	S	Test	Code: E	PA Method	200.7: Dissolv	ved Metal	s	
Client ID:	LCSW	Batch ID: A4	0223	R	unNo: 4	0223				
Prep Date:		Analysis Date: 1/	24/2017	S	eqNo: 1	261934	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.

D Sample Diluted Due to Matrix

Holding times for preparation or analysis exceeded Н

ND Not Detected at the Reporting Limit

R RPD outside accepted recovery limits

S % Recovery outside of range due to dilution or matrix В Analyte detected in the associated Method Blank

Е Value above quantitation range

J Analyte detected below quantitation limits

Р Sample pH Not In Range

RL Reporting Detection Limit

W Sample container temperature is out of limit as specified Page 5 of 22

14-Feb-17

WO#: 1701253

Client: Navajo Refining Company

Project: Quarterly R.O. Reject

Sample ID LCS-A	Samp	Type: LC	S	Tes	tCode: El	PA Method	200.7: Dissol	ved Meta	ls	
Client ID: LCSW	Bato	ch ID: A4	0223	R	RunNo: 4	0223				
Prep Date:	Analysis	Date: 1/	24/2017	S	SeqNo: 1	261934	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	Samp	Type: LC	SLL	Test	tCode: El	PA Method	200.7: Dissol	ved Meta	ls	
Client ID: BatchQC	Bato	h ID: A4	0223	R	RunNo: 4	0223				
Prep Date:	Analysis	Date: 1/	24/2017	S	eqNo: 1	261935	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.

- 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

Page 6 of 22

WO#: 1701253

Client: Navajo Refining Company

Project: Quarterly R.O. Reject

Sample ID	1701253-001GM	SDL Samp	Type: MS	SD	Tes	TestCode: EPA 200.8: Dissolved Metals					
Client ID:	R.O. Reject	Bat	ch ID: C4	0026	F	RunNo: 4	0026				
Prep Date:		Analysis	Date: 1/	13/2017	S	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	1701253-001GM	SLL Samp	Type: MS	\$	Tes	tCode: E	PA 200.8: [Dissolved Me	tals		
Client ID:	R.O. Reject	Bat	ch ID: C4	0026	F	RunNo: 4	0026				
Prep Date:		Analysis	Date: 1/	13/2017	S	SeqNo: 1	254503	Units: mg/L			
Analyte	1919 (1919) (191	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	Samp	Type: LC	S	Tes	tCode: El	PA 200.8: [Dissolved Me	tals		
Client ID:	LCSW	Batch ID: C40026			F	RunNo: 4	0026				
Prep Date:		Analysis	Date: 1/	13/2017	S	eqNo: 1	254506	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	Samp	Type: LC	SLL	Tes	tCode: El	PA 200.8: [Dissolved Me	tals		
Client ID:	BatchQC	Bat	ch ID: C4	0026	F	RunNo: 4	0026				
Prep Date:		Analysis	Date: 1/	13/2017	5	SeqNo: 1	254507	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			ORDER 19 19 19 19 19 19 19 19 19 19 19 19 19
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	Samp	Туре: МЕ	BLK	Tes	tCode: El	PA 200.8: I	Dissolved Me	tals		
Client ID:	PBW	Batch ID: C40026 RunNo: 40026									
Prep Date:		Analysis	Date: 1/	13/2017	5	SeqNo: 1	254508	Units: mg/L			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual

Qualifiers:

- * Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- Н 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
- В Analyte detected in the associated Method Blank
- Е Value above quantitation range
- J Analyte detected below quantitation limits Р
 - Sample pH Not In Range
- RL Reporting Detection Limit
- W Sample container temperature is out of limit as specified

Page 7 of 22

WO#: 14-Feb-17

1701253

Client: Navajo Refining Company

Project: Quarterly R.O. Reject

Sample ID MB	Samp	Туре: МВІ	LK	Tes	tCode: E	PA 200.8:	Dissolved Me	tals		
Client ID: PBW	Batc	h ID: C40	026	F	RunNo: 4	0026				
Prep Date:	Analysis [Date: 1/1	3/2017	S	SeqNo: 1	254508	Units: mg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	ND	0.0010					1/5 for			
Lead	ND	0.00050								
Selenium	ND	0.0010								
Uranium	ND	0.00050								

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

Page 8 of 22

WO#: **1701253** *14-Feb-17*

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 RP[DLimit Qual
Mercury	ND 0.00020			
Sample ID LCS-29608	SampType: LCS	TestCode: EPA Method	245.1: Mercury	n na na mana ana ana ana ana ana ana ana
Sample ID LCS-29608 Client ID: LCSW	SampType: LCS Batch ID: 29608	TestCode: EPA Method RunNo: 39928	245.1: Mercury	
Sample ID LCS-29608 Client ID: LCSW Prep Date: 1/9/2017	SampType: LCS Batch ID: 29608 Analysis Date: 1/10/2017	TestCode: EPA Method RunNo: 39928 SeqNo: 1251285	245.1: Mercury Units: mg/L	
Sample ID LCS-29608 Client ID: LCSW Prep Date: 1/9/2017 Analyte	SampType: LCS Batch ID: 29608 Analysis Date: 1/10/2017 Result PQL SPK value	TestCode: EPA Method RunNo: 39928 SeqNo: 1251285 SPK Ref Val %REC LowLimit	245.1: Mercury Units: mg/L HighLimit %RPD RPI	DLimit Qual

Qualifiers:

- * Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- Holding times for preparation or analysis exceeded Н
- ND Not Detected at the Reporting Limit
- R RPD outside accepted recovery limits
- \mathbf{S} % Recovery outside of range due to dilution or matrix
- В Analyte detected in the associated Method Blank
- Е Value above quantitation range
- J Analyte detected below quantitation limits
- Р Sample pH Not In Range
- RLReporting Detection Limit
- W Sample container temperature is out of limit as specified

Page 9 of 22

WO#: 1701253

14-Feb-17

Client:Navajo Refining CompanyProject:Quarterly R.O. Reject

Sample ID	МВ	SampType:	MBLK	Tes	tCode: El	PA Method	300.0: Anions	;		
Client ID:	PBW	Batch ID:	R39919	F	RunNo: 3	9919				
Prep Date:		Analysis Date:	1/9/2017	S	SeqNo: 1	251098	Units: mg/L			
Analyte		Result PC	QL 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	Tes	tCode: El	PA Method	300.0: Anions	;		
Client ID:	LCSW	Batch ID:	R39919	F	RunNo: 3	9919				
Prep Date:		Analysis Date:	1/9/2017	5	SeqNo: 1	251099	Units: mg/L			
Analyte		Result PC	L 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	МВ	SampType:	MBLK	Tes	tCode: El	PA Method	300.0: Anions			
Client ID:	PBW	Batch ID:	R39952	F	RunNo: 3	9952				
Prep Date:		Analysis Date:	1/10/2017	5	SeqNo: 1	251860	Units: mg/L			
Analyte		Result PC	QL SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sulfate		ND 0	.50							
Sample ID	LCS	SampType:	LCS	Tes	tCode: El	PA Method	300.0: Anions	5		
Client ID:	LCSW	Batch ID:	R39952	F	RunNo: 3 !	9952				
Prep Date:		Analysis Date:	1/10/2017	5	SeqNo: 1	251861	Units: mg/L			
Analyte		Result PC	QL 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.

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

its Page 10 of 22

14-Feb-17

1701253

WO#:

Project:	Quarterl	y R.O. Reject	
Sample ID ME	3-29609	SampType: MBLK	TestCode: EPA Method 8011/504.1: EDB
Client ID: PE	sw	Batch ID: 29609	RunNo: 39918
Prep Date: 1	/10/2017	Analysis Date: 1/10/2017	SeqNo: 1251243 Units: µg/L
Analyte		Result PQL SPK val	ue SPK Ref Val %REC LowI imit HighI imit %

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
1,2-Dibromoethane	ND	0.010								
Sample ID LCS-29609	SampT	Гуре: LC	S	Tes	tCode: El	PA Method	8011/504.1: 6	EDB		
Client ID: LCSW	Batcl	h ID: 29	609	F	RunNo: 3	9918				
Prep Date: 1/10/2017	Analysis [Date: 1 /	10/2017	5	SeqNo: 1	251245	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.
- 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

Page 11 of 22

WO#:

Navajo Refining Company **Client:**

Project: Quarterly R.O. Reject

Sample ID LCS-29657	SampT	ype: LC	S	TestCode: EPA Method 8015M/D: Diesel Range					e	
Client ID: LCSW	Batch	n ID: 29	657	F	RunNo: 3	9973				
Prep Date: 1/12/2017	Analysis D	ate: 1/	12/2017	S	eqNo: 1	252916	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			
						****				and the second state of the second
Sample ID MR 20657	SomeT	WDO: ME		Таа	Cada, E	DA 84 - 41 4	004 CM/D D			
Sample ID MB-29657	SampT	ype: ME	BLK	Tes	tCode: E	PA Method	8015M/D: Die	sel Rang	е	
Sample ID MB-29657 Client ID: PBW	SampT Batch	ype: ME 1D: 29	3LK 657	Tes F	tCode: El RunNo: 3	PA Method 9973	8015M/D: Die	sel Rang	e	NIN ((((((((((((((((((
Sample ID MB-29657 Client ID: PBW Prep Date: 1/12/2017	SampT Batch Analysis D	ype: ME 1D: 29 0 ate: 1 /	BLK 657 12/2017	Tes F S	tCode: El RunNo: 3 SeqNo: 1	PA Method 9973 252917	8015M/D: Die Units: mg/L	sel Rang	e	
Sample ID MB-29657 Client ID: PBW Prep Date: 1/12/2017 Analyte	SampT Batch Analysis D Result	ype: ME ID: 29 ate: 1 / PQL	3LK 657 12/2017 SPK value	Tes F S SPK Ref Val	tCode: E RunNo: 3 SeqNo: 1 %REC	PA Method 9973 252917 LowLimit	8015M/D: Die Units: mg/L HighLimit	sel Rang	e RPDLimit	Qual
Sample ID MB-29657 Client ID: PBW Prep Date: 1/12/2017 Analyte Diesel Range Organics (DRO)	SampT Batch Analysis D Result ND	ype: ME ID: 29 Pate: 1/ PQL 1.0	3LK 657 12/2017 SPK value	Tes F S SPK Ref Val	tCode: El RunNo: 3 SeqNo: 1 %REC	PA Method 9973 252917 LowLimit	8015M/D: Die Units: mg/L HighLimit	sel Rang	e RPDLimit	Qual
Sample ID MB-29657 Client ID: PBW Prep Date: 1/12/2017 Analyte Diesel Range Organics (DRO) Motor Oil Range Organics (MRO)	SampT Batch Analysis D Result ND ND	ype: ME n ID: 29 pate: 1/ PQL 1.0 5.0	3LK 657 12/2017 SPK value	Tes F SPK Ref Val	tCode: El RunNo: 3 SeqNo: 1 %REC	PA Method 9973 252917 LowLimit	8015M/D: Die Units: mg/L HighLimit	sel Rang %RPD	e RPDLimit	Qual

Qualifiers:

- * Value exceeds Maximum Contaminant Level.
- Sample Diluted Due to Matrix D
- Η 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
- В Analyte detected in the associated Method Blank
- Е Value above quantitation range
- J Analyte detected below quantitation limits
- Р Sample pH Not In Range
- RL Reporting Detection Limit
- Sample container temperature is out of limit as specified W

Page 12 of 22

WO#: 1701253

14-Feb-17

Navajo Refining Company **Client:**

Project: Quarterly R.O. Reject

Sample ID MB-2	29618	SampTy	pe: ME	BLK	Tes	tCode: El	PA Method	8082: PCB's		n Martin (Mangalan Karakan) Wata Sakati ing Karakan (Karakan) Wata Sakati ing Karakan (Karakan)	
Client ID: PBW	1	Batch	ID: 29	618	F	RunNo: 3	9949				
Prep Date: 1/10	0/2017	Analysis Da	ite: 1/	11/2017	S	SeqNo: 1	251667	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: Decachlorobip	ohenyl	1.6		2.500		63.2	26.1	140			
Surr: Tetrachloro-m	-xylene	1.4	M & M Marketon and Colorado	2.500		55.2	15	123			
Sample ID LCS-	-29618(1221)	SampTy	pe: LC	S	Tes	tCode: El	PA Method	8082: PCB's			
Client ID: LCS	N	Batch	ID: 290	618	F	RunNo: 3	9949				
Prep Date: 1/10	0/2017	Analysis Da	ite: 1/	11/2017	S	SeqNo: 1	251690	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: Decachlorobip	ohenyl	1.8		2.500		71.6	26.1	140			
Surr: Tetrachloro-m	-xylene	1.2		2.500		48.0	15	123			
Sample ID LCSI	D-29618(1221)	SampTy	pe: LC	SD	Tes	tCode: El	PA Method	8082: PCB's			
Client ID: LCS	S02	Batch	ID: 296	618	F	RunNo: 3	9949				
Prep Date: 1/10	0/2017	Analysis Da	te: 1/	11/2017	S	SeqNo: 1	252020	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: Decachlorobip	ohenyl	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)	SampTy	pe: LC	S	Tes	tCode: El	PA Method	8082: PCB's	******		
Client ID: LCS	N	Batch	ID: 296	618	F	RunNo: 3	9949				
Prep Date: 1/10	0/2017	Analysis Da	te: 1/	11/2017	S	SeqNo: 1	252021	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: Decachlorobip	bhenyl	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.
- D Sample Diluted Due to Matrix
- Holding times for preparation or analysis exceeded Η
- ND Not Detected at the Reporting Limit
- R RPD outside accepted recovery limits
- S % Recovery outside of range due to dilution or matrix
- В Analyte detected in the associated Method Blank
- Value above quantitation range Е
- J Analyte detected below quantitation limits Р
 - Sample pH Not In Range
- RL Reporting Detection Limit
- W Sample container temperature is out of limit as specified

Page 13 of 22

WO#: 1701253 14-Feb-17

Client: Navajo Refining Company

Project: Quarterly R.O. Reject

Sample ID LCSD-29618(1232) SampT	ype: LC	SD	Tes	tCode: El	PA Method	8082: PCB's			
Client ID: LCSS02	Batch	n ID: 29	618	F	RunNo: 3	9949				
Prep Date: 1/10/2017	Analysis D	ate: 1/	11/2017	5	SeqNo: 1	252022	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.
- 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

Page 14 of 22

Client: Navajo Refining Company

Project: Quarterly R.O. Reject

Sample ID rb	SampType: MBLK TestCode: EPA Method 8260B: VOLATILES Batch ID: W39912 RunNo: 39912									
Client ID: PBW	Batch	h ID: W	39912	F	RunNo: 3	9912				
Prep Date:	Analysis D	Date: 1/	9/2017	S	SeqNo: 1	250932	Units: µg/L			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	ND	1.0	n na manana ka				*****	*****	*****	
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	SampT	ype: LC	S	Tes	tCode: El	PA Method	8260B: VOL	ATILES		
Client ID: LCSW	Batch	n ID: W3	39912	F	RunNo: 3	9912				
Prep Date:	Analysis D)ate: 1/	9/2017	S	SeqNo: 1	250933	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			

0

0

Qualifiers:

1,1-Dichloroethene

Trichloroethene (TCE)

Surr: Toluene-d8

Surr: 1,2-Dichloroethane-d4

Surr: 4-Bromofluorobenzene

Surr: Dibromofluoromethane

- * Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- Η Holding times for preparation or analysis exceeded

20

22

9.4

9.0

9.8

9.1

1.0

1.0

20.00

20.00

10.00

10.00

10.00

10.00

- ND Not Detected at the Reporting Limit
- R RPD outside accepted recovery limits
- S % Recovery outside of range due to dilution or matrix
- В Analyte detected in the associated Method Blank
- Е Value above quantitation range

102

109

93.8

89.5

98.4

91.5

70

70

70

70

70

70

- J Analyte detected below quantitation limits
- Р Sample pH Not In Range
- RL Reporting Detection Limit
- W Sample container temperature is out of limit as specified

130

130

130

130

130

130

Page 15 of 22

WO#: 1701253

14-Feb-17

Client: Navajo Refining Company

Project: Quarterly R.O. Reject

Sample ID MB-29615	Samp1	Гуре: МВ	LK	Tes	tCode: E	PA Method	8310: PAHs		WWW.WWWWWWWWWWWWWWWWWWWWW	****
Client ID: PBW	Batcl	h ID: 296	15	F	RunNo: 3	9968				
Prep Date: 1/10/2017	Analysis D	Date: 1/1	1/2017	5	SeqNo: 1	252566	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	SampT	ype: LCS	5	Tes	tCode: El	PA Method	8310: PAHs			
Client ID: LCSW	Batch	h ID: 296	15	F	unNo ⁻ 3	9968				

Chencid. LCSW	Datci	110. 29	015	R	anno: 3	9968				
Prep Date: 1/10/2017	Analysis [)ate: 1/	11/2017	S	eqNo: 1	252567	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:

- * Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- Н Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- R RPD outside accepted recovery limits
- \mathbf{S} % Recovery outside of range due to dilution or matrix
- В Analyte detected in the associated Method Blank
- Е Value above quantitation range
- J Analyte detected below quantitation limits Р
- Page 16 of 22

- Sample pH Not In Range
- RLReporting Detection Limit
- W Sample container temperature is out of limit as specified

Client: Navajo Refining Company

Project: Quarterly R.O. Reject

Sample ID LCS-29615	Sampī	ype: LC	S	Tes	tCode: El	PA Method	8310: PAHs			
Client ID: LCSW	Batcl	h ID: 29	615	F	RunNo: 3	9968				
Prep Date: 1/10/2017	Analysis [Date: 1/	11/2017	S	SeqNo: 1	252567	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	SampT	ype: LC	SD	Tes	tCode: El	PA Method	8310: PAHs			
Client ID: LCSS02	Batcl	n ID: 29	615	F	RunNo: 3	9968				
Prep Date: 1/10/2017	Analysis D	0ate: 1 /	11/2017	S	SeqNo: 1	252568	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.
- D Sample Diluted Due to Matrix
- Holding times for preparation or analysis exceeded Η
- Not Detected at the Reporting Limit ND
- R RPD outside accepted recovery limits
- S % Recovery outside of range due to dilution or matrix
- В Analyte detected in the associated Method Blank
- Е Value above quantitation range
- J Analyte detected below quantitation limits Р
- Page 17 of 22

- Sample pH Not In Range RL Reporting Detection Limit
- W Sample container temperature is out of limit as specified

WO#: 14-Feb-17

1701253

WO#: 1701253

14-Feb-17

Client:	Navajo	Refining Co	ompany								
Project:	Quarter	ly R.O. Reje	ect								
Sample ID	MB-29866	SampT	ype: ME	зlk	Tes	tCode: To	otal Phenol	ics by SW-84	6 9067	*****	
Client ID:	PBW	Batch	n ID: 29	866	, F	RunNo: 4	0252				
Prep Date:	1/25/2017	Analysis D)ate: 1/	25/2017	S	SeqNo: 1	262095	Units: µg/L			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Phenolics, Tota	al Recoverable	ND	2.5	******							
Sample ID	LCS-29866	SampT	ype: LC	S	Tes	tCode: To	otal Phenol	ics by SW-84	6 9067		
Client ID:	LCSW	Batch	n ID: 29	866	F	RunNo: 4	0252				
Prep Date:	1/25/2017	Analysis D	ate: 1/	25/2017	5	SeqNo: 1	262096	Units: µg/L			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Phenolics, Tota	al Recoverable	21	2.5	20.00	0	104	62.4	146			
Sample ID	LCSD-29866	SampT	ype: LC	SD	Tes	tCode: To	otal Phenol	ics by SW-84	6 9067		
Client ID:	LCSS02	Batch	n ID: 29	866	F	RunNo: 4	0252				
Prep Date:	1/25/2017	Analysis D)ate: 1 /	25/2017	5	SeqNo: 1	262097	Units: µg/L			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Phenolics, Tota	al Recoverable	23	2.5	20.00	0	113	62.4	146	8.32	21	

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

Page 18 of 22

WO#: **1701253** *14-Feb-17*

Client: Project:	Navajo I Quarterl	Refining Company R.O. Reject	ny							
Sample ID	MB-R40523	SampType:	MBLK	Test	tCode: EF	PA 335.4: T	otal Cyanide	Subbed		
Client ID:	PBW	Batch ID:	R40523	R	unNo: 4(0523				
Prep Date:		Analysis Date:	1/16/2017	S	eqNo: 12	269895	Units: mg/L			
Analyte		Result PQI	L SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Cyanide	41 m 1 m 4 m 1 m 1 m 1 m 1 m 1 m 1 m 1 m	ND 0.010	00							
Sample ID	LCS-R40523	SampType:	LCS	Test	Code: EF	PA 335.4: T	otal Cyanide	Subbed		
Client ID:	LCSW	Batch ID:	R40523	R	unNo: 4(0523				
Prep Date:		Analysis Date:	1/16/2017	S	eqNo: 12	269896	Units: mg/L			
Analyte		Result PQI	L 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.
- 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

Page 19 of 22

Client:	Navajo R	efining Co	ompany								
Project:	Quarterly	R.O. Reje	ect								
Sample ID	rb	SampT	ype: MI	BLK	Tes	tCode: E	PA Method	8015D: Gaso	line Rang	e	
Client ID:	PBW	Batch	n ID: G3	39990	F	RunNo: 3	9990				
Prep Date:		Analysis D)ate: 1/	/12/2017	S	SeqNo: 1	253120	Units: mg/L			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Rang	ge Organics (GRO)	ND	0.050	****		an an ann an Anna an Anna Anna Aonaicean			and a set of the state of the s		
Surr: BFB		8.8		10.00		87.5	70	130			
Sample ID	2.5ug gro lcs	SampT	ype: LC	s	Tes	tCode: E	PA Method	8015D: Gaso	line Rang	e	
Client ID:	LCSW	Batch	n ID: G 3	39990	F	RunNo: 3	9990				
Prep Date:		Analysis D	ate: 1/	/12/2017	5	SeqNo: 1	253121	Units: mg/L			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Rang	ge 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 ms	d SampT	ype: MS	SD	Tes	tCode: E	PA Method	8015D: Gaso	line Rang	e	
Client ID:	R.O. Reject	Batch	n ID: G 3	39990	F	RunNo: 3	9990				
Prep Date:		Analysis D	ate: 1/	/12/2017	S	SeqNo: 1	253124	Units: mg/L			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Rang	ge 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 SampT	ype: MS	S	Tes	tCode: E	PA Method	8015D: Gaso	line Rang	e	
Client ID:	R.O. Reject	Batch	n ID: G3	39990	F	RunNo: 4	0004				
Prep Date:		Analysis D	ate: 1/	/13/2017	S	SeqNo: 1	254101	Units: mg/L			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Gasoline Rang	ge Organics (GRO)	0.53	0.050	0.5000	0.01760	102	70	130			

Qualifiers:

- * Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- Н 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
- В Analyte detected in the associated Method Blank
- Е Value above quantitation range

RL

- J Analyte detected below quantitation limits Р
 - Sample pH Not In Range
 - Reporting Detection Limit
- W Sample container temperature is out of limit as specified

1701253 14-Feb-17

WO#:

Page 20 of 22

Client: Navajo Refining Company

Project: Quarterly R.O. Reject

Sample ID MB-R40526	Samp ⁻	Туре: МЕ	BLK	Tes	tCode: E	PA 903.1: F	Ra 226 and EF	PA 904.0: I	Ra 228-Subbe	d
Client ID: PBW	Batc	h ID: R4	0526	F	RunNo: 4	0526				
Prep Date:	Analysis [Date: 2 /	2/2017	5	SeqNo: 1	269905	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.
- D Sample Diluted Due to Matrix
- Н Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- R RPD outside accepted recovery limits
- \mathbf{S} % Recovery outside of range due to dilution or matrix
- В Analyte detected in the associated Method Blank
- E Value above quantitation range
- Analyte detected below quantitation limits J
- Р Sample pH Not In Range
- RL Reporting Detection Limit
- W Sample container temperature is out of limit as specified

Page 21 of 22

WO#: 1701253

14-Feb-17

WO#: **1701253** *14-Feb-17*

Client: Project:	N Q	avajo Refining (uarterly R.O. Re	Company ject								
Sample ID	MB-29623	Samp	Type: M	BLK	Tes	tCode: S	M2540C MC	D: Total Diss	olved So	lids	
Client ID:	PBW	Bat	ch ID: 29	623	F	RunNo: 3	9966				
Prep Date:	1/10/201	7 Analysis	Date: 1	/11/2017	S	SeqNo: 1	252489	Units: mg/L			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved	d Solids	ND	20.0								
Sample ID	LCS-2962	3 Samp	Type: LC	s	Tes	tCode: S	M2540C MC	D: Total Diss	olved So	lids	
Client ID:	LCSW	Bat	ch ID: 29	623	F	RunNo: 3	9966				
Prep Date:	1/10/201	7 Analysis	Date: 1	/11/2017	S	eqNo: 1	252490	Units: mg/L			
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved	d Solids	1060	20.0	1000	0	106	80	120			

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

Page 22 of 22

HALL ENVIRONMEN ANALYSIS LABORATORY	ITAL Y	Hall Environmental Analysis Laboratory 4901 Hawkins NE Albuquerque, NM 87109 TEL: 505-345-3975 FAX: 505-345-4107 Website: www.hallenvironmental.com	S
Client Name: NAVAJO) REFINING CO	Work Order Number: 1701253	
Repaired by/datas	E	NINALI	· · · ·

Sample Log-In Check List

			er. 1701255		RcptNo: 1						
Received by/date:	RE	01/09/1	7								
Logged By:	Ashley Gallegos	1/9/2017 9:20:00 AN	١	AZ							
Completed By:	Ashiey Gallegos	1/9/2017 9:54:08 AN	١	A							
Reviewed By:	XA orlogli	7		· 0							
Chain of Custo	<u>ody</u>										
1. Custody seals	intact on sample bottles?		Yes	No 🗌	Not Present						
2, Is Chain of Cu	istody complete?		Yes 🖌	No []]	Not Present						
3. How was the s	sample delivered?		<u>Courier</u>								
Log In											
4. Was an attem	npt made to cool the samp	les?	Yes 🔽	No	NA						
5. Were all samp	bles received at a tempera	ture of >0° C to 6.0°C	Yes 🖌	No []]	NA []]						
6. Sample(s) in p	proper container(s)?		Yes 🔽	No							
7. Sufficient sam	ple volume for indicated te	est(s)?	Yes 🖌	No 🗍							
8. Are samples (e	except VOA and ONG) pro	perly preserved?	Yes 🔽	No							
9. Was preserval	tive added to bottles?		Yes	No 🕅	NA []]						
10.VOA vials have	e zero headspace?		Yes 🖌	No []]	No VOA Vials						
11. Were any sample containers received broken?			Yes 🗌	No 🗹	# of ores						
12. Does paperwork match bottle labels? (Note discrepancies on chain of custody)			Yes 🖌	No 🗔	bottles checked for pH:						
13. Are matrices c	orrectly identified on Chair	of Custody?	Yes 🔽	No 🗌	Adjusted?	No					
14. Is it clear what	analyses were requested?	?	Yes 🔽	No		0					
15. Were all holdin (If no, notify cu	ng times able to be met? Istomer for authorization.)		Yes 🗹	No	Checked by:	Ke					
Special Handlii	ng (if applicable)										
16. Was client noti	ified of all discrepancies wi	ith this order?	Yes	No []]	NA 🗹						
Person N	Jotified:	Date									
By Whon	n:	Via:	eMail []] Pl	none 🗍 Fax	In Person						
Regardin	g:			ATT THE OWNER AND A DESCRIPTION OF THE	n an an an ann an an an an an an an an a						
Client Ins	structions:		9.3832.7539.3422.0422.0422.0424.0426.0424.0424.0492								
17. Additional rem	arks:	· · · · · · · · ·									
18. <u>Cooler Inform</u>	ation										
Cooler No	Temp ºC Condition	Seal Intact Seal No	Seal Date	Signed By							
				arr owned and a second							

(N ro Y) selddu8 riAl \succ VOCs: 1,1,1-Trichloroethane; 1,1,2,2-Tetrachloroethane; 1,1,2,2-Tetrachloroethylene; 1,1,2-ANALYSIS LABORATORY SVOCs: benzo(a)pyrene, phenol, 1-methylnaphthalene, 2-methylnaphthalene, naphthalene 504.1:EDB × HALL ENVIRONMENTAL Trichforoethane; 1,1,2-Trichforoethyfene; 1,1-Dichloroethane; 1,1-Dichloroethene; 1,2-Hd × 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. Dibromoethane; 1,2-Dichloroethane; Benzene; Carbon Tetrachloride; Chloroform; sbiloS bevlossid letoT × Metals: As, Al, Ba, B, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, U, Zn 4901 Hawkins NE - Albuquerque, NM 87109 Nitrate/Nitrite × Dichloromethane; Ethylbenzene; Toluene; Total Xylenes; Vinyl Chloride Fax 505-345-4107 ebinoul⁻¹ × www.hallenvironmental.com Analysis Request slonard × Sulfate Chloride × (822-69+822-69) (YivitocoibeF × 8082: PCBs × Tel. 505-345-3975 8015: GRO, DRO, ORO × \times 7470: Mercury × 335.4: Total Cyanide × 6010B: WQCC Metals \times 8270C: WOCC list SVOCs Remarks \times 8260B:WQCC List VOCs × 0726 2007 100-Time Time 19/17 Date Date Sampier: Krad, Hubhard Rush Preservative Project #: P.O. # 167796 Na2S203 Type 1-unpres H2SO4 1 - 1L Glass H2SO4 1 - 1L Glass unpres 1-250mlGlas unpres 2 - 1L Glass unpres HN03 Monthly R.O. Reject HN03 NaOH HN03 זמוו-עומות וווופי 3-40ml VOA HCL 2-40ml VOA HCL 3-40ml VOA HCI Project Manager: Robert Combs Project Name 3-40ml VOA X Standard Type and # 2 - 500ml P Container ٥ 1-500ml P 1-125ml P Received by: Quarterly Received by: 1-500ml 2-1L P Level 4 (Full Validation) Sample Request ID Chain-ot-Custody Record Relinquished by. Grad, Hussara R.O. Reject Trip Blank Jy a Mailing Address: P.O. Box 159 Artesia, Relinquished by email or Fax#: 575-746-5451 R. Freed, Matrix Client: Navajo Refinery Phone #: 575-748-3311 liquid liauid H:30 liquid H:30 liquid NM 88211-0159 QA/QC Package: Time 4:30 1:20 ぷい 14:30 *d:*,7 4:30 15/17 4:30 5. Ч lime: EDD (Type) H:30 ž 15/17/4:30 lime: X Standard □ Other _ 1212 1517 1/5/17 5 /5/M 15/17 /S/1 فنا 12 LD /s/n Date (5/N 12/17 Date: Date:

YFRONTIER HollyFrontier Companies	Provised Population		2001	and a start of the second s	pH, CI, F, S04, NO2/NO3, TDS	8015 GRO	6020 total metals, 7470 Hg	6020 Dissolved Metals	Cyanide	Radium 226/228	8260 see attached list	80270 see attached list	8015 DRO	Radium 226/228			
r RO Imple s HOLL ient	D D D B	Field R.O. Reject Discarge		Narston Parison											Speed 10.4 mph, Conditions Clear		
апу цьс Reject Sa Detail Attachm). Reject Discarge		Note	X		×	×	× .	×	×	< ×	×	×	8°F, Humidity 42%, Wind Dir, East, Wind		
Navajo Refining Comp 501 E. Main Artesia, NM 88210 (Tel) 575.748.3311 (Fax) 575.746.5451	o. LLC	D North Field R.C		tisti #oficial Conteleters	2	3	~	-	2	е (7	- 0	2	2	1/5/17 Tmp.42	59	
	Month Minne Quarterly RO Reis Mars Nove Bredy Hubbard Mars Mars Navajo Refining C 115/17 @ 4:51 pm			et Sze	500ml Plastic	40ml VOA	500ml Plastic	125ml Plastic	500ml Plastic		1 Cloce	1L Glass	40ml VOA	40ml VOA	a (Vicenses: Oscalications) East	mp. 17.1C Field pH 7.6	•
		第10 で		Cental	11.11	1012	6 5	1				0	0	14.	ELECTOR OF	Field Te	

3

•

.

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):

$$\frac{\partial^2 p}{\partial r^2} + \frac{1}{r} \frac{\partial p}{\partial r} = \frac{\phi \mu c_t}{0.000264 \text{ k}} \frac{\partial p}{\partial t}$$
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 $p \rightarrow p_0$ (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):

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

where Ei represents the exponential integral defined by:

$$\operatorname{Ei}(-x) = -\int_x^{\infty} \frac{e^{-\varepsilon}}{\varepsilon} d\varepsilon$$
 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:

for all $t_1^j < t$. 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:

$$\Delta p_{skin}^{b} (psi) = 141.2 \frac{q_{i}^{b} \mu}{kh} s_{b}$$

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 $r_{w,b}^2$ (wellbore radius squared) leads to the following expression for the transient flowing pressure at a generic wellbore (b):

$$\begin{split} p_{wf}^{b}(x_{b}, y_{b}, t) &= p_{o} + \sum_{j=1}^{N} \frac{70.6 q_{i}^{j} \mu}{kh} \operatorname{Ei} \left(\frac{-39.5 \phi \mu c_{t} [(x_{b} - x_{j})^{2} + (y_{b} - y_{j})^{2}]}{kt} \right) \\ &+ \sum_{j=l(j \neq b)}^{N} \sum_{i=1}^{n_{j-1}} \frac{70.6 (q_{i+1}^{j} - q_{i}^{j}) \mu}{kh} \operatorname{Ei} \left(\frac{-39.5 \phi \mu c_{t} [x_{b} - x_{j})^{2} + (y_{b} - y_{j})^{2}]}{k(t - t_{i}^{j})} \right) \\ &+ \frac{70.6 q_{i}^{b} \mu}{kh} \left[\operatorname{Ei} \left(\frac{-39.5 \phi \mu c_{t} r_{w,b}^{2}}{kt} \right) - 2s_{b} \right] \\ &+ \sum_{i=1}^{n_{j-1}} \frac{70.6 (q_{i+1}^{b} - q_{i}^{b}) \mu}{kh} \left[\operatorname{Ei} \left(\frac{-39.5 \phi \mu c_{t} r_{w,b}^{2}}{k(t - t_{i}^{b})} \right) - 2s_{b} \right] \end{split}$$

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 $p - p_0$, 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 $\Delta p = p - p_0$ at a single well location over a specified time interval.

3

TECHNICAL REFERENCES

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

- Muskat, M., <u>The Flow of Homogeneous Fluids Through Porous Media</u>, 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., <u>Handbook of Mathematical Functions</u>, Dover, New York, 1972.

APPENDIX D-2

VISCOSITY CORRELATIONS







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





COMPRESSIBILITY OF PORE VOLUME AND DISTILLED WATER

APPENDIX D-4

PREDICTED PRESSURE RISE CALCULATIONS

Predicted Pressure Increase Calculations

Navajo Refining Company, L.L.C.

Permeability (md) =	32
Porosity (%) =	8.5
Thickness (feet) =	75

Thickness (feet) =

Compressibility $(psi^{-1}) = 8.40E-06$ Viscosity (cp) = 0.57 Wellbore Radius (feet) = 0.51042

Modeled Rate = 150 gpm

Г

		Time	Pres	sure Increase	(psi)	ΙГ	
	Date	(days)	Wellbore	1-mile	2.5-miles		Date
-							01
							02
							03
							04
		; 					05
17	06/01	0	0.00	0.00	0.00	č	06
20	07/01	30	1610.22	51.92	1.25	č	√ <u>07</u>
	08/01	61	1671.42	95.83	9.51		08
	09/01	92	1706.85	125.19	20.54		09
	10/01	122	1731.19	146.51	31.18		10
	11/01	153	1750.72	164.13	41.47		11,
	12/01	183	1766.16	178.32	50.62		12
	01/01	214	1779.65	190.90	59.28		01,
	02/01	245	1791.32	201.87	67.24		02
	03/01	273	1800.65	210.71	73.89		03
	04/01	304	1809.92	219.54	80.74		04
~	05/01	334	1818.04	227.31	86.90		05
018	06/01	365	1825.69	234.66	92.86	Ś	06
2	07/01	395	1832.50	241.23	98.27	ç	N 07
	08/01	426	1839.02	247.52	103.53		08
	09/01	457	1845.08	253.39	108.50		09
	10/01	487	1850.56	208.71	113.05		10
	12/01	510 540		203.89	101.64		12
	12/01	570	1000.74	200.02	121.04		01
	01/01	579 610	1960.09	273.23	120.70		07
	02/01	620	1009.90	277.04	129.59		02
	03/01	660	1877.04	201.42	136.53		03
	04/01	600	1881 72	200.40	130.33		04
2019	06/01	730	1885.46	203.13	143.17	c	n 00
	07/01	760	1888 94	296.21	146.25		
	08/01	700	1892.39	299.60	149.20		08
	09/01	822	1895 70	302.86	152.31		09
	10/01	852	1898.79	305.90	155.09		10
	11/01	883	1901.87	308.93	157.88		11
	12/01	913	1904.75	311.76	160.49		12
	01/01	944	1907.63	314.60	163.11		01
	02/01	975	1910.42	317.35	165.65		02
	03/01	1004	1912.95	319.84	167.97		03
	04/01	1035	1915.57	322.42	170.37		04
	05/01	1065	1918.03	324.86	172.64		05
20	06/01	1096	1920.51	327.30	174.92	2	1 06
20	07/01	1126	1922.84	329.60	177.08	Č	07
	08/01	1157	1925.18	331.91	179.24		08
	09/01	1188	1927.46	334.16	181.36		09
	10/01	1218	1929.61	336.29	183.36		10
	11/01	1249	1931.78	338.43	185.38		11,
	12/01	1279	1933.82	340.46	187.29		12

	Time Pressure Increase (psi)				(psi)
	Date	(days)	Wellbore	1-mile	2.5-miles
	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
21	06/01	1461	1945.30	351.81	198.05
20	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
	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
N	06/01	1826	1964.53	370.88	216.27
202	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
	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
23	06/01	2191	1980.24	386.48	231.32
202	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
	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
24	06/01	2557	1993.56	399.73	244.15
202	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

Predicted Pressure Increase Calculations

Navajo Refining Company, L.L.C.

Permeability (md) =	32
Porosity (%) =	8.5
Thickness (feet) =	75

Compressibility (psi ⁻¹) =	8.40E-06
Viscosity (cp) =	0.57
Wellbore Radius (feet) =	0.51042

Modeled Rate = 150 gpm

		Time	Pressure Increase (psi)			
	Date	(days)	Wellbore	1-mile	2.5-miles	
	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	
25	06/01	2922	2005.07	411.17	255.30	
20	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	
	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	
26	06/01	3287	2015.22	421.28	265.16	
202	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	
	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	
2	06/01	3652	2024.30	430.32	274 02	
202	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	2027.10	433.85	277 47	
	12/01	3835	2028.51	434.52	278 14	
	01/01	3866	2029.21	435.21	278.81	
	02/01	3807	2020.21	435.90	279.49	
	02/01	3037	2029.90	435.50	280 11	
	04/01	3920	2031 22	437.21	280.78	
	05/01	3027	2031.22	437.21	281 /1	
8	06/01	<u>4</u> 018	2032.53	438 53	282.07	
202	07/01	4010	2032.33	430.33	282.60	
~	08/01	4040	2033.10	430.82	282.03	
	00/01	4079 A110	2033.03	433.02	203.34	
	10/01	4110	2034.49	440.47	203.90 284.50	
	11/01	4140	2035.11	441.10	204.08	
	12/01	4171	2033.70	441.74	200.22	
	12/01	4201	2030.30	442.30	∠0 <u>3</u> .03	

		Time	Pressure Increase (psi)		
	Date	(days)	Wellbore	1-mile	2.5-miles
	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
29	06/01	4383	2040.03	446.00	289.41
20	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
	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
õ	06/01	4748	2046.93	452.88	296.18
200	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
	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
203	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
	01/01	5327	2056.85	462 77	305.93
	02/01	5358	2057 35	463.27	306.42
	02/01	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
2	06/01	5470	2050.73	465 19	308 31
303	07/01	5500	2059.20	465.66	308 78
	08/01	5540	2060.23	466 14	309.25
	00/01	5571	2060.23	400.14	309.20
	10/01	5601	2061 19	467.02	310 19
	11/01	5632	2061.10	467.03	310.10
	12/01	5662	2062 11	468.02	311 10

Predicted Pressure Increase Calculations

Navajo Refining Company, L.L.C.

Permeability (md) =	32
Porosity (%) =	8.5
Thickness (feet) =	75

Compressibility (psi ⁻¹) =	8.40E-06
Viscosity (cp) =	0.57
Wellbore Radius (feet) =	0.51042

Modeled Rate = 150 gpm

		Time	Pressure Increase (psi)			
	Date	(days)	Wellbore	1-mile	2.5-miles	
	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	
33	06/01	5844	2064.84	470.74	313.79	
20;	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	
	01/01	6058	2067.00	473.83	316.85	
	02/01	6089	2068 38	474 27	317.28	
	02/01	6117	2068 78	474.67	317.67	
	04/01	61 <i>1</i> 0	2000.70	475 10	318 10	
	04/01	0140 6170	2009.21	475.10	310.10	
4	05/01	0170	2009.03	475.52	310.01	
03	06/01	6209	2070.06	475.95	318.94	
2	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	
	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	
35	06/01	6574	2074.99	480.87	323.80	
20	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	
	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	
36	06/01	6940	2079.66	485.53	328.41	
203	07/01	6970	2080.03	485.90	328.78	
	08/01	7001	2080 42	486 28	329 16	
	09/01	7032	2080.32	486.66	329 53	
	10/01	7062	2081 17	487.03	320.80	
	11/01	7092	2081.17	487.00	330.27	
	12/01	7122	2081.04	487 77	330.63	
	12/01	1120	2001.01		000.00	

		Time	Pressure Increase (psi)			
Date (days) Wellbore 1-mile		2.5-miles				
	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	
37	06/01	7305	2084.08	489.94	332.78	
20	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	
	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	
38	06/01	7670	2088.29	494.14	336.93	
203	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	
	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	
6	06/01	8035	2092.30	498.14	340.90	
203	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	
	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	
Ģ	06/01	8401	2096 14	501.00	344 70	
204	07/01	8431	2096 44	502.28	345.00	
	08/01	8462	2096 76	502.20	345 31	
	09/01	8493	2097.08	502.00	345.63	
	10/01	8523	2097.38	503 21	345.03	
	11/01	8554	2097.69	503.53	346 24	
	12/01	8584	2098.00	503.83	346.54	

Predicted Pressure Increase Calculations

Navajo Refining Company, L.L.C.

Permeability (md) =	32
Porosity (%) =	8.5
Thickness (feet) =	75

Compressibility (psi ⁻¹) =	8.40E-06
Viscosity (cp) =	0.57
Wellbore Radius (feet) =	0.51042

Modeled Rate = 150 gpm

		Time	Pressure Increase (psi)		
	Date	(days)	Wellbore	1-mile	2.5-miles
	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
41	06/01	8766	2099.80	505.63	348.33
20	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
	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
42	06/01	9131	2103.32	509.15	351.81
20	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
	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
43	06/01	9496	2106.70	512.52	355.16
20	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
	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
44	06/01	9862	2109.96	515.78	358.39
20	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

		Time	Pressure Increase (psi)		
	Date	(days)	Wellbore	1-mile	2.5-miles
	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
45	06/01	10227	2113.10	518.91	361.50
20	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
	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
46	06/01	10592	2116.12	521.93	364.50
20	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
	01/01	10806	2117.85	523.65	366.21
	02/01	10837	2118.09	523.90	366.45
47	03/01	10865	2118.32	524.12	366.67
20	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

$$r_{C} = \sqrt{\frac{0.1337 \ V}{0.8 \ \pi \phi \ h}}$$

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

$$r_{\rm D} = 2.3 \ \sqrt{C_{\rm D} r_{\rm C}} + r_{\rm C}$$

where:

r _D	 Radius to dispersed plume front, feet
C _D	= Coefficient of dispersion (SS=3; LS = 65)

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

		Radial Distance	Radial Distance
Time		to Concentrated	to Dispersed
Period	Total Injection Volume	Plume Front	Plume Front
t	V	r _C	r _D
(years)	(gallons)	(feet)	(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.
- 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 yd³ 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.
- 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.
- Move in and rig up a casing crew and run centralized 13³/₈", 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, Ib	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 ft³ of a Class A light-weight lead cement blend followed by 206 ft³ 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 13³/₆ inch surface casing and lift the stack to make a rough cut on the 13³/₆ inch protection casing. Nipple down the bell nipple, flow line and BOP. If necessary, perform a top out operation between the 20-inch and 13³/₆-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 13³/₆ inch casing. Weld on a temporary flange to the 13³/₆ 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 13% 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 9⁵/₈ 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, Ib	
Capacity, bbl/ft	0.073206

24. Cement the 9⁵/₈ inch casing back to the surface in the following two stages:

<u>Stage One</u> – 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 ft³ of a Class H light-weight lead cement blend followed by 173 ft³ 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.

<u>Stage Two</u> – 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 ft³ of a Class H light-weight lead cement blend followed by 150 ft³ 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 9⁵/₈ inch protection casing, and lift the stack to make a rough cut on the 9⁵/₈ inch protection casing. Nipple down the bell nipple, flow line and BOP. If necessary, perform a top out operation between the 13³/₈ inch and 9⁵/₈ inch casings using 1-inch tremie pipe to place up to 200 sacks of standard cement. Cut the 13³/₈ inch surface casing and make a final cut on the 9⁵/₈ inch casing. Weld on a 9⁵/₈ inch by 11 inch, 3,000 psi, Slip-on-Weld (SOW) casing head with a hanger bowl for 7 inch tubing to the 9⁵/₈ inch protection casing. Nipple up an 11 inch by 13⁵/₈ 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 8¹/₂-inch by 4-inch by 60-foot core barrel and core BHA.

- 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 9⁵/₈ 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, Ib	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.
- 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	1
2.0	WASTE STREAM DESCRIPTION	1
3.0	INJECTED FLUID CHARACTERIZATION SAMPLING PROGRAM	1
	3.1 Sampling Frequency	1
	3.2 Sampling Location	2
	3.3 Sample Collection Equipment	2
	3.4 Sample Containers	2
	3.5 Sampling Methodology	2
	3.6. Sample Preservation	2
	3.7 Field Measurements	3
	3.8 Sampling Personnel	3
4.0	FIELD DOCUMENTATION	3
	4.1 Water Sampling Log	3
	4.2 Sample Container Label	3
	4.3 Chain-of-Custody Form	4
	4.4 Custody Seal	4
	4.5 Field Equipment Calibration Log	4
5.0	QUALITY ASSURANCE/QUALITY CONTROL	4
6.0	SAMPLE CUSTODY AND TRANSPORT	4
7.0	WASTE STREAM ANALYTICAL PROGRAM	5
	7.1 Laboratory Requirements	5
	7.2 Analytical Parameters	5
8.0	REPORTING	6

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.
- Weld a ½ inch steel plate across the 13³/₆-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

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

6186996
UICI-008-1
\$95,000.00
Eddy County

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

KNOW ALL MEN BY THESE PRESENTS:

That <u>Navajo Refining Company</u>, (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 <u>New Mexico</u>, and authorized to do business in the State of New Mexico, as PRINCIPAL, and <u>Safeco Insurance Company of America</u>, a corporation organized and existing under the laws of the State of <u>New Mexico</u>, 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 <u>\$95,000.00</u>, 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 <u>seq</u>. NMAC, the identification and location(s) of said well(s) being:

	WDW-4		API No	0,	located1,	000 feet from the
South	(Name of Well) (North /South)	line and	2,500	feet from the _	West	(East/West) line
of Section	23 Township	<u>175</u>	(North) (Sou	th), Range	27	(East) (West),
NMPM, and	Latitude <u>32.815065</u>	Longitude <u>-104</u>	.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. <u>UICI-008-1</u> 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

By_

Address

Attorney-in-Fact

Address

SURETY

Title

Signature

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)		
SEAL	Nota	ry Public
My Commission Expires		
ACKNOWLEDGMENT FORM FOR PARTNERSHI	P, CORPORATION, OR LIMITED LIABI	LITY COMPANY
STATE OF)		
SS. COUNTY OF		
This instrument was acknowledged before me on	day of 20 by	
	(Name of I	Person Signing Instrument)
asof		
(Capacity, e.g., partner, president, manager, member)	(Name of partnership, corporation or limit	ed liability company)
		Notary Public
SEAL		
My Commission Expires		
ACKNOWLEDGMENT FO	RM FOR CORPORATE SURETY	
STATE OF		
STATE OF		
COUNTY OF)		
This instrument was acknowledged before me on this	day of	, 20,
by, as Attorney_in_Fact)	ey-in-Fact for	
(I value of I atomicy in I act)	(rune of corporate bare	()
SEAL		Notary Public
SEAL		
My Commission Expires		
Corporate Surety attach Power of Attorney		
	APPROVED BY:	
	OIL CONSERVATION DIVISIO	N 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.