

1R - 426-02

Revised
WORKPLANS

DATE:

3-3-09

Hansen, Edward J., EMNRD

From: Hack Conder [hconder@riceswd.com]
Sent: Wednesday, June 03, 2009 3:08 PM
To: Hansen, Edward J., EMNRD
Cc: 'Katie Jones'; 'Hall, Sharon'
Subject: FW: BD Jct. K-27 North & K-27-1 (1R426-02 & 03)
Attachments: Response letter to meeting discussion with OCD 3.3.09.pdf; Figure 1 Site Location Map-k27.pdf

Ed,

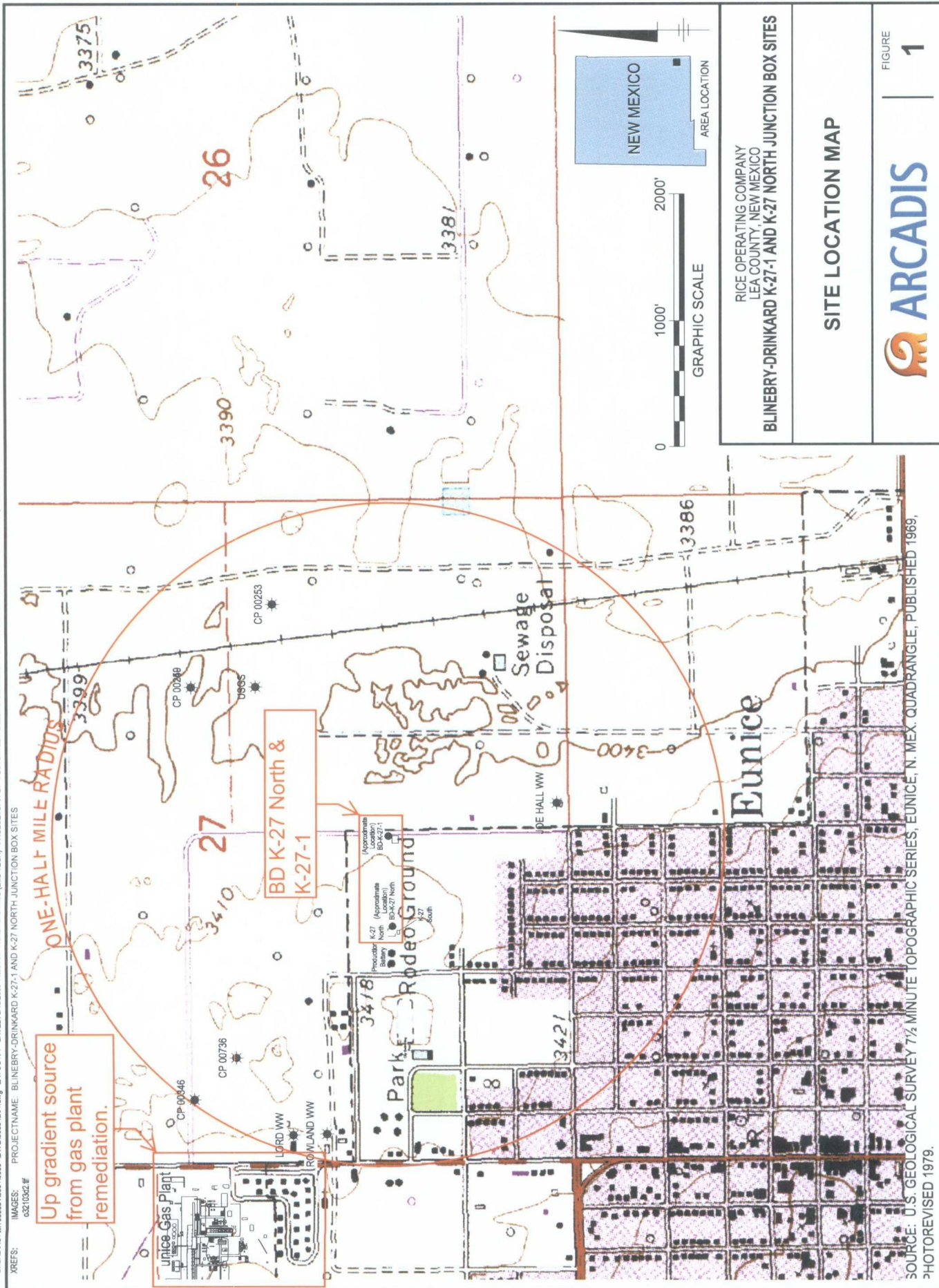
The following is an addendum to 1R426-02&03 BD K-27 response to your request for further information on March 3rd 2009, paragraph 3 on page two. Blue lettering is addition to that paragraph. Also attached are the original response letter to NMOCD and a site map displaying the up gradient source from K-27. If you need any other information please contact me.

ROC proposes the installation of a groundwater recovery system at the former K-27-1 junction box location. A solar-driven pump will be placed in existing well MW-1, an existing 4-inch monitor well. The pump will operate 8-10 hours per day and the groundwater recovered from the well be pumped into a tank. The groundwater will be treated with a R.O. system on site on-site to chloride concentrations below 250 mg/L. The treated water will be used to irrigate the site to promote vegetation and the effluent water will be utilized for pipeline and well maintenance.

Hack Conder
Environmental Manager
Rice Operating Company
575-393-9174
fax 575-397-1471

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 G: CACT: MT: 00056340010000 UNW00634861 mg LAYOUT: 1 SAVED: 3/3/2008 1:56 AM ACADVER: 17.05 [JMS TECH] PAGESUP: PDF PLOTSTYLETABLE: AGANDON.CTB PLOTTED: 3/3/2008 1:56 AM BY: CLAUDY, HEBB
 XREFS: BLINE: DRINKARD K-27-1 AND K-27 NORTH JUNCTION BOX SITES
 IMAGES:



SOURCE: U.S. GEOLOGICAL SURVEY 7½ MINUTE TOPOGRAPHIC SERIES, EUNICE, N. MEX. QUADRANGLE, PUBLISHED 1969, PHOTOREVISED 1979.

Hansen, Edward J., EMNRD

From: Hall, Sharon [Sharon.Hall@arcadis-us.com]
Sent: Thursday, March 05, 2009 7:09 AM
To: Hansen, Edward J., EMNRD
Cc: Hansen, Keith; Hack Conder; Jones, Brad A., EMNRD
Subject: FW: NMOCD case #s 1R0426-02 and 03 Response
Attachments: 03-04-09 response letter.pdf

My apologies. I meant to send this to Ed, not Keith.
Sharon

From: Hall, Sharon
Sent: Thursday, March 05, 2009 8:05 AM
To: Brad.a.jones@state.nm.us
Cc: Hansen, Keith; Hack Conder
Subject: NMOCD case #s 1R0426-02 and 03 Response

Brad,
Respectfully submitted on behalf of ROC is this response to your meeting discussions with ROC. Please let Hack or me know if you have any questions or need additional information.
Regards,
Sharon

Sharon E. Hall PG, REM
Associate Vice President
ARCADIS G&M Inc
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Mr. Brad Jones
New Mexico Energy, Minerals, & Natural Resources Dept.
Oil Conservation Division, Environmental Bureau
1220 S. St. Francis Drive
Santa Fe, New Mexico 87505

Subject:

Response to NMOCD Request
Jcts. K-27North and K-27-1, BD SWD SYSTEM
Unit K, SEC. 27, T21S, R37E
NMOCD CASE #s 1R0426-02 and 1R0426-03

Dear Mr. Jones:

On behalf of Rice Operating Company (ROC), ARCADIS G&M, Inc. (ARCADIS) respectfully submits this response to your request to ROC in the meeting on February 24, 2008 regarding this site. Following submittal of a Closure Report dated March 10, 2008, NMOCD's requested that ROC provide an estimation of the chloride mass that has contaminated the groundwater at the former junction box locations and a plan for the removal of that chloride mass. As described in our July 18, 2008 response our chloride mass estimation and plan for removal of that chloride mass is as follows:

Calculations used to estimate the chloride mass in groundwater that may have resulted from releases from the former junction boxes are detailed in the table below. The size of the impacted area is conservatively assumed to be the combined width and length of each of the two excavations multiplied by a factor of 10 (the estimated horizontal dispersivity factor). This total area is then multiplied by the thickness of the aquifer (15 feet) and the estimated porosity (25%) resulting in a total saturated pore space volume.

The increase in chloride concentrations in groundwater is calculated by subtracting the lowest chloride concentration at the site (MW-5, 260 milligrams per Liter {mg/L}) from the highest measured chloride concentration identified at the site (MW-2, 600 mg/L). This net difference in chloride concentrations conservatively reflects the net impact to groundwater at the site resulting from releases from the junction boxes. It does not take into account other sources or regional groundwater conditions. Impacted groundwater conditions are documented in this area since the 1950's. (Ground-Water Report 6; Geology and Ground-Water Conditions in

Part of a bigger picture

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Environmental

Date:
March 3, 2009

Contact:
Sharon E. Hall

Phone:
432 687-5400

Email:
shall@arcadis-us.com

Our ref:
MT000834.0001

The net difference in the concentration of chlorides is multiplied by the total saturated pore space volume resulting in the estimated chloride mass as shown in the following table.

| Parameter | Value | Description of equations used |
|--|-----------------------|--|
| Release Area | 1650 ft ² | Physical measurement of junction box excavation |
| Longitudinal Dispersivity | 10 | Professional estimate for factoring the plume length |
| Aquifer Thickness | 15 ft | Based on regional groundwater data* |
| Porosity | 25% | Professional estimate of pore volume |
| Volume of impacted groundwater below former junction boxes | 61875 ft ³ | Multiplication of parameters listed above |
| Volume of impacted groundwater below former junction boxes | 1,752104.9 L | Unit conversion of above value to liters |
| Averaged increase in on-site chloride concentrations | 340 mg/L | Difference between concentrations in MW-2 and MW-5 |
| Total Chloride Mass | 595.71 kg | Multiplication of two parameters above |

ROC proposes the installation of a groundwater recovery system at the former K-27-1 junction box location. A solar-driven pump will be placed in existing well MW-1, an existing 4-inch monitor well. The pump will operate 8-10 hours per day and the groundwater recovered from the well will be pumped into a tank. The groundwater will be treated on-site to a chloride concentration of 250 mg/L. The treated water will be used to irrigate the site to promote revegetation.

Installation of the groundwater recovery system is contingent on approval of the New Mexico Office of the State Engineer and landowner approval in accordance with NMSA 1978 Article 72-12-3(B) (Article 1 1-17). The volume of recovery and duration to completion of recovery is based on the wells yield that can be sustained during pumping. If the recovery volumes are

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ARCADIS

Mr. Brad Jones
March 4, 2008

not sufficient to complete the chloride mass recovery in 684 days NMOCD will be notified and informed of the anticipated duration of recovery operations. Additionally, a second pump may be placed in another well.

In your discussions with ROC on February 24, 2009, NMOCD requested further information regarding the likelihood of impacts to groundwater resulting from vadose zone conditions.

Soils in the immediate area of the former junction boxes have been excavated and a poly liner installed at the former junction box locations. Backfill material (blended soils) concentrations did not exceed TPH, BTEX and benzene concentrations of 100 mg/kg, 50 mg/kg and 10 mg/kg, respectively. The site has been graded to prevent further ponding of rainwater and seeded with a blend of native vegetation. A vadose zone potential further source of groundwater impacts has been removed.

ROC is the service provider (agent) for the BD Salt Water Disposal System and has no ownership of any portion of pipeline, well or facility. The BD SWD System is owned by a consortium of oil producers, System Partners, who provide all operating capital on a percentage ownership/usage basis.

Thank you for your consideration concerning this proposed treatment and disposal of groundwater at this site and additional information regarding vadose zone conditions. If you have any questions, do not hesitate to contact me.

Sincerely,
ARCADIS G&M, Inc.

Sharon E. Hall

Sharon E. Hall
Associate Vice President

Copies:
Ed Hansen, NMOCD
Hack Conder, ROC
Marvin Burrows, ROC

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