1R - 426-169

WORKPLANS

Date:

8-16-12

Hansen, Edward J., EMNRD

From: Katie Jones <kjones@riceswd.com>
Sent: Thursday, August 16, 2012 12:16 PM
To: Hansen, Edward J., EMNRD
Cc: Hack Conder; Laura Pena; Lara Weinheimer
Subject: ROC - BD B-29 (1R426-169) Chloride Mass Calculation
Attachments: BD B-29 (1R426-169) Multimed Results.pdf; BD B-29 (1R426-169) MW Data.pdf; BD B-29 (1R426-169) SURVEY.PDF; BD B-29 (1R426-169) Chloride Mass Calculation.pdf

Mr. Hansen,

In response to NMOCD's July 23, 2012 request for a groundwater remediation report, ROC submits the attached chloride mass calculation for the BD B-29 (1R426-169) site.

Six Multimed models were run:

- All soil bore data (with a total area of 57,000 square feet)
- Excavation data (calculated based on the areas of the north, center, and southeast excavation area dimensions totaled together to give an area of 39,063 square feet)
- North excavation (an area of 25,912 square feet)
- Center excavation (an area of 10,276 square feet)
- Southeast excavation (an area of 2,875 square feet), and
- The area outside of the excavation (calculated by subtracting the total excavation area of 39,063 square feet from the total area of 57,000 square feet to yield an area of 17,937 square feet).

With an infiltration rate of 0.6" (which is representative of a poor liner), each model passed multimed indicating that residual chloride in the soil would not affect groundwater above the WQCC standard of 250 mg/L. Approximately 39,063 square feet (the Center, Southeast, and North excavations) are protected by 20-mil reinforced liners (installed beginning in March 2012). The area not covered by a liner (17,937 square feet) also passed multimed, indicating groundwater will not be impacted above WQCC standards. A summary of these multimed models is attached.

Since multimed results indicate residual chlorides in the soil will not affect groundwater above WQCC standards, only monitoring well data was used to calculate the chloride mass. The total area at the BD B-29 site is approximately 57,000 square feet. The aquifer thickness is estimated to be 15 ft thick. The porosity is estimated at 0.25. The volume of the impacted groundwater beneath the site is determined by multiplying the area by the aquifer thickness by the porosity. The volume of impacted groundwater beneath the site is then 213,750 cubic feet. The result is then converted to liters giving a total of 6,052,725.96 liters. The chloride concentration added from the source is the difference between the maximum concentration of 420 mg/L (8/12/2008) at the down gradient well, MW-2, and the minimum concentration of 250 mg/L (5/16/2011) at the up gradient well, MW-3. A table summarizing monitoring well data and a survey showing monitoring well locations are attached. The total chloride mass in the groundwater is then determined by multiplying the volume of impacted groundwater beneath the site by the chloride concentration added from the site. This then is converted to kilograms. Thus, the total chloride mass beneath the site is 1,029 kg.

There are four recovery wells located at the BD O-23-1 vent and BD O-23 vent sites with chloride concentrations ranging from 4,300 mg/L to 10,200 mg/L. The maximum volume of groundwater required to remove 1,029 kg is approximately 1,505 barrels. The recovery systems are expected to extract four gallons a minute, and it is estimated that the system will require a maximum of 26 days to extract 1,505 barrels of groundwater utilizing the two recovery wells at each site (four wells in total).

On August 3rd, 2012, an email was submitted to NMOCD stating that groundwater recovery from BD B-29 started on July 30th, 2012, utilizing both recovery systems at BD O-23 vent and BD O-23-1 vent.

If you have any questions or require any further information, please contact Hack Conder, Laura Pena, or myself.

Thank you,

Katie Jones
Environmental Project Manager
RICE *Operating Company*

All SB data

	Infiltration Rate	Average	Area (ft^2)	Average Concentration	@	Years
Good/plastic liner	0.3"	1495	57000	20.55	@	849
Poor/clay liner	0.6"	1495	57000	86.58	@	426
No liner	1.2"	1495	57000	297.1	@	229

Excavation Data

	Infiltration Rate	Average	Area (ft^2)	Average Concentration	@	Years
Good/plastic liner	0.3"	1781	39063	20.27	@	849
Poor/clay liner	0.6"	1781	39063	85.37	@	426
No liner	1.2"	1781	39063	293	@	229

North Excavation

	Infiltration Rate	Average	Area (ft^2)	Average Concentration	@	Years
Good/plastic liner	0.3"	2020	25912	20.79	@	849
Poor/clay liner	0.6"	2020	25912	83.35	@	426
No liner	1.2"	2020	25912	262.3	@	229

Center Excavation

	Infiltration Rate	Average	Area (ft^2)	Average Concentration	@	Years
Good/plastic liner	0.3"	1404	10276	14.44	@	849
Poor/clay liner	0.6"	1404	10276	57.88	@	426
No liner	1.2"	1404	10276	181.9	@	229

Southeast Excavation

	Infiltration Rate	Average	Area (ft^2)	Average Concentration	@	Years
Good/plastic liner	0.3"	1921	2875	19.68	@	849
Poor/clay liner	0.6"	1921	2875	78.74	@	426
No liner	1.2"	1921	2875	246.2	@	229

Outside Excavation

	Infiltration Rate	Average	Area (ft^2)	Average Concentration	@	Years
Good/plastic liner	0.3"	638	17937	6.564	@	849
Poor/clay liner	0.6"	638	17937	26.31	@	426
No liner	1.2"	638	17937	82.76	@	229

ROC BD B-29 (1R426-169)													
MW	Depth to Water	Total Depth	Well Volume	Volume Purged	Sample Date	Cl	TDS	Benzene	Toluene	Ethyl Benzene	Total Xylenes	Sulfate	Comments
1	90.13	110.97	13.5	50	5/5/2008	296	1280	<0.002	<0.002	<0.002	<0.006	462	clear no odor
1	90.07	110.97	13.6	45	1/9/2008	212	749	<0.001	<0.001	<0.001	<0.003	128	clear no odor
1	90.35	110.97	13.4	50	8/12/2008	304	1380	<0.001	<0.001	<0.001	<0.003	456	clear no odor
1	90.24	110.97	13.5	50	10/9/2008	312	1480	<0.001	<0.001	<0.001	<0.003	393	clear no odor
1	90.21	111.01	13.5	50	1/13/2009	308	1450	<0.001	<0.001	<0.001	<0.003	479	clear no odor
1	90.26	111.01	13.5	50	4/20/2009	320	1460	<0.001	<0.001	<0.001	<0.003	518	clear no odor
1	90.29	111.01	13.5	50	7/27/2009	332	1450	<0.001	<0.001	<0.001	<0.003	444	clear no odor
1	90.32	111.01	13.4	50	10/16/2009	336	1500	<0.001	<0.001	<0.001	<0.003	437	clear no odor
1	90.35	111.1	13.5	50	1/25/2010	340	1550	<0.001	<0.001	<0.001	<0.003	502	clear no odor
1	90.34	111.1	13.5	50	4/22/2010	348	1460	<0.001	<0.001	<0.001	<0.003	539	clear no odor
1	90.32	111.1	13.5	50	7/21/2010	370	1470	<0.001	<0.001	<0.001	<0.003	494	clear no odor
1	90.29	111.1	13.5	50	10/20/2010	328	1430	<0.001	<0.001	<0.001	<0.003	467	clear no odor
1	90.2	111.1	13.6	50	2/9/2011	364	1420	<0.001	<0.001	<0.001	<0.003	433	clear no odor
1	90.21	111.1	13.6	50	5/16/2011	360	1460	<0.001	<0.001	<0.001	<0.003	475	clear no odor
1	90.16	111.1	13.6	50	8/4/2011	372	1530	<0.001	<0.001	<0.001	<0.003	437	clear no odor
1	90.14	111.1	13.6	50	11/3/2011	368	1460	<0.001	<0.001	<0.001	<0.003	477	clear no odor
1	90.19	111.1	13.6	50	2/3/2012	376	1450	<0.001	<0.001	<0.001	<0.003	488	clear no odor
1	90.31	111.1	13.5	50	6/7/2012	352	1490	<0.001	<0.001	<0.001	<0.003	476	clear no odor

MW	Depth to Water	Total Depth	Well Volume	Volume Purged	Sample Date	Cl	TDS	Benzene	Toluene	Ethyl Benzene	Total Xylenes	Sulfate	Comments
2	89.38	104.6	9.9	35	1/9/2008	264	1085	<0.001	<0.001	0.002	<0.003	257	clear no odor
2	89.31	104.6	9.9	500	5/5/2008	400	1510	<0.002	<0.002	<0.002	<0.006	502	clear no odor
2	89.55	104.6	9.8	500	8/12/2008	420	1710	<0.001	<0.001	<0.001	<0.003	432	clear no odor
2	89.51	104.6	9.8	500	10/9/2008	408	1590	<0.001	<0.001	<0.001	<0.003	421	clear no odor
2	89.48	104.55	9.8	40	1/13/2009	390	1620	<0.001	<0.001	<0.001	<0.003	488	clear no odor
2	89.5	104.55	9.8	40	4/20/2009	320	1580	<0.001	<0.001	<0.001	<0.003	497	clear no odor
2	89.52	104.55	9.8	40	7/27/2009	352	1460	<0.001	<0.001	<0.001	<0.003	444	clear no odor
2	89.49	104.55	9.8	40	10/16/2009	344	1550	<0.001	<0.001	<0.001	<0.003	416	clear no odor
2	89.56	104.62	9.8	40	1/25/2010	336	1630	<0.001	<0.001	<0.001	<0.003	510	clear no odor
2	89.48	104.62	9.8	40	4/22/2010	344	1550	<0.001	<0.001	<0.001	<0.003	488	clear no odor
2	89.45	104.62	9.9	40	7/21/2010	360	1410	<0.001	<0.001	<0.001	<0.003	473	clear no odor
2	89.47	104.62	9.8	40	10/20/2010	312	1450	<0.001	<0.001	<0.001	<0.003	455	clear no odor
2	89.38	104.63	9.9	40	2/9/2011	332	1410	<0.001	<0.001	<0.001	<0.003	458	clear no odor
2	89.4	104.63	9.9	40	5/16/2011	380	1300	<0.001	<0.001	<0.001	<0.003	342	clear no odor
2	89.4	104.63	9.9	40	8/4/2011	332	1500	<0.001	<0.001	<0.001	<0.003	451	clear no odor
2	89.39	104.63	9.9	40	11/3/2011	340	1410	<0.001	<0.001	<0.001	<0.003	458	clear no odor
2	89.43	104.63	9.9	40	2/3/2012	332	1390	<0.001	<0.001	<0.001	<0.003	453	clear no odor
2	89.48	104.63	9.8	40	6/7/2012	368	1500	<0.001	<0.001	<0.001	<0.003	444	clear no odor

MW	Depth to Water	Total Depth	Well Volume	Volume Purged	Sample Date	Cl	TDS	Benzene	Toluene	Ethyl Benzene	Total Xylenes	Sulfate	Comments
3	89.96	107.8	2.9	10	12/3/2010	252	1290	<0.001	<0.001	<0.001	<0.003	459	clear no odor
3	89.9	107.8	2.9	10	2/9/2011	264	1290	<0.001	<0.001	<0.001	<0.003	432	clear no odor
3	89.92	107.8	2.9	10	5/16/2011	250	1060	<0.001	<0.001	<0.001	<0.003	329	clear no odor
3	89.88	107.8	2.9	10	8/4/2011	260	1200	<0.001	<0.001	<0.001	<0.003	469	clear no odor
3	89.86	107.8	2.9	10	11/3/2011	280	1340	<0.001	<0.001	<0.001	<0.003	455	clear no odor
3	89.91	107.8	2.9	10	2/3/2012	256	1380	<0.001	<0.001	<0.001	<0.003	493	clear no odor
3	90	107.8	2.8	10	6/7/2012	260	1310	<0.001	<0.001	<0.001	<0.003	468	clear no odor

BD B-29

Chloride Mass Removal Calculation

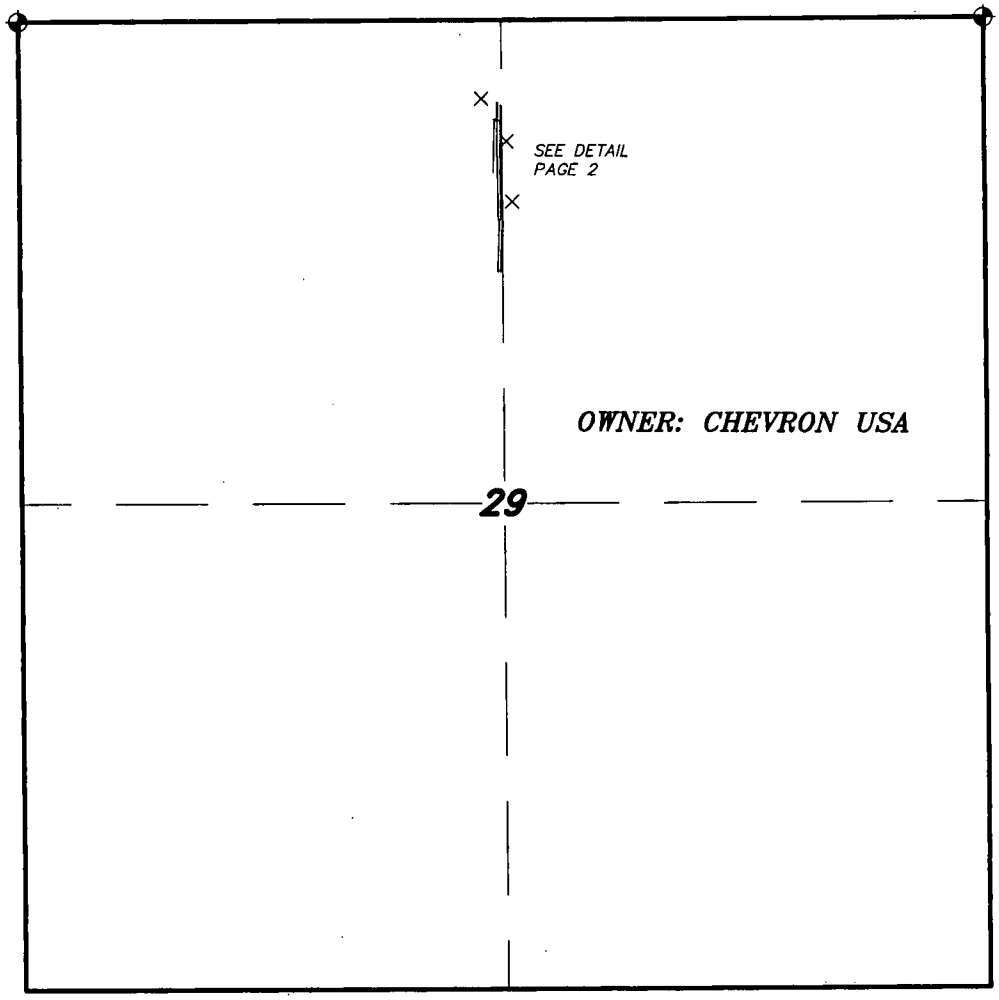
Estimate of Chloride Mass in Groundwater

Parameter	Unit	Value	Description
Impact area	ft^2	57,000	Estimated Area of Impact
Aquifer Thickness	ft	15	NMOCD Approved Estimation
Porosity	%	0.25	Professional Estimate for Water Saturated Pore Volume
Volume of Impacted Groundwater Below Site	ft^3	213,750	Impact Area x Aquifer Thickness x Porosity
Volume of Impacted Groundwater Below Site	L	6,052,725.96	Conversion from ft^3 to Liters
Chloride Concentration from Source	mg/L	170	Difference between Maximum and Mimimum Concentrations in Monitor Wells (MW-2 = 420 mg/L and MW-3 = 250 mg/L)
TOTAL CHLORIDE MASS	**kg**	**1,029**	Volume of Impacted Groundwater Below Site x Chloride Concentration Added to Soil from Source

Estimated Groundwater Recovery System Removal at BD O-23 vents

Parameter	Unit	Value	Description
Groundwater Concentration	mg/L	4,300	Groundwater Concentration from O-23-1 MW-1R
Groundwater Concentration	kg/gal	0.0162774	Conversion from mg/L to kg/gal
Pumping Rate	gals/min	4	Given
Extraction Rate	kg/min	0.06510959	Pumping rate x Groundwater Concentration (kg/gal)
Extraction Rate	kg/day	39.0657531	Conversion from kg/min to kg/day
Representative Total Chloride Mass	kg	1,029	From above
Volume Removal	gals	63,214	Pumping rate x Estimated Removal Time x 60 min/hour x 10 hr/day
Volume Removal	bbls	1,505	Conversion from gals to bbls
ESTIMATED REMOVAL TIME	**day**	**26**	Representative Total Chloride Mass/Extraction Rate

SECTION 29, TOWNSHIP 21 SOUTH, RANGE 37 EAST, N.M.P.M.,
LEA COUNTY, **NEW MEXICO.**



NOTE:
ELEVATIONS ARE ON BLACK MARK
ON NORTH SIDE OF PVC CASING.

NEW MEXICO STATE PLANE COORDINATES (NAD83)

WELL	NORTHING	EASTING	LATITUDE	LONGITUDE	ELEV. PVC	ELEV. GRND
MW #1	531291.129	895535.829	32°27'19.250"	103°11'06.178"	3476.61'	3473.83'
MW #2	530961.941	895568.651	32°27'15.990"	103°11'05.786"	3475.60'	3472.86'
MW #3	531521.992	895397.878	32°27'21.548"	103°11'07.709"	3476.88'	3474.30'

1000 0 1000 2000 FEET

SCALE: 1" = 1000'

I HEREBY CERTIFY THAT THIS PLAT WAS PREPARED FROM FIELD NOTES OF AN ACTUAL SURVEY AND MEETS OR EXCEEDS ALL REQUIREMENTS FOR LAND SURVEYS AS SPECIFIED BY THIS STATE.

GARY L. JONES, N.M. P.S. No. 7977
TEXAS R.P.L.S. No. 5074

BASIN SURVEYS P.O. BOX 1786 – HOBBS, NEW MEXICO

RICE OPERATING COMPANY

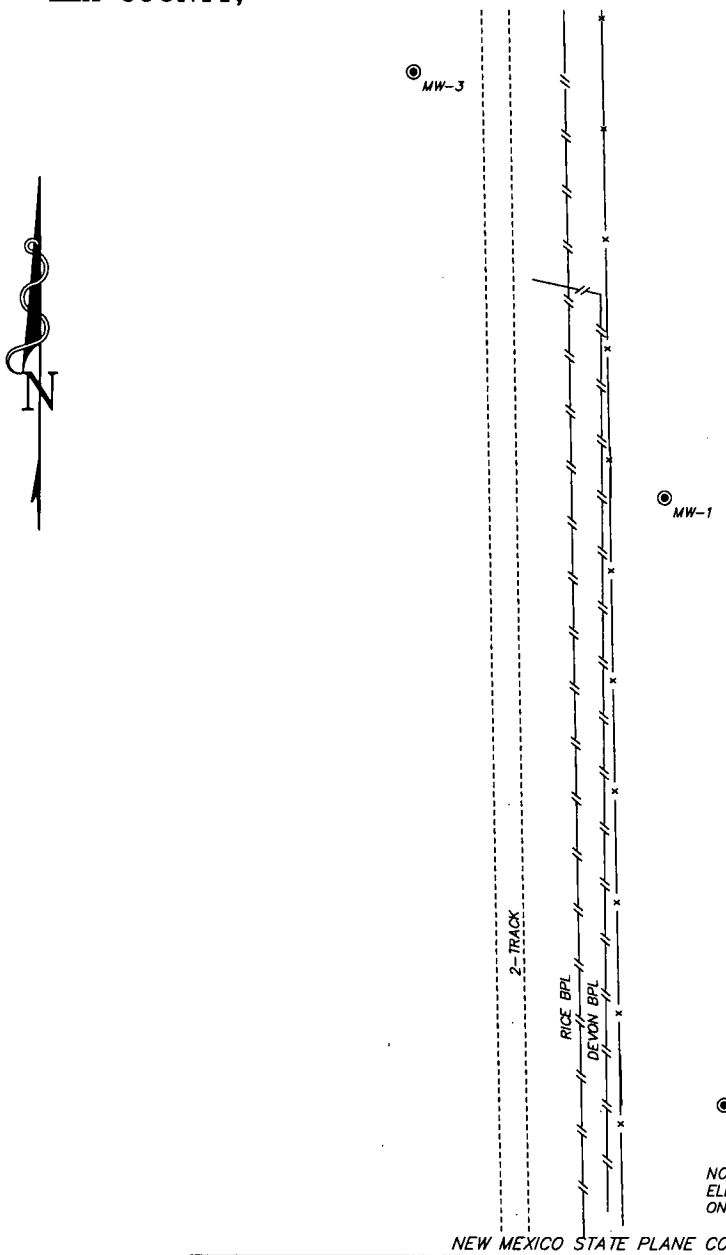
REF: B-29 SITE

MONITOR WELLS LOCATED IN
SECTION 29, TOWNSHIP 21 SOUTH, RANGE 37 EAST,
N.M.P.M., LEA COUNTY, NEW MEXICO.

W.O. Number: 24392	Drawn By: K. GOAD		
Date: 03-30-2011	Disk: KJG – 24392MW.DWG	Survey Date: 03-29-2011	Sheet 1 of 2 Sheets

SECTION 29, TOWNSHIP 21 SOUTH, RANGE 37 EAST, N.M.P.M.,

LEA COUNTY, **NEW MEXICO.**



OWNER: CHEVRON USA

NOTE:
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100 0 100 200 FEET

SCALE: 1" = 100'

I HEREBY CERTIFY THAT THIS PLAT WAS PREPARED FROM FIELD NOTES OF AN ACTUAL SURVEY AND MEETS OR EXCEEDS ALL REQUIREMENTS FOR LAND SURVEYS AS SPECIFIED BY THIS STATE.

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BASIN SURVEYS P.O. BOX 1786 – HOBBS, NEW MEXICO

RICE OPERATING COMPANY

REF: B-29 SITE

MONITOR WELLS LOCATED IN
SECTION 29, TOWNSHIP 21 SOUTH, RANGE 37 EAST,
N.M.P.M., LEA COUNTY, NEW MEXICO.

W.O. Number: 24392	Drawn By: K. GOAD		
Date: 03-30-2011	Disk: KJG – 24392MW.DWG	Survey Date: 03-29-2011	Sheet 2 of 2 Sheets