| District I |
|---|
| 1625 N. French Dr., Hobbs, NM 88240 |
| District II |
| 1301 W. Grand Avenue, Artesia, NM 88210 |
| District III |
| 1000 Rio Brazos Road, Aztec, NM 87410 |
| District IV |
| 1220 S St Francis Dr., Santa Fe, NM 87505 |
| |

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State of New Mexico Energy Minerals and Natural Resources

> Oil Conservation Division 1220 South St. Francis Dr. Santa Fe. NM 87505

Form C-141 Revised October 10, 2003 Submit 2 Copies to appropriate District Office in accordance with Rule 116 on back side of form

| Name of Company Apache Corporation Address P.O. Drawer D, Monument, NM 88265 Facility Name State Q Battery | OPERA Contact | FOR | | | |
|--|---|---|--|---|---|
| Address P.O. Drawer D, Monument, NM 88265 | | | | al Report 🛛 🛛 🛛 | Final Report |
| | | Travis Carnes | 20(2 | | |
| | Telephone I Facility Typ | <u> </u> | | | |
| | | | | 005501 | |
| Surface Owner State of New Mexico Mineral Owner | · Apache C | orporation | Lease | - | 0/ 1/ |
| | ON OF RE | · · · · · · · · · · · · · · · · · · · | API | 30 0 Z S | 06((6 |
| Unit LetterSectionTownshipRangeFeet from theNorJ1620S37E1980 | th/South Line South | Feet from the 2310 | East/West Line East | County L | ea |
| Latitude <u>32.57059</u> | Longitud | e <u>-103.2541</u> | 5 | | |
| | E OF REL | | | | |
| Type of Release Produced Water | Volume of Estimate 6 | | Volume | Recovered 5 B | bls |
| Source of Release Water discharge line | Date and I | Hour of Occurrence | ce Date and | Hour of Discove | ry |
| Was Immediate Notice Given? | If YES, To | Whom? | | | |
| By Whom? | Date and H | Hour | | | |
| Was a Watercourse Reached? | | olume Impacting | the Watercourse. | | |
| Yes X No | | | | | |
| If a Watercourse was Impacted, Describe Fully.* | | | REC | EWED | |
| No watercourse was impacted | | | | 1 0 2009 | |
| | | | HOB | rsocd | |
| Describe Cause of Problem and Remedial Action Taken.* Corrosion caused a failure in the integrity of the water pump dischar truck. The vacuum truck recovered 5 Bbls produced water. A roustabou | | | | e wells, and calle | d a vacuum |
| Describe Area Affected and Cleanup Action Taken.* The release was contained inside the berm of the battery and was resspill footprint was 1700 ft ² . Chloride from the release of produced water cause a measurable increase in ground water chloride concentration. No or human safety. | er at the State Q o action is requi | Battery (recent & ired to protect fres | c historic) may ente sh water, public he | er ground water b alth, the environn | ut will not nent, property |
| I hereby certify that the information given above is true and complete to regulations all operators are required to report and/or file certain release public health or the environment. The acceptance of a C-141 report by should their operations have failed to adequately investigate and remed or the environment. In addition, NMOCD acceptance of a C-141 report federal, state, or local laws and/or regulations. | e notifications a the NMOCD n iate contaminat | and perform corre- narked as "Final F non that pose a the | ctive actions for re Report" does not re reat to ground wate responsibility for | leases which may lieve the operator er, surface water, compliance with | endanger of liability human health any other |
| $\neg \land$ | | <u>OIL CON</u> | SERVATION | DIVISION | a start of |
| Signature: nave omen | | | | - de | CINEEP |
| Printed Name: Travis Carnes | Approved by | District Supervis | | S INTI | AL ENGIN |
| Title: Production Foreman | Approval Da | ite: | Expiration | DIVISION CONMENTIN | |
| E-mail Address: travis.carnes@usa.apachecorp.com | Conditions of | f Approval: | | Attached | |
| Date: 4/7/09 Phone: 432-425-2962 | FGRL | 09121416 | ,99 | 1RF# | 09.4.2156 |
| * Attach Additional Sheets If Necessary 3 NEED TO INSTALL MODITOR WELL TO PROJOCE IMPACT INFO TO PROJOCE IMPACT INFO TO PROJOCE IMPACT INFO TO PROJOCE IMPACT INFO TO PROJOCE IMPACT INFO | -lwerks | 2) PRENIO | QUATE DEL 205 SPILLS' DITIONS 1011E | RENDER IN | PART |

Name of Company

J . L

Final Report

Oil Conservation Division 1220 South St. Francis Dr. Santa Fe, NM 87505

Release Notification and Corrective Action

| | OPERATO | R | \boxtimes | Initial Report |
|---------------------------|--------------|----------------|-------------|----------------|
| Apache Corporation | Contact | Travis Carnes | | |
| awer D. Monument NM 88265 | Telephone No | (432) 425-2962 | | |

| Address P.O. Drawer D, Monument, NM 88265 | Telephone No. | (432) 425-2962 |
|---|---------------|----------------|
| Facility Name State Q Battery | Facility Type | Production |
| | | |

Surface Owner State of New Mexico Mineral Owner Apache Corporation Lease No. 035591

| | | | | LOCA | ATION OF RE | LEASE | | | |
|-------------|---------|----------|-------|---------------|--------------------|---------------|----------------|--------|--|
| Unit Letter | Section | Township | Range | Feet from the | North/South Line | Feet from the | East/West Line | County | |
| J | 16 | 205 | 37E | 1980 | South | 2310 | East | Lea | |
| | | | ł | | | | | | |

Latitude 32.57059 Longitude -103.25415

| NATURI | E OF RELEASE | | |
|--|---|--|---------|
| Type of Release Produced water | Volume of Release UNK Estimate 6-24 Bbls | Volume Recovered 5 Bbls | |
| Source of Release Water discharge line | Date and Hour of Occurrence 1/20/09 - AM | Date and Hour of Discovery 1/20/09 - 11:00 AM | |
| Was Immediate Notice Given? | If YES, To Whom? | | |
| 🗌 Yes 🔲 No 🖾 Not Required | E E | | |
| By Whom? | Date and Hour | · | |
| Was a Watercourse Reached? | If YES, Volume Impacting the Wa | itercourse. | |
| If a Watercourse was Impacted, Describe Fully.* | | | |
| No watercourse was impacted | | | |
| Describe Cause of Problem and Remedial Action Taken.* Corrosion caused a failure in the integrity of the water pump discharg truck. The vacuum truck recovered 5 Bbls produced water. A roustabout | | | un |
| Describe Area Affected and Cleanup Action Taken.* The release was contained inside the berm of the battery and was rest spill footprint was 1700 ft ² . Impact to ground water and/or environment | is being investigated as described in th | e attachment. | |
| I hereby certify that the information given above is true and complete to regulations all operators are required to report and/or file certain release public health or the environment. The acceptance of a C-141 report by t should their operations have failed to adequately investigate and remedia or the environment. In addition, NMOCD acceptance of a C-141 report federal, state, or local laws and/or regulations. | notifications and perform corrective a the NMOCD marked as "Final Report" ate contamination that pose a threat to | ctions for releases which may endanger does not relieve the operator of liabilit ground water, surface water, human he | r ty |
| Signature 7764 4 Company | | VATION DIVISION | |
| Printed Name: Travis Carnes | Approved by District Supervisor: | and All | |
| Title: Production Foreman | Approval Date: | Expiration Date | |
| E-mail Address: travis.carnes@usa.apachecorp.com | Conditions of Approval: | Attached 🗌 | |
| Date: 1/21/09 Phone:432-425-2962 Attach Additional Sheets If Necessary | | | · |

RECEIVED

FEB 0 3 2009

HOBBSOCD



February 3, 2009

Mr. L.W. Hill NMOCD District 1 1625 N. French Drive Hobbs, New Mexico 88240 Via Email and FEDEX

RE: Apache Corporation State Q Battery Notice of Release T20S, R37E Section 16 UL J, Lat 32.57059 Long -103.25415

Dear Mr. Hill:

Attached to this letter is our original C-141 for a minor release at the above-referenced site. Under separate cover, R.T. Hicks Consultants, Ltd. will submit our final report that uses API's Amigo produced water spill tool to help evaluate the environmental impact. Because this release was quite small, we were not surprised to see that the evaluation determined that the residual chloride in soil does not pose a threat to fresh water or the environment.

Apache believes that the Amigo decision tool can help us to focus our environmental efforts on sites that require action and eliminate unnecessary responses. Because we anticipate using the Amigo tool for larger spills (although we hope such a need does not arise), Hicks Consultants has volunteered to meet with NMOCD in Hobbs to present their findings and conclusions and address any questions. We look forward to working with you.

Sincerely, Apache Corporation

One Travis Carnes

RECEIVED

FEB 0 3 2009

R. T. HICKS CONSULTANTS, LTD.

901 Rio Grande Blvd NW ▲ Suite F-142 ▲ Albuquerque, NM 87104 ▲ 505.266.5004 ▲ Fax: 505.266-0745

March 31 2009

Mr. Larry Johnson NMOCD District 1 1625 N. French Drive Hobbs, New Mexico 88240

RE: Apache Corporation State Q Battery Amendment to Final Report

Dear Mr. Johnson:

Apache Corporation requested R.T. Hicks Consultants amend the previously-submitted report to include new data that Apache collected at your request.

Release Characteristics

We have amended Plate 2 to show the laboratory results of all sampling. The most recent sampling (see Appendix A of this submission) shows:

- 1. The chloride concentration at BH-1 is 80 mg/kg at 3-feet below grade
- 2. Chloride concentrations at BH-4 show additional evidence of past releases at this location
- 3. Background chloride in soil is less than 16 mg/kg.

Chloride Mass in the Unsaturated Zone

Plate 2 shows the release footprint and sample locations. The recent data showing evidence of historic releases does not change the original estimate of chloride mass for the most recent release. The Massload calculation submitted previously remains

- 0.17 kg/m^2 based upon release volume estimate and chloride in the release and
- 0.19 kg/m² using the most representative soil boring data for the recent release

However, inclusion of the recently-acquired data affords a higher degree of certainty regarding the threat to ground water posed by historic releases of produced water.

As we stated in the previous submission, Massload requires that data from borings show a decrease of chloride concentration with depth. New data from BH-1 at 3-feet below grade (80 mg/kg) eliminates the need to assume a chloride concentration of 230 mg/kg at a depth of 3-feet.

The additional sampling at BH-4 shows chloride concentrations in soil from 0-4 feet range from about 500 mg/kg to about 800 mg/kg. Below 4 feet to a depth of 8 feet, chloride



April 1, 2009 Page 5

concentrations range from 320 to 400 mg/kg. From these data we conclude that historic releases probably pooled in the area of BH-4 and in the area of BH-3, resulting in chloride concentrations ranging from 320 to 400 mg/kg from below the depth of 4-feet to the capillary fringe (about 18 feet below grade) at both boring locations.

For the purpose of estimating the total chloride load using Massload, we used the values presented in Table 1 below.

| Chlori | de Concer Extrap | | ofiles, Chle lues in Yel | | g/kg. |
|-----------------|---------------------|------|-----------------------------|------|---------|
| Depth [feet] | BH-4 | BH-3 | BH-2 | BH-1 | Average |
| 0 | 592 | 304 | 248 | 192 | 334 |
| 1 | 592 | 304 | 248 | 192 | 334 |
| 1.5 | 592 | 304 | 148 | 192 | 309 |
| 2 | 592 | 592 | 48 | 192 | 356 |
| 2.5 | 496 | 496 | 48 | 240 | 320 |
| 3 | 816 | 816 | , 48 | 80 | 440 |
| 4 | 784 | 784 | 48 | 80 - | 424 |
| 4.5 | 352 | 352 | 48 | 80 | 208 |
| 5 | 368 | 368 | 48 | 80 | 216 |
| 6 | 400 | 400 | 48 | 80 | 232 |
| 6.5 | 320 | 320 | 48 | 80 | 192 |
| 7 | 400 | 400 | 48 | 80 | 232 |
| 8 | 368 | 368 | 48 | . 80 | 216 |
| 18 | 368 | 368 | 48 | 80_ | 216 |

Table 1

All of the values highlighted in yellow represent the concentration we believe exist in the subsurface based upon the sampling and our professional judgment. At BH-4, the average chloride concentration over the depth interval of 4.5-7 feet is 368 mg/kg, therefore we used this value for the concentration at 8 and 18 feet. Because shallow chloride concentration from BH-3 is similar to (albeit less than) BH-4, we assumed in Massload that the deep chloride concentration profile for BH-3 is also similar. For BH-2 and BH-1, we assumed that the chloride values of 48 and 80 will be constant between the deepest sample and ground water. The Massload spreadsheet showing the calculation of mass is presented in Appendix B of this submission. The compact disc provides a copy of the Massload Excel spreadsheet for the site.

Chloride Mass Input for Amigo

The revised calculation presented in the Massload program allows us to conclude that the total mass per unit area is <u>not</u> 0.57 kg/m^2 , as previously estimated. The new data input to Massload calculate a total chloride mass of 2.35 kg/m².



April 1, 2009 Page 5

Texture of the Unsaturated Zone

The surface texture input of caliche remains consistent with the more recent results. However, the deeper samples show fine sand rather than medium sand from 3-7 feet. The chloride concentration profile also suggests that the texture of the unsaturated zone between 3-7 feet is consistent with a finer-grained texture than medium sand.

Unsaturated Zone Input for Amigo

The new data allow us to conclude that employing a texture for the unsaturated zone consisting of 1 part caliche and 5 parts medium sand provides the closest match to observations in the field.

Data Evaluation Using Amigo – Most Probable Scenario

The revised Amigo report (Appendix C) generated by the input of the data identified above and in the previous submission is the predicted chloride concentration in a hypothetical monitoring well located at the down gradient edge of the release site.

Using the new data from BH-4 and the conservative assumptions built-into Amigo, the tool predicts that the chloride mass at the site caused by the historic releases will migrate to ground water and result in no impact to ground water (see Figure 1 below).

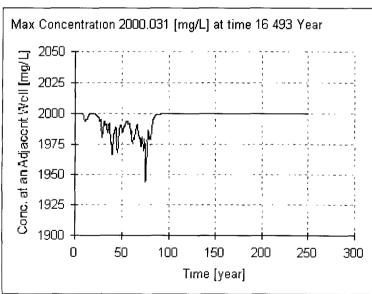


Figure 1

Data Evaluation Using Amigo - Worst Case Scenario

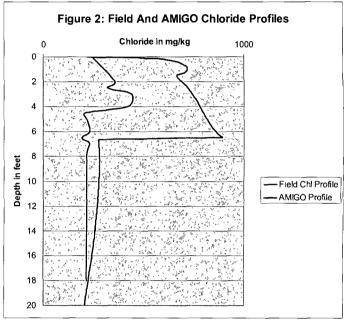
The additional data demonstrate that using "medium sand" as the surface texture and vadose zone does not agree with the observations of texture in the field (caliche, sand and clay in the upper 4-6 feet underlain by fine sand). Additionally, because of the introduction of the new data into Amigo, we could not create a reasonable match between chloride v. depth profiles and the observed values in the field if "medium sand" is used for the texture of the unsaturated zone between 0-7 feet.

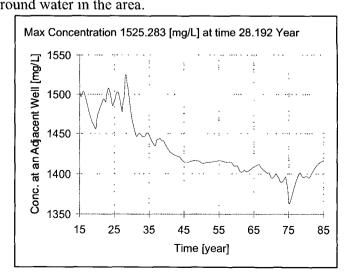
Figure 2 presents our interpretation of the chloride concentrations with depth below the spill footprint based upon site analyses as presented in Table 1. Also plotted on Figure 2 is

the Amigo-generated profile for the input parameters outlined in Appendix D at Year 15 of the simulation. Simulating a "worst case" scenario with the Amigo tool can involve adjusting certain input parameters such that the shape of the chloride v. depth profiles are similar but the Amigo-generated profile should represent a greater chloride load than measured in the field. The Historic Amigo Massload spreadsheet presented in Appendix D generated Figure 2 and a copy of the spreadsheet is on the attached compact disc. For the worst case scenario, all input data remain the same as the most probable case except

- 1. the chloride load increased from 2.35 kg/m^3 (measured in the field) to 5.75 kg/m^3
- 2. the background concentration of chloride in the aquifer at year 15 (the time of the chloride profile match) is 1500 mg/L to account for a 500 mg/L decrease due to natural restoration of ground water in the area.
- 3. the aquifer mixing zone decreased from 30 to 20 feet
- 4. the hydraulic conductivity of the aquifer decreased from 80 ft/day to 60 ft/day

The output from this input to Amigo under these worst-case conditions suggests an increased chloride concentration of 25.283 mg/L





April 1, 2009 Page 5

Discussion

The revised predictions of Amigo show that changes in chloride concentrations beneath the site cannot be distinguished from natural variation of chloride concentrations in ground water impacted by the brine release(s) from the Climax Chemical site.

Although AMIGO is not designed to predict the impact to ground water caused by recent <u>and</u> historic releases at a site, such is the case here; one can provide a reasonable estimate of the impact to ground water caused by historic releases by using the methods described in Appendix D. Because the tool assumes that all of the chloride in the unsaturated zone was released in a single spill event and migrates to ground water as a single large mass – not as individual releases over time, AMIIGO will generally overestimate the impact to ground water if the input from Massload includes historic events. Using a "chloride profile matching" technique, such as described in Appendix D, can provide a reasonable estimate of the "worst case" scenario.

Conclusions and Recommendation

The conclusions from the previously-submitted report remain unchanged:

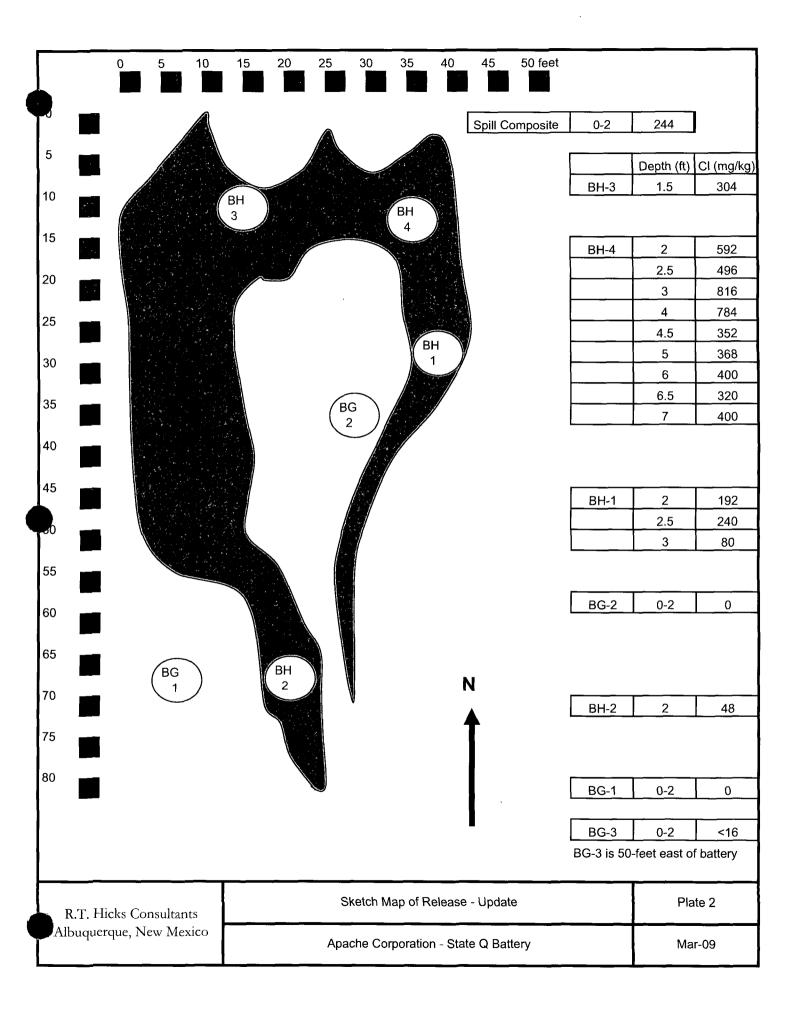
- 1. Chloride from the release of produced water at the State Q Battery (recent and historic) may enter ground water but will not cause a measurable increase in ground water chloride concentration.
- 2. Regulated hydrocarbons are not present in sufficient concentration to pose a threat to ground water quality
- 3. No action is required at this active tank battery site to protect fresh water, public health, the environment, property or human safety.

We respectfully request closure of the regulatory file associated with this recent release. Upon closure of the facility after production ceases, the operator will sample the entire site and re-evaluate the conclusions and recommendations presented herein. Please contact me if you have any questions regarding this submission. We would be pleased to meet with NMOCD in Hobbs to address any concerns.

Sincerely, R.T. Hicks Consultants

Randall T. Hicks Principal

Copy: Apache Corporation



APPENDIX A

.



ANALYTICAL RESULTS FOR APACHE CORPORATION ATTN: TRAVIS CARNES P.O. DRAWER D MONUMENT, NM 88265 FAX TO: (575) 393-1927

Receiving Date: 02/16/09 Reporting Date: 02/16/09 Project Number: NOT GIVEN Project Name: STATE Q BATTERY Project Location: NOT GIVEN

Analysis Date: 02/16/09 Sampling Date: NOT GIVEN Sample Type: SOIL Sample Condition: COOL & INTACT Sample Received By: ML Analyzed By: HM

CI

| | | 1 | |
|------------------------|---|---------|---------|
| LAB NUMBER | SAMPLE ID | | (mg/kg) |
| H16900-1 | BH-1 @ 3' | | 80 |
| H16900-2 | BG #3 | | < 16 |
| | | | |
| | | | |
| | | | |
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| | a Manufa Sana ya Mangara ya mangara kata kata ya Mangara ya Mangara ya Mangara ya Mangara ya Mangara ya Mangara | | |
| Quality Control | | | 490 |
| True Value QC | | | 500 |
| % Recovery | | | 98.0 |
| Relative Percen | t Difference | ŧ | 4.0 |

METHOD: Standard Methods Analyses performed on 1:4 w:v aqueous extracts.

Chemist

02/16/09 Date

4500-CI'B

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising, whether based in contract or tort, shall be limited to the amount paid by client for analyses. All claims, in a build by Client for analyses and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within thirty (30) days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damages, including, without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above-stated reasons or otherwise. Results relate only to the samples identified above. This report shall not be reproduced except in full with written approval of Cardinal Laboratories.

| ARDINAL LABORATORIES | | | | | | | | | , | | | | | , | | | | |
|---|------------------------|------------------------------|-----------------------------|-----------------------|---------------------|----------------------|----------------------|------------|-------|----------|-------|-----|------|----------|-----|--------------|---|--|
| 101 East Marland, Hobbs, NM 86240 | | | | | | | | | | | | | | Page_ | | r | | |
| (575) 393-2326 Fax (575) 393-2476 | بمتجيرة مسطلة عنطنتاني | 1 | A | 3/1 | LTO | | | | | | ΔΝΔ | LYS | SR | EQUI | | | | |
| Project Manager: TRAVIS CARNES | | P.O. | | | | | | | | | | | | | | | | |
| Address: Po DRAVER D | | Com | pany: | | | | | | | | | | | | | | | |
| City: MONUMENT State: NM Zip: 582 | 65 | Attn: | | | | | | | | | | | | | | | | |
| Phone #: 575 393-2144 Fax #: 393-1927 | | Addr | | | | | | | | | | | | | 1 | | | |
| Project # Project Owner: | | City: | | | | | | | | | | | | | | | | |
| Project Name: ST. Q. BATTERY | | State | | z | lip: | | | | | | | | | | | | | |
| Project Location: | | Phon | 10 #: | | | | | | | | | | | | | | | |
| Sampler Namo: | | Fax # | | | | | | | | | | | | | | | | |
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| 69001 BH-1@3' GI | 4 | | | | | | \times | | | | | | | ļ. | | | | |
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| PLEASE NOTE: Listsky and Darrages. Cardina's leability and client's exclusive remody for any cleim arising whether analyses, All claims. Including those for negligence and any other caute whistoever shall be deemed waived unless to | made in writing ar | nd received | t by Cardin | inal with | nin 30 days efter o | to notelomos | he applicat | ig | | | | | | | | | | |
| service in ne event shall Cardinal be habe for incidential or consequential damages, including without limitation, bush atfiliates or successors arising out of or related to the performance of services hereunder by Cardinal, repartiess of w | nether such claim | , loss of us n is based a | e, or loss c upper any c | of profit of the n | above stated reps | ions or otherwis | in | | | | | | | | | | | |
| Sampler Relinquished: Dato: Received By | 4 | | | | · E | Phone Re Fax Resu | lt: | 0 | | No No | Add'l | | #: | | | | | |
| Time: | | | | | ſ | REMARK | S: | | | | | | | | | | | |
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| Alin Comune Time: 9:30 Mas | ty a | Gl | Br. | 7 | 7 | | t | ·osi < | : 0a | 2606 | 150 | 67 | ach | eco | 60. | Com | | |
| (Defivered By: (Circle One) [Temp. * Sai | mple Condi | | | | D BY: | | -1(| VC V * * * | | | | -4- | | ••• | | | | |
| Sampler - UPS - Bus - Other: | | 95 10 | Ĵ | initia | AB | | | | | | | | | | | • | | |

† Cardinal cannot accept verbal changes. Please fax written changes to 575-393-2476.





ANALYTICAL RESULTS FOR APACHE CORPORATION ATTN: TRAVIS CARNES P.O. DRAWER D MONUMENT, NM 88265 FAX TO: (575) 393-1927

Receiving Date: 02/17/09 Reporting Date: 02/18/09 Project Number: NOT GIVEN Project Name: STATE Q BATTERY Project Location: NOT GIVEN Analysis Date: 02/18/09 Sampling Date: 02/17/09 Sample Type: SOIL Sample Condition: INTACT Sample Received By: ML Analyzed By: HM

CL

| LAB NUMBER | SAMPLE ID | ł | (mg/kg) |
|-----------------|--------------|--|---------|
| H16912-1 | BH-4 @ 4' | 1 | 784 |
| H16912-2 | BH-4 @ 4.5' | | 352 |
| H16912-3 | BH-4 @ 5' | | 368 |
| | | í | _ |
| | | | |
| | | | |
| | | 2 | |
| | | ······································ | |
| Quality Control | | | 490 |
| True Value QC | | , , , , , , , , , , , , , , , , , , , | 500 |
| % Recovery | , | 1 | 98.0 |
| Relative Percen | t Difference | 1 | 4.0 |

METHOD: Standard Methods 4500-CI'B Analyses performed on 1:4 w:v aqueous extracts.

Chemist

02/18/09 Date

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim ensing, whether based in contract or tort, shall be limited to the amount paid by client for analyses. All claim Line and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within thirty (30) days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damages, including, without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of services horeunder by Cardinal, regardless of whether such claim is based upon any of the above-stated reasons or otherwise. Results relate only to the samples identified above. This report shall not be reproduced except in full with written approval of Cardinal Laboratories.

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| ARDINAL LABO | | | | | | | | | | | | | | | | | | | | | | | | | |
| (575) 393-2326 F | | | | | | | | | | | | | | | | | | | | | Page_ | of | | | |
| Company Name: A-ACHE | the second s | | | | | | Τ | | | BI | LLT | 0 | | | | | | AN/ | LYS | IS RI | EQUE | ST | | | |
| Project Manager: TRAVIS | | | | | | | F | P.O. | # : | | | | | | | | | | \square | | | 1 | | T | |
| Address: P.O. DRAWER | | | | | | | c | Com | pan | ıy: | | | | | | | | | | | | | | | |
| city: MONUMENT | State: NM | Zip: | | 88 | <u>765</u> | 5 | ļ | Attn: | | | | | | | | | | | | | | | | | |
| Phone #: (575) 393-2144 | Fax #: (5 | 75) | 3 | 13- | FIZ | 7_ | 1 | Addr | 055 | | | | | | | | | | | | | | | | |
| Project # | Project Owner | : | | | | | | City: | | | • | | | | | | | | | | | | | | |
| Project Name: STATE Q B | AFTERY | | | | | | 5 | State | 1: | | Zip: | _ | | | | | | | | | | | | | |
| Project Location: | | | | | | | F | hon | 10 # | ÷: | | | | | | | | | | | | | | | 1 |
| Sampler Name: | | | | | | | F | ax # | | | | | | | | | | | | | | | | | |
| FOR LAS USE ONLY | | | | | MAT | | | - PF | RES | ERV | SAM | PLIN | IG | | | | | | | . | | | | | |
| | | ŇŎ | S | Ж, | r | | | | | | | | | | | | | | | | | | | | |
| Lab I.D. Sample ! | n | (G)RAB OR (C)OMP | # CONTAINERS | GROUNDWATER | i i | | | ļ | 1 = | , | | | | 1- | | | | | | | | | | | |
| | | ABO | AT N | | | | SLUDGE | OTHER : ACID/RASE | | | | | | | | | | | | | | | | | |
| | | GJR | 8 | SRO. | SOIL | E | | ACID/RAS |)) | OTHER | DAT | εİ | TIME | - | | | | | | | | | | | |
| 912-1 BH-4@4 |) } } | Ğ | Ť | | | | 1 | 2 | | Ť | 2/11/2 | | | ${\succ}$ | | | | | | | | | | | |
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| -3 BH-4 @ 5 | ;` | G | 1 | | $\square \mathcal{V}$ | Ł | | _ | Ι | | L | | | \geq | | | | | | | | | | | |
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| enalyses. All claims including those for negligence and any siner annice, in no event shall Cardinal be Reble for Incidental of Const affiliates or exiscessore arising out of or related to the performance | equantal damages, laduding | a without | i Brrdial | illon, bus | stress hite | erruption | ns, ios | a of cas | e, or to | ona of pr | nofits incurred | 5 by c® | eni, ila subsidiar | ries. | ** | | | | | | | | | | |
| Sampler Relinquished: | Date: | | | ved B | | BUGH GR | Bin De 1 | 28300 | Лропа | iny of a | IS BUCKE MAN | 1 | Phone Re | sult, | 0 | | | | Phone | #: | | | ***** | | |
| r. | Time: | 1 | | | | | | | | | | | Fax Resu REMARKS | | | | No | Add'l | Fax₽. | | | | | | **** |
| Relinquished By: | Date. 2-17.09 | Re | ceiv | ved B | ₩: <u>,</u> | | | | 7 | | | | | | | | | | | | | | | | |
| 201 | Z-17.07 | - | Л | [] | 4 | - | 4 | | K | í | 4 | | | | | t | ~~ / <i>2</i> | . ^ | - 0. | 1.01 | 300 | ~~l | area. | ~ / | 7 |
| Delivered By: (Circle One) | Time:/:28 | Tem | | 10 | ample | <u></u> | | 22 | 4 | | A KED BY: | | | | | -10 | ant | >.(_ | ain | 1056 | ery | UCN | ecor | P.C | .cm |
| • | | Tem | ю. | C C | lool | Intac | 2- | | UI | | Liais BY: | | | | | | | | | | | | | | |
| Sampler - UPS - Bus - Other: | | | | { | Yes | 18 | res No | Ì | λ | 10 | 13 | | | | | | | | | | | | | | |

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† Cardinal cannot accept verbal changes. Please fax written changes to 575-393-2476.





ANALYTICAL RESULTS FOR APACHE CORPORATION ATTN: TRAVIS CARNES P.O. DRAWER D MONUMENT, NM 88265 FAX TO: (575) 393-1927

Receiving Date: 02/17/09 Reporting Date: 02/17/09 Project Number: NOT GIVEN Project Name: STATE Q BATTERY Project Location: NOT GIVEN Analysis Date: 02/17/09 Sampling Date: 02/17/09 Sample Type: SOIL Sample Condition: INTACT Sample Received By: ML Analyzed By: HM

C

| LAB NUMBER SAMPLE ID | 5 | (mg/kg) |
|-----------------------------|----------|---------|
| H16907-1 BH-4 3' | <u>.</u> | 816 |
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| | ; | |
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| | | |
| | | |
| Quality Control | | 490 |
| True Value QC | | 500 |
| % Recovery | ! | 98.0 |
| Relative Percent Difference | · · · | 4.0 |

METHOD: Standard Methods 4500-CI'B Analysis performed on a 1:4 w:v aqueous extract.

Chemist

02/17/09 Date

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| 101 East Marland, Hobbs, NM 88240 | | | | | | | | | | |
| (575) 393-2326 Fax (575) 393-2476 | | | | | | | Page | of | | |
| Company Name: MPACILE CORP. | | | L TO | | ·/ ····· | ANALYS | IS REQUE | ST | | |
| Project Manager: TRAN'S CARNES | | P.O. #: | | | | | | | | |
| Address: P.O. DRAWER D | | Company: | | | | | | | | |
| | \$8265 | Attn: | | | | | | | | |
| Phone #: (5751393-2144 Fax #: (575)393 | -1927 | Address: | | | | | | | | - 1 |
| Project #: Project Owner: | | City: | | | | | | | | |
| Project Name: STATE & BATTERY | | State: Z | ip: | | | | | | | |
| Project Location: | | Phone #: | | | | | | | | |
| Sampler Name: | | Fax #: | | | | | | | | |
| FOR LASUED DIALY | MATRIX | PRESERV | SAMPLING | | | | | | | |
| Lap I:D. Sample:IID | ~ | | | | | | | | | |
| Fap I:D. | WASTEWATER Soil | | | · . | | | | | | |
| | WASTEW Soil Oil Sludge | OTHER - ACID/BASE- ICE / COOL OTHER - | | 21 | | | | | | |
| | WAS1 SOIL OIL SLUD | OTHER ACID/BA ICE / CO OTHER | DATE TIME | | | | · | | | |
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| 0101-1 DH-4 3 011 | +++++- | 6 | | | | + | | | - | |
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| service In no event shall Cardinel be Rable for incidental or consequental damages, including without Imitiation, efficience or <u>successors arising out of or related to the performance of services bereunder by Cardinal, regardles</u> | a of whether such claim | | have stated reasons or otherwit | | | | | | | |
| Sampler Relinquished: Date. Received | d 8y: | | Phone Re Fax Resul | t: 🖸 | No No | Add'l Phone Add'l Fax #: | #: | | | |
| Time: | | | REMARK | S: | | | | | | |
| Relinguished By: Date: 2-17-09 Received | By: | in. | | | | | | | | |
| - Plan (ima Time, 7:50 / | Int. | YR. | 1 | | L. | a | <u></u> | | | |
| -Delivered By: (Circle One) | Sample Conditi | | | | Travis (| la rnesk | japaci | hecoip. | (OM | |
| Sampler - UPS - Bus - Other: | Cool Integt | s M | 3B | | | | ł | 1 | | |

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ANALYTICAL RESULTS FOR APACHE CORPORATION ATTN: TRAVIS CARNES P.O. DRAWER D MONUMENT, NM 88265 FAX TO: (575) 393-1927

Receiving Date: 02/18/09 Reporting Date: 02/19/09 Project Number: NOT GIVEN Project Name: STATE Q BATTERY Project Location: NOT GIVEN Analysis Date: 02/19/09 Sampling Date: 02/18/09 Sample Type: SOIL Sample Condition: INTACT Sample Received By: AB Analyzed By: HM

CI_

| LAB NUMBER | SAMPLE ID | (mg/kg) |
|-------------------------|--|---------|
| H16922-1 | 6' | 400 |
| H16922-2 | 6.5' | 320 |
| H16922-3 | 7' | 400 |
| | an a | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| Quality Control | | 500 |
| True Value QC | | 500 |
| % Recovery | | 100 |
| Relative Percent | Difference | < 0.1 |

METHOD: Standard Methods Analyses performed on 1:4 w:v aqueous extracts.

Chemist

4500-CI'B

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| (575) 393-2326 Fax (575) 393-2 Company Name: A PACHE CORD. | 4/0 | | | | | Т | | | 8/1 | LL TO | | T | | | | ΔΝ | | | REQU | | · | | |
| Project Manager. TRANIS CARNES | مغطيب المحر سعا | | | | | P. | 0. # | | | | | <u> </u> | | 1 | | 1 | 1 | T | T | Ī | 1 | | , |
| Address: PO. DRAWER D | | | | | | Co | omp | any | : | | | 1 | | 1 | | | | | | | | | |
| City: MonJument State: NM | Zip: | 88 | 26 | 55 | - | At | tn: | | | | | | | | | | | | | 1 | | | |
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| Project # Project Owner | | | | | | CI | ty: | | | | | | | | | | | | | | | | |
| Project Name: STATE Q BATTERY | | | | | | St | ate | | | Zip: | | | | | | 1 | | | | | | | |
| Project Location: | | | | , | | Pt | non | o #: | | | | | | · | | | | | | | | | |
| Sampler Name: | | | | | | Fa | x # | | | | | | | | | | | | | | | | |
| FOR LAB USE CALLY | a. | | | MATI | | | | ESE | RV. | SAMPLI | NG | | | | | | | 1 | | | · | | |
| | (G)RAB OR (C)OMP. # CONTAINERS | ER | œ | | | | | | | | | | | | | | | | | ļ | | | |
| Lab I.D. Sample I.D. | (G)PAB OR (C)C # CONTAINERS | GROUNDWATER | WASTEWATER | | | | ці, | ы | | | | 1 | | 1 | | | | | | | ` | | |
| | AB SUL | NNO | STEV | | | Ē | ACID/BASE: | ICE / COOL | ĒR. | | | \odot | | | | | | | | | | | |
| | <u>0</u> # | ЦЙ | X | 悥 | 5 | 16 | Į. | Ĕ | Ē | DATE | TIME | L | | | | | | | | | <u> </u> | | |
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| enalyses. All claims including those for negligence and any other cause whatsoever shall be service. In no event shall Cardinal be liable for incidental or consequential damages, including | doemed wa swithout lim | alved uni station t | ess m orizud | ade in 1 58 inter | writing a rupforn | ind reci s, loss c | elved i of use | by Cerd , or locs | Rnal w of pro | ithin 30 days afte plits incurred by c | r completion of U Rent, de subsidia | he epolical vies, | ble | | | | | | | | | | |
| attriates or successors entring out of or related to the performance of services beceander by C Sampler Relinquished: Date: | Rece | | | | uch cle | n hi ba | sed y | ION ett | y at the | above stated re | Phone Re | sult: | ٥ | | No | | Phone | | | | | | |
| Time: | 1 | | | | | | | | | | Fax Resu REMARK | | 0 | | No | Add' | Fax # | • | | | | | |
| Relinquished By: Date; | Rece | ived | By | | | | | * | | | | | | | | | | | | | | | |
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| Delivered Bv: (Circle One) Sampler - UPS - Bus - Other: | Temp. | | Coc | a l | Cond ntect X Y | | 1 | | | (ED BY, ials) | | | *** | Tru | /10 - | | 116 | aw | wpæ | chec | P | ». COI | 111 |

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Appendix B

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| User | nput (not bo | th) | Depth to Water | Meters | 1.1.1 | Feet | S | 2 | 609 60 | | | ٦ |
|--|--|-----------|--|--|-------------------------------|---------------------|--|--------------------------|--------------------------|---|-------------------------------|-------|
| User | Input (option | al) | User provided mois | t bulk densit | y (rho_m) | | 2013.33 | kg/M^3 | | | | |
| User I | nputs (option | nal) | Dry Bulk Density (n Vol Moist Content | ho, 1415 is d (Theta_v, 0 | efault value) 135 is defau | = 1 value) = | 2498.04141 4552.040.13 | 5 kg/m^3 | 1550 kg/m^3 - Moist bull | k density used i | n calculations | |
| | | | Calculated moist bu | ulk density (rf | no_m) ≍ | | 155 |) kg/m^3 | | | | |
| | Boring 1 | Boring ID | BH-1 | | T | | | | | | | τ |
| | | | If a Composite Sam | ple from a D | epth Interva | | | Automatic and the second | Grab Samples | | | 1 |
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| User Inputs | depth) 1 2 3 4 5 6 7 7 8 9 | Sample | A A | | Sample | Sample | Ave Depth 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | 2 25 3 18 | Y, Motors 2 | depth in cm 60 96 76 2 91 44 548 64 0 0 0 0 0 0 | 192 192 240 61 70 | |
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| | 20 21 22 23 24 25 26 27 28 29 30 | | | | | | | | | 0 0 0 0 0 0 0 0 0 0 | | |
| | | | | | | | | | Chloride load for Bo | ning 1 in ka/m^ | 2= 1471 | ¥ |

i.

| | | Proportional Area Weights | Chi Load of each Borehole | Equal Area Weights | |
|---------------------|-----------------------------|--|------------------------------|--------------------------|--------|
| User Input | Boring 1 | * _ BH-1 | 0.91 | 1 00 | |
| (Optional) | Boring 2 | | 0 00 | 0 00 | |
| (optional) | Boring 3 | BH-3 | 3 82 | 1 00 | |
| | Boring 4 | BH-4 | 4 06 | 1 00 | |
| Pro Area | Boring 5 | / BH-2 | 0 59 | 1 00 | |
| Weights must | Boring 6 | (a) (b) (b) (b) (b) (b) (b) (b) (b) (b) (b | 0 00 | 0 00 | |
| sum to | Boring 7 | | 0.00 | 0 00 | |
| between 0 975 | Bonng 8 | :· ' ' | 0.00 | 0 00 | |
| | Boring 9 | (2.50 m) | 0 00 | 0 00 | |
| 414 1020 | | | 0.00 | | _ |
| and 1 025 | Boring 10 Sum of weights | | 0 00 | 0.00 | |
| Output for AMIGO | Averaged Ch | foride Load of All Bore | holes | 2.05 | kg/m^2 |

| Boring 2 | Boring ID | VOID | | | | | | | | | |
|-------------|---|--|---|------------|-----------|------------------|----------------|----------------------|------------------|---|---|
| | If a | Composite Sample | | epth Inter | | | G | rab Samples | | | |
| Sample | | Feel | | , | Meters | a and a | z | z, | z | CHL LONG | |
| Number | | | | | , | } | 10000 | | | | |
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| depth) | Sample | Sample Ave | | Sample | Sample | " Ave Depth | ing feet a | meters | depth in cm | 1396 CC | |
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Appendix C

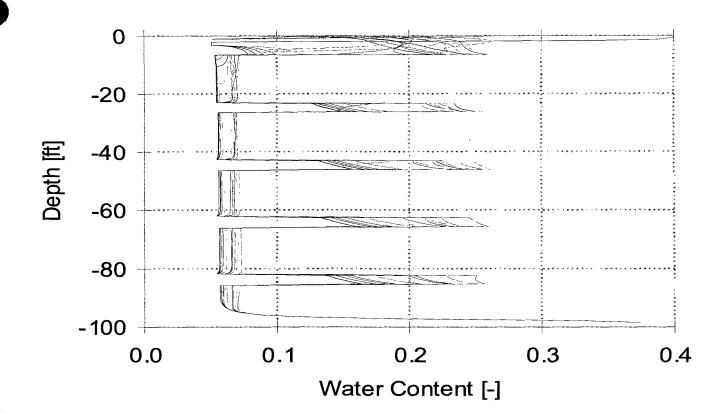
Project: StateQMostProbabNewMass.ami

Path: P:\Apache State Q Battery\Modeling\StateQMostProbabNewMass.ami Date: 3/10/2009 Units: English (inches) Climate: Arid Hot (NM/W.Texas, Hobbs) Plant Uptake Trigger: 1% Input Concentration

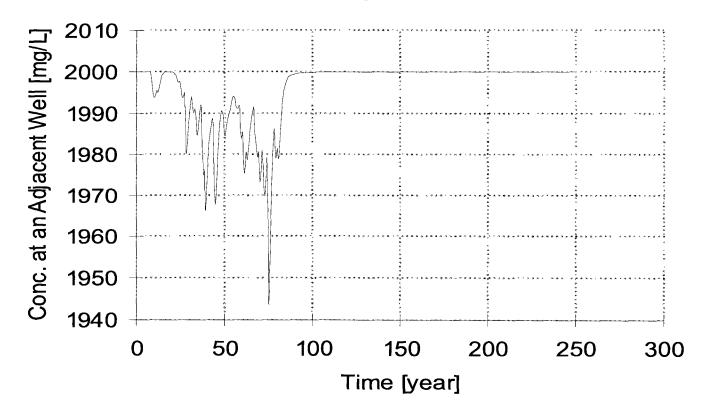
Groundwater Characteristics Background CI Concentration in Aquifer: 2000 [mg/L] Aquifer porosity: 0.3 [-] Groundwater Table Depth: 20 [ft] Aquifer Thickness: 30 [ft] Slope of Water Table: 0.001 [-] Hydraulic Conductivity: 80 [ft/d] Groundwater Flux: 2.4 [ft2/d]

Source Characteristics Chloride Load:: 2.35 [kg/m2] Max. length of the spill in direction of GW flow:: 80 [ft]

Soil Profiles Surface Layer: Caliche Soil Profile: P4 - Caliche (1) + Medium Sand (5)



Max Concentration 2000.031 [mg/L] at time 16.493 Year





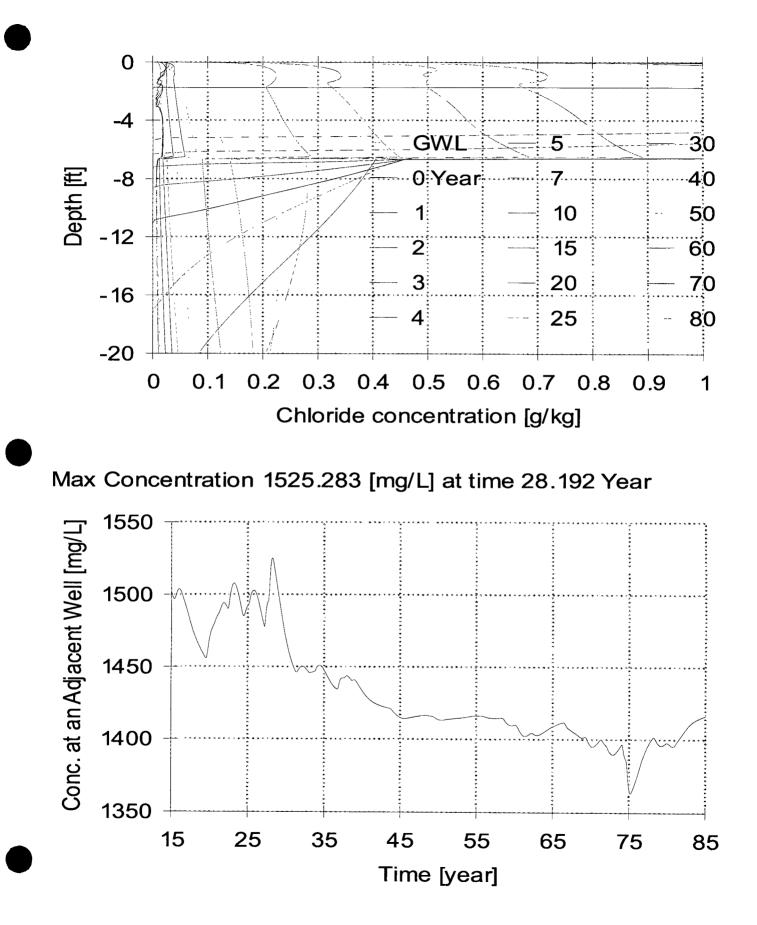
Project: StateQWorstCase2.ami

Path: P:\Apache State Q Battery\Modeling\StateQWorstCase2.ami Date: 3/10/2009 Units: English (inches) Climate: Arid Hot (NM/W.Texas, Hobbs) Plant Uptake Trigger: 1% Input Concentration

Groundwater Characteristics Background Cl Concentration in Aquifer: 1420 [mg/L] Aquifer porosity: 0.3 [-] Groundwater Table Depth: 20 [ft] Aquifer Thickness: 20 [ft] Slope of Water Table: 0.001 [-] Hydraulic Conductivity: 60 [ft/d] Groundwater Flux: 1.2 [ft2/d]

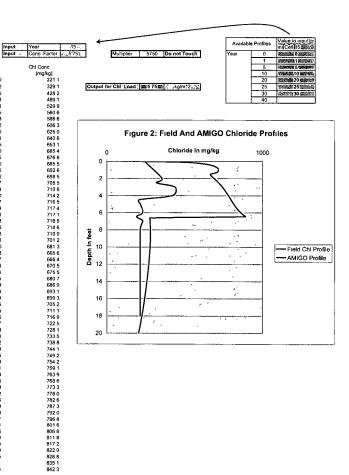
Source Characteristics Chloride Load:: 5.75 [kg/m2] Max. length of the spill in direction of GW flow:: 80 [ft]

Soil Profiles Surface Layer: Caliche Soil Profile: P4 - Caliche (1) + Medium Sand (5)



How to Use () Copy excel spreasheet and rename with the side name in place of 3 Stekamer Work in the side of the second second second second second () Export biomete conventration (plkg) data set from AMIGO This will array as a file called Chartt bit Be sure har you use a childref bood of 10 nithe Amigo tool pror to exporting the data () Chartt bit Tesue in a hyou use a childref bood of 10 nithe Amigo tool pror to exporting the data () Chartt bit Tesue in a file called () Starting na file styles). This will get you to the Test Import Wizard (2) Instein C. choose Fixed Width (2) Starting the unsign of Fixed Nucl () Signiform of the unsign of Fixed How use 2b) Just accept 'Next' 'Next', and 'Emish', 3) Starting in the upper left Excel box, use, 'Control A' and 'Control C' to cony the entire data set 1. The 'Chart 1' sheet of the 'Heoron-MICOPOR Stellame six select the upper left cell of the stellar data is in the data set, 'Control V' or your favorite command Note, 1! Step 3 and Step 4 do not start in the upper left cell the links will be to the wrong data six. 2! Chorse the upper left cell of the stellar by the same and

If Step 3 and Step 4 do not start in the upper left cell the justs will be to the wrong data y. Step 1 (2000) the set of the profile to be seen and enter in Cell 15 Only the inputs listed in the profile cells will result in a choice if nothing is input or science other input beaded 0.1 5 - 30, the profile from Ver4 0 is a theorem by default Choose the profile variant hall beat minics the shape of the field chicking data (2000) the concentration factor (cell 9) such the input the domention of the concentration and other the domention of the concentration factor may be lowered without causing the Arrigo-generate profile to become less than the field data profile Note 10 Output the concentration factor the too sing on the concentration of Stop 6 the model is an opnion without the basefield or anti-mathematical support. 10 Data cells the concentration factor be too sing on the concentration of Stop 6 the model is an opnion without the basefield mathematical support. 10 Data Center (2001) and the support of the step of here profile sate/add (cell 6) is subtraction factor (a) Dupport (can be spring) from a sing and and correct turb by satering Time as the year chosen. 10 Data (can be spring) from a sing the spring time and the year chosen. 10 Data (can be spring) from a sing the spring time and the year chosen. 10 Data (can be spring) from a sing the spring time at the year chosen. 10 Data (can be spring) from a the year chosen. 11 Data (can be the spring time at the year chosen. 11 Data (can be the spring time at the year chosen. 11 Data (can be the spring) from a the year chosen. 11 Data (can be the spring time at the year chosen. 12 Data (can be the year the year time the year chosen. 13 Data (can be the year time the year chosen. 14 Data (can be the year time the year chosen. 15 Data (can be the year time the year chosen. 15 Data (can be the year time the year chosen. 15 Data (can be the year time the year chosen. 15 Data (can be the year time the year timp Note Call with questions it is almost certain that this does not answer all questions



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