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April 2013

**C-144 Permit Package for
Jackson Unit 24H
Temporary Pit
Section 22 T24S R33E Lea County NM**



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

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

MAY 20 2013

R. T. HICKS CONSULTANTS, LTD.

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

April 17, 2013

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

RE: Murchison Oil and Gas, Jackson Unit 24H

Dear Geoff:

On behalf of Murchison Oil and Gas, R.T. Hicks Consultants submits the attached C-144 application for the above-referenced well. The current drilling schedule calls for a spud date in about 35 days.

Please note the following:

1. The generic plans that were recently approved by OCD have been modified slightly to reflect a change— the inner horseshoe will contain the fresh water fluids and cuttings, not brine.
2. We anticipate “in place” burial of stabilized solids.
3. 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
4. We certify that we conducted a site inspection to examine the conditions on the ground with respect to the siting criteria.

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



Randall Hicks
Principal

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

C-144 and Site Specific Information for Temporary Pit

R.T. Hicks Consultants, Ltd.

901 Rio Grande Blvd. NW, Suite F-142
Albuquerque, NM 87104

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

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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 August 1, 2011

For temporary pits, closed-loop systems, and below-grade tanks, submit to the appropriate NMOCD District Office.
For permanent pits and exceptions submit to the Santa Fe Environmental Bureau office and provide a copy to the appropriate NMOCD District Office.

**Pit, Closed-Loop System, Below-Grade Tank, or
Proposed Alternative Method Permit or Closure Plan Application**

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

Instructions: Please submit one application (Form C-144) per individual pit, closed-loop system, 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, Texas 75093-4698
Facility or well name: Jackson Unit 24H
API Number: 30-025-41093 OCD Permit Number: PI 6006
U/L or Qtr/Qtr O Section 22 Township T24S Range R33E County: Lea
Center of Proposed Design: Latitude 32°11'47.065" N Longitude 103°33'34.246" W NAD: ☐ 1927 ☒ 1983
Surface Owner: ☐ Federal ☒ State ☐ Private ☐ Tribal Trust or Indian Allotment

2.
☒ **Pit:** Subsection F or G of 19.15.17.11 NMAC
Temporary: ☒ Drilling ☐ Workover
☐ Permanent ☐ Emergency ☐ Cavitation ☐ P&A
☒ Lined ☐ Unlined Liner type: Thickness 20 mil ☒ LLDPE ☐ HDPE ☐ PVC ☐ Other _____
☒ String-Reinforced
Liner Seams: ☒ Welded ☐ Factory ☐ Other _____ Volume: 21,146 bbl Dimensions: L 152' x W 151' x D Drilling = 6-9 feet

3.
☐ **Closed-loop System:** Subsection H of 19.15.17.11 NMAC
Type of Operation: ☐ P&A ☐ Drilling a new well ☐ Workover or Drilling (Applies to activities which require prior approval of a permit or notice of intent)
☐ Drying Pad ☐ Above Ground Steel Tanks ☐ Haul-off Bins ☐ Other _____
☐ Lined ☐ Unlined Liner type: Thickness _____ mil ☐ LLDPE ☐ HDPE ☐ PVC ☐ Other _____
Liner Seams: ☐ Welded ☐ Factory ☐ Other _____

4.
☐ **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 _____

5.
☐ **Alternative Method:**
Submittal of an exception request is required. Exceptions must be submitted to the Santa Fe Environmental Bureau office for consideration of approval.

6.

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 _____

7.

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)

8.

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

9.

Administrative Approvals 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:

- ☐ Administrative approval(s): Requests must be submitted to the appropriate division district or the Santa Fe Environmental Bureau office for consideration of approval.
- ☐ Exception(s): Requests must be submitted to the Santa Fe Environmental Bureau office for consideration of approval.

10.

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. Requests regarding changes to certain siting criteria may require administrative approval from the appropriate district office or may be considered an exception which must be submitted to the Santa Fe Environmental Bureau office for consideration of approval. Applicant must attach justification for request. Please refer to 19.15.17.10 NMAC for guidance. Siting criteria does not apply to drying pads or above-grade tanks associated with a closed-loop system.

Ground water is less than 50 feet below the bottom of the temporary pit, permanent pit, or below-grade tank.

- NM Office of the State Engineer - iWATERS database search; USGS; Data obtained from nearby wells **SEE FIGURE 1**

☐ Yes ☒ No

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 **SEE FIGURE 3**

☐ Yes ☒ No

Within 300 feet from a permanent residence, school, hospital, institution, or church in existence at the time of initial application. (*Applies to temporary, emergency, or cavitation pits and below-grade tanks*)

- Visual inspection (certification) of the proposed site; Aerial photo; Satellite image. **SEE FIGURE 4**

☐ Yes ☒ No
☐ NA

Within 1000 feet from a permanent residence, school, hospital, institution, or church in existence at the time of initial application. (*Applies to permanent pits*)

- Visual inspection (certification) of the proposed site; Aerial photo; Satellite image.

☐ Yes ☐ No
☒ NA

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.

- NM Office of the State Engineer - iWATERS database search; Visual inspection (certification) of the proposed site. **SEE FIGURES 1 & 2**

☐ 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. **SEE FIGURE 5**

- Written confirmation or verification from the municipality; Written approval obtained from the municipality

☐ Yes ☒ No

Within 500 feet of a wetland.

- US Fish and Wildlife Wetland Identification map; Topographic map; Visual inspection (certification) of the proposed site
- **SEE FIGURE 6**

☐ Yes ☒ No

Within the area overlying a subsurface mine.

- Written confirmation or verification or map from the NM EMNRD-Mining and Mineral Division. **SEE FIGURE 7**

☐ Yes ☒ No

Within an unstable area.

- Engineering measures incorporated into the design; NM Bureau of Geology & Mineral Resources; USGS; NM Geological Society; Topographic map. **SEE FIGURE 8**

☐ Yes ☒ No

Within a 100-year floodplain.

- FEMA map. **SEE FIGURE 9**

☐ Yes ☒ No

11.

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: _____

12.

Closed-loop Systems 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.

- ☐ Geologic and Hydrogeologic Data (only for on-site closure) - based upon the requirements of Paragraph (3) of Subsection B of 19.15.17.9
☐ Siting Criteria Compliance Demonstrations (only for on-site closure) - 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: _____
☐ Previously Approved Operating and Maintenance Plan API Number: _____ (Applies only to closed-loop system that use above ground steel tanks or haul-off bins and propose to implement waste removal for closure)

13.

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 H₂S, 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

14.

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 ☐ Closed-loop System
☐ 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 (Exceptions must be submitted to the Santa Fe Environmental Bureau for consideration)

15.

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 F 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 I of 19.15.17.13 NMAC
☐ Site Reclamation Plan - based upon the appropriate requirements of Subsection G of 19.15.17.13 NMAC

16.

Waste Removal Closure For Closed-loop Systems That Utilize Above Ground Steel Tanks or Haul-off Bins Only: (19.15.17.13.D NMAC)

Instructions: Please indentify the facility or facilities for the disposal of liquids, drilling fluids and drill cuttings. Use attachment if more than two facilities are required.

Disposal Facility Name: _____ Disposal Facility Permit Number: _____

Disposal Facility Name: _____ Disposal Facility Permit Number: _____

Will any of the proposed closed-loop system operations and associated activities occur on or in areas that *will not* be used for future service and operations?

☐ Yes (If yes, please provide the information below) ☐ No

Required for impacted areas which will not be used for future service and operations:

☐ 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 I of 19.15.17.13 NMAC

☐ Site Reclamation Plan - based upon the appropriate requirements of Subsection G of 19.15.17.13 NMAC

17.

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 may require administrative approval from the appropriate district office or may be considered an exception which must be submitted to the Santa Fe Environmental Bureau office for consideration of approval. Justifications and/or demonstrations of equivalency are required. Please refer to 19.15.17.10 NMAC for guidance.

Ground water is less than 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 between 50 and 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

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 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 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 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.

- NM Office of the State Engineer - iWATERS database; 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 500 feet of a wetland.

- US Fish and Wildlife Wetland Identification map; Topographic map; Visual inspection (certification) of the proposed site

☐ 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

18.

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 F of 19.15.17.13 NMAC

☐ Construction/Design Plan of Burial Trench (if applicable) based upon the appropriate requirements 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 Subsection F of 19.15.17.13 NMAC

☒ Waste Material Sampling Plan - based upon the appropriate requirements of Subsection F 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 I of 19.15.17.13 NMAC

☒ Site Reclamation Plan - based upon the appropriate requirements of Subsection G of 19.15.17.13 NMAC

19.

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: [Signature] Date: April 11, 2013

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

20.

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

OCD Representative Signature: [Signature] Approval Date: 5/16/13

Title: Environmental Specialist

OCD Permit Number: P16006

21.

Closure Report (required within 60 days of closure completion): Subsection K of 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: _____

22.

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.

23.

Closure Report Regarding Waste Removal Closure For Closed-loop Systems That Utilize Above Ground Steel Tanks or Haul-off Bins Only:

Instructions: Please indentify the facility or facilities for where the liquids, drilling fluids and drill cuttings were disposed. Use attachment if more than two facilities were utilized.

Disposal Facility Name: _____ Disposal Facility Permit Number: _____

Disposal Facility Name: _____ Disposal Facility Permit Number: _____

Were the closed-loop system operations and associated activities performed on or in areas that *will not* be used for future service and operations?

☐ Yes (If yes, please demonstrate compliance to the items below) ☐ No

Required for impacted areas which will not be used for future service and operations:

- ☐ Site Reclamation (Photo Documentation)
☐ Soil Backfilling and Cover Installation
☐ Re-vegetation Application Rates and Seeding Technique

24.

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)
☐ 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

25.

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 50 feet beneath the temporary pit.

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

1. The location of the temporary pit as an orange square.
2. The location of the Mogi 9 State 1H and Brinninstool 4 State 3, where depth to water was measured in the associated 120-foot conductor casing borings.
3. Water wells from the OSE database as a blue triangle inside colored circles that indicate well depth. Please note, 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 square.
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.

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 3400 above sea level (see Plate 1 of GWR-6). Because the location lies at an elevation of 3539.3, the Ogallala Formation, if it is present, could be more than 130 feet thick (3539.3-3400).

Topographically, the site lies on a south-southwest facing slope that drains to a low area in which lies the Double X Ranch headquarters. This topographic low area may be an ancient collapse feature (breccia pipes) associated with the removal of salt due to upward groundwater flow from the Capitan Reef¹. Approximately 75 feet of topographic relief is present from the bottom of the low area to the proposed location of the well (3539-3464= 75). The deepest part of this topographic low is approximately 1.5 miles to the south of the site.

¹ http://nmgs.nmt.edu/publications/guidebooks/downloads/57/57_p0233_p0242.pdf

Siting Criteria (19.15.17.10 NMAC) Murchison Oil and Gas: Jackson Unit 24H

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, located 1 mile south of the proposed pit and the Brinninstool 4 State 3 rathole located about 1 mile north of the proposed pit.

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 eight 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), which appears on the USGS topographic map, was inspected in the field as plugged and abandoned. Because no data exist for the Bell Lake Windmill, which is plotted on the USGS topographic map, it is not listed on Table 1.

	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												
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:

Siting Criteria (19.15.17.10 NMAC)
Murchison Oil and Gas: Jackson Unit 24H

- 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 and C2281 are 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 the Table but is identified on the 7.5 minute topographic map of the area north of Jackson Unit 24H, is plugged and abandoned

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-432 obviously tap a shallow water table associated with the collapse features described above. We believe that the shallow wells located at the Double X Ranch headquarters (C 2310, C2311/Misc-14), the Pipeline Windmill (C 2312/Misc-61), Misc-13 and C 2309 also tap shallow water table aquifers associated with collapse features.

The lack of a regional water table aquifer described in GWR-6 is borne out in the data from well #12, located about 1/2 mile east-northeast 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 (3400 feet asl). All wells outside of ancient collapse features record water levels below the projected base of the Ogallala and tap water-bearing 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 3,150 feet.

With respect to shallow water table aquifers within ancient collapse features, we were able to map the horizontal limit of groundwater within the Bell Lake Sink. We found through hydrogeologic logging conducted at the Mogi 9 State 1H and Brinninstool 4 State 3 sites that the 120-foot deep borings exhibited only dry sediments. At the Brinninstool 4 State 3 surface casing, lowering a water level probe to the total depth of the casing about 3 days after completion demonstrated that the hole remained dry. Because well C 2312/Misc-61 tap the same water table aquifer as the wells at the ranch headquarters (C 2310, 2311/Misc-14), we know the horizontal extent of the shallow water table aquifer near the Double X Ranch headquarters is larger than observed at the Bell Lake Sink. The data from well Misc-12 clearly demonstrate that this water table aquifer does not extend to the location of the Jackson Unit 24H proposed pit

The hydrologic and geologic data demonstrate that groundwater within collapse features are localized. We conclude with a high degree of certainty that groundwater, as defined by OCD Rules, exists beneath the Jackson Unit 24H site only in the Triassic Dockum Group redbeds at a

depth of about 200 feet. In the highly unlikely event that the localized water table aquifer extends (uphill) from the ranch headquarters area to the Jackson Unit 24H location, we conclude the water table elevation would be less than 3420 feet asl (based upon the observed gradient from C 2312/Misc-61 to C2311/Misc-14). Thus, the depth to this water table aquifer would be about 119 feet, if the water table unit were to exist in this area.

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 200 feet of any other significant watercourse or lakebed, sinkhole, or playa lake (measured from the ordinary high-water mark).

- Two ephemeral watercourses are shown on Figure 3 about 1200 feet east and nearly 2000 feet west of the location. We examined the watercourse 1200 feet east and found that it does meet the definition of a watercourse. The drainage 2000 feet west is a watercourse near the Jackson 8 location, but due west of the Jackson Unit 24H location, our field examination could not identify the features that define a watercourse under OCD Rules²
- Neither of these watercourses
 - Are continuously flowing
 - Drain to other surface water features
 - Are a significant watercourse as defined by NMOCD Rules³.
- No watercourses, as defined by NMOCD Rules, or water bodies exist within 300-feet of the location
- The topographic low centered on the Double X Ranch headquarters may be 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 a permanent residence, school, hospital, institution, church, or other structure in existence at the time of initial application.

- The nearest structures are tank batteries and a corral.
- The Ranch headquarters are a permanent residence and lie about 1.5 miles south 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.

- Figure 1 and 2 show the locations of all area water wells, active or plugged

² "Watercourse" means a river, creek, arroyo, canyon, draw or wash or other channel having definite banks and bed with visible evidence of the occasional flow of water.

³ "Significant watercourse" means a watercourse with a defined bed and bank either named on a USGS 7.5 minute quadrangle map or a first order tributary of such watercourse.

Siting Criteria (19.15.17.10 NMAC)
Murchison Oil and Gas: Jackson Unit 24H

- the nearest active water wells are located approximately 1.5 miles southwest and about 1.5 miles northwest. There are no known domestic water wells located within 1000 feet of the location.
- No springs were identified within the mapping area.

Distance to Municipal Boundaries and Fresh Water Fields

Figure 5 demonstrates that the location is not within incorporated municipal boundaries or defined municipal fresh water well fields covered under a municipal ordinance adopted pursuant to NMSA 1978, Section 3-27-3, as amended.

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

Distance to Wetlands

Figure 6 demonstrates the location is not within 500 feet of wetlands.

- The nearest designated wetlands is a stock pond located about 1.5 miles due east.

Distance to Subsurface Mines

Figure 7 and our general reconnaissance of the area demonstrate that the nearest mines are caliche pits.

- The nearest caliche pit is located approximately 5 miles west.

Distance to High or Critical Karst Areas

Figure 8 shows the location of the temporary pits with respect 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 the area of the Double X Ranch headquarters

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, 2 and 3 for the design of the temporary pit and the Design and Construction Plan at the end of this application.

Legend

Location

OSE Water Wells

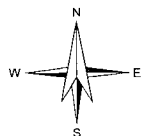
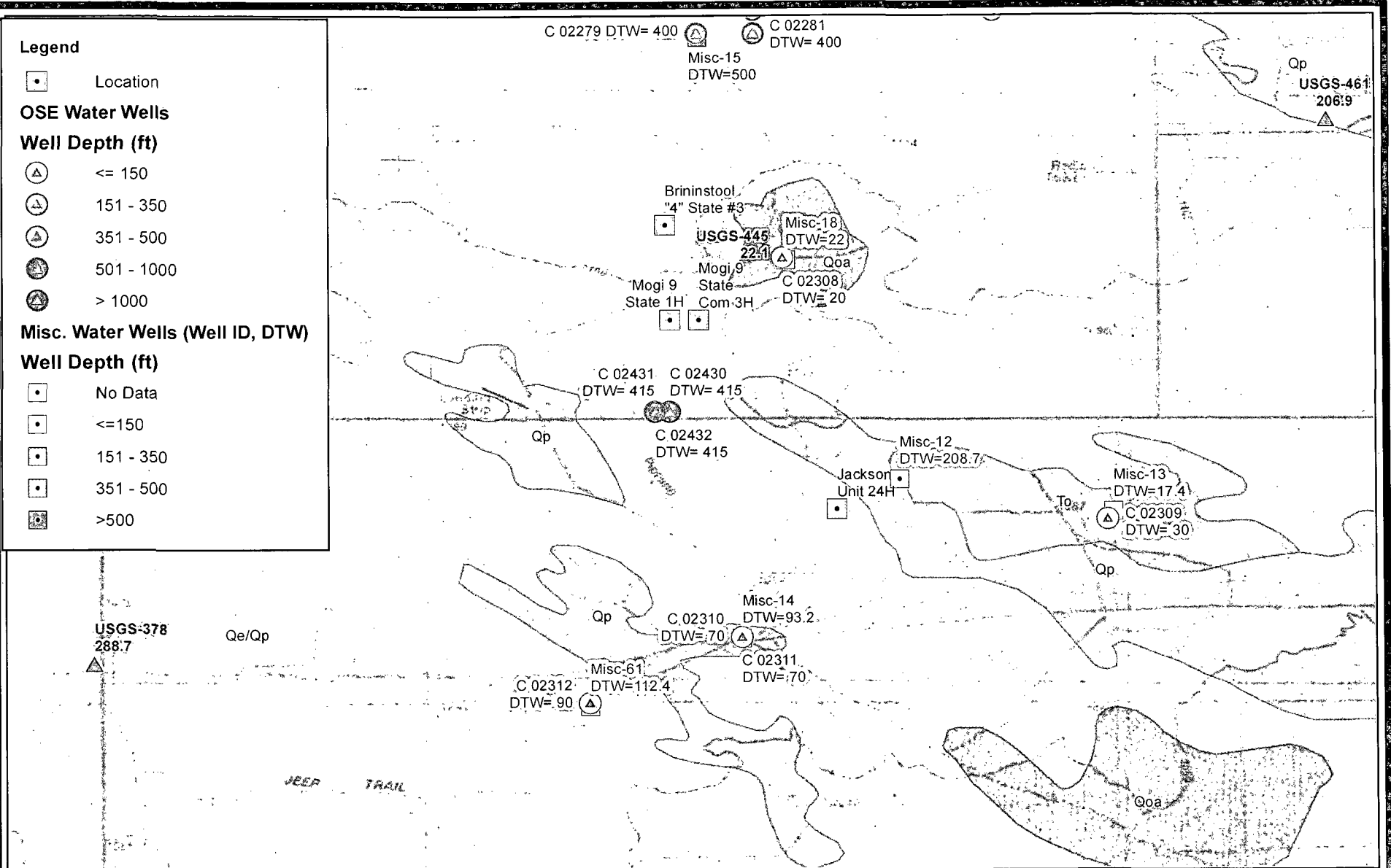
Well Depth (ft)

- △ ≤ 150
- △ 151 - 350
- △ 351 - 500
- 501 - 1000
- > 1000

Misc. Water Wells (Well ID, DTW)

Well Depth (ft)

- No Data
- ≤ 150
- 151 - 350
- 351 - 500
- > 500



0 1
Miles

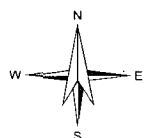
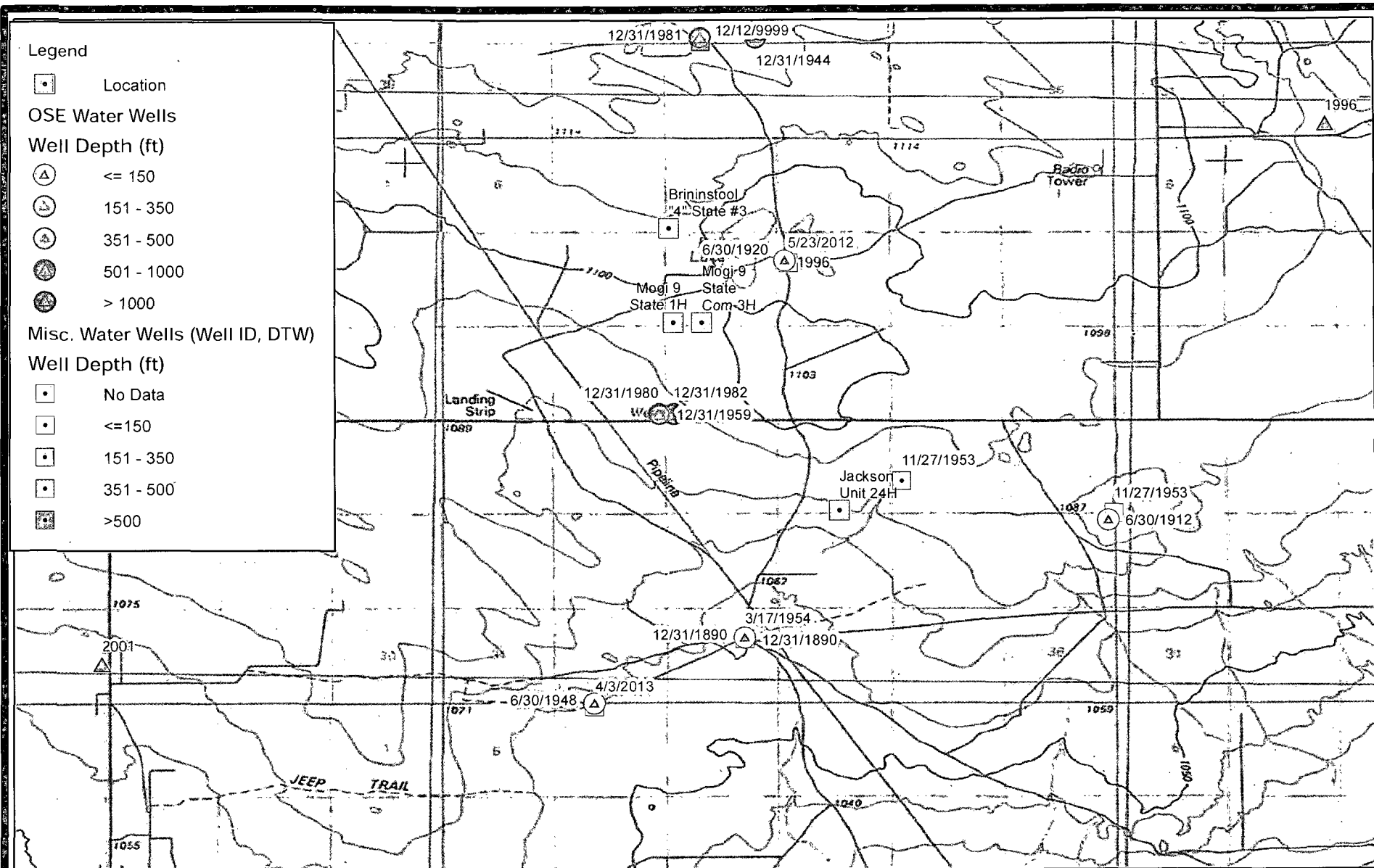
R.T. Hicks Consultants, Ltd
901 Rio Grande Blvd NW Suite F-142
Albuquerque, NM 87104
Ph: 505.266.5004

Geology and Depth to Groundwater

Murchison - Jackson Unit 24H & Mogi 9 State Com 3H

Figure 1

April 2013



0 1
Miles

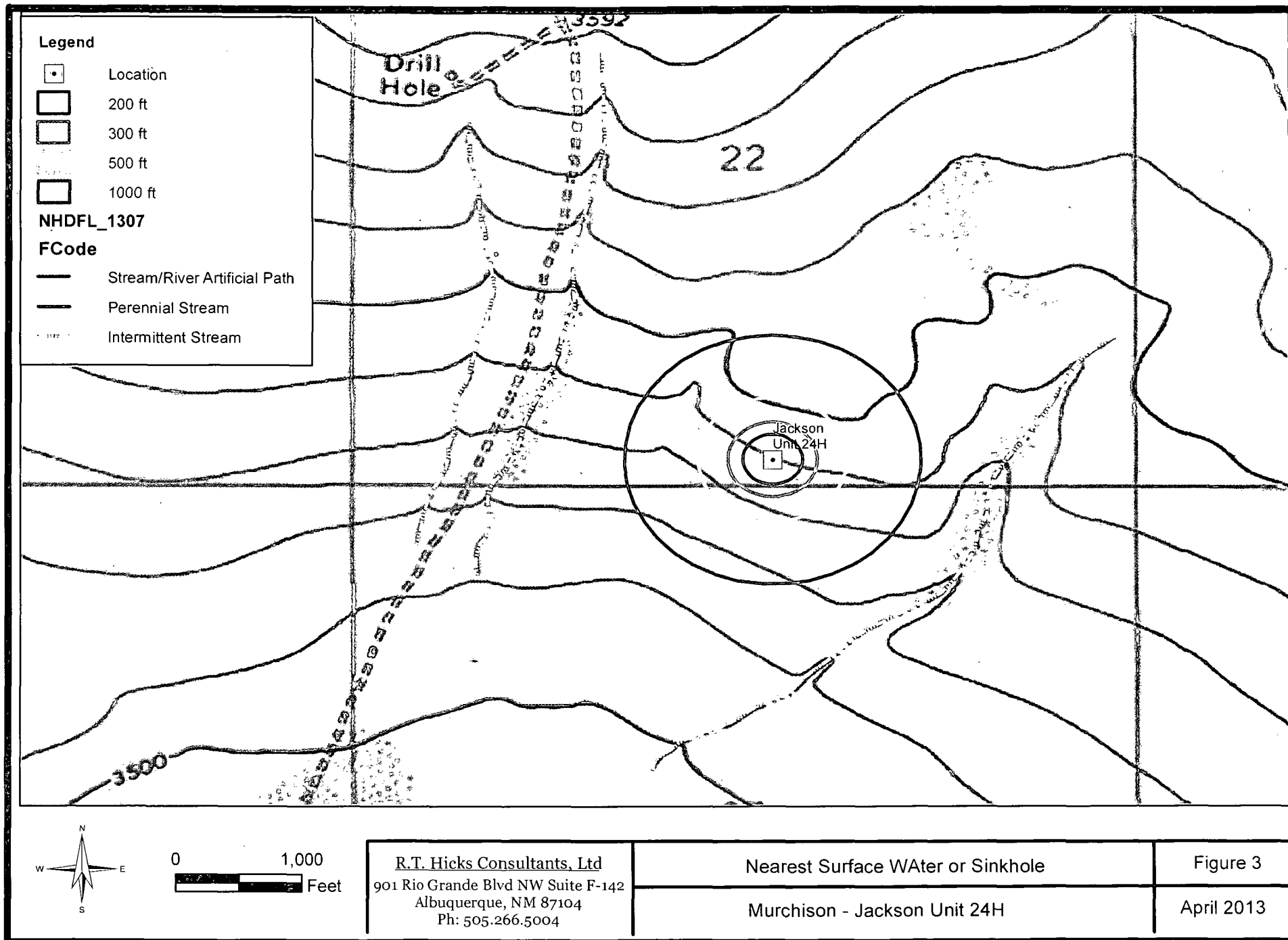
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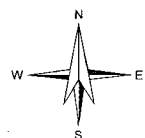
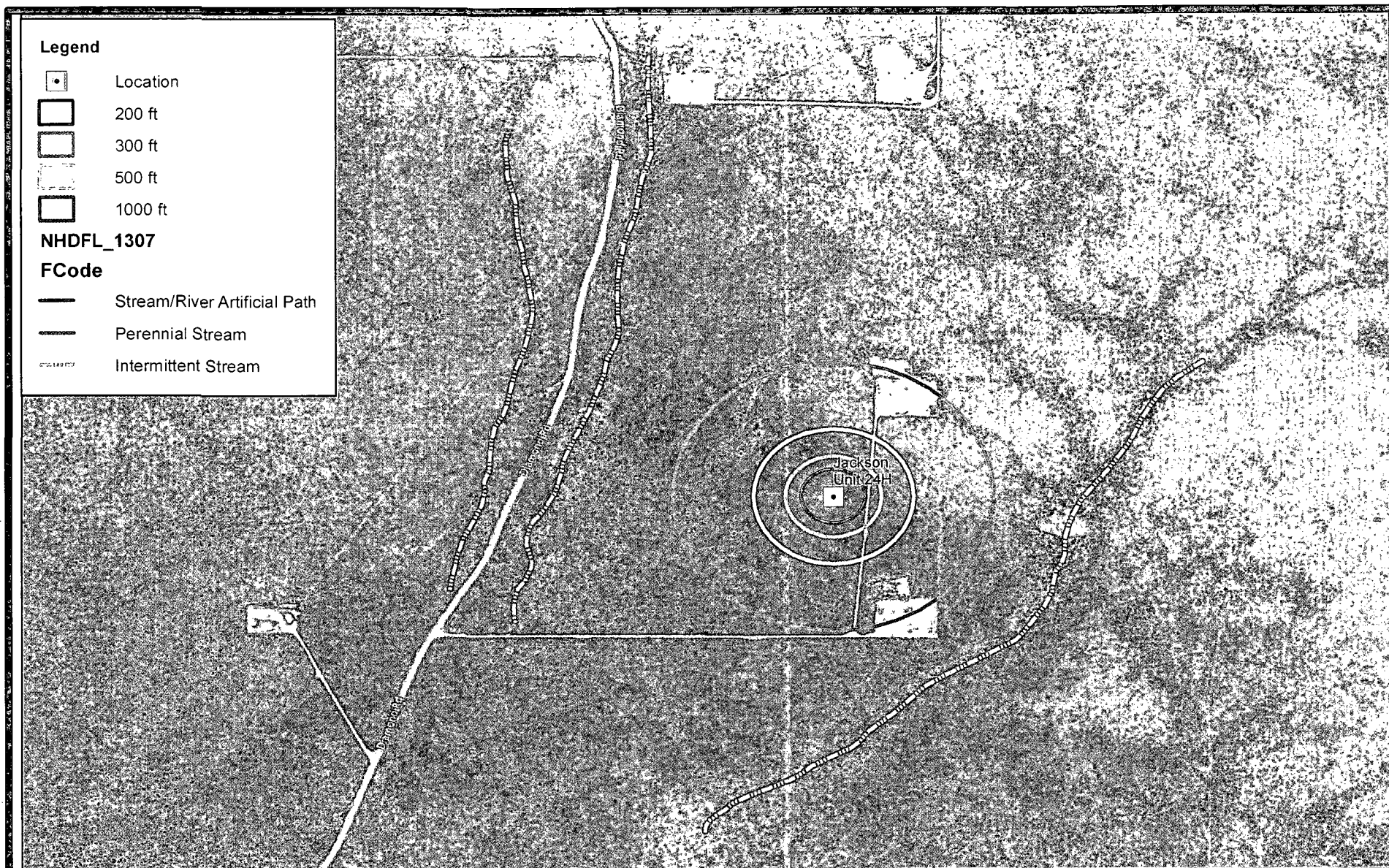
Date of Water Level Measurements

Murchison - Jackson Unit 24H & Mogi 9 State Com 3H

Figure 2

April 2013





0 1,000
Feet

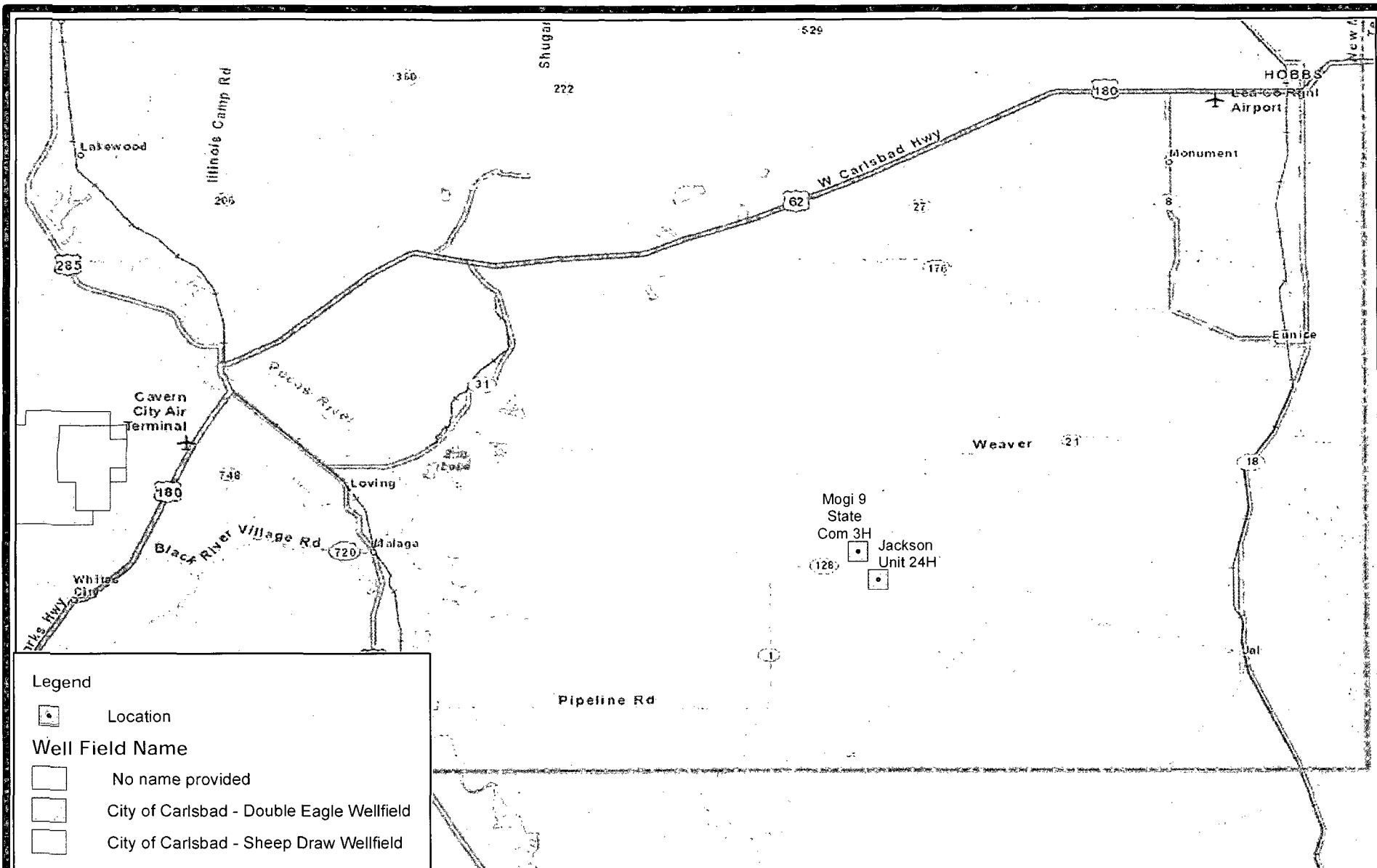
R.T. Hicks Consultants, Ltd
901 Rio Grande Blvd NW Suite F-142
Albuquerque, NM 87104
Ph: 505.266.5004

Nearest Structures

Murchison - Jackson Unit 24H

Figure 4

April 2013



Legend



Location

Well Field Name



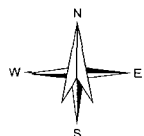
No name provided



City of Carlsbad - Double Eagle Wellfield



City of Carlsbad - Sheep Draw Wellfield



0 10
Miles

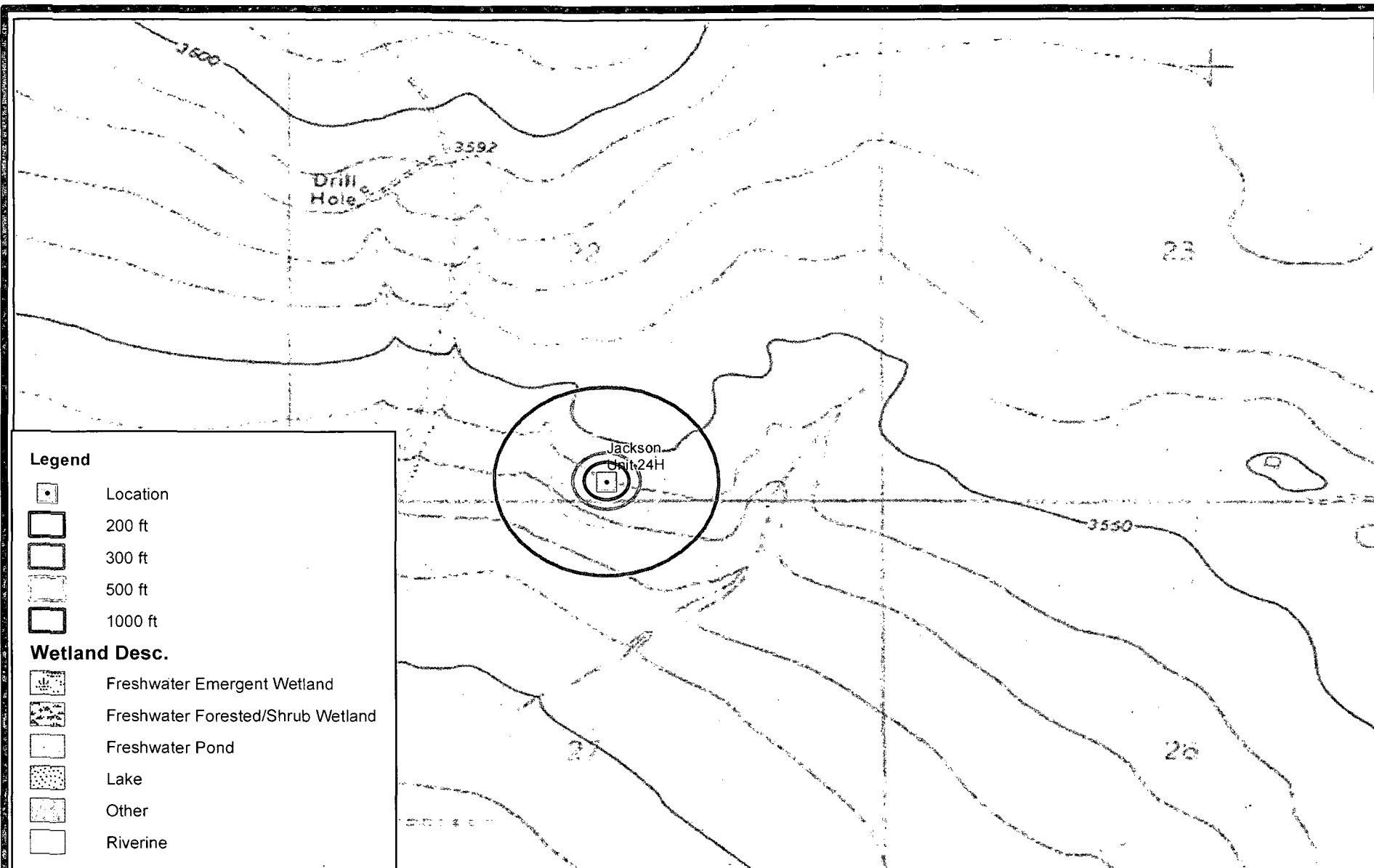
R.T. Hicks Consultants, Ltd
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Albuquerque, NM 87104
Ph: 505.266.5004

Nearest Municipalities and Wellfields

Murchison - Jackson Unit 24H & Mogi 9 State Com 3H

Figure 5

April 2013

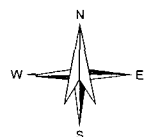


Legend

- Location
- 200 ft
- 300 ft
- 500 ft
- 1000 ft

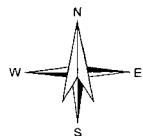
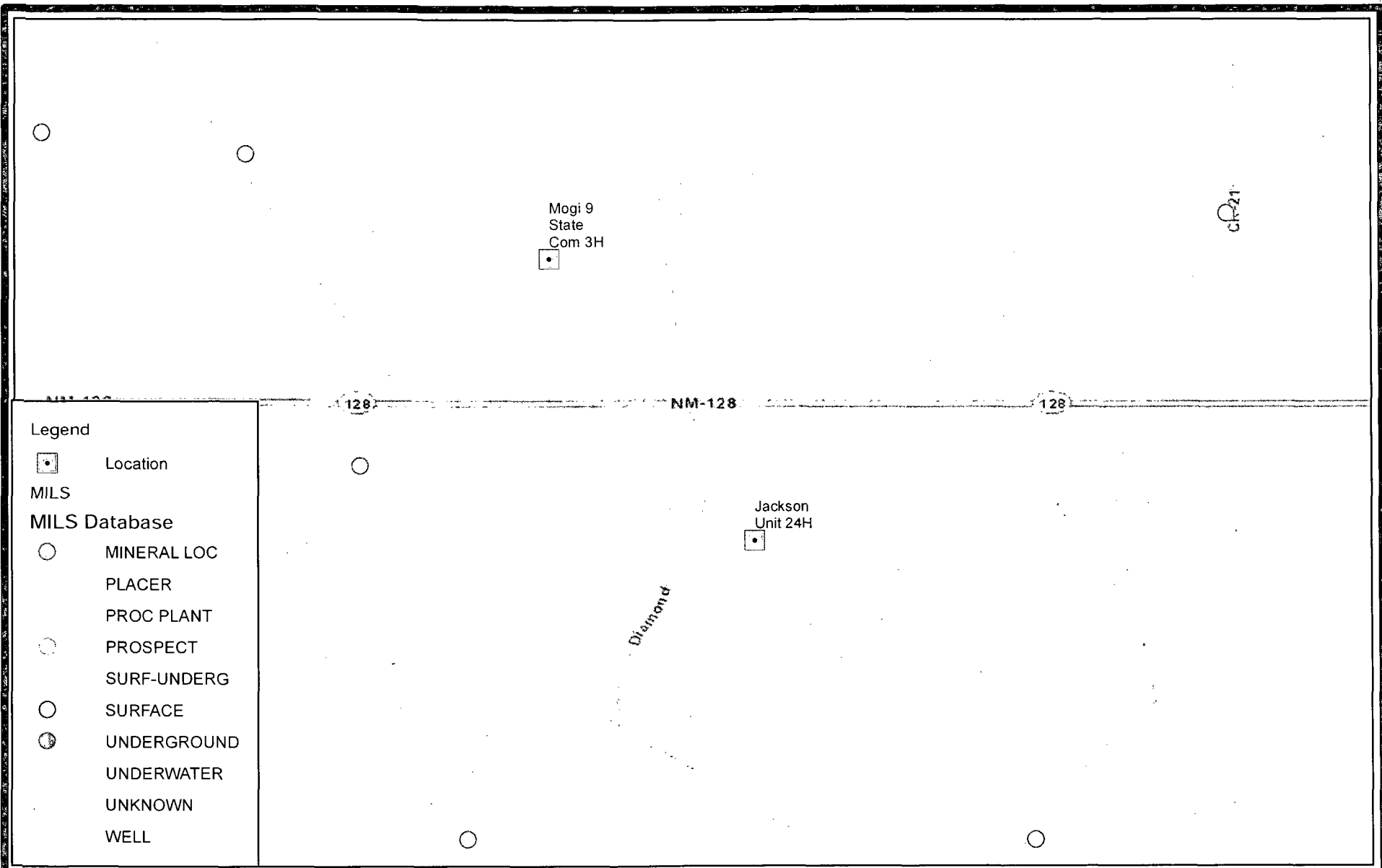
Wetland Desc.

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine



0 1,000
 Feet

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Nearest Wetlands	Figure 6
	Murchison - Jackson Unit 24H	April 2013



0 1
Miles

R.T. Hicks Consultants, Ltd
901 Rio Grande Blvd NW Suite F-142
Albuquerque, NM 87104
Ph: 505.266.5004

Nearest Mines
Murchison - Jackson Unit 24H & Mogi 9 State Com 3H

Figure 7
April 2013

128

San Mateo

Mogi 9
State
Com 3H

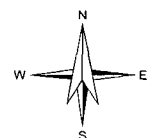
Jackson
Unit 24H

Legend

- Location
- <all other values>

Potential

- CRIT
- HIGH
- MEDIUM
- LOW



0 5 Miles

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Albuquerque, NM 87104
Ph: 505.266.5004

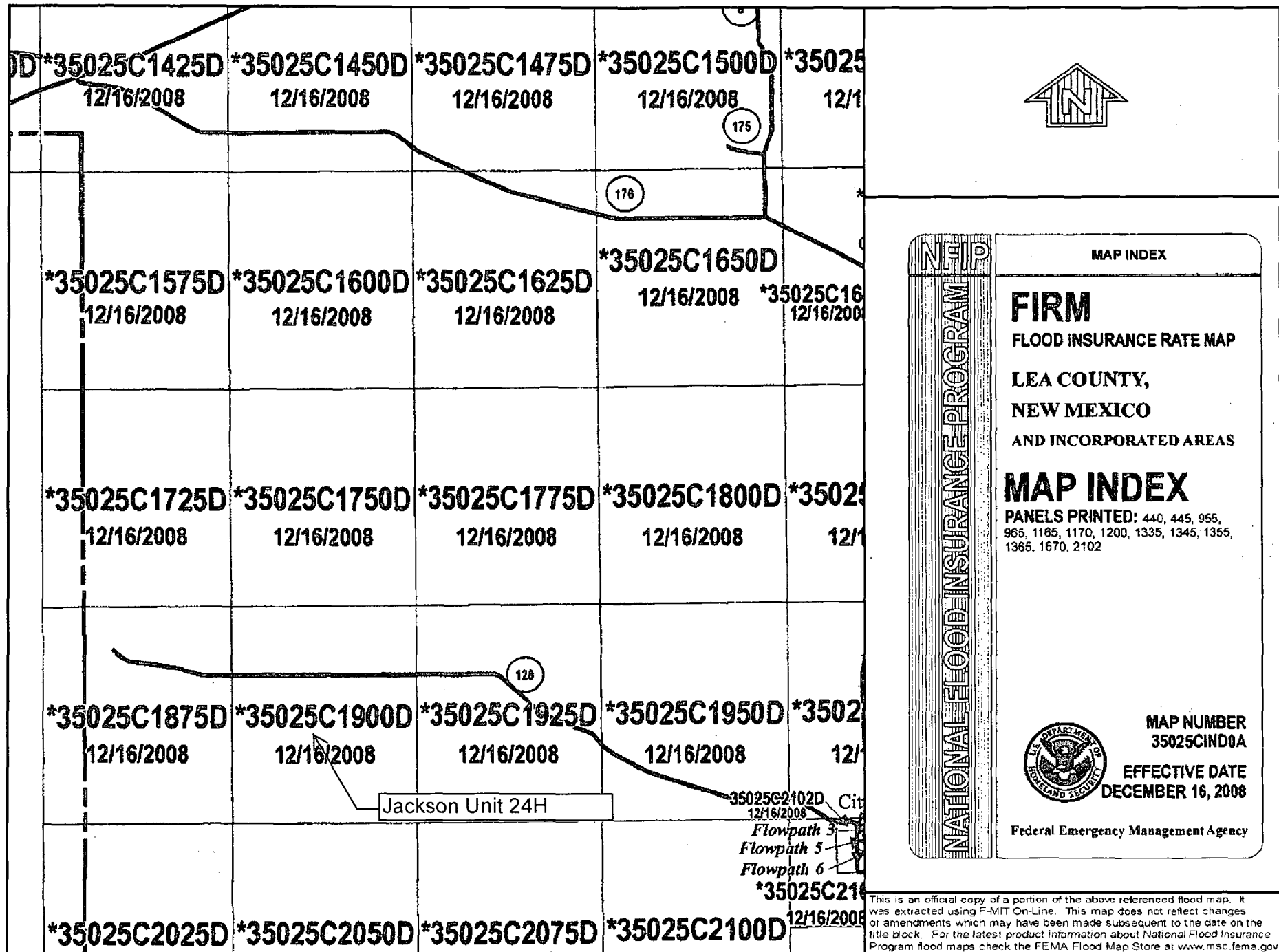
BLM Cave/Karst Potential

Murchison - Jackson Unit 24H & Mogi 9 State Com 3H

Figure 8

April 2013

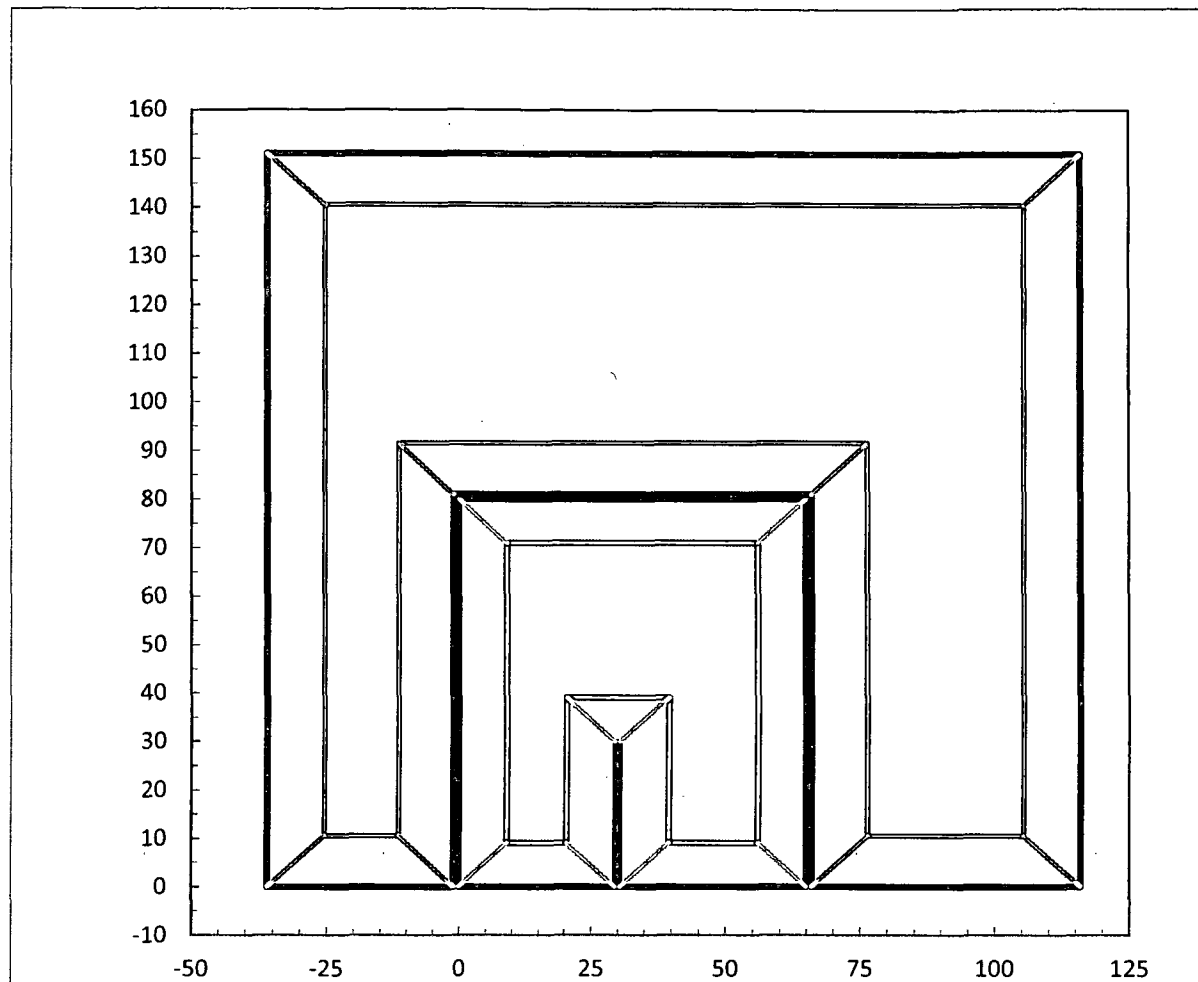
Figure 9 - FEMA Flood Insurance Map



Site Specific Information Plates

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Albuquerque, NM 87104



Inner Horseshoe Capacity 3957 bbl
Outer Horseshoe Capacity 17189 bbl

Fluid Cell Capacity 0 bbl
Total Capacity 21146 bbl

Drilling Cell total width 152.00
Drilling Cell total length 151.00

Slopes of Pit Horizontal Distance (1.7 TO 2.0) 1.50
Slopes of Pit Vertical Distance 1.00
Inner Outer horseshoe divider width at surface 1.00

DRCL 5/16/13

Inner Horseshoe
total width (left right) 65.00
total length (up down) 80.00
width discharge side 35.00
depth 6.00
Length of Divider 30.00
Divider Width 1.00
Width of discharge floor 16.50
Width of suction floor 11.50

Outer Horseshoe
width discharge side 50.00
width suction side 35.00
length far side (up down) 70.00
Average depth 7.00
Depth at discharge 5.00
Depth at suction 9.00
Width of discharge floor 29.00
Width of suction floor 14.00
Length of far side floor (right to left) 131.00
Width of far side floor (Up-down dimension) 49.00

N



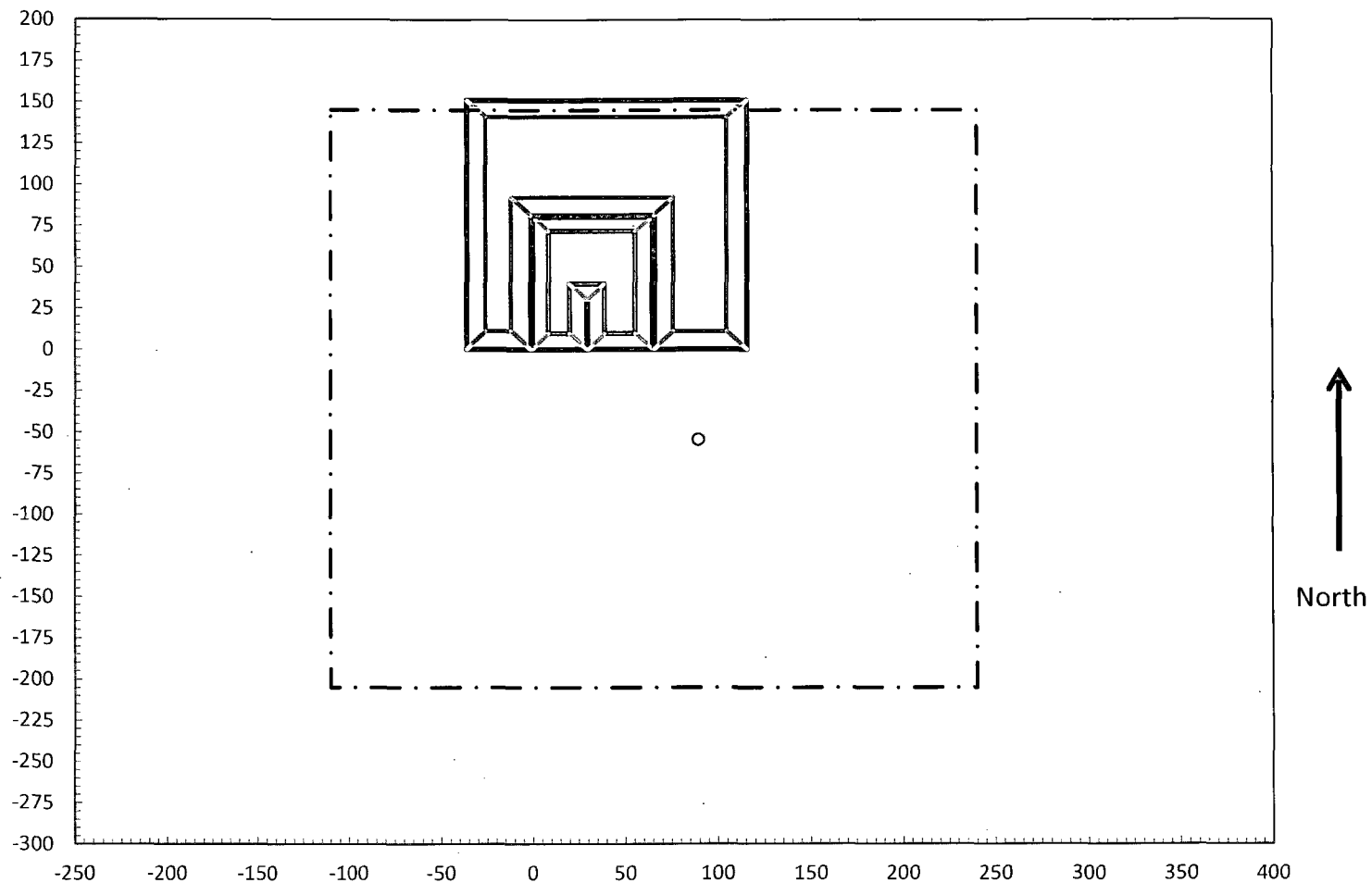
R.T. Hicks Consultants
901 Rio Grande Blvd. NW
Suite F-142
Albuquerque, N. M. 87104

Drawing of Drilling Cell

Plate 1

Murchison Oil and Gas - Jackson Unit 24H

Apr-13



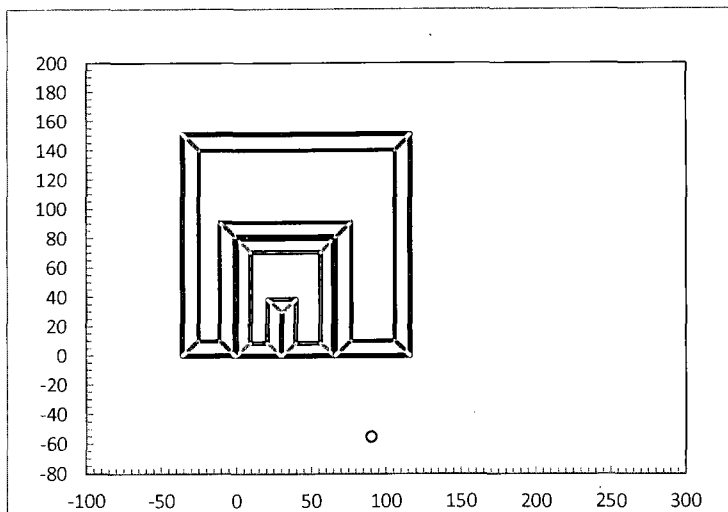
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 Albuquerque, N. M. 87104

Drawing of Drilling Pit and Well in Relation to Pad Boundaries

Murchison Oil and Gas - Jackson Unit 24H

Plate 2

April 2013



Width refers to Right to Left dimensions. Length refers to Up-down dimensions.

Overall Dimensions	Total Width of Horseshoe Cells (Right to left Dimension)	152.0	[feet]
	Total Length of Horseshoe Cells (Up-down Dimension)	151.0	
	Total Width of Horseshoes plus Fluids Cell (Right to left Dimension)	162.0	
	Total Length of Horseshoe and Fluids Cells (Up-down Dimension)	151.0	
	Rise over Run for all slopes	1.5	[-]
Inner Horseshoe Dimensions	Width of Inner Horseshoe (Rigth to left dimension)	65.0	[feet]
	Length of Inner Horseshoe (Up-down dimension)	80.0	
	Depth of Inner Horseshoe	6.0	
	Inner Horseshoe Floor (Up-down dimension) on divider axis	32.0	[feet]
	Inner Horseshoe Floor width on Discharge side	16.5	
	Inner Horseshoe Floor width on Suction Side	11.5	
	Width of Inner Horseshoe Divider on ground surface	1.0	[feet]
	Length of Inner Horseshoe Divider on the ground surface	30.0	
	Distance from lower left corner of Inner Horseshoe to Divider Axis	30.0	
Divider Dimensions	Width of Divider between Inner and Outer Horseshoes	1.0	[feet]
Outer Horseshoe Dimensions	Length of Outer Horseshoe, Discharge and Suction Sides	151.0	[feet]
	Width of Outer Horseshoe Discharge Side	50.0	
	Depth of Outer Horseshoe on Discharge Side	6.0	
	Width of Outer Horseshoe Suction Side	35.0	[feet]
	Depth of Outer Horseshoe Suction Side	9.0	
	Up-down dimension of Outer Horseshoe Far Side	70.0	
	Width of Outer Horseshoe Far Side	152.0	[feet]
	Depth of Outer Horseshoe Far Side	7.0	
	Width of Outer Horseshoe Discharge side on Floor	14.0	
	Width of Outer Horseshoe Suction side on Floor	49.0	
	Outer Horseshoe Far side Pit Floor (Up-down dimension)	49.0	
Fluid Cell Dimensions	Fluid Cell Width (Right to Left Dimension)	0.0	[feet]
	Fluid Cell Length (Up-down Dimension)	0.0	
	Fluid Cell Depth	10.0	

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Albuquerque, N. M. 87104

Drilling Pit Dimensions

Murchison Oil and Gas - Jackson Unit 24H

Plate 3

April 2013

Survey Information

R.T. Hicks Consultants, Ltd.

901 Rio Grande Blvd. NW, Suite F-142
Albuquerque, NM 87104

District I
1625 N. French Dr., Hobbs, NM 88249
Phone: (575) 393-6161 Fax: (575) 393-0720
District II
811 S. First St., Artesia, NM 88210
Phone: (505) 748-1283 Fax: (505) 748-9720
District III
1009 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 JACKSON UNIT	
⁶ OGRID No. 15363	⁷ Operator Name MURCHISON OIL & GAS, INC.	
		⁸ Well Number 24H
		⁹ Elevation 3539.3

¹⁰ Surface Location

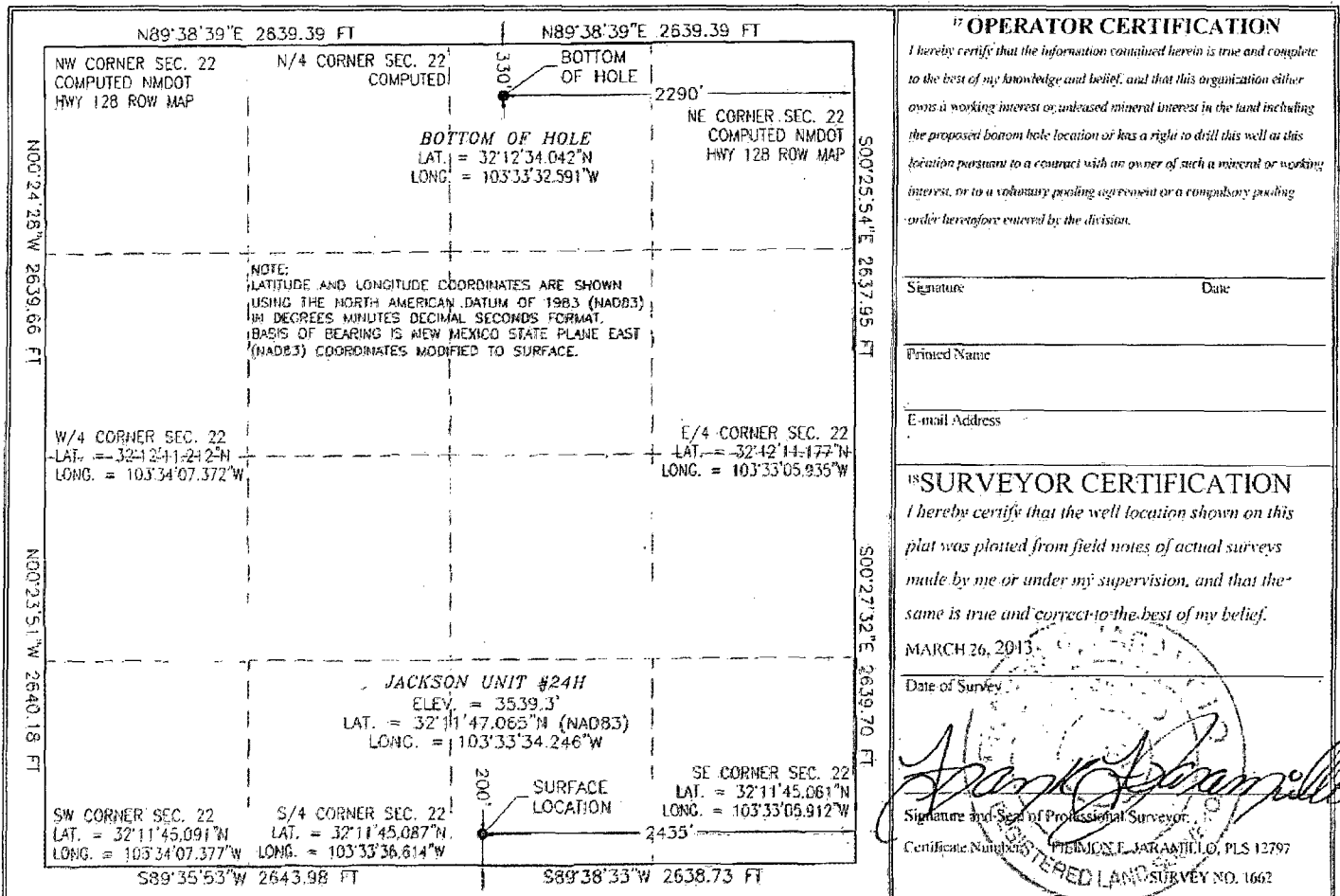
UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
O	22	24 S	33 E		200	SOUTH	2435	EAST	LEA

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
B	22	24 S	33 E		330	NORTH	2290	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.



NOTE: LATITUDE AND LONGITUDE COORDINATES ARE SHOWN USING THE NORTH AMERICAN DATUM OF 1983 (NAD83) IN DEGREES, MINUTES AND DECIMAL SECONDS FORMAT. BASIS OF BEARING IS NEW MEXICO STATE PLANE EAST (NAD83) COORDINATES MODIFIED TO SURFACE.



FROM STATE HWY. 128 AND CR. J2 (DIAMOND) GO SOUTH ON J2
1.35 MILES, TURN LEFT ON CALIFORNIA AND GO EAST 0.5 MILES.
TURN LEFT AND GO NORTH 0.2 MILES AND LOCATION IS ON THE LEFT.
(WEST) 210'.

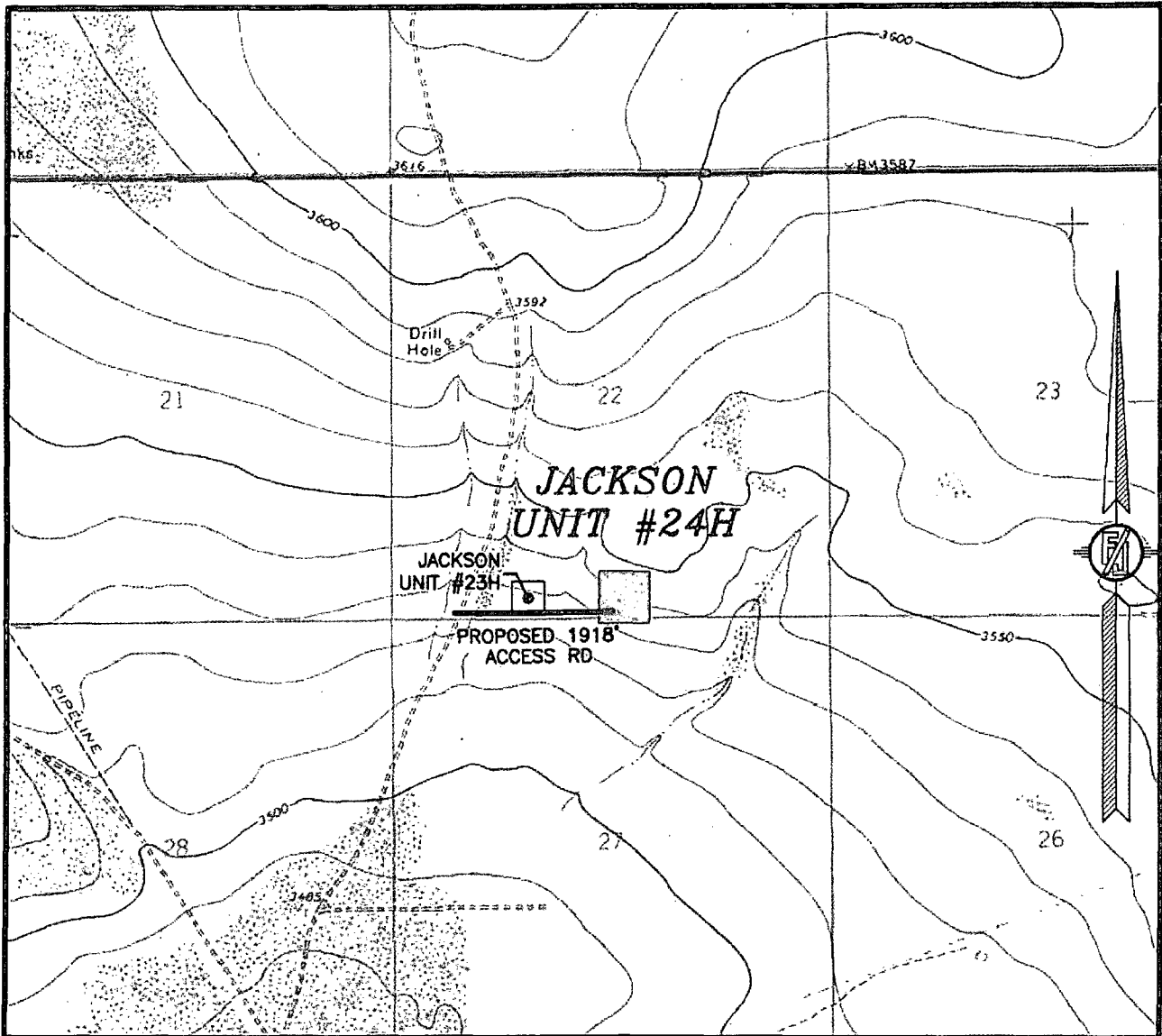
LOCATED 200 FT. FROM THE SOUTH LINE
AND 2435 FT. FROM THE EAST LINE OF
SECTION 22, TOWNSHIP 24 SOUTH,
RANGE 33 EAST, N.M.P.M.
LEA COUNTY, STATE OF NEW MEXICO

SURVEY NO. 1662

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

CARLSBAD, NEW MEXICO

SECTION 22, 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

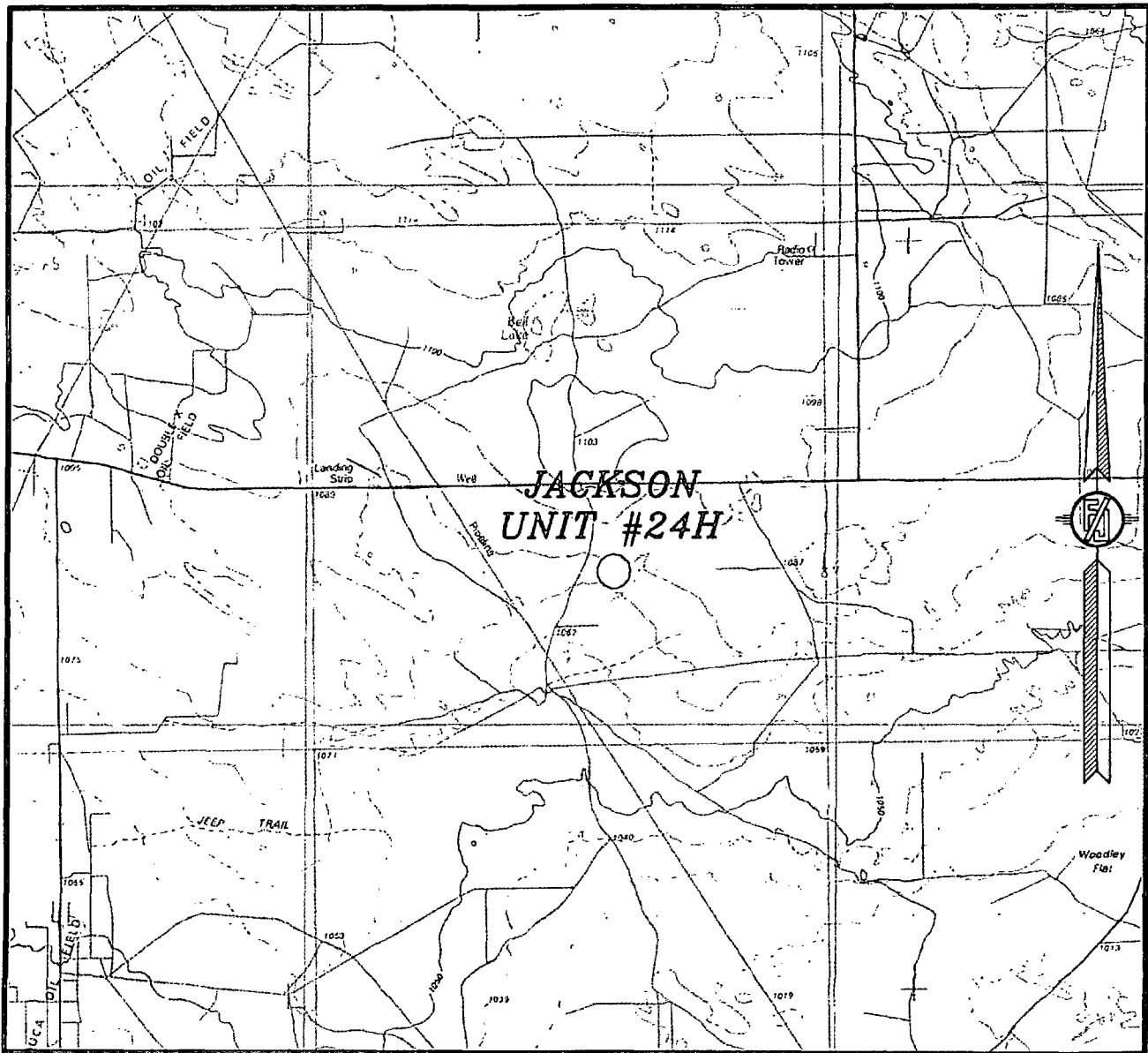
MURCHISON OIL & GAS, INC.
JACKSON UNIT #24H
LOCATED 200 FT. FROM THE SOUTH LINE
AND 2435 FT. FROM THE EAST LINE OF
SECTION 22, TOWNSHIP 24 SOUTH,
RANGE 33 EAST, N.M.P.M.
LEA COUNTY, STATE OF NEW MEXICO

MARCH 26, 2013

SURVEY NO. 1662

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

SECTION 22, TOWNSHIP 24 SOUTH, RANGE 33 EAST, N.M.P.M.
LEA COUNTY, STATE OF NEW MEXICO
VICINITY MAP



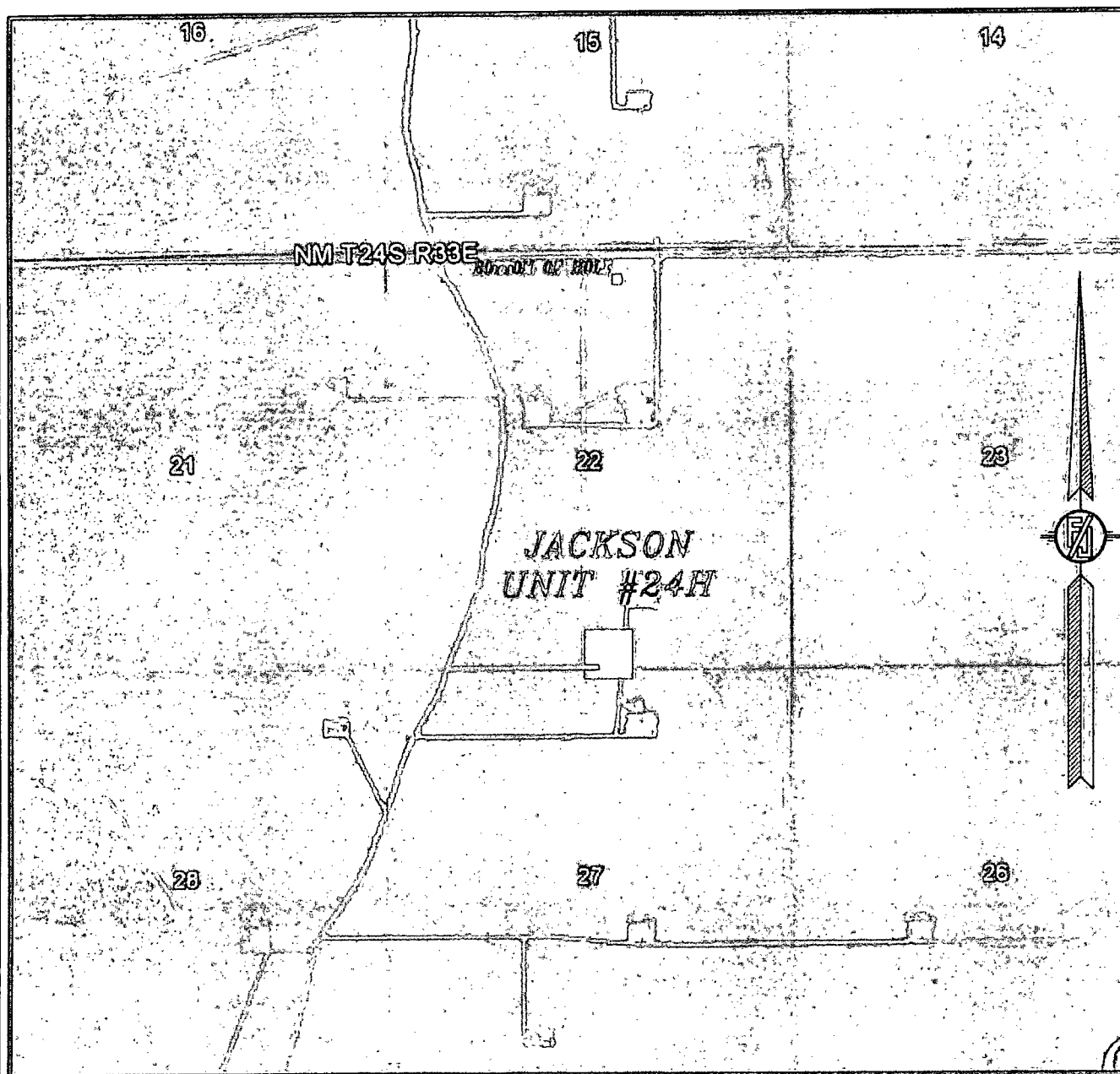
NOT TO SCALE

MURCHISON OIL & GAS, INC.
JACKSON UNIT #24H
LOCATED 200 FT. FROM THE SOUTH LINE
AND 2435 FT. FROM THE EAST LINE OF
SECTION 22, TOWNSHIP 24 SOUTH,
RANGE 33 EAST, N.M.P.M.
LEA COUNTY, STATE OF NEW MEXICO

MARCH 26, 2013

MADRON SURVEYING, INC. 301 SOUTH CANAL (575) 234-3341 CARLSBAD, NEW MEXICO SURVEY NO. 1662

SECTION 22, 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 #24H
LOCATED 200 FT. FROM THE SOUTH LINE
AND 2435 FT. FROM THE EAST LINE OF
SECTION 22, TOWNSHIP 24 SOUTH,
RANGE 33 EAST, N.M.P.M.
LEA COUNTY, STATE OF NEW MEXICO

MARCH 26, 2013

SURVEY NO. 1662

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 Plan

Plates 1 2, and 3 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 inner horseshoe for fresh water fluid and cuttings
 - b. An outer horseshoe for brine and cut brine 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 will 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 filtered perforated pipe and drainage mats cover much of the bottom of the drilling cell of the pit – the cut brine cell and the inner 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-cut 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 in the cut brine-brine cell may also be used to introduce 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 to the cut brine-brine cell 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

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- 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

1. The operator or qualified contractor will design and construct the pit to contain liquids and solids and prevent contamination of fresh water and protect public health and the environment.
2. Prior to constructing the pit the operator or qualified contractor will strip and stockpile the topsoil for use as the final cover or fill at the time of closure.
3. The operator will post an upright sign in compliance with 19.15.16.8 NMAC. The operator will post the sign in a manner and location such that a person can easily read the legend. The sign will provide the following information: the operator's name; the location of the site by quarter-quarter or unit letter, section, township and range; and emergency telephone numbers.
4. The operator will fence the pit in a manner that prevents unauthorized access and will maintain the fences in good repair. The operator will fence the pit to exclude livestock with a four-foot fence that has at least four strands of barbed wire evenly spaced in the interval between one foot and four feet above ground level. The pit will be completely fenced at all times excluding drilling and workover operations. During drilling or workover operations, the operator is not required to fence the edge of the pit adjacent to the drilling or workover rig.
5. The operator will design and construct the temporary pit to prevent unauthorized releases and ensure the confinement of liquids.
6. 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.
7. The slopes of the pit will be no steeper than two horizontal feet to one vertical foot (2H:1V). Unless an alternate slope, protective to fresh water, public health and the environment, is proposed and approved by the appropriate division district office.
8. If necessary to address any concerns relating to the presence of karst and associated instability, during construction of the pit the contractor will compact the earth material

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that forms the foundation for the pit liner. An expected proctor density of greater than 90% will be achieved by

- a. Adding water to the earth material as appropriate,
 - b. Compacting the earth by walking a crawler-type tractor down the sides and bottom of the pit
 - c. Repeating this process with a second 6-inch lift of earth material if necessary
9. The operator will design and construct the temporary pit with a geomembrane liner. The geomembrane liner will consist of 20-mil string reinforced LLDPE or equivalent liner material that the appropriate division district office approves. 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.
10. The operator will minimize liner seams and orient them up and down, not across a slope. The operator will use factory-welded seams. Prior to any field seaming, the operator will overlap liners four to six inches and orient seams parallel to the line of maximum slope, *i.e.*, oriented along, not across, the slope. The operator will minimize the number of welded field seams in corners and irregularly shaped areas. Qualified personnel will weld field seams.
11. Construction will avoid excessive stress-strain on the liner.
12. Geotextile will be placed under the liner where needed to reduce localized stress-strain or protuberances that may otherwise compromise the liner's integrity.
13. The operator and/or qualified contractor retained by the operator will anchor the edges of all liners in the bottom of a compacted earth-filled trench. The anchor trench will be at least 18 inches deep.
14. The operator and/or qualified contractor retained by the operator will 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.
15. The operator and/or qualified contractor retained by the operator will design and construct the temporary pit to prevent run-on of surface water. As necessary, a berm or ditch will surround the temporary pit to prevent run-on of surface water.
16. The volume of the temporary pit (fluids cell plus drilling cell), including freeboard, does not exceed 10 acre-feet (77,583 bbls).

Temporary Pit Operating and Maintenance Plan

The operator will operate and maintain the pit to contain liquids and solids and maintain the integrity of the liner, liner system, or any secondary containment system to prevent contamination of fresh water and protect public health and the environment as described below:

1. If feasible, the operator will recycle, reuse or reclaim of all drilling fluids and recovered water in a manner approved by division rules that prevents the contamination of fresh water and protects public health and the environment. Specifically, drilling fluids and reclaimed water will be transferred to other drilling operations for use (see closure plan).
2. If re-use is not possible, fluids will be sent to disposal at division-approved facility.
3. Reuse or disposal of fluids from the pit will be conducted in a manner approved by division rules that prevents the contamination of fresh water and protects public health and the environment.
4. The operator will not discharge into or store any hazardous waste in the pit.
5. If any pit liner's integrity is compromised, or if any penetration of the liner occurs above the liquid's surface, then the operator will notify the appropriate division district office within 48 hours (phone or email) of the discovery and repair the damage or replace the liner.
6. 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, notify the appropriate district office within 48 hours (phone or email) of the discovery and repair the damage or replace the pit liner.
7. The injection or withdrawal of liquids from the pit will be accomplished through 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.
8. The operator will install diversion ditches and berms around the pit as necessary to prevent the collection of surface water run-on.
9. The operator will immediately remove any visible layer of oil from the surface of the temporary pit and maintain on site an oil absorbent boom to contain and remove oil from the pit's surface.
10. Only fluids used or generated during the drilling or workover process will be discharged into the temporary pit. The discharge of workover fluids to the drilling pit as a rinse to the drilling waste solids is discussed in the closure plan (below).
11. The operator will maintain the temporary pit free of miscellaneous solid waste or debris.
12. Although hydrocarbon-based drilling mud is not anticipated for use, the operator will use a tank made of steel to contain hydrocarbon-based drilling fluids if need be.
13. Immediately after cessation of drilling, the operator will remove any visible or measurable layer of oil from the surface of a drilling pit, in the manner described above.
14. The operator will maintain at least two feet of freeboard for the temporary pit.
15. The operator will inspect the temporary pit containing drilling fluids at least daily while the drilling rig is on-site to ensure compliance with this plan.
16. After drilling operations, the operator will inspect the temporary drilling pit weekly so long as liquids remain in the temporary pit.

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17. The operator will maintain a log of such inspections and make the log available for the appropriate district office's review upon request.
18. The operator will file a copy of the log with the appropriate division district office when the operator closes the temporary pit.
19. The operator will remove all free liquids from the temporary pit within 30 days from the date that the operator releases the drilling rig – unless granted an extension of time by the District Office. The operator will note the date of the drilling rig's release on form C-105 or C-103 upon well completion.

Temporary Pit Closure Plan

Protocols and Procedures

The operator will use the following procedures and protocols to implement the closure:

- The operator will notify the surface owner by certified mail, return receipt requested, prior to closure, that the operator plans to close the temporary pit.
- The operator of the temporary pit will notify the applicable division district office verbally or by email at least 72 hours, but not more than one week, prior to any closure operation. The notice will include the operator's name and the location to be closed by unit letter, section, township and range, well's name, number, the API number.
- The operator of the temporary pit will remove all liquids from the temporary pit prior to closure and either:
 - Dispose of the liquids in a division-approved facility, or
 - Recycle, reuse or reclaim the liquids for use in drilling another well.
- Fluids on and entrained in the drilling waste will be removed from the pit for re-use or disposal.
- The operator may request extensions of time for the pit to hold free liquids as extensions may be necessary to allow the addition of water to the outer horse shoe of the pit to cause rinsing of solid waste and removal of constituents of concern via the pit drainage system to an above-ground tank (or truck) or to the fluids cell of the temporary pit. Sources of water for rinsing the solid drilling waste in the outer horse shoe include:
 - Residual fresh water in the workover cell not used for hydraulic fracturing (removed from the workover cell prior to the introduction of flow-back)
 - Flow-back of water pumped down hole during hydraulic fracturing that is less than 50% of the estimated TDS of pit pore water based on field conductance or specific gravity measurements¹.
- The operator shall remove all free liquids from the temporary pit within 30 days from the date that the operator released the drilling rig. The operator shall note the date of the drilling rig's release on form C-105 or C-103 upon well completion. The operator will request an extension of up to three months from the appropriate division district office if necessary to allow for rinsing of drilling waste solids and the recovery of water for re-use.
- Fluids drained from the cell are temporarily stored in the above-ground tank or fluids cell or are removed directly from the pit by truck for re-use or disposal. Both temporary storage of fluids from the pit and reuse or 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.
- The operator will close the temporary pit within six months of the date that the

¹ If water pumped from the pit drainage system prior to stimulation is 9.5 pounds/gallon and distilled water is 8.3 pounds per gallon, discharge to the outer shoe ceases when measurements of flow back are 8.9 pounds/gallon or less

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operator releases the drilling rig. An extension not to exceed three months may be requested of the applicable district office.

- The operator will close the pit by an earlier date that the division requires because of imminent danger to fresh water, public health or the environment.
- Within 60 days of closure completion, the operator will submit a closure report on form C-144, with necessary attachments to document all closure activities including sampling results; information required by 19.15.17 NMAC; a plot plan; and details on back-filling, capping and covering, where applicable.
- In the closure report, the operator will certify that all information in the report and attachments is correct and that the operator has complied with all applicable closure requirements and conditions specified in the approved closure plan.
- The operator will provide a plat of the pit location on form C-105 with the closure report within 60 days of closing the temporary pit.

Additional Protocols and Procedures for On-Site Closure

- The operator has provided the surface owner notice of the operator's proposal of an on-site closure (see transmittal letter for proof of notice to the landowner) as required in 19.15.17.13.F(1)(b).
- Upon receipt of NMOCD approval for on-site closure (in-place burial), the operator will notify the surface owner by certified mail, return receipt requested, that the operator plans to close the pit and where the operator has approval for on-site closure. Evidence of mailing of the notice will demonstrate compliance with this requirement.
- The operator will place a steel marker at the center of an on-site burial (unless the surface owner requires an alternative marker that is acceptable to the appropriate division district office). The steel marker will be not less than four inches in diameter and will be cemented in a three-foot deep hole at a minimum. The steel marker will extend at least four feet above mean ground level and at least three feet below ground level. The operator name, lease name and well number and location, including unit letter, section, township and range, and that the marker designates an on-site burial location will be welded, stamped or otherwise permanently engraved into the metal of the steel marker.
- The operator will report the exact location of the on-site burial on form C-105 filed with the division.
- If the State of New Mexico or the Federal government owns the land surface, no deed exists, the land is held in trust. Therefore, the operator cannot file a deed notice identifying the exact location of the on-site burial with the county clerk in the county. The exact location of the on-site burial will be transmitted to the surface owner by copy of the form C-105 discussed above.
- If the surface is not in the public domain, the operator will file a deed notice identifying the exact location of the on-site burial with the county clerk in the county. The exact location of the on-site burial will be transmitted to the surface owner by copy of the form C-105 discussed above.

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In-place closure is the preferred closure alternative for the temporary pit. If waste sampling results suggest that standards for in-place closure are not met for the entire drilling cell (inner horseshoe and outer horseshoe), the operator will implement excavation and removal as described in later sections of this plan

Site Reclamation Plan

After the operator has closed the pit, the operator will reclaim the pit location and all areas associated with the pit, including associated access roads to a safe and stable condition that blends with the surrounding undisturbed area. The operator will substantially restore the impacted surface area to the condition that existed prior to oil and gas operations by placement of the soil cover as provided in Subsection H of 19.15.17.13 NMAC, re-contour the location and associated areas to a contour that approximates the original contour and blends with the surrounding topography and re-vegetate according to Subsection I of 19.15.17.13 NMAC.

Soil Cover Design Plan

If the operator removes the pit contents or remediates any contaminated soil to the division's satisfaction the soil cover will consist of the background thickness of topsoil or one foot of suitable material to establish vegetation at the site, whichever is greater.

The soil cover for the in-place burial will consist of a minimum of four feet of compacted, non-waste containing, earthen material. The soil cover will include either the background thickness of topsoil or one foot of suitable material to establish vegetation at the site, whichever is greater.

The operator will construct the soil cover to the site's existing grade and prevent ponding of water and erosion of the cover material.

Re-vegetation Plan

1. The first growing season after the operator closes the pit, including access roads; the operator will seed or plant the disturbed areas.
2. The operator will accomplish seeding by drilling on the contour whenever practical.
3. The operator will obtain vegetative cover that equals 70% of the native perennial vegetative cover (un-impacted by overgrazing, fire or other intrusion damaging to native vegetation).
4. In the absence of specific guidance from the surface owner, the operator will follow BLM mandates for the seed mixture not including noxious weeds, and maintain that cover through two successive growing seasons. The operator will notify NMOCD of the specific mixture prior to seeding.
5. During the two growing seasons that prove viability, there will be no artificial irrigation of the vegetation.
6. The operator will repeat seeding or planting until it successfully achieves the required vegetative cover.
7. If conditions are not favorable for the establishment of vegetation, such as periods of drought, the operator may request that the division allow the operator to delay seeding or planting until soil moisture conditions become favorable or may require the operator to use additional cultural techniques such as mulching, fertilizing, irrigating, fencing or other practices.
8. The operator will notify the division when it has seeded or planted and when it successfully achieves re-vegetation.

In-place Closure Plan

In the event that sampling of the drilling waste suggests that the inner and outer horseshoe of the drilling cell meet the criteria for in-place closure, the operator will proceed with in-place closure for one or both cells (inner and outer horseshoe).

Siting Criteria Compliance Demonstration for In-Place Burial

The Siting Criteria Compliance Demonstration for the temporary pit show that the requirements of 19.15.17.10 NMAC are met for in-place closure.

Waste Material Sampling Plan for In-place Burial

The operator will collect at a minimum, a five-point, composite sample of the contents of the temporary pit after treatment or stabilization.

The purpose of the sampling after the waste material is stabilized is to demonstrate that:

- Benzene, as determined by EPA SW 846 method 8021B or 8260B, does not exceed the concentration limit for in-place burial;
- Total BTEX, as determined by EPA SW-846 method 8021B or 8260B, does not exceed the concentration limit for in-place burial;
- The GRO and DRO combined fraction, as determined by EPA SW-846 method

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- 8015M, does not exceed the concentration limit for in-place burial;
- TPH, as determined by EPA method 418.1 does not exceed the concentration limit for in-place burial;
- Chloride, as determined by EPA method 300.1, does not exceed the concentration limit for in-place burial or the background concentration, whichever is greater.
- The Stabilized waste passes the paint filter liquids test (EPA SW-846, method 9095)

Protocols and Procedures for In-Place Burial

In addition to the General Conditions Protocols and Procedures and the Additional Protocols and Procedures for On-site Closure listed above, the operator will execute the following steps for in-place closure of the pit:

- A. The operator will measure the distance between the top of the drilling waste and existing grade to determine if stabilized drilling waste (see stabilization methods, below) will be at least 4-feet below existing grade to allow installation of the soil cover (see soil cover design, above).
- B. The operator will stabilize or solidify the contents of the pit to a bearing capacity sufficient to support the temporary pit's final cover. However, the operator will not mix the pit contents with soil or other material at a mixing ratio of greater than 3:1, (3 parts soil or other material to 1 part drilling waste).
- C. Specifically, the drilling waste will be stabilized in the cell by adding no more than 3 parts clean fill derived from the excavation of the pit to 1 part drilling waste.
- D. After stabilization such that the waste material will support the soil cover, the mixture will be re-sampled (as necessary) pursuant to NMOCD Rules (see above).
- E. If sample results show that stabilized waste in the inner and outer horse shoe of the cell satisfy the regulatory standards for in-place burial, the operator will measure the distance between the stabilized waste and existing grade and, if necessary, transfer stabilized waste from one shoe to the other to allow for placement of the soil cover (see design criteria, above).
- F. Cover the geomembrane lined, filled, temporary pit with compacted, non-waste containing, earthen material; construct a division-prescribed soil cover; recontour and re-vegetate the site as described in this plan. Specifically, a 4-foot thick soil cover consistent with NMOCD Rules will be placed over the stabilized waste.
- G. If necessary to meet the other mandates of NMOCD Rules (e.g placement of a 4-foot soil cover to existing grade) and this closure plan, some of the stabilized drilling waste in the inner horseshoe will be excavated and placed in the outer horseshoe. This process would be conducted according to applicable regulations as described below, not allowing waste stabilization to exceed a 3:1 mixing ratio (3 parts soil or other material to 1 part drilling waste) and testing stabilized waste to demonstrate compliance with in-place burial standards as required.

- H. Any excess liner above the stabilized waste will be removed for re-use or disposal.

Excavation and Removal Closure Plan

IF THE CRITERIA FOR ON-SITE CLOSURE (IN-PLACE BURIAL) FOR SOME OR ALL OF THE TEMPORARY PIT ARE NOT MET, THE OPERATOR WILL ADHERE TO NMOC RULES AND IMPLEMENT THE FOLLOWING ACTIONS FOR ONLY THE MATERIALS THAT DO NOT MEET CRITERIA FOR IN PLACE CLOSURE:

Protocols and Procedures for Excavation and Removal

The operator will close the temporary pit by excavating the drilling waste that does not meet the criteria for in-place closure and any synthetic pit liners that cannot be re-used and transferring those materials to one of the division- approved facilities listed below:

Controlled Recovery, Inc.	NM-01-0006
Lea Land, LLC	NM-01-0035

If the sampling program described below demonstrates that a release has not occurred or that any release does not exceed the concentrations specified in Subparagraph (b.ii) of Paragraph (1) of Subsection B of 19.15.17.13 NMAC, then the operator will:

1. Backfill the temporary pit excavation with compacted, non-waste containing, earthen material;
2. Construct a division-prescribed soil cover to existing grade as described in the Soil Cover Plan (above);
3. Re-contour and re-vegetate the site as described in the Re-vegetation Plan (above).

Confirmation Sampling Plan for Excavation and Removal

The operator will test the soils beneath the temporary pit after excavation to determine whether a release has occurred. To determine if a release has occurred, the operator and/or qualified contractor will collect, at a minimum:

- A five-point, composite sample
- Individual grab samples from any area that is wet, discolored or showing other evidence of a release

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The purpose of this sampling is to demonstrate that:

- Benzene, as determined by EPA SW-846 method 8021B or 8260B does not exceed concentration limits of the Rule;
- Total BTEX, as determined by EPA SW-846 method 8021B or 8260B does not exceed concentration limits of the Rule;
- The GRO and DRO combined fraction, as determined by EPA SW-846 method 8015M, does not exceed concentration limits of the Rule;
- The TPH, as determined by EPA method 418.1 does not exceed 2,500 mg/kg; and
- Chloride, as determined by EPA method 300.1, does not exceed concentration limits of the Rule or the background concentration, whichever is greater.

Reporting

The operator shall notify the division of its results on form C-141. If the operator or the division determines that a release has occurred, then the operator will comply with 19.15.29 NMAC and 19.15.30 NMAC, as appropriate.