



December 5, 2014

Mr. John Axelson
East Environmental Supervisor
Colorado Oil and Gas Conservation Commission
1120 Lincoln Street, Suite 801
Denver, Colorado 80203

RE: Work Plan for a Subsurface Investigation to Assess Potential Groundwater and Surface Water Impacts Associated with the Rice Lease Produced Water Pits (Facility #116281) Logan County, Colorado - Olsson Project # 014-0704

Dear Mr. Axelson,

CM Production, LLC (CM) has retained Olsson Associates to perform a subsurface investigation to assess the presence of shallow groundwater, potential impacts to groundwater from historic and present operation of three produced water pits, and the potential for seepage from the pits to impact surface water in an intermittent or ephemeral drainage located to the east of the site. This work is tentatively scheduled for the week of December 15, 2014. Results should be received by early January 2015. The purpose of this work is to perform a site specific sensitive area determination to satisfy the requirements of Rule 901. e. The site location is shown on Figure 1.

Proposed Scope of Work

Olsson proposes to advance three borings to a maximum of 30 feet below ground surface (bgs), or to auger refusal if a competent, impermeable layer, is encountered at shallower depth. The proposed locations of the three wells are shown on Figure 2. It is expected that a rubber-track mounted probe rig, capable of using augers, will be needed to get to the proposed boring locations, and in particular the upgradient boring to the north of the north pit. Alternatively, a central mining equipment (CME) 75 rig may be able to access all three locations and complete the borings using hollow stem augers. Splitspoon samplers will be used and blow counts recorded for each sample drive if hollow stem auger drilling is used.

The borings will be logged by a geologist and the logs will include the lithologies, recorded using the unified soil classification system, changes in lithology, observations of staining or moisture content, and any apparent odor. A well completion diagram will also be prepared for each well.

The three borings will be completed as temporary groundwater monitoring wells. The wells will be constructed with ten feet of 2-inch diameter schedule 40 PVC machine-slotted screen at the bottom of the well, a 2-inch threaded bottom cap, and a 10-20 silica sand pack will be placed in the annular space around the screen from the bottom of the boring and brought up to at least

two feet above the top of the screened interval. The well will be raised to the surface using 2-inch diameter blank PVC casing, and the annular space around the casing will be sealed using granular bentonite and bentonite crumbles, hydrated with potable water. The bentonite seal will be brought to within one foot of the surface.

The surface completion of the monitoring wells will consist of a metal riser to protect the wells, grouted in place at the ground surface. The PVC well casing will be capped with a 2-inch expandable J-plug. The wells will be checked using a water level indicator, and a disposable bailer. If the wells are dry at the time of completion, Olsson will return to the site and check the wells within a couple of weeks.

Olsson will hand auger a boring down from the north pit at a location above the base of the main drainage. The hand auger boring will be advanced to a maximum depth of ten feet bgs, or to auger refusal. If auger refusal is encountered at a depth shallower than five feet, two additional hand auger boring locations will be attempted to get to greater depth.

A hand auger location will be advance to the north of the pits along the main drainage, as described above to assess water seepage from higher on the bluff of the Chimney Canyons, unless a surface water sample can be obtained from the main drainage in this area. The purpose of these samples will be to assess background conditions upgradient of the pits.

Analytical Program

If groundwater is not encountered, and the three wells remain dry there will not be any groundwater monitoring required. If groundwater is encountered then it will be sampled for the Table 910-1 water parameters:

- Benzene, toluene, ethylbenzene, and xylenes (BTEX) by EPA Method 8260;
- Chlorides by EPA Method 325.3
- Sulfate by EPA Method 375.4
- Total dissolved solids (TDS) by SM 2540C
- pH EPA Method 150.1
- Electrical Conductivity EPA 120.1

Additionally, if sufficient groundwater can be obtained from the wells, the wells will be sampled for major cations (Ca, Fe, Mg, Mn, Na) and anions (Br, CO₃, HCO₃, Cl, F, NO₂, NO₃, SO₄), to allow for a comparison of the groundwater chemistry between the wells.

If a competent, impermeable layer is encountered at a depth shallower than 30 feet bgs, then Olsson will attempt to collect a geotechnical sample so that the hydraulic conductivity can be assessed or a sieve analysis can be performed to assess percentages of fines. A percolation test may be performed at a later date if a suitable geotechnical sample cannot be collected.

Proposed Schedule

Olsson has contacted a drilling company and has tentatively scheduled the work for December 15 through December 17, 2014. It is expected that the sample results will be received by early January 2015. Olsson will summarize the findings of this limited subsurface investigation and site specific subsurface investigation in a brief report.

Sincerely,

Olsson Associates, Inc.



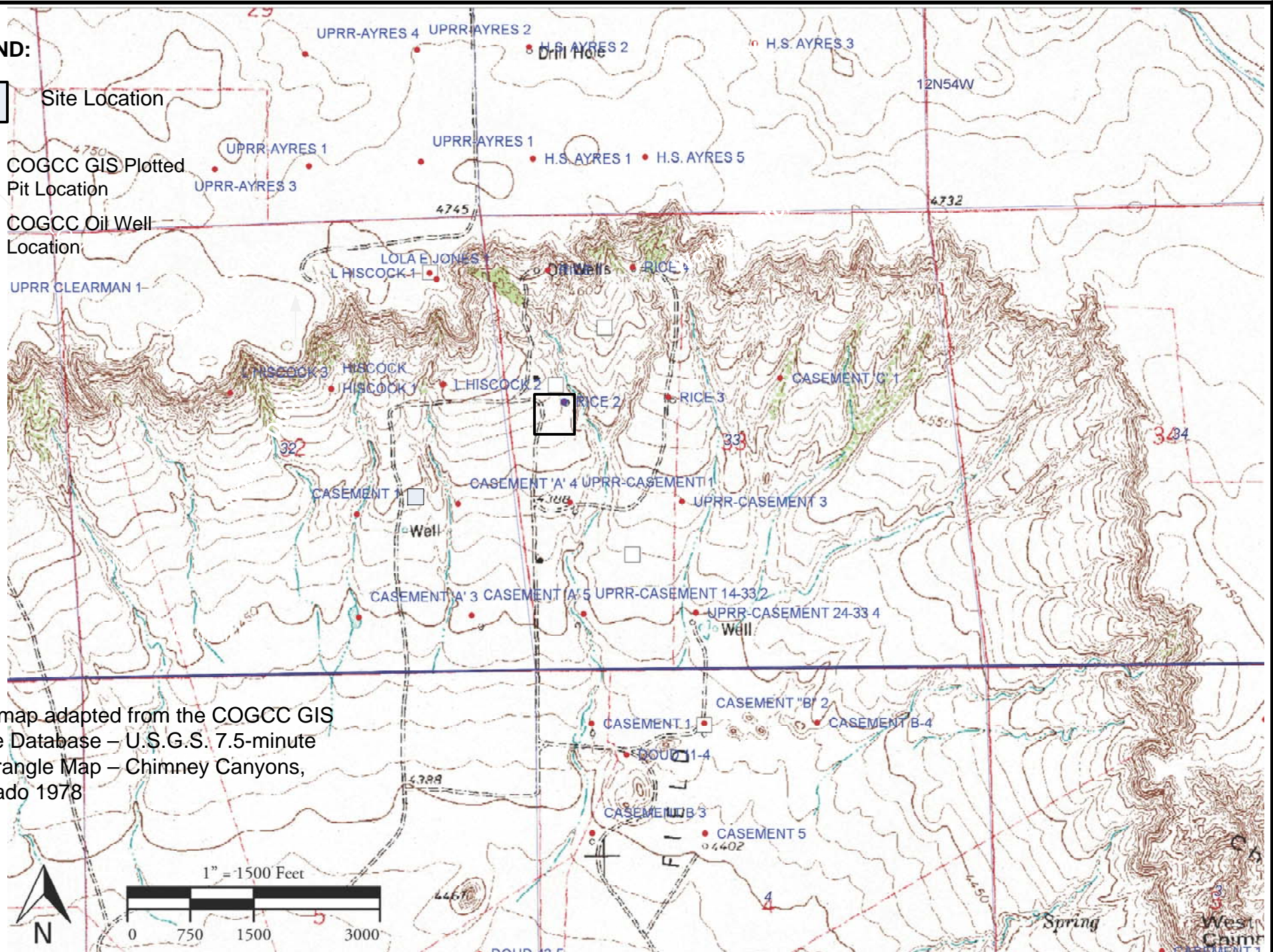
James W. Hix, PG
Senior Geologist

cc: John Teff – CM Production, LLC
Curtis Ditzell – CM Production, LLC
Kirk Mueller – Davis Graham & Stubbs, LLP
Jeremy Ferrin – COGCC
Britta Beckstead – Colorado AG Office

FIGURES

LEGEND:

- Site Location
- COGCC GIS Plotted Pit Location
- COGCC Oil Well Location



Base map adapted from the COGCC GIS Online Database – U.S.G.S. 7.5-minute Quadrangle Map – Chimney Canyons, Colorado 1978

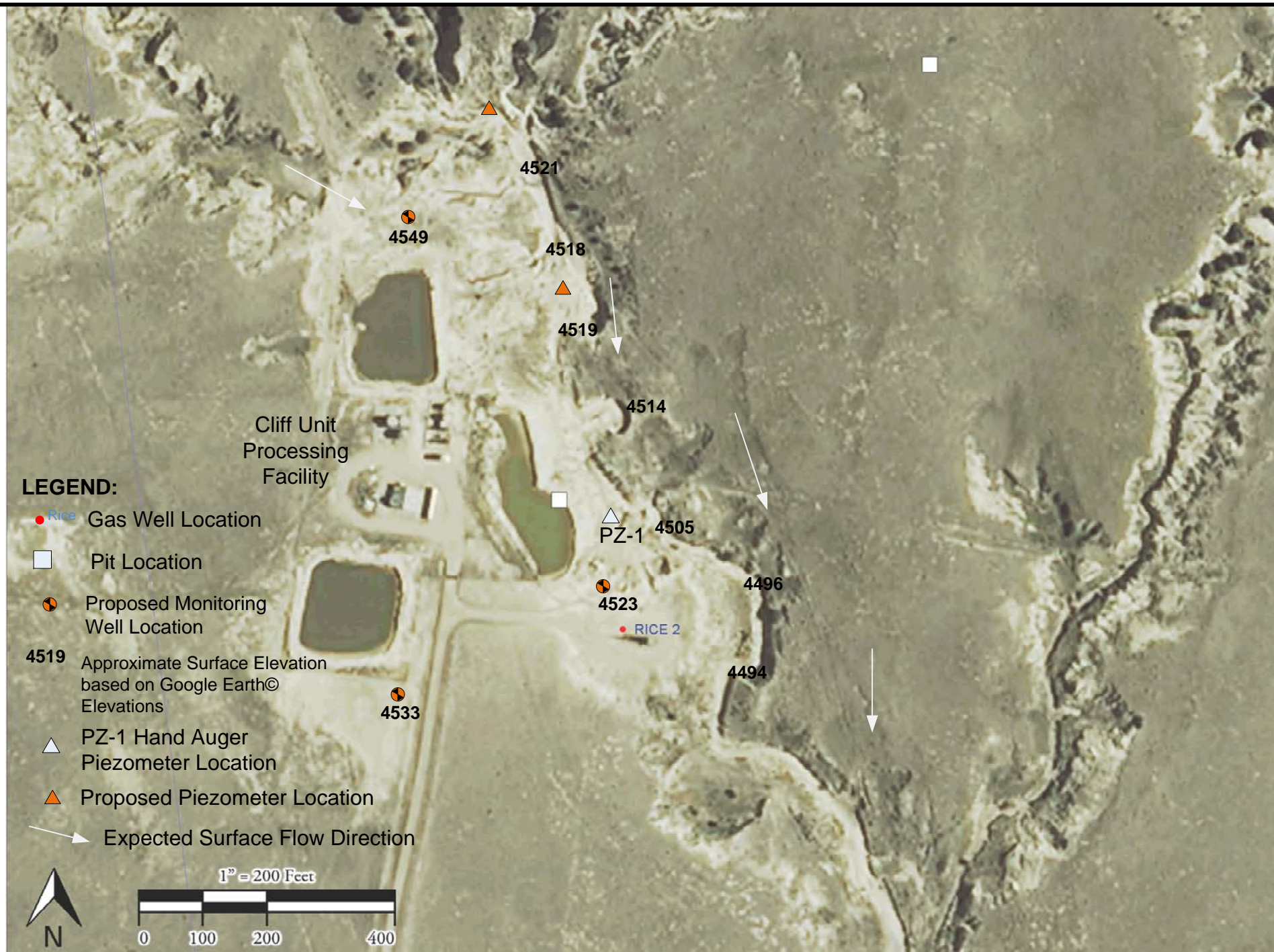
PROJECT NO: 014-0704
 DRAWN BY: JWH
 DATE: 08/20/2014

General Site Location Map
 CM Production, LLC
 Cliff Field, Rice Lease, Logan County, Colorado

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FIGURE
 1



PROJECT NO: 013-1681

DRAWN BY: JWH

DATE: 12/04/2014

Rice Lease – Proposed Monitoring Well Locations
CM Production, LLC
Cliff Field, Rice Lease, Logan County, Colorado

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FIGURE

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