

1R - 427-15

WORKPLANS

Date:

5-18-10

Hansen, Edward J., EMNRD

From: lpgalusky@alumni.virginia.edu on behalf of L Peter Galusky Jr @ Texerra [lpg.texerra@gmail.com]
Sent: Tuesday, May 18, 2010 9:06 AM
To: Hansen, Edward J., EMNRD
Cc: Katie Jones; Lara Weinheimer
Subject: Re: NMOCD Case No. 1R 427-15. Rice Operating Company. EME State 'H' EOL. Addendum to Termination Request
Attachments: EME State H EOL soil chloride mass calculations 05.07.10 lpg.xls

Mr. Hansen,

Please find attached an Excel spreadsheet which contains the calculations that you requested.

The rationale for these calculations is summarized as follows:

- The affected area is assumed to be elliptical or circular (circular if the length and width are the same).
- The affected depth is the thickness of the unsaturated zone to within approximately 5 ft of the water table.
- The average "contributed" soil chloride concentration is estimated from field measurements, subtracting a reasonable value for presumed, adjacent "oil field" background levels.
- The contributed soil chloride mass is calculated as the "contributed" concentration times the mass of the affected soil, the latter being calculated as the affected area times the affected depth times an estimated soil bulk density (3,000 lbs/cu yd).
- The volume (in bbls) of chloride-laden groundwater from a regionally impacted well that needs to be removed is calculated by dividing the residual contributed soil chloride mass (in lbs) by the groundwater chloride concentration (converted to and expressed in lbs/bbl).
- The approximate time that it will take to remove this much groundwater is calculated by dividing the volume of groundwater to be removed (in bbls) by the anticipated average daily pumping rate (expressed in bbls/day).

Please call me if you wish to go over these calculations or if you have any questions pertaining to them.

Thank you.

Sincerely,

Pete G.

--

L Peter Galusky, Jr. Ph.D.
Texerra
Tel: 432-634-9257
E-mail: lpg@texerra.com

On Thu, May 13, 2010 at 6:13 PM, Hansen, Edward J., EMNRD <edwardj.hansen@state.nm.us> wrote:

RE: “Addendum to Termination Request”

for the Rice Operating Company’s

EME State ‘H’ EOL Site

Unit Letter E, Section 17, T20S, R37E, NMPM, Lea County, New Mexico

Remediation Plan (1R480) Further Information Required

Dear Mr. Conder:

The New Mexico Oil Conservation Division (OCD) has received the Addendum to Termination Request for the EME State ‘H’ EOL Site, dated May 13, 2010, and has conducted a review of the Addendum. The Addendum indicates that additional information is required for the proposed chloride mass removal.

ROC must submit additional information to the OCD within 10 days for chloride mass removal, including the calculations for determining the chloride mass.

If you have any questions regarding this matter, please contact me at 505-476-3489.

Edward J. Hansen

Hydrologist

Environmental Bureau

From: lpgalusky@alumni.virginia.edu [mailto:lpgalusky@alumni.virginia.edu] **On Behalf Of** L Peter Galusky Jr @ Texerra

Sent: Wednesday, May 12, 2010 5:31 PM

To: Hansen, Edward J., EMNRD

Cc: Katie Jones; Hack Conder

Subject: NMOCD Case No. 1R 427-15. Rice Operating Company. EME State 'H' EOL. Addendum to Termination Request

Mr. Hansen,

The following information is given in support of our remediation Termination Request for the EME State 'H' EOL project (NMOCD Case Number 1R 427-15) submitted to NMOCD on December 31, 2009.

We propose to compensate for the potential elevation in groundwater chloride mass due to the movement of residual soil chlorides into the groundwater by removing an equivalent mass of groundwater chlorides from a nearby recovery well (at the EME L-6 Boot), where elevated chlorides are known to have been caused by historical regional impacts.

The estimated residual soil chloride mass for the site is 898 lbs, based on the average measured soil chloride concentration across the affected soil volume. The estimated volume of groundwater that would need to be withdrawn from the EME L-6 well is 246 bbls, based on a chloride concentration of 11,600 ppm. The time required to remove this quantity of water will depend upon the pumping rate, but is estimated to be approximately 14 days based on a 24 hr averaged rate of 0.5 gpm.

Thank you.

Peter Galusky

--

L Peter Galusky, Jr. Ph.D. P.E.

Principal

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Soil Chloride Calculator
Estimated Mass of Contributed, Residual Soil Chloride
Rice Operating Company

Site: **EME State H EOL**
 This estimate prepared by: **L. Peter Galusky, Jr.**
 Date: **5/7/2010**

Inputs in Blue Font

Notes

length of affected area (ft)	35 measured/estimated
width of affected area (ft)	35 measured/estimated
affected area (sq ft)	962 calculated
affected depth (ft)	25 measured/estimated
depth to water table (ft)	30 estimated
avg Cl- conc of affected soil (ppm)	586 measured/estimated
est. natural background Cl- conc (ppm)	250 estimated
unsat zone mass density (lbs/cu yd)	3,000 estimated
Cl- conc attributed to source (ppm)	336 calculated
volume of affected soil (cu yds)	890 calculated
total mass of affected soils (lbs)	2,671,181 calculated
mass of contributed residual soil chloride (lbs)	898 calculated

Equivalent Volume of Affected Groundwater to Remove

Cl- conc of recovery well (ppm)	(EME L-6)	11,600 measured/estimated
avg daily pumping rate of recover well (gpm)		0.5 measured/estimated
avg daily pumping rate of recoveyr well (bbls/day)		17.1 calculated
Cl- conc of recovery well (lbs/bbl)		3.7 calculated
# bbls to remove contributed Cl- from unsat zone		246 calculated
days pumping required to remove contributed Cl-		14 calculated

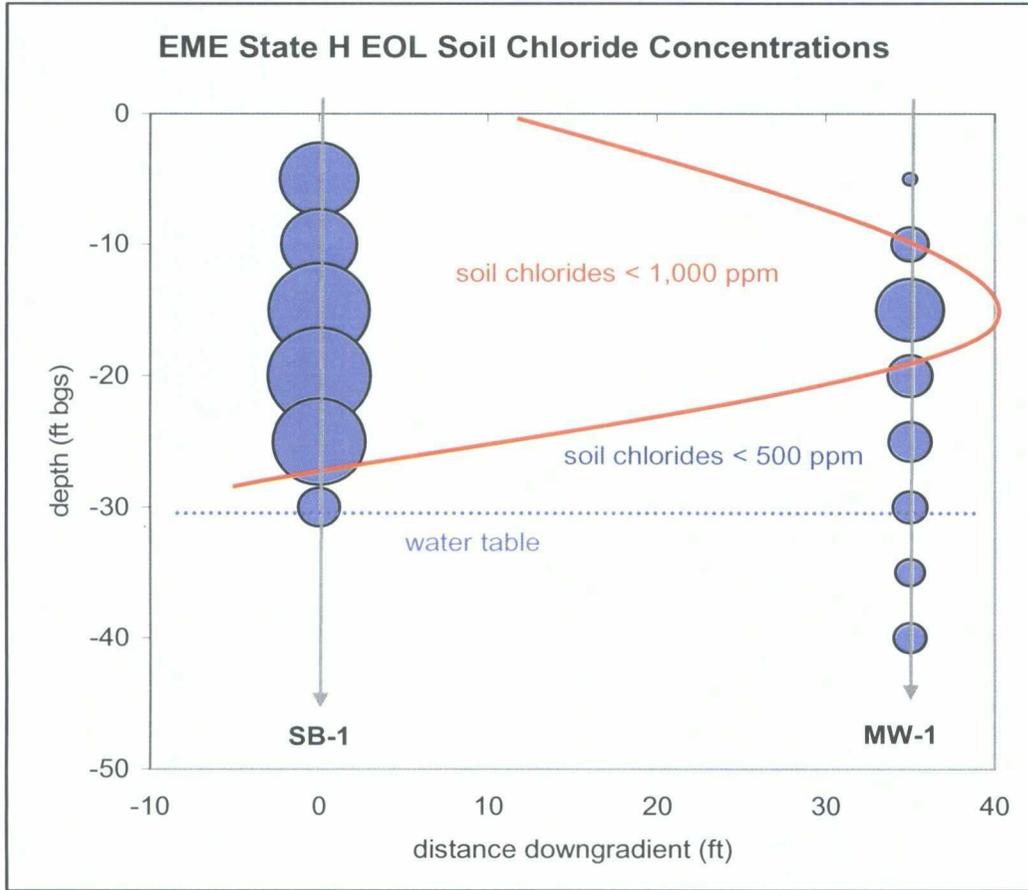


Figure 4 – Field titrated soil chloride concentrations, measured on 11-28-07. Red line illustrates approximate (visually interpolated) area containing soil chlorides values between 500 and 1,000 ppm. (Taken from ICP Report & Monitoring Plan of March 20, 2008).

EME State H EOL Soil Chloride Concentrations 11-28-07

depth (ft) bgs	lateral distance (ft) downgradient							
	0	5	10	15	20	25	30	35
-5	751	663	576	489	401	314	227	139
-10	730	677	625	572	519	467	414	361
-15	961	916	870	825	780	734	689	643
-20	982	903	824	745	666	587	508	430
-25	886	818	750	682	614	547	479	411
-30	402	392	382	372	362	352	342	332
-35								280
-40								312

Note: Values in blue font are interpolated.

Avg soil chloride conc (ppm)
586