



APPLICATION FOR MODIFICATION

CLASS I UIC PERMIT 00-340

CHRISTENSEN RANCH DISPOSAL WELLFIELD

A COGEMA Mining, Inc.

935 Pendell Boulevard
P.O. Box 730
Mills, WY 82644

DECEMBER 2006

Prepared By:
Petrotek Engineering Corporation
10288 West Chatfield Ave., Suite 201
Littleton, Colorado 80127
Phone: (303) 290-9414
Fax: (303) 290-9580



Petrotek Engineering Corporation 10288 West Chatfield Avenue, Suite 201 Littleton, Colorado 80127 (303) 290-9414 (303) 290-9580 Fax

February 2, 2007

COGEMA Mining, Inc.
935 Pendell Boulevard
Mills, WY 82644

Attention: Donna Wichers

Subject: Class I Disposal Well Plugging and Abandonment Cost Estimate
Irigaray Mine; Johnson County, Wyoming

Dear Donna:

Per your request, Petrotek Engineering Corporation (Petrotek) has prepared a plugging and abandonment cost estimate for the proposed COGEMA DW No. 4 and No. 5 wells. Because the well design and completion for both wells are very similar, one cost is provided that is representative for each of the wells. The procedures included herein are based on COGEMA's permit modification application to Wyoming Department of Environmental Quality (WDEQ) UIC Permit 00-340 which applies to both wells, and WDEQ regulations and guidance.

A time and materials cost estimate for plugging either of the wells follows. The cost is based on information provided by COGEMA, WDEQ requirements, our field experience, and recent quotes from applicable vendors.

The costs are based on the following assumptions:

- A falloff test and Radioactive Tracer log (RAT) may be required. Based on historical WDEQ requirements, (1) a falloff test would be required if more than six months has elapsed since the last falloff test, and (2) a Part II mechanical integrity test (e.g., a RAT log) would be required if more than 2 years had elapsed since the last RAT log.
- Materials disposal (e.g., tubing, packer, wellhead and other debris) will be the responsibility of COGEMA.
- Subcontractor costs are billed directly to COGEMA (no markup by Petrotek).
- Cementing costs were based on the attached quote from Rocky Mountain Cementers in Casper, Wyoming.
- RAT costs are based on recent jobs performed by Superior Production Logging.

Well abandonment will be performed in accordance with WDEQ and the Wyoming Oil and Gas Conservation Commission regulations. The proposed procedures for both the DW No. 4 and the No. 5 wells includes the following:

1. Rig up pulling unit. R/D tree and R/U and 3,000 psi BOPs. Test same.
2. Latch tubing, get off on/off tool (if used) and POOH L/D tubing.
3. P/U 2 7/8" workstring. RIH, latch on/off tool and pull packer. POOH and LD same.
4. RIH and cement well from TD to surface in 1,000- to 2,000-foot stages with a minimum of approximately 660 sx 50/50 Pozmix A cement (1.26 ft³/sx). This approach is proposed due to the extensive perforated interval in the Lance, and may be changed, on approval from WDEQ, to include multiple conventional squeeze jobs rather than filling the casing.
5. Tie into 9 5/8" x 5 1/2" annulus and attempt to bullhead 40 sacks 50/50 Pozmix A cement.
6. R/D BOPs and pulling unit.
7. Cut and remove wellhead at 5-10 feet below ground surface. Place a dry hole monument in a 10 sack cement plug at the surface.

Please contact the undersigned or Ken Cooper if you have any questions or comments regarding the plugging procedures, cost estimate, or other matters.

Sincerely,



Petrotek Engineering Corporation
Hal Demuth

| Well Depth = 6200' GL for both wells | | | |
|---|--------------|-----------------|-----------------|
| | Unit Cost | Units Req'd. | Total Cost |
| FIELD OPERATIONS | | | |
| <i>Subcontractors - Direct bill to COGEMA</i> | | | |
| Mob/demob & Location Preparation | \$4,000 | 1 | \$4,000 |
| Workover Rig and Associated Equipment (days) | \$5,000 | 4 | \$20,000 |
| Rental Tools (days) | \$1,500 | 4 | \$6,000 |
| Rental Tubing Inspection | \$6,000 | 1 | \$6,000 |
| Falloff Test | \$6,500 | 1 | \$6,500 |
| RAT Log | \$3,600 | 1 | \$3,600 |
| Trucking | \$3,000 | 1 | \$3,000 |
| Contract Labor | \$1,000 | 2 | \$2,000 |
| Cement (700 sx), pumping & equipment | \$14,000 | 1 | \$14,000 |
| Contingency | \$7,000 | 1 | \$7,000 |
| <i>Total Estimated Subcontractor Charges</i> | | | \$72,100 |
| Test Design and Project Management (hours) | \$100 | 24 | \$2,400 |
| Supervision (days) | \$725 | 5 | \$3,625 |
| Travel (hours) | \$100 | 8 | \$800 |
| Field Truck and Fuel (days) | \$120 | 6 | \$720 |
| Per Diem (days) | \$100 | 6 | \$600 |
| Data Analysis (lump sum) | \$1,000 | 1 | \$1,000 |
| Report Preparation (hours) | \$100 | 24 | \$2,400 |
| <i>Total Estimated Petrotek Charges</i> | | | \$11,545 |
| TOTAL ESTIMATED COST PER WELL | | | \$83,645 |
| <i>Assumptions:</i> | | | |
| Subcontractors will bill COGEMA directly - otherwise a 12.5% markup will apply. | | | |
| Field activities can be completed in 5 days; otherwise T&M rates will apply. | | | |
| Falloff test is required if > 6 months since last test; RAT log required if > 2 years since last log. | | | |
| The well is cemented from bottom to top in 3-4 stages. | | | |
| COGEMA will be responsible for disposal of all well equipment. | | | |



APPLICATION FOR MODIFICATION

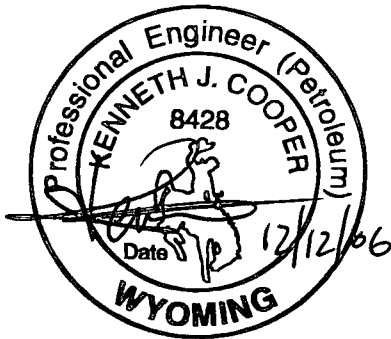
CLASS I UIC PERMIT 00-340

CHRISTENSEN RANCH DISPOSAL WELLFIELD

A COGEMA Mining, Inc.

935 Pendell Boulevard
P.O. Box 730
Mills, WY 82644

DECEMBER 2006



Kenneth J. Cooper, P.E.

Prepared By:
Petrotek Engineering Corporation
10288 West Chatfield Ave., Suite 201
Littleton, Colorado 80127
Phone: (303) 290-9414
Fax: (303) 290-9580

06-841

DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER QUALITY DIVISION
WATER QUALITY RULES AND REGULATIONS, CHAPTER XIII (1993)

| |
|-----------------------------------|
| DEQ/WQD |
| Application No: _____ |
| Date received: DEC 15 2006 |
| (Agency Use Only) |

1. Type of Application

This application is being made for a Class I injection well permit:

New Permit _____ Modified Permit XX

The current permit number is UIC 00-340.

2. Name of Facility: Christensen Ranch Disposal Wellfield

The Christensen Ranch disposal wellfield, as currently permitted under UIC 00-340, includes four Class I disposal wells. Two wells are active, and two wells have not yet been drilled. This application for modification request is for the addition of two new wells ("proposed wells") located northwest of the currently permitted wells and an increase in the total combined injection rate for the six-well system.

COGEMA DW No. 4: NW ¼ SW ¼ NW ¼, Section 9, Township 45 North, Range 77 West, Sixth Principal Meridian, Johnson County, Wyoming.

505 feet from the west line; 1909 feet from the north line of Section 9.

COGEMA DW No. 5: SE ¼ NW ¼ SW ¼ Section 5 Township 45 North, Range 77 West, Sixth Principal Meridian, Johnson County, Wyoming.

396 feet from the east line; 1989 feet from the south line of Section 5.

Mailing Address of the Operator

COGEMA Mining, Inc.
935 Pendell Boulevard
P.O. Box 730
Mills, WY 82644
307-234-5019

Street Address where the records will be kept

COGEMA Mining, Inc.
935 Pendell Boulevard
Mills, WY 82644
307-234-5019

Name and title of responsible individual

Donna Wichers - General Manager

3. Name, address and telephone number of the operator on site

COGEMA Mining, Inc.
Christensen/Irigaray Mines
P.O. Box 730
Mills, WY 82644
307-464-1427

4. Description of the discharge

This permit application is for the injection of industrial wastes which are non-hazardous under the Resource Conservation and Recovery Act.

The wastes consist of operational and restoration bleed streams from in-situ leach (ISL) uranium mining operations, including: normal overproduction (wellfield bleed) streams, yellowcake wash water, laboratory waste, reverse osmosis brine, groundwater and groundwater sweep solutions and plant washdown water from the Irigaray and Christensen Ranch operations, both covered by Land Quality Division Permit to Mine No. 478 and U.S. Nuclear Regulatory Commission License SUA-1341. These waste streams are beneficiation wastes, exempt from RCRA regulation under the Bevill Amendment found in 40 CFR 261.4(b)(7).

The Standard Industrial Classification (SIC) code for this waste is 109.

5. Area Permit

Four Class I injection wells currently are permitted under UIC 00-340, which is an area permit. The COGEMA DW No. 1 and Christensen 18-3 wells have been operated for many years. The COGEMA DW No. 2 and No. 3 have not yet been drilled. All four wells are all located in the vicinity of the Christensen Mine.

This permit modification request includes disposal of the waste listed in Section 4.0 of this application to the Lance Formation through two additional (new) wells, the COGEMA DW No. 4 and COGEMA DW No. 5. The new wells will be located in the immediate vicinity of the Irigaray Mine Central Processing Plant (the main processing plant for both the Irigaray

and Christensen Mines). Information from Section 2.0 and Attachments A, D, E, G, H, I and J are included for each new well.

New permits for wells in the vicinity of the Irigaray Plant are requested because five of the seven evaporation ponds used for historical operations have been decommissioned. For future wastewater management, COGEMA either needs to install the disposal wells or re-construct the decommissioned ponds. COGEMA believes that management of wastewater via disposal wells is more protective of human health and the environment, and prefers to install disposal wells rather than more surface evaporation ponds. Additionally, the two permitted wells (DW No. 2 and DW No. 3) at Christensen that have not yet been installed are reserved for wastewater disposal from groundwater restoration of future Christensen wellfields.

Further, it is requested that the total injection rate for the area permit be increased to 750 gallons per minute (gpm) for the six-well system (see Attachment H).

6. Summary of the ownership

a. Ownership of oil and gas lease(s) within the Area of Review

Oil & Gas Ownership

United States - Bureau of Land Management

COGEMA DW No. 4
Section 5: S2NE, N2SE, SWSE

COGEMA DW No. 5
Section 8: NENE

Federal Oil & Gas Lease WYW 130106

ABO Petroleum Corp. (16%)
105 S 4th St.
Artesia, NM 88210 2123

Lance Oil and Gas Co. Inc. (25%)
1099 18th St. #1200
Denver, CO 80202 1955

MYCO Industries (3.2%)
105 S. 4th S.
Artesia, NM 88210 2123

Sharbro Oil Ltd. Co. (12.8%)
105 S. 4th S.
Artesia, NM 88210 2123

Williams Production RMT Co. (25%)

1515 Arapahoe St. TWR 3 #1000
Denver, CO 80202 3150

Yates Drilling Co. (16%)
105 S. 4th S.
Artesia, NM 88210 2123

Yates Petroleum Corporation (2%)
105 S. 4th S.
Artesia, NM 88210 2123

COGEMA DW No. 4
Section 4: SWNW, NWSW

COGEMA DW No. 5
Section 9: SWNW, N2SW

Federal Oil & Gas Lease WYW 128454

Anadarko Petroleum Corp. (35%)
1201 Lake Robbins Dr
The Woodlands, TX 77380

Citation 2004 Investment LP (35%)
8223 Willow Place South
Houston, TX 77070

Forest Oil Corp. (30%)
707 17th St #3600
Denver, CO 80202

Dennis R. Lawrence and Grace Lawrence Moriarity,
Co-Trustees of the Mary Irigaray Lawrence Life Estate Trust (50%)
P.O. Box 370, Buffalo, WY 82834
Charles G. Irigaray, Martha Christine Irigaray and Nancy Irigaray,
Co-Trustees of the Joseph P. Irigaray Testamentary Trust (50%)
P.O. Box 699, Buffalo, WY 82834

COGEMA DW No. 4
Section 4: SWSW
Section 5: SESE

COGEMA DW No. 5
Section 8: SENE, NESE
Section 9: N2NW, SENW

Fee O&G Lease
Anadarko Petroleum Corp. (35%)
1201 Lake Robbins Dr
The Woodlands, TX 77380

b. Owner(s) of surface rights within the Area of Review

Surface Owners:

United States - Bureau of Land Management

COGEMA DW No. 4
Section 5: SWSE

COGEMA DW No. 5
Section 8: NENE

Larry Brubaker
2394 Irigaray Road
Kaycee, WY 82639

COGEMA DW No. 4
Section 8: SENE, NESE
Section 9: NW, N2SW

COGEMA DW No. 5
Section 4: SWNW, W2SW
Section 5: S2NE, N2SE, SESE

Surface Lease:
Malapai Resources Company

c. Copies of access agreements

A copy of the Surface Lease dated January 1, 2006 between Larry Brubaker and Malapai Resources Company, successor to COGEMA Mining, Inc. is included in Appendix 1.

d. Owner of record documents

Malapai and/or COGEMA Mining, Inc. hold the only water rights on the Irigaray portion of the Area of Review. These water rights are related to uranium in situ leach (ISL) mining. Grazing rights are held by the surface owner. Malapai continues to hold unpatented mining claims on locatable minerals and a Lease of Mineral Interests relating to fee lands within the Area of Review. Malapai and COGEMA Mining, Inc. have a Joint Participation Agreement for which COGEMA is the operator of the Christensen/Irigaray Mines.

Cross C Livestock Company no longer owns the surface. The Lease of Surface Interests dated January 1, 1991 between Cross C Livestock Company, Inc. and Malapai Resources Company has been terminated.

7. Status as Federal, State, private, public or other entity

| | |
|------------------|---------|
| COGEMA DW No. 4: | Private |
| COGEMA DW No. 5: | Private |

8. Facility on Indian land? No

9. CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Donna L. Wichers
Printed name of person signing

General Manager
Title


Signature of Applicant

12-12-06
Date Signed

ATTACHMENTS

A. Discharge Zone(s) and Confining Layer(s)

The disposal zone to be utilized in the two new disposal wells under this proposed modification to Permit UIC 00-340 is the Cretaceous Lance Formation. This is the same formation currently permitted for the 4-well system authorized under UIC 00-340.

The new disposal wells will be located in Johnson County, Wyoming, near the Irigaray Mine where the Central Processing Plant for both the Irigaray and Christensen Ranch operations is located (Figures 1 and 2). The discussion of the geology, lithology, hydrology, and formation characteristics for the Lance Formation, and overlying and underlying confining zones is based on (1) regional and local geology from published sources and oil and gas logs, and (2) logs and testing information from the two existing wells being operated under Permit UIC 00-340 (the COGEMA DW No. 1 and the Christensen 18-3).

The Lance Formation in the Pumpkin Buttes District of the Powder River Basin is comprised of up to 3,000 feet of predominantly fine grained, gray to brown sandstones, mudstones and black to dark gray carbonaceous shales with minor coal seams. Thin bentonitic layers are common throughout the sequence and are evidence of volcanic activity in the uplands far to the west. The entire Lance sequence is of continental origin. Deposition was by predominantly east flowing, low energy, braided streams, following the final regression of the Late Cretaceous seaway.

The Lance Formation conformably overlies the Cretaceous Lewis Shale of marine origin. Its upper boundary with the Tertiary Fort Union Formation is the renowned K - T marker bed. This contact is denoted in outcrops by a thin anonymously iridium-rich claystone. In the subsurface of the Pumpkin Buttes area, the boundary between the Lance and Paleocene Fort Union Formation appears conformable, and is much less distinct.

Overlying confinement above the Lance injection zone is provided by interbedded shale layers of the Upper Lance and the Tullock member of the Fort Union Formation. Based on laboratory analysis of cores taken from shallower shales in the overlying Wasatch Formation where COGEMA conducts ISL mining, it is expected that these shales will exhibit very low permeabilities. The COGEMA data indicate that the Wasatch shales exhibit permeabilities on the order of 10^{-8} cm/sec to 10^{-9} cm/sec. Based on confining stresses at greater depth, it is likely that the much deeper Lower Fort Union and Lance shales will exhibit at least the same order of permeability, or lower. Interbedded shales of the Lower Lance provide underlying confinement between the Lance injection zone and the Fox Hills Sandstone.

Deposition of the Lance coincided with the initial stages of the Laramide Orogeny; the mountain building episode that dominated the western United States from Late Cretaceous through Eocene time. Only the Wind River Range and the Granite

Mountains were actively rising during Lance time. In central Wyoming, stream patterns were generally eastward flowing, which is evident in the subsurface where Lance sandstone lenses exhibit a more continuous nature in their east - west direction. A cross-section index map is shown on Figure 3. Structural and stratigraphic cross-section are presented on Figures 4 through 7. During later stages of the Laramide Orogeny (i.e. Fort Union through White River time), the actively rising Front Range and Casper Arch separated the Wind River and Powder River basins. In the Powder River Basin this upwelling disrupted the east-trending deposition and imposed a predominant drainage direction to the north, mimicking the actively subsiding basin axis.

Known economic value of the Lance sediments in the Powder River Basin includes proven and potential hydrocarbon production and some minor potential uranium prospects on Pine Ridge (which may actually be Lower Fort Union in age). Oil production from the Lance occurs approximately 65 miles east of the proposed Class I well in the Flat Top Field (T33 & T34N, R68 & R69W, Converse County, WY). Seven wells in this field produced 320 MBO and 5.5 BCFG between 1959 and 1980; production continues to date. Based on State records, total Flat Top field production to date from the Lance is approximately 387 MBO and 6.1 BCFG.

While the Lance Formation consists of braided fluvial deposits, the sedimentary units can be correlated between the two existing COGEMA disposal wells (DW No. 1 and the Christensen 18-3) and, regionally, between the disposal wells and oil and gas exploration and production wells (Figures 4 through 7).

As noted in Attachment E of this application, the Lance Formation is not used, in any fashion, as a source of drinking water in the vicinity of the Christensen Ranch or Irigaray mines. The only documented use of the Lance in this area is for disposal of wastewater in accordance with the Class I permit and the aquifer exemption granted for the COGEMA DW No. 1 and Christensen 18-3 wells(both operational), and the COGEMA DW No. 2 and No. 3 (not yet drilled).

Injection Interval – Proposed Wells

The proposed injection interval is the permeable portions of the Lance Formation, which are generically described by Connor (1992) as "*sequences of sandy, fluvial channel deposits and finer grained interfluvial deposits overlying and intertonguing with the marginal marine [and underlying] Upper Cretaceous Fox Hills Sandstone.*" The Fort Union Formation occurs above the Lance, and is composed of alternating thin sands and shales; the Fox Hills occurs conformably below the Lance Formation and is comprised of near-shore marine sands. The Lewis Shale occurs below the Fox Hills. Information pertaining to the Lance in the proposed injection well area is presented below. Regional and local isopach maps for the Lance are shown on Figures 8 and 9. The proposed well locations are in the western portion of the Powder River Basin, approximately 12 miles east of the Basin axis (Figure 10).

The proposed injection interval includes the Upper and Middle Lance. Because the proposed wells have not yet been drilled, the depths of the injection intervals must be estimated. The anticipated surface elevations for the DW No. 4 and No. 5 are both approximately 4,350 feet AMSL, which is similar to that of the DW No. 1 well. Because of regional structure, however, the injection interval depths for each well vary to a small degree.

The nearest well to the DW No. 4 location is the Anadarko Petroleum Heldt Draw No. 80 (API No. 19-20561; NE $\frac{1}{4}$ SE $\frac{1}{4}$ Section 9, T45N, R77W; KB elevation 4,351 feet AMSL; surface elevation 4,337 feet AMSL; approximately 0.7 miles to the southeast; completed in the Parkman at approximately 7,900 feet) (Table 1). The closest well to the DW No. 5 location is the Davis Oil Heldt Draw No. 58 (API No. 19-20569; SW $\frac{1}{4}$ NE $\frac{1}{4}$ Section 4, T45N, R77W; KB elevation 4,454 feet AMSL; estimated surface elevation 4,440 feet AMSL; approximately 1 mile to the east; drilled to the Shannon at 9,339 feet and plugged/abandoned).

Based on the regional geology, and specifically, geologic correlations from those wells, COGEMA proposes to utilize the injection interval from approximately 3,800 to 6,200 feet below ground surface (bgs) in both the DW No. 4 and No. 5. The Lance injection interval will be identified, as well as the upper and lower confining zones, from logs run during the drilling and completion of the wells. The log picks will be presented to WDEQ for concurrence prior to perforating the casing in either well.

The nearest well with a porosity log is the Amoco Producing Co (Warren Enterprises) No. 1 U.S.A Norville (API No. 19-20594) located in SW $\frac{1}{4}$, NE $\frac{1}{4}$, NW $\frac{1}{4}$ of Sec 22, T45N, R77W (over 2 miles southeast of the DW No. 4 location). Based on analysis of that log, the Lance contains more than 2,000 feet of >8% porosity. However, it is unlikely that all the porous zones would be perforated. Based on a likely perforation interval (>12% porosity), a total of 690 feet of thickness has been assigned. Final perforation intervals will be based on logs obtained from the DW No. 4 and DW No. 5 wells.

Summary of Lance Formation Data

| | |
|-------------------------------------|---|
| Data Sources: | Log data from the Anadarko Petroleum Heldt Draw No. 80 Section 9, T45N, R77W; KB elevation 4,351 feet AMSL; surface elevation 4,337 feet AMSL; reservoir data from the COGEMA DW No. 1 and Christensen 18-3, both completed in the Lance. |
| Age: | Upper Cretaceous/Tertiary |
| Lithology: | Interbedded sandstones, siltstones and shales deposited under delta front/deltaic conditions |
| Upper Confining Zone and thickness: | Fort Union Formation (>750 feet) |
| Lower Confining Zone and thickness: | Lower Lance (approx. 250 feet) |
| Estimated Top of Lance at Well: | 446 AMSL (approx. 3,905 bgs) |

Estimated base of Lance

Injection Interval: -1,849 AMSL (approx. 6,200 bgs)

Gross Injection

Interval Thickness: Approx. 2,295 feet

Lance Net Sand Thickness

With Porosity >12%: Approx. 690 feet (based on sonic log porosity)

Permeability 9.7 md (COGEMA DW #1 and CR 18-3 Falloff Tests)

Water Saturation 100%

Initial Pressure: 2,077 psi @ midpoint depth of 5,053 feet bgs (0.41 psi/ft gradient based on historic off-set COGEMA data)

Physical and chemical data for the Lance Formation, based on regional geology and pressure/flow data from the COGEMA DW No. 1 and Christensen 18-3 wells, are presented in Table 2.

Confining Zones

As shown on the geologic cross-sections (Figures 4 through 7), the Lance Formation is confined above by shales of the Lower Fort Union Formation. Confinement below the Lance injection zone is provided by shales in the Lower Lance. The continuity of these confining layers is evident on the cross-sections. As noted previously, testing/analysis of shales within the overlying Wasatch Formation (approximately 300 to 600 feet below ground surface) has shown the vertical permeability of these shales to be on the order of 10^{-8} to 10^{-9} cm/sec. It is expected that the deeper shales of the Fort Union and Lance will exhibit the same or lower permeabilities than those of the Wasatch.

B. Wells Penetrating Receiver

As discussed in Attachment D, the cone of influence, and subsequently, the Area of Review, for both proposed wells are small in comparison to the extent of the Lance in the Powder River Basin. No oil and gas production or plugged exploratory wells penetrate the receiver (the Lance Formation) within the Cone of Influence or within the minimum AOR for either of the proposed wells.

No wells penetrate the receiver (Lance Formation) within the AOR for either the DW No.4 or DW No. 5 wells. For reference purposes, a list of wells outside the AOR (1/4-mile radius) for the injection wells, but within a 2-mile radius of the proposed Class I wells is provided in Table 1. A map showing the locations of those wells is presented as Figure 3 and the AOR outlines are shown on Figure 12.

C. Geologic Cross Sections

A cross-section index map is provided as Figure 3. Geologic cross-sections are included on Figures 4 through 7, and previously were discussed in Attachment A.

D. Area of Review (AOR)

The Area of Review (AOR) for the proposed wells has been evaluated in accordance with Chapter XIII, Section 5. Determination of the Lance Formation AOR requires calculation of the cone of influence (COI), which has been performed in accordance with Chapter XIII, Section 5(b)(iv)(A), and calculation of the volumetric fillup (also referred to as the ultimate area of emplaced waste [ULEW]) as stated in Chapter XIII, Section 5(b)(iv)(B).

The equations required for these calculations, including the input data and assumptions are summarized in Tables 2 and 3 and presented below. The calculated values for the COI and volumetric fillup are summarized in the following section, and shown in detail on Table 3. This information is followed by the identification of the final AOR.

For consistency, all depths in this section are based on an estimated surface elevation of 4350 feet AMSL. Based on proposed well locations and topographic maps, this surface elevation was used for both the DW No. 4 and DW No. 5 wells.

a. Cone of Influence (COI)

As mentioned previously, the depth and completion intervals for the proposed wells (DW No. 4 and 5) are expected to be similar. Hence the same depths were used for both wells. Additionally, depth and reservoir data were used from the existing CR 18-3 and DW No. 1 wells.

Section 5(b)(iv)(A) states that the cone of influence is calculated as follows:

$$r = ((2.25 KHt)/(S10^x))^{1/2}$$

$$\text{where: } x = (W/G - B) \times (4\pi KH/2.3Q)$$

- r = Radius of the cone of influence of an injection well (feet)
- K = Hydraulic conductivity of the injection zone (feet/day)
- H = Thickness of the injection zone (feet)
- t = Time of injection (days)
- S = Storage coefficient (dimensionless)
- W = Hydrostatic head of underground source of drinking water (feet)
measured from the base of the injection zone
- G = Specific gravity of fluid in the injection zone (dimensionless)
- B = Original hydrostatic head of injection zone (feet) measured from the
base of the injection zone
- Q = Injection rate (cubic feet/day)
- π = 3.142

To convert intrinsic permeability (in millidarcies) to permeability (or hydraulic conductivity) in ft/day, the following formula is used:

$$K = K_i (\rho g / m \mu)$$

where:

$$\begin{aligned} K &= \text{Permeability (cm/sec)} \\ K_i &= \text{Intrinsic permeability (millidarcies)} \\ \rho &= 0.999099 \text{ gm/cm}^3 - \text{the density of water} \\ g &= 980 \text{ cm/sec}^2 - \text{the acceleration of gravity} \\ m &= 0.01 \text{ gm/(sec cm)} \\ \mu &= 0.44 \text{ centipoise} \end{aligned}$$

and $1 \text{ Darcy} = 9.87 \times 10^{-9} \text{ cm}^2$ and there are 2835 ft/day per cm/sec

Based on injection and falloff testing analyses from the DW No. 1, the average intrinsic permeability of the Lance Formation is estimated to be 9.7 millidarcies (md). The calculated permeability value was converted to hydraulic conductivity as follows:

$$K_i = 9.7 \text{ millidarcies} = 0.0097 \text{ Darcies}$$

$$K_i = (0.0097 \text{ Darcies})(9.87 \times 10^{-9} \text{ cm}^2/\text{Darcy})$$

$$K_i = 9.57 \times 10^{-11} \text{ cm}^2$$

$$K = \frac{(9.57 \times 10^{-11} \text{ cm}^2)(.999099 \text{ gm/cm}^3)(980 \text{ cm/sec}^2)}{(0.0044 \text{ gm/sec cm})}$$

$$K = 2.13 \times 10^{-5} \text{ cm/sec}$$

$$K = (2.13 \times 10^{-5} \text{ cm/sec})(2835 \text{ ft/day} / \text{cm/sec})$$

$$K = 0.0604 \text{ ft/day}$$

Other assumptions and input parameters used for calculations in this section are summarized below:

- Per the EPA Guidance Document on Area of Review (page V-14), the Coefficient of Storage (S) is the thickness of the injection zone multiplied by $10^{-6}/\text{ft}$.
- The value for B (specified by WDEQ regulations as the original hydrostatic head of injection zone in feet measured from the base of the injection zone) was based on the results from the testing in the DW No. 1 and the Christensen 18-3, which indicate an original pressure gradient in the Lance Formation of 0.411 psi/ft.
- Since the information for USDWs in the area is limited, it is assumed that the head in the overlying USDWs (W) can be approximated by the land surface, using a fluid

gradient of 0.433 psi/ft. The head (W) was measured from the base of the Lance Formation (assumed to be 6,200 feet bgs from the DW No. 1).

- Based on log analysis from the Anadarko Heldt Draw No. 80 well, the net sand thicknesses of the injection zone is expected to be 690 feet. This thickness was based on a 12 percent porosity cutoff. The average formation porosity (based on evaluation of the FDC curve on the Anadarko log), is 17 percent.
- The estimated injection period is 20 years.
- For each well, the requested injection rate is 4,286 bbl/day (125 gpm), or 24,064 cubic feet per day.
- Based on swabbing samples from the COGEMA DW No. 1 completion, the total dissolved solids (TDS) concentration of the injection zone (Lance) fluid is about 2,400 mg/l; the specific gravity is 1.001 (Dowell Fluids Reference Manual).
- The injection zone fluid viscosity (0.44 cp at 148 degrees F) was estimated from Figure D-16 in the text "Well Testing" (John Lee; Society of Petroleum Engineers of AIME, 1982).

Based on the COI equations required by WDEQ regulations, and the input variables shown above, the COI for the new wells (DW No. 4 and No. 5) is 1,090 feet. The detailed calculations are shown on Table 3; the COI for each well is shown on Figures 12 and 12A.

b. Area of the ultimate limit of emplaced waste (ULEW)

The following formula was used for this calculation:

$$R = (Qt/\pi Hp)^{1/2}$$

where: R = Radius of volumetric fillup (feet)
 Q = Injection rate (feet /day)
 t = Time of injection (days)
 π = 3.142
 H = Thickness of the injection zone (feet)
 p = porosity expressed as a pure decimal

Using the assumptions listed in the previous section, the ULEW for both DW No. 4 and DW No. 5 is 690 feet (Figure 12A). These calculations are shown on Table 3.

c. Minimum Area of Review

In accordance with Chapter XIII, Section 5(b)(iv)(C) and (D), the minimum area of review for a Class I non-hazardous well shall never be less than one-quarter (¼) mile, the cone

of influence, or the area of emplaced waste, whichever is greatest. As such, the minimum AOR for both wells is $\frac{1}{4}$ mile (1,320 feet).

d. Final Area of Review

In accordance with Chapter XIII, Section 5(b)(iv)(E), the final areas of review shall conform to the public land survey and be legally described by Township, Range and Section to the nearest quarter section. The final AORs for DW No. 4 and DW No. 5 are presented below and shown on Figures 12 and 12A.

For reference purposes, the COI and AOR for both disposal wells are shown on Figure 12A. Review of that figure indicates that the wells are spaced a sufficient distance from each other that the COI's do not intersect.

DW No. 4 AOR

Township 45 North, Range 77 West, 6th P.M

Section 8: NE $\frac{1}{4}$ NE $\frac{1}{4}$
Section 8: SE $\frac{1}{4}$ NE $\frac{1}{4}$
Section 8: NE $\frac{1}{4}$ SE $\frac{1}{4}$
Section 9: NW $\frac{1}{4}$
Section 9: NW $\frac{1}{4}$ SW $\frac{1}{4}$
Section 9: NE $\frac{1}{4}$ SW $\frac{1}{4}$

DW No. 5 AOR

Township 45 North, Range 77 West, 6th P.M

Section 4: SW $\frac{1}{4}$ SW $\frac{1}{4}$
Section 4: NW $\frac{1}{4}$ SW $\frac{1}{4}$
Section 4: SW $\frac{1}{4}$ NW $\frac{1}{4}$
Section 5: SE $\frac{1}{4}$
Section 5: SE $\frac{1}{4}$ NE $\frac{1}{4}$
Section 5: SW $\frac{1}{4}$ NE $\frac{1}{4}$

E. Water Quality Information - Proposed Injection Zone

a. Water quality data

Initial water quality data from the Lance Formation were obtained from the analysis of samples taken during two DSTs in the Christensen 18-3. The water samples were collected from the two discrete DST intervals within the Lance: 6,375 feet to 6,495 feet, and 5,168 feet to 5,302 feet. Results from analysis from these samples indicates that the average TDS of the Lance water in those specific zones is on the order of 1,750 mg/l (Table 4). However, the TDS concentrations in the samples representing the entire Lance are higher. For example, the average TDS of the two samples collected during the

re-completion of the DW No. 1 is 2,400 mg/l (Tables 5 and 6). These samples were collected from the lower and upper portion, respectively, of the Lance completion interval.

To provide detailed data regarding other constituents, Table 4 summarizes the water quality of the DST samples from the 18-3 well. As shown in Table 4, samples from DST No. 1 were analyzed for dissolved constituents as well as total metals and phenols. Samples from DST No. 2 were analyzed for total constituents as well as oil and grease, hydrogen sulfide, benzene and phenols. The Lance Formation data in Table 4 are also compared to Wyoming groundwater standards, or an EPA standard, if applicable. Also provided for comparison purposes are analytical data from COGEMA's mining solutions that are indicative of the water to be injected into the Lance formation.

As can be seen from the comparisons in Table 4, the water quality in the Lance exceeds many standards for domestic, agricultural and livestock use. The Lance water is unusable due to high concentrations of hydrocarbon-related constituents and qualifies for exemption as described later in this application. However, comparing the quality of the water to be injected into the Lance with the existing Lance quality (Table 4 comparison to Mine Units 5 and 6 recovery solution quality), the two have very similar TDS and sodium bicarbonate levels. With respect to the similarity of water quality and water quality compatibility issues, the Lance Formation is an ideal receiver for COGEMA's sodium bicarbonate-based ISL mining waste streams.

b. Analysis of water from any usable aquifer within the AOR

This information has been provided in file UIC 00-340 and is hereby referenced.

c. Quality assurance data

This information was included in file UIC 00-340 and is hereby referenced.

d. Aquifer Exemption

Based on the information presented above, the TDS of the Lance Formation is less than 10,000 mg/l (i.e., on the order of 2,400 mg/l). As such, use of the Lance Formation in the proposed disposal wells will require an aquifer exemption or a modification to the existing exemption for UIC 00-340.

The criteria for exempted aquifers are presented in CFR 40 146.4 as follows:

An aquifer or a portion thereof which meets the criteria for an "underground source of drinking water" in §146.3 may be determined under 40 CFR 144.8 [sic; should be 144.7] to be an "exempted aquifer" if it meets the following criteria:

(a) It does not currently serve as a source of drinking water; and,

(b) It cannot now and will not in the future serve as a source of drinking water because:

- (1) *It is mineral, hydrocarbon, or geothermal energy producing, or can be demonstrated by a permit applicant as part of a permit application for a Class II or III operation to contain minerals or hydrocarbons that considering their quantity and location are expected to be commercially producible.*
- (2) *It is situated at a depth or location which makes recovery of water for drinking water purposes economically or technologically impractical;*
- (3) *It is so contaminated that it would be economically or [sic] technologically impractical to render that water fit for human consumption; or*
- (4) *It is located over a Class III well mining area subject to subsidence or catastrophic collapse; or*
- (c) *The total dissolved solids content of the ground water is more than 3,000 and less than 10,000 mg/l and it is not reasonably expected to supply a public water system.*

Discussion of the Lance limitations with regard to general water quality in the Powder River Basin were presented by the Wyoming Water Development Commission (2002). Chapter 3 of that report states the following regarding the Lance as a drinking water supply: *"TDS content in waters generally range from <500 - 3060 mg/l. Composition variable, mainly Sodium Sulfate or Calcium Sulfate. Variable iron (0 - 6.03 mg/l) and Sulfate (<100 - 1780 mg/l) content, SAR 1.9 - 39. Generally undesirable for domestic water source due to possible high Iron, Manganese and Sulfate content. Generally fair to poor for stock use. Unsuitable for irrigation due to high salinity and / or high SAR..... Generally yields less than 15 gpm in planning area. Development limited due to uneconomical drilling depths."*

The data obtained for the Lance Formation by COGEMA indicates that the exemption criteria stated under §146.4 (a) and (b [1, 2, and 3]) are satisfied. Support for classification according to these criteria, including cost estimates for developing and treating such water, has been provided in file UIC 00-340 and is summarized below.

§146.4 (a): The Lance Formation does not currently serve as a source of drinking water in the vicinity of the Irigaray or Christensen Ranch or the final AORs for the existing or proposed disposal wells. The nearest documented well completed in the Lance is over 24 miles to the west of Christensen Ranch and appears to be associated with oil or gas development; the exact use is not known. Approximately 30 miles to the west, the Lance Formation outcrops at the surface. In that area of local recharge, the well use is predominantly for livestock watering.

§146.4 (b[1]): The Lance Formation cannot and will not serve as a source of drinking water because it is hydrocarbon producing.

The Lance is an established oil and gas producing formation in the Powder River Basin, and other Wyoming basins of the same depositional time period and environment. Production from the Lance in the Powder River Basin began in 1959 and continues to date. Concentrations of phenols, oil and grease, and benzene observed in the samples from the DSTs in the Christensen 18-3 are consistent with sand deposits that either (1) are in the near vicinity of source rock, or (2) are

located at a structural low in a formation through which oil and gas have migrated. Based on the location of the two disposal wells relative to the structure and setting of the Powder River Basin, both scenarios apply.

§146.4 (b[2]): The Lance Formation cannot and will not serve as a source of drinking water because it is situated at a depth that makes recovery of water for drinking water purposes impractical.

As discussed in Attachment A and shown on Figures 4 through 7, the depth of the proposed injection interval in the Lance Formation is approximately 3,900 to 6,200 feet below ground surface. Water at this depth is considered economically impractical to produce and treat (see UIC 95-241 and UIC 97-407 for additional detailed information). Additionally, there are extremely high quality water-producing aquifers much shallower than the Lance in the Wasatch Formation (250 to 700 feet below ground surface).

§146.4 (b[3]): The Lance Formation cannot and will not serve as a source of drinking water because it is so contaminated that it would be impractical to render that water fit for human consumption.

As shown on Tables 4 and 5, the Lance water contains elevated concentrations of various constituents that exceed Wyoming Class I, II or III groundwater standards. Non-metals such as chloride, TDS, pH and ammonia exceed several Wyoming standards. Perhaps more importantly, trace metals and organic compounds that exceed Wyoming Class I, II, or III groundwater standards are as follows: fluoride (5.12 mg/l), boron (1.04 mg/l), copper (2.39 mg/d), iron (8.36 mg/l), lead (0.07 mg/l), manganese (0.47 mg/l) mercury (0.004 mg/l), and zinc (14.1 mg/l). In addition, elevated concentrations of oil and grease (18.9 mg/l) were detected that are in excess of all Wyoming classification standards ranging from virtually free of the compound for Class I and up to 10 mg/l for Class II and III. Finally, benzene was detected in the DST #2 water sample at 6,900 µg/l, which greatly exceeds the EPA drinking water standard of 5 µg/l. Based on these concentrations, the Lance does not qualify for classification as a USDW in Wyoming (i.e., Class I, II, III or IV waters).

EPA agreed with the information provided, and granted an aquifer exemption for the first two wells to be completed in the Lance Formation (the DW No. 1 and the Christensen 18-3) in March of 1999 (64 FR 14803, March 26, 1999). EPA subsequently approved an exemption for two additional wells (COGEMA DW No. 2 and No. 3) in 2002. The reference from 40 CRF 147 for both exemptions follows.

§147.2555 Aquifer exemptions since January 1, 1999

In accordance with §144.7(b) and §146.4 of this chapter, the aquifers described in the following table are hereby exempted from the definition of an underground source of drinking water, as defined in 40 CFR 144.3:

Aquifer Exemptions Since January 1, 1999

| Formation | Approximate depth (feet below ground surface) | Location |
|--|---|--|
| Powder River Basin, only approximately 0.4 square miles of the Lance Formation which is less than 0.005% of the Basin at indicated depths and location.. | 3,800_6,800..... | Two cylindrical volumes with centers in the wells COGEMA DW No. 1 and 18-3 Christensen respectively, and radius of 1,320 feet. Both wells are located in the Christensen Ranch, in Johnson County, WY. The COGEMA DW No. 1 well is located at approximately 450 feet West of N/S line and 100 feet North of E/W line of SE/4, NW/4, Section 7, T44N, R76W. The 18-3 Christensen well is located approximately 600 feet West of N/S line and 550 South of E/W line of NE/4, NW/4, Section 18, T44N, R76W. |
| Lance Formation at indicated depths and locations. | 3,800_6,500..... | Two cylindrical volumes with centers in the wells COGEMA DW No. 2 and COGEMA DW No. 3 respectively, and radius of 1320 feet. Both wells are located in the Christensen Ranch, in Johnson County WY. The COGEMA DW |

No. 2 is located at approximately 2,290 feet from the North line and 1130 feet from the East line SW1/4 SE1/4 NE1/4 of Section 7, Township 44 North, Range 76 West. The COGEMA DW No. 3 is located approximately 3300 feet from the North line and 1340 feet from the West line center of SW1/4 of Section 5, Township 44 North, Range 76 West.

[64 FR 14803, Mar. 26, 1999, as amended at 67 FR 47726, July 22, 2002]

In accordance with the same criteria presented and previously approved for four Class I wells under UIC 000-340, COGEMA is requesting an aquifer exemption, or a modification to the existing aquifer exemption in the Lance Formation for the proposed wells (the DW No. 4 and DW No. 5). The requested exemption area includes the final AOR as specified in Attachment D, Part d of this application.

F. Further description of the discharge:

The anticipated water chemistry of the injected waste streams previously was submitted in Exhibit O of the original application for UIC 88-545, in UIC 95-241, and UIC 97-407. The waste streams are unchanged for the proposed new injection wells.

G. Description of the Wells

a1. Casing and Tubing Design (DW No. 4 and No. 5)

The design of all well components will incorporate high-strength carbon steel to withstand corrosion and pressure in excess of those expected during the 20-year injection period.

The surface and production casings are expected to consist of 9 5/8" 36.0 #/ft J-55 ST&C and 5 1/2" 15.5 #/ft J-55 LT&C, or equivalent, respectively (Figure 13). The tubing string proposed for both wells is 2 7/8" 6.5 #/ft J-55 EUE, or equivalent. It has been assumed that 3,930 feet of tubing will be installed in each well.

| Summary of Tubular Performance Properties COGEMA DW No. 4 and No. 5 | | | |
|--|-------------|----------------|---------------|
| | Burst (psi) | Collapse (psi) | Tensile (lbs) |
| 9 5/8" 36.0 #/ft J-55 ST&C | 3,520 | 2,020 | 394,000 |
| 5 1/2" 15.5 #/ft J-55 LT&C | 4,810 | 4,040 | 217,000 |
| 2 7/8" 6.5 #/ft J-55 EUE | 7,260 | 7,680 | 99,600 |

a.2 Packer, Annulus Fluid, Wellhead and Tree

The tubing in each well will be isolated from the annulus with a packer. It is anticipated that the packer likely will be a Baker Lok-Set mechanical packer, or equivalent. If warranted, an on/off tool may be installed above the packer. The tubing will be internally coated (e.g., TK-69, TK-99 or similar).

The annulus fluid will consist of fresh water with corrosion inhibitor.

For both wells, the tubing will hang in a 5 1/2" x 2 7/8" tubing head and a tree will be installed above the tubing hanger. It is anticipated that a 3" tree (rated for 2,000 or 3,000 psi by ANSI or API) will include a bottom master valve, a flow tee with one side outlet and valve, a swab valve, and a pressure gauge above the swab valve (Figure 14).

a.3 Cementing

Both of the proposed wells will be cemented in accordance with Chapter XIII, Section 11. The 9 5/8" surface casing strings will be cemented from total depth to surface using lite cement (lead) and Class G tail, or suitable equivalent cement.

The 5 1/2" production casing will be cemented as follows: (1) Class G or 50/50 Pozmix in the interval from 6,200 to 3,200 feet (approximately 700 feet above the top of the Lance injection interval) to total depth; and (2) lite cement from 3,200 feet to surface. It is anticipated that the 5 1/2" casing will be cemented in two stages, with the DV tool placed at about 3,200 feet.

a.4 Log and Cores

Open-hole and cased-hole logs will be run, and in accordance with Chapter XIII, Section 11. If applicable data are not available from nearby wells, cores (whole or sidewall) will be collected.

H. Operating Data

a. Discharge Rates

Permit UIC 00-340 is an area permit, with a maximum permitted injection rate of 500 gpm for four wells (e.g., 125 gpm per well, on average).

COGEMA is requesting that the current permit limit (500 gpm) be modified to a total injection rate under the area permit of 750 gpm (e.g., 125 gpm for each of six wells).

b. Injection Pressure

Per WDEQ guidance, the following equation was used to estimated fracture pressure for the proposed wells.

$$P = F \times D$$

Where: P = Fracture pressure of the receiver
 F = Fracture gradient in psi/ft of depth
 D = Depth to the bottom of the receiver

Based on testing results from the step-rate injection test in the DW No. 1, a fracture gradient of 0.642 psi/ft was assigned to the Lance Formation. This fracture gradient is consistent with a calculated gradient based on the observed pore pressure and estimated overburden and tensile stresses.

Using the equation above, the fracture pressure of the receiver for both of the proposed new wells is calculated to be 3,980 psi (see Table 7 for detailed calculations).

Calculation of the Limiting Surface Injection Pressure requires input of the fracture pressure, hydrostatic head, and friction losses as follows:

$$\text{Limiting surface injection pressure (L in psi)} = (P - h + T + L_p)(0.90)$$

$$\text{Hydrostatic head (h)} = G \times D \times 0.433$$

Where: h = Hydrostatic head at the bottom of the receiver
 G = Specific Gravity of the injection fluid
 D = Depth to the bottom of the receiver

- Tubing pressure loss (T) was obtained from Western Company charts. The estimated pressure loss for an injection rate of 125 gpm in 2 7/8" tubing is 204 psi for each of the proposed new wells.
- Perforation pressure loss (L_p) was neglected

Based on the above equation, and the noted assumptions, the Limiting Surface Injection Pressure for both proposed wells is 1,347 psi (Table 7).

c. Proposed stimulation program

The need for formation stimulation will be assessed during the completion of each well. At this time, it is anticipated that one or both wells may be stimulated with 7.5 to 15 percent HCl. The need for subsequent (periodic) treatments will be assessed during operation of the wells.

Hydraulic fracture treatments (using sand as a proppant) may be considered for one or both of the new wells if the injection capacity is not sufficient to meet COGEMA's requirements. Potential frac jobs would be (1) designed to contain the fracture within the zone of interest in the Lance Formation, and (2) performed only after approval by WDEQ.

In addition, small-scale fracture treatments using either acid or water may be performed to overcome near-wellbore damage caused during drilling. Such treatments, which utilize no proppant, typically create small fractures with a length and height of one to five feet.

d. Injection procedure

The specific injection procedure for each well will be dependent on (1) the capacity of the well as determined from testing performed during the well completion operations, and (2) COGEMA's disposal requirements at that time. In general, however, it is anticipated that injection operations will commence at 25 to 50 percent of the anticipated injection capacity for a period of 1 to 5 days, with subsequent increases over the next month. During the startup period, the flow monitoring and injection equipment, annulus monitoring system and the pressure shutdown systems will be checked to assure proper operation.

To protect the well tubulars, low concentrations of corrosion inhibitor and antisclant may be added to the injection stream at the surface, as necessary. In addition, periodic batch treatments with an oxygen scavenger may be performed. This type of preventative treatment program is similar to that which has been used on the DW No. 1 and Christensen 18-3.

e. Surface Equipment

A schematic drawing of surface equipment including storage tanks, pumps, filters, meters, valves, recording devices, wellhead monitoring devices and control valves for the DW No. 1 and Christensen 18-3 have previously been submitted (files 88-545, 95-241 and 97-407). It is anticipated that a similar configuration of surface equipment will be installed for the new wells.

f. Description of flow monitoring devices

As noted above, the surface injection facilities for DW No. 1 and Christensen 18-3 include continuous recording devices to monitor injection pressure, flow rate, and annulus

pressure between the long string and the tubing. The same, or equivalent, facilities will be used for the new wells.

g. Methods and procedures used for inspection and failure detection

Both the DW No. 4 and DW No. 5 wells will be equipped with high-level shutoff switches on the injection tubing to prevent operation of the pumps at pressures greater than the Limiting Surface Injection Pressure. In addition, both wells will be equipped with a low-pressure shut-down switch on the surface injection line that will deactivate the injection pump in the event of a surface leak. Finally, the new wells will include a high/low pressure shutdown switch with a pressure sensor on the tubing/casing annulus. This switch will stop the injection pump in the event of either (1) a tubing leak or (2) a casing, packer, or wellhead leak.

Construction and operation of the existing wells (the DW No. 1 and Christensen 18-3) has been, and will continue to be performed in accordance with the State and Federal UIC regulations to prevent migration of fluids into any underground source of drinking water. Similarly, construction and operation of the proposed new wells (DW No. 4 and DW No. 5) will be in full compliance with State and Federal UIC regulations.

h. Staffing and training information

Staffing and training related to the operation of Class I disposal wells have been in place and constant since the startup of existing wells DW No. 1 and Christensen 18-3. COGEMA has written standard operating procedures for well startup, operation, and shutdown. On-site staff at Christensen/Irigaray have over 35 collective years of experience with disposal well operations. In addition to the DW No. 1 and Christensen 18-3, COGEMA has operated four other Class I disposal wells in Texas.

I. Monitoring Plan

a. Monitoring requirements are already addressed in the permit UIC 00-340. No changes are proposed.

b. Monitoring wells

Due to the extreme depth of the Lance Formation, the lack of demonstrated use of shallow USDWs in the area, and the confining zones above and below the injection horizon, the installation of monitoring wells within the final AORs to assess fluid migration in the Lance Formation is not necessary.

c. Monitoring plan conformance

There are no requested changes to the monitoring requirements of UIC 00-340 as a result of modifying the permit to include two additional wells in the Lance Formation.

d. Quality assurance plan

The quality assurance program currently in place for COGEMA DW No. 1 and the Christensen 18-3 will continue, and will apply to the DW No. 4 and No. 5.

J. Well Abandonment

a. Abandonment Procedures: COGEMA DW No. 4 and DW No. 5

Well abandonment will be performed in accordance with WDEQ and the Wyoming Oil and Gas Conservation Commission regulations. The proposed procedures for DW No. 4 and No. 5 will include the following:

1. Rig up pulling unit. R/D tree and R/U and 3,000 psi BOPs. Test same.
2. Latch tubing, get off on/off tool (if used) and POOH L/D tubing.
3. P/U 2 7/8" workstring. RIH, latch on/off tool and pull packer. POOH and LD same.
4. RIH and cement well from TD to surface in 1,000- to 2,000-foot stages with a minimum of approximately 660 sx 50/50 Pozmix A cement (1.26 ft³/sx). This approach is proposed due to the extensive perforated interval in the Lance, and may be changed, on approval from WDEQ, to include multiple conventional squeeze jobs rather than filling the casing.
5. Tie into 9 5/8" x 5 1/2" annulus and attempt to bullhead 40 sacks 50/50 Pozmix A cement.
6. R/D BOPs and pulling unit.
7. Cut and remove wellhead at 5-10 feet below ground surface. Place a dry hole monument in a 10 sack cement plug at the surface.

K. Financial Surety

COGEMA Mining, Inc. currently holds Letter of Credit No. [REDACTED] issued by HSBC Bank USA in favor of the State of Wyoming, Department of Environmental Quality, in the amount of \$10,369,238.00. The letter of credit is to insure the reclamation and restoration of the Irigaray and Christensen Ranch ISL uranium facilities. Covered in the letter of credit amount are costs for the plugging and abandonment of the existing DW No. 1 and Christensen 18-3 disposal wells.

Worksheet 1 of COGEMA's reclamation estimate includes \$73,950 and \$66,250 for plugging and abandoning wells DW No. 1 and CR 18-3 respectively. Additionally, a 20%

contingency is added, allowing for a total of \$168,240 for the plugging and abandonment of the two existing wells. The financial surety estimate is updated annually. As soon one or both of the newly proposed wells are completed as disposal wells, the estimate will be revised to include specific costs of reclamation for those wells.

The annual updates of COGEMA's financial surety estimate are reviewed and approved by both the Wyoming Department of Environmental Quality and the U.S. Nuclear Regulatory Commission.

L. Mechanical Integrity

After completion of the DW No. 4 or No. 5, Part I mechanical integrity will be demonstrated for each well before injection commences, in accordance with the procedures specified by WDEQ.

Part II integrity will be demonstrated prior to injection by either (1) a Radioactive Tracer Log and Temperature Survey coupled with a casing pressure check, or (2) an oxygen activation log.

M. Reports

The required quarterly and annual reports for Class I injection wells will be filed no later than 30 days after the end of the calendar quarter.

N. Location Maps

New maps and figures with information that applies specifically to this modification application have been prepared and are included. A list of those information sources follows.

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Appendix 1 – Surface Lease Agreement

P. REFERENCES

COGEMA, 1997, *Application for Modification, Christensen Ranch Disposal Wellfield, Permit UIC 95-241*, COGEMA, Harlan & Associates, Inc. and Petrotek Engineering.

COGEMA, 1998, Supplemental Technical Document in Support of Aquifer Exemption, Christensen Ranch Mine Disposal Wellfield, COGEMA, Harlan & Associates and Petrotek Engineering, April 17, 1998.

COGEMA, 2000, *Application for Modification, Christensen Ranch Disposal Wellfield, Permit UIC 97-407*, COGEMA, Harlan & Associates and Petrotek Engineering

Connor, Carol Waite 1992, *The Lance Formation; Petrography and Stratigraphy, Powder River Basin and Nearby Basins, Wyoming and Montana*, USGS Bulletin No 1917-I

US Environmental Protection Agency, 1999; Underground Injection Control Program Revision; Aquifer Exemption Determination for Portions of the Lance Formation Aquifer in Wyoming; Final Rule; *Federal Register* March 26, 1999.

US Environmental Protection Agency, 2002; Underground Injection Control Program Revision; Aquifer Exemption Determination for Portions of the Lance Formation Aquifer in Wyoming; Final Rule; *Federal Register* July 22, 2002.

Wyoming Water Development Commission, 2002; *2002 Powder/Tongue River Basin Final Water Plan*; <http://waterplan.state.wy.us/plan/powder/finalrept.html>

Table 1
Summary of Oil and Gas Wells Outside AOR but within a 2-mile Radius of COGEMA DW No. 4 and DW No. 5

| API Number | Well Name | Location | Date Drilled | Total Depth (ft; RKB) | Perforated Interval (ft; RKB) | Completion Formation | Plugging/ Completion Information |
|--|---------------------------|--------------------------|--------------|-----------------------|-------------------------------|--------------------------|---|
| DW No. 4 | | | | | | | |
| 49-019-20507 | TMU H-65 | T45N R 77W Sec 15 C NW | 4/11/79 | 9588 | 9409-9435 | Shannon (Table Mtn) | Producing oil well; currently shut in |
| 49-019-20557 | TMU H71 | T45N R77W Sec 15 SW NE | 2/16/80 | 9500 | 9369-9387 | Shannon (Table Mtn) | Producing oil well |
| 49-019-20539 | Heldt Draw Unit W18377 69 | T45 N R77 W Sec 15 NW SW | 8/23/79 | 9575 | 9456-9468 | Shannon (Table Mtn) | Oil well drilled in 1979; No plugging data available; ceased production in 1983; reportedly plugged in 1983 |
| DW No. 5 | | | | | | | |
| 49-019-20569 | Heldt Draw Unit 78 | T45N R77W Sec 4 SW NE | 5/7/80 | 9446 | n/a | Shannon @ TD (Table Mtn) | Plugged 5/27/80 |
| 49-019-20611 | Heldt Draw Unit 79 | T45N R77W Sec 10 SE NW | 12/10/80 | 9475 | n/a | Parkman @ TD (Table Mtn) | Plugged 1/8/81 |
| 49-019-20561 | Heldt Draw 80 | T45N R77W Sec 9 NE SE | 4/13/80 | 9415 | 8098-8103 | Parkman (Table Mtn) | Producing Oil Well; currently shut in |
| 49-019-20556 | TMU H73-1 | T45N R77W Sec 10 CSW | 5/8/84 | 9415 | 9310-9325 | Shannon (Table Mtn) | Oil Well; Converted to Injection Well (Shannon FM) in 1999 |
| Notes: | | | | | | | |
| No wells are within either the DW No.4 or No.5 AORs. All wells associated with DW No.5 are also within a two mile radius of DW No.4. | | | | | | | |
| No water quality data were available from the USGS Produced Water Database or WYOGCC websites | | | | | | | |
| n/a - well was not perforated; plugged after reaching TD | | | | | | | |

Table 2
Estimated Physical and Chemical Data COGEMA DW No. 4 and No. 5
(Based on DW No. 1 and CR 18-3)

| <i>PARAMETER</i> | <i>VALUE</i> | <i>SOURCE/MEAS. METHOD</i> |
|--------------------------------|--|--|
| Est. Formation Temperature | 119° F (at 3905 feet) 148° F (at 6200 feet) | DW No. 1 & CR 18-3 RAT logs; downhole temp. gauges DW No. 1 & CR 18-3 RAT logs; downhole temp. gauges |
| Est. Formation Pressure | 1605 psi (at 3905 feet) | Downhole pressure gauges (DW No. 1) |
| Est. Static Water Level | 315 feet | Downhole pressure gauges (DW No. 1) |
| Est. Formation Fracture Press. | 0.78 psi/ft (at 3905 feet) 0.64 psi/ft (at 6200 feet) | Downhole pressure gauges (DW No. 1) |
| Est. Formation Porosity | 17 percent | DW No. 1 & CR 18-3 Openhole logs |
| Est. Gross Formation Thickness | 2450 feet | Regional logs & DW No. 1 |
| Est. Net Formation Thickness | 1819 | Regional logs & DW No. 1 |
| Est. Net Perforated Thickness | 690 feet | Regional logs & DW No. 1 |
| Est. Formation Flow Capacity | 6693 md-ft | DW No. 1 Testing Analyses |
| Est. Formation Transmissivity | 41.7 ft ² /day | DW No. 1 Testing Analyses |
| Est. Formation Storativity | 6.57 E-4 | DW No. 1 Testing Analysis |
| Est. Formation Water TDS | 2400 mg/l | Formation water samples (DW No. 1) |
| Est. Form. Water Sp. Grav. | 1.001 | Formation water samples (DW No. 1) |

Table 3
Calculation of COI, ULEW, and AOR
COGEMA DW No. 4 and DW No. 5

| | | | |
|---|--------------------------|------------------------|---------------|
| Permeability/Hydraulic Conductivity Conversion | | | |
| K = | K = Ki (pg/mu) | | |
| u = | 0.44 | cp @ 148 deg. F. BHT | |
| mu = | 0.44 cp * 0.01 gm-sec/cm | = | 0.0044 |
| Ki | K | Assume kh = 6693 md-ft | |
| (md) | (ft/day) | | |
| 9.70 | 0.0604 | | |
| Head in USDW from base of Lance (W) = | | | Source |
| Pressure Grad. of Lance = | | | |
| Pressure in Lance = | | | |
| Head in Lance (B) = | | | |
| W - B = | | | |
| Thickness of Lance (H) = | | | |
| Storage of Lance (S)= | | | |
| Average Lance Porosity (φ) = | | | |
| Injection Rate = | | | |
| Injection Rate (Q) = | | | |
| Injection Period (t) = | | | |
| Injection Period (t) = | | | |
| Fluid in Inj. Zone = | | | |
| SP Gravity(G) = | | | |
| CONE OF INFLUENCE CALCULATION | | | |
| Cone of Influence (r) = | | | |
| Where x = | | | |
| x = | | | |
| r = | | | |
| ULTIMATE LIMIT OF EMPLACED WASTE | | | |
| R = radius of volumetric fillup (feet) | | | |
| R = | | | |
| R = | | | |
| MINIMUM AREA OF REVIEW | | | |
| Cone of Influence = | | | |
| Radius of Volumetric Fillup (ULEW) = | | | |
| Minimum Radius (1/4 mile) = | | | |

Table 4
Christensen 18-3 Lance Formation
Water Quality Analysis

| LANCE FORMATION WATER QUALITY | | | | | | | | MINING SOLUTION QUALITY | |
|-------------------------------|--|---|---|---|---------|---------|---|---|---|
| Sample Date | 18-3 DST #1 (Dissolved) 09-Aug-97 | 18-3 DST #1 (Total Metals) 13-Aug-97 | 18-3 DST #2 (Totals) 13-Aug-97 | Wyoming or EPA Groundwater Standards | | | Class Exceedances in the Lance Formation | Mine Unit 5 Recovery 22-Jul-97 | Mine Unit 6 Recovery 22-Jul-97 |
| | Class I Domestic | Class II Agricultural | Class III Livestock | | | | | | |
| | Major Ions mg/l: | | | | | | | | |
| Ca | 6.8 | 17 | 7.2 | --- | --- | --- | --- | 234 | 242 |
| Mg | < 1.0 | 2.91 | < 1.0 | --- | --- | --- | --- | 43.9 | 41.70 |
| Na | 652 | 667 | 532 | --- | --- | --- | --- | 577 | 581 |
| K | 16.90 | 17.0 | 6.5 | --- | --- | --- | --- | 10.5 | 10.60 |
| CO3 | 44 | --- | 0 | --- | --- | --- | --- | 0 | 0 |
| HCO3 | 994 | --- | 1010 | --- | --- | --- | --- | 1460 | 1480 |
| SO4 | 228 | --- | 61.5 | 250 | 200 | 3000 | --- | 703 | 705 |
| Cl | 327 | --- | 256 | 250 | 100 | 2000 | I, II | 98.3 | 96 |
| NH3 (N) | 1.66 | --- | 1.67 | 0.5 | --- | --- | I | < 0.05 | 0.06 |
| NO2 (N) | < 0.10 | --- | < 0.10 | 1.0 | --- | 10.0 | --- | < 0.10 | < 0.10 |
| NO3 (N) | < 0.10 | --- | < 0.10 | 10.0 | --- | --- | --- | < 0.10 | < 0.10 |
| F | 4.54 | --- | 5.12 | 1.4-2.4 | --- | --- | I | < 0.10 | < 0.10 |
| SiO2 | 26.80 | 44.1 | 27.0 | --- | --- | --- | --- | 18.6 | 27.30 |
| Non-Metals mg/l: | | | | | | | | | |
| TDS @ 180 C | 1947 | --- | 1430 | 500 | 2000 | 5000 | I | 2540 | 2610 |
| Oil and Grease | --- | --- | 18.9 | Free | 10.0 | 10.0 | I, II, III | --- | --- |
| Hydrogen Sulfide | --- | --- | < 1.0 | 0.05 | --- | --- | --- | --- | --- |
| Phenols | 0.33 | --- | 0.33 | 0.001 | --- | --- | I | --- | --- |
| Benzene (ug/l) | --- | --- | 6900 | 5.0 (EPA) | --- | --- | I | --- | --- |
| Cond. (umho/cm) | 3043 | --- | 2380 | --- | --- | --- | --- | 3530 | 3580 |
| Alk. (as CaCO3) | 875 | --- | 831 | --- | --- | --- | --- | 1200 | 1200 |
| pH (units) | 8.89 | --- | 8.19 | 6.5-9.0 | 4.5-9.0 | 6.5-8.5 | III | 7.18 | 7.22 |
| Trace Metals mg/l: | | | | | | | | | |
| Al | < 0.10 | 2.98 | 0.44 | --- | 5.0 | 5.0 | --- | < 0.10 | < 0.10 |
| As | 0.004 | 0.003 | 0.006 | 0.05 | 0.1 | 0.2 | --- | 0.007 | 0.027 |
| Ba | < 0.10 | --- | 0.68 | 1.0 | --- | --- | --- | < 0.10 | < 0.10 |
| B | < 0.10 | 1.04 | 0.78 | 0.75 | 0.75 | 5.0 | I, II | 0.10 | 0.10 |
| Cd | < 0.01 | < 0.01 | < 0.01 | 0.01 | 0.01 | 0.05 | --- | < 0.01 | < 0.10 |
| Cr | < 0.05 | < 0.05 | < 0.05 | 0.05 | 0.10 | 0.05 | --- | < 0.05 | < 0.05 |
| Cu | 0.02 | 2.39 | 0.29 | 1.0 | 0.20 | 0.50 | I, II, III | < 0.01 | < 0.01 |
| Fe | 0.08 | 8.36 | 27.8 | 0.3 | 5.0 | --- | I, II | < 0.05 | < 0.05 |
| Pb | < 0.05 | < 0.05 | 0.07 | 0.05 | 5.0 | 0.1 | I | < 0.05 | < 0.05 |
| Mn | 0.09 | 0.27 | 0.47 | 0.05 | 0.20 | --- | I, II | 0.38 | 0.41 |
| Hg | 0.0002 | --- | 0.004 | 0.002 | --- | 0.00005 | I, III | < 0.001 | < 0.001 |
| Mo | < 0.10 | < 0.10 | < 0.10 | --- | --- | --- | --- | < 0.10 | < 0.10 |
| Ni | < 0.05 | < 0.05 | < 0.05 | --- | 0.20 | --- | --- | < 0.05 | < 0.05 |
| Se | 0.006 | < 0.001 | < 0.001 | 0.01 | 0.02 | 0.05 | --- | 1.45 | 1.19 |
| V | < 0.10 | < 0.10 | < 0.10 | --- | 0.10 | 0.10 | --- | 1.1 | 3.50 |
| Zn | 0.01 | 14.1 | 0.83 | 5.0 | 2.0 | 25.0 | I, II | < 0.01 | < 0.01 |
| Radiometric pCi/l: | | | | | | | | | |
| U (mg/l) | 0.0005 | --- | 0.0009 | 5.0 | 5.0 | 5.0 | --- | 14 | 28.9 |
| Ra 226 | < 0.20 | --- | 0.8 | 5.0 | 5.0 | 5.0 | --- | 650 | 1020 |
| Ra 226 +/- | --- | --- | 0.3 | --- | --- | --- | --- | 7.8 | 10.00 |

Source of Data: COGEMA Mining, Inc.; Analysis by Energy Laboratories, Inc.



ENERGY LABORATORIES, INC.

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MAILING: P.O. BOX 3258 • CASPER, WY 82602

E-mail: energy@trjb.com • FAX: (307) 234-1639 • PHONE: (307) 235-0515 • TOLL FREE: (888) 235-0515

TABLE 5

LABORATORY ANALYSIS REPORT - COGEMA

Sample ID:
Laboratory ID:
Sample Matrix:
Sample Date:
Report Date:
Revision Date:

| |
|-------------------|
| Lower Lance |
| 98-71103 |
| Water |
| 11/18/98 |
| December 10, 1998 |
| January 15, 1998 |

| Major Ions | | Units | Reporting Limit | Results |
|------------------------|-----------------------------------|-------|-----------------|---------|
| Calcium, total | Ca | mg/L | 1.0 | 18.0 |
| Magnesium, total | Mg | mg/L | 1.0 | 3.0 |
| Sodium, total | Na | mg/L | 1.0 | 606 |
| Potassium, total | K | mg/L | 1.0 | 291 |
| Carbonate | CO ₃ | mg/L | 1.0 | < 1.0 |
| Bicarbonate | HCO ₃ | mg/L | 1.0 | 575 |
| Sulfate | SO ₄ | mg/L | 1.0 | 288 |
| Chloride | Cl | mg/L | 1.0 | 770 |
| Ammonium as N | NH ₄ | mg/L | 0.05 | 4.96 |
| Nitrite as N | NO ₂ | mg/L | 0.10 | < 0.10 |
| Nitrate + Nitrite as N | NO ₃ + NO ₂ | mg/L | 0.10 | < 0.10 |
| Fluoride | F | mg/L | 0.10 | 2.07 |
| Silica, total | SiO ₂ | mg/L | 1.0 | 31.0 |

| Non-Metals | | | | |
|--------------------------------|-------------------|------------|------|------|
| Total Dissolved Solids @ 180°C | TDS | mg/L | 2.0 | 2460 |
| Total Suspended Solids | TSS | mg/L | 2.0 | 99.0 |
| Conductivity | | µmho/cm | 1.0 | 4250 |
| Alkalinity | CaCO ₃ | mg/L | 1.0 | 472 |
| pH | | std. units | 0.10 | 8.27 |

| Total Metals | | | | |
|--------------|----|------|--------|---------|
| Aluminum | Al | mg/L | 0.10 | 0.90 |
| Arsenic | As | mg/L | 0.001 | 0.007 |
| Barium | Ba | mg/L | 0.10 | 0.30 |
| Boron | B | mg/L | 0.10 | 0.40 |
| Cadmium | Cd | mg/L | 0.005 | < 0.005 |
| Chromium | Cr | mg/L | 0.05 | < 0.05 |
| Copper | Cu | mg/L | 0.01 | 0.53 |
| Iron | Fe | mg/L | 0.05 | 28.0 |
| Lead | Pb | mg/L | 0.05 | 0.24 |
| Manganese | Mn | mg/L | 0.01 | 0.48 |
| Mercury | Hg | mg/L | 0.0001 | 0.0002 |
| Molybdenum | Mo | mg/L | 0.10 | < 0.10 |
| Nickel | Ni | mg/L | 0.05 | < 0.05 |
| Selenium | Se | mg/L | 0.001 | 0.003 |
| Vanadium | V | mg/L | 0.10 | < 0.10 |
| Zinc | Zn | mg/L | 0.01 | 2.67 |

| Quality Assurance Data | | Target Range | |
|------------------------|--------|--------------|-------|
| Anion | meq | | 37.25 |
| Cation | meq | | 37.03 |
| WYDEQ A/C Balance | % | -5 - +5 | -0.30 |
| Calc TDS | mg/L | | 2329 |
| TDS A/C Balance | dec. % | 0.80 - 1.20 | 1.06 |

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COMPLETE ANALYTICAL SERVICES



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TABLE 6

LABORATORY ANALYSIS REPORT - COGEMA MINING, INC.

Sample ID:
Laboratory ID:
Sample Matrix:
Sample Date:
Report Date:
Revision Date:

| |
|-------------------|
| Upper Lance |
| 98-71418 |
| Water |
| 11/20/1998 |
| December 14, 1998 |
| January 15, 1998 |

| Major Ions | | Units | Reporting Limit | Results |
|------------------------|-----------------------------------|-------|-----------------|---------|
| Calcium, total | Ca | mg/L | 1.0 | 20.8 |
| Magnesium, total | Mg | mg/L | 1.0 | 3.1 |
| Sodium, total | Na | mg/L | 1.0 | 425 |
| Potassium, total | K | mg/L | 1.0 | 459 |
| Carbonate | CO ₃ | mg/L | 1.0 | 13.3 |
| Bicarbonate | HCO ₃ | mg/L | 1.0 | 482 |
| Sulfate | SO ₄ | mg/L | 1.0 | 140 |
| Chloride | Cl | mg/L | 1.0 | 724 |
| Ammonium as N | NH ₄ | mg/L | 0.05 | 6.12 |
| Nitrite as N | NO ₂ | mg/L | 0.10 | < 0.10 |
| Nitrate + Nitrite as N | NO ₃ + NO ₂ | mg/L | 0.10 | < 0.10 |
| Fluoride | F | mg/L | 0.10 | 1.77 |
| Silica, total | SiO ₂ | mg/L | 1.0 | 31.8 |

| Non-Metals | | | | |
|--------------------------------|-------------------|------------|------|------|
| Total Dissolved Solids @ 180°C | TDS | mg/L | 2.0 | 2330 |
| Total Suspended Solids | TSS | mg/L | 1.0 | 117 |
| Conductivity | | µmho/cm | 1.0 | 4000 |
| Alkalinity | CaCO ₃ | mg/L | 1.0 | 414 |
| pH | | std. units | 0.10 | 8.69 |

| Total Metals | | | | |
|--------------|----|------|--------|---------|
| Aluminum | Al | mg/L | 0.10 | 2.87 |
| Arsenic | As | mg/L | 0.001 | 0.016 |
| Barium | Ba | mg/L | 0.10 | 0.27 |
| Boron | B | mg/L | 0.10 | 0.31 |
| Cadmium | Cd | mg/L | 0.005 | < 0.005 |
| Chromium | Cr | mg/L | 0.05 | < 0.05 |
| Copper | Cu | mg/L | 0.01 | 0.63 |
| Iron | Fe | mg/L | 0.05 | 23.6 |
| Lead | Pb | mg/L | 0.05 | 0.31 |
| Manganese | Mn | mg/L | 0.01 | 0.36 |
| Mercury | Hg | mg/L | 0.0001 | 0.0002 |
| Molybdenum | Mo | mg/L | 0.10 | < 0.10 |
| Nickel | Ni | mg/L | 0.05 | < 0.05 |
| Selenium | Se | mg/L | 0.001 | 0.005 |
| Zinc | Zn | mg/L | 0.01 | 7.29 |

| Quality Assurance Data | | Target Range | |
|------------------------|--------|--------------|-------|
| Anion | meq | | 31.69 |
| Cation | meq | | 33.81 |
| WYDEQ A/C Balance | % | -5 - +5 | 3.24 |
| Calc TDS | mg/L | | 2090 |
| TDS A/C Balance | dec. % | 0.80 - 1.20 | 1.11 |

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COMPLETE ANALYTICAL SERVICES

Table 7
Calculation of Limiting Surface Pressure
COGEMA DW No. 4 and DW No. 5

Fracture Pressure

$$P = F \times D$$

P = fracture pressure at the bottom of the receiver (psi) (0.642 psi/ft from DW #1)

F = Fracture gradient (psi/ft)

D = Depth to the bottom of the receiver (6200 feet; bgs)

Hydrostatic Head

$$h = G \times D \times 0.433 \text{ psi/ft}$$

h = hydrostatic head at the bottom of the receiver (psi)

G = specific gravity of the injection fluid

D = Depth to the bottom of the receiver (feet; bgs)

Limiting Surface Injection Pressure

$$L = (P - h + T + L_p) \times 0.90$$

L = limiting surface injection pressure (psi)

P = fracture pressure at the bottom of the receiver (psi)

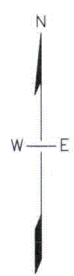
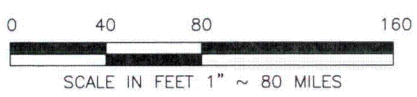
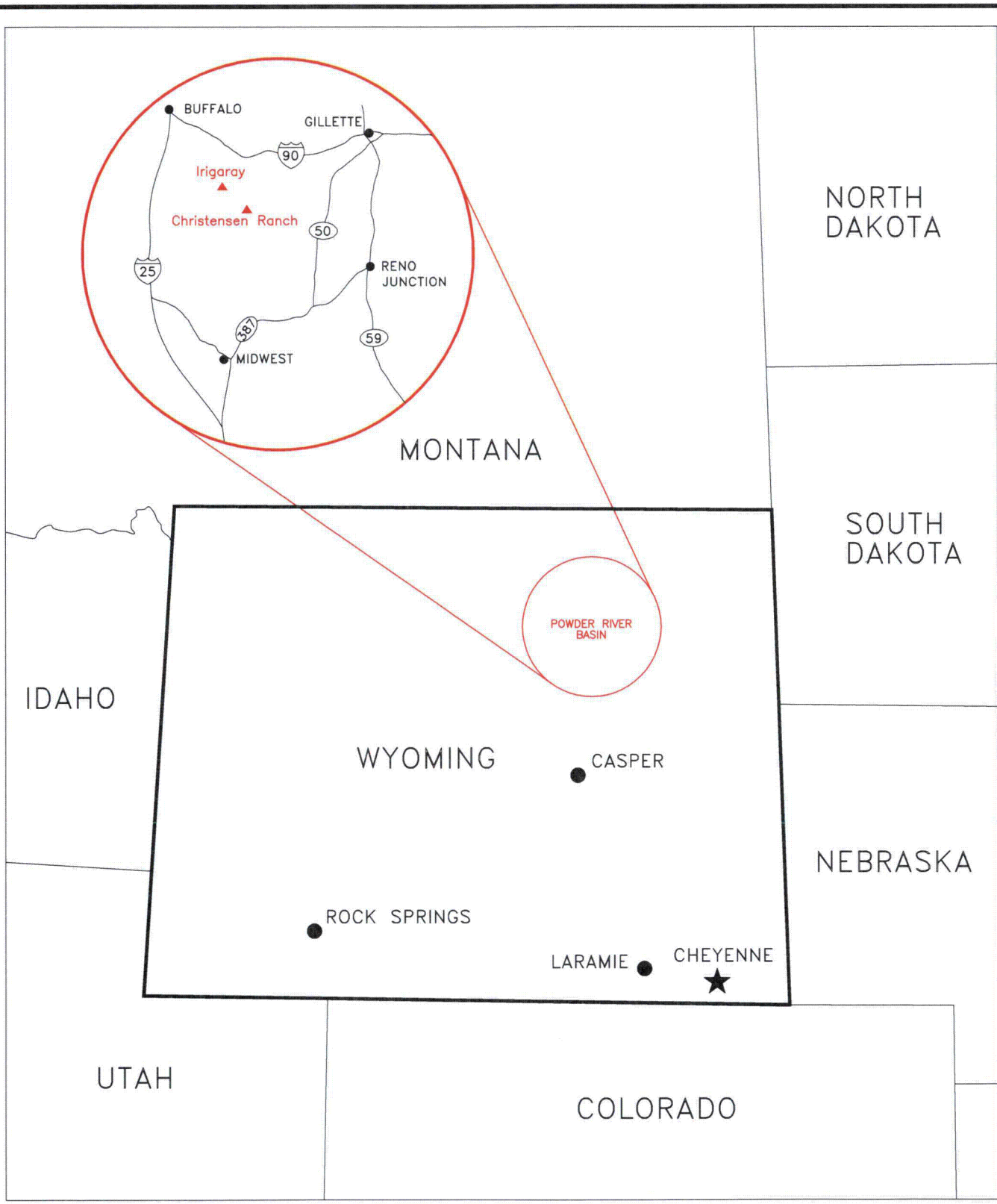
h = hydrostatic head at the bottom of the receiver (feet)

T = tubing pressure loss (psi)

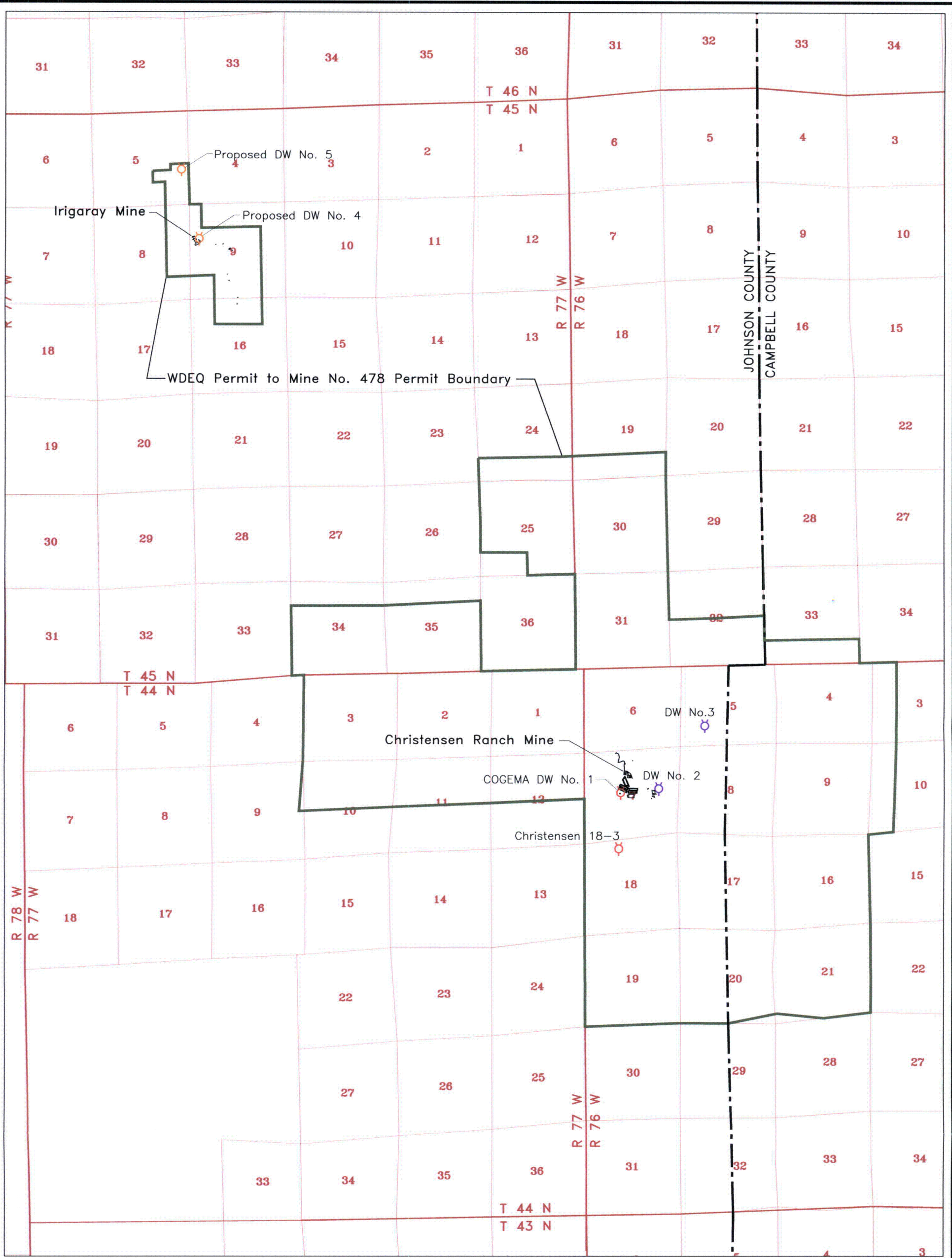
L_p = perforation pressure loss (psi)

Assume: L_p = 0
 Injection Rate = 125 gpm
 Tubing length = 3930 feet
 From charts, friction loss is 52 psi/1000 feet (2 7/8" tubing at 125 gpm)

| | F | D | P | G | h | T | L |
|-------------------------|----------|------|-------|-------|-------|-------|-------------|
| Wells | (psi/ft) | (ft) | (psi) | | (psi) | (psi) | (psi) |
| DW No. 4 & 5 | 0.642 | 6200 | 3980 | 1.001 | 2687 | 204 | 1347 |

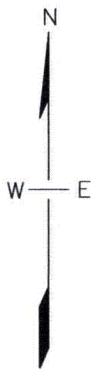
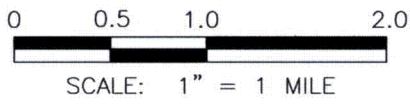


| | |
|--|------------------------|
| COGEMA Mining, Inc. | |
| FIGURE 1 CHRISTENSEN RANCH AND IRIGARAY MINES SITE LOCATION MAP | |
| PROJECT: 217-31 | DATE: DECEMBER 2006 |
| 2006 CLI Fig1.dwg | BY: KRS CHECKED: HPD |
| Petrotek 10288 West Chatfield Avenue, Suite 201 Littleton, Colorado 80127 303-290-9414 www.petrotek.com | |



LEGEND

- EXISTING ACTIVE DISPOSAL WELL LOCATION
- PERMITTED DISPOSAL WELL LOCATION
- PROPOSED NEW DISPOSAL WELL LOCATION

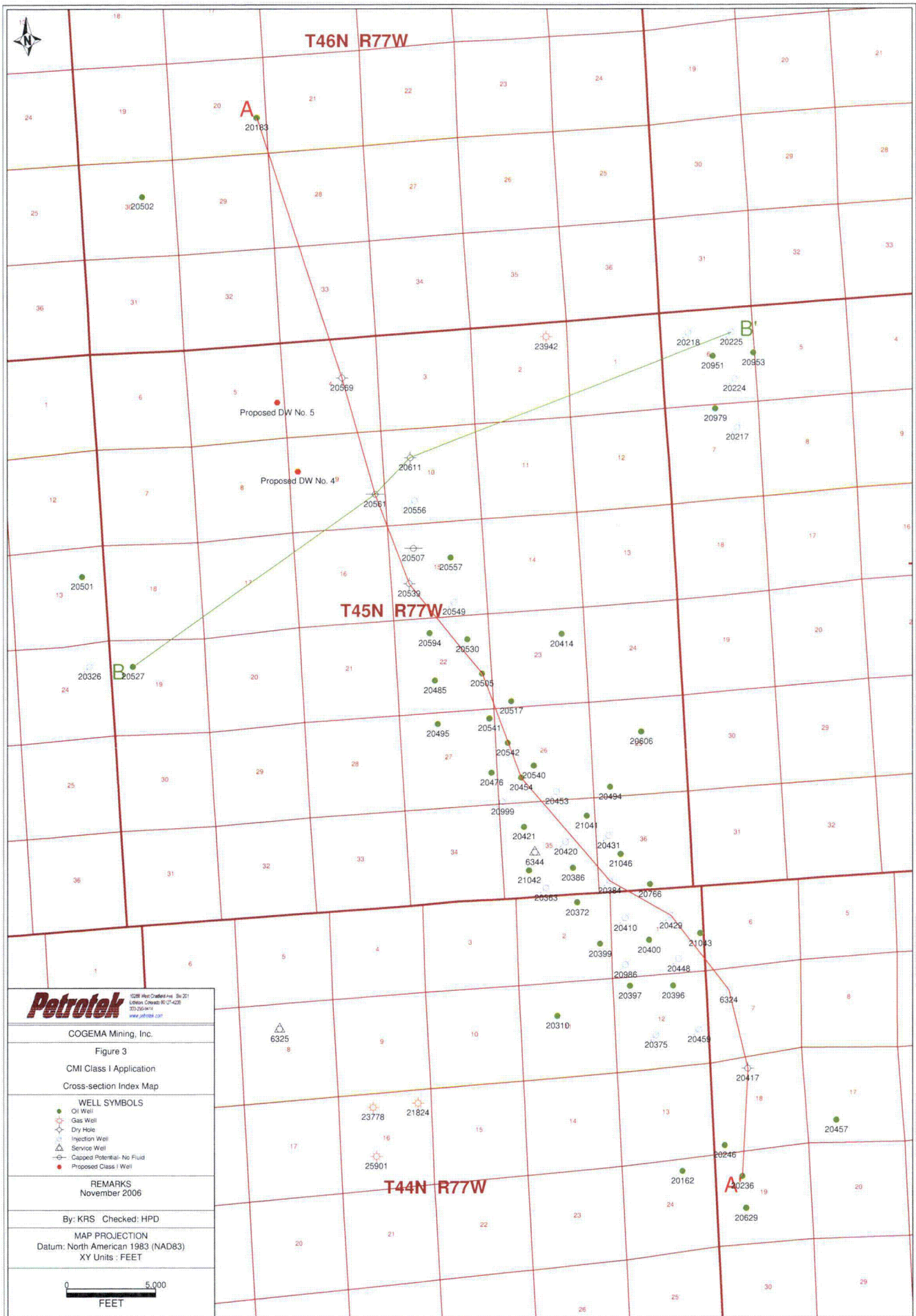


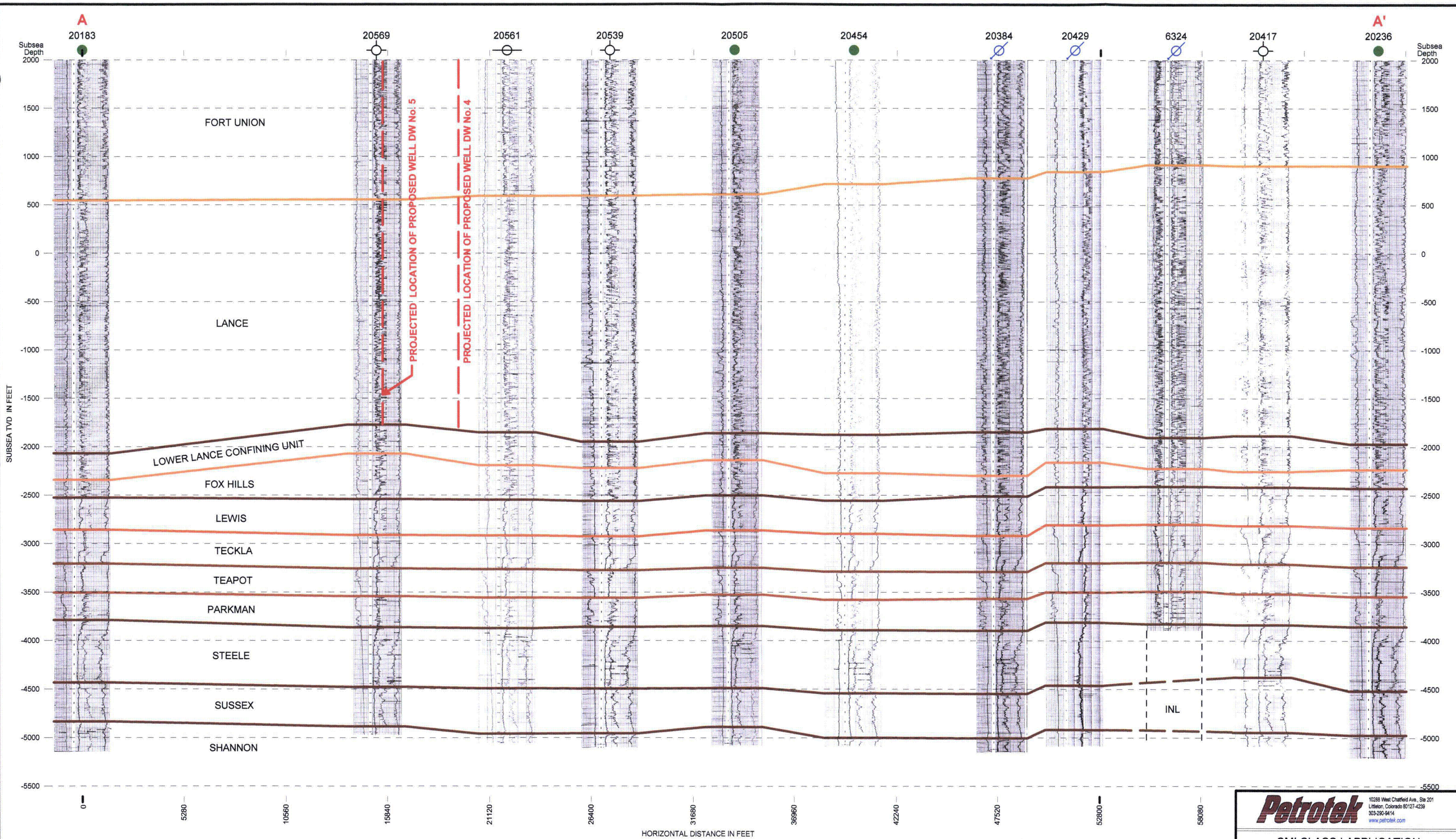
COGEMA Mining, Inc.

FIGURE 2
LOCATION OF COGEMA'S EXISTING
AND PROPOSED CLASS I WELLS

| | |
|-----------------|----------------------|
| PROJECT: 217-31 | DATE: DECEMBER 2006 |
| COMPOSITE.dwg | BY: KRS CHECKED: HPD |

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CMI CLASS I APPLICATION

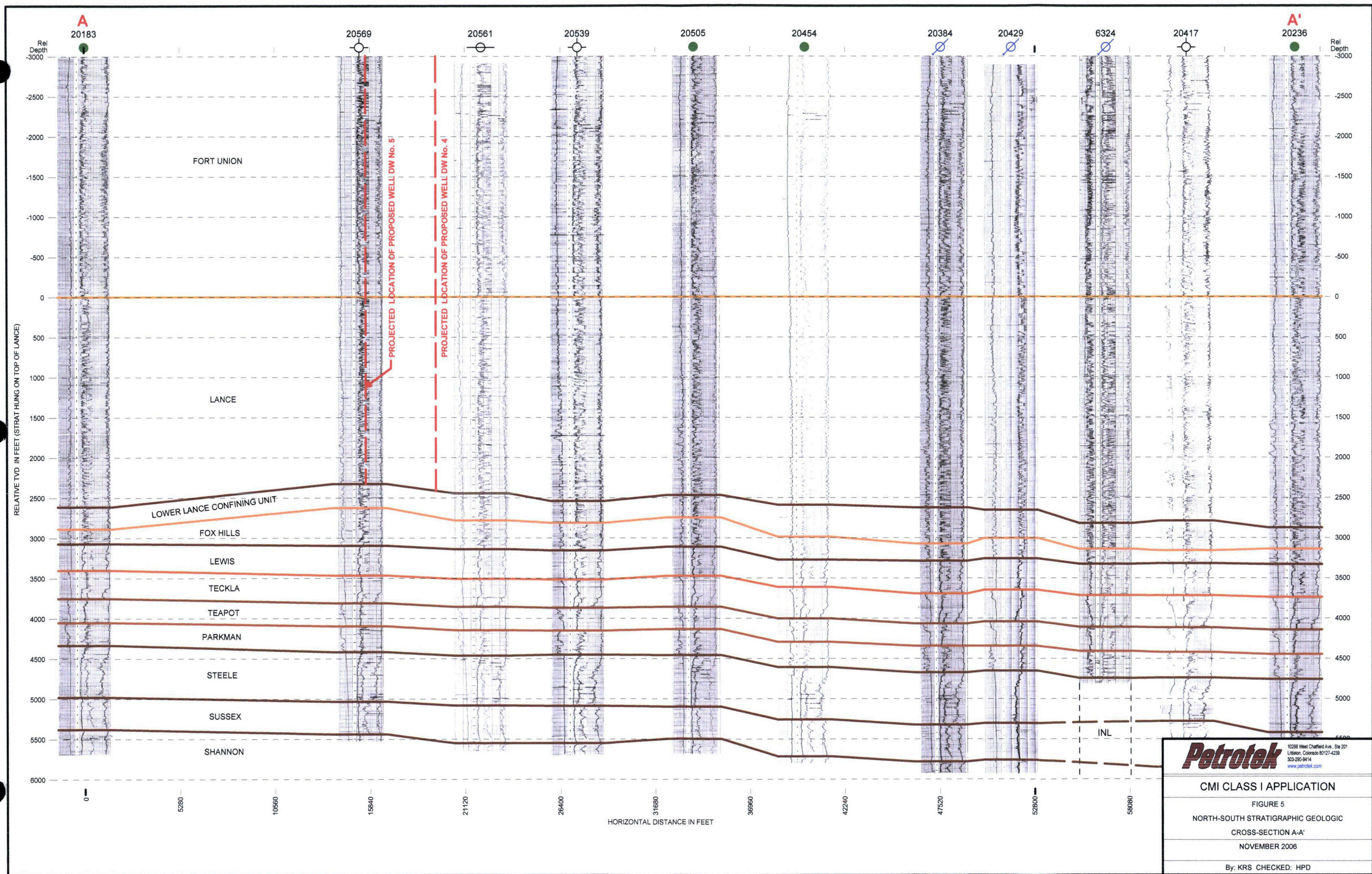
FIGURE 4

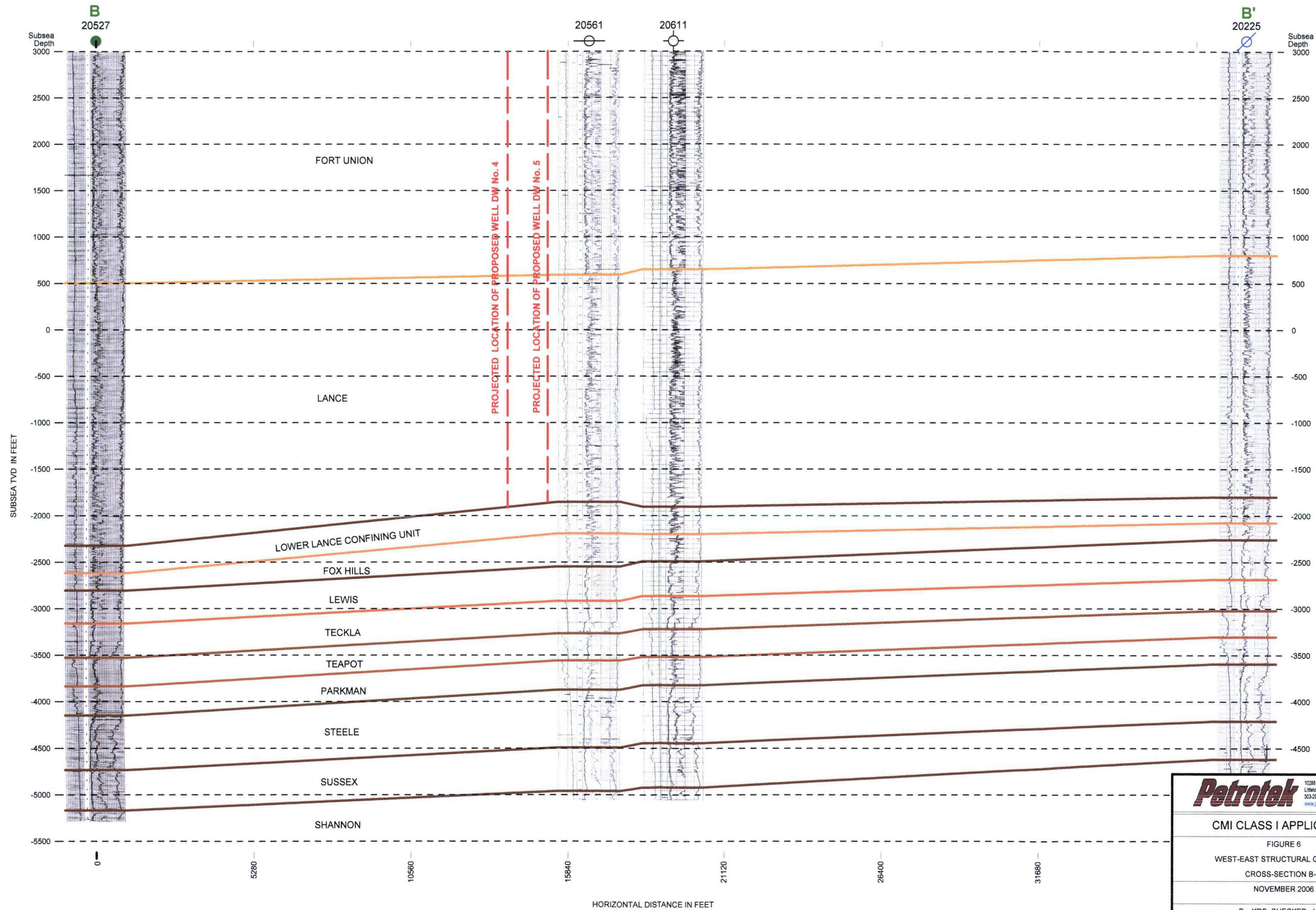
NORTH-SOUTH STRUCTURAL GEOLOGIC

CROSS-SECTION A-A'

NOVEMBER 2006

By: KRS CHECKED: HPD



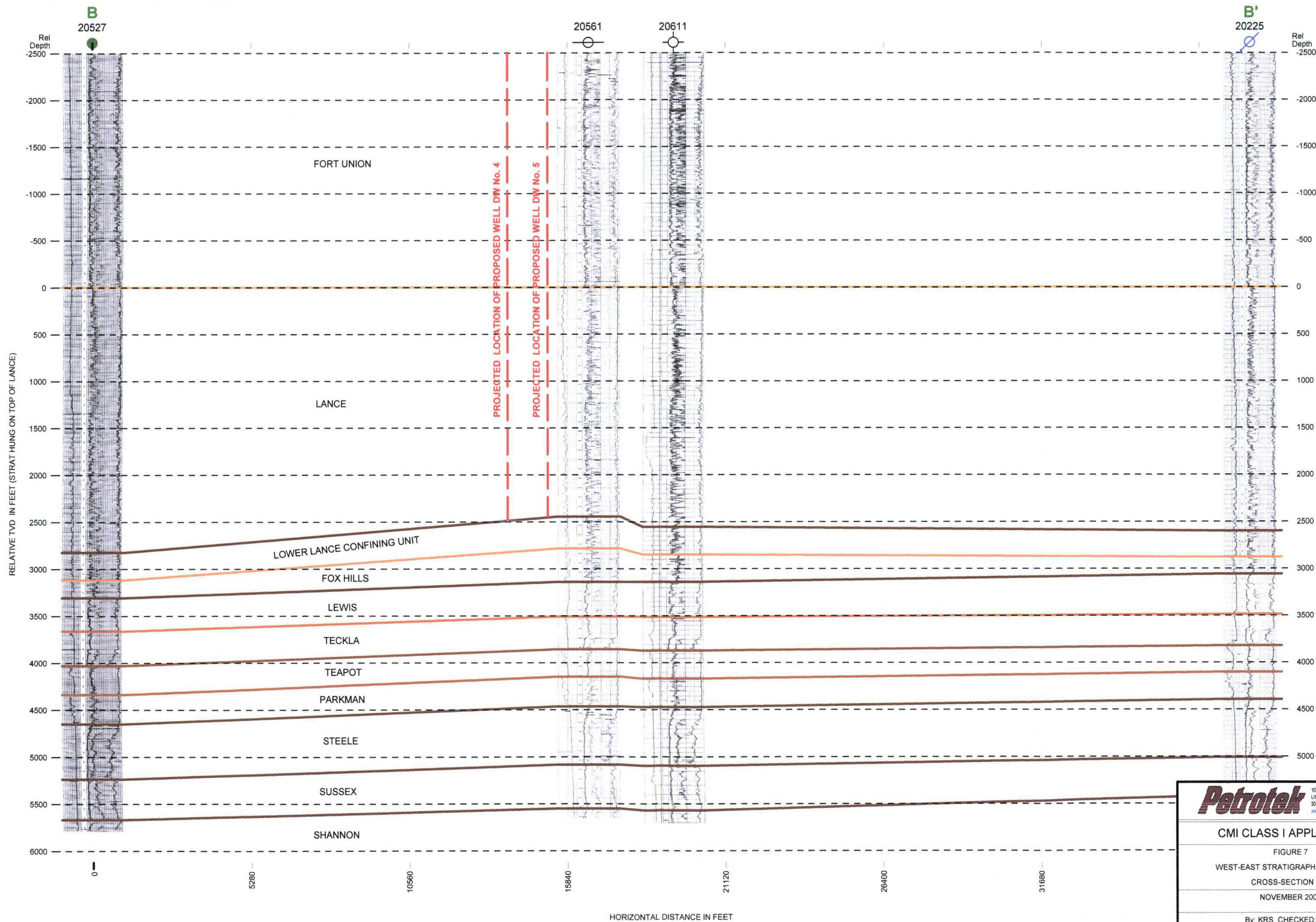


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FIGURE 6
 WEST-EAST STRUCTURAL GEOLOGIC
 CROSS-SECTION B-B'
 NOVEMBER 2006

By: KRS CHECKED: HPD



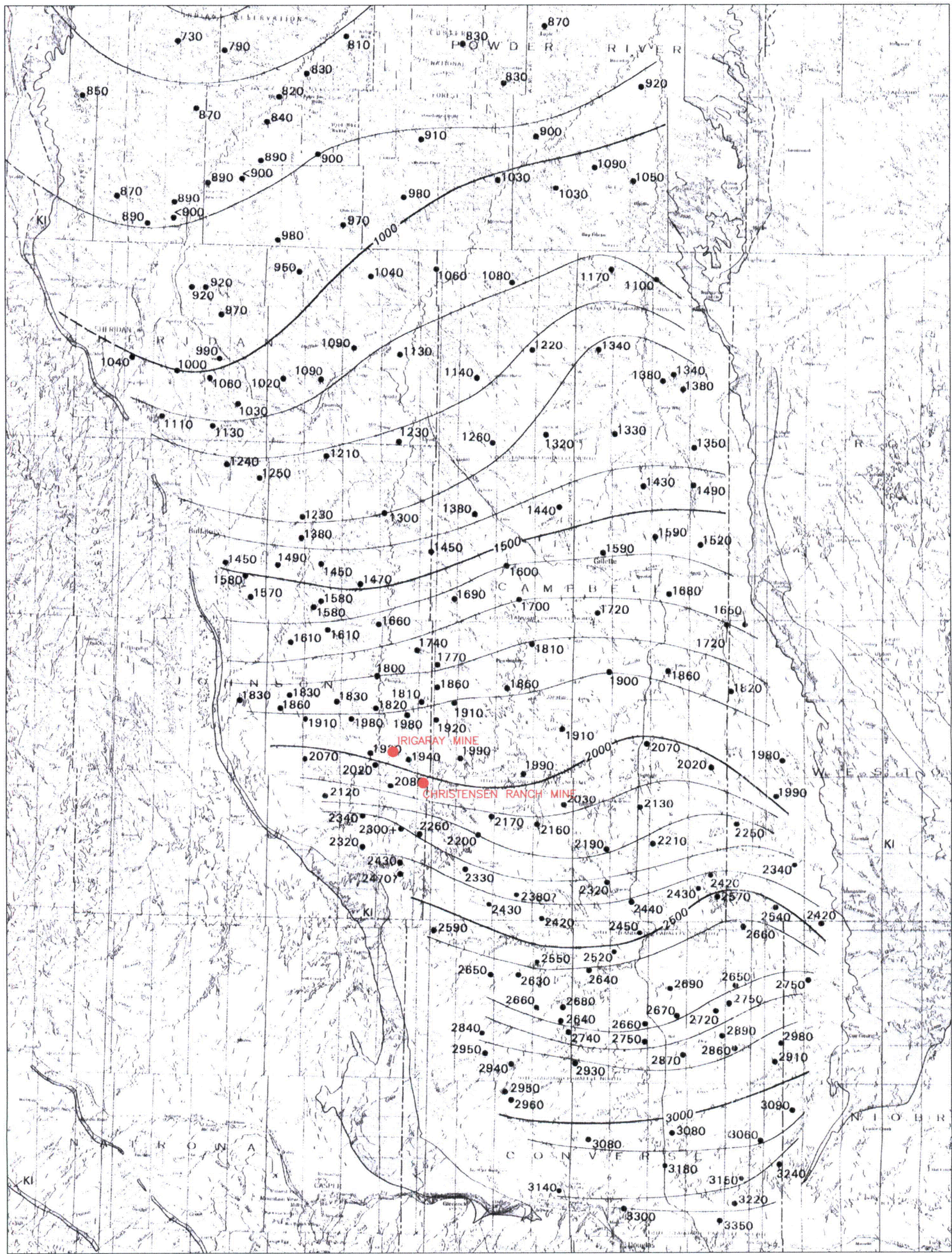
Petrotek 10288 West Chatfield Ave., Ste 201
 Littleton, Colorado 80127-4239
 303-290-9414
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FIGURE 7
 WEST-EAST STRATIGRAPHIC GEOLOGIC
 CROSS-SECTION B-B'

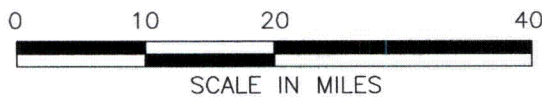
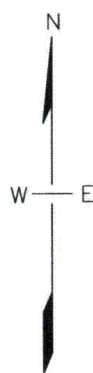
NOVEMBER 2006

By: KRS CHECKED: HPD



LEGEND

500 THICKNESS CONTOUR INTERVAL = 500'



MAP FROM: CONNOR, 1992

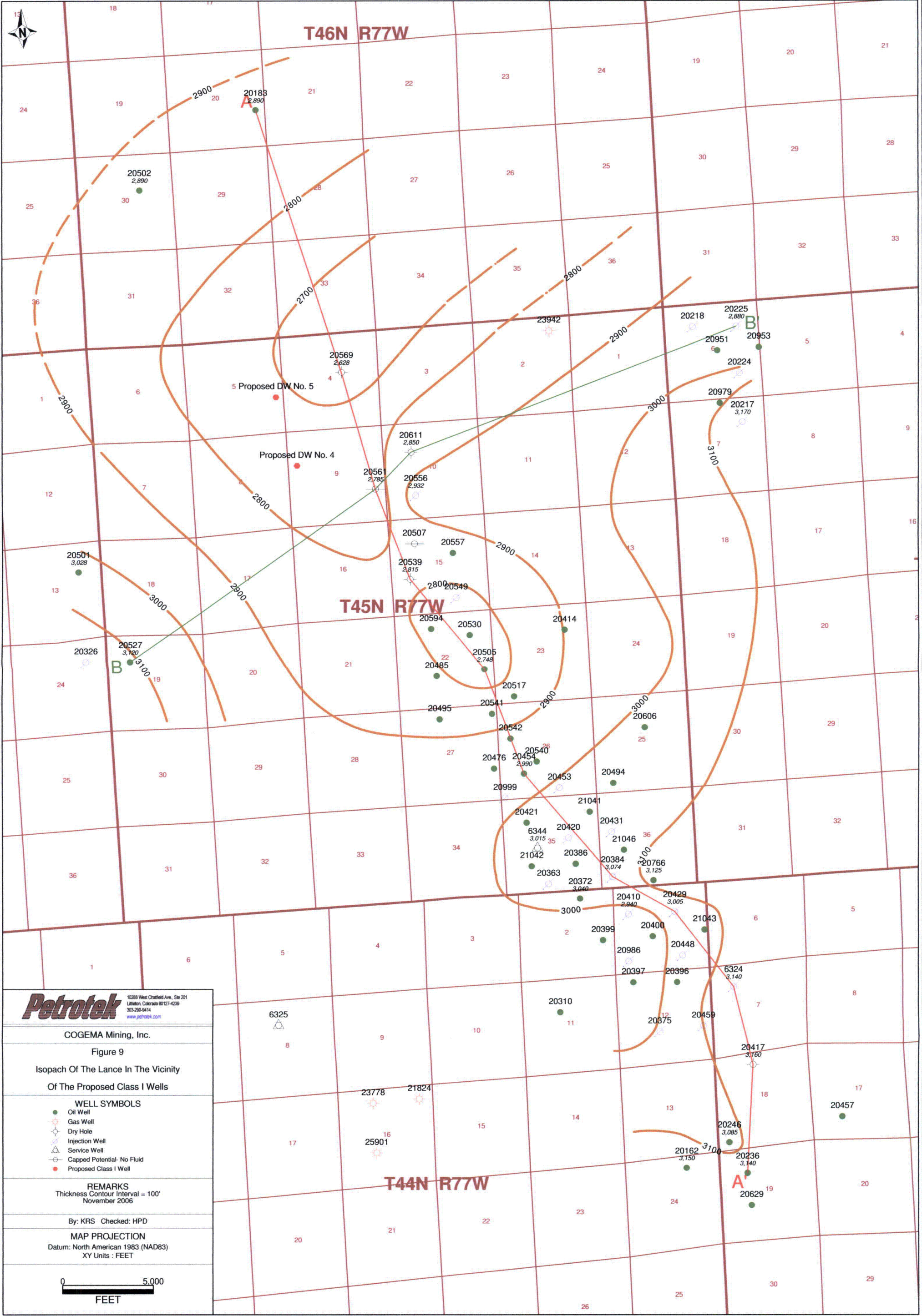
COGEMA Mining, Inc.

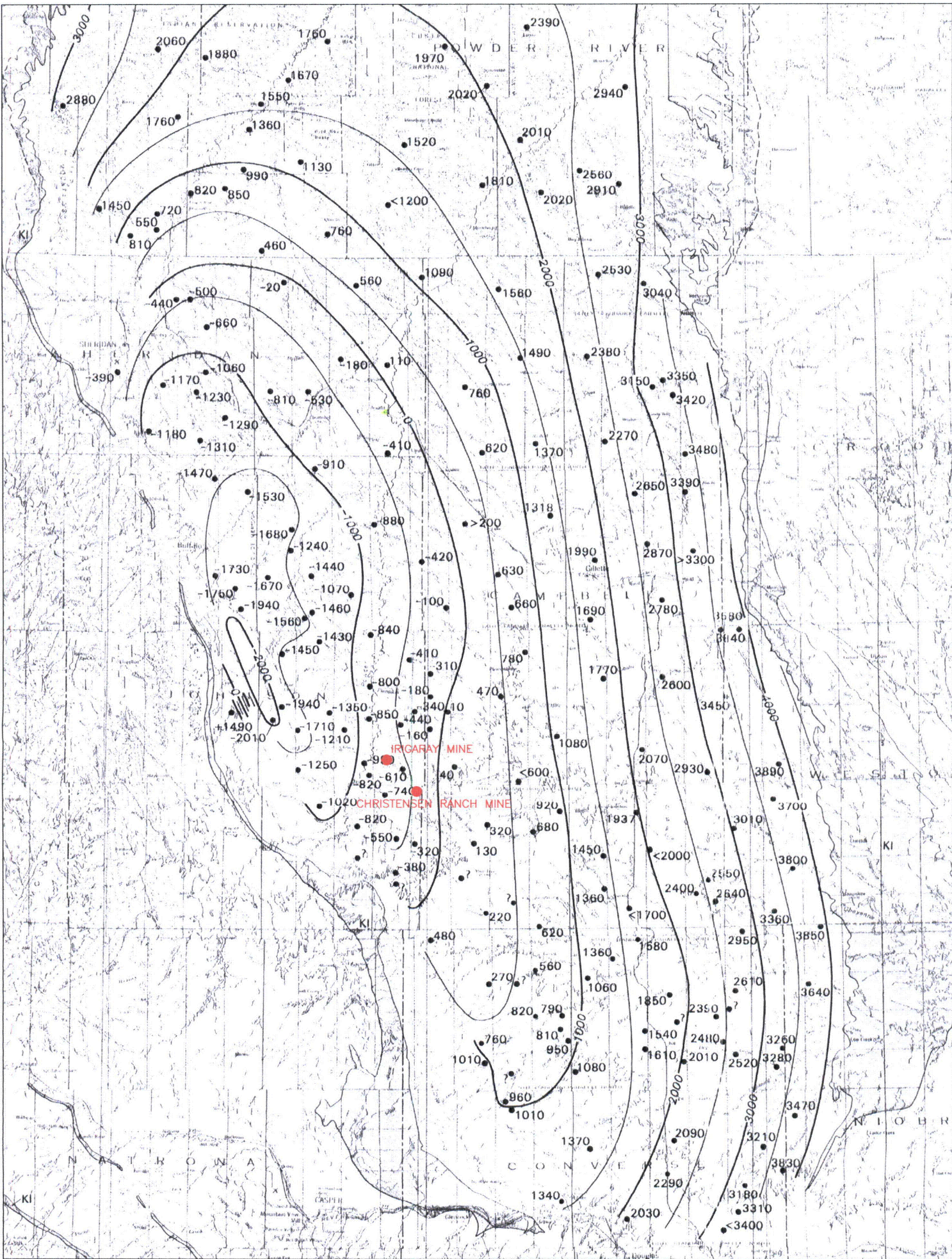
FIGURE 8
REGIONAL ISOPACH MAP
OF THE LANCE FORMATION

| | |
|-------------------|----------------------|
| PROJECT: 217-31 | DATE: DECEMBER 2006 |
| 2006 CLI Fig8.dwg | BY: KRS CHECKED: HPD |

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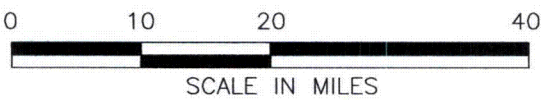
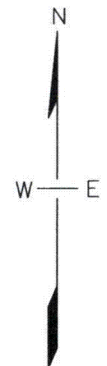
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LEGEND

500 SUBSEA CONTOUR INTERVAL = 500'



MAP FROM: CONNOR, 1992

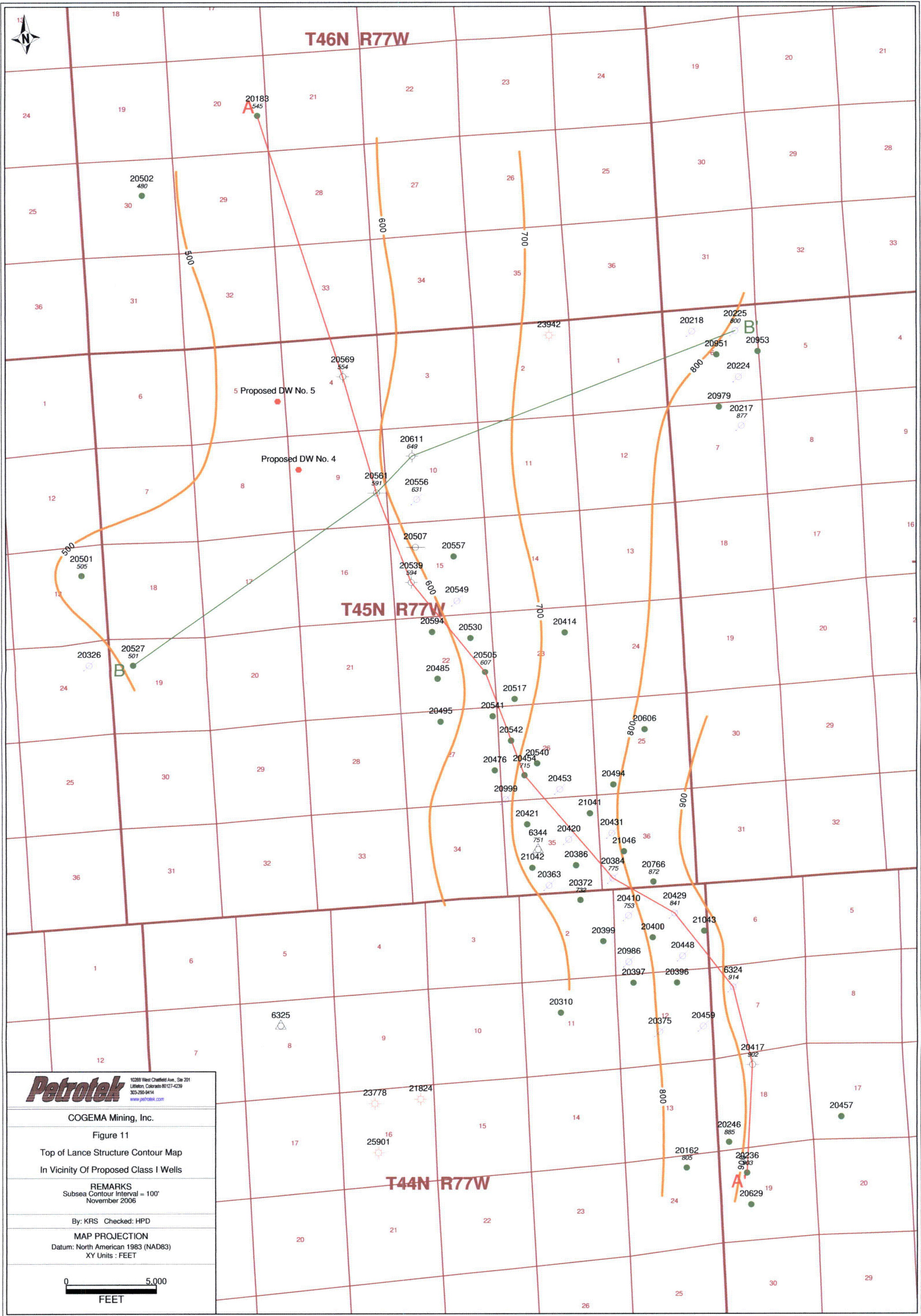
COGEMA Mining, Inc.

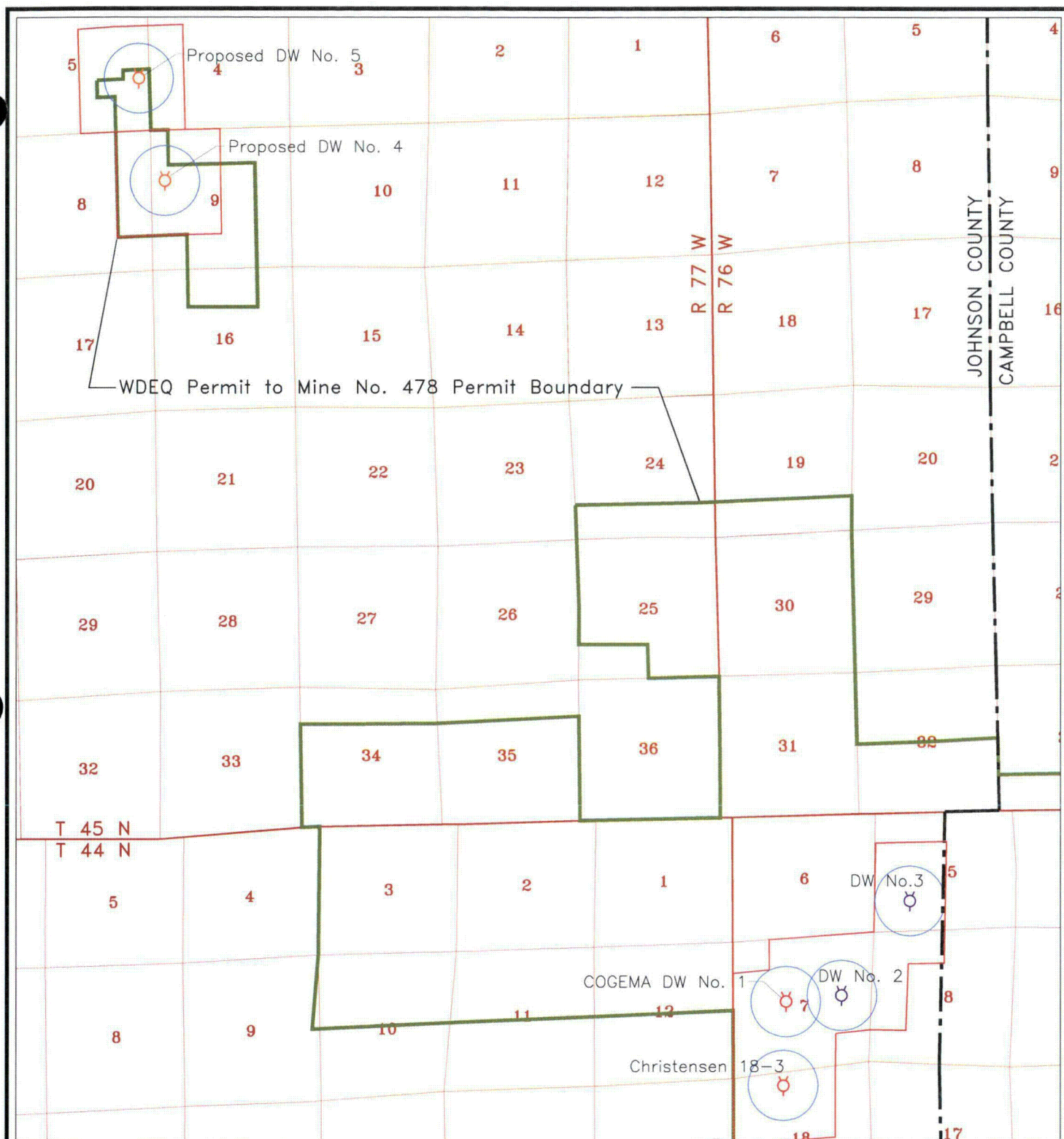
FIGURE 10
REGIONAL STRUCTURAL CONTOUR MAP
TOP OF LANCE

| | |
|--------------------|----------------------|
| PROJECT: 217-31 | DATE: NOVEMBER 2006 |
| 2006 CLI Fig10.dwg | BY: KRS CHECKED: HPD |

Petrotek

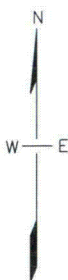
10288 West Chatfield Avenue, Suite 201
Littleton, Colorado 80127
303-290-9414
www.petrotek.com





LEGEND

- EXISTING ACTIVE DISPOSAL WELL LOCATION
- PERMITTED DISPOSAL WELL LOCATION
- PROPOSED NEW DISPOSAL WELL LOCATION
- AREA OF REVIEW (LEGAL)
- 0.25 MILE AOR



COGEMA Mining, Inc.

FIGURE 12

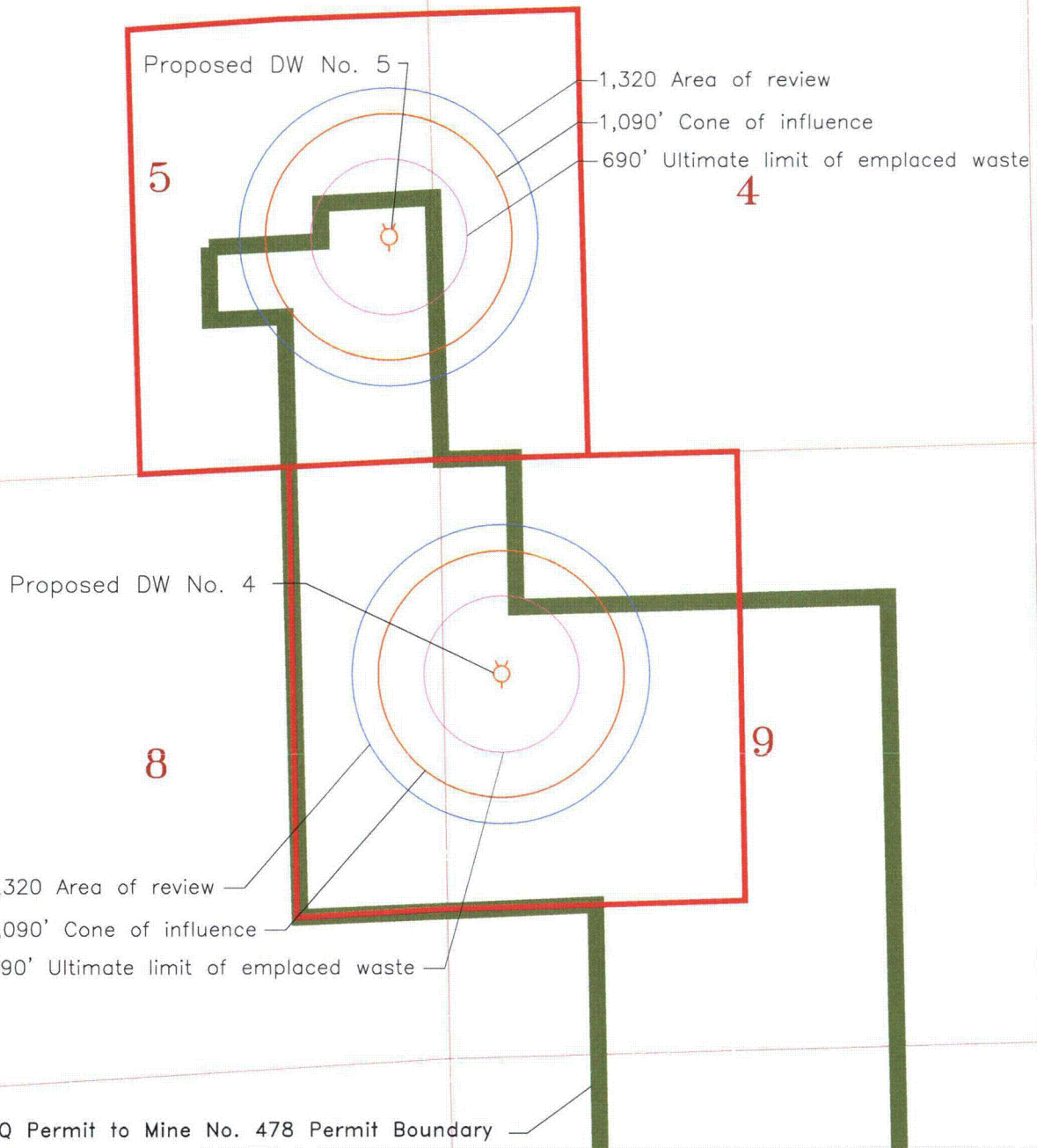
EXISTING AND PROPOSED CLASS I WELL
LOCATIONS AND AREAS OF REVIEW

| | |
|-----------------|----------------------|
| PROJECT: 217-31 | DATE: DECEMBER 2006 |
| COMPOSITE.dwg | BY: KRS CHECKED: HPD |

Petrotek

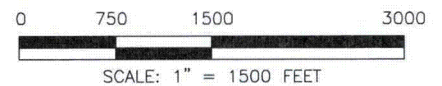
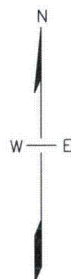
10288 West Chatfield Avenue, Suite 201
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T46N R77W
T45N R77W



LEGEND

- PROPOSED NEW DISPOSAL WELL LOCATION
- AREA OF REVIEW (LEGAL)
- 0.25 MILE AREA OF REVIEW
- 1,090' CONE OF INFLUENCE
- 690' ULTIMATE LIMIT OF EMPLACED WASTE
- SECTION QUARTER/QUARTER LINE



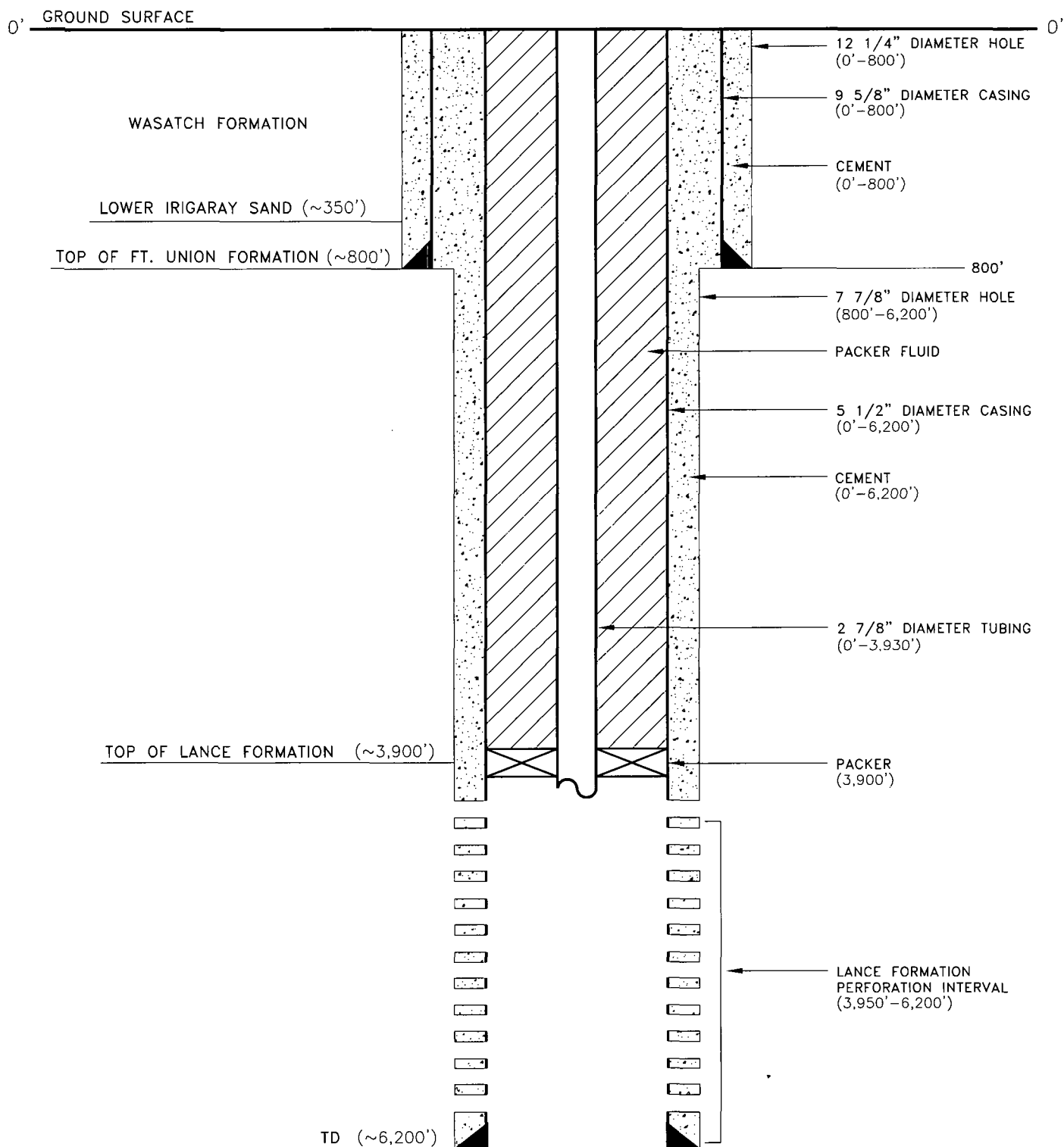
COGEMA Mining, Inc.

FIGURE 12A
PROPOSED CLASS I WELL LOCATIONS
AREAS OF REVIEW, CONES OF INFLUENCE
AND ULTIMATE LIMITS OF EMPLACED WASTE

| | |
|-----------------|----------------------|
| PROJECT: 217-31 | DATE: DECEMBER 2006 |
| COMPOSITE.dwg | BY: KRS CHECKED: HPD |

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NOT TO SCALE

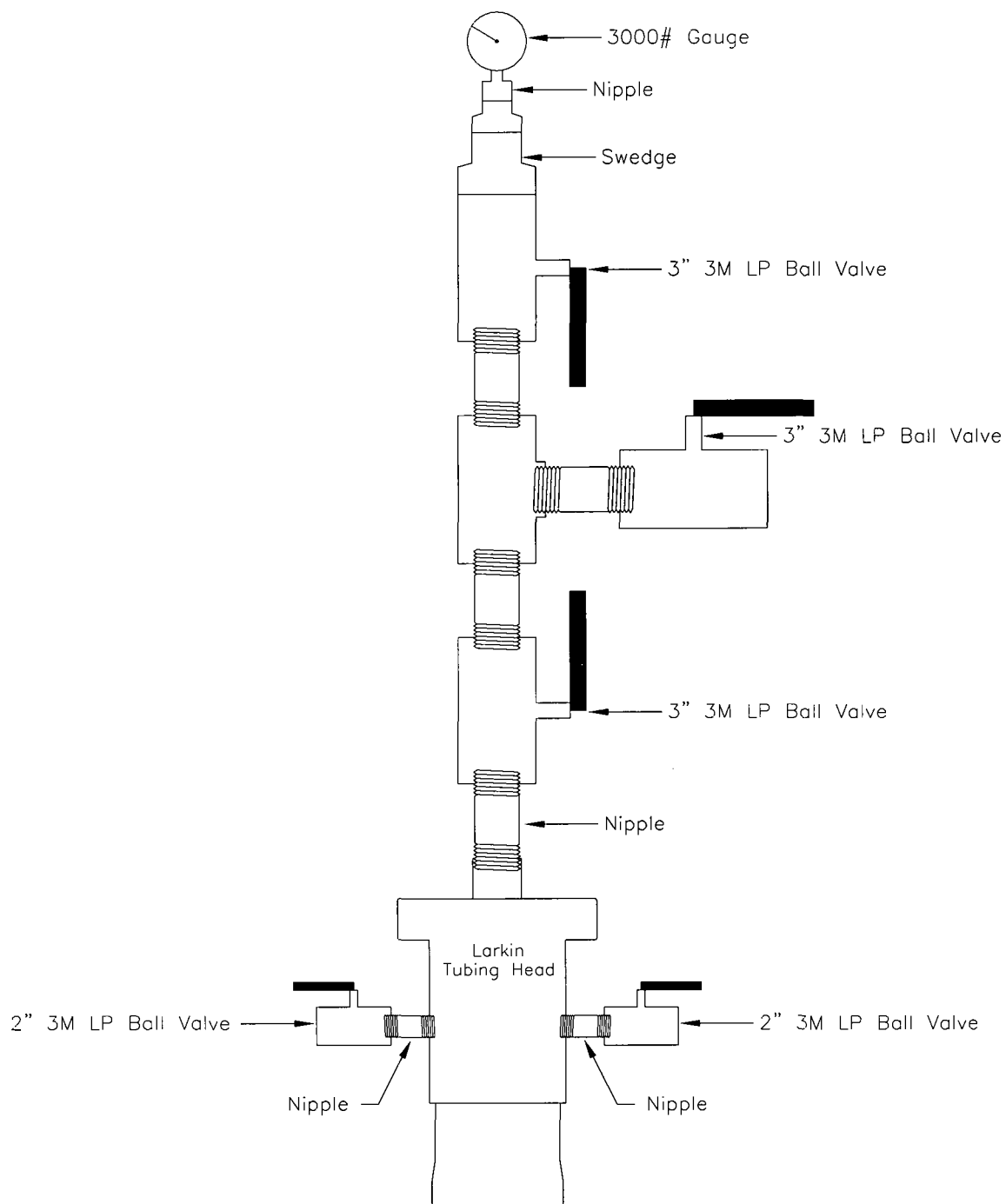
COGEMA Mining, Inc.

FIGURE 13
PRELIMINARY WELL COMPLETION SCHEMATIC
COGEMA DW No. 4 & 5

| | |
|---------------------|------------------------|
| PROJECT: 217-31 | DATE: DECEMBER 2006 |
| 2006CLIFig13-14.dwg | BY: KRS CHECKED: HPD |

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NOT TO SCALE

COGEMA Mining, Inc.

FIGURE 14
PRELIMINARY WELLHEAD SCHEMATIC
COGEMA No. 4 & 5

| | |
|---------------------|----------------------|
| PROJECT: 217-31 | DATE: DECEMBER 2006 |
| 2006CLIFig13-14.dwg | BY: KRS CHECKED: HPD |

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APPENDIX 1

SURFACE LEASE AGREEMENT

SURFACE LEASE

Surface Lease dated effective as of January 1, 2006 ("Effective Date") between Larry Brubaker ("Lessor"), having its place of business represented at 2394 Irigaray Road, Kaycee, WY 82639 and COGEMA MINING, INC. ("Lessee"), a Delaware corporation, having a place of business at 935 Pendell Blvd., P.O. Box 730, Mills, WY 82644.

1. Lease and Term.

a. Lessor leases to Lessee, for the purposes described in this Surface Lease, all of the real property described in Exhibit A attached hereto and hereby incorporated herein, together with all surface rights, easements and rights of way incident or appurtenant to such real property, and improvements, fixtures, personal property, mining machinery and tools (except certain machinery and tools now on such property, as more particularly described in Exhibit B attached hereto and hereby incorporated herein, owned by Lessor) on such property that are or may be useful or convenient for mining, milling and beneficiation of ores and minerals, reclamation and related uses, but not including coal bed gas uses ("Property"). Lessor confirms the right of Lessee to continue to use all the property owned by Lessee that is on the Property, including but not limited to the processing plant, ponds, water wells, wellfield fixtures and equipment.

b. The term of this Surface Lease shall commence on the Effective Date and, unless earlier terminated as set forth herein, continue for ten (10) years and thereafter for so long as Lessee is conducting on a continuous basis any exploration, development, mineral processing or mining operations, and until Lessee shall have completed its reclamation obligations and has had release of its performance bond for such obligations on the Property or upon other lands pursuant to a mining plan which involves use of the Property, from all applicable governmental authorities. Such operations shall be deemed conducted on a continuous basis unless and until a period of one hundred eighty (180) consecutive days elapses in which no such exploration, mining or developing or processing is conducted, excluding, however, periods of force majeure as provided herein. For purposes of this paragraph, development or processing operations shall include, but not be limited to: development work to define ore bodies containing minerals; mine feasibility studies; maintenance of a shut-down mine and/or mill on standby status while due diligence is exercised to obtain markets or otherwise remove the cause of the shut-down; or any work involving the extraction of ore or minerals.

2. Bonus and Rental.

Lessee shall pay Lessor as a lease initiation payment the sum of Five Thousand Dollars (\$5,000.00) within 15 days of the execution of this Surface Lease.

So long as this Surface Lease remains in effect, commencing with the first anniversary of the Effective Date of this Surface Lease, and as of each successive such anniversary date, Lessee shall pay to Lessor

the amount of Two Thousand Dollars (\$2,000.00) ("Rental"). Said Rental shall be full compensation for use of and damages to the Property caused by or relating to the activities by and exercise of rights herein granted to Lessee.

In addition, Lessee shall pay to Lessor, monthly, as of the first day of the month, the amount of Three Thousand Dollars (\$3,000.00) ("Processing Plant Rental") until the existing processing plant and equipment on the Property is dismantled and removed.

During such years Lessee is conducting mining on the Property or on the Christensen Ranch, the annual Rental shall be increased from Two Thousand Dollars (\$2,000.00) to Five Thousand Dollars (\$5,000.00).

3. Surface Use Fee.

Lessee shall pay to Lessor a one time payment of Two Hundred Dollars (\$200.00) per acre as surface damage for any new well field that is fenced on the Property.

4. Title.

Lessor represents that Lessor is in exclusive possession of and owns the surface estate of the Property.

5. Lesser Interest; Adverse Claim.

Lessee shall have no obligation to Lessor to protect or defend Lessor's interest in the Property if any third person asserts any claim to such for any reason except Lessee's failure to perform obligations expressly required by this Surface Lease.

6. Operating Rights.

a. Lessor grants Lessee unrestricted access to the Property, and the following rights with respect to the Property during the term of this Surface Lease, and Lessor will not interfere with Lessee's utilization of the Property for such purposes:

- i. To explore, develop and mine, and to extract, remove, store and dispose of any and all ores, minerals, air, water, waste and other materials from the Property by means of underground or surface mining operations or workings in or on the Property or other property and to deposit on the Property all such materials whether from the Property or other property;
- ii. To carry on crushing, screening, milling, treatment, processing, beneficiating, smelting and refining operations on or in the Property (including the existing processing plant and related

facilities) or other property with respect to ores, minerals and other materials, including existing tailings, wastes and dumps;

- iii. To use any part of the Property for stockpiles, tailings, waste dumps and leach pads and for any other purpose incident to mining, milling, processing and other operations;
- iv. To erect or construct, use and maintain on the Property such roads, impoundments, pipelines, power lines, facilities, buildings, structures, machinery and equipment as Lessee may require for the conduct of its operations;
- v. To stockpile, inventory or sell or otherwise dispose of ores, minerals and other material in such forms, at such times and on such terms as Lessee alone may determine.
- vi. To permanently bury non-hazardous and non-toxic waste, including but not limited to debris from plant demolition and well fields, but not including material from outside the Property, in the large ponds located at the plant site in accordance with approvals by the Wyoming Department of Environmental Quality.
- vi. To conduct final reclamation of its mining activities and facilities; and enter on, into and upon and within two (2) miles of the Property with personnel and equipment to do all things thereon that are necessary in order to conduct extended monitoring, testing and sampling the air, groundwater or surface for environmental purposes, and to monitor, establish or reestablish vegetation on the Property as may be required by governmental agencies.
- vii. To fence off areas, without cost, from any other use for its wellfield or mining related activities, or while vegetation is being established and until regulatory authorities release such areas from further reclamation. Lessee and Lessor agree to use their best efforts to coordinate their operations to minimize conflicting uses of the surface and to cooperate to resolve any conflicting demands that may arise, if possible.

b. Lessee shall conduct its operations in a good and workmanlike manner in substantial compliance with the generally accepted understanding of applicable laws and regulations as from time to time exist in the mining industry.

7. Co-mingling.

Lessee may commingle ores and minerals from the Property with other ores and minerals. Before commingling, Lessee shall weigh (or calculate by volume), sample and assay such ores and minerals in accordance with sound mining and metallurgical practices for payable content. Lessee shall keep records of such determination for one year after the end of the Lessee lease year in which such determinations are made.

8. Indemnity; Limitations of Liability.

a. Lessee shall keep the Property free of liens for labor performed and materials furnished for Lessee. Lessee shall hold Lessor harmless from all liability to third persons caused by Lessee's operations on the Property which result in injury to or death of persons or livestock or damage to personal property or liability from violation of applicable laws or regulations and Lessor shall hold Lessee harmless from all liability arising out of or related to the use or occupancy of the Property by Lessor.

b. In no event shall Lessee's liability for damage or economic loss to Lessor's interest in the Property, whether resulting from Lessee's negligence or otherwise, exceed the fair market value of the affected property (not including its value for mining and related purposes).

c. Lessor warrants and represents that the Property has heretofore been maintained in compliance with all applicable laws and regulations relating to environmental law and matters and that there are no hazardous materials owned by Lessor stored on the Property.

d. The payments as expressly required by this Surface Lease are in lieu of any obligation of Lessee, express or implied, to explore, develop or mine the Property or to make any other efforts or expenditures in connection therewith.

e. Lessee shall hold Lessor harmless and defend Lessor from all liability and claims by any third persons or Cross C Livestock, Inc., which may arise out of the forfeiture, termination, or the terms and conditions of that Lease of Surface Interests dated January 1, 1991, between Cross C Livestock, Inc., and Malapai Resources Company, but not related to any other agreement, written, verbal or implied between Lessor and such third persons or Cross C Livestock, Inc.

f. The obligations and limitations of liability in this section shall survive termination of this Surface Lease.

9. Inspection.

At reasonable times and with reasonable advance notice to Lessee, Lessor may at Lessor's risk and expense:

- i. enter the Property to make reasonable inspections of Lessee's operations, and
- ii. inspect records necessary to substantiate Lessee's performance of its obligations under this Surface Lease. Lessee shall have no obligation to disclose to Lessor any interpretive data or exploration concepts prepared or developed by Lessee.

10. Avoidance of Forfeiture.

- a. Default by Lessee in performance of any obligation arising hereunder shall not cause a forfeiture

or termination of this Surface Lease, nor cause a forfeiture, termination or reversion of the estate created hereby, except as provided in Section 12c hereunder in the case of any failure to pay money.

b. If Lessee commits a default, Lessor shall give Lessee notice specifying the default with particularity. Lessor's sole remedy shall be recovery of actual compensatory damages plus interest at the judgment rate from the date Lessee receives notice of default. If Lessee by notice to Lessor disputes the existence of the default, no interest shall accrue if Lessee, within thirty (30) days after the default is finally determined, initiates and diligently pursues to completion efforts to cure the default.

c. If at any time Lessee is in default by failure to pay any payment when due, Lessor may terminate this Lease by written notice to Lessee if such default is not cured within thirty (30) days after written notice of default is given to Lessee. If there is a bona fide dispute as to whether a default has occurred, then there shall be no termination unless, after an adverse final determination by a court of competent jurisdiction as to such default, Lessee fails to cure such default within (30) days of said final determination.

11. Termination; Surrender.

a. Lessee may at any time, terminate this Surface Lease by giving at least thirty (30) days prior written notice thereof to Lessor.

b. Upon termination and at Lessor's request, Lessee shall give to Lessor, for recording, a quitclaim deed surrendering and quitclaiming to Lessor all of the Property.

c. Upon termination of this Surface Lease, Lessee's obligations hereunder shall terminate and Lessee shall be relieved of all obligations, liability or responsibility with respect to the Property, except those obligations and liabilities incurred prior to termination.

d. Lessee shall have the right at any time during or within one hundred eighty (180) days after the end of this term of this Surface Lease to remove all property and fixtures placed by Lessee on the Property.

e. Lessee will be responsible for the reclamation of the Property necessitated by Lessee's actions on the Property so as to comply with the laws of applicable state, county and federal government authorities.

f. The provisions of this paragraph 11 shall survive termination of this Surface Lease.

12. Method of Payment.

All payments due Lessor shall be deemed received by Lessor if paid to Larry Brubaker, 2394 Irigaray Road. Kaycee, WY 82639. Lessee shall not be liable for the ultimate distribution to Lessor or Lessor's successors or assigns of payments so made by Lessee.

If said depository, or successors, should at any time cease to exist or refuse or fail to serve hereunder or Lessor revokes said depository, Lessee may withhold any payments due under this Surface Lease (without interest) until thirty (30) days after such time as Lessor shall appoint in writing another depository in the United States of America to serve as successor to said depository. Payment or tender by Lessee to the depository shall constitute and shall be payment as fully as if such payment were made directly to Lessor. Lessee shall not have any obligations whatsoever with respect to the distribution by the depository of any such amount to persons entitled thereto. No charge or transfer of ownership of Lessor's interest in this Surface Lease (including but not limited to any interest in any amount due and payable by Lessee hereunder) shall be binding until an instrument, satisfactory in form and substance to the depository and to Lessee, effecting such change or transfer, has been received by the depository and Lessee. If at any time any person, firm or corporation which is not a signatory to this Surface Lease claims to be entitled to payment of any amount due and payable by Lessee hereunder, Lessee may withhold payment of any such amount until (a) all adverse claims involved have been finally concluded with respect to such claim; provided, however, that nothing contained herein shall prevent Lessee from invoking any remedy available at law or in equity including the bringing of an action in the nature of an interpleader in a court of competent jurisdiction.

13. Rights-of-Way.

While this Surface Lease is in effect, Lessee shall have non-exclusive rights-of-way upon, over, into and through the Property and other property now or hereafter owned, leased or otherwise controlled by Lessor (or any of them) in the vicinity of the Property to construct, improve and maintain such pipe lines, communication lines, electrical power or transmission lines, roads, railroads, tramways, flumes, tunnels, drifts and other facilities as may be necessary or convenient for Lessee's operations under this Surface Lease and to access the neighboring property.

Access across the Property shall be along the main road that traverses the Property generally on a north-south orientation. General access for sampling and vegetation purposes shall be by whatever means of travel and routes that are available that will cause the least surface impact reasonably practicable.

14. Governing Law.

This Surface Lease shall be governed by and construed in accordance with the laws of the State of Wyoming, without reference to choice of law principles.

15. Notices.

All notices and other communications to either party shall be in writing and delivered personally or sent by prepaid mail, telecopier, or other means providing for receipt of the communication in written

form. All notices of default or arbitration and demands for performance or assurance, if delivered personally to Lessee, shall be delivered to Lessee, and if mailed to either party, shall be sent by certified or registered mail, return receipt requested.

Notices shall be effective upon mailing or upon hand delivery if hand delivered.

Any notices which either party desires to give to the other hereunder shall be sent to the following address:

If to Lessor:

Larry Brubaker
2394 Irigaray Road
Kaycee, WY 82639

If to Lessee:

Cogema Mining, Inc.
935 Pendell Blvd
P.O. Box 730
Mills, WY 82644
Attn: General Manager

Either party may change its address at any time by so notifying the other party in writing. Notices so sent or delivered to Lessor shall be as effective as if given to each of the persons named as Lessor.

16. Short Form.

Lessee and Lessor shall sign and acknowledge a short form of this Surface Lease to give notice hereof to third persons. Lessee may record the short form of this Surface Lease, or both.

17. Transfer.

Except as otherwise expressly provided in this Surface Lease, any party may from time to time transfer interests in this Surface Lease or in the Property. The transferor shall give, as soon as reasonably practical, notice thereof to the other party, including the names and addresses of the transferees, a copy of the documents of transfer and the recording data for any document relating to the transfer.

18. Transfer of Wellfield Building.

Upon such time as Lessee shall no longer need the existing wellfield building on the Property for its activities, Lessee shall survey the building for radioactivity, and if the building meets NRC specifications for private use, Lessee shall offer the building to Lessor, whereupon if accepted in writing, Lessee shall transfer ownership of the building to Lessor free of charge, "as is", without any warranty, and Lessor shall thereupon assume responsibility therefore and indemnify and hold harmless Lessee and its shareholders, directors, officers and employees of and from any liability or obligation with respect thereto.

19. Entire Agreement; Interpretation.

This Surface Lease contains the entire agreement of the parties. There are not other conditions, agreements, representations, warranties or understandings, express or implied. The division of this Surface Lease into sections and the use of captions are solely for convenience of reference and shall not be used in its interpretation.

26. Effect.

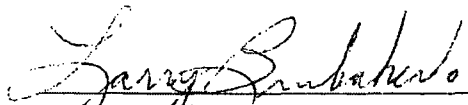
a. All covenants, conditions and terms of this Surface Lease shall be of benefit to, and shall run with, the Property and shall bind and inure to the benefit of the parties and their respective successors and assigns.

b. This Surface Lease has been negotiated between the parties at arm's length. The sole relationship between the parties is that of lessor/lessee. Nothing in this Surface Lease shall be construed to create between the parties, expressly or by implication, any partnership, joint enterprise, relationship of trust and confidence or other special relationship, or any relationship of master and servant or principal and agent, or the like. If any provision of this Surface Lease is or becomes void or unenforceable by force of law, the other provisions shall remain valid and enforceable.

IN WITNESS WHEREOF, this Surface Lease has been executed effective the date first above written.

LESSOR

LESSEE
COGEMA MINING, INC.


Larry Brubaker

By

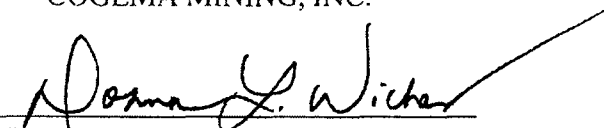

Donna L. Wichers, General Manager

EXHIBIT A

Attached to and made a part of that certain Surface Lease dated effective January 1, 2006, between LARRY BRUBAKER and COGEMA MINING, INC.

Township 45 North, Range 77 West, 6th P.M.

- Section 4: W $\frac{1}{2}$ SW $\frac{1}{4}$, W $\frac{1}{2}$ NW $\frac{1}{4}$.
- Section 5: Lots 1, 2, N $\frac{1}{2}$ SE $\frac{1}{4}$, S $\frac{1}{2}$ NE $\frac{1}{4}$, SE $\frac{1}{4}$ SE $\frac{1}{4}$.
- Section 8: SE $\frac{1}{4}$ NE $\frac{1}{4}$, NE $\frac{1}{4}$ SE $\frac{1}{4}$, SE $\frac{1}{4}$ SE $\frac{1}{4}$.
- Section 9: NW $\frac{1}{4}$ NE $\frac{1}{4}$, S $\frac{1}{2}$ NE $\frac{1}{4}$, NW $\frac{1}{4}$, SW $\frac{1}{4}$, SE $\frac{1}{4}$.
- Section 17: E $\frac{1}{2}$ E $\frac{1}{2}$

Township 46 North, Range 77 West, 6th P.M.

- Section 19: SW $\frac{1}{4}$ SE $\frac{1}{4}$, SE $\frac{1}{4}$ SW $\frac{1}{4}$.
- Section 29: SW $\frac{1}{4}$.
- Section 30: N $\frac{1}{2}$ NE $\frac{1}{4}$, SE $\frac{1}{4}$ NE $\frac{1}{4}$, E $\frac{1}{2}$ SE $\frac{1}{4}$.
- Section 32: NW $\frac{1}{4}$, N $\frac{1}{2}$ SW $\frac{1}{4}$, SE $\frac{1}{4}$ SW $\frac{1}{4}$.

EXHIBIT B

(List of excluded personal property)

None

Exh B

AMENDMENT TO SURFACE LEASE

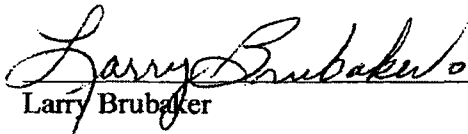
Whereas effective January 1, 2006, Larry Brubaker "Lessor" and Cogema Mining, Inc. ("Lessee") entered into a certain "Surface Lease" to lease the Property for the mining and processing of uranium mined from the property described therein and/or other property;

Now Therefore, the parties wish to clarify their intent by striking section 6 a (ii) from the Surface Lease and substituting there for the following replacement Section 6 a (ii):

- (ii) To carry on crushing, screening, milling, treatment, processing, beneficiating, smelting and refining operations on or in the Property (including the existing processing plant and related facilities) with respect to ores, minerals and other materials mined from the Property or other properties.

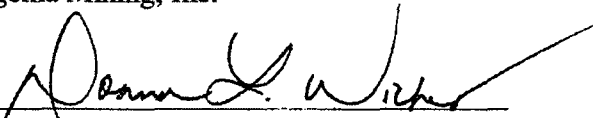
In Witness Whereof, this Amendment to Surface Lease has been effective the date first written above.

LESSOR


Larry Brubaker

LESSEE

Cogema Mining, Inc.


By: Donna Wichers, General Manager