

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: BC Operating, Inc OGRID #: 160825
Address: PO Box 50820, Midland, Texas 79710
Facility or well name: Black River 10 State Com 1H
API Number: 30-015-42689 OCD Permit Number: _____
U/L or Qtr/Qtr A Section 15 Township 24S Range 27E County: Eddy
Center of Proposed Design: Latitude 32.22370525 N Longitude 104.17113439 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 17,204 barrels Dimensions: L 165 x 115 x D 7 feet

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.

Variations 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 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

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	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> 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	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> 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	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> 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	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> 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	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> 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	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Within 300 feet of a wetland. US Fish and Wildlife Wetland Identification map; Topographic map; Visual inspection (certification) of the proposed site	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> 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	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> 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

☐ 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): Deane Durham Title: Drilling Engineer

Signature:  Date: April 7, 2015

e-mail address: ddurham@bcoperating.com Telephone: (432) 253-7748

18.

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

OCD Representative Signature:  Approval Date: 6/17/2015

Title: Environmental Specialist OCD Permit Number: 2-13-0024

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

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: _____

April 2015

**C-144 Permit Package for
Black River 10 State Com 1H
SHL Section 15 T24G R27E, Eddy Co, NM**



View northwest toward staked location from SE pad corner stake

**Prepared for
BC Operating
Midland, Texas**

**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
Artesia ▲ Carlsbad ▲ Durango ▲ Midland

April 7, 2015

Ms. Heather Patterson
Mr. Mike Bratcher
NMOCD District 2
811 S. First Street
Artesia, New Mexico 88210
Via E-mail and US Mail

RE: C-144 for BC Operating Black River 10 State Com 1H
SHL Section 15, T24S, R27E,

Dear Ms. Patterson:

On behalf of BC Operating, R.T. Hicks Consultants, Ltd. is pleased to submit the attached permit for a temporary pit. Please note the following in the C-144 Package

1. The hydrogeologic data are quite good for the area; the location meets the setback distance to groundwater.
2. My personal site inspection showed no signs of unstable ground within this medium cave/karst potential area.
3. With respect to nearby watercourses, we believe pad location with a pit on the north side meets the setback criteria of 300 feet. When we stake the pit boundaries prior to construction of the location, we will measure the distance and either confirm a pit on the north is acceptable or we will rotate the pit location clockwise to meet the 300 foot setback.
4. The submission includes a variance request that has been previously approved by OCD for other temporary pits.
5. The temporary pit generic plans are verbatim from previously-approved C-144 drilling pit permits.
6. This letter and application are copied to the surface owner (State Land Office) as notification of the intent to bury drilling solids on-site.
7. BC Operating plans to begin construction of the location in May. If you can review this permit by the end of the month, that would be much appreciated.

Please let me know if you have any questions or concerns.

Sincerely,
R.T. Hicks Consultants



Randall Hicks

Copy: BC Operating
Ed Martin, State Land Office (surface owner)

Statement Explaining Why the Applicant Seeks a Variance

The prescriptive mandates of the Rule that are the subject of this variance request are the following:

19.15.17.11 DESIGN AND CONSTRUCTION SPECIFICATIONS:

F(2) A temporary pit shall 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 operator shall construct a temporary pit so that the slopes are no steeper than two horizontal feet to one vertical foot (2H:1V). The appropriate division district office may approve an alternative to the slope requirement if the operator demonstrates that it can construct and operate the temporary pit in a safe manner to prevent contamination of fresh water and protect public health and the environment.

There are two reasons for the ~~30J~~ <3X slope for the suction side of the double horseshoe pit:

1. The steeper slopes create a slightly smaller surface footprint and
2. As the suction side of the drilling pit holds few solids and mostly fluid, a steeper slope reduces the volume of fluid (water) needed to
 - a. fill the pit for drilling and
 - b. dispose of after drilling

Demonstration That the Variance Will Provide Equal or Better Protection of Fresh Water, Public Health and the Environment

Our recent experience with drilling pits of this geometry show that solids do not accumulate in the suction sides of these pits. The size of the pit allows for solids to settle before reaching the suction side and the higher elevation of the bottom of the suction side also minimizes the amount of solids deposited on the liner. Thus, in this area of the pit, solids do not add additional stress/weight on the liner and liner seams.

While we have observed erosion and stress on the liner at the discharge side of the drilling pit, we have not observed any failures on the suction side. Our observations support a conclusion that slightly steeper slopes will provide equal protection of fresh water, public health and the environment for these defined areas of the drilling pit where solids do not accumulate and where discharge onto the liner does not occur.

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

Distance to Groundwater

Figure 1, Figure 2, and the discussion below demonstrates that groundwater (fresh water as defined by NMOCD Rules) at the location is greater than 50 feet beneath the temporary pit that will contain fluids that cannot be classified as “low-chloride.” Groundwater will be more than 50 feet below the bottom of the buried waste, meeting criteria for in-place closure.

Figure 1 is a geologic/ topographic map that shows:

1. The location of the staked well location as a hexagon with the surface elevation.
2. Water wells from the OSE database are plotted as a blue triangle inside colored circles that indicate well depth (see legend). OSE wells are often mis-located in the WATERS database as older wells are plotted in the center of the quarter, quarter, quarter, of the Section Township and Range. For example, we could find no evidence via historic and recent aerial photographs or field inspection on foot that well C-1452 exists as represented in the OSE database.
3. Water wells from the USGS database as large colored triangles that represent the unit in which the well was completed (none are present in Figure 1).
4. Water wells, which are not documented in the public databases but were identified by field inspection or other published reports as colored squares (none were identified in Figure 1).
5. The depth-to-water from the most recent available measurement for each well is provided adjacent to the well symbol.

Our examination of the geology of the area near the proposed temporary pits causes us to conclude that the uppermost water-bearing zone lay in the Permian Rustler Formation. Existing data do not allow us to determine if the water in the Rustler is unconfined or confined. For a confined aquifer, the depth to groundwater is the top of the permeable unit (e.g. 100 feet) but the depth to groundwater (the potentiometric surface) can be a few feet below the ground surface.

Note that the Castile Formation (Pc) crops out to the north of the location and the Salado Formation (Psl) is exposed west of the location. Both of the rock units are described as dominated by evaporates (e.g. salt) and/or gypsum. This mineralogy typically does not create potable groundwater. The hydrogeology of the area is described in the next section.

The Group A and Group B OSE wells were used to create Figure 2 and are discussed below. These wells are shown on topographic maps and aerial photographs.

Figure 2 is larger scale geologic and topographic map that shows:

1. The location of the staked location as a hexagon.
2. Water wells measured by the USGS or other professionals, the formation completion depth of the well (see Figure 1 Legend) and the calculated elevation of the groundwater surface and the date of the observation.
3. An example water elevation from a deeper well in the Group A and B OSE wells shown in Figure 1.
4. Isocontour lines displaying the elevation of the groundwater surface of the Rustler Formation.

Hydrogeology

Figures 1 and 2 show that the proposed pit straddles the contact between the Rustler and underlying Castile Formation. This relationship appears odd as the Castile underlies the Salado, which crops out about ½ mile southwest of the pit location. Additionally, in a larger scale geologic map of the area, the outcrop pattern conforms to what is expected: the Rustler overlying the Salado, which overlies the Castile. For the geologic map of Figures 1 and 2 to be correct, the Salado would be removed by post-deposition solution in this area allowing deposition of the Rustler over the Castile. Such a disconformity is reported in the literature¹ and presumably has occurred here as well. Thus, the map suggests the Rustler would form a relatively thin alluvial blanket over the anhydrite and gypsum of the Castile Formation.

In the area, only the Rustler and Alluvium contain groundwater for beneficial use. Any groundwater in the Castile can be assumed to be high in sulfate or brine. Groundwater in the Salado is brine and this unit is the source of the high salinity seepage into the Pecos River at Malaga Bend. A requirement of 630 feet of surface casing to protect fresh water zones at this location appears to be incorrect based upon our interpretation of the hydro-geologic column.

Depth to Groundwater

We typically try to avoid using data from the OSE database as this data relies upon observed water levels by drillers during the completion of the water well. The OSE dataset provides some useful data in certain areas – and the data in Group A and B areas of Figures 1 and 2 are useful and discussed below. As indicated above, we could find no evidence in air photos or via a foot survey that well C-1452 exists as located in the OSE database.

The following table provides data from the OSE database on wells in Group A and B of Figures 1 and 2. One common feature of these wells is the shallow depth of groundwater (17-56 feet) and the shallow total depth of many wells (e.g. 30 feet for C-1943). Because of these two features, we believe errors in depth to water data reported by drillers could be minimized.

The range of groundwater elevation is 29 feet for Group A (3156 to 3127) over a distance of about 1.25 miles and a time span of 56 years. With the Group B wells, the range is 42 feet (3084 to 3042) over a distance of about one mile and a time span of 32 years. The more recent data (post- 2000) in these two groups provides an average groundwater elevation of 3144 for Group A and 3064 for Group B, yet both these sub-groups have a relatively large variation. The deeper wells, which may not be as influenced by irrigation or the stage of the nearby Black River, provide an average groundwater elevation of 3130 for Group A and 3070 for Group B with a very small variation.

The regional potentiometric surface is based upon measured static water levels by professionals (e.g. USGS, Hicks Consultants) from 2013-14 for most of the data. Because the data are relatively sparse near the proposed pit, we performed the evaluation (above) of the OSE data to

¹

http://www.wipp.energy.gov/information_repository/cra/2009_cra/references/Others/Powers_Holt_1999_The_Los_Medanos_Member_of_the_Permian_Rustler_Formation.pdf

Siting Criteria (19.15.17.10 NMAC) BC Operating – Black River 10 State Com 1H

determine if these data could assist in providing more certainty of the depth to groundwater at the proposed pit location. We conclude that the averaged groundwater elevation of 3130 is reasonable in the area of Group A wells. In the Group B wells we are less certain of a conclusion that the averaged groundwater elevation is 3070.

Well ID	Finish Date	Elevation (ft msl)	Well Depth (ft)	Depth to Water (ft)	GW Elev (ft msl)	Use of Well
Group A OSE Wells						
C 00683	3/10/1956	3151	50	17	3134	DOMESTIC
C 01187	5/28/1964	3151	108	17	3134	
C 00516	1/27/1955	3163	105	36	3127	IRR
C 00516 S	3/15/1956	3163	50	17	3146	IRR
C 00631	2/11/1955	3163	50	24	3139	
C 01366	11/26/1966	3163	60	35	3128	EXPL
C 00516 POD6	5/9/2006	3163	78	17	3146	IRR/COMM
C 03092	5/18/2004	3193	54	37	3156	
C 03490 POD1	6/30/2011	3152	140	23	3129	IRR. & COMM.
Average post 2000					3144	
Average >100 TD					3130	
Group B OSE Wells						
C 00347	6/25/1976	3109	60	30	3079	EXP.
C 02976	9/27/2003	3100	57	27	3073	DOM/STK
C 01943	9/25/1981	3109	30	25	3084	
C 03037	7/31/2004	3095	116	25	3070	
C 03145	3/4/2005	3109	103	40	3069	
C 03260 POD1	11/2/2008	3098	80	56	3042	LIVESTOCK
Average post 2000					3064	
Average >100 TD					3070	
Note: Surface elevation obtained from USGS Topographic Map (1:24000)						

Rather than employ an average of several wells from the OSE database, wells C-03490-POD1 (Group A) and C-03260-POD1 (Group B) were selected to represent the associated group because:

- We could verify the exact location on a USGS topographic map or recent Google aerial image. Verification that the well exists may allow for future gauging of the well as necessary, with well owner consent. Thus, it is reproducible data.
- Each of these wells contained depth to water and completion date data in the OSE database.
- Well drilled more recently than nearby wells will contain more reliable data – because of regional water level declines and other factors.
- Both of these wells are south of the Black River, and

- Both wells are relatively deep compared to other wells in associated group.

From these data we conclude:

- Beneath the proposed pit, the elevation of groundwater in the uppermost water bearing zone is approximately 3075.
- Based upon the geologic section, this elevation should be within the anhydrite of the Castile Formation or salt of the Salado. Thus, any groundwater in this zone would be brine or rich in sulfate and unpotable.
- Given the surface elevation of the well (3181) and a 10-foot (maximum) deep temporary pit, the distance between the bottom of the pit and the groundwater surface is about 106 feet (3181-3075).

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 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, significant watercourses, sinkhole 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.
- A mapped blue-line watercourse is present about 400 feet from the staked location.
- Our site inspection found several gullies about 500 feet east of the site and some cattle-track erosional features west of the location, but these drainages do not meet the definition of a significant watercourse and are not within the setback distances
- We examined an area north of the pit that contained dense vegetation and appeared to periodically hold some surface water after rains. We found no evidence of subsidence or unstable ground at this location or anywhere near the proposed pit.

When we stake out the pit location, we will measure the exact distance to the mapped watercourse and, if necessary, rotate the location such that the distance from the pit to the significant watercourse is more than 300 feet. We will notify OCD if this action is required.

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 in-place closure.

- The nearest structures are oil and gas wells and tank batteries.

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 1,000 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 in-place closure.

- Figure 1 shows the locations of all area water wells, active or plugged.
- The nearest active water well is located about 1½ mile northwest or due east of the site (Group A or B wells)
- There are no known domestic wells within 1,000 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 in-place closure.

- The closest municipality is Malaga, NM approximately 6 miles east.
- The closest public well field is located approximately 12 miles northwest.

Distance to Wetlands

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

- The nearest designated wetlands are “freshwater pond” located approximately 1800 feet southwest of the location

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 20 miles northeast and southeast

Stability of Pit Area and Distance to High or Critical Karst Areas

Figure 8 shows the location of the Temporary Pit with respect to BLM Karst areas using the 2014 map and Figure 1 shows the regional geology.

- The proposed temporary pit is located within a “medium” potential karst area.
- The nearest “high” or “critical” potential karst area is located approximately 6-8 miles southeast, southwest, and northwest (as an isolated area of high karst) of the site.
- No evidence of solution voids were observed near the site during the field inspection.
- No evidence of unstable ground was observed.
- A professional geologist (Randall Hicks) conducted the field survey and concluded that the ground is stable.

Distance to 100-Year Floodplain

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

- Our field inspection and examination of the topography permits a conclusion that the location is not within any floodplain and has low risk for flooding.

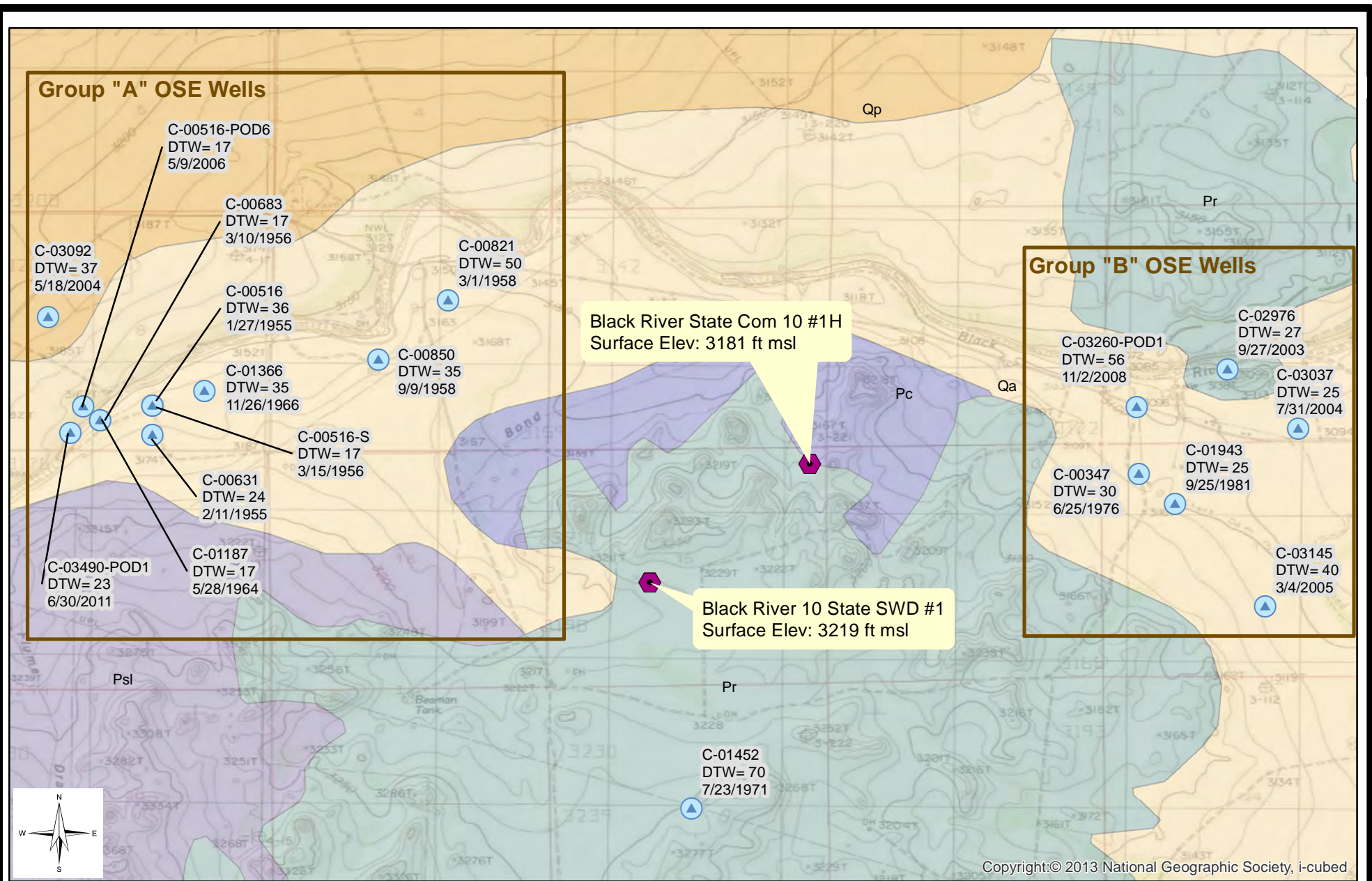
Temporary Pit Design

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

Site Specific Information Figures

R.T. Hicks Consultants, Ltd.

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



0 0.5 1
Miles

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

Depth To Water and Geology
BC Operating, Inc
Black River State Com 10 #1H

Figure 1
April 2015

Legend



Pit Location

OSE Water Wells

Well Depth (ft)



<= 150

NM Geology

Map Unit, Description



Pc, Paleozoic-Castile Formation; anhydrite sequence



Pr, Paleozoic-Ruster Formation; siltstone, gypsum, sandstone, and dolomite; Upper Permian



Psl, Paleozoic-Salado Formation; evaporite sequence; Upper Permian



Qa, Quaternary Alluvium



Qp, Quaternary-Piedmont Alluvial Deposits

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Albuquerque, NM 87104
Ph: 505.266.5004

Legend
Depth To Water and Geology
BC Operating, Inc
Black River State Com 10 #1H

Figure 1
Legend
April 2015

Legend



Pit Location

Potentiometric Surface (ft msl)



Isocontour

USGS Gauging Station (GW Elev, Date)

Aquifer Code, Well Status



Alluvium/Bolsom



Castile Formation, Water level was affected recently by pumping at a nearby site that taps the same aquifer.



Rustler

Misc. Water Wells (GW Elev, Date)

Well Depth



No Data



151 - 350

OSE Water Wells (GW Elev, Date)

Well Depth (ft)



<= 150



151 - 350

NM Geology

Map Unit, Description



Pc, Paleozoic-Castile Formation; anhydrite sequence



Pr, Paleozoic-Rustler Formation; siltstone, gypsum, sandstone, and dolomite; Upper Permian



Psl, Paleozoic-Salado Formation; evaporite sequence; Upper Permian



Qa, Quaternary Alluvium



Qoa, Quaternary-Older Alluvial



Qp, Quaternary-Piedmont Alluvial

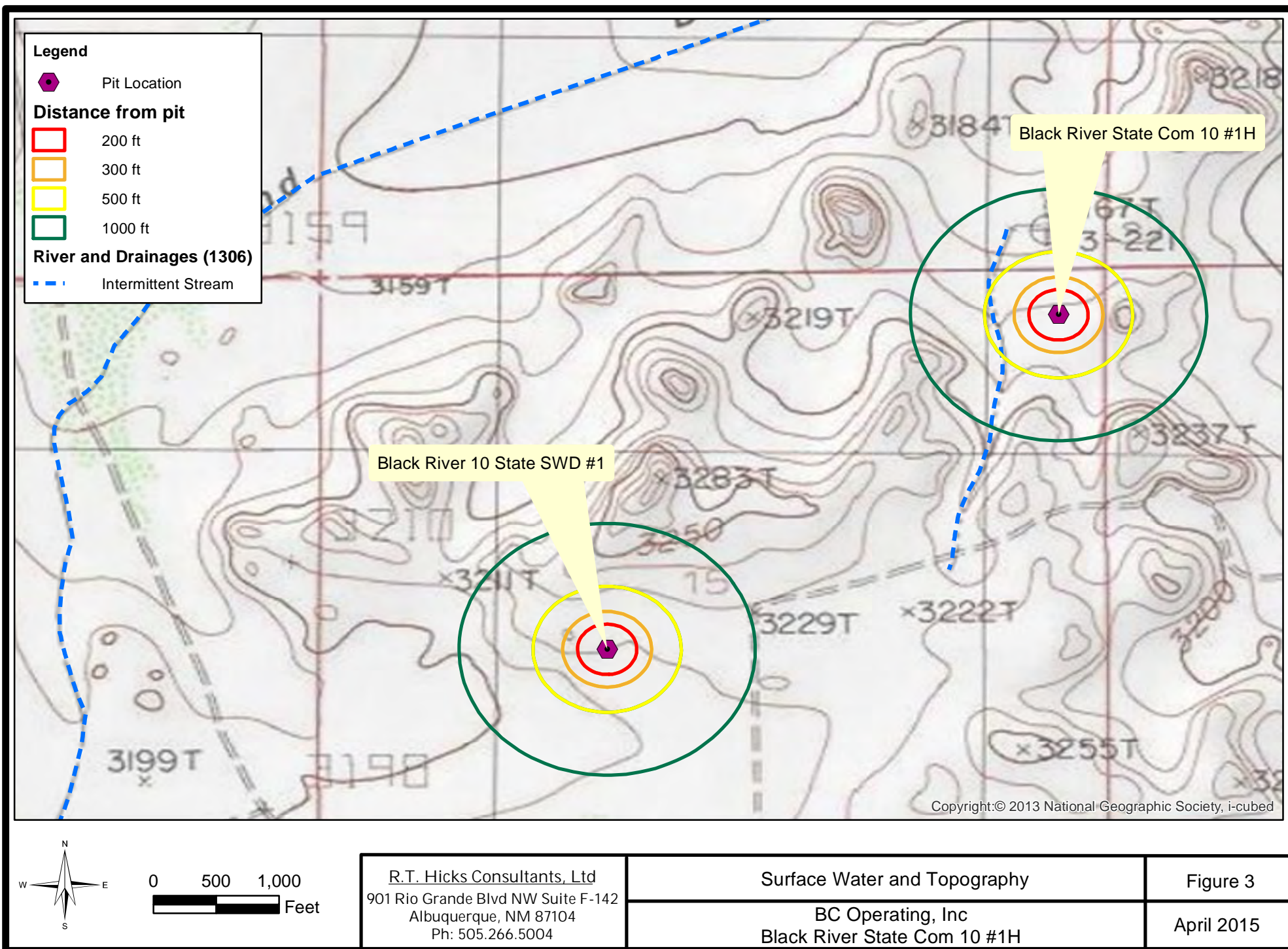
R.T. Hicks Consultants, Ltd
901 Rio Grande Blvd NW Suite F-142
Albuquerque, NM 87104
Ph: 505.266.5004

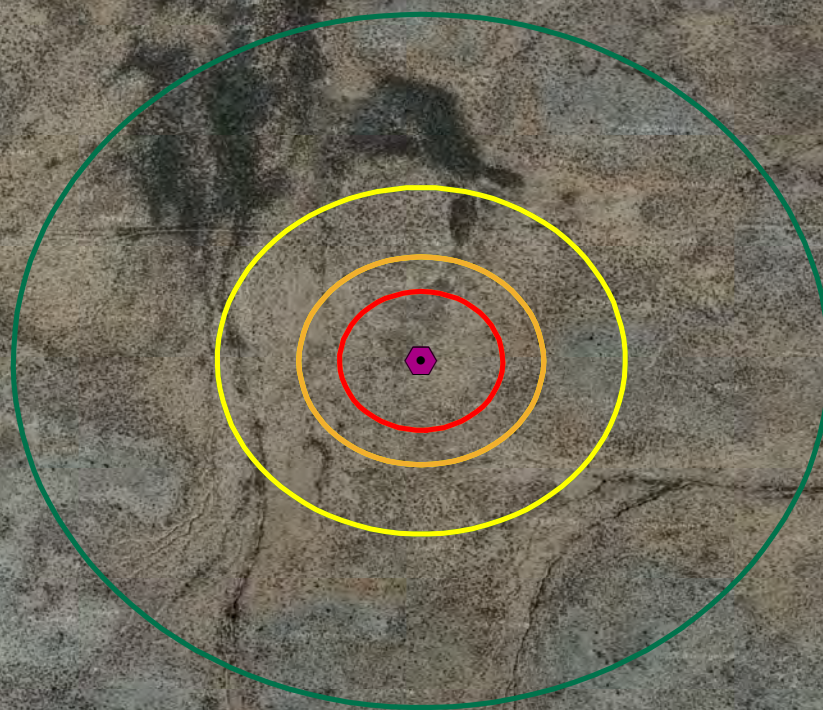
Potentiometric Surface and Groundwater Elevation
at Nearby Water Wells

BC Operating, Inc
Black River State Com 10 #1H


Figure 2
Legend

April 2015








Legend


 Pit Location

Distance from pit

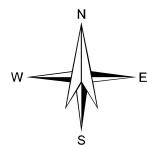
 200 ft

 300 ft

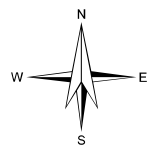
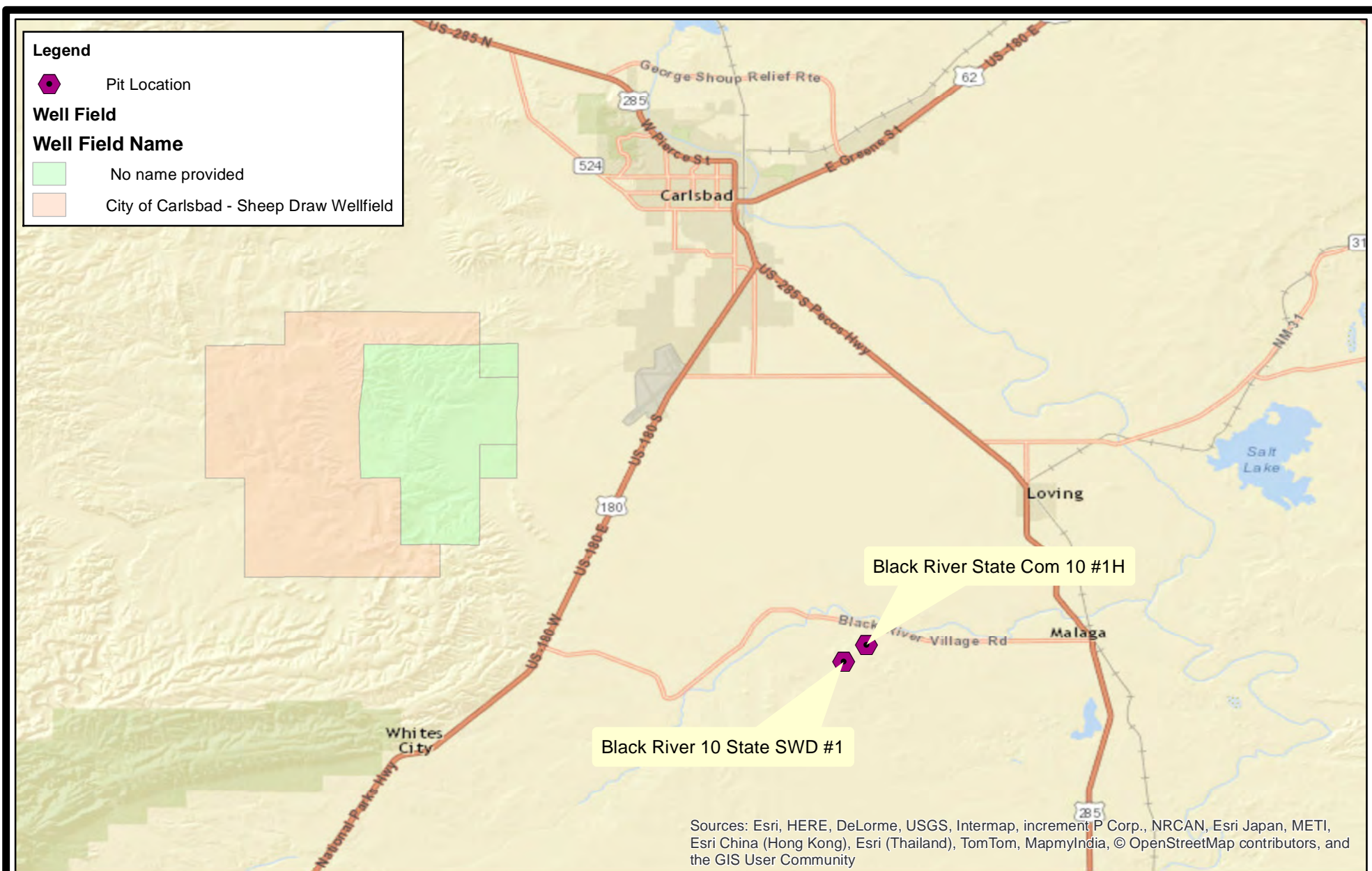
 500 ft

 1000 ft

Imagery ©2015 , DigitalGlobe, NMRGIS, Texas Orthoimagery Program, USDA Farm Service Agency



R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Nearby Structures	Figure 4
	BC Operating, Inc Black River State Com 10 #1H	April 2015



0 2 4
Miles

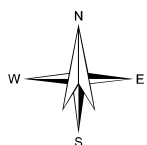
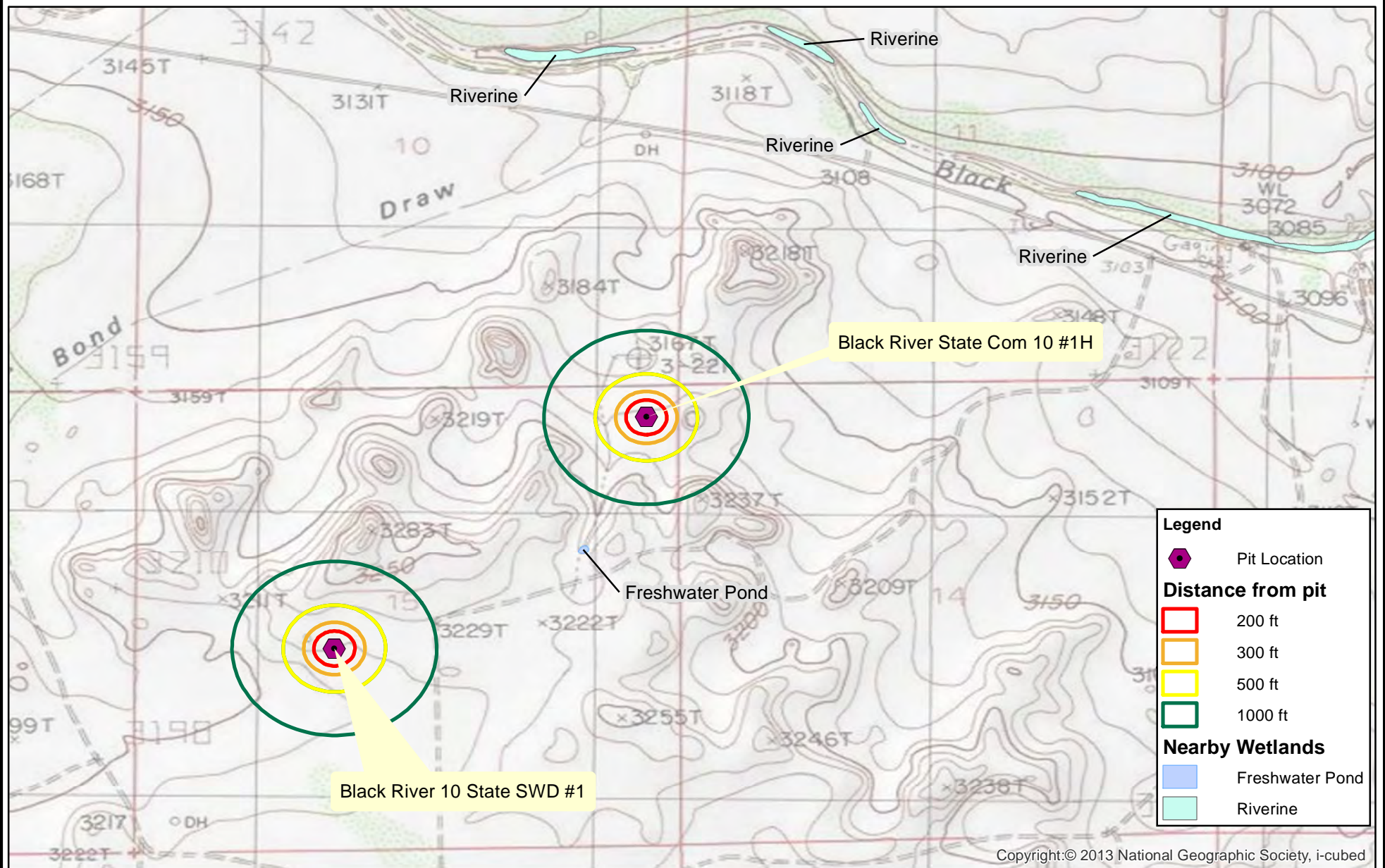
R.T. Hicks Consultants, Ltd
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Albuquerque, NM 87104
Ph: 505.266.5004

Nearby Municipalities and Well Fields

BC Operating, Inc
Black River State Com 10 #1H

Figure 5

April 2015



0 1,000 2,000
Feet

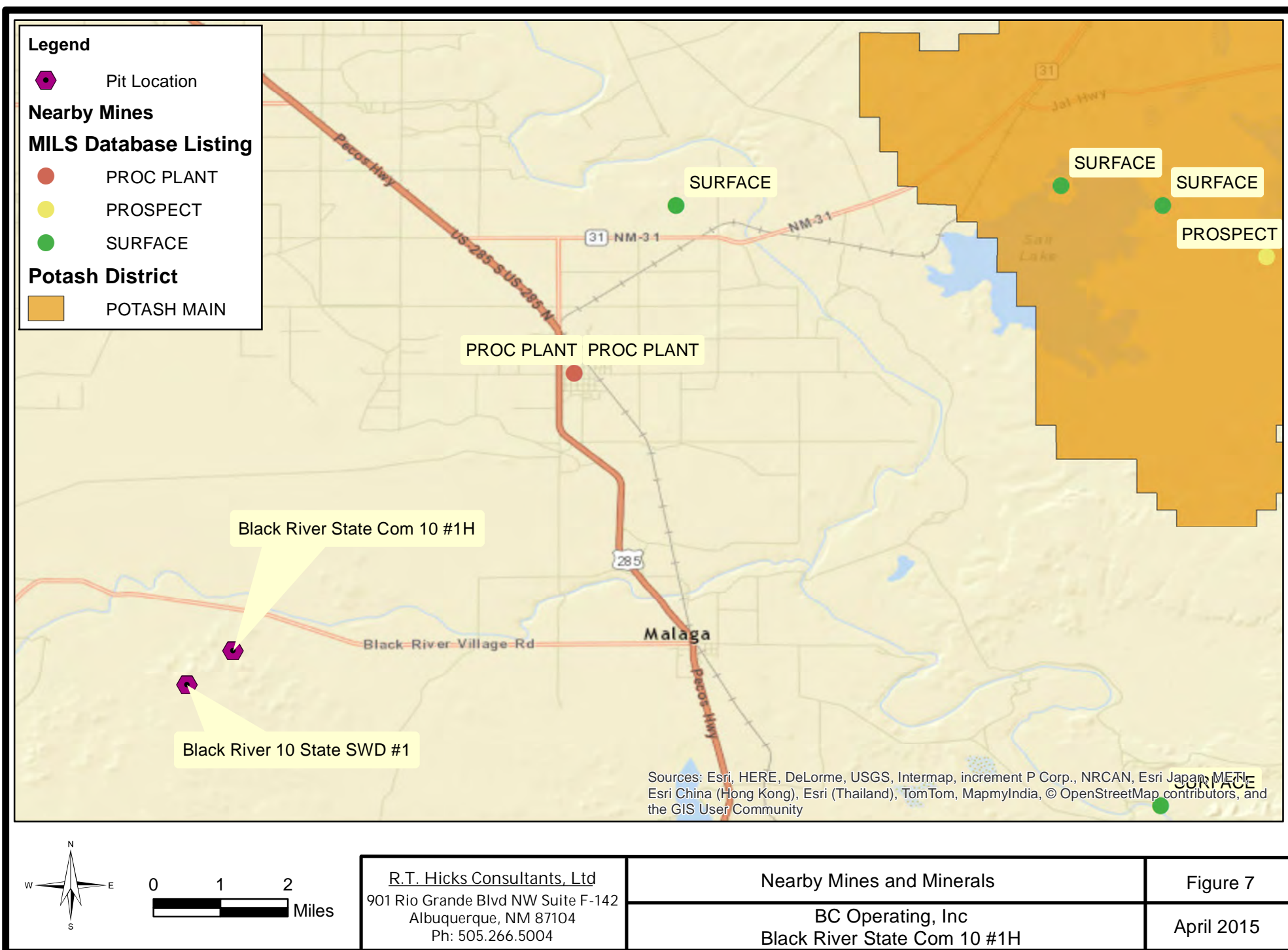
R.T. Hicks Consultants, Ltd
901 Rio Grande Blvd NW Suite F-142
Albuquerque, NM 87104
Ph: 505.266.5004

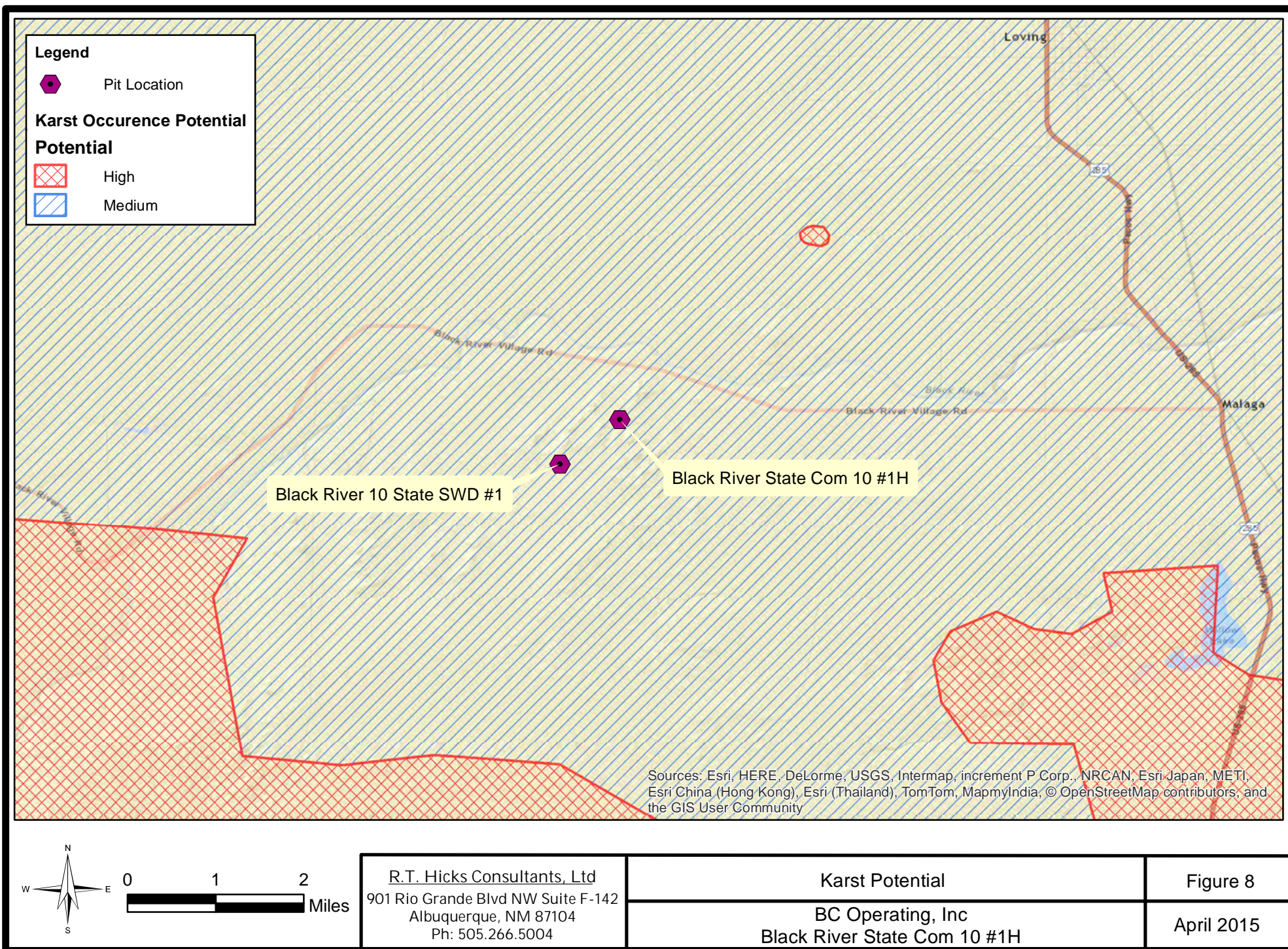
Nearby Wetlands

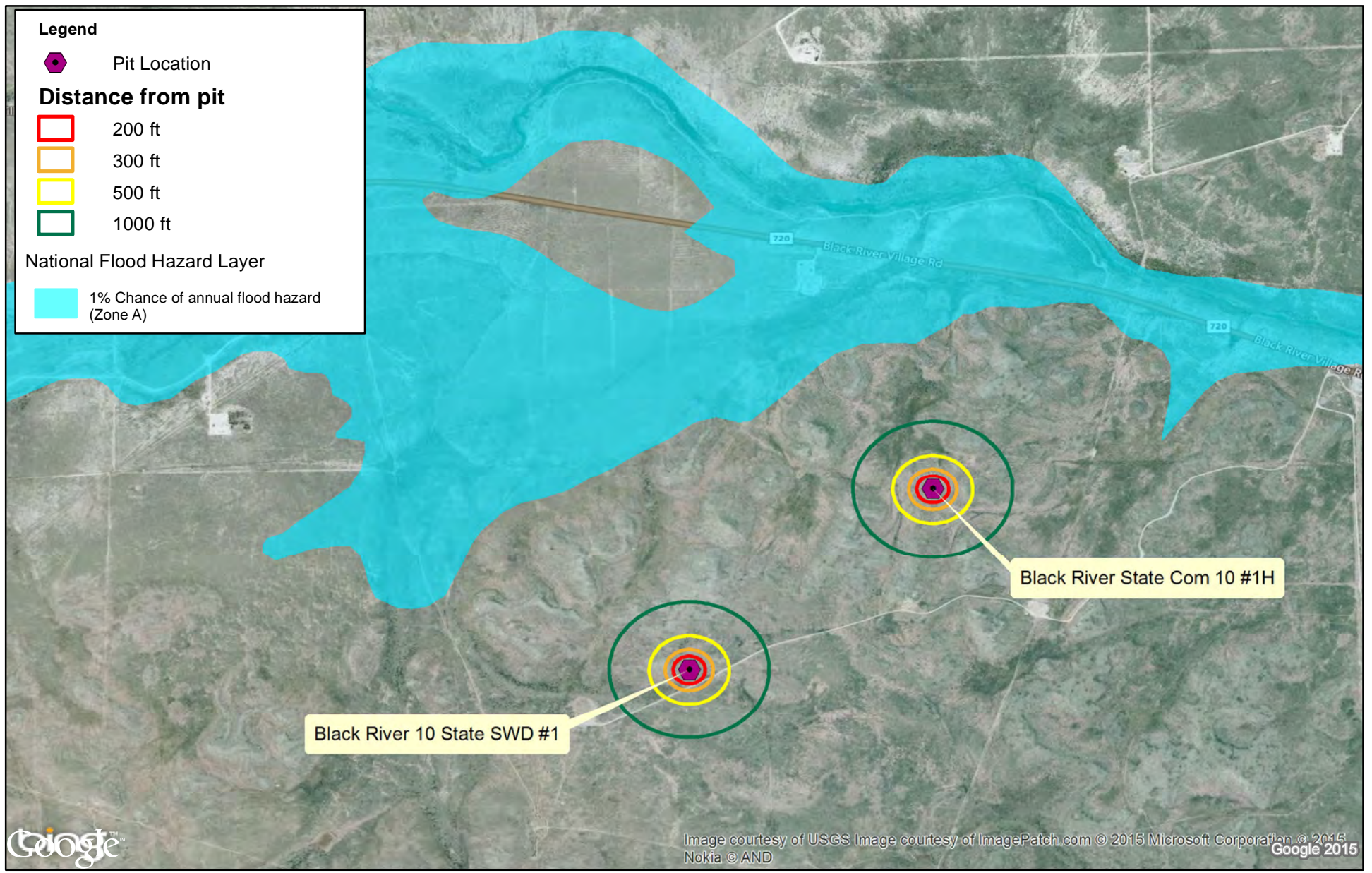
BC Operating, Inc
Black River State Com 10 #1H

Figure 6

April 2015







FEMA Source: <https://hazards.fema.gov/gis/nfhl/services/public/NFHLWMS/MapServer/WMSServer>



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Albuquerque, NM 87104
Ph: 505.266.5004

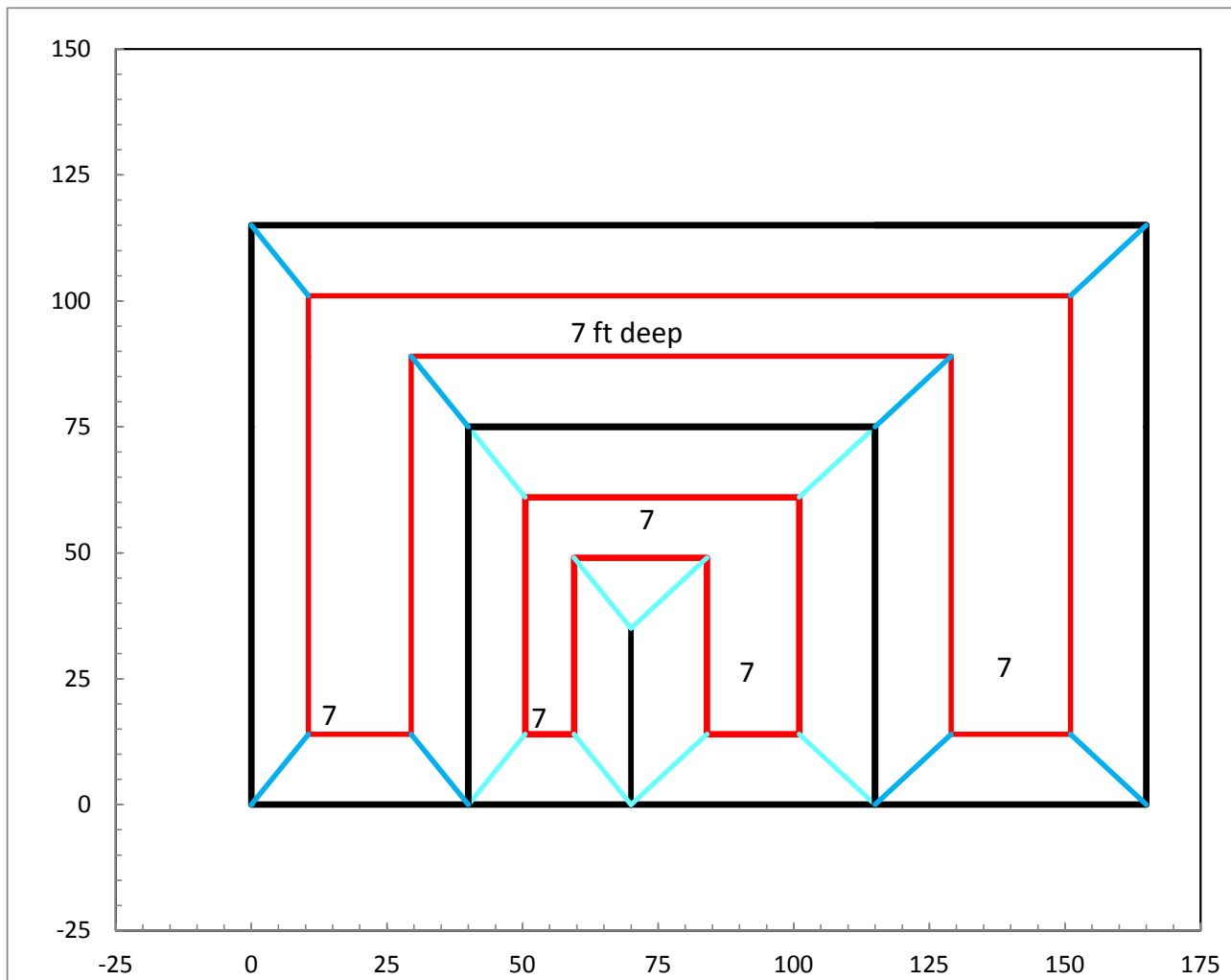
FEMA Flood Map
BC Operating, Inc
Black River State Com 10 #1H

Figure 9
April 2015

Site Specific Information Plates

R.T. Hicks Consultants, Ltd.

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




Inner Horseshoe Capacity 4110 bbl
Outer Horseshoe Capacity 11099 bbl

Fluid Cell Capacity 0 bbl
Total Capacity 15209 

Drilling Cell Dimensions

Drilling Cell Total Width	165.0
Drilling Cell Total Length	115.0

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)	75.0
Total Length (up down)	75.0
Depth	7.0
Width of discharge top	45.00
Width of suction top	30.00
Length of Divider	35.0
Divider Width	0.0
Width of discharge floor	17.0
Width of suction floor	9.0

Outer Horseshoe Dimensions

Width Discharge Side	50.0
Width Suction Side	40.0
Length Far Side (up down)	50.0
Width of discharge Floor	22.0
Width of Suction Floor	12.0
Width of Far Side Floor (right-left dimension)	87.0
Length of far side floor (Up-down dimension)	12.0
Depth of Discharge Side	7.0
Depth of Far Side	7.0
Depth of Suction Side	7.0

North 

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

Drawing of Drilling Cell

Plate 1

BC Operating -Black River 10 1H

April - 2015

Appendix A

Site Inspection Photographs & 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 88240
Phone: (575) 393-6161 Fax: (575) 393-0720

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

Form C-101
Revised July 18, 2013

Energy Minerals and Natural Resources

Oil Conservation Division
NM OIL CONSERVATION
ARTESIA DISTRICT
1220 South St. Francis Dr.
Santa Fe, NM 87505
SEP 29 2014

☐ AMENDED REPORT

APPLICATION FOR PERMIT TO ~~DRILL~~ RE-ENTER, DEEPEN, PLUGBACK, OR ADD A ZONE

1. Operator Name and Address BC Operating, Inc. P.O. Box 50820 Midland, Texas 79710		2. OGRID Number 160825	
3. Property Code 313739		4. API Number 30-015-42689	
5. Property Name Black River 10 State Com		6. Well No. 1H	

7. Surface Location

UL - Lot	Section	Township	Range	Lot Idn	Feet from	N/S Line	Feet From	E/W Line	County
A	15	24S	27E		240	North	360	East	Eddy

8. Proposed Bottom Hole Location

UL - Lot	Section	Township	Range	Lot Idn	Feet from	N/S Line	Feet From	E/W Line	County
A	10	24S	27E		240	North	360	East	Eddy

9. Pool Information

Pool Name Black River, Wolfcamp (Gas)	Pool Code 97442
--	--------------------

Additional Well Information

11. Work Type New Well	12. Well Type Gas	13. Cable/Rotary Rotary	14. Lease Type State	15. Ground Level Elevation 3209'
16. Multiple No	17. Proposed Depth 8900' TVD/14,044' MD	18. Formation Wolfcamp	19. Contractor TBD	20. Spud Date 11/01/2014
Depth to Ground water		Distance from nearest fresh water well		Distance to nearest surface water

☒ We will be using a closed-loop system in lieu of lined pits

21. Proposed Casing and Cement Program

Type	Hole Size	Casing Size	Casing Weight/ft	Setting Depth	Sacks of Cement	Estimated TOC
Surface	16"	13 3/8"	48#	630'	400	0'
Intermediate	12 1/4"	9 5/8"	40#	3100'	1135	0'
Production	8 1/2"	5 1/2"	17#	14,044'	2500	0'

Casing/Cement Program: Additional Comments

22. Proposed Blowout Prevention Program

Type	Working Pressure	Test Pressure	Manufacturer
Double Ram Annular	3000#	2000#	Hydrill/Shaeffer

23. I hereby certify that the information given above is true and complete to the best of my knowledge and belief.

I further certify that I have complied with 19.15.14.9 (A) NMAC ☒ and/or 19.15.14.9 (B) NMAC ☒, if applicable.

Signature: Pam Stevens

Printed name: Pam Stevens

Title: Regulatory Analyst

E-mail Address: pstevens@bcoperating.com

Date: 09/25/2014

Phone: 432-684-9696

OIL CONSERVATION DIVISION

Approved By:

T. C. Shepard
"Geologist"

Title:

Approved Date:

9-30-2014

Expiration Date:

9-30-2016

Conditions of Approval Attached

NSL Required

District I
1625 N. French Dr., Hobbs, NM 88240
Phone: (575) 393-6161 Fax: (575) 393-0720
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 30-015-42689	² Pool Code 97442	³ BLACK RIVER WOLF CAMP (GAS) EAST
⁴ Property Code 313739	⁵ Property Name BLACK RIVER 10 STATE COM	⁶ Well Number 1H
⁷ OGRID No. 160825	⁸ Operator Name B.C. OPERATING, INC.	⁹ Elevation 3181'

¹⁰ Surface Location

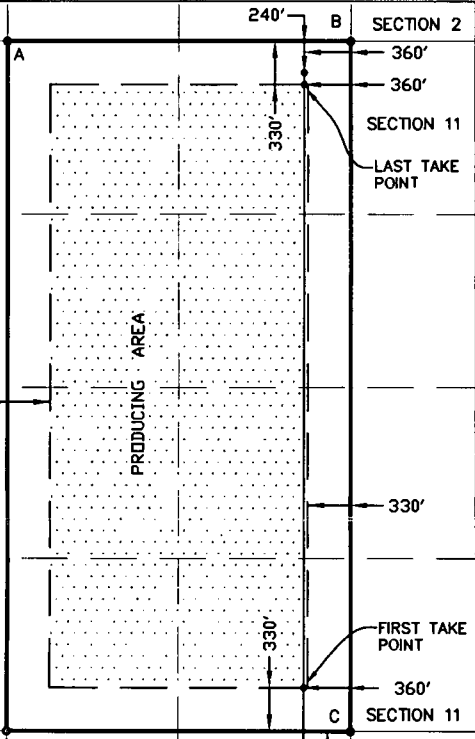
UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
A	15	T24S	R27E		240'	NORTH	360'	EAST	EDDY

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
A	10	T24S	R27E		240'	NORTH	360'	EAST	EDDY

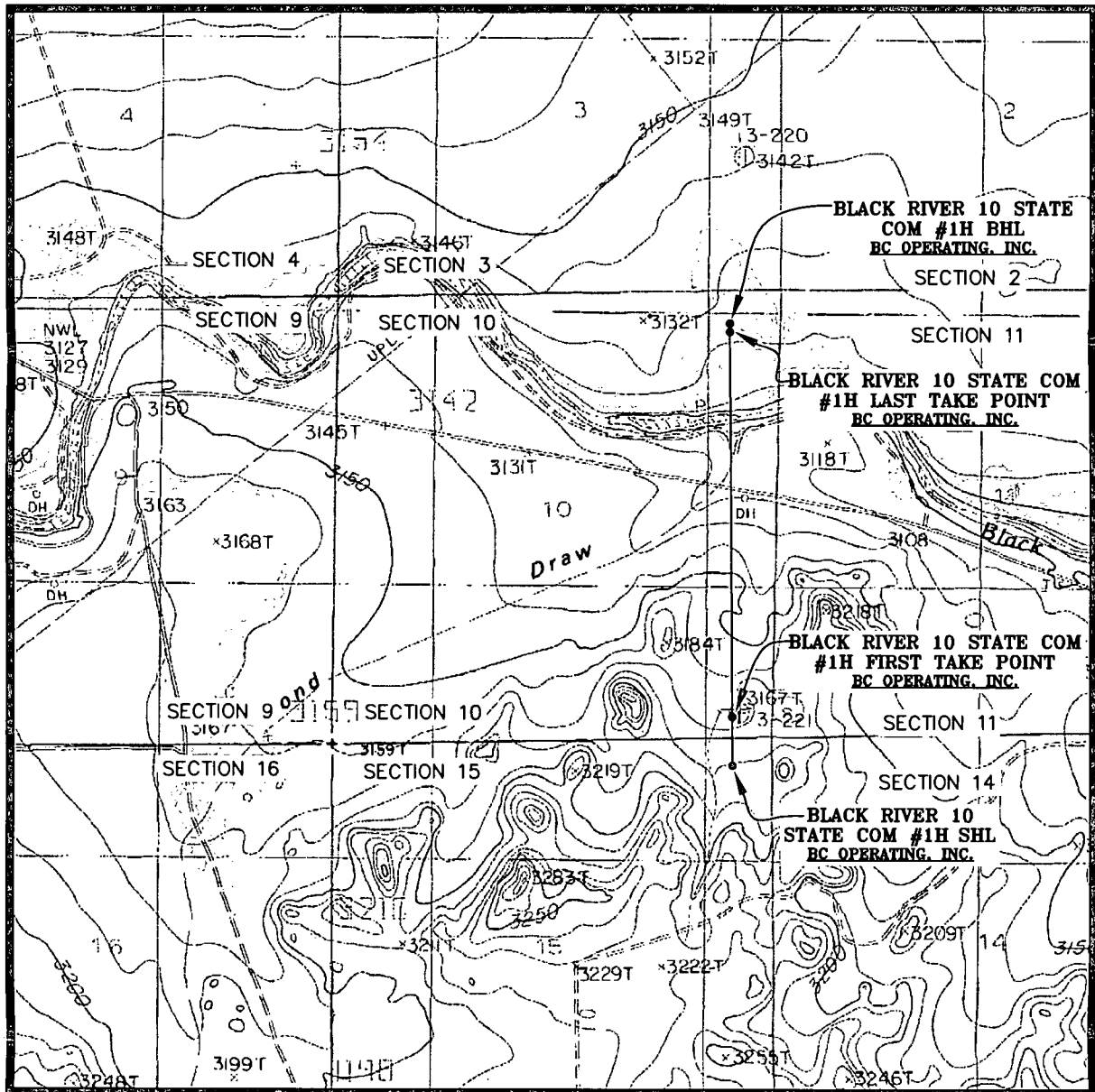
¹² Dedicated Acres 320.00	¹³ Joint or Infill	¹⁴ Consolidation Code	¹⁵ Order No.
---	-------------------------------	----------------------------------	-------------------------

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.

¹⁶ SECTION 4	SECTION 3	SECTION 2		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. Pam Stevens 9/22/14 Signature Date Pam Stevens Printed Name psterens@bcoperating.com E-mail Address
SECTION 9	SECTION 10	SECTION 11		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. SEPTEMBER 22, 2014 Date of Survey Signature and Seal of Professional Surveyor
SECTION 9	SECTION 10	SECTION 11		LLOYD P. SHORT NEW MEXICO 21653 PROFESSIONAL SURVEYOR
SECTION 16	SECTION 15	SECTION 14		

CORNER COORDINATES
NAD 83, SPCS NM EAST
A - Y: 430743.64' / X: 589192.43'
B - Y: 430688.80' / X: 591823.83'
C - Y: 445391.38' / X: 591850.64'
D - Y: 445423.66' / X: 589198.69'
NAD 27, SPCS NM EAST
A - Y: 430685.32' / X: 548009.70'
B - Y: 430630.45' / X: 550641.05'
C - Y: 445333.13' / X: 550667.77'
D - Y: 445365.44' / X: 548015.87'

LOCATION VERIFICATION MAP

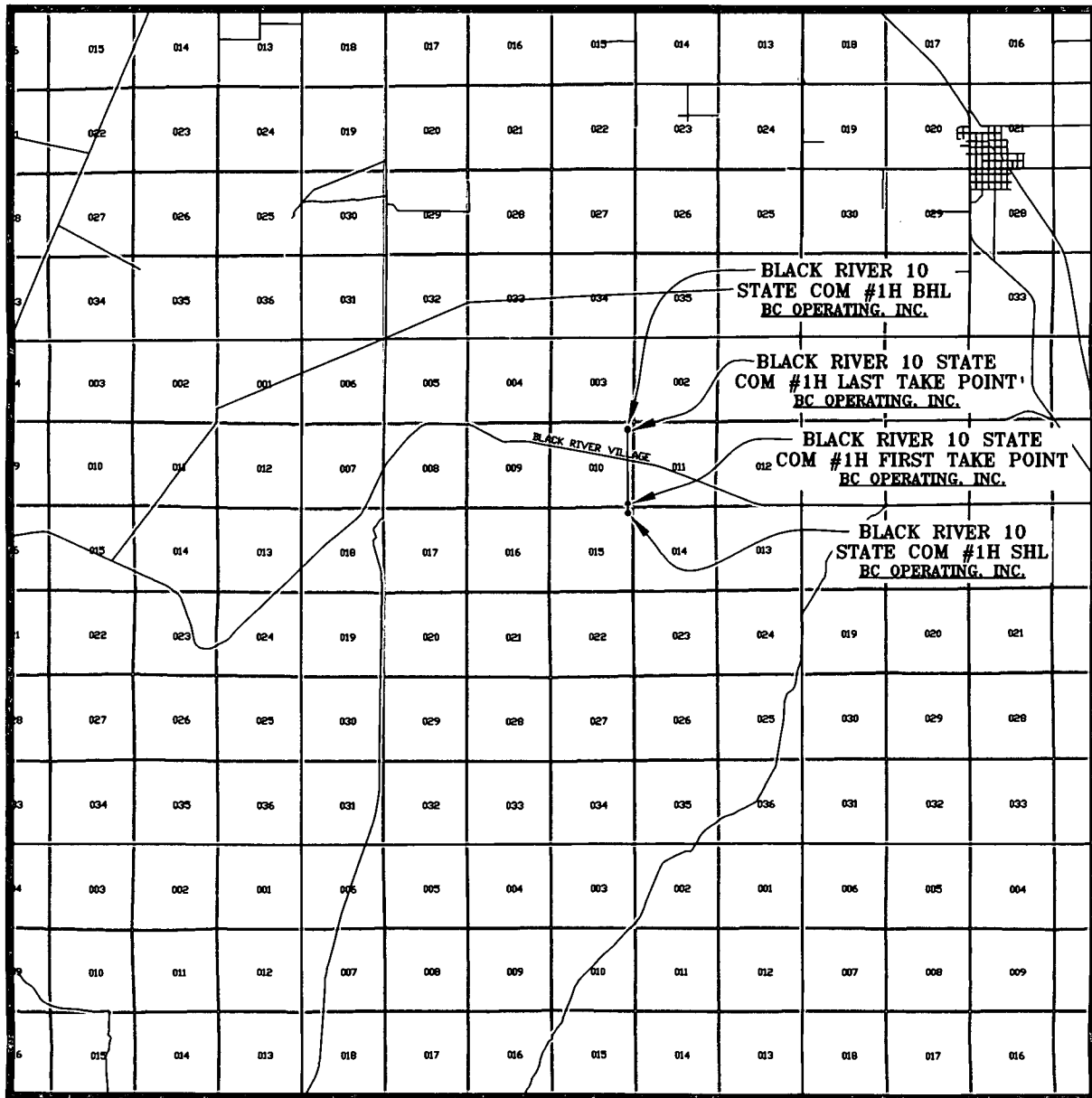


SEC. 15 TWP. 24-S RGE. 27-E
 SURVEY: N.M.P.M.
 COUNTY: EDDY
 DESCRIPTION: 240' FNL & 360' FEL
 ELEVATION: 3181'
 OPERATOR: B.C. OPERATING, INC.
 LEASE: BLACK RIVER 10 STATE COM
 U.S.G.S. TOPOGRAPHIC MAP: BOND DRAW, N.M.

SCALE: 1" = 2000'
 CONTOUR INTERVAL = 10'

PREPARED BY:
 R-SQUARED GLOBAL, LLC
 1309 LOUISVILLE AVENUE, MONROE, LA 71201
 318-323-6900 OFFICE
 JOB No. R3421_001

VICINITY MAP



SEC. 15 TWP. 24-S RGE. 27-E

SURVEY: N.M.P.M.

COUNTY: EDDY

DESCRIPTION: 240' FNL & 360' FEL

ELEVATION: 3181'

OPERATOR: B.C. OPERATING, INC.

LEASE: BLACK RIVER 10 STATE COM

U.S.G.S. TOPOGRAPHIC MAP: BOND DRAW, N.M.

SCALE: 1" = 2 MILES

PREPARED BY:
R-SQUARED GLOBAL, LLC
1309 LOUISVILLE AVENUE, MONROE, LA 71201
318-323-8900 OFFICE
JOB No. R3421_001

BC Operating, Inc. Closed Loop System

Design Plan

Equipment List

- 2 – 414 MI Swaco *Centrifuges*
- 2 – MI Swaco 4 screen *Moongoose Shale Shakers*
- 2 – double screen *Shakers* with rig inventory
- 2 – CRI *Haul off bins* with track system
- 2 – additional 500bbl *Frac tanks* for fresh and brine water
- 2 – 500bbl *water tanks* with rig inventory

**Equipment manufactures may vary due to availability but components will not.*

Operation and Maintenance

The system along with equipment will be inspected numerous times a day by each tour to make sure all equipment is operating correctly. Routine maintenance will be done to keep system running properly. Any leak in system will be repaired and/or contained immediately and the OCD notified within 48 hours of the remediation process start.

Closure Plan

While drilling, all cuttings and fluids associated with drilling will be hauled off and disposed of via Controlled Recovery Incorporated Facilities Permit NM01-0006.

State of New Mexico
Energy, Minerals and Natural Resources Department

Susana Martinez
Governor

David Martin
Cabinet Secretary

Brett F. Woods, Ph.D.
Deputy Cabinet Secretary

NM OIL CONSERVATION
ARTESIA DISTRICT

JAN 15 2015

Jami Bailey, Division Director
Oil Conservation Division



RECEIVED

November 18, 2014

BC OPERATING, INC.
Attn: Ms. Michael Feldewert

ADMINISTRATIVE NON-STANDARD LOCATION

Administrative Order NSL-7193
Administrative Application Reference No. pMAM1430229266

BC Operating, Inc.
OGRID 160825
Black River 10 State Com Well No. 1H
API No. 30-015-42689

Proposed Location:

	<u>Footages</u>	<u>Unit</u>	<u>Sec.</u>	<u>Twsp.</u>	<u>Range</u>	<u>County</u>
Surface	240 FNL & 360 FEL	A	15	24S	27E	Eddy
Penetration Point	330 FSL & 360 FEL	P	10	24S	27E	Eddy
Terminus	240 FNL & 360 FEL	A	10	24S	27E	Eddy

Proposed Project Area:

<u>Description</u>	<u>Acres</u>	<u>Pool</u>	<u>Pool Code</u>
E/2 of Section 10	320	Black River; Wolfcamp, East (G)	97442

Reference is made to your application received on October 28, 2014.

You have requested to drill this horizontal well at an unorthodox gas well location described above in the referenced pool or formation. This proration unit is governed by statewide Rule 19.15.15.10.B NMAC, which provides for 320-acre units, with wells located at least 660 feet from a unit outer boundary, and Rule 19.15.16.14.B(2) NMAC concerning directional wells in designated project areas. This surface location is outside the project area, and is permitted by Rule 19.15.16.15.B (4) NMAC which allows for surface locations outside project area. This location is unorthodox because a portion of the project area is less than 660 feet from the unit boundary.

November 18, 2014

Page 2

Your application has been duly filed under the provisions of Division Rules 19.15.15.13 NMAC and 19.15.4.12.A(2) NMAC.

It is our understanding that you are seeking this location, because it will allow for efficient well spacing and prevent waste of a productive reservoir.

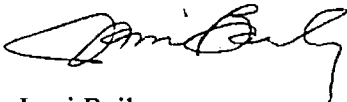
It is also understood that you have given due notice of this application to all operators or owners who are "affected persons," as defined in Rule 19.15.4.12 A (2) NMAC, in all adjoining units towards which the proposed location encroaches.

Pursuant to the authority conferred by Division Rule 19.15.15.13 (B) NMAC, the above-described unorthodox location is hereby approved.

The above approvals are subject to your being in compliance with all other applicable Division rules, including, but not limited to Division Rule 19.15.5.9 NMAC.

Jurisdiction of this case is retained for the entry of such further orders as the Division may deem necessary.

DONE at Santa Fe, New Mexico, on November 18, 2014



Jami Bailey
Director

JB/mam

cc: New Mexico Oil Conservation Division – Artesia
New Mexico State Land Office – Oil, Gas, and Minerals



View north of staked location showing nature of vegetation and topography. Hill in background is mapped as Castile Formation in Figures 1 and 2.



View to east from about 350 feet east of staked location. Mapped watercourse is west of viewpoint.



View north of small depression north of location where stormwater collects. No evidence of unstable ground.



View northeast toward location showing small cattle track and erosional feature. Bedrock is exposed in this cattle track beneath 1-2 feet of thin soil.

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 consist of outer and inner drilling cells and an optional fluids cell as described below:

1. Drilling cells (reserve pit) consist of:
 - a. An outer horseshoe for
 - i. fresh water and cut-brine fluid and cuttings or
 - ii. brine and cut-brine fluid and cuttings
 - b. An inner horseshoe for
 - i. brine and fluid and cuttings or
 - ii. fresh water fluid and cuttings
2. The optional fluids cell may be used
 - a. For storage of fresh water used in drilling or stimulation
 - b. For storage of stimulation flow-back (fresh) water prior to re-use or disposal
 - c. As an approved disposal site for drilling solids derived from a nearby well on the same lease. Prior to such disposal the operator will provide notice to OCD that
 - i. Identifies the well(s) to be served by the fluids cell of the temporary pit
 - ii. Provides the date that the drilling rig moved from the first well using the pit
 - iii. Affirms that the fluids pit will be closed in conformance with the mandates of the Rule

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 or rinse the solids to remove salt and/or petroleum hydrocarbons. The drainage system may be installed in the entire drilling cell or only in one horseshoe (e.g. the inner horseshoe). As described in the closure plan, this system of fabric-wrapped perforated pipe and drainage mats lie on the bottom of the drilling cells of the pit. The system will drain to the lowest corner of horseshoe where a standpipe rises from the depression to the top of the berm. The drainage system can remove 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. After any rinsing process, the 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.

C-144 Supplemental Documentation for Temporary Pit

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 any 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 LLDPE string-reinforced liner (that meets the requirements of OCD Rules for temporary pits) 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 that is 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 as specified by and meets all requirements of OCD Rules.

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

C-144 Supplemental Documentation for Temporary Pit

- 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.

C-144 Supplemental Documentation for Temporary Pit

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. However, a transmittal letter may notify OCD that drilling waste from a nearby site on the same lease may be placed in the temporary pit (e.g. placed in the drilling or fluids cells of the temporary pit). A notice will include the name of the nearby well, the date that the drilling or workover rig moved from the temporary pit, an affirmation that the temporary pit will be closed in conformance with the mandates of the Rule, including the mandated lifetime of the pit.

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 via email, which serves as notification that the operator intends on-site burial of solids.

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 optional drainage system described in the design and construction plan is not shown on the Plates but can be important element of the closure plan.

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 last drilling or workover rig associated with the relevant pit permit.
- 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 the fluids cell of the temporary pit; thereby further rinsing the residual solids in the pit.
- 20-60 days after placement of fresh or 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, an eight-point composite sample of the residual solids in the drilling cell of the temporary pit and a five-point composite sample of any solids in the fluids cell of the temporary 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 after being mixed in a ratio of 3:1 with the earth material to be used for stabilization of the residual cuttings and mud. A volumetric average of the laboratory result from the drilling cell solids and any fluid cells solids will be used to determine compliance with the standards of Table II.

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. It will be placed in a manner so as 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
3. Over the sloping, stabilized material and liner, place the **Soil Cover** 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.
4. Contour the cover to
 - a. blend with the surrounding topography
 - b. prevent erosion of the cover and
 - c. prevent ponding over the cover.

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-105
if burial includes solids derived from a nearby well on the same lease, the report will list the name, API # and location of the well(s) from which the solids originated

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 rig was released from the first well using the pit. This date will be noted on form C-105 or C-103 filed with the division upon the well's completion (or re-completion in the case of a workover).

Reclamation and Re-vegetation Plan

In addition to the area of the in-place burial, the operator will reclaim the surface impacted by the temporary pit, including access roads associated with the pit, to a safe and stable condition that blends with the surrounding undisturbed area including:

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. This includes the area of the temporary pit if a transmittal letter to OCD proposes an alternative to the re-vegetation or recontouring requirement with

- a demonstration that the proposed alternative provides equal or better prevention of erosion, and protection of fresh water, public health and the environment
- written documentation that the alternative is agreed upon by the surface owner.

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

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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.

From: Patterson, Heather, EMNRD
To: ["Randall Hicks"](#)
Cc: [Bratcher, Mike, EMNRD](#); ddurham@bcoperating.com; [Billings, Bradford, EMNRD](#)
Subject: RE: BC Operating - Black River 10 State Com 1H C-144
Date: Tuesday, May 26, 2015 11:46:00 AM

Mr. Hicks,

Brad and I reviewed this plan last week and our main concern is the depth to groundwater. We don't see enough evidence to prove that the depth to groundwater will be greater than 50 feet at this site. The OCD would like to see a hard data point at the location before this permit can be approved.

If you have any questions or concerns please contact me,

Heather Patterson
Environmental Specialist
NMOCD District II
Office (575)748-1283 ext.101
Cell (575)703-0228

From: Randall Hicks [<mailto:r@rthicksconsult.com>]
Sent: Sunday, May 24, 2015 1:29 PM
To: Billings, Bradford, EMNRD
Cc: Patterson, Heather, EMNRD; Bratcher, Mike, EMNRD; ddurham@bcoperating.com
Subject: FW: BC Operating - Black River 10 State Com 1H C-144

Brad - Heather

I have been on vacation and am checking up on permit applications. This one should be stamped received at District 1 on April 10 – more or less. So June 10, more or less, is the 60 day “auto denial” per the Rule. I know Mike has been out of pocket and I know Brad helped on the Lime Rock NW State 19 permit in Mike’s absence and I imagine that Heather is also filling in.

So if this pit permit needs some help to get it out the door on time, I am transmitting it again to you all.

I hope Mike is feeling better.

Randall Hicks
R.T. Hicks Consultants
Cell: 505-238-9515
Office: 505-266-5004

From: Randall Hicks [<mailto:r@rthicksconsult.com>]
Sent: Tuesday, April 07, 2015 5:02 PM
To: Heather.Patterson@state.nm.us

Cc: Martin, Ed; 'Bratcher, Mike, EMNRD'; Deane Durham
Subject: BC Operating - Black River 10 State Com 1H C-144

Ms. Patterson –

We will be shipping a paper copy of this package via US Mail today – unless you do not want the paper. District 1 and 4 have allowed electronic copies rather than paper but District 3 wants paper.

I have copied Mr. Bratcher on this email in the event that you are too swamped to conduct this very easy review. As stated in the cover letter

- The site meets all the setback criteria
- The data are very good with respect to karst, surface water and depth to groundwater
- The generic plans for pit are verbatim from previously-approved C-144s in Lea County
- The requested variance has been approved for other drilling pits in NM

If you haven't yet reviewed a drilling pit C-144, this would be a good one.

Let me know if you want a paper copy via US Mail.

Randall Hicks
RT Hicks Consultants
Office: 505-266-5004
Cell: 505-238-9515

R. T. HICKS CONSULTANTS, LTD.

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

June 9, 2015

Mr. Brad Billings
Ms. Heather Patterson
Mr. Mike Bratcher
NMOCD District 2
811 S. First Street
Artesia, New Mexico 88210
Via E-mail and US Mail

RE: Revised Groundwater Setback Criteria Demonstration for
BC Operating Black River 10 State Com 1H and Black River 10 SWD

Lady and Gentlemen:

On behalf of BC Operating, R.T. Hicks Consultants, Ltd. is pleased to submit the attached revision of the groundwater setback criteria siting demonstration for the Black River 10 State Com 1H. The attached siting demonstration also applies to the Black River 10 SWD proposed pit. The data demonstrate that the distance between the bottom of the proposed pits at the above-referenced wells is significantly greater than 50 feet.

In addition to the data and our conclusions, we ask that OCD consider the highlighted elements of the Rule presented below.

19.15.17.9.B (2) Temporary pits. The plan for design and construction of a temporary pit shall follow applicable liner manufacturers' requirements. The permit application also shall include operating and maintenance procedures, a closure plan and hydrogeologic data that provides sufficient information and detail on the site's topography, soils, geology, surface hydrology and ground water hydrology to enable the appropriate division district office to evaluate compliance with the siting criteria of 19.15.17.10 NMAC. In the absence of site-specific ground water data, the operator can provide a reasonable determination of probable ground water depth using data generated by models, cathodic well lithology, published information or other tools as approved by the appropriate division district office. The plan...

We believe the Commission is stating that groundwater wells or borings on the same location as a proposed temporary pit are not required provided that the operator presents a "reasonable determination of probable ground water depth..." The data presented in the original permit application and this amendment use published information (from the USGS and peer-reviewed reports) and recent depth to water data generated by Hicks Consultants. These data have been approved by all OCD Districts in previous submissions. As stated in the attachment and the initial application, the use of OSE data to determine depth to water is problematic. As documented by our May-June 2015 field program, OSE data can be very useful if the data are relatively recent (e.g. post 2000) and the density of data is more than 2 wells per square mile.

Thus, the permit application with this amendment meet the criteria of the rule with respect to using published information and depth to water data derived from professional measurements – both of which have been approved by all OCD Districts.

With respect to a reasonable determination of probable groundwater depth, we trust the OCD will agree that the following are reasonable and probable:

- Groundwater flows from areas of high head to areas of low head.
- In this area, the uppermost groundwater unit is
 - unconfined and
 - hydraulically connected to the Black River.
- The water table elevation is sub-parallel to the elevation of the ground surface, which slopes from the mountains to the west toward the Pecos River to the east.
- Depth to water measurements do not provide reasonable data that allow for a probable determination of the distance between the bottom of a pit and groundwater unless the elevation of the measurement and the elevation of the pit are considered.
- The density of measured groundwater data in the area is quite good and allows a trained professional to develop a reasonable and probable water table surface. Using the water table surface and the elevation of the bottom of the pit, one can reasonably determine the probable distance between a proposed drilling pit and the groundwater surface

Please contact me if you have any questions.

Sincerely,
R.T. Hicks Consultants

A handwritten signature in black ink, appearing to read "Randall Hicks", written in a cursive style.

Randall Hicks

Copy: BC Operating
Ed Martin, State Land Office (surface owner)

Distance to Groundwater

Figure 1, revised Figure 2, Plates 1a-1d and the discussion below demonstrates that groundwater (fresh water as defined by NMOCD Rules) at the location is greater than 50 feet beneath the temporary pit that will contain fluids that cannot be classified as “low-chloride.” Groundwater will be more than 50 feet below the bottom of the buried waste, meeting criteria for in-place closure.

Figure 1 is a geologic/ topographic map that shows:

1. The location of the staked well location as a hexagon with the surface elevation.
2. Water wells from the OSE database are plotted as a blue triangle inside colored circles that indicate well depth (see legend). OSE wells are often mis-located in the WATERS database as older wells are plotted in the center of the quarter, quarter, quarter, of the Section Township and Range. For example, we could find no evidence via historic and recent aerial photographs or field inspection on foot that well C-1452 exists as represented in the OSE database.
3. Water wells from the USGS database as large colored triangles that represent the unit in which the well was completed (none are present in Figure 1).
4. Water wells, which are not documented in the public databases but were identified by field inspection or other published reports as colored squares (none were identified in Figure 1).
5. The depth-to-water from the most recent available measurement for each well is provided adjacent to the well symbol.

Our examination of the geology of the area near the proposed temporary pits causes us to conclude that the uppermost water-bearing zone lay in the Permian Rustler Formation. Existing data do not allow us to determine if the water in the Rustler is unconfined or confined. For a confined aquifer, the depth to groundwater is the top of the permeable unit (e.g. 100 feet) but the depth to groundwater (the potentiometric surface) can be a few feet below the ground surface.

Note that the Castile Formation (Pc) crops out to the north of the location and the Salado Formation (Psl) is exposed west of the location. Both of the rock units are described as dominated by evaporates (e.g. salt) and/or gypsum. This mineralogy typically does not create potable groundwater. The hydrogeology of the area is described in the next section.

The Group A and Group B OSE wells were initially used to create Figure 2 and are discussed below. These wells are shown on topographic maps and aerial photographs. In late May and June of 2015, Hicks Consultants measured depths to water in several wells along the Black River in order to employ water levels measured by professionals to create Figure 2 rather than driller's observations during drilling- as is reported in the Office of the State Engineer website.

Figure 2 is larger scale geologic and topographic map that shows:

1. The location of the staked location as a hexagon.
2. Water wells measured by the USGS or other professionals, the formation completion depth of the well (see Figure 1 Legend) and the calculated elevation of the groundwater surface and the date of the observation.

3. An example water elevation from a deeper well in the Group A and B OSE wells shown in Figure 1.
4. Isocontour lines displaying the elevation of the groundwater surface of the Rustler Formation.

Hydrogeology

Figures 1 and 2 show that the proposed pit straddles the contact between the Rustler and underlying Castile Formation. This relationship appears odd as the Castile underlies the Salado, which crops out about ½ mile southwest of the pit location. Additionally, in a larger scale geologic map of the area, the outcrop pattern conforms to what is expected: the Rustler overlying the Salado, which overlies the Castile. For the geologic map of Figures 1 and 2 to be correct, the Salado would be removed by post-deposition solution in this area allowing deposition of the Rustler over the Castile. Such a disconformity is reported in the literature¹ and presumably has occurred here as well. Thus, the map suggests the Rustler would form a relatively thin alluvial blanket over the anhydrite and gypsum of the Castile Formation.

In the area, only the Rustler and Alluvium contain groundwater for beneficial use. Any groundwater in the Castile can be assumed to be high in sulfate or brine. Groundwater in the Salado is brine and this unit is the source of the high salinity seepage into the Pecos River at Malaga Bend. A requirement of 630 feet of surface casing to protect fresh water zones at this location appears to be incorrect based upon our interpretation of the hydro-geologic column.

Depth to Groundwater

We typically try to avoid using data from the OSE database as this data relies upon observed water levels by drillers during the completion of the water well. The OSE dataset provides some useful data in certain areas – and the data in Group A and B areas of Figures 1 and 2 are useful and discussed below. However, we elected to update these OSE data with measured depth to water measurements in late May and early June of 2015. As indicated above, we could find no evidence in air photos or via a foot survey that well C-1452 exists as located in the OSE database.

The following table provides data from the OSE database on wells in Group A and B of Figures 1 and 2. One common feature of these wells is the shallow depth of groundwater (17-56 feet) and the shallow total depth of many wells (e.g. 30 feet for C-1943). Because of these two features, we believe errors in depth to water data reported by drillers could be minimized. Indeed, based upon the measurements of 2015, this is the case as discussed below.

The range of groundwater elevation is 29 feet for Group A (3156 to 3127) over a distance of about 1.25 miles and a time span of 56 years. With the Group B wells, the range is 42 feet (3084 to 3042) over a distance of about one mile and a time span of 32 years. The more recent data (post- 2000) in these two groups provides an average groundwater elevation of 3144 for Group A

¹

http://www.wipp.energy.gov/information_repository/cra/2009_cra/references/Others/Powers_Holt_1999_The_Los_Medanos_Member_of_the_Permian_Rustler_Formation.pdf

Siting Criteria (19.15.17.10 NMAC) BC Operating – Black River 10 State Com 1H

and 3064 for Group B, yet both these sub-groups have a relatively large variation. The deeper wells, which may not be as influenced by irrigation or the stage of the nearby Black River, provide an average groundwater elevation of 3130 for Group A and 3070 for Group B with a very small variation.

The regional potentiometric surface is based upon measured static water levels by professionals (e.g. USGS, Hicks Consultants) from 2013-15. Because the data are relatively sparse near the proposed pit, we performed the evaluation (above) of the OSE data to determine if these data could assist in providing more certainty of the depth to groundwater at the proposed pit location and then measured depth to water in selected wells in late May and early June.. In the permit document submitted in April, we concluded that the averaged groundwater elevation of 3130 is reasonable in the area of Group A wells. In the Group B wells we were less certain of a conclusion that the averaged groundwater elevation is 3070.

Well ID	Finish Date	Elevation (ft msl)	Well Depth (ft)	Depth to Water (ft)	GW Elev (ft msl)	Use of Well
Group A OSE Wells						
C 00683	3/10/1956	3151	50	17	3134	DOMESTIC
C 01187	5/28/1964	3151	108	17	3134	
C 00516	1/27/1955	3163	105	36	3127	IRR
C 00516 S	3/15/1956	3163	50	17	3146	IRR
C 00631	2/11/1955	3163	50	24	3139	
C 01366	11/26/1966	3163	60	35	3128	EXPL
C 00516 POD6	5/9/2006	3163	78	17	3146	IRR/COMM
C 03092	5/18/2004	3193	54	37	3156	
C 03490 POD1	6/30/2011	3152	140	23	3129	IRR. & COMM.
Average post 2000				26	3144	
Average >100 TD				25	3130	
Group B OSE Wells						
C 00347	6/25/1976	3109	60	30	3079	EXP.
C 02976	9/27/2003	3100	57	27	3073	DOM/STK
C 01943	9/25/1981	3109	30	25	3084	
C 03037	7/31/2004	3095	116	25	3070	
C 03145	3/4/2005	3109	103	40	3069	
C 03260 POD1	11/2/2008	3098	80	56	3042	LIVESTOCK
Average post 2000				37	3064	
Average >100 TD				33	3070	
Note: Surface elevation obtained from USGS Topographic Map (1:24000)						

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The May-July measurements of three (3) static water levels in the Group A and Group B wells agree with the measured depth to water measurements of 2015, as shown in the inset maps below.

Rather than employ data from wells from the OSE database, we elected to use the measured levels from the May-June 2015 field program. The two measurements from the Group A wells



are 24.5 below ground surface for Misc 284 (C-515 on Figures 1 and 2) and 21 feet below ground surface for a well not identified on the OSE website (Misc-285). These measurements agree very well with the average values shown in Table 1.

Wells in the Group B area were either plugged and abandoned (C-347, not found where the OSE

database suggests (C-1943) or inaccessible (C-3037 and C2976). One well or open casing was identified adjacent to a working but non-pumping well (Misc 286). The depth to water of 32.4 agrees with the average value of the Group B wells in Table 1.



From these data we conclude:

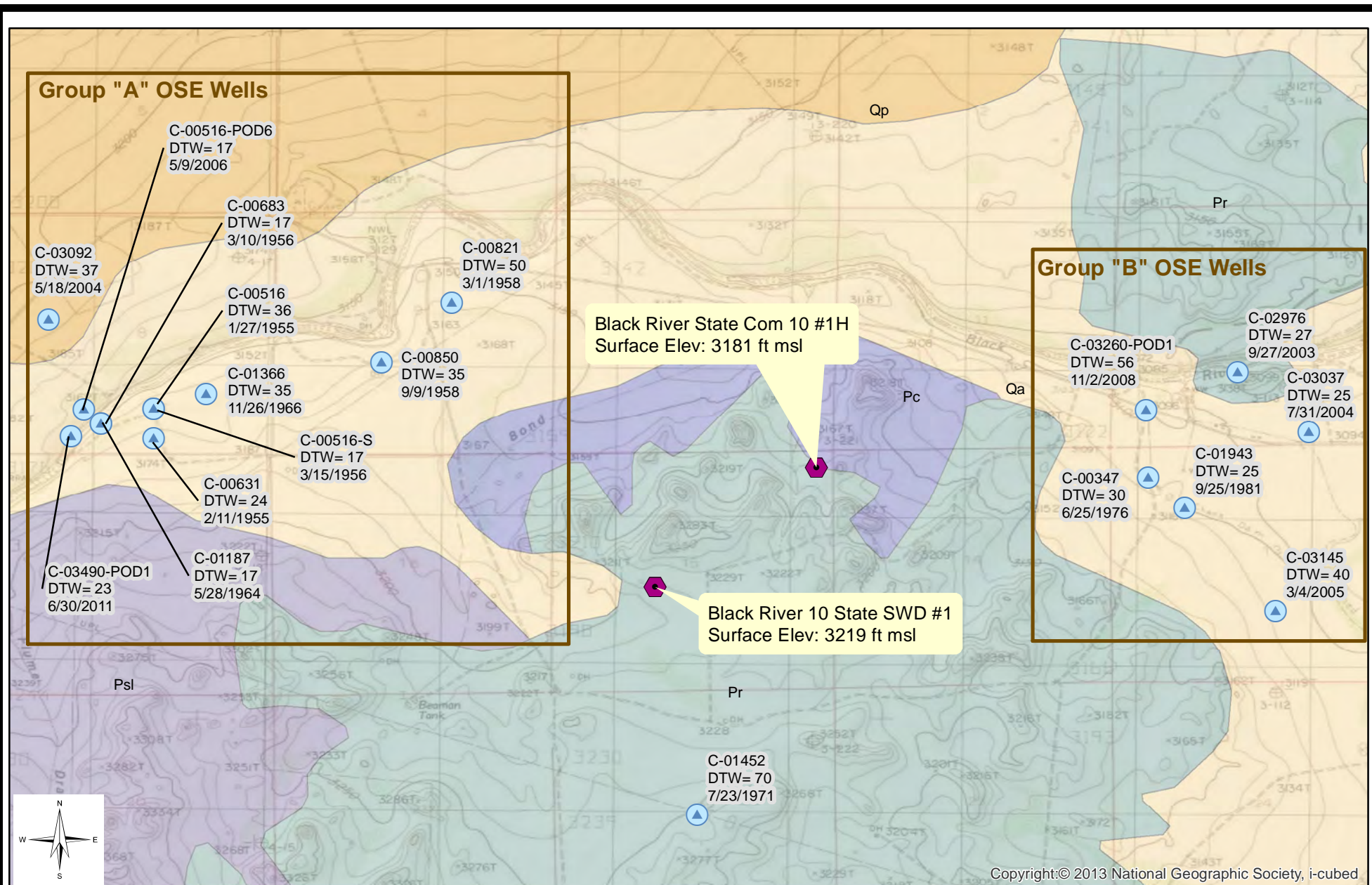
- Beneath the proposed pit, the elevation of groundwater in the uppermost water bearing zone is approximately 3075.
- Based upon the geologic section, this elevation should be within the anhydrite of the Castile Formation or salt of the Salado. Thus, any groundwater in this zone would brine or rich in sulfate and unpotable.
- Depth to water information from the OSE website can be useful if
 - The density of data is relatively high (e.g. several wells in one square mile)
 - The data are relatively recent
- Given the surface elevation of the well (3181) and a 10-foot (maximum) deep temporary pit, the distance between the bottom of the pit and the groundwater surface is about feet 106 feet (3181-3075).

Siting Criteria (19.15.17.10 NMAC)
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We would like to address a question of OCD staff during the water level measurement program relating to the depth to water data versus the elevation of the groundwater surface:

How can the depth to water data show less than 50 feet while the permit application concludes the distance between the bottom of the pit and groundwater is greater than 100 feet?

Plates 1A-1D show the elevation of the water table surface based upon depth to water measurements subtracted from the surface elevation at the well. Unlike the Figures in the application, OCD can verify the potentiometric surface elevation through careful examination of the topographic map and the depth to water measurements (Plate 2). Where depth to water measurements are less than 50 feet, such as near the Black River (Group A and Group B wells) or the southeastern quadrant of Plate 2, the surface elevation is significantly lower than the proposed Black River 10 State Com 1H drilling pit. For example, well USGS 371 lies at a elevation of 3080.1 (according to the USGS database) and has a measure depth to water of 17.29 feet, resulting in a groundwater elevation of 3062.81. Well USGS-379 also shows a depth to water less than 20 feet, but also sits at a surface elevation significantly lower than the proposed drilling pit. In short, depth to water measurements by themselves provide no value in determining the distance between the bottom of a pit and groundwater – unless the pit and the wells are at the same elevation.



0 0.5 1
Miles

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Depth To Water and Geology
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Figure 1
April 2015

Legend



Pit Location

OSE Water Wells

Well Depth (ft)



<= 150

NM Geology

Map Unit, Description



Pc, Paleozoic-Castile Formation; anhydrite sequence



Pr, Paleozoic-Ruster Formation; siltstone, gypsum, sandstone, and dolomite; Upper Permian



Psl, Paleozoic-Salado Formation; evaporite sequence; Upper Permian



Qa, Quaternary Alluvium

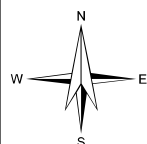
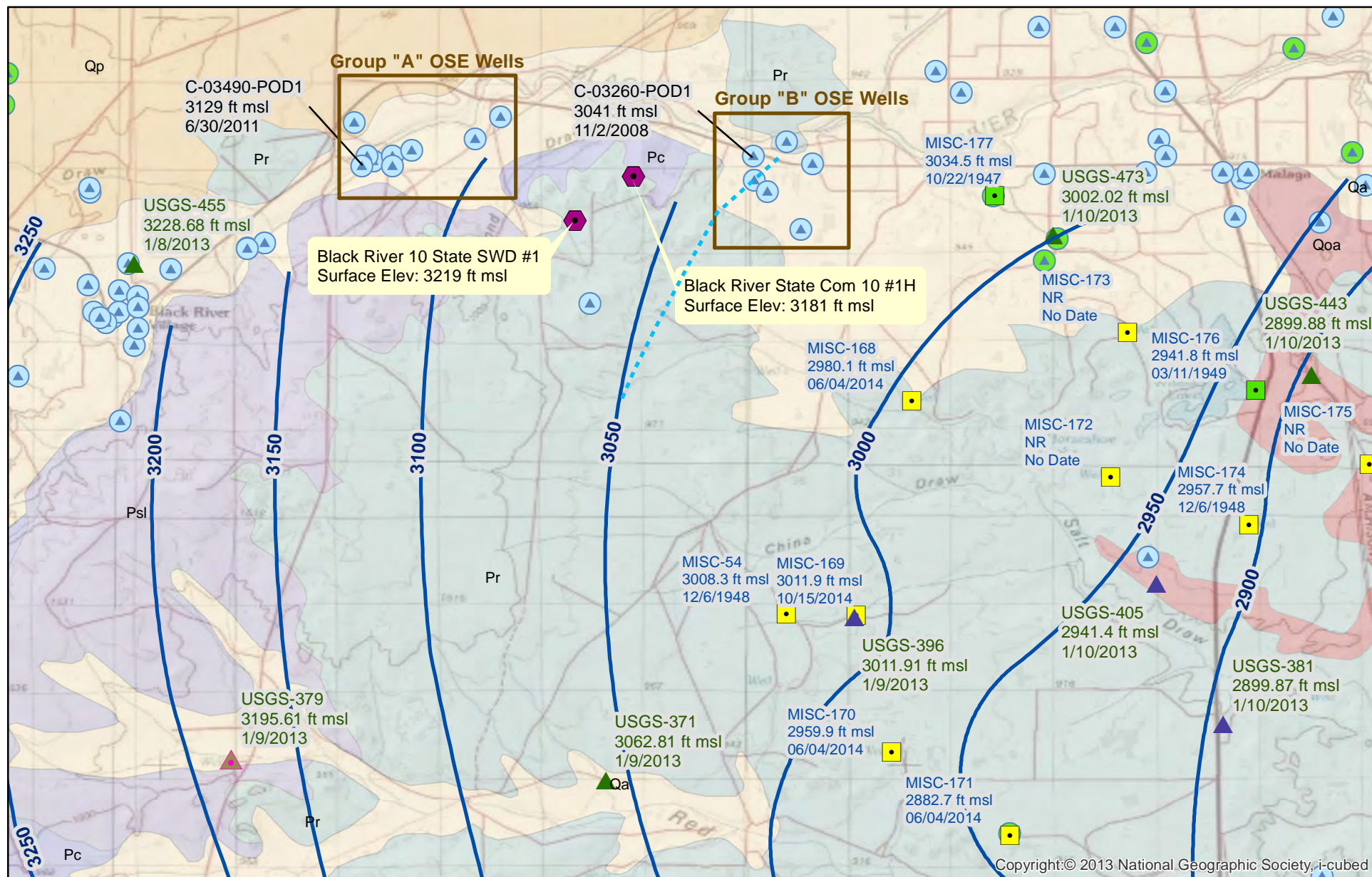


Qp, Quaternary-Piedmont Alluvial Deposits

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Legend
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Figure 1
Legend
April 2015



0 1 2
Miles

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Potentiometric Surface and Groundwater Elevation
at Nearby Water Wells
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Figure 2
April 2015

Legend



Pit Location

Potentiometric Surface (ft msl)



Isocontour

USGS Gauging Station (GW Elev, Date)

Aquifer Code, Well Status



Alluvium/Bolsom



Castile Formation, Water level was affected recently by pumping at a nearby site that taps the same aquifer.



Rustler

Misc. Water Wells (GW Elev, Date)

Well Depth



No Data



151 - 350

OSE Water Wells (GW Elev, Date)

Well Depth (ft)



<= 150



151 - 350

NM Geology

Map Unit, Description



Pc, Paleozoic-Castile Formation; anhydrite sequence



Pr, Paleozoic-Rustler Formation; siltstone, gypsum, sandstone, and dolomite; Upper Permian



Psl, Paleozoic-Salado Formation; evaporite sequence; Upper Permian



Qa, Quaternary Alluvium



Qoa, Quaternary-Older Alluvial



Qp, Quaternary-Piedmont Alluvial

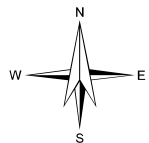
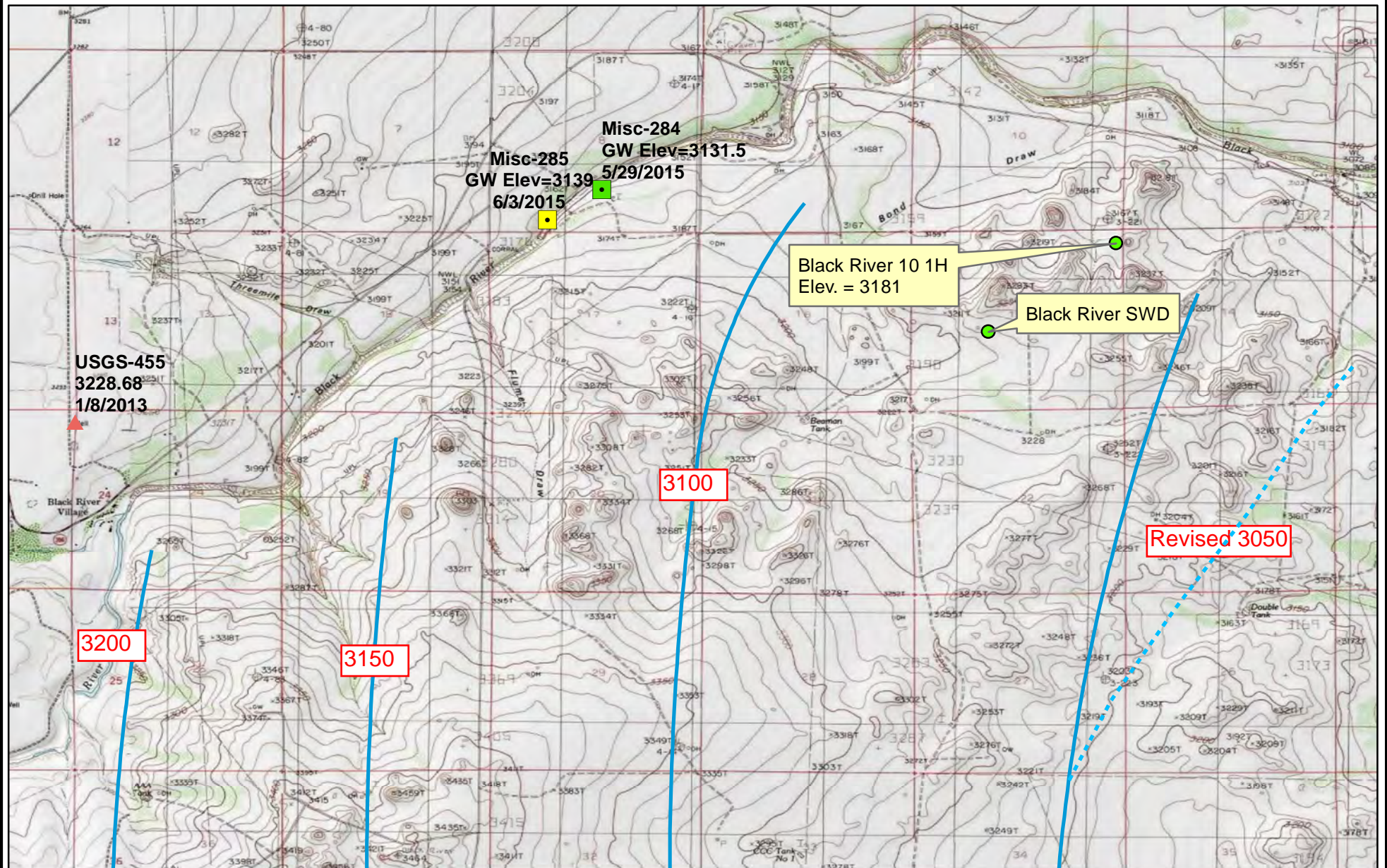
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Potentiometric Surface and Groundwater Elevation
at Nearby Water Wells

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Black River State Com 10 #1H

Figure 2
Legend

April 2015



0 2,000
Feet

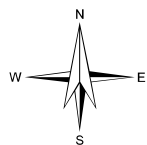
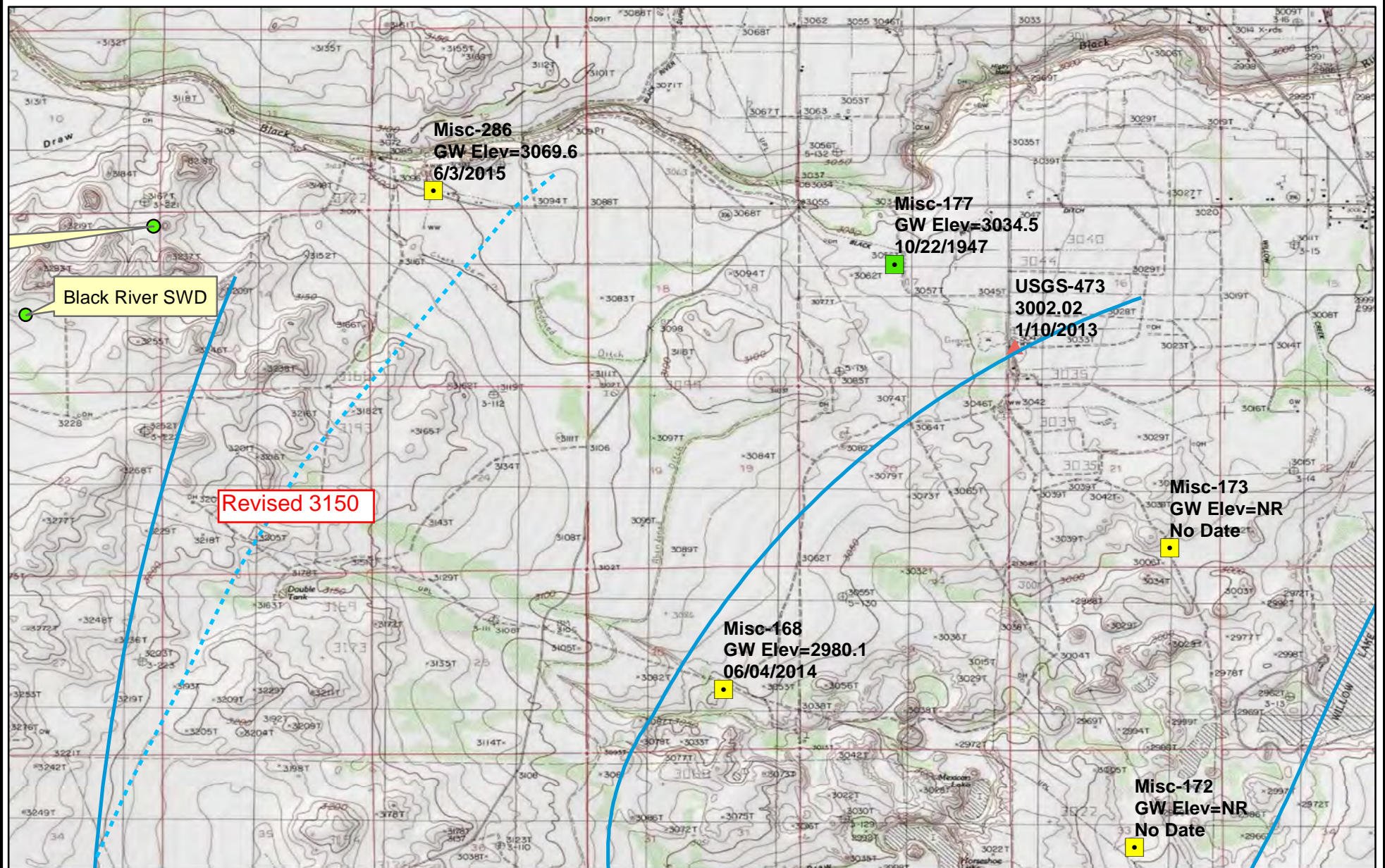
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Groundwater Elevation

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Plate 1a

June 2015



0 2,000
Feet

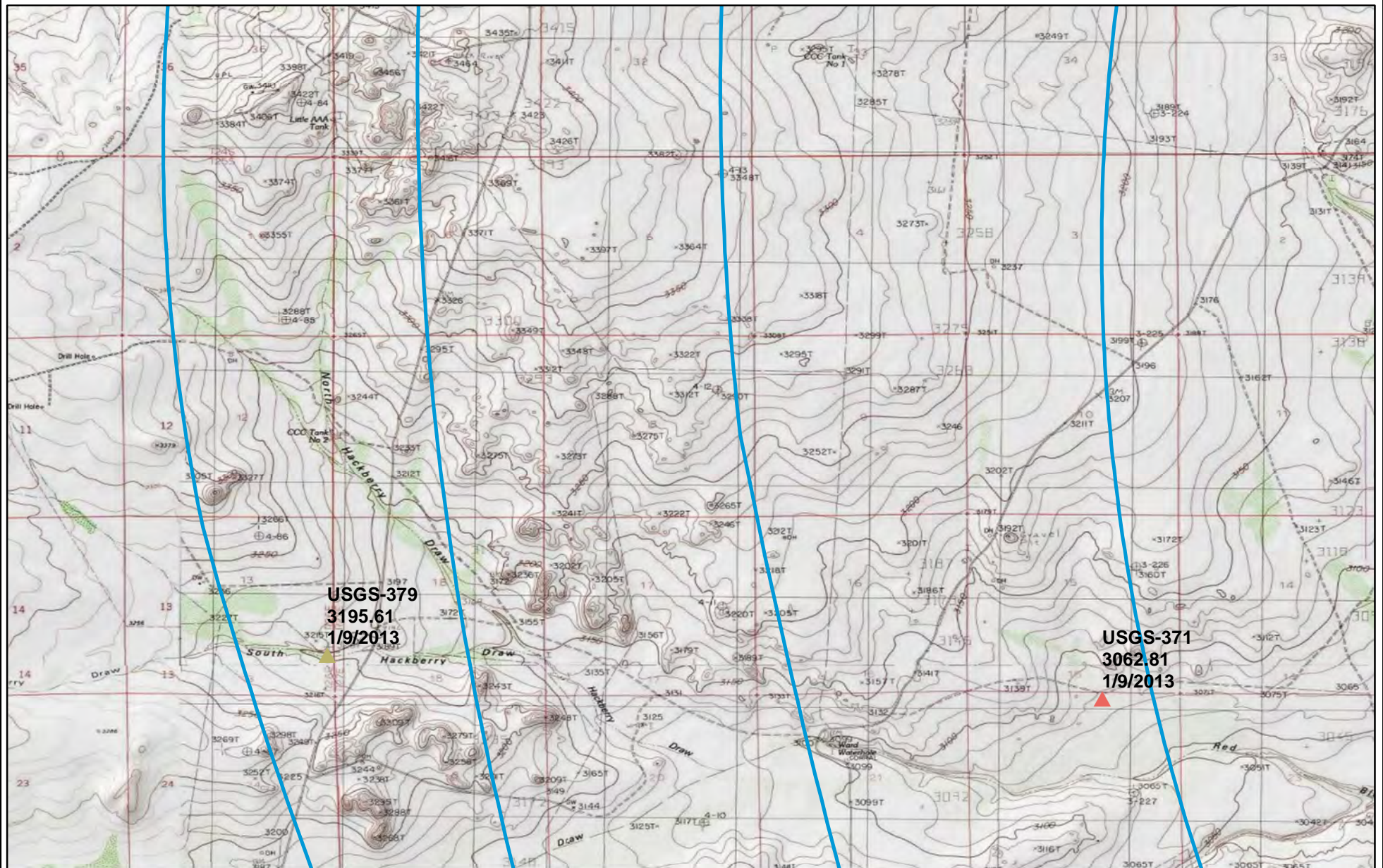
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Groundwater Elevation

Plate 1b

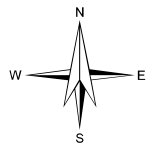
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June 2015



USGS-379
3195.61
1/9/2013

USGS-371
3062.81
1/9/2013



0 2,000
Feet

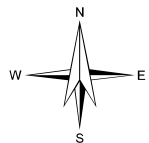
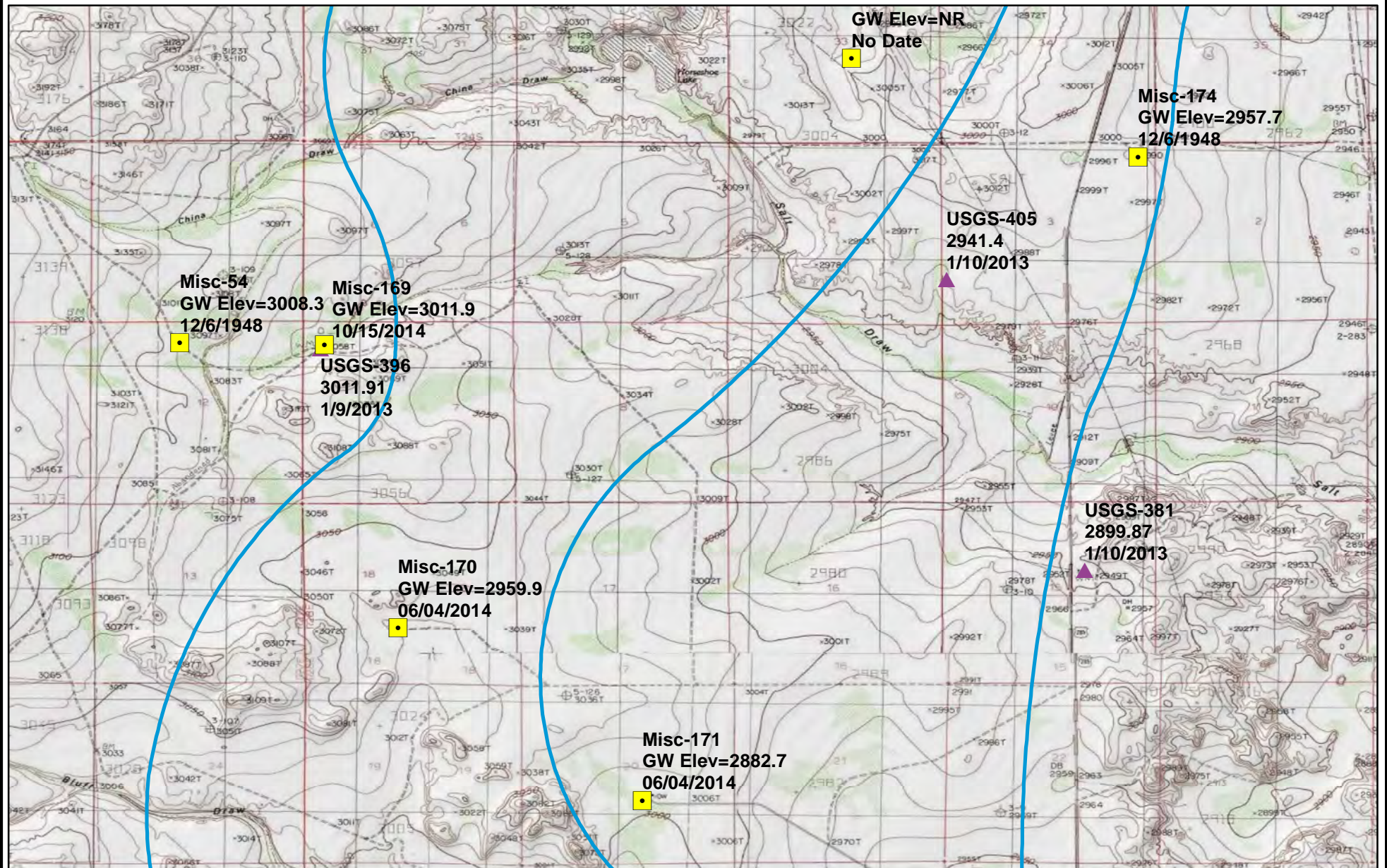
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Groundwater Elevation

Plate 1c

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June 2015



0 2,000
Feet

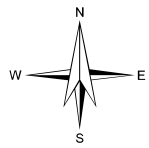
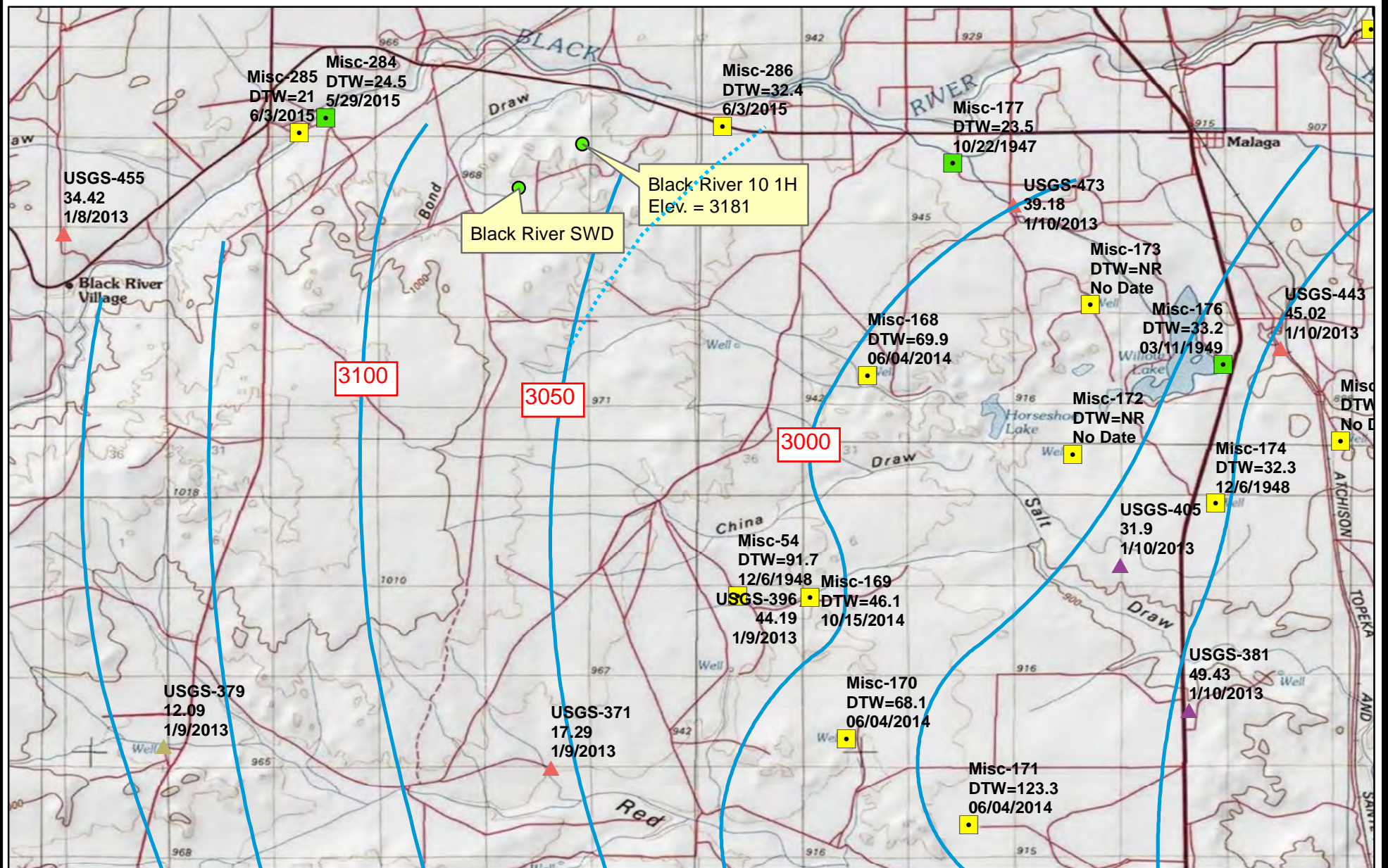
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Groundwater Elevation

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Plate 1d

June 2015



0 4,000
Feet

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Depth to Groundwater and Potentiometric Surface

BC Operating - Black River State Com 1H

Plate 2

June 2015