January 2014

C-144 Permit Package for Jackson Unit 17H Temporary Pit Section 15, T24S, R33E, Lea County

30-025-41087

Prepared for
Murchison Oil and Gas, Inc.
Plano, Texas

1/18

Prepared by
R.T. Hicks Consultants, Ltd.
Albuquerque, New Mexico

R. T. HICKS CONSULTANTS, LTD.

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

January 6, 2014

Mr. Geoffrey Leking
NMOCD District 1
1625 French Drive
Hobbs, NM 88240
Via E-Mail and US Mail

RE: Murchison Oil and Gas, Jackson Unit 17H C-144 application (resubmission)

Dear Mr. Leking:

On behalf of Murchison Oil and Gas, R.T. Hicks Consultants resubmits the attached C-144 application for the above-referenced well. As a result of your recent review and feedback of other applications since the original submission of this application on 10/1/2013, we have made the following changes:

1. We have revised a rat hole evaluation to clarify that we evaluated cuttings from rat hole drilling at two well locations in the area and have also added a third evaluation from the nearby Jackson Unit 15H installation.
2. The site-specific information and siting criteria were slightly amended to clarify that the dry cuttings at rat hole installations were employed in our evaluation of groundwater at the Jackson Unit 17H.
3. Plate 1 has been amended by the addition of a subtitle to clarify the pit's dimensions and a portion of the key on Plate 2 that was causing confusion was removed.
4. The Generic Plans differ from previously-approved submissions in that we changed the words "will" to "may" in regard to the use of a drainage system to emphasize that this is an optional feature.

Please also note the following:

1. We anticipate "in place" burial of stabilized solids.
2. This letter and application is copied to the State Land Office to notify the surface landowner of the operator's intent to use on-site burial.
3. I certify that I performed a visual inspection of the site.

If you have any questions or concerns regarding this application, please contact me. As always, we appreciate your work ethic and attention to detail.

Sincerely,
R.T. Hicks Consultants

Kristin Pope

Kristin Pope
Project Geologist

Copy: Murchison Oil and Gas
NM State Land Office, Terry Warnell

District I
1625 N. French Dr., Hobbs, NM 88240
District II
811 S. First St., Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources
Department
Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-144
Revised June 6, 2013

For temporary pits, below-grade tanks, and multi-well fluid management pits, submit to the appropriate NMOCD District Office.
For permanent pits submit to the Santa Fe Environmental Bureau office and provide a copy to the appropriate NMOCD District Office.

Pit, Below-Grade Tank, or Proposed Alternative Method Permit or Closure Plan Application

Type of action:
- ☐ Below grade tank registration
- ☒ Permit of a pit or proposed alternative method
- ☐ Closure of a pit, below-grade tank, or proposed alternative method
- ☒ Modification to an existing permit/or registration
- ☐ Closure plan only submitted for an existing permitted or non-permitted pit, below-grade tank, or proposed alternative method

Instructions: Please submit one application (Form C-144) per individual pit, below-grade tank or alternative request

Please be advised that approval of this request does not relieve the operator of liability should operations result in pollution of surface water, ground water or the environment. Nor does approval relieve the operator of its responsibility to comply with any other applicable governmental authority's rules, regulations or ordinances.

1.
Operator: Murchison Oil & Gas, Inc. OGRID #: 15363
Address: 1100 Mira Vista Blvd., Plano, TX 75093-4698
Facility or well name: Jackson Unit No. 17H
API Number: 30-025-41087 OCD Permit Number: P1-05981
U/L or Qtr/Qtr A Section 15 Township 24S Range 33E County: Lea
Center of Proposed Design: Latitude 32° 13' 27.531" N Longitude 103° 33' 17.257" W NAD: ☐1927 ☒ 1983
Surface Owner: ☐ Federal ☒ State ☐ Private ☐ Tribal Trust or Indian Allotment

2.
☒ **Pit:** Subsection F, G or J of 19.15.17.11 NMAC
Temporary: ☒ Drilling ☐ Workover
☐ Permanent ☐ Emergency ☐ Cavitation ☐ P&A ☐ Multi-Well Fluid Management Low Chloride Drilling Fluid ☐ yes ☒ no
☒ Lined ☐ Unlined Liner type: Thickness 20 mil ☒ LLDPE ☐ HDPE ☐ PVC ☐ Other
☒ String-Reinforced
Liner Seams: ☒ Welded ☐ Factory ☐ Other Volume: 23,712 bbl Dimensions: L 150 x W 170 x D 6-10 ft

3.
☐ **Below-grade tank:** Subsection I of 19.15.17.11 NMAC
Volume: bbl Type of fluid:
Tank Construction material:
☐ Secondary containment with leak detection ☐ Visible sidewalls, liner, 6-inch lift and automatic overflow shut-off
☐ Visible sidewalls and liner ☐ Visible sidewalls only ☐ Other
Liner type: Thickness mil ☐ HDPE ☐ PVC ☐ Other

4.
☐ **Alternative Method:**
Submittal of an exception request is required. Exceptions must be submitted to the Santa Fe Environmental Bureau office for consideration of approval.

5.
Fencing: Subsection D of 19.15.17.11 NMAC *(Applies to permanent pits, temporary pits, and below-grade tanks)*
☐ Chain link, six feet in height, two strands of barbed wire at top *(Required if located within 1000 feet of a permanent residence, school, hospital, institution or church)*
☒ Four foot height, four strands of barbed wire evenly spaced between one and four feet
☐ Alternate. Please specify

6.

Netting: Subsection E of 19.15.17.11 NMAC *(Applies to permanent pits and permanent open top tanks)*

☐ Screen ☐ Netting ☐ Other_____

☐ Monthly inspections (If netting or screening is not physically feasible)

7.

Signs: Subsection C of 19.15.17.11 NMAC

☐ 12"x 24", 2" lettering, providing Operator's name, site location, and emergency telephone numbers

☒ Signed in compliance with 19.15.16.8 NMAC

8.

Variances and Exceptions:

Justifications and/or demonstrations of equivalency are required. Please refer to 19.15.17 NMAC for guidance.

Please check a box if one or more of the following is requested, if not leave blank:

☐ Variance(s): Requests must be submitted to the appropriate division district for consideration of approval.

☐ Exception(s): Requests must be submitted to the Santa Fe Environmental Bureau office for consideration of approval.

9.

Siting Criteria (regarding permitting): 19.15.17.10 NMAC

Instructions: The applicant must demonstrate compliance for each siting criteria below in the application. Recommendations of acceptable source material are provided below. **Siting criteria does not apply to drying pads or above-grade tanks.**

General siting	
Ground water is less than 25 feet below the bottom of a low chloride temporary pit or below-grade tank. - ☐ NM Office of the State Engineer - iWATERS database search; ☐ USGS; ☐ Data obtained from nearby wells	☐ Yes ☐ No ☒ NA
Ground water is less than 50 feet below the bottom of a Temporary pit, permanent pit, or Multi-Well Fluid Management pit . NM Office of the State Engineer - iWATERS database search; USGS; Data obtained from nearby wells **See Figures 1 & 2**	☐ Yes ☒ No ☐ NA
Within incorporated municipal boundaries or within a defined municipal fresh water well field covered under a municipal ordinance adopted pursuant to NMSA 1978, Section 3-27-3, as amended. **(Does not apply to below grade tanks)** **See Figure 5** - Written confirmation or verification from the municipality; Written approval obtained from the municipality	☐ Yes ☒ No
Within the area overlying a subsurface mine. **(Does not apply to below grade tanks)** **See Figure 7** - Written confirmation or verification or map from the NM EMNRD-Mining and Mineral Division	☐ Yes ☒ No
Within an unstable area. **(Does not apply to below grade tanks)** **See Figure 8** - Engineering measures incorporated into the design; NM Bureau of Geology & Mineral Resources; USGS; NM Geological Society; Topographic map	☐ Yes ☒ No
Within a 100-year floodplain. **(Does not apply to below grade tanks)** **See Figure 9** - FEMA map	☐ Yes ☒ No
Below Grade Tanks	
Within 100 feet of a continuously flowing watercourse, significant watercourse, lake bed, sinkhole, wetland or playa lake (measured from the ordinary high-water mark). - Topographic map; Visual inspection (certification) of the proposed site	☐ Yes ☐ No
Within 200 horizontal feet of a spring or a fresh water well used for public or livestock consumption;. - NM Office of the State Engineer - iWATERS database search; Visual inspection (certification) of the proposed site	☐ Yes ☐ No
Temporary Pit using Low Chloride Drilling Fluid (maximum chloride content 15,000 mg/liter)	
Within 100 feet of a continuously flowing watercourse, or any other significant watercourse or within 200 feet of any lakebed, sinkhole, or playa lake (measured from the ordinary high-water mark). (Applies to low chloride temporary pits.) - Topographic map; Visual inspection (certification) of the proposed site	☐ Yes ☐ No
Within 300 feet from a occupied permanent residence, school, hospital, institution, or church in existence at the time of initial application. - Visual inspection (certification) of the proposed site; Aerial photo; Satellite image	☐ Yes ☐ No
Within 200 horizontal feet of a spring or a private, domestic fresh water well used by less than five households for domestic or stock watering purposes, or 300feet of any other fresh water well or spring, in existence at the time of the initial application. NM Office of the State Engineer - iWATERS database search; Visual inspection (certification) of the proposed site	☐ Yes ☐ No

Within 100 feet of a wetland. - US Fish and Wildlife Wetland Identification map; Topographic map; Visual inspection (certification) of the proposed site	☐ Yes ☐ No
Temporary Pit Non-low chloride drilling fluid	
Within 300 feet of a continuously flowing watercourse, or any other significant watercourse, or within 200 feet of any lakebed, sinkhole, or playa lake (measured from the ordinary high-water mark). See Figure 3 - Topographic map; Visual inspection (certification) of the proposed site	☐ Yes ☒ No
Within 300 feet from a permanent residence, school, hospital, institution, or church in existence at the time of initial application. - Visual inspection (certification) of the proposed site; Aerial photo; Satellite image. See Figure 4	☐ Yes ☒ No
Within 500 horizontal feet of a spring or a private, domestic fresh water well used by less than five households for domestic or stock watering purposes, or 1000 feet of any other fresh water well or spring, in the existence at the time of the initial application; - NM Office of the State Engineer - iWATERS database search; Visual inspection (certification) of the proposed site See Figures 1 & 2	☐ Yes ☒ No
Within 300 feet of a wetland. See Figure 6 - US Fish and Wildlife Wetland Identification map; Topographic map; Visual inspection (certification) of the proposed site	☐ Yes ☒ No
Permanent Pit or Multi-Well Fluid Management Pit	
Within 300 feet of a continuously flowing watercourse, or 200 feet of any other significant watercourse, or lakebed, sinkhole, or playa lake (measured from the ordinary high-water mark). - Topographic map; Visual inspection (certification) of the proposed site	☐ Yes ☐ No
Within 1000 feet from a permanent residence, school, hospital, institution, or church in existence at the time of initial application. - Visual inspection (certification) of the proposed site; Aerial photo; Satellite image	☐ Yes ☐ No
Within 500 horizontal feet of a spring or a fresh water well used for domestic or stock watering purposes, in existence at the time of initial application. - NM Office of the State Engineer - iWATERS database search; Visual inspection (certification) of the proposed site	☐ Yes ☐ No
Within 500 feet of a wetland. - US Fish and Wildlife Wetland Identification map; Topographic map; Visual inspection (certification) of the proposed site	☐ Yes ☐ No

10.
Temporary Pits, Emergency Pits, and Below-grade Tanks Permit Application Attachment Checklist: Subsection B of 19.15.17.9 NMAC
Instructions: Each of the following items must be attached to the application. Please indicate, by a check mark in the box, that the documents are attached.

☐ Hydrogeologic Report (Below-grade Tanks) - based upon the requirements of Paragraph (4) of Subsection B of 19.15.17.9 NMAC
☒ Hydrogeologic Data (Temporary and Emergency Pits) - based upon the requirements of Paragraph (2) of Subsection B of 19.15.17.9 NMAC
☒ Siting Criteria Compliance Demonstrations - based upon the appropriate requirements of 19.15.17.10 NMAC
☒ Design Plan - based upon the appropriate requirements of 19.15.17.11 NMAC
☒ Operating and Maintenance Plan - based upon the appropriate requirements of 19.15.17.12 NMAC
☒ Closure Plan (Please complete Boxes 14 through 18, if applicable) - based upon the appropriate requirements of Subsection C of 19.15.17.9 NMAC and 19.15.17.13 NMAC

☐ Previously Approved Design (attach copy of design) API Number: _____ or Permit Number: _____

11.
Multi-Well Fluid Management Pit Checklist: Subsection B of 19.15.17.9 NMAC
Instructions: Each of the following items must be attached to the application. Please indicate, by a check mark in the box, that the documents are attached.

☐ Design Plan - based upon the appropriate requirements of 19.15.17.11 NMAC
☐ Operating and Maintenance Plan - based upon the appropriate requirements of 19.15.17.12 NMAC
☐ A List of wells with approved application for permit to drill associated with the pit.
☐ Closure Plan (Please complete Boxes 14 through 18, if applicable) - based upon the appropriate requirements of Subsection C of 19.15.17.9 NMAC and 19.15.17.13 NMAC
☐ Hydrogeologic Data - based upon the requirements of Paragraph (4) of Subsection B of 19.15.17.9 NMAC
☐ Siting Criteria Compliance Demonstrations - based upon the appropriate requirements of 19.15.17.10 NMAC

☐ Previously Approved Design (attach copy of design) API Number: _____ or Permit Number: _____

12.
Permanent Pits Permit Application Checklist: Subsection B of 19.15.17.9 NMAC
Instructions: Each of the following items must be attached to the application. Please indicate, by a check mark in the box, that the documents are attached.

- ☐ Hydrogeologic Report - based upon the requirements of Paragraph (1) of Subsection B of 19.15.17.9 NMAC
- ☐ Siting Criteria Compliance Demonstrations - based upon the appropriate requirements of 19.15.17.10 NMAC
- ☐ Climatological Factors Assessment
- ☐ Certified Engineering Design Plans - based upon the appropriate requirements of 19.15.17.11 NMAC
- ☐ Dike Protection and Structural Integrity Design - based upon the appropriate requirements of 19.15.17.11 NMAC
- ☐ Leak Detection Design - based upon the appropriate requirements of 19.15.17.11 NMAC
- ☐ Liner Specifications and Compatibility Assessment - based upon the appropriate requirements of 19.15.17.11 NMAC
- ☐ Quality Control/Quality Assurance Construction and Installation Plan
- ☐ Operating and Maintenance Plan - based upon the appropriate requirements of 19.15.17.12 NMAC
- ☐ Freeboard and Overtopping Prevention Plan - based upon the appropriate requirements of 19.15.17.11 NMAC
- ☐ Nuisance or Hazardous Odors, including H_2S, Prevention Plan
- ☐ Emergency Response Plan
- ☐ Oil Field Waste Stream Characterization
- ☐ Monitoring and Inspection Plan
- ☐ Erosion Control Plan
- ☐ Closure Plan - based upon the appropriate requirements of Subsection C of 19.15.17.9 NMAC and 19.15.17.13 NMAC

13.
Proposed Closure: 19.15.17.13 NMAC
Instructions: Please complete the applicable boxes, Boxes 14 through 18, in regards to the proposed closure plan.

Type: ☒ Drilling ☐ Workover ☐ Emergency ☐ Cavitation ☐ P&A ☐ Permanent Pit ☐ Below-grade Tank ☐ Multi-well Fluid Management Pit ☐ Alternative

Proposed Closure Method: ☐ Waste Excavation and Removal
☐ Waste Removal (Closed-loop systems only)
☒ On-site Closure Method (Only for temporary pits and closed-loop systems)
☒ In-place Burial ☐ On-site Trench Burial
☐ Alternative Closure Method

14.
Waste Excavation and Removal Closure Plan Checklist: (19.15.17.13 NMAC) ***Instructions: Each of the following items must be attached to the closure plan. Please indicate, by a check mark in the box, that the documents are attached.***

- ☐ Protocols and Procedures - based upon the appropriate requirements of 19.15.17.13 NMAC
- ☐ Confirmation Sampling Plan (if applicable) - based upon the appropriate requirements of Subsection C of 19.15.17.13 NMAC
- ☐ Disposal Facility Name and Permit Number (for liquids, drilling fluids and drill cuttings)
- ☐ Soil Backfill and Cover Design Specifications - based upon the appropriate requirements of Subsection H of 19.15.17.13 NMAC
- ☐ Re-vegetation Plan - based upon the appropriate requirements of Subsection H of 19.15.17.13 NMAC
- ☐ Site Reclamation Plan - based upon the appropriate requirements of Subsection H of 19.15.17.13 NMAC

15.
Siting Criteria (regarding on-site closure methods only): 19.15.17.10 NMAC
Instructions: Each siting criteria requires a demonstration of compliance in the closure plan. Recommendations of acceptable source material are provided below. Requests regarding changes to certain siting criteria require justifications and/or demonstrations of equivalency. Please refer to 19.15.17.10 NMAC for guidance.

Ground water is less than 25 feet below the bottom of the buried waste. - NM Office of the State Engineer - iWATERS database search; USGS; Data obtained from nearby wells	☐ Yes ☒ No ☐ NA
Ground water is between 25-50 feet below the bottom of the buried waste - NM Office of the State Engineer - iWATERS database search; USGS; Data obtained from nearby wells	☐ Yes ☒ No ☐ NA
Ground water is more than 100 feet below the bottom of the buried waste. - NM Office of the State Engineer - iWATERS database search; USGS; Data obtained from nearby wells	☒ Yes ☐ No ☐ NA
Within 100 feet of a continuously flowing watercourse, or 200 feet of any other significant watercourse, lakebed, sinkhole, or playa lake (measured from the ordinary high-water mark). - Topographic map; Visual inspection (certification) of the proposed site	☐ Yes ☒ No
Within 300 feet from a permanent residence, school, hospital, institution, or church in existence at the time of initial application. - Visual inspection (certification) of the proposed site; Aerial photo; Satellite image	☐ Yes ☒ No
Within 300 horizontal feet of a private, domestic fresh water well or spring used for domestic or stock watering purposes, in existence at the time of initial application. - NM Office of the State Engineer - iWATERS database; Visual inspection (certification) of the proposed site	☐ Yes ☒ No
Written confirmation or verification from the municipality; Written approval obtained from the municipality	☐ Yes ☒ No
Within 300 feet of a wetland. US Fish and Wildlife Wetland Identification map; Topographic map; Visual inspection (certification) of the proposed site	☐ Yes ☒ No
Within incorporated municipal boundaries or within a defined municipal fresh water well field covered under a municipal ordinance	

adopted pursuant to NMSA 1978, Section 3-27-3, as amended. - Written confirmation or verification from the municipality; Written approval obtained from the municipality	☐ Yes ☒ No
Within the area overlying a subsurface mine. - Written confirmation or verification or map from the NM EMNRD-Mining and Mineral Division	☐ Yes ☒ No
Within an unstable area. - Engineering measures incorporated into the design; NM Bureau of Geology & Mineral Resources; USGS; NM Geological Society; Topographic map	☐ Yes ☒ No
Within a 100-year floodplain. - FEMA map	☐ Yes ☒ No

16.
On-Site Closure Plan Checklist: (19.15.17.13 NMAC) ***Instructions: Each of the following items must be attached to the closure plan. Please indicate, by a check mark in the box, that the documents are attached.***

- ☒ Siting Criteria Compliance Demonstrations - based upon the appropriate requirements of 19.15.17.10 NMAC
- ☒ Proof of Surface Owner Notice - based upon the appropriate requirements of Subsection E of 19.15.17.13 NMAC
- ☐ Construction/Design Plan of Burial Trench (if applicable) based upon the appropriate requirements of Subsection K of 19.15.17.11 NMAC
- ☒ Construction/Design Plan of Temporary Pit (for in-place burial of a drying pad) - based upon the appropriate requirements of 19.15.17.11 NMAC
- ☒ Protocols and Procedures - based upon the appropriate requirements of 19.15.17.13 NMAC
- ☐ Confirmation Sampling Plan (if applicable) - based upon the appropriate requirements of 19.15.17.13 NMAC
- ☒ Waste Material Sampling Plan - based upon the appropriate requirements of 19.15.17.13 NMAC
- ☐ Disposal Facility Name and Permit Number (for liquids, drilling fluids and drill cuttings or in case on-site closure standards cannot be achieved)
- ☒ Soil Cover Design - based upon the appropriate requirements of Subsection H of 19.15.17.13 NMAC
- ☒ Re-vegetation Plan - based upon the appropriate requirements of Subsection H of 19.15.17.13 NMAC
- ☒ Site Reclamation Plan - based upon the appropriate requirements of Subsection H of 19.15.17.13 NMAC

17.
Operator Application Certification:

I hereby certify that the information submitted with this application is true, accurate and complete to the best of my knowledge and belief.

Name (Print): Greg Boans Title: Production Superintendent

Signature:  Date: January 6, 2014

e-mail address: gboans@jdmii.com Telephone: (575) 361-4962

18.
OCD Approval: ☐ Permit Application (including closure plan) ☐ Closure Plan (only) ☐ OCD Conditions (see attachment)

OCD Representative Signature: _____ **Approval Date:** _____

Title: _____ **OCD Permit Number:** _____

19.
Closure Report (required within 60 days of closure completion): 19.15.17.13 NMAC

Instructions: Operators are required to obtain an approved closure plan prior to implementing any closure activities and submitting the closure report. The closure report is required to be submitted to the division within 60 days of the completion of the closure activities. Please do not complete this section of the form until an approved closure plan has been obtained and the closure activities have been completed.

☐ **Closure Completion Date:** _____

20.
Closure Method:

☐ Waste Excavation and Removal ☐ On-Site Closure Method ☐ Alternative Closure Method ☐ Waste Removal (Closed-loop systems only)
☐ If different from approved plan, please explain.

21.
Closure Report Attachment Checklist: ***Instructions: Each of the following items must be attached to the closure report. Please indicate, by a check mark in the box, that the documents are attached.***

- ☐ Proof of Closure Notice (surface owner and division)
- ☐ Proof of Deed Notice (required for on-site closure for private land only)
- ☐ Plot Plan (for on-site closures and temporary pits)
- ☐ Confirmation Sampling Analytical Results (if applicable)
- ☐ Waste Material Sampling Analytical Results (required for on-site closure)
- ☐ Disposal Facility Name and Permit Number
- ☐ Soil Backfilling and Cover Installation
- ☐ Re-vegetation Application Rates and Seeding Technique
- ☐ Site Reclamation (Photo Documentation)

On-site Closure Location: Latitude _____ Longitude _____ NAD: ☐1927 ☐ 1983

22.

Operator Closure Certification:

I hereby certify that the information and attachments submitted with this closure report is true, accurate and complete to the best of my knowledge and belief. I also certify that the closure complies with all applicable closure requirements and conditions specified in the approved closure plan.

Name (Print): _____ Title: _____

Signature: _____ Date: _____

e-mail address: _____ Telephone: _____

Distance to Groundwater

Figure 1, Figure 2, and the discussion presented below demonstrates that groundwater (fresh water as defined by NMOCD Rules) at the location is greater than 100 feet beneath the temporary pit that will contain fluids which cannot be classified as "low-chloride." Groundwater will be more than 25 feet below the bottom of the buried waste, meeting criteria for burial trench or in-place closure.

Figure 1 is an area geologic and topographic map that shows:

1. The location of the temporary pit as an orange hexagon.
2. The location of the Mogi 9 State 1H (Misc-68) and Brinninstool 4 State 3H (Misc-69), where we evaluated cuttings during the 120-foot conductor casing borings. The cuttings from these auger borings were dry. Cuttings from a conductor boring at the Jackson Unit 15H site, approximately 100 feet west of the subject site, were also dry.
3. Water wells from the OSE database as a blue triangle inside colored circles that indicate well depth. OSE wells are often miss-located in the WATERS database as older wells are plotted in the center of the quarter, quarter, quarter, of the Section Township and Range.
4. Water wells from the USGS database as large green triangles.
5. Water wells, which are not documented in the public databases but were identified by field inspection or other published reports as colored squares.
6. The depth-to-water from the most recent available measurement for each well is provided adjacent to the well symbol.

Figure 2 is an area topographic map that shows:

1. The location of the temporary pit as an orange hexagon.
2. Water wells with the same symbols as those shown in Figure 1.
3. The date of the most recent depth-to-water measurement for each water well and the identifier number of the well. Note that Well Misc-15 shows a date of 12/12/9999 because Open File Report OF-95[1] does not report a date of water level measurement.
4. Groundwater elevation measurements.

Geology

The proposed temporary pit is located on exposures of Quaternary Age eolian and piedmont deposits (Qe/Qp on Figure 1). These deposits are a thin covering of the underlying Tertiary Ogallala Formation or, in some places, the redbeds of the Dockum Group. The Ogallala Formation consists primarily of sand with some clay, silt and gravel, generally capped by caliche. Based on information from Ground-Water Report 6 (GWR-6) *Geology and Ground-Water Conditions in Southern Lea County, New Mexico* by Alexander Nicholson and Alfred Clebsch (1961), the top of the redbeds in the area is about 3550 above sea level (see Plate 1 of GWR-6). Because the location lies at an elevation of 3613 feet, the Ogallala Formation, if it is present, could be 63 feet thick or more (3613-3550).

Topographically, the site lies immediately outside of the southeastern boundary of the Bell Lake Sink, a 2-mile wide circular depression (see Figures 1-4). This and other nearby depressions

[1] See http://geoinfo.nmt.edu/publications/openfile/details.cfml?Volume=95

have been described as an ancient collapse feature (breccia pipes) associated with the removal of salt due to upward groundwater flow from the Capitan Reef[2]. Approximately 50 feet of topographic relief is present from the bottom of the sink to the proposed location of the well (3611-3563= 50). The deepest point of the sink is approximately 1.4 miles to the northwest of the subject site.

Water Table Elevation

The 14 water wells identified on Figures 1 and 2 were used to determine the water table elevation below the temporary pit. We also employed data from the Mogi 9 State 1H rathole (Misc-68), located about 1.75 miles west of the proposed pit and the Brinninstool 4 State 3H rathole (Misc-69) located about 2 miles northwest of the proposed pit. On November 12, 2013, NMOCD witnessed as R.T. Hicks Consultants logged cuttings from the rat hole boring at the Jackson Unit 15H site. All cuttings were dry to 120 feet, the total depth of the boring.

Four of these 14 wells appear on more than one database (yellow highlight on Table 1). Because a single well appears on multiple databases, Table 1 lists the "alias" of these four wells. The entries on Table 1 include ten listings from the New Mexico Office of the State Engineer (OSE) database. Three wells are derived from the USGS database (USGS 445 is also listed on the OSE database as C 2308 and in Open File Report 95 as Misc-18). Five wells described in Open File Report No. 95 (OFR-95) and GWR-6; two of these four are also listed in the OSE database and one is in the USGS database. Misc-61 is the same well as C 2312 and is listed in the miscellaneous database due to our recent water level measurement of this well. One well (Bell Lake Windmill, north of the Jal Highway 128), which appears on the USGS topographic map, was inspected in the field as plugged and abandoned. Because no data exists for the Bell Lake Windmill, it is not listed on Table 1.

[2] See http://nmgs.nmt.edu/publications/guidebooks/downloads/57/57_p0233_p0242.pdf

	Well Location						Well Source Information							Groundwater Elevation Data							
Well Numbers	Township (south)	Range (east)	Section	Quarter Section (64,	16,	4)	NM-OSE Database	USGS Database	Open File Rpt. 95	GW Report No. 6	USGS Topo Sheet	Aerial Photograph	Field Verification	Surface Elevation (published)	Surface Elevation (Topo Sheet)	Well Total Depth (published)	Depth to Water (published)	Groundwater Elev. (published)	Groundwater Elev. (using topo elev.)	Gauging Date	Alias ID
Misc-15	23	33	28	3	4	4	Y		Y		Y	Y	Y	3675		575.0	500.0	3175.0		12/12/1944	C 2279
C 02279	23	33	28	3	4	3	Y				Y	Y	Y		3675	650.0	400.0		3,025	12/31/1981	Misc. 15
C 02281	23	33	28	4	4	3	Y						Y		3685	545.0	400.0		3,140	12/31/1944	
USGS-461	23	34	32	1	4	4		Y			Y	Y		3573	3574		206.9	3366	3367	3/18/1996	
USGS-378	24	32	33	2	2	4		Y				Y		3499	3499		288.7	3210		2/27/2001	
USGS-445	24	33	10	1	3	1	Y	Y	Y		Y	Y	Y	3589	3588	36	22.1	3567		3/13/1996	C 2308, Misc. 18
Misc-18	24	33	10	1	3	1	Y	Y	Y		Y		Y	3589		40.0	22.0	3567.0		5/23/2012	USGS-445, C 2308
C 02308	24	33	10	1	3	1	Y	Y	Y		Y		Y		3589	40.0	20.0		3,549	6/30/1920	USGS-445, Misc. 18
C 02430	24	33	16	3	3	3	Y				Y		Y		3572	643.0	415.0		2,929	12/31/1982	
C 02431	24	33	17	4	4	4	Y				Y		Y		3572	525.0	415.0		3,047	12/31/1959	
C 02432	24	33	17	4	4	4	Y				Y		Y		3572	640.0	415.0		2,932	12/31/1980	
Misc-12	24	33	23	3	3	4			Y			Y		3558	3549	232.0	208.7	3326.0	3340.3	11/27/1953	
Misc-13	24	33	24	4	4	4			Y		Y										
C2309	24	33	25	2	2	2	Y				Y				3512	60	30		3482	6/30/1912	
C2311	24	33	33	1	3	2	Y		Y	Y	Y	Y		3460	3465		93.2	3367	3372	3/17/1954	Misc-14
Misc-14	24	33	33	1	3	2	Y		Y	Y	Y	Y		3460	3465		93.2	3367	3372	3/17/1954	C-2311
C 2310	24	33	33	1	3	2	Y		Y	Y	Y	Y		3460	3465	120	70		3395		
C 2312	25	33	5	2	2	1	Y				Y	Y	Y	3473	3473	150	90.0	3383.0	3383.0	6/30/1998	Misc-61
Misc-61	25	33	5	2	2	1	Y				Y	Y	Y	3473	3473	150	112.4	3360.6	3360.6	4/3/2013	C-2312

Table 1 – Groundwater Data

Visual inspections of questionable wells were performed to verify the information provided by the public records and published reports. Initially, an attempt was made to identify each well using USGS topographic maps. The surface elevations of wells identified on the maps were compared to the published surface elevation, if available. Wells that could not be verified using maps were searched for using current and historic satellite photographs in an effort to identify windmills, tanks, or roads associated with the well. Locations that could not be verified by maps or photographs were verified in the field. Attempts were also made to gauge wells during the field investigation when access was permitted. The results of the field inspections are summarized as follows:

- Seven of the 14 water wells were physically located by field inspection.
- Water well #18 (445, C2308) was accessed on October 10, 2012 and the depth-to-water was measured at 22 feet below ground surface.
- Water well #C2279 (#15) is a windmill at the Ranch Headquarters.
- Water wells C2280 is abandoned/plugged
- At the three-well cluster shown as C2430-C2432, we identified only one operational well in the field. The well owner reports that three wells do exist in this cluster.
- Depth to water in well C 2312 (Misc-61) was measured on April 3, 2013.
- Well Misc-12 is plugged and abandoned
- The Bell Lake Windmill, which is not on Table 1 but is identified on the USGS topographic map, is plugged

Hydrogeology

GWR-6 (1961) indicates that Ogallala groundwater is not present as a regional aquifer within the

Bell Lake area. The Bell Lake Windmill and wells Misc-18/ USGS-445 obviously tap a shallow water table associated with the collapse features described above. The lack of a regional water table aquifer described in GWR-6 is borne out in the data from well #12, located about 1.5 miles south-southeast from the proposed pit. Here the water supply well spuds on Ogallala Formation (To), is drilled to a total depth of 232 feet and records a water level of 208.7 feet below land surface (see Table 1). The water elevation in well #12 (3326 feet asl) lies below the projected bottom of the Ogallala Formation (3550 feet asl at this location). All wells outside of ancient collapse features record water levels below the projected base of the Ogallala and tap waterbearing units within the red beds (Dockum Group). Based on the depth-to-water measurements (published and recent) the regional groundwater (Triassic Santa Rosa Formation) is present across the area at an elevation below 3,250 feet.

Within the Bell Lake Sink are two water supply wells (visible on USGS topographic maps), the plugged Bell Lake Windmill and the abandoned (but open casing) Bell Well. The water level in the abandoned Bell Well is 22 feet below grade at a projected elevation of 3568 (3590-22). Obviously this water level is highly localized because the surface elevation at Bell Lake is 3562 (about 5-feet lower than the Bell Lake Windmill) and the lake holds no water. The horizontal limit of groundwater within the Bell Lake Sink is also documented by the hydrogeologic logging conducted at the Mogi 9 State 1H (Misc-68), Brinninstool 4 State 3H (Misc-69), and Jackson Unit 15H sites where the 120-foot deep borings were logged as dry sediments. The attached Rat Hole Evaluations describe in detail the findings at these borings.

The hydrologic and geologic data demonstrate that groundwater within the Bell Lake Sink is highly localized. The fact that both water supply wells are abandoned also suggests that groundwater for beneficial use no longer exists in the Sink area. We conclude with a high degree of certainty that groundwater, as defined by OCD Rules, exists beneath the Jackson Unit 17H site only in the Triassic Dockum Group redbeds at a depth of more than 300 feet.

Distance to Surface Water

Figure 3 and the site visit demonstrates that the location is not within 300 feet of a continuously flowing watercourse or any other significant watercourse or 200 feet from lakebed, sinkhole, or playa lake (measured from the ordinary high-water mark). This temporary pit will also qualify for burial trench or in-place closure as the location is not within 100 feet of a continuously flowing watercourse, or 200 feet of any other significant watercourse or lakebed, sinkhole or playa lake (measured from the ordinary high-water mark).

- No continuously flowing watercourses or other water bodies, as defined by NMOCD Rules, exist within the prescribed setback criteria for the siting, trench burial, or in-place closure of a temporary pit at this location.
- The nearest topographic low area is the Bell Lake Sink located north of the location. Neither Bell Lake nor excavated areas south of Bell Lake contained surface water on the day of the inspection. Google Earth images suggest the excavated areas south of the lakebed contained water periodically from 1996 to 2012 (also see Figure 4). Bell Lake, however, did not exhibit evidence of surface water during this period.

- The Bell Lake Sink is an ancient collapse feature but is not considered a sinkhole as typically used in NMOCD Rules.

Distance to Permanent Residence or Structures

Figure 4 and the site visit demonstrates that the location is not within 300 feet from an occupied permanent residence, school, hospital, institution, church, or other structure in existence at the time of initial application. This also qualifies the location for burial trench or in-place closure.

- The nearest structures are oil and gas wells and tank batteries.
- A cattle gathering area with corrals is located about 1 mile northwest of the location.

Distance to Non-Public Water Supply

Figures 1 and Figure 2 demonstrates that the location is not within 500 horizontal feet of a private, domestic fresh water well or spring that less than five households use for domestic or stock watering purposes, or within 1000 horizontal feet of any other fresh water well or spring, in existence at the time of initial application. Additionally, this location is also not within 300 feet of a spring or private, domestic fresh water well used for domestic or stock watering purposes, thus qualifying for burial trench or in-place closure.

- Figure 1 and 2 show the locations of all area water wells, active or plugged.
- The nearest active water wells are located approximately 2.25 miles southwest. There are no known domestic water wells located within 1000 feet of the location. Plugged/abandoned wells do exist in the Bell Lake Sink.
- There are no known domestic wells within 1000 feet of this location.
- No springs were identified within the mapping area (see Figure 3).

Distance to Municipal Boundaries and Fresh Water Fields

Figure 5 demonstrates that the location is not within incorporated municipal boundaries or within defined municipal fresh water well fields covered under a municipal ordinance adopted pursuant to NMSA 1978, Section 3-27-3, as amended. This also qualifies the location for burial trench or in-place closure.

- The closest municipality is Jal, NM approximately 28 miles to the southeast.
- The closest public well field is located approximately 50 miles to the west and/or 50 miles north.

Distance to Wetlands

Figure 6 demonstrates the location is not within 300 feet of wetlands. This also qualifies the location for burial trench or in-place closure.

- The nearest designated wetland is a "freshwater emergent wetland" located more than 1 mile to the northwest (Bell Lake area excavations).
- North of this emergent wetland is the excavation designated as a "freshwater pond."

Distance to Subsurface Mines

Figure 7 and our general reconnaissance of the area demonstrate that the nearest mines are caliche pits. This location is not within an area overlying a subsurface mine.

- The nearest mapped caliche pit is located approximately 3 miles to the southwest.

Distance to High or Critical Karst Areas

Figure 8 shows the location of the temporary pits with respect to BLM Karst areas.

- The proposed temporary pit is located within a "low" potential karst area.
- The nearest "high" or "critical" potential karst area is located approximately 18 miles west of the site.
- No evidence of solution voids were observed near the site during the field inspection.
- No evidence of unstable ground was observed in Bell Lake Sink.

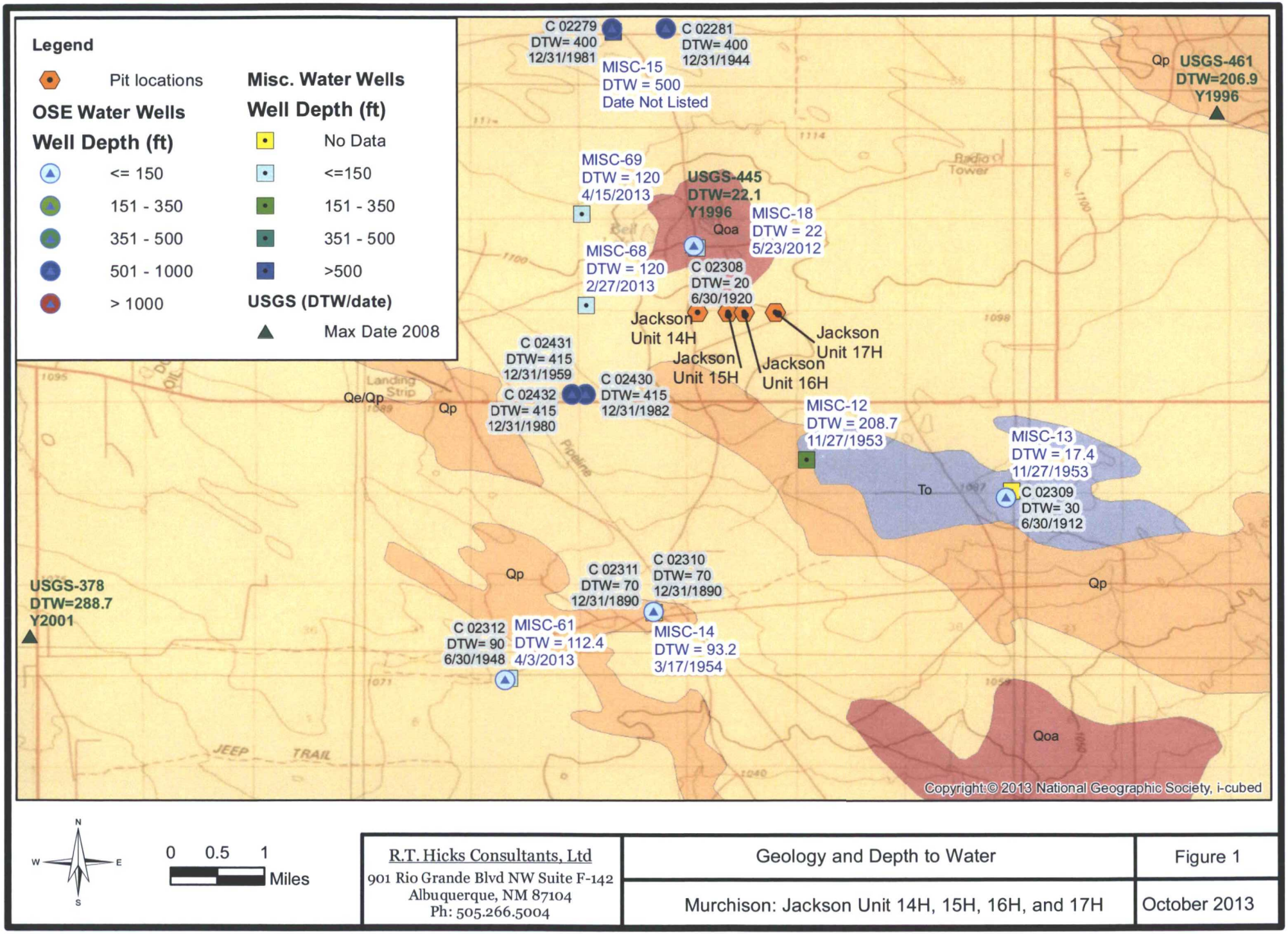
Distance to 100-Year Floodplain

Figure 9 demonstrates that the location is within an area that has not yet been mapped by the Federal Emergency Management Agency with respect to the Flood Insurance Rate 100-Year Floodplain.

- Areas that are not mapped are generally considered minimal flood risk
- Our field inspection and examination of the topography permits a conclusion that the location is not within any floodplain

Temporary Pit Design

Please refer to Plates 1 and 2 for the design of the temporary pit and the Design and Construction Plan at the end of this application.



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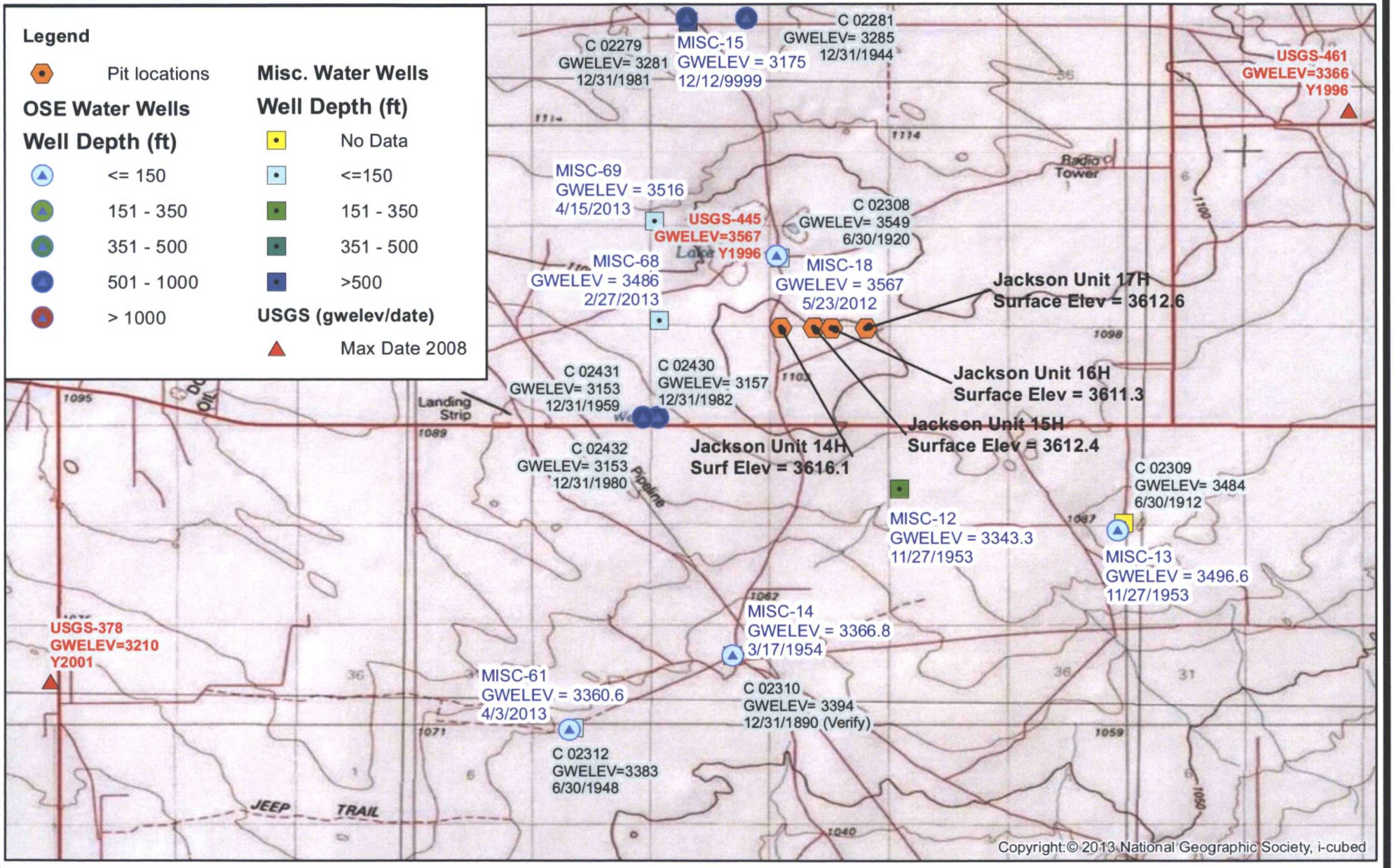
Albuquerque, NM 87104
Ph: 505.266.5004

Geology and Depth to Water

Figure 1

Murchison: Jackson Unit 14H, 15H, 16H, and 17H

October 2013



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Miles

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Topology and Groundwater Elevation

Figure 2

Murchison: Jackson Unit 14H, 15H, 16H, and 17H

October 2013

N
W E
S

0 1,000 2,000
Feet

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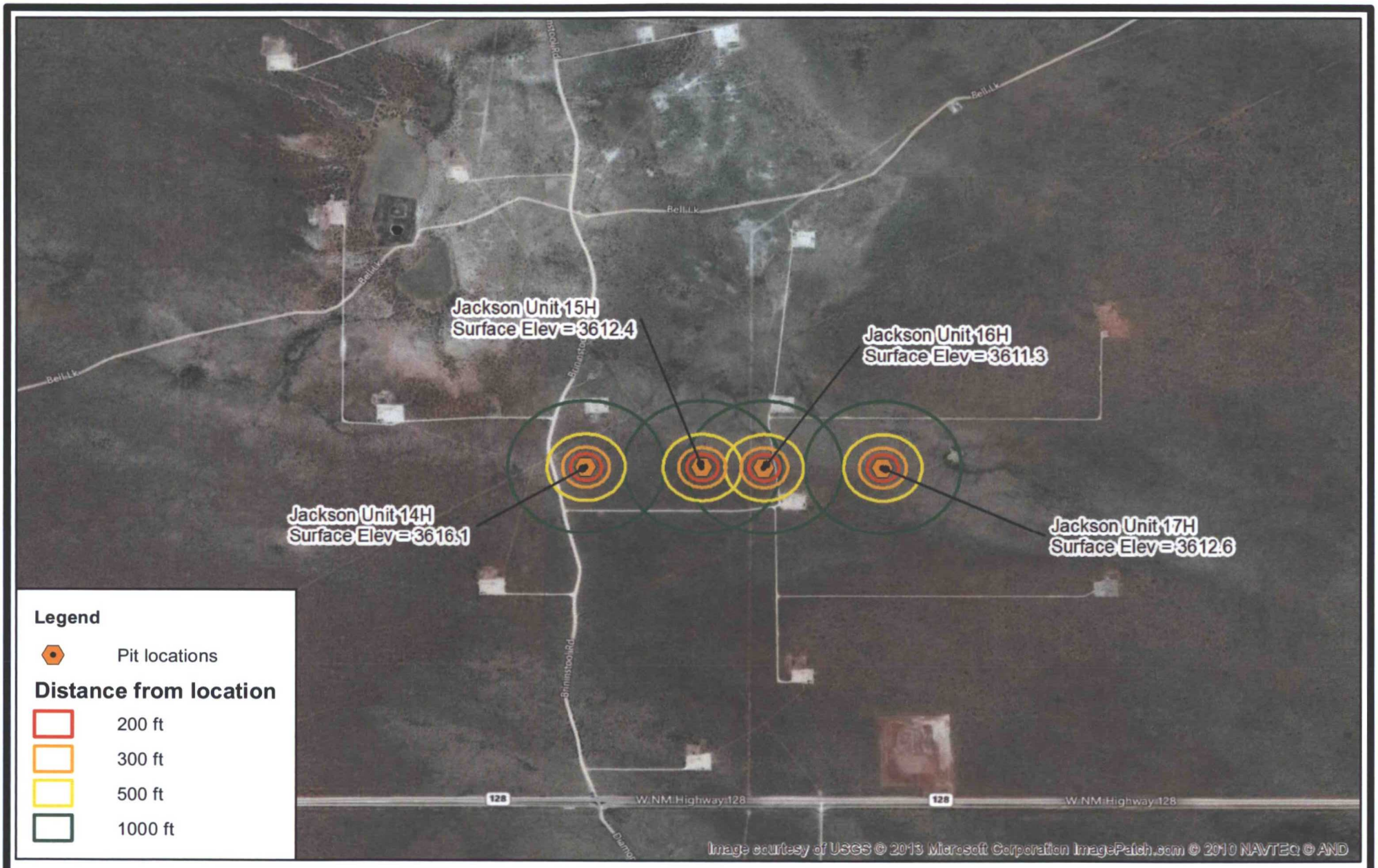
Nearby Surface Water Features

Figure 3

Murchison: Jackson Unit 14H, 15H, 16H, and 17H

October 2013



N W E S

0 1,000 2,000 Feet

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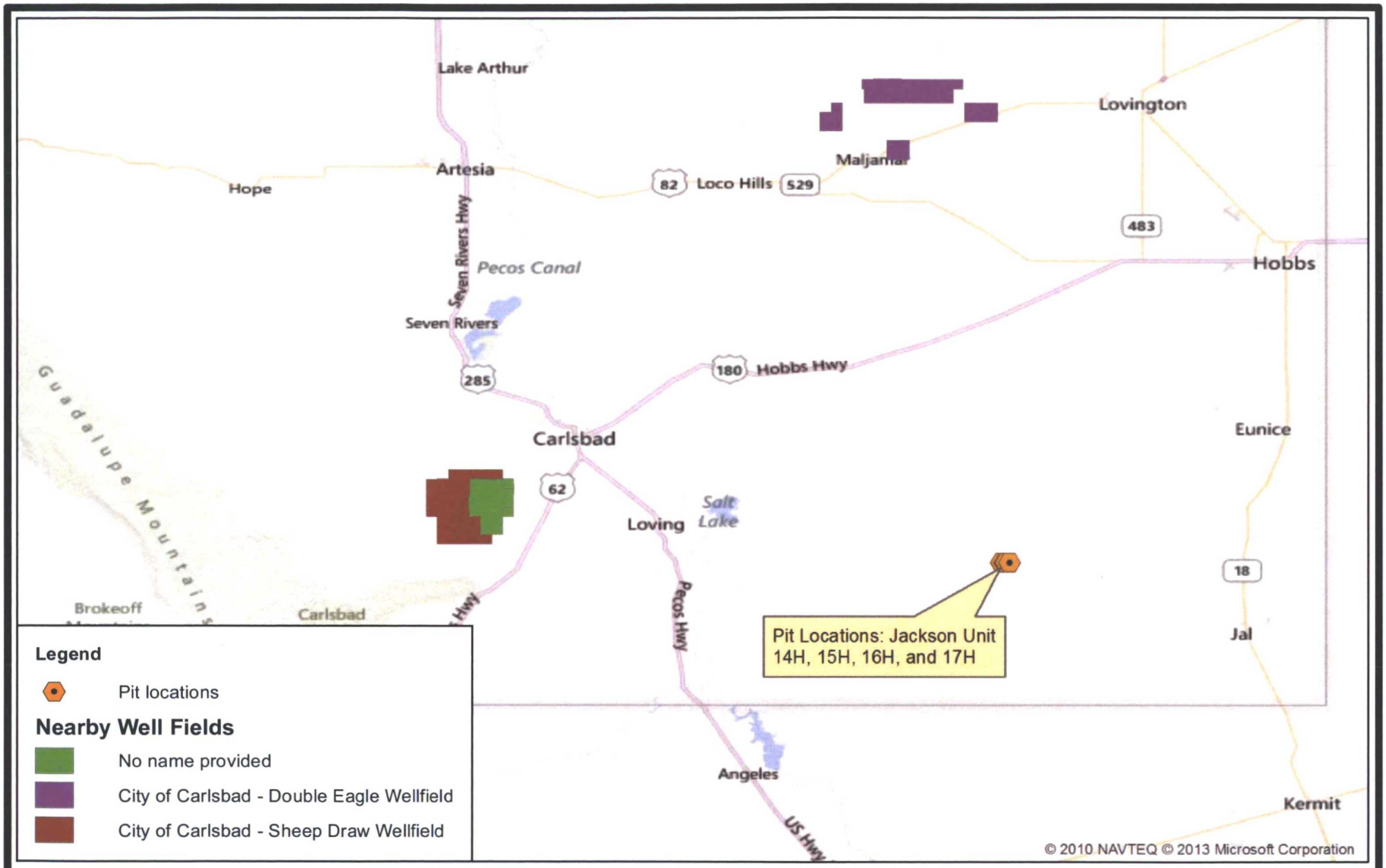
Nearby Structures

Figure 4

Murchison: Jackson Unit 14H, 15H, 16H, and 17H

October 2013



N
W E
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Miles

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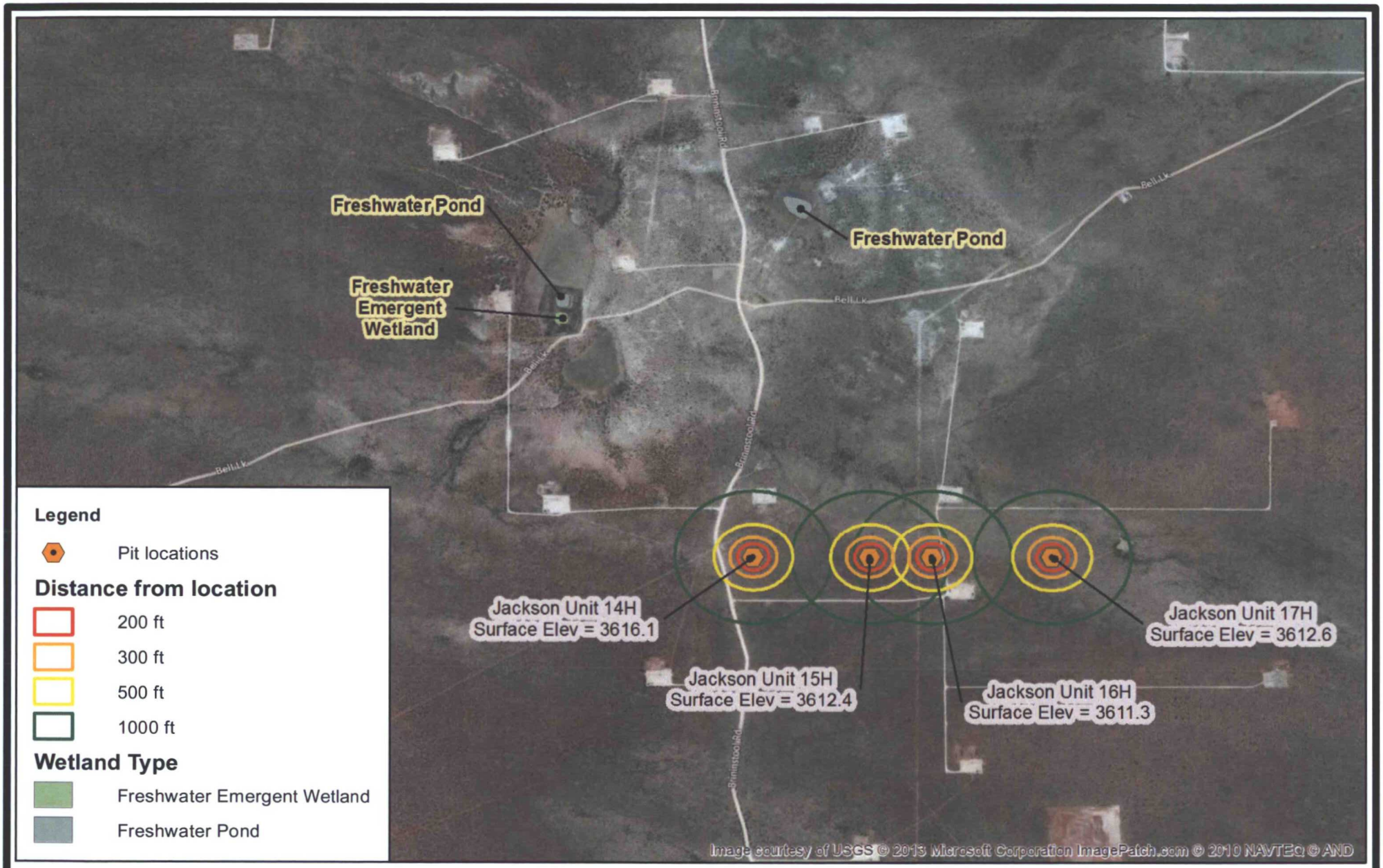
Nearby Municipalities and Well Fields

Figure 5

Murchison: Jackson Unit 14H, 15H, 16H, and 17H

October 2013



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W E
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0 1,000 2,000 Feet

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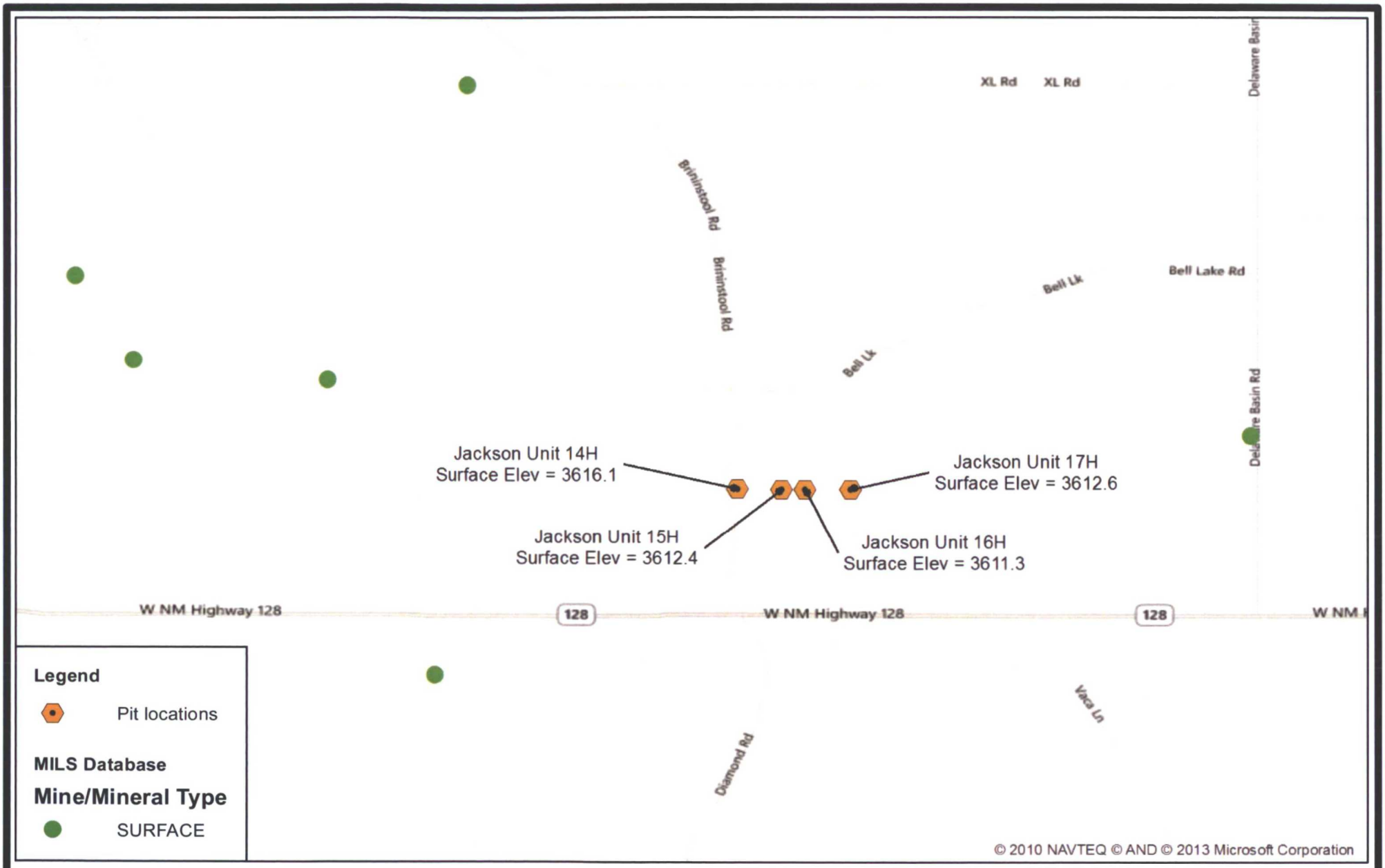
Nearby Wetlands

Figure 6

Murchison: Jackson Unit 14H, 15H, 16H, and 17H

October 2013



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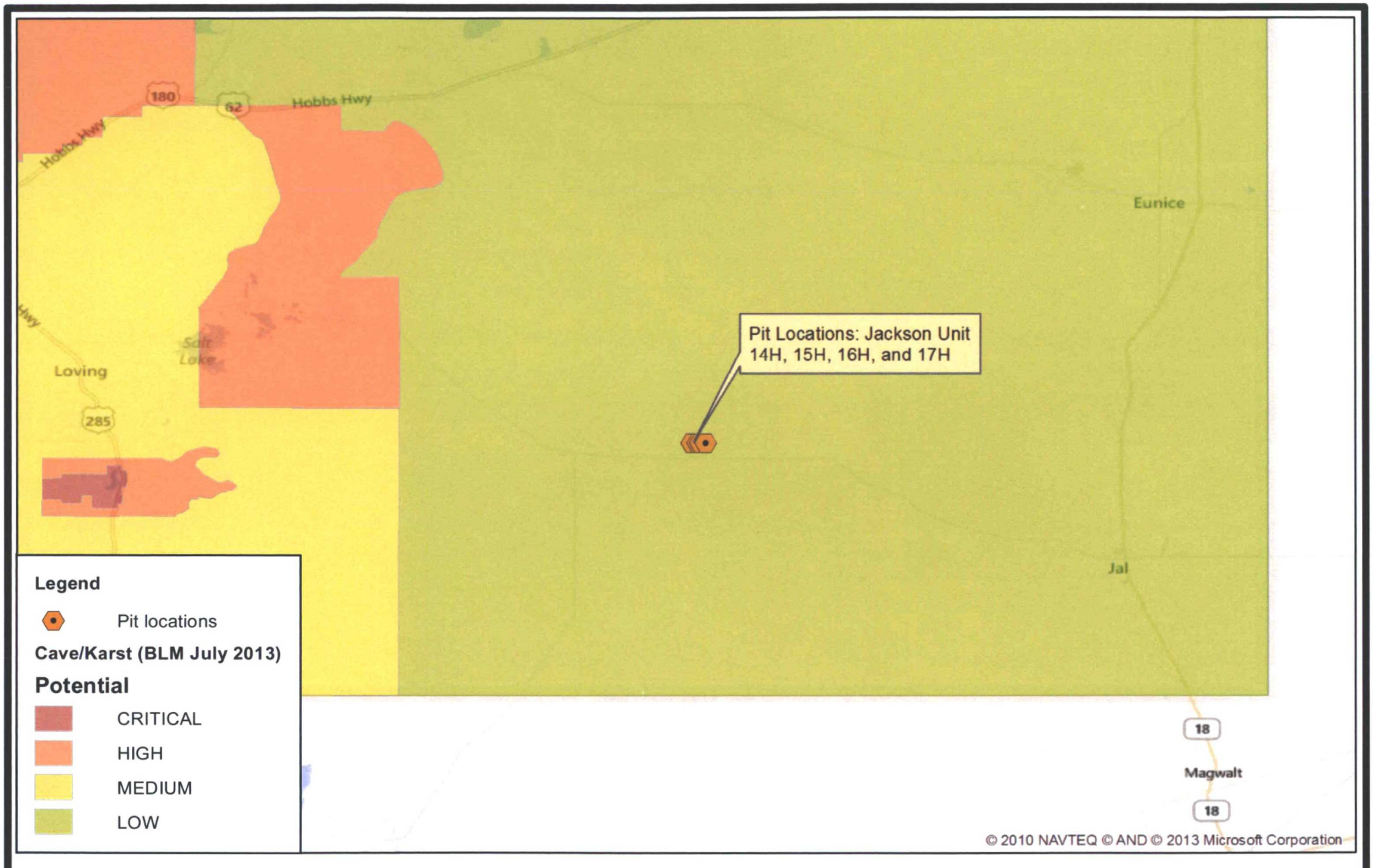
Nearby Mines

Figure 7

Murchison: Jackson Unit 14H, 15H, 16H, and 17H

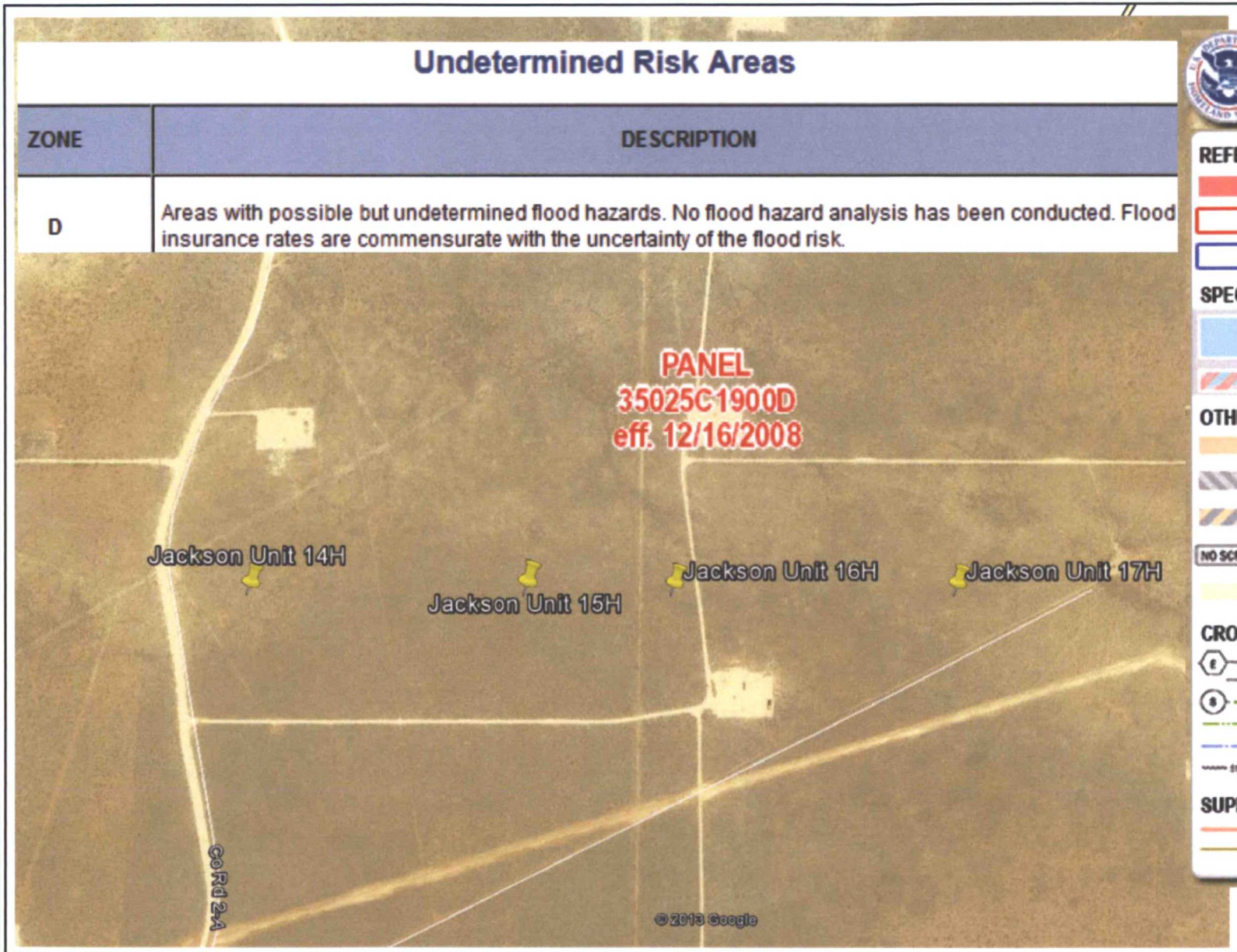
October 2013



R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Karst Potential	Figure 8
	Murchison: Jackson Unit 14H, 15H, 16H, and 17H	October 2013

Undetermined Risk Areas

ZONE	DESCRIPTION
D	Areas with possible but undetermined flood hazards. No flood hazard analysis has been conducted. Flood insurance rates are commensurate with the uncertainty of the flood risk.



FEMA NFHL

REFERENCE LAYERS
- NFHL Data Available
- FIRM Panel Boundary
- LOMR Boundary

SPECIAL FLOOD HAZARD AREAS
- 1% Annual Chance Flood Hazard *Zone A, AE, A99, AO, AH, AR, V, VE*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee *Zone X*
- NO SCREEN Areas Outside the 0.2% Annual Chance Floodplain *Zone X*
- Areas of Undetermined Flood Hazard *Zone D*

CROSS SECTIONS & BFES
- Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- Coastal Transect Baseline
- Profile Baseline
- Base Flood Elevation

SUPPORTING INFORMATION
- Limit of Study
- Jurisdictional Boundary

N W E S

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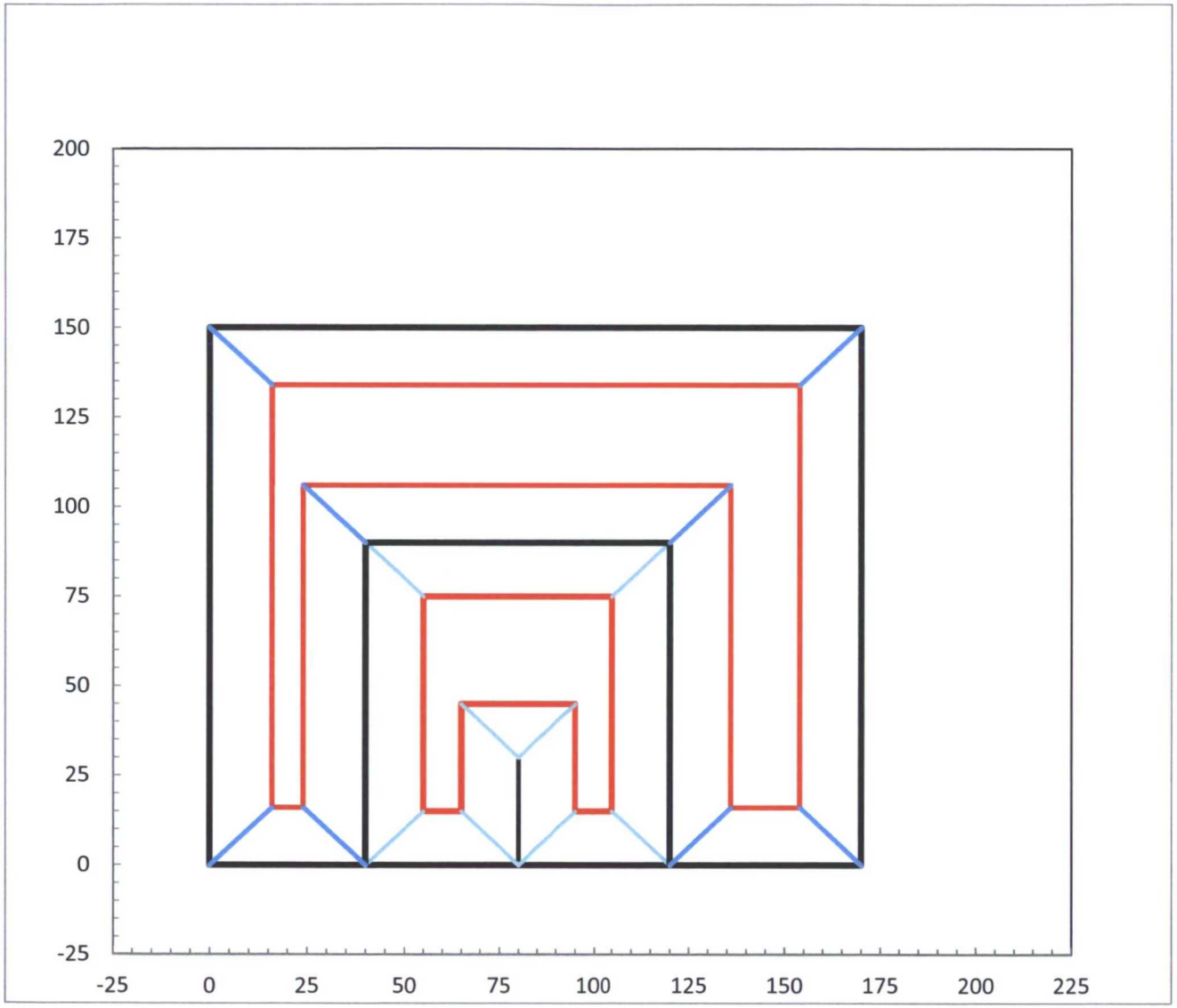
FEMA Flood Potential | Figure 9

Murchison: Jackson Unit 14H, 15H, 16H, and 17H | October 2013



Drilling Cell Dimensions	
Drilling Cell Total Width	170.0
Drilling Cell Total Length	150.0
Slopes of Pit Horizontal Distance	2.00
Slopes of Pit Vertical Distance	1.00
Horseshoe divider width at surface	0.0

Inner Horseshoe Dimensions	
Total Width (left right)	80.0
Total Length (up down)	90.0
Depth	7.5
Length of Divider	30.0
Divider Width	0.0
Width of discharge floor	10.0
Width of suction floor	10.0

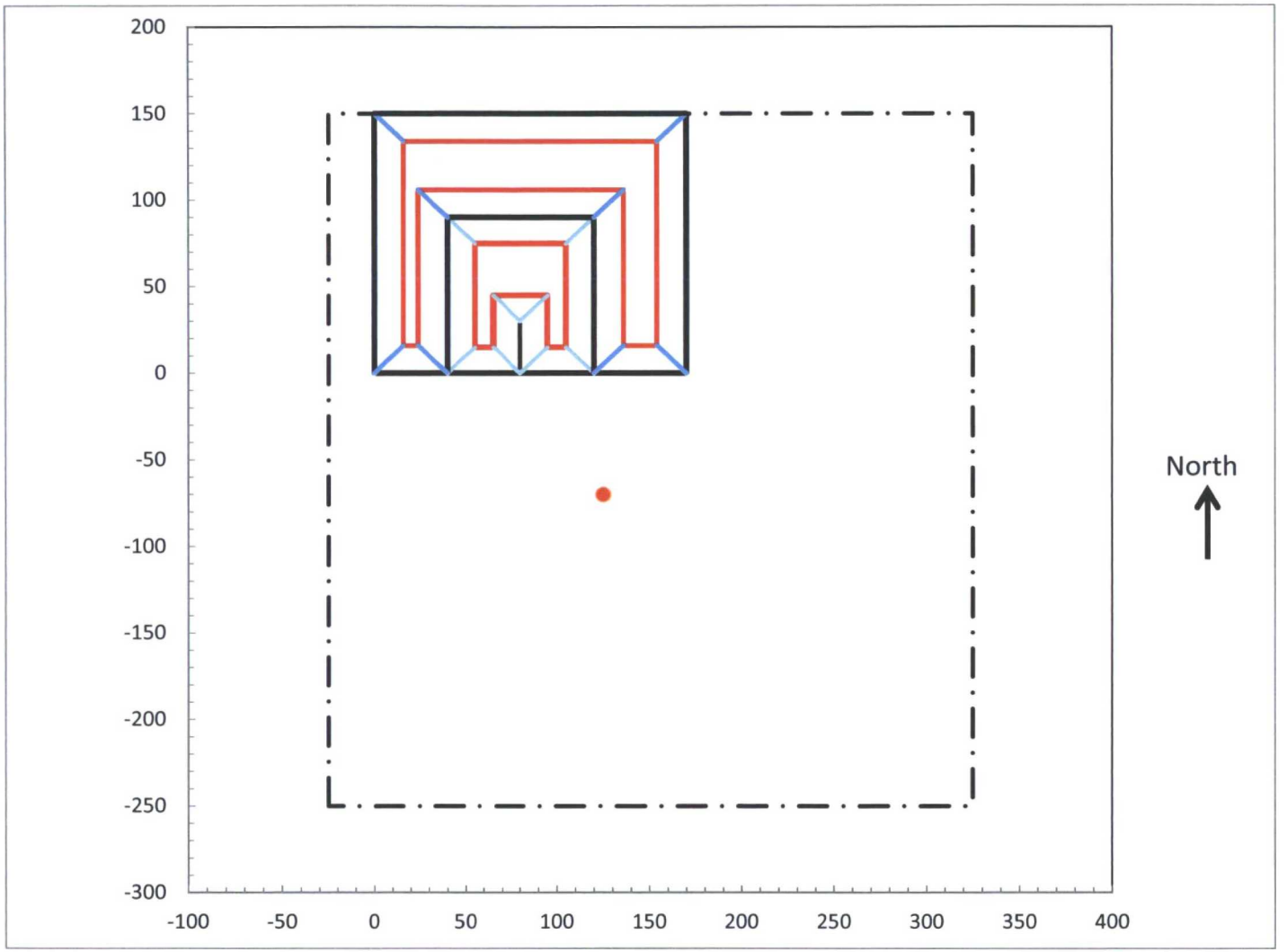
Outer Horseshoe Dimensions	
Width Discharge Side	50.0
Width Suction Side	40.0
Length Far Side (up down)	60.0
Width of discharge Floor	18.0
Width of Suction Floor	8.0
Width of Far Side Floor (right-left dimension)	126.0
Length of far side floor (Up-down dimension)	28.0
Depth of Discharge Side	6.0
Depth of Far Side	8.0
Depth of Suction Side	10.0

Fluids Cell Dimensions	
Width (left-right)	0.0
Length (up-down)	0.0
Depth	10.0

Inner Horseshoe Capacity 6011 bbl
Outer Horseshoe Capacity 17701 bbl

Frac Cell Capacity 0 bbl
Total Capacity 23712 bbl

R.T. Hicks Consultants 901 Rio Grande Blvd. NW Suite F-142 Albuquerque, N. M. 87104	**Drawing of Drilling Cell** Dimensions of floor are not to scale	**Plate 1**
	Murchison - Jackson Unit 17H Design approved 7/22/2013 API# 30-025-41227	**January 2014**



- Black Lines are on the ground surface.
- Red Lines are on the Pit Floors.
- The origin (0,0) is at the southwest corner of the outer horseshoe cell.

R.T. Hicks Consultants 901 Rio Grande Blvd. NW Suite F-142 Albuquerque, N. M. 87104	**Drawing of Drilling Pit and Well in Relation to Pad**	**Plate 2**
	Murchison-Jackson Unit 17 H Design approved 9/22/2013 API# 30-025-41227	**January 2014**

R. T. Hicks Consultants, Ltd.

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

February 28, 2013
Revised November 1, 2013

Murchison Oil and Gas, Mogi 9 State Com 1H Rat Hole Evaluation and Brinninstool 4 State 3H Observations

The Mogi 9 State Com #1H well site has an elevation of 3606 and located 1 mile due south of the Brinninstool 4 State 3H site. The Brinninstool 4 State 3H site is 30 feet higher, with an elevation of 3636.3. The Mogi 9 State Com #1H rat hole location is:

- Lower in elevation than the Brinninstool well site,
- Closer to the center of the Bell Lake depression area
- Closer to the closed topographic contour that defines the edge of the ancient collapse feature

Within the eastern portion of the Bell Lake Sink shallow (Ogallala or Alluvium) groundwater is known to be present at an elevation of 3,566 feet (see Table 1 and Figure 1 in the C-144 application). In the western portion of the Sink, groundwater is likely deeper, as the surface elevation of Bell Lake is about 3565 and the lake is dry. Based on this information it is expected that the shallow groundwater, if present at the Brinninstool 4 State 3H site would be approximately 50 to 70 feet below the surface.

On February 27, 2013 Dale Littlejohn witnessed the drilling of the rat hole at the Mogi 9 #1H site. Ready Drill LLC of Monahans, Texas performed the work using a track-mounted 30-inch auger drilling rig as shown in the adjacent photograph.

Mr. Littlejohn arrived at the site at 10:30 am and found the operations shut down (waiting on fuel for the drilling rig) with the auger in the hole at a depth of approximately 70 feet. This provided an excellent opportunity to check for any groundwater that may have accumulated in the bottom of the while the drilling rig was not operational.

At 11:25 am the rig had been re-fueled and the bottom 1 foot was cut, removed, and inspected for possible moisture. The photograph from the 70 to 71-foot depth interval (shown to the right) demonstrates that the soil cuttings were completely dry. Also, a mirror was used to reflect sunlight in to the boring in order to inspect the walls and bottom. There were no indications of water seeps in the walls or an accumulation of water at the total depth.

Over the next 2.5 hours the boring was advanced to a total depth of 120 feet by removing approximately 1 to 1.5 feet of material per trip into the hole. Mr. Littlejohn carefully inspected each auger for the appearance of moisture in the soil prior to it being spun off

and removed from the drilling pad. Had the slightest indication of moisture been identified in the soil, the operation would have been suspended to allow for the accumulation of measurable water.

The photograph to the left was taken from the soil recovered at a depth of 98 feet as it is being spun from the auger. This photograph demonstrates the lack of moisture in the cuttings. It is believed that any potential moisture from the bottom or walls of the boring would have been easily identified during the drilling process as each trip into the hole should contact wet soil if it is present at any depth.

During the drilling operations, soil samples were collected and described as shown on the adjacent log. Based on the evaluation of the cuttings it appears that the Ogallala (or alluvium) is present at least seven feet above the Bell Lake well groundwater elevation. The top of the Triassic is identified by the hard purple shale at a depth of 33 feet and extends to the total depth of the boring.

Photo	Lithologic Description
	**0 - 12 Ft**: CALICHE with some sand.
	12 - 33 Ft: SAND, Light brown to pinkish brown, fine grained, poorly sorted.
	33 - 37 Ft: SHALE, Dark purple, hard, friable.
	37 - 39 Ft: SANDSTONE, Gray, fine grain, very hard drilling,
	39 - 94 Ft: SILTY SHALE, Grayish brown, interbedded with gray siltstone, and very fine grain sand.
	94 - 112 Ft: SHALE, Gray, friable, interbedded with grayish brown silty shale.
	112 - 120 Ft: SHALE, Dark reddish brown, friable, platty.

In light of the geology observed from the rat hole samples and the absence of any detectable moisture throughout the drilling operation, it was determined that the additional costs associated with suspending the installation of the conductor pipe for 24 to 72 hours in order to allow the accumulation of potential groundwater was not justified at this site. Had any moisture been observed during drilling, or had porous rocks been present below the groundwater elevation observed in Bell Lake water wells, the installation of conductor pipe would have been suspended.

On April 2, 2013, Randall Hicks and Kristin Pope examined the cuttings from the Brinninstool 3H conductor pipe auger boring. Because the pit lining was occurring at the same time, we could not catch the auger rig while drilling, thus there are no photographs. The drillers reserved samples from the auger boring at 5-foot intervals. Our examination documented that the cuttings to 120 feet were dust/dry. There is no evidence of groundwater as defined by New Mexico Rules/Regulations from ground surface to a depth of 120 feet at the Brinninstool 4 State 3H location.

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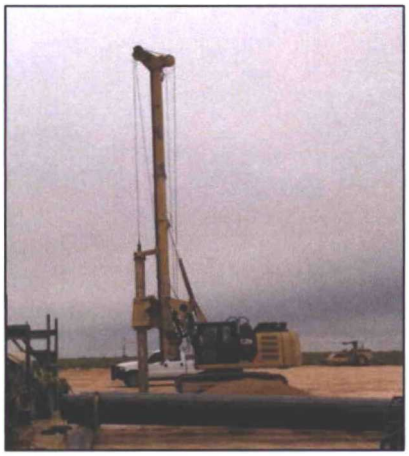
901 Rio Grande Blvd NW ▲ Suite F-142 ▲ Albuquerque, NM 87104 ▲ 505.266.5004 ▲ Fax: 505.266-0745

Memorandum

From: Kristin Pope

Date: November 17, 2013

RE: Murchison Oil and Gas, Jackson Unit 15H Conductor Hole Evaluation



The Jackson Unit 15H well site has a surface elevation of 3,612 feet and is located just outside the southern edge of the Bell Lake depression area, an ancient collapse feature. Within the eastern portion of the Bell Lake Sink shallow (Ogallala or Alluvium) groundwater is known to be present at an elevation of 3,566 feet. Based on this information it is expected that the shallow groundwater, if present at the Jackson Unit #15H site would be approximately 40 to 50 feet below the surface.

On November 12, 2013 I witnessed the drilling of the conductor hole at the Jackson Unit 15H, located in eastern Lea County. Ready Drill LLC of Monahans, Texas performed the work using a track-mounted 30-inch auger drilling rig as shown in the adjacent photograph.

As the photo to the right demonstrates, I arrived at the site at 7:50 am when the auger just began to break ground, beginning at 8 feet below ground surface (the depth of the cellar). Beginning at 10 feet, samples from the cuttings were collected every 10 feet to log the lithology. No water or drilling fluids were used to drill this conductor hole.

Over the next 6.5 hours the boring was advanced to a total depth of 120 feet by removing approximately 1.5 feet of material per trip into the hole. I inspected the cuttings from each trip for moisture to indicate a groundwater formation, but all samples were dry. If any appreciable moisture would have been indicated, the operation would have been suspended to allow the water to accumulate and then measured.

During the drilling operations, soil samples were collected and described as shown on the enclosed log. Based on the evaluation of the cuttings it appears that the Ogallala (or alluvium) is present at least six feet above the Bell Lake well groundwater elevation. The top of the Triassic is identified by the hard purple shale at a depth of 40 feet and extends to the total depth of the boring.

Based on these observations, I am certain that no groundwater is present below the Jackson Unit 15H well site to 120 feet below ground surface (3,492 feet below sea level).

Kristin Pope

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District II
811 S. First St., Artesia, NM 88210
Phone: (575) 748-1283 Fax: (575) 748-9720
District III
1000 Rio Brazos Road, Aztec, NM 87410
Phone: (505) 334-6178 Fax: (505) 334-6170
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505
Phone: (505) 476-3460 Fax: (505) 476-3462

State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-102
Revised August 1, 2011
Submit one copy to appropriate District Office

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

[1] API Number	[2] Pool Code	[3] Pool Name

[4] Property Code	[5] Property Name	[6] Well Number
	JACKSON UNIT	17H

[7] OGRID No.	[8] Operator Name	[9] Elevation
15363	MURCHISON OIL & GAS, INC.	3612.6

[10] Surface Location

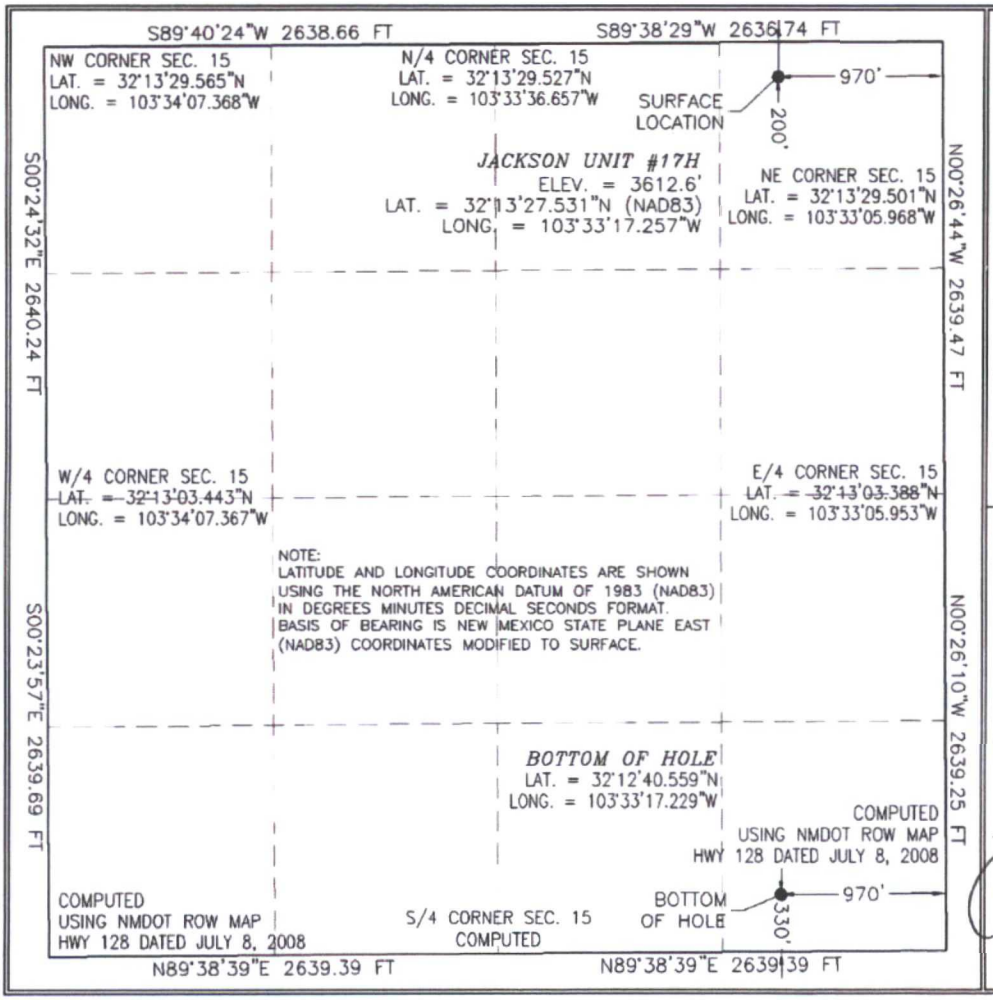
UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
A	15	24 S	33 E		200	NORTH	970	EAST	LEA

[11] Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
P	15	24 S	33 E		330	SOUTH	970	EAST	LEA

[12] Dedicated Acres	[13] Joint or Infill	[14] Consolidation Code	[15] Order No.

No allowable will be assigned to this completion until all interests have been consolidated or a non-standard unit has been approved by the division.



[17] OPERATOR CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.

Signature Date

Printed Name

E-mail Address

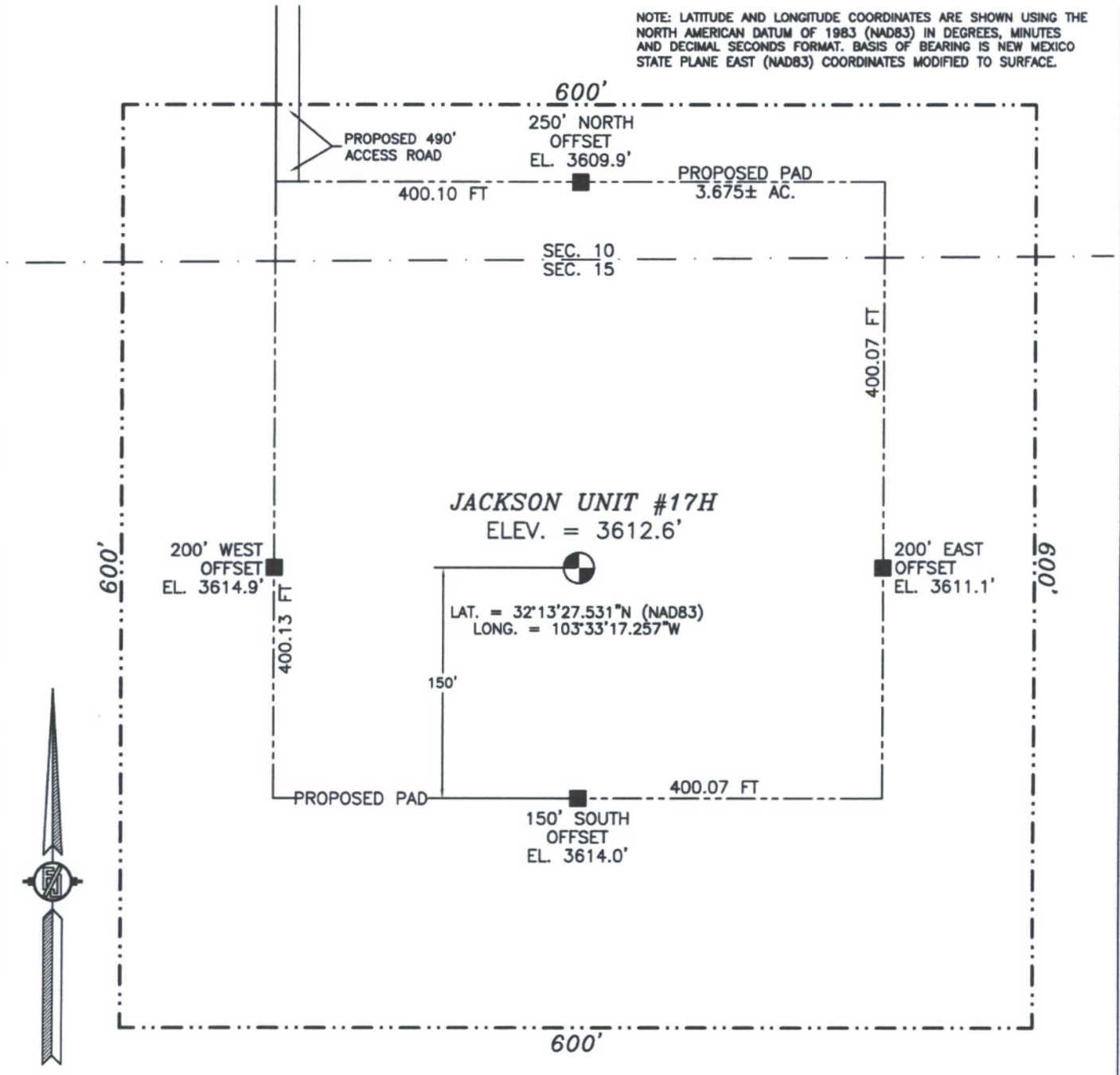
[18] SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.

MARCH 7, 2013
Date of Survey

Signature and Seal of Professional Surveyor:
Certificate Number: FILIMON F. JARAMILLO, PLS 12797
SURVEY NO. 1656

SECTION 15, TOWNSHIP 24 SOUTH, RANGE 33 EAST, N.M.P.M.
LEA COUNTY, STATE OF NEW MEXICO



010 50 100 200

SCALE 1" = 100'

DIRECTIONS TO LOCATION

FROM STATE HWY. 128 AND CR. #J2 (BRININSTOOL) GO NORTH ON CR. J2 0.8 MILES, TURN RIGHT AND GO EAST 0.55 MILES, BEND LEFT AND GO NORTH 0.25 MILES, TURN RIGHT AND GO EAST 0.24 MILES TO A PROPOSED ROAD SURVEY AND FOLLOW FLAGS SOUTH 490' TO THE NW. CORNER OF PROPOSED PAD FOR THIS LOCATION.

MURCHISON OIL & GAS, INC.
JACKSON UNIT #17H

LOCATED 200 FT. FROM THE NORTH LINE AND 970 FT. FROM THE EAST LINE OF SECTION 15, TOWNSHIP 24 SOUTH, RANGE 33 EAST, N.M.P.M.
LEA COUNTY, STATE OF NEW MEXICO

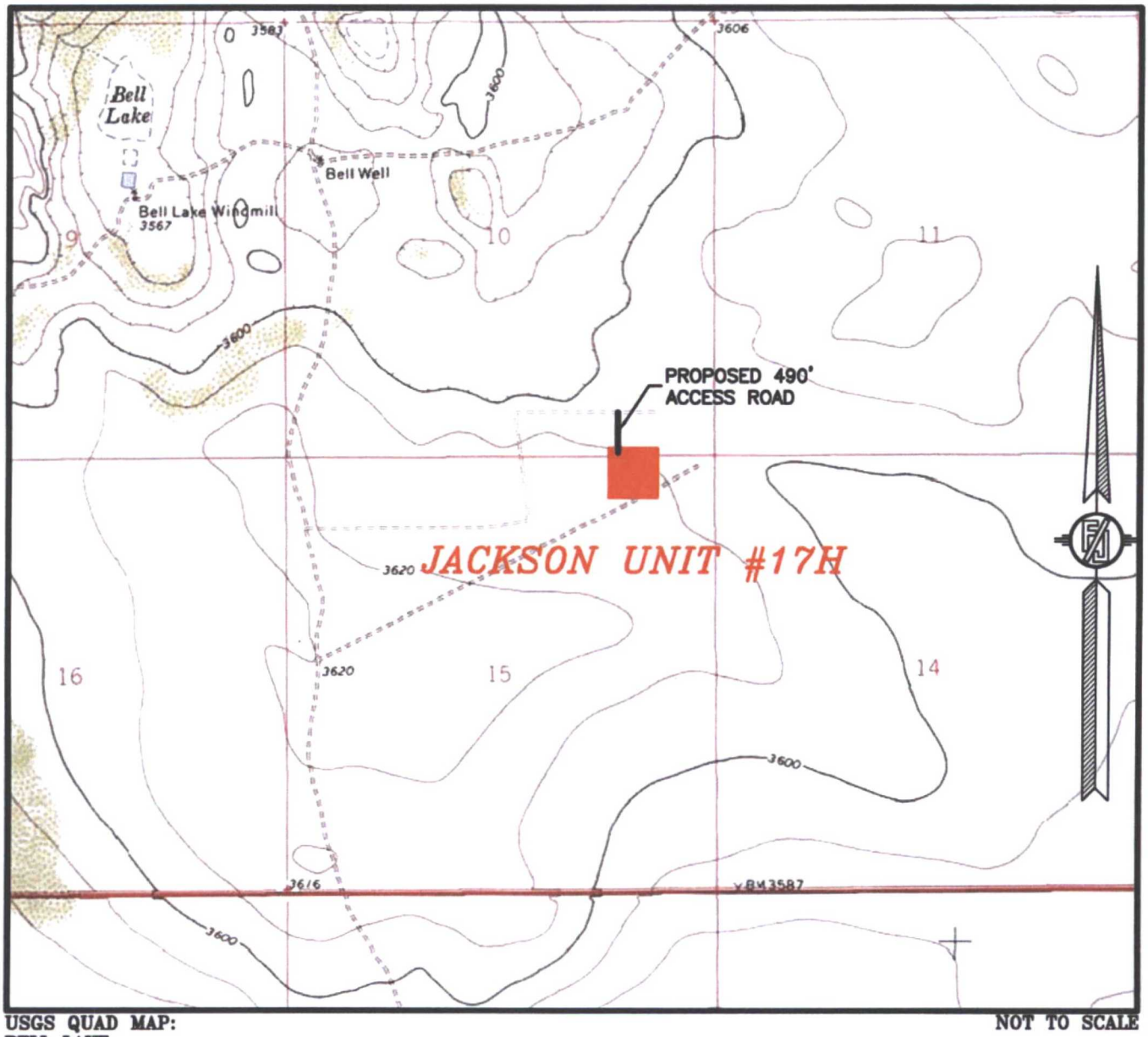
MARCH 7, 2013

SURVEY NO. 1656

MADRON SURVEYING, INC. 301 SOUTH CANAL (575) 234-3341 CARLSBAD, NEW MEXICO

SECTION 15, TOWNSHIP 24 SOUTH, RANGE 33 EAST, N.M.P.M.
LEA COUNTY, STATE OF NEW MEXICO

LOCATION VERIFICATION MAP



USGS QUAD MAP:
BELL LAKE

NOT TO SCALE

MURCHISON OIL & GAS, INC.

JACKSON UNIT #17H

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AND 970 FT. FROM THE EAST LINE OF
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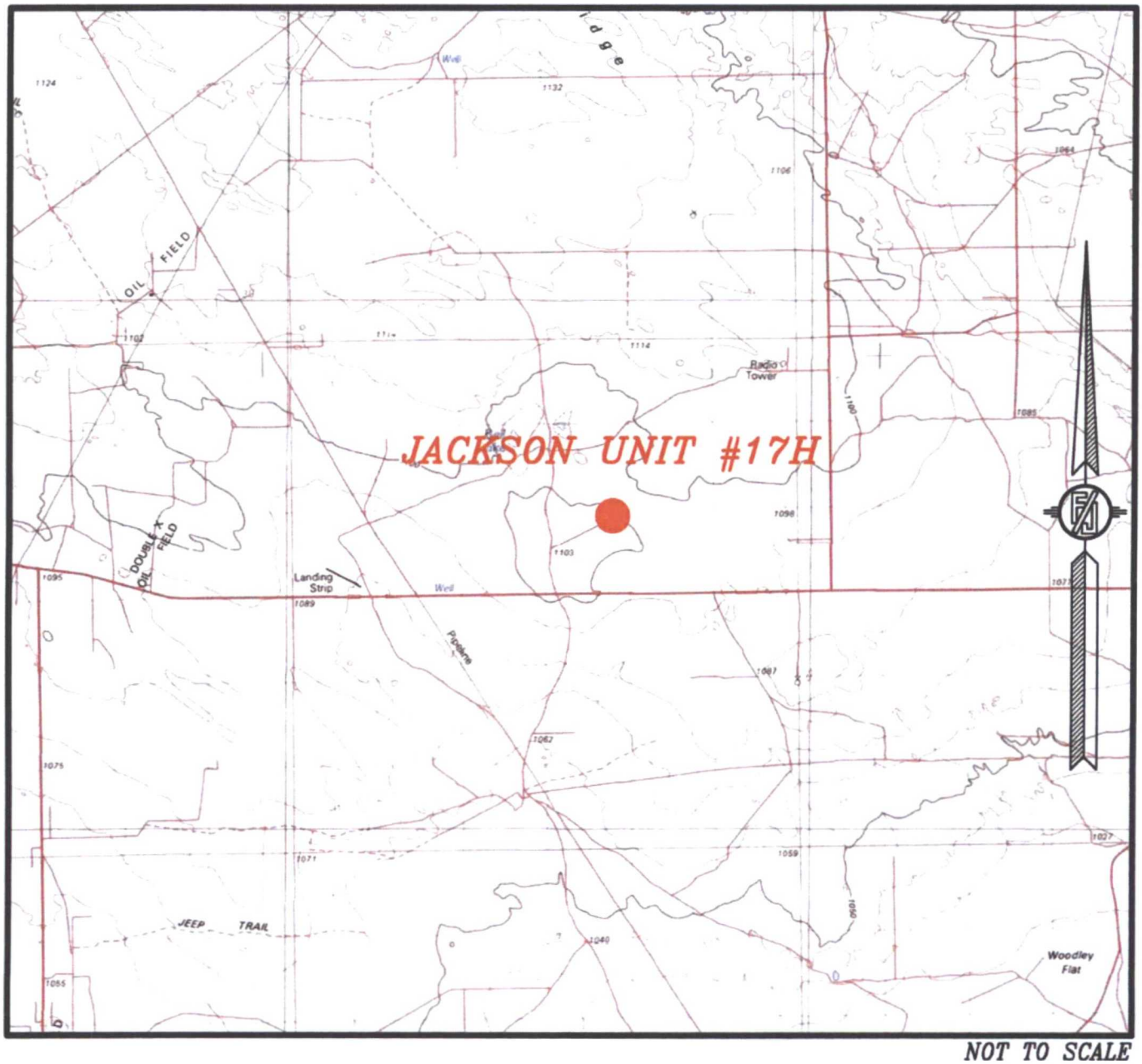
LEA COUNTY, STATE OF NEW MEXICO

VICINITY MAP



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SECTION 15, TOWNSHIP 24 SOUTH, RANGE 33 EAST, N.M.P.M.
LEA COUNTY, STATE OF NEW MEXICO

AERIAL PHOTO

NOT TO SCALE
AERIAL PHOTO:
GOOGLE EARTH
MARCH 2012

MURCHISON OIL & GAS, INC.

JACKSON UNIT #17H

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MARCH 7, 2013

SURVEY NO. 1656

MADRON SURVEYING, INC. 301 SOUTH CANAL (575) 234-3341 CARLSBAD, NEW MEXICO

Generic Plans for Temporary Pits

R.T. Hicks Consultants, Ltd.
901 Rio Grande Blvd. NW, Suite F-142
Albuquerque, NM 87104

Temporary Pit Design/Construction Plan

Plates 1 and 2 show the design of the temporary pit proposed for this project. Field conditions and the drilling rig layout will determine the final configuration of the pit cells, which will consists of the following:

1. A cell for drilling fluid circulation and cuttings storage consisting of:
    a. An outer horseshoe for fresh water and cut-brine fluid and cuttings
    b. An inner horseshoe for brine and fluid and cuttings
2. A cell for the storage of fresh water (drilling/stimulation) and stimulation flow-back water prior to re-use or disposal (OPTIONAL)

In addition to the commitments listed below, the operator may install a system that can drain water entrained in the drilling waste of the drilling pit. As described in the closure plan, this system of fabric-wrapped perforated pipe and drainage mats lie on the bottom of the drilling cell of the pit – generally the brine cell. The system will drain to the lowest corner of each cell, generally near the suction area. The exact location will be determined upon completion of the cells. Standpipes rise from the depression and can house a solar-powered pump. The drainage system for the brine cell removes water to an above-ground tank, the fluids cell of the pit, or directly to a truck for re-use or disposal. The drainage system may also be used to introduce fresher water below the residual cuttings/mud, causing the introduced fluid to move upwards through the cuttings/mud and enhance the solids rinsing process. Introduced water can be removed from the pit for re-use via a vacuum truck or recovered from the drainage system at the bottom.

The temporary storage of fluids, fluid reuse or fluid disposal will be conducted in a manner approved by division rules that prevents the contamination of fresh water and protects public health and the environment. This drainage and rinsing system allows the operator to:

- Recover clear water for possible re-use
- Reduce the concentration of constituents of concern in the drilling waste by removing some water entrained in the drilling waste.

Precipitation and the possible addition of relatively fresh water (see closure plan) will rinse the solid drilling waste, causing additional reduction in the constituents of concern as the water is recovered for re-use or disposal.

For any temporary storage of fluids derived from the drilling pit and placed in an above-ground tank, the following will apply:

1. Construction, operation and maintenance of the temporary storage tank(s) will adhere to all applicable NMOCD Rules including but not limited to:
    a. Safety stipulations
    b. Protection from hydrogen sulfide mandates
    c. Signage and identification requirements
    d. Secondary containment requirements for temporary tanks
    e. Applicable netting requirements

2. Any cleaning of the temporary tank(s) will adhere to NMOCD Rules relating to tank cleaning.
3. Transportation of water or drilling fluids derived from the drilling pit will adhere to all applicable NMOCD Rules relating to transportation.
4. Storage of water or drilling fluids in temporary above-ground tanks will also adhere to all applicable Federal mandates.

During final closure of the pit, the tanks and secondary containment system will be removed from the location and the area beneath the tank inspected for any leakage. If any leakage is suspected, the operator will sample the soil beneath the tanks and report any release pursuant to NMOCD Rules.

Finally, we intend to place any temporary tank used in conjunction with the pit drainage system on a 20-mil liner with a berm around it that would allow any inadvertently released fluids to drain or be pumped back into the pit.

Construction/Design Plan of Temporary Pit

Stockpile Topsoil

Prior to constructing the pit the qualified contractor will strip and stockpile the topsoil for use as the final cover or fill at the time of closure.

Signage

The operator will post an upright sign in a conspicuous place in compliance with 19.15.16.8 NMAC as the pit and the well are operated by the same operator. Section 19.15.16.8 states in part:

> 19.15.16.8 SIGN ON WELLS:
> B. For drilling wells, the operator shall post the sign on the derrick or not more than 20 feet from the well.
> C. The sign shall be of durable construction and the lettering shall be legible and large enough to be read under normal conditions at a distance of 50 feet.
> F. Each sign shall show the:
> (1) well number;
> (2) property name;
> (3) operator's name;
> (4) location by footage, quarter-quarter section, township and range (or unit letter can be substituted for the quarter-quarter section);
> and
> (5) API number.

The sign will also provide emergency telephone numbers.

Fencing:

During drilling or workover operations, the operator will not fence the edge of the pit adjacent to the drilling or workover rig.

As the pit is not located within 1000 feet of a permanent residence, school, hospital, institution or church, the operator will fence the pit to exclude livestock with four-wire strands evenly spaced in the interval between one foot and four feet above ground level.

Earthwork

The temporary pit will have a properly constructed foundation and interior slopes consisting of a firm, unyielding base, smooth and free of rocks, debris, sharp edges or irregularities to prevent the liner's rupture or tear.

The slopes of the pit will be no steeper than two horizontal feet to one vertical foot (2H:1V) unless in the transmittal letter the operator requested an alternative to the slope requirement with a demonstration that the pit can be operated in a safe manner to prevent contamination of fresh water and protect public health and the environment.

A berm or ditch will surround the temporary pit to prevent run-on of surface water.

If the transmittal letter identifies concerns relating to the presence of karst and associated instability, during construction of the pit the contractor will compact the earth material that forms the foundation for the pit liner. An expected proctor density of greater than 90% will be achieved by

1. adding water to the earth material as appropriate,
2. compacting the earth by walking a crawler-type tractor down the sides and bottom of the pit
3. repeating this process with a second 6-inch lift of earth material if necessary

Liner Installation

The geomembrane liner will consist of 20-mil string reinforced LLDPE or equivalent liner material identified in the transmittal letter or on Form C-144 (that the appropriate division district office approves through approval of this permit application). The geomembrane liner will be composed of an impervious, synthetic material that is resistant to petroleum hydrocarbons, salts and acidic and alkaline solutions. The liner material will be resistant to ultraviolet light. Liner compatibility will comply with EPA SW-846 method 9090A.

The operator will direct the liner installation contractor to:

1. minimize liner seams and orient them up and down, not across a slope
2. use factory welded seams where possible
3. overlap liners four to six inches and orient seams parallel to the line of maximum slope, i.e., oriented along, not across, the slope, prior to any field seaming
4. minimize the number of welded field seams in comers and irregularly shaped areas
5. utilize only qualified personnel to weld field seams
6. avoid excessive stress-strain on the liner
7. place geotextile under the liner where needed to reduce localized stress-strain or protuberances that may otherwise compromise the liner's integrity
8. anchor the edges of all liners in the bottom of a compacted earth-filled trench that is at least 18 inches deep
9. place additional material (liner, felt, etc.) to ensure that the liner is protected from any fluid force or mechanical damage at any point of discharge into or suction from the lined temporary pit.

A berm or ditch will surround the temporary pit to prevent run-on of surface water. During drilling operations, the operator may elect to remove run-on protection on the pit edge adjacent to the drilling or workover rig provided that the pit is being used to collect liquids escaping from the drilling or workover rig and this additional fluid will not cause a breach of the temporary pit.

The temporary pit will not be used to vent or flare gas and the volume of the temporary drilling pit, including freeboard, will not exceed 10 acre-feet.

Temporary Pit Operating and Maintenance Plan

The operator will maintain and operate the pit in accordance with the following plan to contain liquids and solids and maintain the integrity of the liner to prevent contamination of fresh water and protect public health and the environment.

If feasible, the operator will recycle, reuse or reclaim all drilling fluids in the temporary pit in a manner approved by division rules that prevents the contamination of fresh water and protects public health and the environment. Re-use of drilling fluids and workover fluids (stimulation flow-back) for drilling and stimulation of subsequent wells is anticipated. If re-use is not possible, fluids will be sent to disposal at a division-approved facility.

The operator will not discharge into or store any hazardous waste in the pit.

If the pit develops a leak or if any penetration of the pit liner occurs above the liquid's surface, then the operator will repair the damage or initiate replacement of the liner within 48 hours of discovery or will seek a variance from the division district office within this time period.

If the pit develops a leak or if any penetration of the pit liner occurs below the liquid's surface, then the operator will remove all liquid above the damage or leak line within 48 hours of discovery. The operator will also notify the district division office (19.15.29 NMAC) within this same 48 hours of the discovery and repair the damage or replace the pit liner.

The operator will ensure that the drilling contractor installs and uses a header, diverter or other hardware that prevents damage to the liner by erosion, fluid jets or impact from installation and removal of hoses or pipes during injection or withdrawal of liquids.

During construction, the operator or qualified contractor will install diversion ditches and berms around the pit as necessary to prevent the collection of surface water run-on. As outlined in the Construction and Design Plan, during drilling operations, the edge of the temporary pit adjacent to the drilling or workover rig may not have run-on protection if the operator is using the temporary pit to collect liquids escaping from the drilling or workover rig and run-on will not result in a breach of the temporary pit.

The operator will maintain on site an oil absorbent boom to contain and remove oil from the pit's surface.

The operator will only discharge fluids or mineral solids (including cement) generated or used during the drilling, completion, or workover processes into the pit.

The operator will maintain the temporary pit free of miscellaneous solid waste or debris. Immediately after cessation of drilling or a workover operation, the operator will remove any visible or measurable layer of oil from the surface of the pit.

The operator will maintain at least two feet of freeboard for the temporary pit, except under extenuating circumstances, which will be noted on the pit inspection log as described below.

The operator will inspect the temporary pit containing drilling fluids daily while the drilling rig or workover rig is on site. After the rigs have left the site, the operator will inspect the pit weekly as long as liquids are present in the pit. The operator will maintain a log of the inspections. The operator will make the log available to the division district office upon request.

The operator will remove all free drilling fluids from the surface of the temporary pit within 60 days from the date that the last drilling or workover rig associated with the pit permit is released. The operator will note the date of this release upon Form C-105 or C-103 upon well or workover completion. The operator may request an extension up to two months from the division district office as long as this additional time does not exceed the temporary pit life span (Subsection R of 19.15.17.7 NMAC).

Temporary Pit In-Place Closure Plan

The wastes in the temporary pit are destined for in place burial at the drilling location or, if stated in the permit transmittal letter, a nearby site on the same lease.

The operator will not begin closure operations without approval of the closure plan submitted with the permit application.

Siting Criteria Compliance Demonstration

Compliance with siting criteria is described in the site-specific information appended to the C-144.

Proof of Surface Owner Notice

The application package was transmitted to the surface landowner and OCD via email.

Construction/Design Plan of Temporary Pit

The design and construction protocols for the temporary pit are provided in the design and construction plan and in Plates 1-2. The drainage system described in the design and construction plan is not shown on the Plates but can be important element of the closure plan. The drainage system is not used for all pits.

General Protocols and Procedures

- All free liquids from the pit will be recycled or disposed in a manner consistent with OCD Rules.
- Residual drilling fluids will be removed from the pit within 60 days of release of the drilling rig.
- Water derived from the well stimulation program (flow-back or unused fresh water) that is significantly higher quality than the residual drilling fluids *may* discharge into the pit. The fresher water *may* discharge into the drainage system to flow through the solids or onto the solids in the pit.
- A low-flow pump *may* remove water from the drainage system to a tank or a fluids cell of the temporary pit; thereby further rinsing the residual solids in the pit.
- 20-60 days after placement of fresh flow-back water into the drilling cell, any water in the pit will be removed for re-use or disposal.
- The residual drilling mud and cuttings will be stabilized to a capacity sufficient to support the 4-foot thick soil cover.
- The residual pit solids will not be mixed at a ratio greater than 1 part pit solids to 3 parts dry earth material (e.g. subsoil).
- The pit will not be closed until the stabilized pit contents pass the paint filter liquids test.

Waste Material Sampling Plan

Prior to closure, a five-point (minimum) composite sample of the residual solids in the pit will be tested in a laboratory to demonstrate that the stabilized material will not exceed the contaminant concentrations listed in Table II of 19.15.17.13 NMAC mixed in a ratio of 3:1 with the earth material to be used for mixing and stabilization of the residual cuttings and mud.

In-place burial is the selected on-site disposal alternative.

If a concentration of a contaminant within the material mixed at a ratio not exceeding 3:1 is higher than the concentration given in Table II, closure will proceed in accordance with Subsection C of 19.15.17.13 NMAC.

Protocols and Procedures for Earthwork

Stabilization of the residual cuttings and mud is accomplished by mixing dry earth material within the temporary pit footprint. After stabilization the operator or qualified contractor will:

1. Place a geomembrane cover over the sloping surface of the stabilized waste material in a way to prevent infiltration of water and so that infiltrated water does not collect on the geomembrane cover after the upper soil cover has been placed.
2. Use a geomembrane cover made of 20-mil string reinforced LLDPE liner or an equivalent cover approved by the district office that is composed of an impervious, synthetic material that is resistant to petroleum hydrocarbons, salts and acidic and alkaline solutions and complies with EPA SW-846 Method 9090A will be used to separate the soil cover from the underlying stabilized cuttings.
3. Over the sloping, stabilized material and liner, the contractor will place the **Soil Cover** in a manner that will not cause the liner panels to shift and expose the stabilized cuttings.
4. The **Soil Cover** consists of:
   a. at least 3-feet of compacted, uncontaminated, non-waste containing earthen fill with chloride concentrations less than 600 mg/kg as analyzed by EPA Method 300.0.
   b. either the background thickness of topsoil or one foot of suitable material to establish vegetation at the site, whichever is greater, over the 3-foot earth material.
5. Contour the cover to
   a. blend with the surrounding topography
   b. prevent erosion of the cover and
   c. prevent ponding over the cover.

QUESTION RE: BULLET 3

Closure Notice

The operator will notify the surface owner by certified mail, return receipt requested, that the operator plans closure operations at least 72 hours, but not more than one week, prior to any closure operation. The notice will include the well name, API number, and location.

After approval for in-place burial, the operator shall notify the district office verbally and in writing at least 72 hours but not more than one week before any closure operation. Notice will include the operator's name and the location of the temporary pit. The location will include unit letter, section number, township and range. If the location is associated with a well, then the well's name, number and API number will be included.

Should onsite burial be on private land, the operator will file a deed notice including exact location of the burial with the county clerk of the county where the onsite burial is located.

Closure Report

Within 60 days of closure completion, the operator will submit a

i. closure report on form C-144, with necessary attachments

ii. a certification that all information in the report and attachments is correct, that the operator has complied with all applicable closure requirements and conditions specified in the approved closure plan
iii. a plat of the pit location on form C-l05
iv. if burial is in a nearby trench/pit, a separate C-105 showing the exact location

Unless the permit transmittal letter requests an alternative marker to comply with surface landowner specifications, the operator will place at the center of an onsite burial a steel marker that

- is not less than four inches in diameter
- is placed at the bottom of a three-foot deep hole (minimum) that is filled with cement to secure the marker
- is at least four feet above mean ground level
- permanently displays the operator name, lease name, well number, unit letter, section, township and range in welded or stamped legible letters/numbers

Timing of Closure

The operator will close the temporary pit within 6 months from the date the drilling or workover rig was released from the site. This date will be noted on form C-105 or C-103 filed with the division upon the well's or workover's completion.

Reclamation and Re-vegetation Plan

In addition to the area of the in-place burial, the operator will reclaim the surface to a safe and stable condition that blends with the surrounding undisturbed area including:

1. the pit location not used for burial
2. other areas associated with the in-place burial including access roads

Areas not reclaimed as described herein due to their use in production or drilling operations will be stabilized and maintained to minimize dust and erosion.

As stated above, the soil cover for burial in-place

A. consists of a minimum of three feet of non-waste containing, uncontaminated, earthen material with chloride concentrations less than 600 mg/kg (or background concentration) as analyzed by EPA Method 300.0 placed over the liner and stabilized solids
B. is capped by the background thickness of topsoil or 1-foot of suitable material to establish vegetation, whichever is greater
C. blends into surrounding topography
D. is graded to prevent ponding and to minimize erosion

For all areas disturbed by the closure process that will not be used for production operations or future drilling, the operator will

I. Replace topsoils and subsoils to their original relative positions
II. Grade so as to achieve erosion control, long-term stability and preservation of surface water flow patterns
III. Reseed in the first favorable growing season following closure

Re-vegetation and reclamation plans imposed by the surface owner will be outlined in communications with the OCD.

The operator will notify the division when the surface grading work element of reclamation is complete.

The operator will notify the division when the site meets the surface owner's requirements or exhibits a uniform vegetative cover that reflects a life-form ratio of plus or minus fifty percent (50%) of pre-disturbance levels and a total percent plant cover of at least seventy percent (70%) of pre-disturbance levels, excluding noxious weeds.