Form 3160-3
(February 2005)

FORM APPROVED
OMB No. 1004-0137
Expires March 31, 2007

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

APPLICATION FOR PERMIT TO DRILL OR REENTER

5. Lease Serial No. UTU-077547

6. If Indian, Allotee or Tribe Name N/A

7. If Unit or CA Agreement, Name and No. N/A

8. Lease Name and Well No. Cottonwood Fed 23-13

9. API Well No. 43-007-31252

1a. Type of work: ☑ DRILL ☐ REENTER

1b. Type of Well: ☐ Oil Well ☑ Gas Well ☐ Other ☐ Single Zone ☑ Multiple Zone

2. Name of Operator: Petro-Canada Resources (USA), Inc.

3a. Address: 1099-18th Street, Suite 400, Denver, Colorado 80202

3b. Phone No. (include area code): 303-297-2100

10. Field and Pool, or Exploratory: ~~undesignated~~ Wildcat

4. Location of Well (Report location clearly and in accordance with any State requirements.*)
At surface 568394X 2,213' FNL & 2,309' FEL, SW/4 NE/4, 4392446Y 39.680996
At proposed prod. zone 2,213' FNL & 2,309' FEL, SW/4 NE/4, -110.202474

11. Sec., T. R. M. or Blk. and Survey or Area: Section 23, T13S, R15E, SLB&M

14. Distance in miles and direction from nearest town or post office*: 13.30 miles northeast of Sunnyside, Utah

12. County or Parish: Carbon

13. State: UT

15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drlg. unit line, if any): 2,213'

16. No. of acres in lease: 1,440 acres

17. Spacing Unit dedicated to this well: 40 acres

18. Distance from proposed location* to nearest well, drilling, completed, applied for, on this lease, ft.: 1,500'

19. Proposed Depth: 11,500'

20. BLM/BIA Bond No. on file: UT 1215

21. Elevations (Show whether DF, KDB, RT, GL, etc.): 7,983' GR

22. Approximate date work will start*: 05/01/2007

23. Estimated duration: 35 days drilling 40 days completion

24. Attachments

The following, completed in accordance with the requirements of Onshore Oil and Gas Order No.1, must be attached to this form:

1. Well plat certified by a registered surveyor.
2. A Drilling Plan.
3. A Surface Use Plan (if the location is on National Forest System Lands, the SUPO must be filed with the appropriate Forest Service Office).
4. Bond to cover the operations unless covered by an existing bond on file (see Item 20 above).
5. Operator certification
6. Such other site specific information and/or plans as may be required by the BLM.

25. Signature: Don Hamilton — Name (Printed/Typed): Don Hamilton — Date: 11/07/2006

Title: Agent for Petro-Canada Resources (USA), Inc.

Approved by (Signature): Bradley G. Hill — Name (Printed/Typed): BRADLEY G. HILL — Date: 11-09-06

Title: ENVIRONMENTAL MANAGER — Office:

Application approval does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.
Conditions of approval, if any, are attached.

Title 18 U.S.C. Section 1001 and Title 43 U.S.C. Section 1212, make it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

*(Instructions on page 2)

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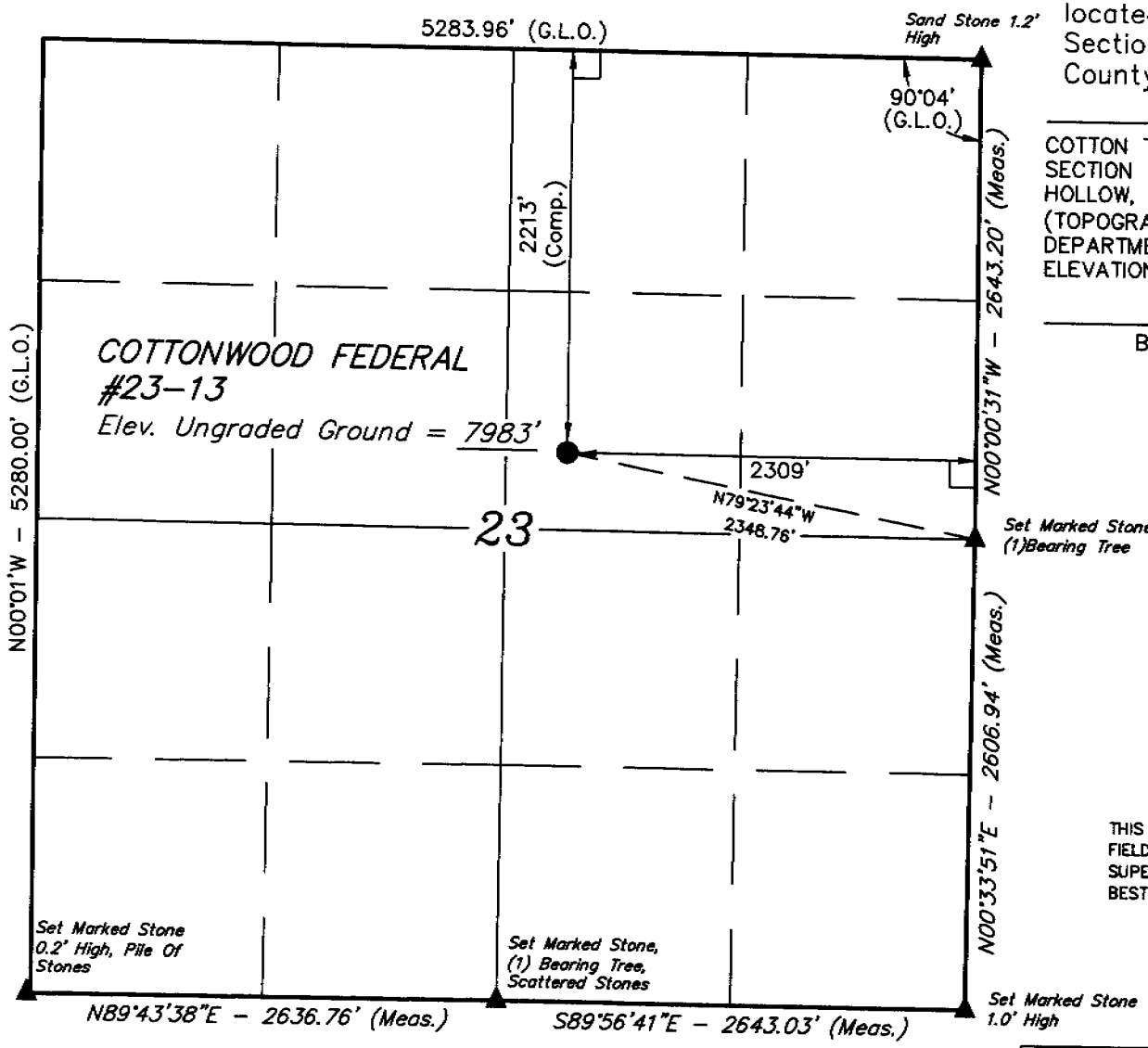
Federal Approval of this Action is Necessary

RECEIVED
NOV 09 2006
DIV. OF OIL, GAS & MINING

T13S, R15E, S.L.B.&M.

PETRO-CANADA RESOURCES (USA), INC.

Well location, COTTONWOOD FEDERAL #23-13, located as shown in the SW 1/4 NE 1/4 of Section 23, T13S, R15E, S.L.B.&M., Carbon County, Utah.

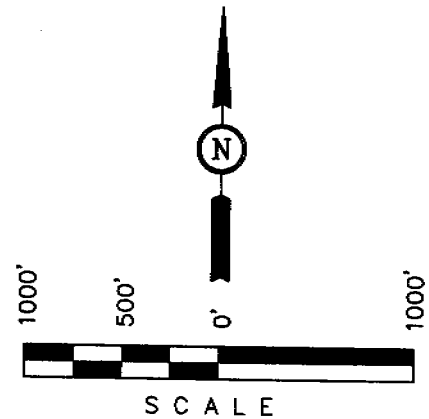


BASIS OF ELEVATION

COTTON TRIANGULATION STATION, LOCATED IN THE NW 1/4 OF SECTION 31, T12S, R16E, S.L.B.&M. TAKEN FROM THE TWIN HOLLOW, CARBON COUNTY, QUADRANGLE, 7.5 MINUTE QUAD. (TOPOGRAPHIC MAP) PUBLISHED BY THE UNITED STATES DEPARTMENT OF THE INTERIOR, GEOLOGICAL SURVEY. SAID ELEVATION IS MARKED AS BEING 7386 FEET.

BASIS OF BEARINGS

BASIS OF BEARINGS IS A G.P.S. OBSERVATION.



CERTIFICATE

THIS IS TO CERTIFY THAT THE ABOVE PLAT WAS PREPARED FROM FIELD NOTES OF ACTUAL SURVEYS MADE BY ME OR UNDER MY SUPERVISION AND THAT THE SAME ARE TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

REGISTERED LAND SURVEYOR
REGISTRATION NO. 161319
STATE OF UTAH

LEGEND:

└ = 90° SYMBOL

● = PROPOSED WELL HEAD.

▲ = SECTION CORNERS LOCATED.

(NAD 83)
LATITUDE = 39°40'51.40" (39.680944)
LONGITUDE = 110°12'11.27" (110.203131)
(NAD 27)
LATITUDE = 39°40'51.53" (39.680981)
LONGITUDE = 110°12'08.71" (110.202419)

UINTAH ENGINEERING & LAND SURVEYING
85 SOUTH 200 EAST - VERNAL, UTAH 84078
(435) 789-1017

SCALE 1" = 1000'	DATE SURVEYED: 09-12-06	DATE DRAWN: 09-26-06
PARTY D.R. R.R. C.H.	REFERENCES G.L.O. PLAT	
WEATHER WARM	FILE PETRO-CANADA RESOURCES (USA), INC.	

DRILLING PLAN

Attachment for Permit to Drill

Name of Operator:	Petro-Canada Resources (USA), Inc.
Address:	1099 – 18th Street, Suite 400 Denver, CO 80202
Well Location:	Cottonwood Fed 23-13 2,213' FNL & 2,309' FEL, SW/4 NE/4 Section 23, T13S, R15E Carbon County, UT

1. GEOLOGIC SURFACE FORMATION — Green River

2 & 3. ESTIMATED DEPTHS OF IMPORTANT GEOLOGIC MARKERS AND FORMATIONS EXPECTED TO CONTAIN WATER, OIL AND GAS OR MINERALS

Formation	Depth
Green River	Surface
Wasatch	2,700"*
Price River	6,200' *
Castlegate	8,200' *
Blackhawk	8,500' *
Starpoint	8,800' *
Mancos	9,200' *
TD	11,500'

* PROSPECTIVE PAY

4. PROPOSED CASING PROGRAM

All casing used to drill this well will be new casing.

Type	Size	Weight	Grade	Conn.	Top	Bottom	Hole
Surface	9.625"	43.5 ppf	L-80	STC	0'	1,200'	12-1/4"
Production	5.5"	20.0 ppf	P-110	LTC	0'	11,500'	7-7/8"

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DRILLING PLAN

5. OPERATOR'S MINIMUM SPECIFICATIONS FOR PRESSURE CONTROL

Surface hole: No BOPE will be utilized.

Production hole: Prior to drilling out the surface casing shoe, 5,000 psi BOP equipment will be installed. The pipe rams will be operated at least once per day from surface casing depth to total depth. The blind rams will be tested once per day from surface casing depth to total depth if operations permit.

A diagram of the planned BOP equipment for normal drilling operations in this area is attached. As denoted there will be two valves and one check valve on the kill line, two valves on the choke line, and two adjustable chokes on the manifold system. The BOP "stack" will consist of two BOP rams (1 pipe, 1 blind) and one annular type preventer, all rated to a minimum of 5,000 psi working pressure.

The BOP equipment will be pressure tested prior to drilling below the surface casing shoe. All test pressures will be maintained for fifteen (15) minutes without any significant pressure decrease. Clear water will be circulated into the BOP stack and lines prior to pressure testing. The BLM and the state of Utah Division of Oil, Gas and Mining will be notified 24 hours in advance of all BOP pressure tests.

6. MUD SYSTEMS

Sufficient mud materials to maintain mud properties, control lost circulation and to contain "kick" will be available at the well site.

Interval	Mud Weight (ppg)	Viscosity	Fluid Loss	Remarks
0 – 40'	8.3 – 8.6	27-40	--	Native Spud Mud
40' – 1,200'	8.3 – 8.6	27-40	15 cc or less	Native/Gel/Lime
1,200' – TD	8.6 – 9.5	38-46	15 cc or less	Potassium Formate

7. BLOOIE LINE

- An automatic igniter will not be installed on blooie line. The blooie will have a constant ignition source.
- A "target tee" connection will be installed on blooie line for 90° change of directions for abrasion resistance.
- "Target tee" connections will be a minimum of 50' from wellhead.
- The blooie line discharge will be a minimum of 100' from the wellhead.

8. AUXILIARY EQUIPMENT TO BE USED

- Upper Kelly cock; lower Kelly cock will be installed while drilling
- Inside BOP or stab-in valve (available on the rig floor)
- Safety valve(s) and subs to fit all string connections in use
- Mud monitoring will be visually observed

9. TESTING, LOGGING, AND CORING PROGRAMS TO BE FOLLOWED

Cores	None anticipated.
Testing	None anticipated.
Sampling	30' samples; surface casing to TD Preserve samples all show intervals
Surveys	Run every 1,000' and on trips
Logging	DIL-GR-SP, FDC-CNL-GR-Caliper-Pe-Microlog, Sonic-GR, all TD to base of surface casing, GR through surface casing.

10. ANTICIPATED ABNORMAL PRESSURES OR TEMPERATURES EXPECTED

- No abnormal temperature or pressures are anticipated.
- The formations to be penetrated do not contain known H_2S gas.

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DRILLING PLAN

11. WATER SUPPLY
    - No water pipelines will be laid for this well.
    - No water well will be drilled for this well.
    - Drilling water for this will be hauled on the road(s) shown in Exhibit B
    - Water to be used for drilling will be obtained through a direct purchase from Bill Barrett Corporation (BBC) utilizing an existing water well located in Cottonwood Canyon on State Lands: Section 32-T12S-R16E; BBC has previously been granted authorization with SITLA Right of Entry #4534 and Water Right #90-1542.

12. CEMENT SYSTEMS

- Surface Casing: 145 sacks Premium Lite Plus with additives mixed;
  Weight: 11.5 ppg
  Yield: 2.84 cu.ft/sack
  218 sacks Type III Cement with additives mixed;
  Weight: 14.5 ppg
  Yield: 1.41 cu.ft/sack
  Cement will be circulated to surface with 100% excess

- Production Casing: 1134 sacks Premium Lite High Strength cement with additives mixed;
  Weight: 13.5 ppg
  Yield: 1.49 cu.ft/sack
  Cement will be placed in two stages through the use of a stage tool. Depth determined based on potential pay sections, estimated at 4000 ft.
  353 sacks Class G cement with additives mixed.
  Weight: 15.8 ppg
  Yield: 1.15 cu.ft/sack
  Top of cement to be determined by log and sample evaluation; estimated TOC 2,200'.
  Volume is log caliper +10%

13. ANTICIPATED STARTING DATE AND DURATION OF THE OPERATIONS

Starting Date:	May 1, 2007
Duration:	35 days, drilling and 40 days completion

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SURFACE USE PLAN

Attachment for Permit to Drill

Name of Operator:	Petro-Canada Resources (USA), Inc.
Address:	1099 – 18th Street, Suite 400 Denver, CO 80202
Well Location:	Cottonwood Fed 23-13 2,213' FNL & 2,309' FEL, SW/4 NE/4 Section 23, T13S, R15E Carbon County, UT

The dirt contractor will be provided with an approved copy of the surface use plan of operations before initiating construction.

An off-lease federal right-of-way is being requested with this application and is necessary for an access and pipeline corridor to the existing federal lease UTU-077547. No other surface use is necessary.

The BLM onsite inspection for the referenced well was conducted on Monday, September 25, 2006 at approximately 11:30 am. In attendance at the onsite inspections were the following individuals:

Don Stephens	Geologist	Bureau of Land Management – Price
Jeff Brower	Hydrologist	Bureau of Land Management – Price
David Waller	Wildlife Biologist	Bureau of Land Management – Price
Bill James	Habitat Manager	Division of Wildlife Resources
Nathan Sill	Habitat Biologist	Division of Wildlife Resources
Danny Rasmussen	Surveyor	Uintah Engineering & Land Surveying
Ryan Robinson	Survey Hand	Uintah Engineering & Land Surveying
Alan Vrooman	Regulatory Manager	Petro-Canada Resources (USA), Inc.
Don Hamilton	Agent	Buys & Associates, Inc.

1. Existing Roads:

   a. The proposed well site is located approximately 13.30 miles northeast of Sunnyside, Utah.

   b. The use of roads under State and County Road Department maintenance are necessary to access the Cottonwood Ridge area. However, an encroachment permit is not anticipated since no upgrades to the State or County Road system are proposed at this time.

   c. All existing roads will be maintained and kept in good repair during all phases of operation.

   e. Vehicle operators will obey posted speed restrictions and observe safe speeds commensurate with road and weather conditions.

   f. An off-lease federal right-of-way is necessary for the off-lease portions of the access road and pipeline corridor trending northeast from the north line of Section 23, T13S, R15E. An off-lease federal right-of-way grant is being requested with this application.

2. Planned Access Roads:

a. From the existing Sagebrush Flat access road the existing native bladed-surface Cottonwood Ridge access road trending southwest will be upgraded for approximately 3.6 miles to the proposed well site spur road.

b. From the existing Cottonwood Ridge access road an access is proposed trending northwest approximately 140' to the proposed well site. The access consists of entirely new disturbance and crosses no significant drainages.

c. A road design plan is not anticipated at this time.

d. The proposed access road will consist of a 22' travel surface within a 30' disturbed area across entirely BLM managed lands.

e. BLM approval to upgrade the existing access corridor and construct the new access corridor is requested with this application.

f. A maximum grade of 10% will be maintained throughout the project.

g. No turnouts are proposed.

h. No low water crossings and one 18' culvert at the spur road intersection with the Cottonwood Ridge road is anticipated. Additional culverts and adequate drainage structures will be incorporated into the remaining existing road.

i. No surfacing material will come from federal or Indian lands.

j. No gates or cattle guards are anticipated at this time.

k. Surface disturbance and vehicular travel will be limited to the approved location access road.

l. All access roads and surface disturbing activities will conform to the standards outlined in the Bureau of Land Management and Forest Service publication: Surface Operating Standards for Oil and Gas Exploration and Development, (1989).

m. The operator will be responsible for all maintenance of the access road including drainage structures.

3. Location of Existing Wells:

a. No existing wells are located within a one mile radius of the proposed well.

4. Location of Production Facilities:

a. All permanent structures will be painted a flat, non-reflective Olive Black to match the standard environmental colors. All facilities will be painted within six months of installation. Facilities required to comply with the Occupational Safety and Health Act (OSHA) may be excluded.

b. Site security guidelines identified in 43 CFR 3163.7-5 and Onshore Oil and Gas Order No. 3 will be adhered to.

c. A gas meter run will be constructed and located on lease within 500 feet of the wellhead.

Meter runs will be housed and/or fenced. All gas production and measurement shall comply with the provisions of 43 CFR 3162. 7-3, Onshore Oil and Gas Order No. 5, and American Gas Association (AGA) Report No. 3.

d. A two-tank battery will be constructed on this lease, it will be surrounded by a dike of sufficient capacity to contain the storage capacity of the largest tank. All loading lines and valves will be placed inside the berm surrounding the tank battery. All liquid hydrocarbons production and measurement shall conform to the provisions of 43 CFR 3162.7-3 and Onshore Oil and Gas Order No. 4 and Onshore Oil and Gas Order No. 5 for natural gas production and measurement.

e. Any necessary pits will be properly fenced to prevent any wildlife and livestock entry.

f. All access roads will be maintained as necessary to prevent erosion and accommodate year-round traffic. The road will be maintained in a safe useable condition.

g. The site will require periodic maintenance to ensure that drainages are kept open and free of debris, ice, and snow, and that surfaces are properly treated to reduce erosion, fugitive dust, and impacts to adjacent areas.

h. A gas pipeline is associated with this application and is being applied for at this time. The proposed gas pipeline corridor will leave the east side of the well site and traverse 110' southeast to the proposed Cottonwood Fed 27-14 pipeline corridor.

i. The new gas pipeline will be a 10" or less steel buried / surface pipeline within a 30' wide utility corridor. The use of the proposed well sites and existing access roads will facilitate the staging of the pipeline construction. A new pipeline length of approximately 110' is associated with this well.

j. Petro-Canada intends on installing the pipeline on the surface by welding many joints into long lengths, dragging the long lengths into position and then completing a final welding pass to join the long lengths together. Petro-Canada intends on connecting the pipeline together utilizing conventional welding technology.

k. The pipeline will be buried unless surface rock exists or conditions encountered during construction prohibit the burial of the pipeline.

5. Location and Type of Water Supply:

a. The location and type of water supply has been addressed as number 11 within the previous drilling plan information.

6. Source of Construction Material:

a. The use of materials will conform to 43 CFR 3610.2-3.

b. No construction materials will be removed from BLM lands.

c. If any gravel is used, it will be obtained from a state approved gravel pit.

7. Methods of Handling Waste Disposal:

a. All wastes associated with this application will be contained and disposed of utilizing approved facilities.

b. Drill cuttings will be contained and buried on site.

c. The reserve pit will be located outboard of the location and along the south side of the pad.

d. The reserve pit will be constructed so as not to leak, break, or allow any discharge.

e. The reserve pit will be lined with 12 mil minimum thickness plastic nylon reinforced liner material. The liner will overlay a felt liner pad only if rock is encountered during excavation. The pit liner will overlap the pit walls and be covered with dirt and/or rocks to hold it in place. No trash, scrap pipe, etc., that could puncture the liner will be disposed of in the pit. Pit walls will be sloped no greater than 2:1. A minimum 2-foot freeboard will be maintained in the pit at all times during the drilling and completion operation.

f. The reserve pit has been located in cut material. Three sides of the reserve pit will be fenced before drilling starts. The fourth side will be fenced as soon as drilling is completed, and shall remain until the pit is dry. After the reserve pit has dried, all areas not needed for production will be rehabilitated.

g. No chemicals subject to reporting under SARA Title III (hazardous materials) in an amount greater than 10,000 pounds will be used, produced, stored, transported, or disposed of annually in association with the drilling, testing, or completion of the well. Furthermore, no extremely hazardous substances, as defined in 40 CFR 355, in threshold planning quantities, will be used, produced, stored, transported, or disposed of in association with the drilling, testing, or completion of the well.

h. Trash will be contained in a trash cage and hauled away to an approved disposal site as necessary but no later than at the completion of drilling operations. The contents of the trash container will be hauled off periodically to the approved Uintah County Landfill near Vernal, Utah.

i. Produced fluids from the well other than water will be produced into a test tank until such time as construction of production facilities is completed. Any spills of oil, gas, salt water or other produced fluids will be cleaned up and removed.

j. After initial clean-up, a 400 bbl tank will be installed to contain produced waste water. This water will be transported from the tank to an approved disposal well for disposal near Roosevelt, Utah.

k. Any salts and/or chemicals, which are an integral part of the drilling system, will be disposed of in the same manner as the drilling fluid.

l. Sanitary facilities will be on site at all times during operations. Sewage will be placed in a portable chemical toilet and the toilet replaced periodically utilizing a licensed contractor to transport by truck the portable chemical toilet so that its contents can be delivered to the Vernal Wastewater Treatment Facility in accordance with state and county regulations.

8. Ancillary Facilities:

a. A complete drilling crew camp is being proposed with this application and will be located central to the project area. A central crew camp will be analyzed in detail within the associated Environmental Assessment.

9. Well Site Layout: (See Exhibit B)

a. The well will be properly identified in accordance with 43 CFR 3162.6.

b. Access to the well pad will be from the east.

c. The pad and road designs are consistent with BLM specification

d. A pre-construction meeting with responsible company representative, contractors and the BLM will be conducted at the project site prior to commencement of surface-disturbing activities. The pad and road will be construction-staked prior to this meeting.

e. The pad has been staked at its maximum size of 245' X 290'; however it will be constructed smaller if possible, depending upon rig availability. Should the layout change, this application will be amended and approved utilizing a sundry notice.

f. All surface disturbing activities, will be supervised by a qualified, responsible company representative who is aware of the terms and conditions of the APD and specifications in the approved plans.

g. All cut and fill slopes will be such that stability can be maintained for the life of the activity.

h. Diversion ditches will be constructed as shown around the well site to prevent surface waters form entering the well site area.

i. The site surface will be graded to drain away from the pit to avoid pit spillage during large storm events.

j. The stockpiled topsoil (first 6 inches or maximum available) will be stored in a windrow on the uphill side of the location to prevent any possible contamination. All topsoil will be stockpiled for reclamation in such a way as to prevent soil loss and contamination.

k. Pits will remain fenced until site cleanup.

l. The blooie line will be located at least 100 feet from the well head.

m. Water injection may be implemented if necessary to minimize the amount of fugitive dust.

10. Plans for Restoration of the Surface (Interim Reclamation and Final Reclamation):

a. Site reclamation for a producing well will be accomplished for portions of the site not required for the continued operation of the well.

b. Upon well completion, any hydrocarbons in the pit shall be removed in accordance with 43 CFR 3162.7-1.Once the reserve pit is dry, the plastic nylon reinforced liner shall be torn and perforated before backfilling of the reserve pit. The reserve pit and that portion of the location not needed for production facilities/operations will be re-contoured to the approximate natural contours.

c. Following BLM published Best Management Practices the interim reclamation will be completed within 90 days of completion of the well to reestablish vegetation, reduce dust and erosion and compliment the visual resources of the area.

a. All equipment and debris will be removed from the area proposed for interim reclamation and the pit area will be backfilled and re-contoured.

b. The area outside of the rig anchors and other disturbed areas not needed for the operation of the well will be re-contoured to blend with the surrounding area and reseeded at 12 lbs /acre with the following native grass seeds:

1. Crested Wheat Grass (4 lbs / acre)
2. Needle and Thread Grass (4 lbs / acre)
3. Rice Grass (4 lbs / acre)

c. Reclaimed areas receiving incidental disturbance during the life of the producing well will be re-contoured and reseeded as soon as practical.

d. The Operator will control noxious weeds along access road use authorizations, pipeline route authorizations, well sites, or other applicable facilities by spraying or mechanical removal. A list of noxious weeds may be obtained from the BLM or the appropriate County Extension Office. On BLM administered land, it is required that a Pesticide Use Proposal be submitted and approved prior to the application of herbicides, pesticides or possibly hazardous chemicals.

e. Prior to final abandonment of the site, all disturbed areas, including the access road, will be scarified and left with a rough surface. The site will then be seeded and/or planted as prescribed by the BLM. The BLM recommended seed mix will be detailed within their approval documents.

11. Surface and Mineral Ownership:

a. Surface Ownership – Federal under the management of the Bureau of Land Management - Price Field Office, 125 South 600 West, Price, Utah 84501; 435-636-3608.

b. Mineral Ownership – Federal under the management of the Bureau of Land Management - Price Field Office, 125 South 600 West, Price, Utah 84501; 435-636-3608.

12. Other Information:

a. Montgomery Archaeological Consultants has conducted a Class III archeological survey. A copy of the pending report will be submitted under separate cover to the appropriate agencies by Montgomery Archaeological Consultants.

b. A paleontological survey has not been required but a BLM approved paleontologist will be present and monitor construction activities during the excavation of bedrock.

c. Our understanding of the results of the onsite inspection are:

a. No Threatened and Endangered flora and fauna species were found during the onsite inspection.

b. No drainage crossings that require additional State or Federal approval are being crossed.

13. Operator's Representative and Certification

Title	Name	Office Phone
Company Representative (Denver)	Alan Vrooman	1-303-350-1171
Agent	Don Hamilton	1-435-719-2018

Certification:

I hereby certify that I, or persons under my direct supervision, have inspected the proposed drill site and access route; that I am familiar with the conditions which currently exists; that the statements made in this APD package are, to the best of my knowledge, true and correct; and that the work associated with the operations proposed herein will be performed by Petro-Canada Resources (USA), Inc. and its contractors and subcontractors in conformity with this APD package and the terms and conditions under which it is approved. I also certify responsibility for the operations conducted on that portion of the leased lands associated with this application, with bond coverage being provided under Petro-Canada's BLM bond. This statement is subject to the provisions of 18 U.S.C. 1001 for the filing of a false statement.

Signature: Don Hamilton Date: 11-7-06

BOP Equipment

5000psi WP

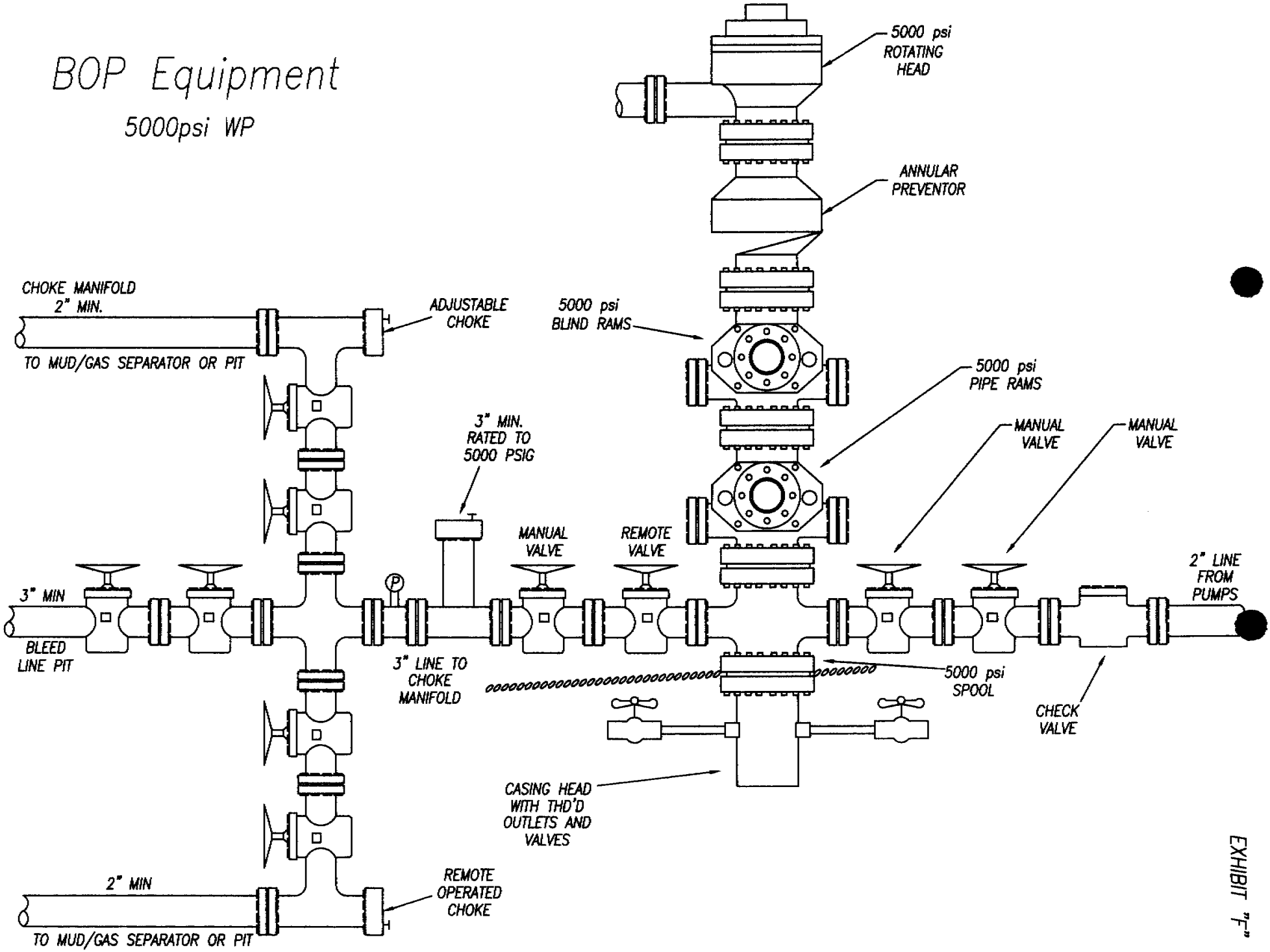


EXHIBIT "F"

PETRO-CANADA RESOURCES (USA), INC.

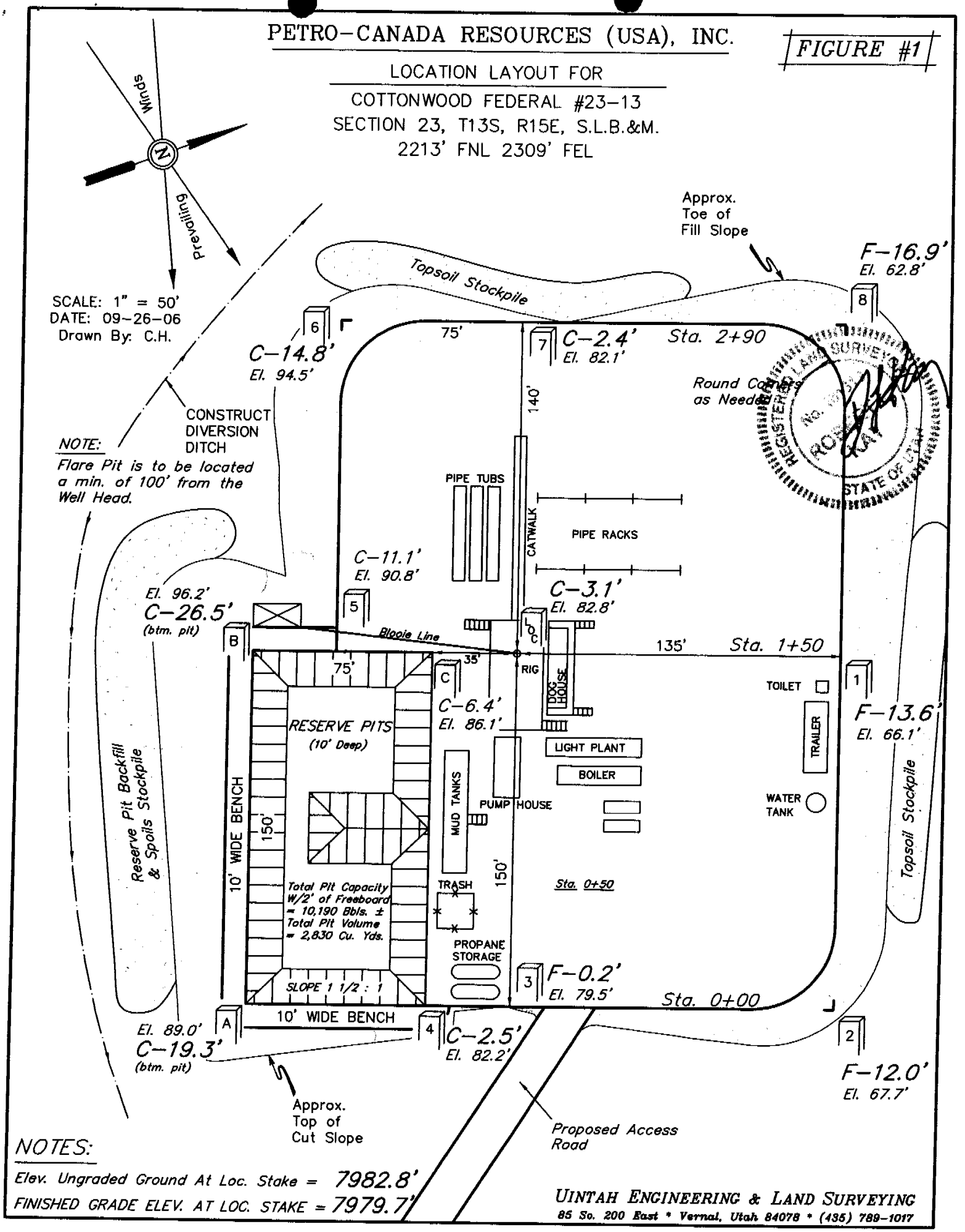
FIGURE #1

LOCATION LAYOUT FOR

COTTONWOOD FEDERAL #23-13

SECTION 23, T13S, R15E, S.L.B.&M.

2213' FNL 2309' FEL



NOTES:

Elev. Ungraded Ground At Loc. Stake = 7982.8'

FINISHED GRADE ELEV. AT LOC. STAKE = 7979.7'

UINTAH ENGINEERING & LAND SURVEYING

85 So. 200 East * Vernal, Utah 84078 * (435) 789-1017

B&A Buys & Associates, Inc.
Environmental Consultants

2580 Creekview Road
Moab, Utah 84532
435/719-2018 435/719-2019 Fax

November 7, 2006

Fluid Minerals Group
Bureau of Land Management
82 East Dogwood
Moab, Utah 84532

RE: Application for Permit to Drill - Petro-Canada Resources (USA), Inc.
Cottonwood Fed 23-13– 2,213' FNL & 2,309' FEL, SW/4 NE/4,
Section 23, T13S, R15E, SLB&M, Carbon County, Utah

Dear Fluid Minerals Group:

On behalf of Petro-Canada Resources (USA), Inc. (Petro-Canada), Buys & Associates, Inc. respectfully submits the enclosed original and three copies of the Application for Permit to Drill (APD) for the above referenced federal surface and mineral vertical well. A request for exception to spacing (R649-3-2) is hereby requested based on topography since the well is located less than 460' of the drilling unit boundary. Petro-Canada is the only owner and operator within 460' of the proposed well. Included with the APD is the following supplemental information:

Exhibit "A" - Survey plats, layouts and photos of the proposed well site;

Exhibit "B" - Proposed location maps with access & pipeline corridor;

Exhibit "C" – Production Site Layout;

Exhibit "D" - Drilling Plan;

Exhibit "E" - Surface Use Plan;

Exhibit "F" - Typical BOP and Choke Manifold diagram.

Please accept this letter as Petro-Canada's, written request for confidential treatment of all information contained in and pertaining to this application.

Thank you very much for your timely consideration of this application. Please feel free to contact myself or Alan Vrooman of Petro-Canada at 303-350-1171 if you have any questions or need additional information.

Sincerely,

Don Hamilton

Don Hamilton
Agent for Petro-Canada

cc: Alan Vrooman, Petro-Canada
Carla Konopka, Petro-Canada
Don Stephens, BLM - Price Field Office
Diana Whiney, Division of Oil, Gas & Mining

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DIV. OF OIL, GAS & MINING

FILE COPY

CONFIDENTIAL

PETRO-CANADA RESOURCES (USA), INC.

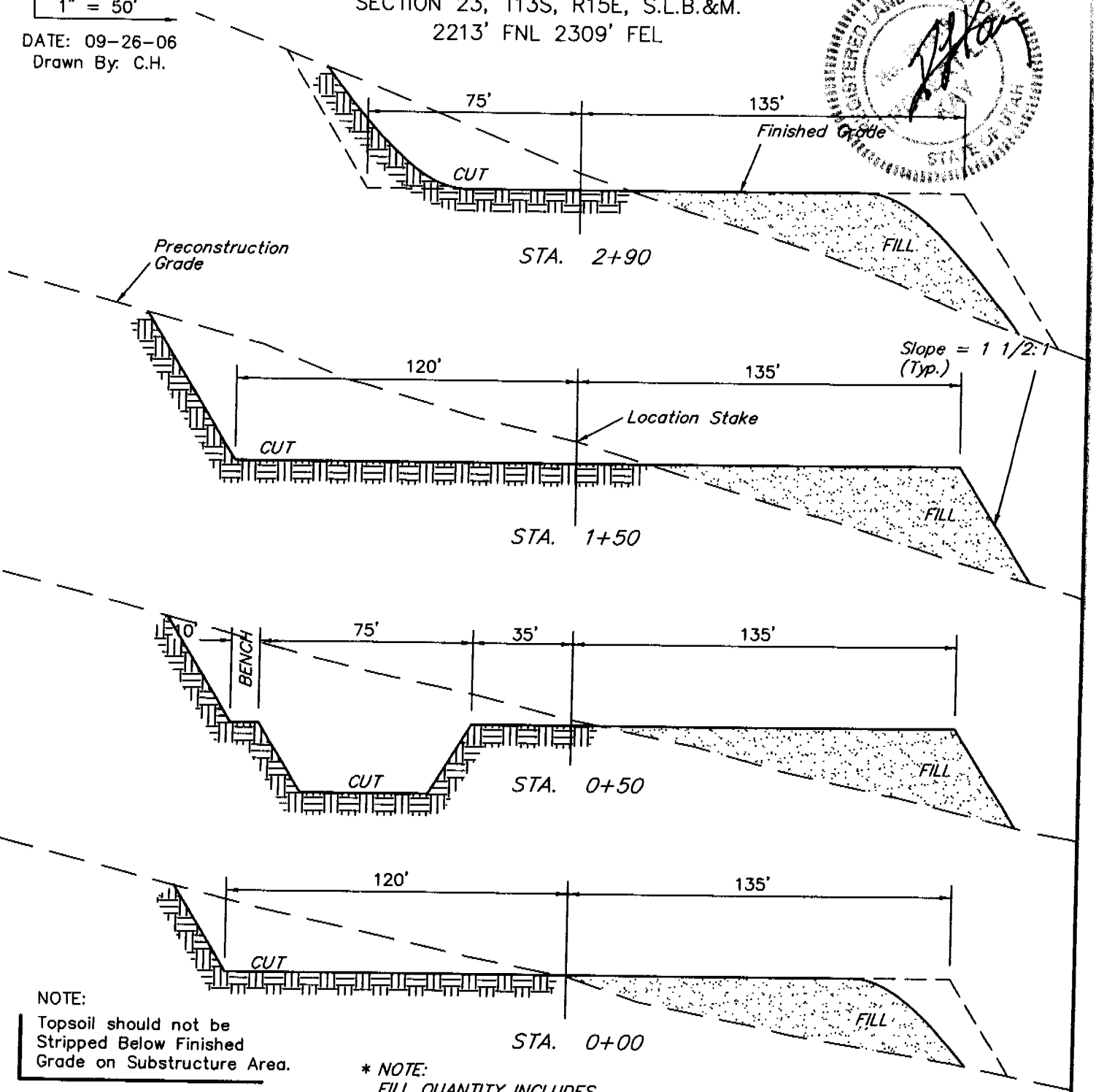
FIGURE #2

TYPICAL CROSS SECTIONS FOR

COTTONWOOD FEDERAL #23-13
SECTION 23, T13S, R15E, S.L.B.&M.
2213' FNL 2309' FEL

1" = 20'
X-Section Scale
1" = 50'

DATE: 09-26-06
Drawn By: C.H.



NOTE:
Topsoil should not be Stripped Below Finished Grade on Substructure Area.

* NOTE:
FILL QUANTITY INCLUDES 5% FOR COMPACTION

APPROXIMATE YARDAGES

CUT
(6") Topsoil Stripping = 1,770 Cu. Yds.
Remaining Location = 13,360 Cu. Yds.

TOTAL CUT = 15,130 CU.YDS.
FILL = 11,940 CU.YDS.

EXCESS MATERIAL = 3,190 Cu. Yds.
Topsoil & Pit Backfill (1/2 Pit Vol.) = 3,190 Cu. Yds.
EXCESS UNBALANCE (After Interim Rehabilitation) = 0 Cu. Yds.

UINTAH ENGINEERING & LAND SURVEYING
85 So. 200 East * Vernal, Utah 84078 * (435) 789-1017

PETRO-CANADA RESOURCES (USA), INC.

COTTONWOOD FEDERAL #23-13

LOCATED IN CARBON COUNTY, UTAH
SECTION 23, T13S, R15E, S.L.B.&M.

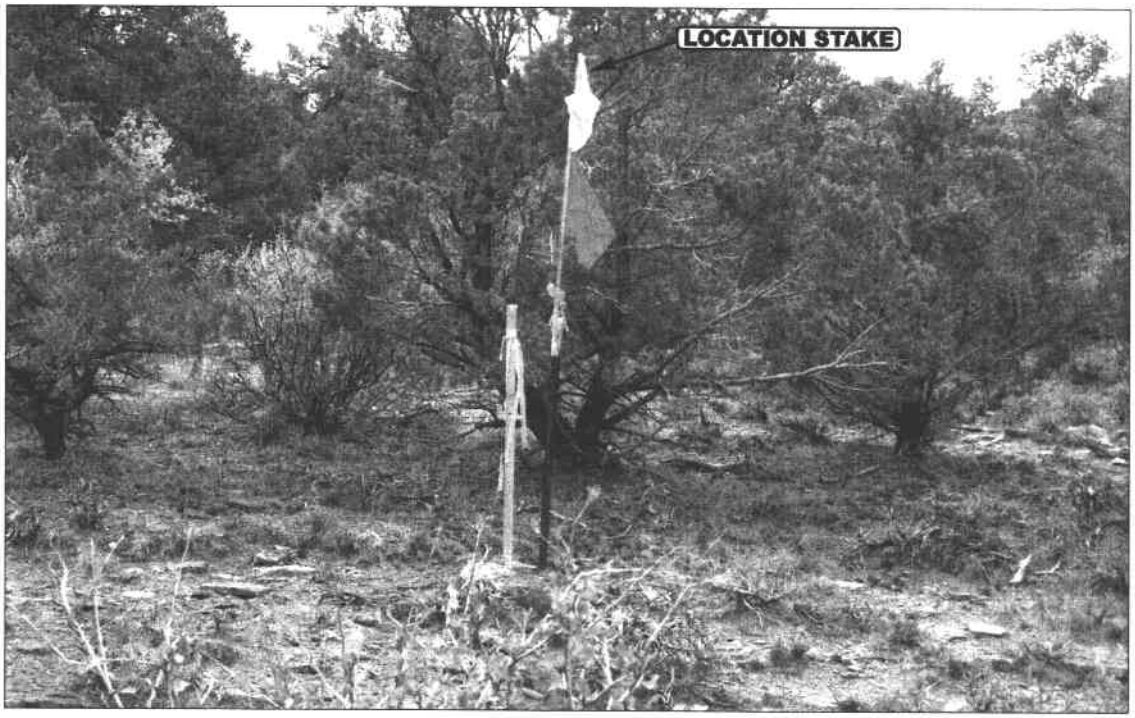


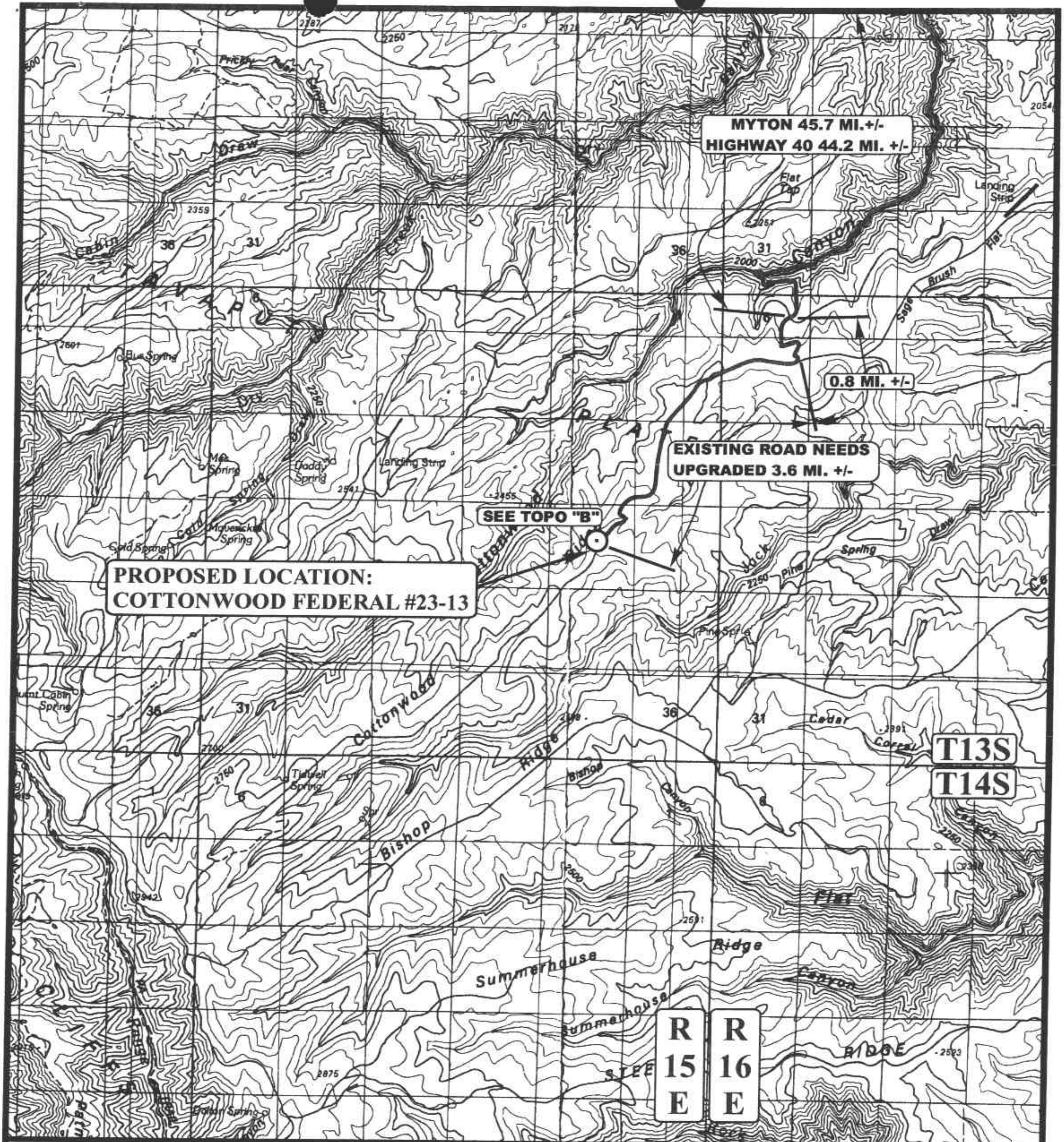
PHOTO: VIEW OF LOCATION STAKE **CAMERA ANGLE: SOUTHWESTERLY**

PHOTO: VIEW FROM BEGINNING OF PROPOSED ACCESS **CAMERA ANGLE: NORTHWESTERLY**

- Since 1964 -

Uintah Engineering & Land Surveying
85 South 200 East Vernal, Utah 84078
435-789-1017 uels@uelsinc.com

LOCATION PHOTOS	09 MONTH	25 DAY	06 YEAR	PHOTO
TAKEN BY: D.R.	DRAWN BY: L.K.	REVISED: 00-00-00		



LEGEND:

⊙ PROPOSED LOCATION

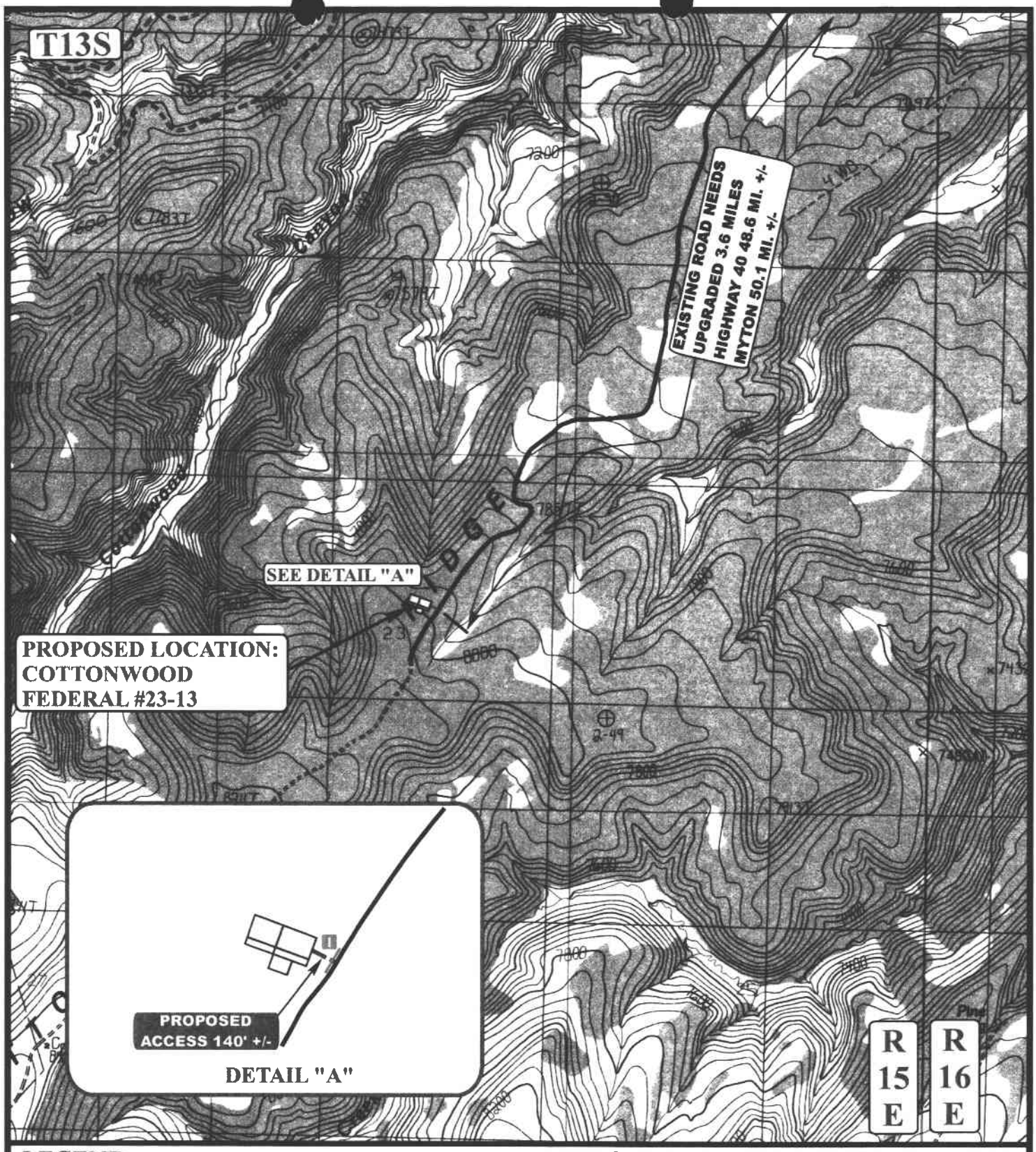
N

PETRO-CANADA RESOURCES (USA), INC.

COTTONWOOD FEDERAL #23-13
SECTION 23, T13S, R15E, S.L.B.&M.
2213' FNL 2309' FEL

UEIS
Uintah Engineering & Land Surveying
85 South 200 East Vernal, Utah 84078
(435) 789-1017 * FAX (435) 789-1813

TOPOGRAPHIC MAP	09 MONTH	25 DAY	06 YEAR	A TOPO
SCALE: 1:100,000	DRAWN BY: L.K.	REVISED: 00-00-00		



LEGEND:

---------- PROPOSED ACCESS ROAD

EXISTING ROAD

1 18" CMP REQUIRED

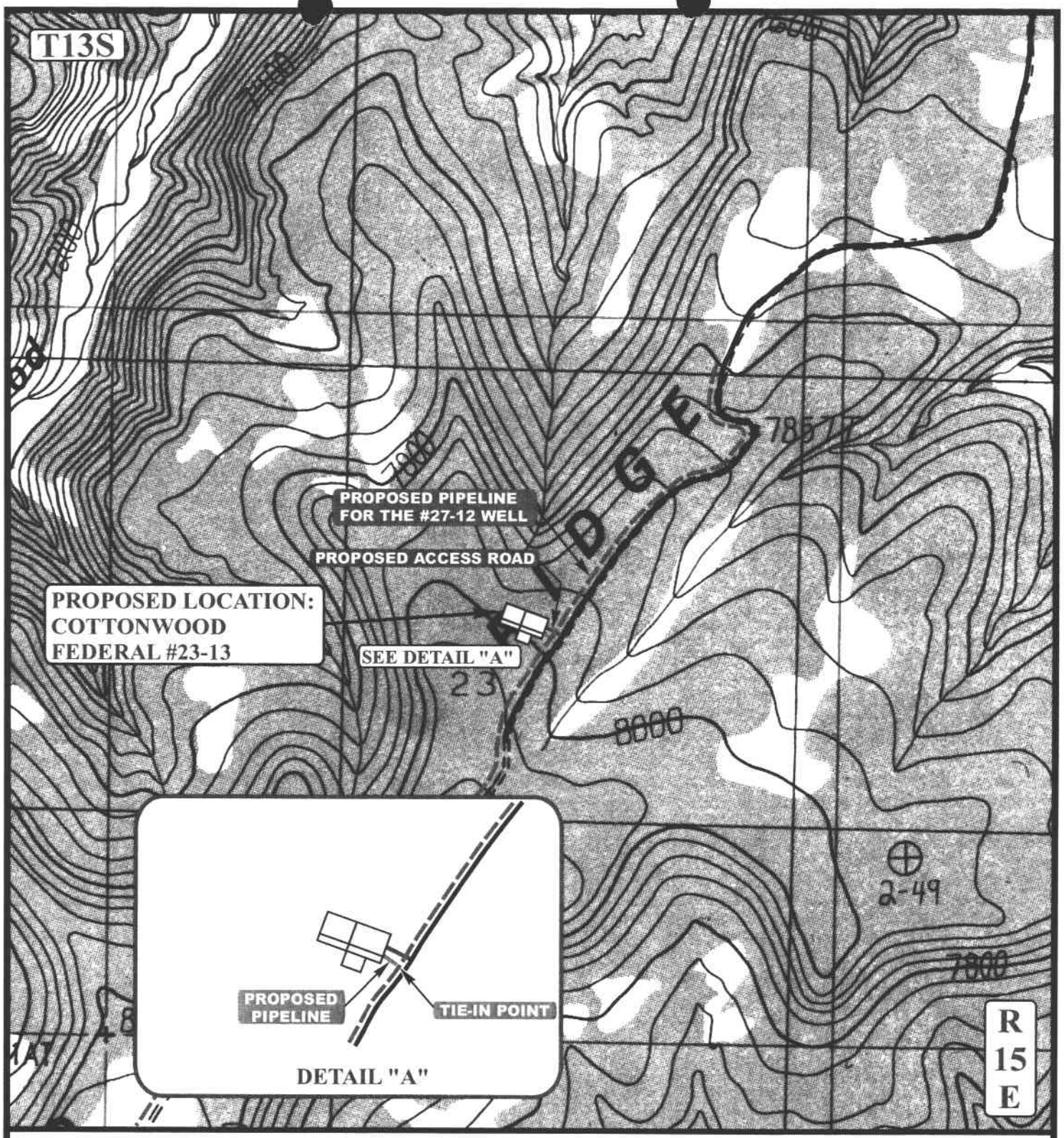
N

PETRO-CANADA RESOURCES (USA), INC.

COTTONWOOD FEDERAL #23-13
SECTION 23, T13S, R15E, S.L.B.&M.
2213' FNL 2309' FEL

UELS
Uintah Engineering & Land Surveying
85 South 200 East Vernal, Utah 84078
(435) 789-1017 * FAX (435) 789-1813

TOPOGRAPHIC MAP	09 MONTH	25 DAY	06 YEAR	B TOPO
SCALE: 1" = 2000'	DRAWN BY: L.K.	REVISED: 00-00-00		



APPROXIMATE TOTAL PIPELINE DISTANCE = 110' +/-

LEGEND:

- PROPOSED ACCESS ROAD
- EXISTING PIPELINE
- PROPOSED PIPELINE
- PROPOSED PIPELINE (SERVICING OTHER WELLS)

N

PETRO-CANADA RESOURCES (USA), INC.

COTTONWOOD FEDERAL #23-13
SECTION 23, T13S, R15E, S.L.B.&M.
2213' FNL 2309' FEL

UELS
Uintah Engineering & Land Surveying
85 South 200 East Vernal, Utah 84078
(435) 789-1017 * FAX (435) 789-1813

TOPOGRAPHIC MAP	09 MONTH	25 DAY	06 YEAR	C TOPO
SCALE: 1" = 1000'	DRAWN BY: L.K.	REVISED: 00-00-00		

WORKSHEET
APPLICATION FOR PERMIT TO DRILL

APD RECEIVED: 11/09/2006

API NO. ASSIGNED: 43-007-31252

WELL NAME: COTTONWOOD FED 23-13

OPERATOR: PETRO-CANADA RESOURCES (N2705)

PHONE NUMBER: 303-297-2100

CONTACT: DON HAMILTON

PROPOSED LOCATION:

SWNE 23 130S 150E

SURFACE: 2213 FNL 2309 FEL

BOTTOM: 2213 FNL 2309 FEL

COUNTY: CARBON

LATITUDE: 39.68100 LONGITUDE: -110.2025

UTM SURF EASTINGS: 568394 NORTHINGS: 4392446

FIELD NAME: WILDCAT (1)

INSPECT LOCATN BY: / /

Tech Review	Initials	Date
Engineering		
Geology		
Surface		

LEASE TYPE: 1 - Federal

LEASE NUMBER: UTU-077547

SURFACE OWNER: 1 - Federal

PROPOSED FORMATION: MNCS

COALBED METHANE WELL? NO

RECEIVED AND/OR REVIEWED:

✓ Plat

✓ Bond: Fed[1] Ind[] Sta[] Fee[]
(No. UT 1215)

N Potash (Y/N)

N Oil Shale 190-5 (B) or 190-3 or 190-13

✓ Water Permit
(No. 90-1542)

N RDCC Review (Y/N)
(Date:)

N/A Fee Surf Agreement (Y/N)

N/A Intent to Commingle (Y/N)

LOCATION AND SITING:

____ R649-2-3.

Unit: ____

____ R649-3-2. General
Siting: 460 From Qtr/Qtr & 920' Between Wells

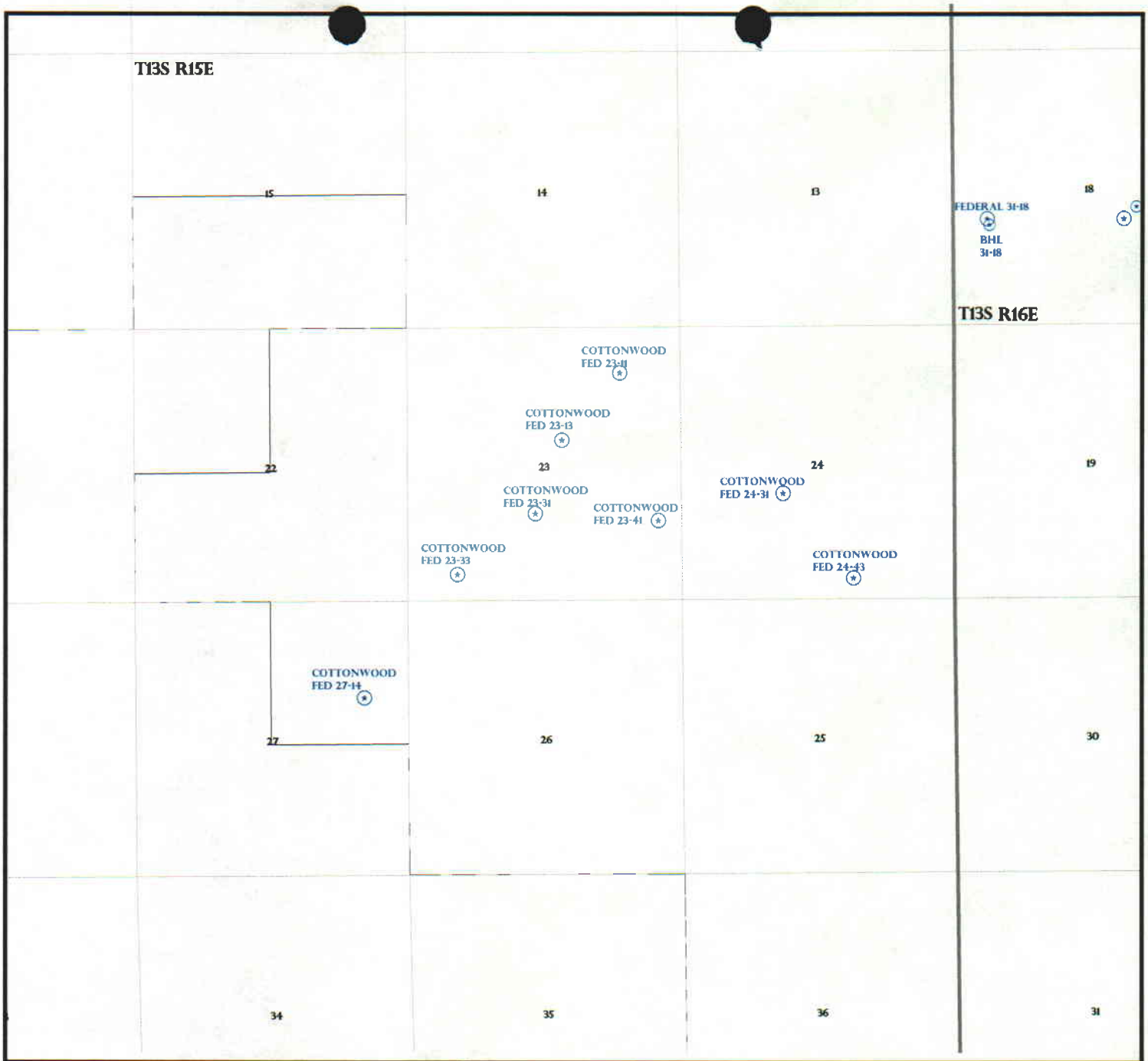
✓ R649-3-3. Exception

____ Drilling Unit
Board Cause No: ____
Eff Date: ____
Siting: ____

____ R649-3-11. Directional Drill

COMMENTS: ____

STIPULATIONS: 1- Surface Agreement
2- Spacing Strip



OPERATOR: PETRO-CANADA RES (N2705)

SEC: 23,24,27 T.13S R. 15E

FIELD: WILDCAT (001)

COUNTY: CARBON

SPACING: R649-3-2 / GENERAL SITING

Field Status
- ABANDONED
- ACTIVE
- COMBINED
- INACTIVE
- PROPOSED
- STORAGE
- TERMINATED

Unit Status
- EXPLORATORY
- GAS STORAGE
- NF PP OIL
- NF SECONDARY
- PENDING
- PI OIL
- PP GAS
- PP GEOTHERML
- PP OIL
- SECONDARY
- TERMINATED

Wells Status
- GAS INJECTION
- GAS STORAGE
- LOCATION ABANDONED
- NEW LOCATION
- PLUGGED & ABANDONED
- PRODUCING GAS
- PRODUCING OIL
- SHUT-IN GAS
- SHUT-IN OIL
- TEMP. ABANDONED
- TEST WELL
- WATER INJECTION
- WATER SUPPLY
- WATER DISPOSAL
- DRILLING

Utah Oil Gas and Mining

N
W E
S

PREPARED BY: DIANA MASON

DATE: 9-NOVEMBER-2006

State of Utah

Department of Natural Resources

MICHAEL R. STYLER
Executive Director

Division of Oil, Gas & Mining

JOHN R. BAZA
Division Director

JON M. HUNTSMAN, JR.
Governor

GARY R. HERBERT
Lieutenant Governor

November 9, 2006

Petro-Canada Resources (USA), Inc.
1099-18th St., Ste. 400
Denver, CO 80202

Re: Cottonwood Federal 23-13 Well, 2213' FNL, 2309' FEL, SW NE, Sec. 23, T. 13 South, R. 15 East, Carbon County, Utah

Gentlemen:

Pursuant to the provisions and requirements of Utah Code Ann.§ 40-6-1 *et seq.*, Utah Administrative Code R649-3-1 *et seq.*, and the attached Conditions of Approval, approval to drill the referenced well is granted.

Appropriate information has been submitted to DOGM and administrative approval of the requested exception location is hereby granted.

This approval shall expire one year from the above date unless substantial and continuous operation is underway, or a request for extension is made prior to the expiration date. The API identification number assigned to this well is 43-007-31252.

Sincerely,

Gil Hunt
Associate Director

pab
Enclosures

cc: Carbon County Assessor
Bureau of Land Management, Moab District Office

1594 West North Temple, Suite 1210, PO Box 145801, Salt Lake City, UT 84114-5801
telephone (801) 538-5340 • facsimile (801) 359-3940 • TTY (801) 538-7458 • *www.ogm.utah.gov*

Operator: Petro-Canada Resources (USA), Inc.

Well Name & Number Cottonwood Federal 23-13

API Number: 43-007-31252

Lease: UTU-077547

Location: SW NE **Sec.** 23 **T.** 13 South **R.** 15 East

Conditions of Approval

1. General

   Compliance with the requirements of Utah Admin. R. 649-1 *et seq.*, the Oil and Gas Conservation General Rules, and the applicable terms and provisions of the approved Application for permit to drill.

2. Notification Requirements

   Notify the Division within 24 hours of spudding the well.

   - Contact Carol Daniels at (801) 538-5284.

   Notify the Division prior to commencing operations to plug and abandon the well.

   - Contact Dan Jarvis at (801) 538-5338

3. Reporting Requirements

   All required reports, forms and submittals will be promptly filed with the Division, including but not limited to the Entity Action Form (Form 6), Report of Water Encountered During Drilling (Form 7), Weekly Progress Reports for drilling and completion operations, and Sundry Notices and Reports on Wells requesting approval of change of plans or other operational actions.

4. State approval of this well does not supersede the required federal approval, which must be obtained prior to drilling.

5. This proposed well is located in an area for which drilling units (well spacing patterns) have not been established through an order of the Board of Oil, Gas and Mining (the "Board"). In order to avoid the possibility of waste or injury to correlative rights, the operator is requested, once the well has been drilled, completed, and has produced, to analyze geological and engineering data generated therefrom, as well as any similar data from surrounding areas if available. As soon as is practicable after completion of its analysis, and if the analysis suggests an area larger than the quarter-quarter section upon which the well is located is being drained, the operator is requested to seek an appropriate order from the Board establishing drilling and spacing units in conformance with such analysis by filing a Request for Agency Action with the Board.

Form 3160-3
(February 2005)

RECEIVED
MOAB FIELD OFFICE
2006 NOV -7 P 1:27
DEPT OF THE INTERIOR
BUREAU OF LAND MGMT

FORM APPROVED
OMB No. 1004-0137
Expires March 31, 2007

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

APPLICATION FOR PERMIT TO DRILL OR REENTER

5. Lease Serial No. **UTU-077547**

6. If Indian, Allotee or Tribe Name **N/A**

7. If Unit or CA Agreement, Name and No. **N/A**

1a. Type of work: ☑ DRILL ☐ REENTER

1b. Type of Well: ☐ Oil Well ☑ Gas Well ☐ Other ☐ Single Zone ☑ Multiple Zone

8. Lease Name and Well No. **Cottonwood Fed 23-13**

2. Name of Operator **Petro-Canada Resources (USA), Inc.**

9. API Well No. 43007310352

3a. Address **1099-18th Street, Suite 400 Denver, Colorado 80202**

3b. Phone No. *(include area code)* **303-297-2100**

10. Field and Pool, or Exploratory **undesignated**

4. Location of Well *(Report location clearly and in accordance with any State requirements.*)*
At surface **2,213' FNL & 2,309' FEL, SW/4 NE/4,**
At proposed prod. zone **2,213' FNL & 2,309' FEL, SW/4 NE/4,**

11. Sec., T. R. M. or Blk. and Survey or Area **Section 23, T13S, R15E, SLB&M**

14. Distance in miles and direction from nearest town or post office* **13.30 miles northeast of Sunnyside, Utah**

12. County or Parish **Carbon**

13. State **UT**

15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drlg. unit line, if any) **2,213'**

16. No. of acres in lease **1,440 acres**

17. Spacing Unit dedicated to this well **40 acres**

18. Distance from proposed location* to nearest well, drilling, completed, applied for, on this lease, ft. **1,500'**

19. Proposed Depth **11,500'**

20. BLM/BIA Bond No. on file **UT 1215**

21. Elevations (Show whether DF, KDB, RT, GL, etc.) **7,983' GR**

22. Approximate date work will start* **05/01/2007**

23. Estimated duration **35 days drilling 40 days completion**

24. Attachments

The following, completed in accordance with the requirements of Onshore Oil and Gas Order No.1, must be attached to this form:

1. Well plat certified by a registered surveyor.
2. A Drilling Plan.
3. A Surface Use Plan (if the location is on National Forest System Lands, the SUPO must be filed with the appropriate Forest Service Office).
4. Bond to cover the operations unless covered by an existing bond on file (see Item 20 above).
5. Operator certification
6. Such other site specific information and/or plans as may be required by the BLM.

25. Signature Don Hamilton | Name *(Printed/Typed)* **Don Hamilton** | Date **11/07/2006**

Title **Agent for Petro-Canada Resources (USA), Inc.**

Approved by *(Signature)* /s/ A. Lynn Jackson | Name *(Printed/Typed)* /s/ A. Lynn Jackson | Date 6/19/07

Title Assistant Field Manager, Division of Resources | Office Division of Resources Moab Field Office

Application approval does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.
Conditions of approval, if any, are attached.

Title 18 U.S.C. Section 1001 and Title 43 U.S.C. Section 1212, make it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

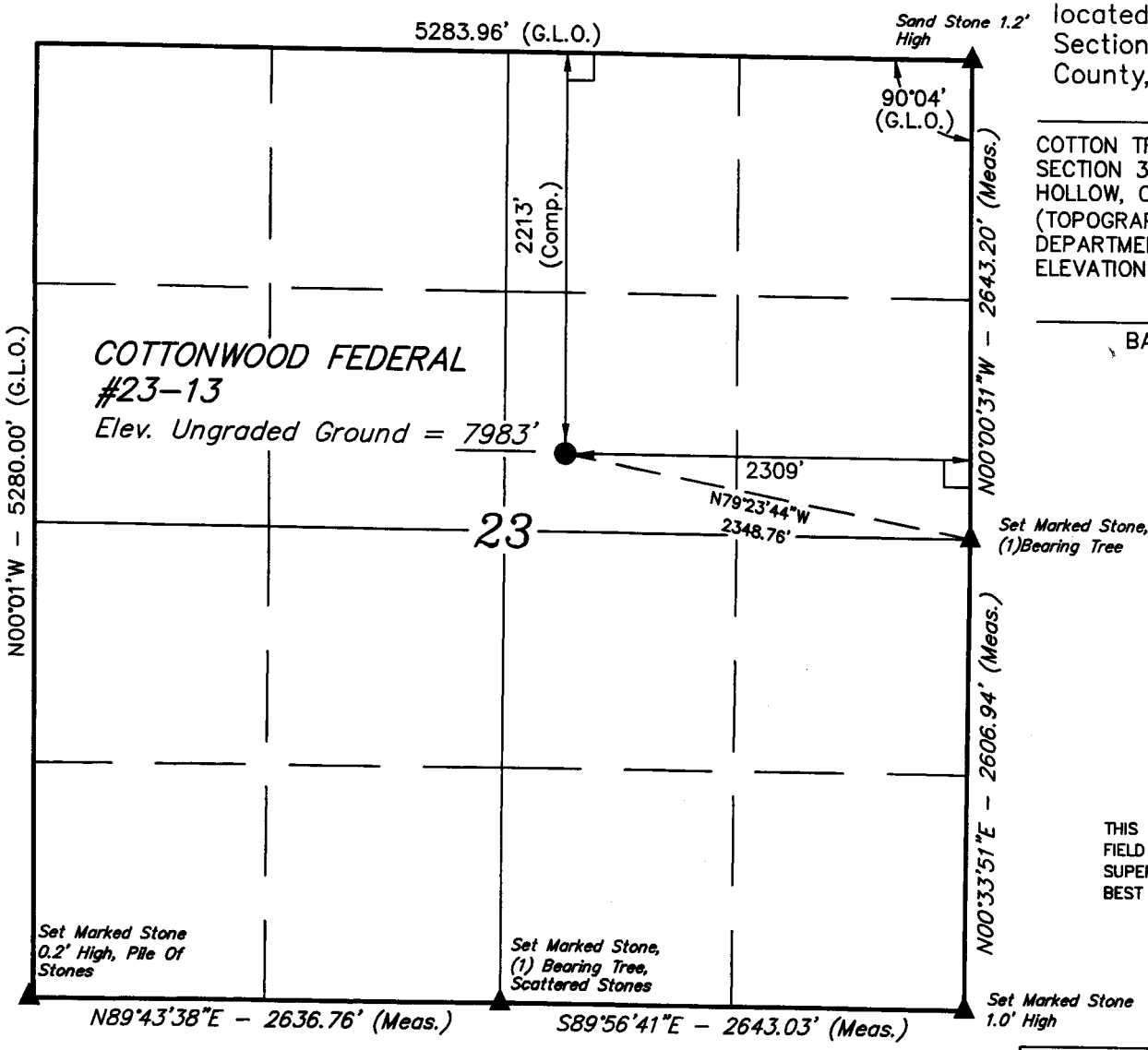
*(Instructions on page 2)

CONFIDENTIAL

CONDITIONS OF APPROVAL ATTACHED

RECEIVED
JUN 2 5 2007
DIV. OF OIL, GAS & MINING

T13S, R15E, S.L.B.&M.



PETRO-CANADA RESOURCES (USA), INC.

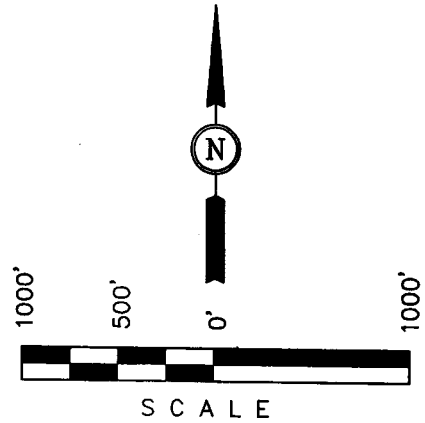
Well location, COTTONWOOD FEDERAL #23-13, located as shown in the SW 1/4 NE 1/4 of Section 23, T13S, R15E, S.L.B.&M., Carbon County, Utah.

BASIS OF ELEVATION

COTTON TRIANGULATION STATION, LOCATED IN THE NW 1/4 OF SECTION 31, T12S, R16E, S.L.B.&M. TAKEN FROM THE TWIN HOLLOW, CARBON COUNTY, QUADRANGLE, 7.5 MINUTE QUAD. (TOPOGRAPHIC MAP) PUBLISHED BY THE UNITED STATES DEPARTMENT OF THE INTERIOR, GEOLOGICAL SURVEY. SAID ELEVATION IS MARKED AS BEING 7386 FEET.

BASIS OF BEARINGS

BASIS OF BEARINGS IS A G.P.S. OBSERVATION.



CERTIFICATE

THIS IS TO CERTIFY THAT THE ABOVE PLAT WAS PREPARED FROM FIELD NOTES OF ACTUAL SURVEYS MADE BY ME OR UNDER MY SUPERVISION AND THAT THE SAME ARE TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

REGISTERED LAND SURVEYOR
REGISTRATION NO. 161319
STATE OF UTAH

REGISTERED LAND SURVEYOR ROBERT L. KAY No. 161319 STATE OF UTAH

LEGEND:

└ = 90° SYMBOL

● = PROPOSED WELL HEAD.

▲ = SECTION CORNERS LOCATED.

(NAD 83)
LATITUDE = 39°40'51.40" (39.680944)
LONGITUDE = 110°12'11.27" (110.203131)
(NAD 27)
LATITUDE = 39°40'51.53" (39.680981)
LONGITUDE = 110°12'08.71" (110.202419)

UINTAH ENGINEERING & LAND SURVEYING
85 SOUTH 200 EAST – VERNAL, UTAH 84078
(435) 789-1017

SCALE 1" = 1000'	DATE SURVEYED: 09-12-06	DATE DRAWN: 09-26-06
PARTY D.R. R.R. C.H.	REFERENCES G.L.O. PLAT	
WEATHER WARM	FILE PETRO-CANADA RESOURCES (USA), INC.	

Petro-Canada Resources (USA), Inc.
Cottonwood Federal 23-13
Lease UTU-77547
SW/NE Sec. 23, T13S, R15E
Carbon County, Utah

A COMPLETE COPY OF THIS APPROVED PERMIT and Conditions of Approval shall be maintained on location during all construction and drilling operations, and shall be available to contractors to ensure compliance.

CONDITIONS OF APPROVAL

Approval of this application does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.

Be advised that Petro-Canada Resources (USA), Inc. is considered to be the operator of the above well and is responsible under the terms and conditions of the lease for the operations conducted on the leased lands.

Bond coverage for this well is provided by **UT 1215** (Principal – Petro-Canada Resources (USA), Inc.) via surety consent as provided for in 43 CFR 3104.2.

This office will hold the aforementioned operator and bond liable until the provisions of 43 CFR 3106.7-2 continuing responsibility are met.

This permit will be valid for a period of one year from the date of approval. After permit termination, a new application must be filed for approval.

All lease operations will be conducted in full compliance with applicable regulations (43 CFR 3100), Onshore Oil and Gas Orders, lease terms, notices to lessees, and the approved plan of operations. The operator is fully responsible for the actions of his subcontractors. Failure to comply with the provisions of this permit, including applicable regulations, stipulations, and/or approval conditions, will be considered a violation subject to the enforcement provisions of 43 CFR Subpart 3163.

A. DRILLING PROGRAM

1. The proposed 5M BOP system is adequate for anticipated conditions. Installation, testing and operation of the system shall be in conformance with Onshore Oil and Gas Order No. 2.

2. Concurrent approval from the State of Utah, Division of Oil, Gas & Mining (DOGM) is required before conducting any surface disturbing activities.

3. Drilling reports, which describe the activities of each day, shall be submitted to the BLM Moab Field Office on a weekly, or more frequent, basis. In addition to a daily summary of activities, drilling reports shall include the drilling fluid weight, details of casing and cement, water flows, lost circulation zones and any other information that would contribute to our understanding of drilling conditions.

4. The production casing shall be cemented into place such that the top-of-cement extends a minimum of 100 feet into the surface casing, leaving no annular space exposed to open-hole. This shall be verified by a cement bond log (CBL) or other appropriate tool for determining top-of-cement, unless cement is circulated to surface.

5. If logging reveals that the cementing objectives were not met, remedial cementing will be required.

6. Locally, the Green River Formation is known to contain oil, gas, oil shale and tar sand deposits. However, the lateral occurrence, distribution and grade of the oil shale and tar sand deposits are not well defined. The operator shall pay particular attention to this section, and shall attempt to identify and describe any of these resources that may be penetrated. Any information obtained on these resources shall be included as part of the Well Completion Report.

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
Price Field Office
Price, Utah

SURFACE USE
CONDITIONS OF APPROVAL

Project Name: Cottonwood Exploratory Drilling EA

Operator: Petro-Canada Resources (USA) Inc.

Wells: Cottonwood Federal 23-13, 23-33, 27-14, 24-31

I Applicable Petro-Canada Exploratory Drilling EA - Alternative C

Under this alternative, the project will be implemented as described in the Proposed Action, including adherence to *The Gold Book* standards, except that drilling procedures/techniques under Alternative C will be determined during the project through implementation of the following procedures:

- The well pads and the associated access roads will be constructed for the proposed 23-13, 23-33, 27-14, and 24-31 wells. Construction methods will be identical to those described in the Proposed Action (Sections 2.2.2 and 2.2.3).

- Wells 23-13, 23-33, 27-14, and 24-31 will be vertically drilled, completed, and tested. Drilling, completion and testing procedures will be identical to those described in the Proposed Action (Sections 2.2.4 and 2.2.5).

- After the drilling, completion and testing of the first four vertical wells is completed, an evaluation will be made to determine whether directional drilling of any or all of the four remaining wells (23-14, 23-31, 23-41, and 24-43) from the four existing well pads will be technically and economically feasible. This evaluation will be based on information gathered in the drilling of the initial wells and knowledge gained about site-specific geologic conditions.

- If it is determined by Petro-Canada and the BLM that directional drilling of any or all of the four remaining wells is technically and economically feasible from the 23-13, 23-33, 27-14, and 24-31 well pads, each well pad will be expanded by 0.2 acres, and such well or wells will be drilled directionally. As such, the surface locations for the proposed vertical wells they will replace, together with associated roads and pipelines, will be eliminated from the project.

- If it will be determined that directional drilling of any or all of the four remaining wells is not feasible from the 23-13, 23-33, 27-14, and 24-31 well pads, the well pads and access roads for such locations will be constructed, and such wells will be vertically drilled.

- Alternative C incorporates all other components of the Proposed Action. As such components may be modified by the elimination of up to four surface locations and associated roads and pipeline connections.

II Site Specific Conditions of Approval

- A pre-construction field meeting may be conducted prior to beginning any dirt work approved under this APD. The operator shall contact the BLM Authorized Officer Don Stephens @ 435-636-3608 at least 48-hours prior to beginning operations so that the meeting can be scheduled. The operator is responsible for having all contractors present (dirt contractors, drilling contractor, pipeline contractor, project oversight personnel, etc.) including the overall field operations superintendent, and for providing all contractors copies of the approved APD(s), project map and BLM Conditions of Approval pertinent to the work that each will be doing.

- A Paleontologist acceptable to the BLM will monitor during surface disturbing activities. If paleontologic resources are uncovered during surface disturbing activities, the paleontologist shall immediately notify the Authorized Officer (AO). The AO will arrange for a determination of significance and, if necessary, recommend a recovery or avoidance plan.

- Petro-Canada will bury all pipelines.

- Petro-Canada will measure gas production on the well pad unless permission is granted for measurement at another place.

- All tanks shall be located on the well location except for the Cottonwood Federal 27-14 whose tanks shall be located on the Cottonwood Federal 23-33 location.

- In order to minimize watershed damage, exploration, drilling, and other development activity will be allowed only during the period from April 30 to November 1. This limitation does not apply to maintenance and operation of producing wells.

- No productions tanks will be placed at the proposed Cottonwood Federal #27-14, as these facilities will be moved to Cottonwood Federal #23-33 to minimize visual and wildlife impacts.

- As the project is subject to UDAQ R307-205-2, Fugitive Dust, Petro-Canada will use water at construction sites and along roads, as necessary, to abate fugitive dust.

- As required by the Price River MFP, if cultural resources are uncovered during surface-disturbing activities, Petro-Canada will suspend operations at the site and immediately contact the AO, who will arrange for a determination of eligibility in consultation with the SHPO, and, if necessary, recommend a recovery or avoidance plan.

- Eligible historic properties will be avoided by the Proposed Action. At sites 42Cb1711 and 42Cb1738, the proposed pipeline will be routed north of the site boundaries. The proposed pipeline corridor will be

routed south of site 42Cb2528 site. At site 42Cb2593, it is recommended that construction activities be confined to the western portion of the pipeline corridor, outside of the site boundary.

- As required under 40 CFR 112.3(e), Petro-Canada will maintain a copy of the SPCC plan at each facility, if the facility is normally attended at least eight hours per day, or at the nearest field office if the facility is not so attended. Petro-Canada will also implement and adhere to SPCC plans in a manner such that any spill or accidental discharge of oil will be reported and remediated.

- All equipment and personnel used during drilling and construction activities will be restricted to only approve access roads.

- All permanent above-ground structures (e.g., production equipment, tanks, etc.) not subject to safety requirements will be painted to blend with the natural color of the landscape. The paint used will be a color which simulates "Standard Environmental Colors." The color selected is Olive Black, 5WA20-6. All facilities will be painted the designated color at the time of installation.

- No oil, lubricants, or toxic substances may be drained onto the ground surface.

- Petro-Canada will not allow any open burning of garbage or refuse at well sites or other facilities.

- Petro-Canada will repair or replace to current BLM standards any fences, cattleguards, gates, drift fences, and natural barriers that are damaged as a result of the Proposed Action. Cattleguards will be used instead of gates for livestock control on most road ROWs.

- To minimize wildlife mortality due to vehicle collisions, Petro-Canada will advise project personnel regarding appropriate speed limits in the Project Area. Employees and contractors will be educated about anti-poaching laws. If wildlife law violations are discovered, the offending employee will be subject to disciplinary action by Petro-Canada.

- Petro-Canada will eliminate the potential exposure of migratory birds to contaminated water.

- Prior to any surface-disturbing activities between April 1 and August 31, Petro-Canada or their contractor will survey all areas within 1/2-mile of proposed surface disturbance for the presence of raptor nests. If occupied/active raptor nests are found, construction will not occur during the critical nesting season for that species within the species-specific buffer, unless the nest is obscured from visual or noise-related impacts through vegetative or topographic screening. BLM biologists will determine spatial buffers based on site-specific vegetative and topographic features within the vicinity of the occupied nest.

- Please contact Don Stephens, Natural Resource Specialist, (435) 636-3608, Bureau of Land Management, Price Field Office, if there are any questions concerning these surface use COAs.

III Standard Conditions of Approval

General

- Petro-Canada will provide georeferenced spatial data depicting as-built locations of all facilities, wells, roads, pipelines, power lines, and other related facilities to the BLM by November 1 of each year until completion of project construction activities has occurred

- Petro-Canada will inform their employees, contractors, and subcontractors about relevant Federal regulations intended to protect archaeological and cultural resources. All personnel will be informed that collecting artifacts, including arrowheads, is a violation of Federal law and that employees engaged in this activity will be subject to disciplinary action.

Construction

- Topsoil will be removed from constructed well locations including areas of cut and fill, and stockpile at the site. Topsoil will also be salvaged for use in reclamation on all other areas of surface disturbance (roads, pipelines, etc.). Clearly segregate topsoil from excess spoil material. Any topsoil stockpiled for one year or longer will be signed and stabilized with annual ryegrass or other suitable cover crop.

- The operator will not push soil material and overburden over side slopes or into drainages. All soil material disturbed will be placed in an area where it can be retrieved without creating additional undue surface disturbance and where it does not impede watershed and drainage flows.

- Construct the backslope no steeper than 1½:1, and construct the foreslope no steeper than 2:1, unless otherwise directed by the BLM Authorized Officer.

- Maintain a minimum 20-foot undisturbed vegetative border between toe-of-fill of pad and/or pit areas and the edge of adjacent drainages, unless otherwise directed by the BLM Authorized Officer.

- Reserve pits will be adequately fenced during and after drilling operations until the pit is reclaimed so as to effectively keep out wildlife and livestock. Adequate fencing, in lieu of more stringent requirements by the surface owner, is defined as follows: 1) Construction materials will consist of steel or wood posts. Three or four strand wire (smooth or barbed) fence or hog panel (16-foot length by 50-inch height) or plastic snow fence must be used with connectors such as fence staples, quick-connect clips, hog rings, hose clamps, twisted wire, etc. Electric fences will not be allowed; 2) Construction standards: Posts shall be firmly set in ground. If wire is used, it must be taut and evenly spaced, from ground level to top wire, to effectively keep out animals. Hog panels must be tied securely into posts and one another using fence staples, clamps, etc. Plastic snow fencing must be taut and sturdy. Fence must be at least 2-feet from edge of pit. 3 sides fenced before beginning drilling, the fourth side fenced immediately upon completion of drilling and prior to rig release. Fence must be left up and maintained in adequate condition until pit is closed.

- The reserve pit will be oriented to prevent collection of surface runoff. After the drilling rig is removed, the operator may need to construct a trench on the uphill side of the reserve pit to divert surface drainage around it. If constructed, the trench will be left intact until the pit is closed.

- The reserve pit will be lined with an impermeable liner if permeable subsurface material is encountered. An impermeable liner is any liner having a permeability less than 10^{-7} cm/sec. The liner will be installed so that it will not leak and will be chemically compatible with all substances that may be put in the pit. Liners made of any man-made synthetic material will be of sufficient strength and thickness to withstand normal installation and pit use. In gravelly or rocky soils, a suitable bedding material such as sand will be used prior to installing the liner.

- Culverts will be placed on channel bottoms on firm, uniform beds, which have been shaped to accept them, and aligned parallel to the channel to minimize erosion. Backfill will be thoroughly compacted.

- The minimum diameter for culverts will be 18 inches. However, all culverts will be appropriately sized in accordance with standards in BLM Manual 9113.

- Pipeline construction shall not block nor change the natural course of any drainage. Pipelines shall cross perpendicular to drainages. Pipelines shall not be run parallel in drainage bottoms. Suspended pipelines shall provide adequate clearance for maximum runoff.

- Pipeline trenches shall be compacted during backfilling. Pipeline trenches shall be routinely inspected and maintained to ensure proper settling, stabilization and reclamation.

- The operator shall submit a Sundry Notice (Form 3160-5) to BLM for approval prior to construction of any new surface disturbing activities that are not specifically addressed in the approved APD.

- Surface disturbance will be limited to the approved location and access routes.

- No surface-disturbing activities will occur during muddy and wet periods (e.g., when soils are saturated and excessive rutting of more than four inches with multiple passes could occur).

- The edges of well pads will be feathered to blend with the surrounding landscape.

- Removal and disturbance of vegetation will be kept to a minimum through construction site management (e.g., using previously disturbed areas and existing easements where feasible, placing pipelines adjacent to roads, limiting well pad size, etc.).

- During the construction phase of the project, Petro-Canada will implement an intensive reclamation and weed control program after each segment of project completion. Petro-Canada will reseed all portions of wells pads and the ROW not utilized for the operational phase of the project. Post-construction seeding application will continue until determined successful by the BLM. Weed control will be conducted through an Approved Pesticide Use and Weed Control Plan from the AO.

- To reduce the spread or introduction of noxious and invasive weed species into the Project Area via project-related vehicles and equipment, Petro-Canada and its contractors will power-wash all construction equipment prior to the entering the Project Area.

- Areas used for spoil storage will be stripped of topsoil before spoil placement.

- Appropriate erosion control and revegetation measures will be employed. In areas with unstable soils where seeding alone may not adequately control erosion, grading will be used to minimize slopes and water bars will be installed on disturbed slopes. Erosion control efforts will be monitored by Petro-Canada and necessary modifications would be made to control erosion.

- Sufficient topsoil or other suitable materials to facilitate revegetation will be segregated from subsoils during all construction operations requiring excavation and will be returned to the surface upon completion of operations. Soils compacted during construction will be ripped and tilled as necessary prior to reseeding. Cut and fill sections on all roads and along pipelines will be revegetated with native species.

- During the activities of road maintenance, new road construction or the construction of well pads, if any standing live or dead trees are damaged, cut down or knocked over by grading or construction equipment, actions would be taken to remove the vegetation from the road or pad edge. These materials would either be chipped on site and dispersed along the road or pad edge or hauled to BLM approved locations and piled for disposal in a manner that would not present a fuel hazard. Piles must be located in openings so that no pile would be within 30 feet of standing live trees. The piled vegetation must also be located adjacent to and accessible by road.

Operations/Maintenance

- Rat and mouse holes shall be filled and compacted from the bottom to the top immediately upon release of the drilling rig from the location.

- Hydrocarbons shall be put in test tanks on location during completion work. Produced water will be put in the reserve pit during completion work per Onshore Order #7.

- The only fluids/waste materials which are authorized to go into the reserve pit are RCRA exempt exploration and production wastes. These include drilling muds and cuttings, rigwash, and excess cement and certain completion & stimulation fluids defined by EPA as exempt. It does not include drilling rig waste, such as spent hydraulic fluids, used engine oil, used oil filter, empty cement, drilling mud, or other product sacks, empty paint, pipe dope, chemical or other product containers, and excess chemicals or chemical rinsate. Any evidence of non-exempt wastes being put into the reserve pit may result in the BLM Authorized Officer requiring specific testing and closure requirements.

- If this well is drilled during the fire season (June-October), the operator shall institute all necessary precautions to ensure that fire hazard is minimized, including but not limited to mowing vegetation on the access route(s) and well location(s), keeping fire fighting equipment readily available when drilling, etc.

- If possible, large-scale drilling and completion supplies will be transported to sites during hours of low use by the public.

- Personnel will be advised regarding appropriate speed limits (15 to 30 mph) in the Project Area, as defined by BLM Manual 9113 – Roads (BLM 1985) and the Surface Operating Standards for Oil and Gas Extraction and Development 4th Addition (BLM and USFS 2006).

Dry Hole/Reclamation

- All disturbed lands associated with this project, including the pipelines, access roads, etc. will be expediently reclaimed and reseeded in accordance with the surface use plan and any pertinent site-specific COAs.

- The attached Seed Mixtures A & B and TMC 1: Browse Hand Planting Tubling Mixtures shall be used for reclamation.

- Disturbed lands will be re-contoured back to conform with existing undisturbed topography. No depressions will be left that trap water or form ponds.

- Reserve pits will be closed as soon as possible, unless the BLM Authorized Officer gives an extension. Squeezing of pit fluids and cuttings is prohibited. Pits must be dry of fluids or they must be removed via vac-truck or other environmentally acceptable method prior to backfilling, re-contouring and replacement of topsoil. Mud and cuttings left in pit must be buried at least 3-feet below re-contoured grade. The operator will be responsible for re-contouring any subsidence areas that develop from closing a pit before it is sufficiently dry.

- Before the location has been reshaped and prior to redistributing the topsoil, the operator will rip or scarify the drilling platform and access road on the contour, to a depth of at least 12 inches. The rippers are to be no farther than 24 inches apart.

- Distribute the topsoil evenly over the entire location and other disturbed areas. Prepare the seedbed by disking to a depth of 4-to-6 inches following the contour.

- Phased reclamation plans will be submitted to BLM for approval prior to individual POD facility abandonment via a Notice of Intent (NOI) Sundry Notice. Individual facilities, such as well locations, pipelines, discharge points, impoundments, etc. need to be addressed in these plans as they are no longer needed. Individual items that will need to be addressed in reclamation plans include:

  1. Pit closure
  2. Configuration of reshaped topography, drainage systems, and other surface manipulations
  3. Waste disposal
  4. Revegetation methods, including specific seed mix (pounds pure live seed/acre) and soil treatments (seedbed preparation, fertilization, mulching, etc.). On private surface, the landowner should be consulted for the specific seed mix.
  5. Other practices that will be used to reclaim and stabilize all disturbed areas, such as water bars, erosion fabric, hydro-mulching, etc.
  6. An estimate of the timetables for beginning and completing various reclamation operations relative to weather and local land uses.

7. Methods and measures that will be used to control noxious weeds, addressing both ingress and egress to the individual well or POD.
8. Decommissioning/removal of all surface facilities.

- A Notice of Intent to Abandon and a Subsequent Report of Abandonment must be submitted for abandonment approval.
- For performance bond release approval, a Final Abandonment Notice (with a surface owner release letter on split-estate) must be submitted prior to a final abandonment evaluation by BLM.
- Soil fertility testing and the addition of soil amendments may be required to stabilize some disturbed lands.
- Any mulch utilized for reclamation needs to be certified weed free.
- Waterbars are to be constructed at least one (1) foot deep, on the contour with approximately two (2) feet of drop per 100 feet of waterbar to ensure drainage, and extended into established vegetation. All waterbars are to be constructed with the berm on the downhill side to prevent the soft material from silting in the trench. The initial waterbar should be constructed at the top of the backslope. Subsequent waterbars should follow the following general spacing guidelines:

Slope (percent)	Spacing Interval (feet)
≤ 2	200
2 – 4	100
4 – 5	75
≥ 5	50

Producing Well

- All internal combustion equipment will be kept in good working order.
- Landscape those areas not required for production to the surrounding topography as soon as possible.
- Reduce the backslope to 2:1 and the foreslope to 3:1, unless otherwise directed by the BLM Authorized Officer. Reduce slopes by pulling fill material up from foreslope into the toe of cut slopes.
- Production facilities (including dikes) must be placed on the cut portion of the location and a minimum of 15 feet from the toe of the back cut unless otherwise approved by the BLM Authorized Officer.
- Any spilled or leaked oil, produced water or treatment chemicals must be reported in accordance with NTL-3A and immediately cleaned up in accordance with BLM requirements. This includes clean-up and proper disposition of soils contaminated as a result of such spills/leaks.
- Distribute stockpiled topsoil evenly over those areas not required for production and reseed as recommended.

- Upgrade and maintain access roads and drainage control (e.g., culverts, drainage dips, ditching, crowning, surfacing, etc.) as necessary and as directed by the BLM Authorized Officer to prevent soil erosion and accommodate safe, environmentally-sound access.
- Prior to construction of production facilities not specifically addressed in the APD, the operator shall submit a Sundry Notice to the BLM Authorized Officer for approval.
- If not already required prior to constructing and drilling the well location, the operator shall immediately upgrade the entire access road to BLM standards (including topsoiling, crowning, ditching, drainage culverts, surfacing, etc.) to ensure safe, environmentally-sound, year-round access. This requirement does not supercede or apply where specific road requirements are addressed in the APD/POD surface use plan (e.g., two track road, spot upgrade, etc.)
- Waterbars shall be installed on all reclaimed pipeline corridors per the guidelines in D #12.

Roads and Pipelines

- No road grades in excess of 15 percent will occur without written permission of the AO.
- Roads constructed on BLM lands shall be constructed to allow for drainage and erosion control. The operator is responsible for maintenance of all roads authorized through the lease or right-of-way. Construction and maintenance shall comply with BLM System Road Standards as described in BLM Manual Section 9113 and the BLM Gold Book standards, except as modified by BLM. Maintenance may include but is not limited to grading, applying gravel, snow removal, ditch cleaning, and headcut restoration/prevention.
- Topsoil from access roads and pipelines are to be wind rowed along the uphill side of the road or stored in an approved manner. When the road and pipeline is rehabilitated, this soil will then be used as a top coating for the seed bed.
- The operator shall provide an inspector under the direction of a registered professional engineer (PE) at all times during road construction. A PE shall certify (statement with PE stamp) that the road was constructed to the required Bureau of Land Management (BLM) road standards.
- Erosion-control structures such as water bars, diversion channels, and terraces will be constructed to divert water and reduce soil erosion on the disturbed area. Road ditch turnouts shall be equipped with energy dissipaters as needed to avoid erosion. Where roads interrupt overland sheet-flow and convert this runoff to channel flow, ditch turnouts shall be designed to reconvert channel flow to sheet flow. Rock energy dissipaters and gravel dispersion fans may be used, or any other design which would accomplish the desired reconversion of flow regime. As necessary cut banks, road drainages, and road crossings shall be armored or otherwise engineered to prevent headcutting

Health and Safety

- In accordance with 29 CFR 1910.1200, a Material Safety Data Sheet (MSDS) for every chemical or hazardous material brought on-site will be kept on file in Petro-Canada's field office.

- Petro-Canada will transport and/or dispose of any hazardous wastes, as defined by the Resource Conservation and Recovery Act of 1976 (RCRA), as amended, in accordance with all applicable Federal, State, and local regulations.

- All storage tanks that contain produced water, or other fluids which may constitute a hazard to public health or safety, will be surrounded by a secondary means of containment for the entire contents of the tank, plus freeboard for precipitation, or to contain 110 percent of the capacity of the tank. The appropriate containment and/or diversionary structures or equipment, including walls and floor, will be constructed so that any discharge from a primary containment system, such as a tank or pipe, will not drain, infiltrate, or otherwise escape to groundwater or surface waters before cleanup is completed. A liner shall be used when the ground is permeable and would allow filtration of fluid to the subsurface strata.

- Notice of any spill or leakage, as defined in BLM NTL 3A, will be immediately reported by Petro-Canada to the AO and to other Federal and State officials as required by law. Oral notice will be given as soon as possible, but within no more than 24 hours, and those oral notices will be confirmed in writing within 72 hours of any such occurrence.

C. REQUIRED APPROVALS, REPORTS AND NOTIFICATIONS

Required verbal notifications are summarized in Table 1, attached.

Building Location- Notify the Price Field Office at least 48-hours prior to commencing construction of location.

Spud- Notify the Price Field Office 24-hours prior to spud. Submit written notification (Sundry Notice, Form 3160-5) to the Moab Field Office within 24-hours after spud, regardless of whether using a dry hole digger or big rig.

Daily Drilling Reports- Daily drilling reports that describe the progress and status of the well shall be submitted to the Moab Field Office on at least a weekly basis. This report may be in any format customarily used by the operator.

Oil and Gas Operations Reports (OGORs)- Production from this well shall be reported to Minerals Management Service (MMS) on a monthly basis.

Sundry Notices- Any modification to the proposed drilling program shall be submitted to the Moab Field Office on a Sundry Notice (Form 3160-5). Regulations at 43 CFR 3162.3-2 describe which operations require prior approval, and which require notification.

Drilling Suspensions- Operations authorized by this permit shall not be suspended for more than 30 days without prior approval of the Moab Field Office. All conditions of this approval shall be applicable during any operations conducted with a replacement rig.

Undesirable Events- Spills, blowouts, fires, leaks, accidents, or any other unusual occurrences shall be immediately reported to the BLM in accordance with requirements of NTL-3A.

Cultural Resources- If cultural resources are discovered during construction, immediately notify the Price Field Office, and work that might disturb the cultural resources shall cease.

First Production- A first production conference will be scheduled as soon as the productivity of the well is apparent. This conference should be coordinated through the Price Field Office.

Notify the Moab Field Office when the well is placed into production. Initial notification may be verbal, but must be confirmed in writing within five business days. Please include the date production started, the producing formation and production volumes.

Well Completion Report- Whether the well is completed as a dry hole or as a producer, a *Well Completion or Recompletion Report and Log* (Form 3160-4) shall be submitted to the Moab Field Office within thirty-days after completion of the well. Two copies of all logs, core descriptions, core analyses, well test data, geologic summaries, sample description, and all other surveys or data obtained and compiled during the drilling, workover, and/or completion operations, will be filed with Form 3160-4. When requested, samples (cuttings and/or samples) will be submitted to the Moab Field Office.

Venting/Flaring of Gas- Gas produced from this well may not be vented/flared beyond an initial, authorized test period of 30 days or 50 MMcf, whichever first occurs, without the prior, written approval of the Moab Field Office. Should gas be vented or flared without approval beyond the authorized test period, the well may be ordered to be shut-in until the gas can be captured or until approval to continue the venting/flaring pursuant to NTL-4A is granted. Compensation shall be due for gas that is vented/flared without approval.

Produced Water- An application for approval of a permanent disposal method and location will be submitted to the Moab Field Office for approval pursuant to Onshore Oil and Gas Order No.7.

Off-Lease Measurement, Storage, Commingling- Prior approval must be obtained from the Moab Field Office for off-lease measurement, off-lease storage and/or commingling of production prior to the sales measurement point. The term "commingling" describes both the combining of production from different geologic zones and/or combining production from different leases or agreement areas.

Plugging and Abandonment- If the well is a dry hole, plugging instructions must be obtained from the Moab Field Office prior to initiating plugging operations.

A "Subsequent Report of Abandonment" (Sundry Notice, Form 3160-5) will be filed with the Moab Field Office within thirty-days following completion of the well for abandonment. This report will indicate where plugs were placed and the current status of surface restoration. Upon completion of approved plugging, a regulation marker will be erected in accordance with 43 CFR 3162.6. Final abandonment will not be approved until the surface reclamation work required by the approved APD or approved abandonment notice has been completed to the satisfaction of the Price Field Office or the appropriate surface managing agency.

TABLE 1

NOTIFICATIONS

Notify Don Stephens (435-636-3608) or Walton Willis (435-636-3662) of the BLM Price Field Office for the following:

2 days prior to commencement of dirt work, construction and reclamation; (Stephens)

1 day prior to spud; (Willis)

50 feet prior to reaching the surface casing setting depth; (Willis)

3 hours prior to testing BOP equipment. (Willis)

If the person at the above number cannot be reached, notify the BLM Moab Field Office at 435-259-2100.

Well abandonment operations require 24-hour advance notice and prior approval. In the case of newly drilled dry holes, verbal approval can be obtained from:

Eric Jones, Petroleum Engineer	Office: 435-259-2117
	Home: 435-259-2214

FORM 9

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

SUNDRY NOTICES AND REPORTS ON WELLS

Do not use this form for proposals to drill new wells, significantly deepen existing wells below current bottom-hole depth, reenter plugged wells, or to drill horizontal laterals. Use APPLICATION FOR PERMIT TO DRILL form for such proposals.

5. LEASE DESIGNATION AND SERIAL NUMBER: UTU-077547
6. IF INDIAN, ALLOTTEE OR TRIBE NAME: N/A
7. UNIT or CA AGREEMENT NAME: N/A
8. WELL NAME and NUMBER: COTTONWOOD FED 23-13
9. API NUMBER: 43-007-31252
10. FIELD AND POOL, OR WILDCAT: undesignated

1. TYPE OF WELL: OIL WELL ☐ GAS WELL ☑ OTHER _____

2. NAME OF OPERATOR: Petro-Canada Resources (USA) Inc

3. ADDRESS OF OPERATOR: 1099 18th St., Ste. 400 CITY Denver STATE CO ZIP 80202 PHONE NUMBER: (303) 297-2300

4. LOCATION OF WELL
FOOTAGES AT SURFACE: 2213' FNL and 2309' FEL COUNTY: Carbon
QTR/QTR, SECTION, TOWNSHIP, RANGE, MERIDIAN: SWNE 23 13S 15E SLB&M STATE: UTAH

11. CHECK APPROPRIATE BOXES TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION		
☑ NOTICE OF INTENT (Submit in Duplicate)	☐ ACIDIZE	☐ DEEPEN	☐ REPERFORATE CURRENT FORMATION
Approximate date work will start: _____	☐ ALTER CASING	☐ FRACTURE TREAT	☐ SIDETRACK TO REPAIR WELL
	☐ CASING REPAIR	☐ NEW CONSTRUCTION	☐ TEMPORARILY ABANDON
	☑ CHANGE TO PREVIOUS PLANS	☐ OPERATOR CHANGE	☐ TUBING REPAIR
	☐ CHANGE TUBING	☐ PLUG AND ABANDON	☐ VENT OR FLARE
☐ SUBSEQUENT REPORT (Submit Original Form Only)	☐ CHANGE WELL NAME	☐ PLUG BACK	☐ WATER DISPOSAL
Date of work completion: _____	☐ CHANGE WELL STATUS	☐ PRODUCTION (START/RESUME)	☐ WATER SHUT-OFF
	☐ COMMINGLE PRODUCING FORMATIONS	☐ RECLAMATION OF WELL SITE	☐ OTHER: _____
	☐ CONVERT WELL TYPE	☐ RECOMPLETE - DIFFERENT FORMATION	

12. DESCRIBE PROPOSED OR COMPLETED OPERATIONS. Clearly show all pertinent details including dates, depths, volumes, etc.

Petro-Canada requests the following correction to the submitted Drilling Plan for the noted location.

Item 4. Proposed Casing Program
Submitted surface casing weight and grade: 43.5 ppf, L-80
Corrected surface casing weight and grade: 36.0 ppf, J-55

The aforementioned correction is requested due to the impact on design criteria and wellhead configuration.

Petro-Canada respectfully requests expedition of approval of our request due to mobilization of a drilling rig within 10 days.

COPY SENT TO OPERATOR
Date: 7-7-07
Initials: RM

NAME (PLEASE PRINT) Susan Miller TITLE Regulatory Analyst
SIGNATURE _____ DATE 6/20/2007

(This space for State use only)

Accepted by the Utah Division of Oil, Gas and Mining
Date: 6/29/07
By: _____

Federal Approval Of This Action Is Necessary

RECEIVED
JUN 2 6 2007
DIV OF OIL, GAS & MINING

(5/2000) (See Instructions on Reverse Side)

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DIVISION OF OIL, GAS AND MINING

SPUDDING INFORMATION

Name of Company: **Petro-Canada Resources USA, Inc**

Well Name: **Cottonwood Fed 23-13**

API No: **43-007-31252** Lease Type: **Federal**

Section **23** Township **13S** Range **15E** County **Carbon**

Drilling Contractor _____ Rig # _____

SPUDDED:

Date **6-30-07**

Time **10:00 AM**

How **Dry**

Drilling will Commence: _____

Reported by **Larry**

Telephone # **435-820-6359**

Date **7-3-07** **Signed** **RM**

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Form 3160-5
(February 2005)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
OM B No. 1004-0137
Expires: March 31, 2007

SUNDRY NOTICES AND REPORTS ON WELLS

Do not use this form for proposals to drill or to re-enter an abandoned well. Use Form 3160 - 3 (APD) for such proposals.

SUBMIT IN TRIPLICATE- Other instructions on reverse side.

5. Lease Serial No.
UTU-077547

6. If Indian, Allottee or Tribe Name
N/A

7. If Unit or CA/Agreement, Name and/or No.
N/A

8. Well Name and No.
COTTONWOOD FED 23-13

9. API Well No.
43-007-31252

10. Field and Pool, or Exploratory Area
undesignated

11. County or Parish, State
Carbon County, Utah

1. Type of Well
☐ Oil Well ☑ Gas Well ☐ Other

2. Name of Operator **Petro-Canada Resources (USA) Inc**

3a. Address
1099 18th Street, Suite 400, Denver, CO 80202

3b. Phone No. *(include area code)*
303-297-2300

4. Location of Well *(Footage, Sec., T., R., M., or Survey Description)*
2213 FNL and 2309' FEL, SW/4 NE/4, Section 23, T13S, R15E, SLB&M

12. CHECK APPROPRIATE BOX(ES) TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION			
☐ Notice of Intent	☐ Acidize	☐ Deepen	☐ Production (Start/Resume)	☐ Water Shut-Off
☑ Subsequent Report	☐ Alter Casing	☐ Fracture Treat	☐ Reclamation	☐ Well Integrity
☐ Final Abandonment Notice	☐ Casing Repair	☐ New Construction	☐ Recomplete	☑ Other **Spud Notification**
	☐ Change Plans	☐ Plug and Abandon	☐ Temporarily Abandon	
	☐ Convert to Injection	☐ Plug Back	☐ Water Disposal	

13. Describe Proposed or Completed Operation (clearly state all pertinent details, including estimated starting date of any proposed work and approximate duration thereof. If the proposal is to deepen directionally or recomplete horizontally, give subsurface locations and measured and true vertical depths of all pertinent markers and zones. Attach the Bond under which the work will be performed or provide the Bond No. on file with BLM/BIA. Required subsequent reports must be filed within 30 days following completion of the involved operations. If the operation results in a multiple completion or recompletion in a new interval, a Form 3160-4 must be filed once testing has been completed. Final Abandonment Notices must be filed only after all requirements, including reclamation, have been completed, and the operator has determined that the site is ready for final inspection.)

Petro-Canada spud the noted location at 9:00 **a.m./p.m. on the** 30 **day of June, 2007.**

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DIV. OF OIL, GAS & MINING

14. I hereby certify that the foregoing is true and correct
Name *(Printed/Typed)* **Susan Miller**

Title **Regulatory Analyst**

Signature

Date 7-2-07

THIS SPACE FOR FEDERAL OR STATE OFFICE USE

Approved by

Title

Date

Conditions of approval, if any, are attached. Approval of this notice does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.

Office

Title 18 U.S.C. Section 1001 and Title 43 U.S.C. Section 1212, make it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

(Instructions on page 2)

FORM 6

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

ENTITY ACTION FORM

Operator: Petro-Canada Resources (USA) Inc

Operator Account Number: N 2705

Address: 1099 18th Street, Suite 400

city Denver

state Co zip 80202

Phone Number: (303) 297-2300

Well 1

API Number	Well Name		QQ	Sec	Twp	Rng	County
007-31252	COTTONWOOD FED 23-13		SWNE	23	13S	15E	Carbon
Action Code	**Current Entity Number**	**New Entity Number**	**Spud Date**			**Entity Assignment Effective Date**	
A	99999	16243	6/30/2007			7/23/07	

Comments: MNCS

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Well 2

API Number	Well Name		QQ	Sec	Twp	Rng	County
Action Code	**Current Entity Number**	**New Entity Number**	**Spud Date**			**Entity Assignment Effective Date**	

Comments:

Well 3

API Number	Well Name		QQ	Sec	Twp	Rng	County
Action Code	**Current Entity Number**	**New Entity Number**	**Spud Date**			**Entity Assignment Effective Date**	

Comments:

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JUL 0 6 2007

ACTION CODES:

- **A** - Establish new entity for new well (single well only)
- **B** - Add new well to existing entity (group or unit well)
- **C** - Re-assign well from one existing entity to another existing entity
- **D** - Re-assign well from one existing entity to a new entity
- **E** - Other (Explain in 'comments' section)

Susan Miller — DIV. OF OIL, GAS & MINING
Name (Please Print)

Signature

Regulatory Analyst — 7/2/2007
Title — Date

(5/2000)

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FORM 9

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

5. LEASE DESIGNATION AND SERIAL NUMBER: UTU-077547

SUNDRY NOTICES AND REPORTS ON WELLS

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: n/a

Do not use this form for proposals to drill new wells, significantly deepen existing wells below current bottom-hole depth, reenter plugged wells, or to drill horizontal laterals. Use APPLICATION FOR PERMIT TO DRILL form for such proposals.

7. UNIT or CA AGREEMENT NAME: n/a

1. TYPE OF WELL: OIL WELL ☐ GAS WELL ☑ OTHER

8. WELL NAME and NUMBER: Cottonwood Fed 23-13

2. NAME OF OPERATOR: Petro-Canada Resources (USA) Inc

9. API NUMBER: 43-007-31252

3. ADDRESS OF OPERATOR: 1099 18th Street, Suite 400 CITY Denver STATE CO ZIP 80202 PHONE NUMBER: (303) 297-2300

10. FIELD AND POOL, OR WILDCAT: undesignated

4. LOCATION OF WELL

FOOTAGES AT SURFACE: 2213' FNL and 2309' FEL COUNTY: Carbon

QTR/QTR, SECTION, TOWNSHIP, RANGE, MERIDIAN: SENE 23 13S 15E S STATE: UTAH

11. CHECK APPROPRIATE BOXES TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION		
☑ NOTICE OF INTENT (Submit in Duplicate)	☐ ACIDIZE	☑ DEEPEN	☐ REPERFORATE CURRENT FORMATION
Approximate date work will start:	☐ ALTER CASING	☐ FRACTURE TREAT	☐ SIDETRACK TO REPAIR WELL
	☐ CASING REPAIR	☐ NEW CONSTRUCTION	☐ TEMPORARILY ABANDON
	☐ CHANGE TO PREVIOUS PLANS	☐ OPERATOR CHANGE	☐ TUBING REPAIR
	☐ CHANGE TUBING	☐ PLUG AND ABANDON	☐ VENT OR FLARE
☐ SUBSEQUENT REPORT (Submit Original Form Only)	☐ CHANGE WELL NAME	☐ PLUG BACK	☐ WATER DISPOSAL
Date of work completion:	☐ CHANGE WELL STATUS	☐ PRODUCTION (START/RESUME)	☐ WATER SHUT-OFF
	☐ COMMINGLE PRODUCING FORMATIONS	☐ RECLAMATION OF WELL SITE	☐ OTHER:
	☐ CONVERT WELL TYPE	☐ RECOMPLETE - DIFFERENT FORMATION	

12. DESCRIBE PROPOSED OR COMPLETED OPERATIONS. Clearly show all pertinent details including dates, depths, volumes, etc.

Petro-Canada requests to extend TD from 11,500' to 12,000'. Initial gas shows are good but would like to deepen.

Petro-Canada respectfully requests verbal approval of our request due to drilling rig is on location.

Approved by the
Utah Division of
Oil, Gas and Mining

Date: 08-14-07

By: [signature]

8-15-07
RM

NAME (PLEASE PRINT) Jan Kajiwara TITLE Regulatory Analyst

SIGNATURE [signature] DATE 8/13/2007

(This space for State use only)

RECEIVED
AUG 13 2007
DIV. OF OIL, GAS & MINING

(5/2000) (See Instructions on Reverse Side)

Form 3160-5
(February 2005)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
OM B No. 1004-0137
Expires: March 31, 2007

SUNDRY NOTICES AND REPORTS ON WELLS

Do not use this form for proposals to drill or to re-enter an abandoned well. Use Form 3160 - 3 (APD) for such proposals.

SUBMIT IN TRIPLICATE- Other instructions on reverse side.

5. Lease Serial No.
UTU-077547

6. If Indian, Allottee or Tribe Name
N/A

7. If Unit or CA/Agreement, Name and/or No.
N/A

1. Type of Well
☐ Oil Well ☑ Gas Well ☐ Other

8. Well Name and No.
COTTONWOOD FED 23-13

2. Name of Operator **Petro-Canada Resources (USA) Inc**

9. API Well No.
43-007-31252

3a. Address
1099 18th Street, Suite 400, Denver, CO 80202

3b. Phone No. *(include area code)*
303-297-2300

10. Field and Pool, or Exploratory Area
undesignated

4. Location of Well *(Footage, Sec., T., R., M., or Survey Description)*
2213 FNL and 2309' FEL, SW/4 NE/4, Section 23, T13S, R15E, SLB&M

11. County or Parish, State
Carbon County, Utah

12. CHECK APPROPRIATE BOX(ES) TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION			
☑ Notice of Intent	☐ Acidize	☐ Deepen	☐ Production (Start/Resume)	☐ Water Shut-Off
☐ Subsequent Report	☐ Alter Casing	☐ Fracture Treat	☐ Reclamation	☐ Well Integrity
☐ Final Abandonment Notice	☐ Casing Repair	☐ New Construction	☐ Recomplete	☑ Other **Proposed plans**
	☐ Change Plans	☐ Plug and Abandon	☐ Temporarily Abandon	
	☐ Convert to Injection	☐ Plug Back	☐ Water Disposal	

13. Describe Proposed or Completed Operation (clearly state all pertinent details, including estimated starting date of any proposed work and approximate duration thereof. If the proposal is to deepen directionally or recomplete horizontally, give subsurface locations and measured and true vertical depths of all pertinent markers and zones. Attach the Bond under which the work will be performed or provide the Bond No. on file with BLM/BIA. Required subsequent reports must be filed within 30 days following completion of the involved operations. If the operation results in a multiple completion or recompletion in a new interval, a Form 3160-4 must be filed once testing has been completed. Final Abandonment Notices must be filed only after all requirements, including reclamation, have been completed, and the operator has determined that the site is ready for final inspection.)

While running production casing, the casing became differentially stuck from approximately 8300'. Petro-Canada planst to drill out and set a liner. Please see the attached detailed procedure.

Accepted by the
Utah Division of
Oil, Gas and Mining
FOR RECORD ONLY

RECEIVED
SEP 0 4 2007
DIV. OF OIL, GAS & MINING

14. I hereby certify that the foregoing is true and correct
Name *(Printed/Typed)* **Susan Miller**

Title **Regulatory Analyst**

Signature

Date **08/30/2007**

THIS SPACE FOR FEDERAL OR STATE OFFICE USE

Approved by

Title

Date

Conditions of approval, if any, are attached. Approval of this notice does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.

Office

Title 18 U.S.C. Section 1001 and Title 43 U.S.C. Section 1212, make it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

(Instructions on page 2)

Cottonwood Federal
2,213' FNL & 2,309' FEL, Sec. 23-T13S-R15E
Wildcat
Carbon County, Utah

Production casing was stuck while running and cemented as follows:

Production Casing: 5-1/2", 20#, L-80 LTC casing, set @ 8,286'
Cmt'd w/ 1470 sx 13.4# 1.46 yld 50/50 Poz Prem

Hole TD is currently 12,000'. Liner plan is as follows:

1. Notify BLM at least 24 hours prior to commencing operations. Set anchors.

2. MIRU DD PU. Set drilling tanks, pump, RU power swivel. Hold rig inspections and pre-job safety meeting.

3. ND WH and NU BOPE. Test BOPE and casing to 10#K.

4. PU & strap in hole with 2-7/8" 7.9 ppf PH6 tubing to TOC. Drill plug, cmt and floats.

5. TIH to 12,000', circ & cond hole.

3.5" PRODUCTION LINER PROGRAM

						Make-up Torque (ft lb):		
Interval	**Weight**	**Grade**	**Coupling**	**I.D.**	**Drift**	**Minimum**	**Optimum**	**Maximum**
8,000' -12,000'	9.3 ppf	P-110	ULTF	2.992"	2.867"		10000	

3.5" PRODUCTION LINER DESIGN:

		API RATING/SAFETY FACTOR		
Interval	**Description**	**Collapse (psi)a**	**Burst (psi)b**	**Tension (1000#)c**
8,000' -12,000'	3.5", 9.3 ppf, P110, ULTF	13,530/2.17	13,970/2.24	219/6.92

a based on full evacuation with 10.0 ppg formation gradient on backside, pipe evacuated
b based on 10.0 ppg gradient, gas to surface, with no fluid on backside, no gas gradient
c based on casing string weight in 10.0 ppg mud
d String Weight in Mud = 32,000 lbs

Length ft. ±	O.D. in.	Equipment	Depth ft. ±
1'	3.5"	Float Shoe	11,999' - 12,000'
40'	3.5"	9.3 ppf P110 LTC (1 jt)	11,959' - 11,999'
2'	3.5"	Landing Collar	11,957' - 11,959'
3,957'	3.5"	9.3 ppf P110 LTC (±45 jts)	8,000' - 11,957'
8'	3.5"	5.5" x 3.5" Ultra Pac Liner Packer / Hanger w/ HST running tool	7,902'

Cottonwood Fed 23-13 Completion Procedure
2,213' FNL & 2,309' FEL, Sec. 23-T13S-R15E
Carbon County, Utah

3.5" PRODUCTION LINER CEMENTING PROGRAM

Cement volumes are based on 3.5" casing in a 7-7/8" hole with 15% excess, 300' of liner lap and 200' excess above liner top at 8,000'. This slurry design is based on mud weight of 10.0 ppg at TD. Halliburton out of Vernal will be pumping this job. Mix and pump the following slurry:

Pre-flush: 50 bbls water

Flush: 25 bbls Weighted Spacer

Lead Slurry: 365 sx (697 ft^3 – xx7 bbls) 50/50 Poz Prem w/ 20% SSA1, 4% Gel, 3 pps Silicalite, .2% Super CBL (expansion), .6% Halad344 (fluid loss), .2% HR12 (retarder), .2% Suspend HT

Tail Slurry: 240 sx (994 ft^3 – xx.7 bbls) 50/50 Poz Prem w/ 3% KCl (accelerator), .2% WG17 (gel), 3 pps Silicalite, .125% PolyEflake, .75% Halad322 (fluid loss), 1 pps Granulite TR

	Lead	Tail
Slurry Weight:	13.0 ppg	13.4 ppg
Slurry Yield:	1.91 ft^3/sx	1.49 ft^3/sx
Water Requirements:	9.55 gal/sx	7.05 gal/sx
Free Water:	0 ml	0 ml
Fluid Loss:	180 ml/30 min	180 ml/30 min
Thickening Time:	7.0 Hrs at 200° F	5 Hrs at 200° F
Compressive Strength:	1500 psi / 24 hrs, 200° F	1900 psi / 24 hrs, 200° F
Estimated Cement Top:	7,700'	9,630'

WELLHEAD AND BOP's

6. RU WL. RIH w/ CBL w/ VDL-GR-CCL & max. temp. and log f/ PBTD +/-11,960' to 1,000'. Correlate to Halliburton DSN/SD Combo log run 8/15/07.

NOTICE

Utah Oil and Gas Conservation General Rule R649-3-21 states that,

- A well is considered completed when the well has been adequately worked to be capable of producing oil or gas or when well testing as required by the division is concluded.

- Within 30 days after the completion or plugging of a well, the following shall be filed:
  - Form 8, Well Completion or Recompletion Report and Log
  - A copy of electric and radioactivity logs, if run
  - A copy of drillstem test reports,
  - A copy of formation water analyses, porosity, permeability or fluid saturation determinations
  - A copy of core analyses, and lithologic logs or sample descriptions if compiled
  - A copy of directional, deviation, and/or measurement-while-drilling survey for each horizontal well

Failure to submit reports in a timely manner will result in the issuance of a Notice of Violation by the Division of Oil, Gas and Mining, and may result in the Division pursuing enforcement action as outlined in Rule R649-10, Administrative Procedures, and Section 40-6-11 of the Utah Code.

As of the mailing of this notice, the division has not received the required reports for

Operator: Petro-Canada Resources (USA), Inc Today's Date: 11/27/2007

Well:		API Number:	Drilling Commenced:
Cottonwood Fed 23-13	drlg rpts/wcr	4300731252	06/30/2007

To avoid compliance action, required reports should be mailed within 7 business days to:

Utah Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
P.O. Box 145801
Salt Lake City, Utah 84114-5801

If you have questions or concerns regarding this matter, please call (801) 538-5284.

cc: Well File
Compliance File

CONFIDENTIAL

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

AMENDED REPORT ☐ FORM 8
(highlight changes)

WELL COMPLETION OR RECOMPLETION REPORT AND LOG

5. LEASE DESIGNATION AND SERIAL NUMBER: UTU-077547

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: N/A

7. UNIT or CA AGREEMENT NAME: N/A

8. WELL NAME and NUMBER: COTTONWOOD FED 23-13

9. API NUMBER: 43-007-312 52

10 FIELD AND POOL, OR WILDCAT:

1a. TYPE OF WELL: OIL WELL ☐ GAS WELL ☐ DRY ☑ OTHER

b. TYPE OF WORK: NEW WELL ☑ HORIZ. LATS. ☐ DEEP-EN ☐ RE-ENTRY ☐ DIFF. RESVR. ☐ OTHER

2. NAME OF OPERATOR: PETRO-CANADA RESOURCES (USA) INC

3. ADDRESS OF OPERATOR: 999 18th Street, Ste. 600 CITY Denver STATE CO ZIP 80202 PHONE NUMBER: (303) 297-2300

4. LOCATION OF WELL (FOOTAGES)
AT SURFACE: 2213 FNL and 2309' FEL, SW/4 NE/4, Section 23, T13S, R15E, SLB&M
AT TOP PRODUCING INTERVAL REPORTED BELOW: 2213 FNL and 2309' FEL, SW/4 NE/4, Section 23, T13S, R15E, SLB&M
AT TOTAL DEPTH: 2213 FNL and 2309' FEL, SW/4 NE/4, Section 23, T13S, R15E, SLB&M

11. QTR/QTR, SECTION, TOWNSHIP, RANGE, MERIDIAN: SWNE 23 13S 15E

12. COUNTY: CARBON

13. STATE: UTAH

14. DATE SPUDDED: 6/30/2007

15. DATE T.D. REACHED: 8/14/2007

16. DATE COMPLETED: ~~DRY HOLE~~ 12-21-07 ABANDONED ☐ READY TO PRODUCE ☐

17. ELEVATIONS (DF, RKB, RT, GL): GL 7983'; KB 8009'

18. TOTAL DEPTH: MD 12,000 TVD

19. PLUG BACK T.D.: MD 11,965 TVD

20. IF MULTIPLE COMPLETIONS, HOW MANY? * N/A

21. DEPTH BRIDGE PLUG SET: MD TVD

22. TYPE ELECTRIC AND OTHER MECHANICAL LOGS RUN (Submit copy of each)
High Res Induction, Spectral Density, Dual Spaced Neutron, Gamma Ray, SONIC, BHWC

23.
WAS WELL CORED? NO ☑ YES ☐ (Submit analysis)
WAS DST RUN? NO ☑ YES ☐ (Submit report)
DIRECTIONAL SURVEY? NO ☑ YES ☐ (Submit copy)

24. CASING AND LINER RECORD (Report all strings set in well)

HOLE SIZE	SIZE/GRADE	WEIGHT (#/ft.)	TOP (MD)	BOTTOM (MD)	STAGE CEMENTER DEPTH	CEMENT TYPE & NO. OF SACKS	SLURRY VOLUME (BBL)	CEMENT TOP **	AMOUNT PULLED
12-1/4"	95/8 K-55	36#		1,205		Class C 450		Surface	
8-3/4"	5.5" K-55	20#		8,286		Poz P+ 1,470			
8 3/4"	3.5" P110	9.3#	7,839			Poz P+ 820		Liner	

25. TUBING RECORD

SIZE	DEPTH SET (MD)	PACKER SET (MD)	SIZE	DEPTH SET (MD)	PACKER SET (MD)	SIZE	DEPTH SET (MD)	PACKER SET (MD)
3 7/8"	11,975							

26. PRODUCING INTERVALS

FORMATION NAME	TOP (MD)	BOTTOM (MD)	TOP (TVD)	BOTTOM (TVD)	INTERVAL (Top/Bot - MD)	SIZE	NO. HOLES	PERFORATION STATUS
(A) ~~Mancos~~ WSTC	~~8,453~~ 5765	5775			5765-5775			Open ☑ Squeezed ☐
(B)					7192-7249			Open ☐ Squeezed ☐ TA
(C)					7806-7816			Open ☐ Squeezed ☐ TA
(D)					11880-11905			Open ☐ Squeezed ☐ TA

27. PERFORATION RECORD CIBP @ 5850', 7872'

28. ACID, FRACTURE, TREATMENT, CEMENT SQUEEZE, ETC.

DEPTH INTERVAL	AMOUNT AND TYPE OF MATERIAL
7814-7824	2 spf, 50 sks Poz Prem
5812'-5813'	4 spf, 200 sks Poz Prem

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JAN 31 2008
DIV. OF OIL, GAS & MINING

29. ENCLOSED ATTACHMENTS:

☑ ELECTRICAL/MECHANICAL LOGS ☑ GEOLOGIC REPORT ☐ DST REPORT ☐ DIRECTIONAL SURVEY
☐ SUNDRY NOTICE FOR PLUGGING AND CEMENT VERIFICATION ☐ CORE ANALYSIS ☐ OTHER:

30. WELL STATUS: ~~TA~~ SI

(5/2000)

(CONTINUED ON BACK)

31. INITIAL PRODUCTION

INTERVAL A (As shown in item #26)

DATE FIRST PRODUCED:		TEST DATE:		HOURS TESTED:		TEST PRODUCTION RATES: →	OIL – BBL:	GAS – MCF:	WATER – BBL:	PROD. METHOD:
N/A										
CHOKE SIZE:	TBG. PRESS.	CSG. PRESS.	API GRAVITY	BTU – GAS	GAS/OIL RATIO	24 HR PRODUCTION RATES: →	OIL – BBL:	GAS – MCF:	WATER – BBL:	INTERVAL STATUS:

INTERVAL B (As shown in item #26)

DATE FIRST PRODUCED:		TEST DATE:		HOURS TESTED:		TEST PRODUCTION RATES: →	OIL – BBL:	GAS – MCF:	WATER – BBL:	PROD. METHOD:
CHOKE SIZE:	TBG. PRESS.	CSG. PRESS.	API GRAVITY	BTU – GAS	GAS/OIL RATIO	24 HR PRODUCTION RATES: →	OIL – BBL:	GAS – MCF:	WATER – BBL:	INTERVAL STATUS:

INTERVAL C (As shown in item #26)

DATE FIRST PRODUCED:		TEST DATE:		HOURS TESTED:		TEST PRODUCTION RATES: →	OIL – BBL:	GAS – MCF:	WATER – BBL:	PROD. METHOD:
CHOKE SIZE:	TBG. PRESS.	CSG. PRESS.	API GRAVITY	BTU – GAS	GAS/OIL RATIO	24 HR PRODUCTION RATES: →	OIL – BBL:	GAS – MCF:	WATER – BBL:	INTERVAL STATUS:

INTERVAL D (As shown in item #26)

DATE FIRST PRODUCED:		TEST DATE:		HOURS TESTED:		TEST PRODUCTION RATES: →	OIL – BBL:	GAS – MCF:	WATER – BBL:	PROD. METHOD:
CHOKE SIZE:	TBG. PRESS.	CSG. PRESS.	API GRAVITY	BTU – GAS	GAS/OIL RATIO	24 HR PRODUCTION RATES: →	OIL – BBL:	GAS – MCF:	WATER – BBL:	INTERVAL STATUS:

32. DISPOSITION OF GAS (Sold, Used for Fuel, Vented, Etc.)

N/A

33. SUMMARY OF POROUS ZONES (Include Aquifers):

Show all important zones of porosity and contents thereof: Cored intervals and all drill-stem tests, including depth interval tested, cushion used, time tool open, flowing and shut-in pressures and recoveries.

Formation	Top (MD)	Bottom (MD)	Descriptions, Contents, etc.

34. FORMATION (Log) MARKERS:

Name	Top (Measured Depth)
Green River	
Wasatch	2,666
North Horn	5,046
U.Price River	6,264
Bluecastle Member	7,425
Castlegate	8,161
Blackhawk	8,752
Starpoint	9,000
Mancos	9,453

35. ADDITIONAL REMARKS (Include plugging procedure)

SEE ATTACHED PERFORATON AND FRACTURE TREATMENT RECORDS

36. I hereby certify that the foregoing and attached information is complete and correct as determined from all available records.

NAME (PLEASE PRINT) SUSAN MILLER TITLE Regulatory Analyst

SIGNATURE [signature] DATE 1/29/2008

This report must be submitted within 30 days of

- completing or plugging a new well
- drilling horizontal laterals from an existing well bore
- recompleting to a different producing formation
- reentering a previously plugged and abandoned well
- significantly deepening an existing well bore below the previous bottom-hole depth
- drilling hydrocarbon exploratory holes, such as core samples and stratigraphic tests

* ITEM 20: Show the number of completions if production is measured separately from two or more formations.

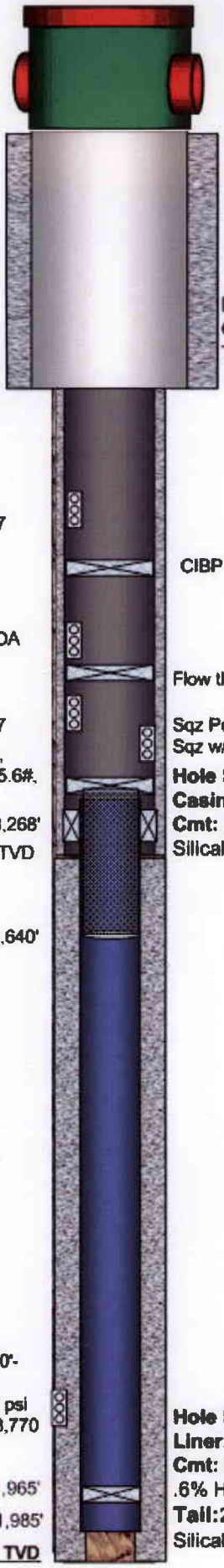
** ITEM 24: Cement Top – Show how reported top(s) of cement were determined (circulated (CIR), calculated (CAL), cement bond log (CBL), temperature survey (TS)).

Send to: Utah Division of Oil, Gas and Mining
1594 West North Temple, Suite 1210
Box 145801
Salt Lake City, Utah 84114-5801

Phone: 801-538-5340

Fax: 801-359-3940

Cottonwood Federal 23-13 Well
Section 23, T13S - R15E
Carbon County, Utah



Hole Size: 12-1/4" **TOC:** Surface (note:15 bbls cement to surface)
Casing:1,205', 9-5/8" 36 ppf K-55 STC (0.0991 bbl/ft annular vol / 0.0981 bbl/ft csg vol)
Tail Cmt: 450 sx Class "G" cement, 2% CaCl, 1/4 pps flowseal, 15.5 ppg, yld 1.15 cfs

1,205' TVD

Wasatch
Perfs 5,765'-5,775'
CO2 Frac'd 12/17/07

CIBP 5,850'

Mesaverde
Perfs 7,192'-7,249' OA
CO2 Frac'd 12/7/07
Mesaverde
Perfs 7,806'-7,816'
CO2 Frac'd 11/30/07

Flow thru frac plug 7,400'

Sqz Perfs 7,814'-7,824'
Sqz w/ 8.5 bbls cmt

Cmt Retainer 7,872', sqz'd w/ 30.7 bbls 15.6#, 1.18 yld

Hole Size: 7-7/8" **TOC: ±7200' (CBL)**
Casing:8,268', 5-1/2", 20 ppf L80 LTC (0.0383 bbl/ft annular vol / 0.0459 bbl/ft csg vol)
Cmt: 1,470 sx Premium 50/50 Poz Cement + 3% bwoc KCl + 0.2% WG17 + 0.1% HR12 + 3 pps Silicalite.125 pps Polyflake + 1 pps Granulite . Yield 1.46 cfs, 13.4 ppg slurry.

TOL 8,268'
8,268' TVD

Burst liner 8,640'

Mancos Perfs 11,880'-11905' OA
Break down – 5,877 psi
Frac'd – burst liner 8,770 psi

Hole Size: 7-7/8" **TOL / TOC:** 7,839'
Liner:4,136', 3-1/2" 9.3 ppf P-110 ULTF (.0246 bbl/ft annular vol/.0149 bbl/ft csg vol/.0262 bbl/ft lap vol)
Cmt: Lead: 227 sx 50/50 Poz Prem w/ 20% SSA1, 4% Gel, 3 pps Silicalite, .2% Super CBL (expansion), .6% Halad344 (fluid loss), .2% HR12 (retarder), .2% Suspend HT 12.5 ppg, 2.1 cfs
Tail:240 sx (994 ft3 – xx.7 bbls) 50/50 Poz Prem w/ 3% KCl (accelerator), .2% WG17 (gel), 3 pps Silicalite, .125% PolyEflake, .75% Halad322 (fluid loss), 1 pps Granulite TR, 13.0 ppg, 1.62 cfs

PBTD 11,965'
SHOE 11,985'
12,000' TVD

Petro-Canada, Cottonwood Fed 23-13

REVISED - Perforation Records

Perforate from 7806' to 7816', 120 degrees, 22.7 gm, .43" diameter holes, 2 spf, 20 holes total

Fracture treatment-average treating pressure 3302#, maximum treating pressure 7820#, average slurry rate 8.6 bpm, maximum slurry rate 13.9 bpm, co2 total use 75.3 ton, ISIP 3461#, 5 min SIP 2870#, 10 min SIP 2796#, 15 min SIP 2766#. 20375 gals used and 43800# 20/40 white sand. Final injection 3843# 18.4 bpm.

Perforate from 7192' to 7197', 5', 2 jspf, 10 holes, from 7224' to 7229', 5', 2 jspf, 10 holes, from 7234' to 7239', 5', 2 jspf, 10 holes, and from 7244' to 7249', 5', 2 jspf, 10 holes. Used 4" csg gun, 120 degree phasing, 23.5 gm, .43" diameter holes. Total of 40 holes.

Fracture treatment- average slurry rate 16.11 bpm, maximum slurry rate 40.12 bpm, maximum well head rate 41.37 bpm, average pressure 4884#, maximum pressure 5526#. Final injection rate 39.47 bpm @ 5380#, frac gradient .95, ISIP 3690#, 5 min 3098#, 10 min 2966#, 15 min 2883#.

Perforate from 5765' to 5775', 10', 2 jspf, 20 holes, using 3 3/8" perf gun w/ 25 gm, .42" diameter holes, 37" penetration @ 120 degree phasing.

Fracture treatment- average treating pressure 3119#, maximum pressure 3455#, average slurry rate 7.0 bpm, maximum slurry rate 9.2 bpm, average co2 rate 8.3 bpm, maximum co2 rate 19.0 bpm, ISIP 2519#, 5 min 2355#, 10 min 2335#, 15 min 2319#.

Perforate 11,880' to 11,905' 25' with 3 spf (75 holes) at 2° phasing.

Fracture treatment - avergage treatment pressure 5437#, maximum 8838# with avg slurry rate at 40.2 bpm, maximum 45.8 bpm. Final ISIP 3455#.

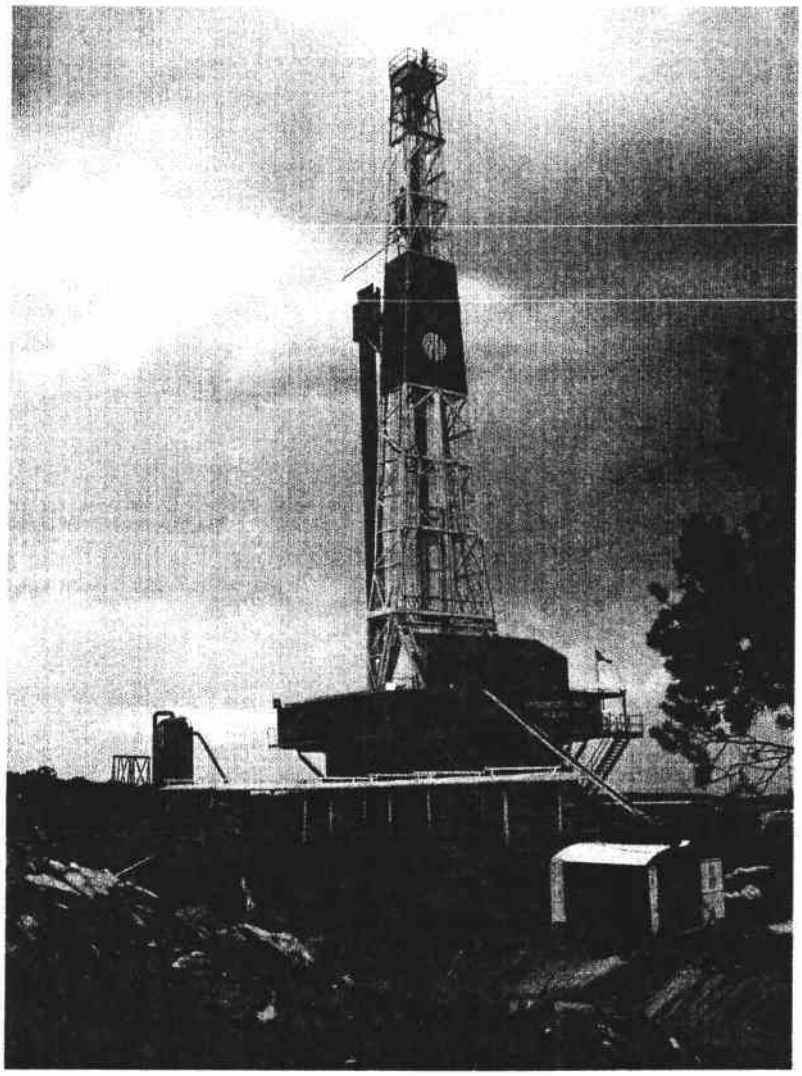
Cottonwood 23-13
Tops

Formation	Drilling Depth	Subsea (KB: 8009)
Uteland Butte (ULBD)	2668	5341
Wasatch (WSTC)	2692	5317
North Horn (NRHN)	5940	2069
Upper Price River (PCRVU)	7178	831
Bluecastle (BLCS)	8500	-491
Castlegate (CSGL)	9176	-1167
Blackhawk (BCKK)	9412	-1403
Starpoint (SRPN)	9693	-1684
Mancos (MNCS)	10076	-2067

CONFIDENTIAL

GEOLOGIC WELLSITE REPORT

Petro-Canada Resources



Cottonwood Federal 23-13
Sec. 23, T13S, R15E
Carbon County, Utah

Tracey Chancellor, Keith Caplan,
Brian Reddick, Paula Reed
Consulting Geologists
Entrada GeoSciences, LLC
11 Inverness Way South
Englewood Co 80112

WELL SUMMARY

The Cottonwood Federal 23-13 well was drilled primarily to test the Cretaceous Mancos Formation. Entrada mobilized to the site on July 9th, 2007. The surface formation on the 23-13 well was the Green River. Gas detection and sample catching began immediately out of surface casing at 1,230 feet on July 16th. The first formation top drilled was the Wasatch at 2,666 feet, which was reached on the 17th of July. The next top drilled was the North Horn Member, which was drilled at 5,046 feet on the 19th of July. The Upper Price River Formation was reached at 6,264 feet, on the 21st. Shortly thereafter the bit was tripped due to hours and a low ROP.

On the 24th, the second bit was tripped out due to a low ROP. Following the bit trip, the Bluecastle Formation was drilled at 7,425 feet on the 24th of July 2007. The next formation top encountered was the Castlegate sandstone, which was drilled at a depth of 8,161 feet on the 25th. The Blackhawk Formation was encountered at a depth of 8,514 feet on the 26th, immediately following a trip for the third bit. The fourth bit was switched out at 8,605 feet on the 27th of July due to a low ROP in very hard siliceous sandstone at the top of the Blackhawk Formation. The fifth bit was pulled early on the 28th, again due to a low ROP. The sixth bit, a diamond impregnated bit designed for drilling hard rock, was unable to wash and ream through the bridges in the hole and was pulled without making any forward progress.

The Starpoint sandstone was reached at a depth of 8,782 feet on the 30th of July, and the seventh bit was pulled shortly thereafter because of a low ROP. Bits number eight and nine drilled very slowly as well. Bit number 10, a tri-cone bit, initially made good penetration, but the hard sands caused it to slow down early and it made only 174 feet. The 11th bit also drilled slowly and made little progress, but drilled through the transition into the Mancos Formation. The Mancos was reached at 9,453 feet on August 7th, 2007. Drilling went significantly faster in the Mancos, and the ROP increased with depth. The remainder of the well took only two additional bits, 12 and 13, that both made progress at a good ROP.

Total depth for the Cottonwood Federal 23-13 well was reached at 12,000 feet on the 14th of August 2007. Electric log TD was 12,007 feet. Entrada GeoSciences was released on the 17th August 2007, after electric logs were run and completed.

GEOLOGICAL SUMMARY

The surface formation for the Cottonwood Federal 23-13 is the Eocene Green River Formation. The predominately lacustrine and fluvial Green River Formation consists of fine to very fine grained sandstones and red to green mudstones, with lesser amounts of lacustrine limestones. No significant gas shows were recorded in the Green River Formation.

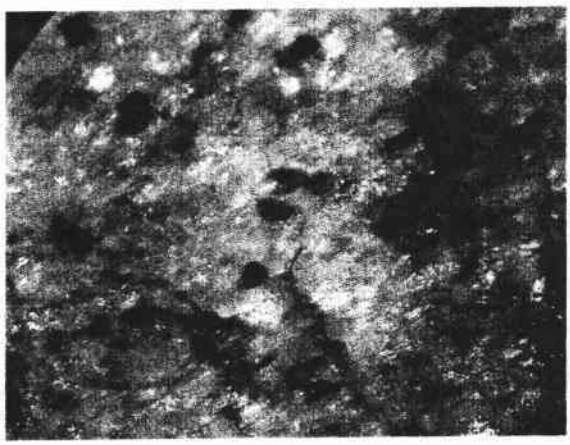
The non marine Wasatch group (2,666 feet) consists predominately of light gray to red brown, poorly indurated silts, sands, and shales, often with minor carbonaceous stringers. The Wasatch group of latest Cretaceous to Eocene is predominately fluvial to lacustrine, and unconformably overlies the Price River Formation of the Mesaverde group. The gas during the upper Wasatch was consistently low and all methane.

The North Horn Formation of the Wasatch group (5,046 feet) is of latest Cretaceous (Maastrichian) to early Tertiary (Paleocene). The upper North Horn lacustrine shale sequence indicates inundation of this area by the early Tertiary Uinta Lake. The North Horn member consists of light gray to red brown to variegated shales, silts, and sands with lesser amounts of white to tan cryptocrystalline limestones. The highest show in the North Horn Formation was 605 units with a mud weight of 9.4 lbs/gal, which had the first significant appearance of heavier hydrocarbons (ethane & propane).

The uppermost formation in the Cretaceous Mesaverde group is the Price River Formation (6,264 feet). The Price River alluvial plain deposits include sediments that accumulated in braided and meandering streams, flood plains, and lacustrine environments. In the Cottonwood Federal 23-13 well, the Price River Formation consists of off white to light gray, fine to medium grained sands with abundant varicolored shales and silts, and minor lacustrine limestone.

The Castlegate Formation is predominately fluvial in origin, with only a minor marine component that unconformably overlies the Blackhawk Formation. The uppermost portion of the Cretaceous Castlegate Formation is the Bluecastle member (7,425 feet). The Bluecastle accumulated in braided stream complexes and consists predominately of thick siliceous sandstones with lesser amounts of shales and silts. The sandstones of the Bluecastle become somewhat calcareous with depth, and several shows of up to 850 units were logged.

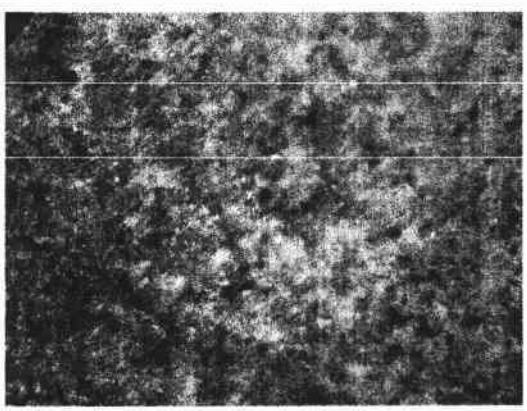
The hard siliceous sandstone from 7,440-7,460 feet, with a show of 854 units. The picture clearly shows fracturing through the individual sand grains.



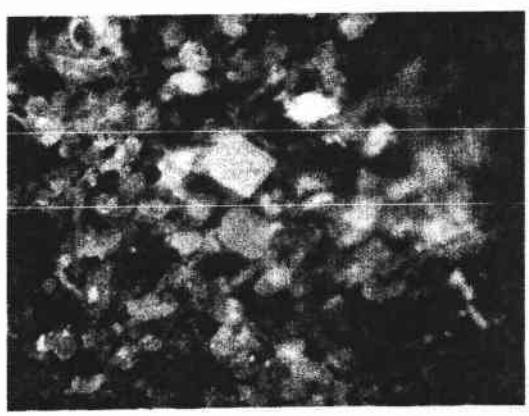
The middle member of the Castlegate Formation is the marine Buck Tongue shale (8137 feet), which was poorly developed in the Cottonwood Federal 23-13 well. The basal member of the Castlegate Formation is the Lower Castlegate member (8,161 feet). The Lower Castlegate member is another fluvial dominated sandstone interval and consists of massive, calcareous, fine grained sandstones grading into poorly sorted sands and finer sediments towards the base.

The depositional environment of the Cretaceous Blackhawk Formation is non marine to marginal marine. The uppermost portion of the Blackhawk Formation in the Cottonwood Federal 23-13 well consists of massive, very hard, siliceous sandstone that caused several bit trips. The Blackhawk Formation in this well contained almost no coal, which is very unusual, possibly indicating a persistent paleo-river channel was present at this location during the time of coal deposition.

Hard siliceous sandstone from 8,500 feet, showing fracturing through quartz grains (bright reflections).



Sandstone from 8,680 feet, showing fractured quartz grains, and calcite rhombs from the mud system.



The Starpoint member is the uppermost sandstone in the Cretaceous Mancos Formation, and fines downward into the fine grained clastics of the main Mancos Formation. Shows in the Starpoint were generally low but increased with the transition into the Mancos.

The marine Cretaceous Mancos Formation in the Cottonwood Federal 23-13 well consisted predominately of gray siltstones and very fine grained sandstones, with lesser amounts of shale. Inoceramus fragments were occasionally noted, particularly in the lowermost portion of the Mancos. Background gas increased throughout the Mancos, and several significant gas shows were recorded. Most notably the 8,050 unit show at 10,854 feet and the 9,000 unit show at 11,874 feet. The later required the well to be shut in and the gas circulated out for two hours. Large gas flares of 30 to 40 feet were recorded while the mud weight was raised to 9.7 lbs/gal to kill the well.

The Cottonwood Federal 23-13 well should be a productive addition to Petro-Canada's holdings in the Uinta basin.

WELL DATA

COMPANY NAME:	Petro-Canada Resources (USA) Inc.	
WELL NAME:	Cottonwood Federal 23-13	
COMPANY REPRESENTATIVE:	Morgan Hocker	
SURFACE LOCATION:	T-R-Sec, County, State	Spot Location
	SWNE Sec 23 T13S R15E Carbon Cty, Utah	2213' FNL, 2309' F
BOTTOM-HOLE LOCATION:	Same	
LAT-LONG:	39.681, -110.20247	
API NUMBER:	043-007-31252-00	
FIELD:	Wildcat	
ELEVATION:	7983' GL, 8009' KB 26' substructure	
SPUD DATE:	6/30/2007	
DATE TD REACHED:	8/14/2007	
CONTRACTOR:	Nabors #266	
TOOLPUSHER:	J.R. McMurtey Logan Benhollow	
DRILLERS:	Chris McArthur Preston Bryant	
PUMPS:	2 National Oil Well 12-P-160, Triplex with 6 1/2" liner, 12 " stroke	
HOLE SIZE:	12 1/4" hole drilled to 1230' 7 7/8" hole from 1230'-12000'	
CASING:	Surface Casing 12 1/4" hole drilled to 1230', set 9 5/8", 36# J55	
MUD COMPANY:	MI Swaco, Halliburton	
ENGINEER:	Dan King, Hayden Prescott	
PROGRAM:	LSND	
WELLSITE GEOLOGY:	Entrada GeoSciences	
GEOLOGISTS:	Tracey Chancellor, Keith Caplan, Neal Day, Brian Reddick, Rocky Bailey, Paula Reed	
LOGGING COMPANY:	Haliburton	
ENGINEER:	J. MELANCON	
TOTAL DEPTH:	Driller 12000 E Logs 12007	
BOTTOM HOLE FORMATION:	Mancos	
SAMPLE PROGRAM:	30' samples from 1230'-5810, 20' samples from 5810'- 8700', 10' samples from 8700'- 10500', 20' samples 10500'-12000' T.D.	
WELL STATUS:	Run production casing	

DAILY CHRONOLOGY

Date	Midnight Depth	24 hr Footage	Activity
7/9/2007	1230	0	Entrada personnel Tracey Chancellor and Keith Caplan mobilize to Price, Utah.
7/10/2007	1230	0	Entrada personnel mobilize to rigsite, attend pre-spud meeting. Entrada went on standby in Price.
7/11/2007	1230	0	Entrada on standby.
7/12/2007	1230	0	Entrada on standby, will hang from a chain attached to the overhead canopy to use the existing holes in the hood over the possum belly
7/13/2007	1230	0	Entrada returned to wellsite. Completed rig up of mudlogging equipment.
7/14/2007	1230	0	Nabors continues rigging up. Electrician working on Top Drive. Pason continues rigging up EDRs and sensor on rig. BOPs tested. Mud supplies and drill pipe delivered., Pason on location rigging up.
7/15/2007	1230	0	Nabors continues to rig up, more drill pipe arrives on location, drill collars, mud arrives on location rig flow lines, rig kelly, build water volume and mud, TIH in hole with drill collars, TIH with heavy drill pipe
7/16/2007	1835	605	Tag cement at 1117', Drill float, shoe and cement out at 02:00 Drill 1230'-1835'
7/17/2007	2990	1155	Drill from 1835'-2043', start to mud up with vis of 37 and weight at 8.8, drill 2043'-2472'. Down at 10:05 to repair swivel. Short trip to casing shoe and make repairs. Resumed drilling at 15:50, drill 2472'-2990'
7/18/2007	4282	1292	Drill from 2990-4282', with occasional surveys
7/19/2007	5356	1074	Drill from 4282'-5356' with occasional surveys
7/20/2007	6100	744	Drill from 5356'-6100' with occasional surveys
7/21/2007	6282	182	Drill from 6100'-6282', TOH with Bit #1, TIH with bit #2
7/22/2007	6892	610	TIH with Bit #2, drilling ahead at 00:36, drill 6282'-6892'
7/23/2007	7321	429	Drill from 6892'-7321', with occasional surveys
7/24/2007	7811	490	Drill from 7321'-7337', circulate & condition hole at 01:00 to TOH bit #2, TIH bit #3, resume drilling at 12:45, drill 7337'-7811'
7/25/2007	8502	691	Drill from 7811'-8502', with occasional surveys
7/26/2007	8590	88	Drill from 8502'-8509', TOH bit #3, TIH bit #4, resume drilling at 18:00, drill 8509-8590'
7/27/2007	8670	80	Drill from 8590'-8605', TOH bit #4, TIH bit #5, resume drilling at 20:20 hour, Drill 8605'-8670'
7/28/2007	8685	15	Drill from 8670'-8685', TOH with bit #5 at 02:20, TIH, wash and ream from 2200', lost circulation, difficulty reaming to bottom, tight hole conditions, TOH with bit #6 before reaching bottom at 4467'

DAILY CHRONOLOGY CONTINUED

Date	Midnight Depth	24 hr Footage	Activity
7/29/2007	8742	57	TOH bit #6, back ream out of hole, TIH #7, resume drilling at 16:15, drill 8685'- 8742'
7/30/2007	8805	63	Drill from 8742' - 8771', TOH at 8805' for bit #8, work tight hole, on bank at 24:00
7/31/2007	8932	127	TIH with bit #8 and a mud motor, drilling ahead at 10:00, drill 8805'-8932'
8/1/2007	9016	84	Drill from 8932'-9016'
8/2/2007	9168	152	Drill from 9016'-9095', survey 1 degree, drill 9095'-9168'
8/3/2007	9219	51	Drill from 9168'- 9188', TOH with bit #8 at 04:00, TIH, drilling ahead at 18:00, drill 9188'-9219'
8/4/2007	9246	27	Drill 9219'-9246'. Drop survey. TOH bit #9, TIH bit #10
8/5/2007	9420	174	TIH, ream to bottom starting at 8900', drilling ahead at 02:00, drill from 9246'- 9420', begin TOH with bit # 10 at 24:00
8/6/2007	9443	23	TOH bit # 10, TIH bit #11, drilling ahead at 18:00, drill from 9420'-9443'
8/7/2007	9563	120	Drill from 9443'-9563'
8/8/2007	9679	116	Drill from 9563'-9587', TOH bit #11 at 05:00, TIH bit #12, drilling ahead at 18:30, drill 9587'-9679'
8/9/2007	10020	341	Drill from 9679'-10020'
8/10/2007	10319	299	Drill from 10020'-10023', survey 2 degree, drill 10023'-10379'
8/11/2007	10498	179	Drill from 10319'-10071', survey 1 degree, drill 10371-10498', drop survey tool, TOH bit #12
8/12/2007	10878	380	10453' survey at 3.75 degrees, TIH bit #13, drilling ahead at 11:00, drill from 10497'-10878'
8/13/2007	11876	998	Drill from 10878'-11876'
8/14/2007	12000	124	Drill from 11876'-12000', circulate & condition, several short trips 25 stands, circulate & condition, TOH for elogs.
8/15/2007	12000	0	Continue to TOH for elogs. Halliburton arrived 11:00 and start running elogs.
8/16/2007	12000	0	Logging of spectral gamma done by 4:00. Sidewall core depths determined by company geologist, Run elogs, WOO, run image tool, rig down e-loggers
8/17/2007	12000	0	Rig down eloggers, TIH, circulate & condition, Entradageo Released at 14:00

BIT RECORD

#	MAKE	TYPE	SIZE	DEPTH IN	DEPTH OUT	FOOTAGE	HOURS RUN
Suface Bit	N/A	N/A		0	1230	1230	N/A
1	Hughes Christensen	HC 504ZX	7/ 7/8"	1230	6282	5052	98.5
2	Hughes Christensen	HC 5062X	7 7/8"	6282	7337	1055	52.5
3	Hughes Christensen	HC 5062X+	7 7/8"	7337	8509	1172	36.5
4	Hughes Christensen	HC 5062ZX+	7 7/8"	8509	8605	96	12.5
5	Hughes Christensen	HC 5092	7 7/8"	8605	8685	80	6
6	Hughes Christensen	HH 35468	7 7/8"	8685	8685	0	0
7	Smith	PF 3290	7 7/8"	8685	8805	120	20.5
8	Hughes Christensen	HC 506ZX	7 7/8"	8805	9188	383	53.5
9	Hughes Christensen	HC505ZX	7 7/8"	9188	9246	58	18
10	Hughes Christensen	HRS55H	7 7/8"	9246	9420	174	21.5
11	Hughes Christensen	HRS554	7 7/8"	9420	9587	167	35
12	Hughes Christensen	HC505ZX	7 7/8"	9587	10498	911	68
13	Hughes Christensen	HC5042ZX	7 7/8"	10498	12000	1502	42.5

MUD RECORD

DATE	DEPTH	WT	VIS	WL	SOL%	Ph	Chlorides
7/16/2007	1292	8.4	27	not measured	0.5	11.7	200
7/17/2007	2455	9.1	36	30.0	5.7	7.5	500
7/18/2007	3626	9.1	34	not measured	5.7	7.5	500
7/19/2007	4799	9.1	33	not measured	5.7	7.5	500
7/20/2007	5696	9.4	36	not measured	6.0	7.3	500
7/21/2007	6282	9.3	38	14.0	6.0	7.0	500
7/22/2007	6494	9.5	37	25.0	6.0	7.2	500
7/23/2007	7125	9.7	34	25.0	6.0	7.3	500
7/24/2007	7337	9.4	40	23.0	5.0	7.0	500
7/25/2007	8260	9.4	40	26.0	6.0	7.1	500
7/26/2007	8509	9.5	37	26.0	6.0	7.3	500
7/27/2007	8605	9.5	39	23.0	6.0	7.1	500
7/28/2007	8685	9.5	36	30.0	6.0	7.3	700
7/29/2007	8685	9.3	35	28.0	5.0	7.0	700
7/30/2007	8783	9.3	35	28.0	5.0	7.0	700
7/31/2007	8805	9.3	38	30.0	6.0	7.1	700
8/1/2007	8955	9.4	36	28.0	6.0	7.3	700
8/2/2007	9100	9.5	37	28.0	7.0	7.3	700
8/3/2007	9188	9.5	36	28.0	6.0	7.4	700
8/4/2007	9241	9.5	37	23.0	7.0	7.3	700
8/5/2007	9301	9.4	40	18.2	6.0	7.1	700
8/6/2007	9420	9.5	36	22.0	6.0	7.3	700
8/7/2007	9487	9.5	45	18.0	6.0	7.2	700
8/8/2007	9587	9.7	35	13.0	7.0	7.2	700
8/9/2007	9810	9.6	36	14.0	6.0	7.1	800
8/10/2007	10133	9.5	33	12.0	6.0	7.3	800
8/11/2007	10406	9.5	33	14.0	6.0	7.3	800
8/12/2007	10498	9.6	40	15.0	6.0	7.1	800
8/13/2007	11195	9.5	36	14.4	6.0	7.2	800
8/14/2007	12000	9.7	40	14.0	6.0	7.3	800
8/15/2007	12000	9.9	47	22.0	7.0	7.2	700
8/16/2007	12000	9.8	50	22.0	7.0	7.1	700
8/17/2007	12000	9.8	52	22.0	7.0	7.0	700

DEVIATION SURVEYS

Depth	Angle	Depth	Angle
1170	0.50	7207	4.00
1670	0.50	7567	2.00
2242	0.75	7821	3.00
2723	0.25	8053	3.00
3195	1.00	8325	3.00
3765	1.00	8615	5.00
4815	1.00	8805	4.75
5387	2.00	9095	1.00
5995	3.50	9175	2.75
6330	2.00	9542	2.00
6465	2.00	9978	2.00
6711	2.00	10177	1.00
6960	2.00		

FORMATION TOPS

Measured from KB elevation: 8009 ft

FORMATION	Sample Top MD (ft)	Sub sea	Elog top
Green River	Surface		
Wasatch	2666	5343	2692
North Horn	5046	2963	5940
U. Price River	6264	1745	7178
Bluecastle member	7425	584	8500
Castlegate	8161	-152	9176
Blackhawk	8752	-743	9412
Starpoint	9000	-991	9693
Mancos	9453	-1444	10042
TD	12000	-3991	12007

INDIVIDUAL SAMPLE DESCRIPTIONS

Sample descriptions by
Tracy Chancellor, Keith Caplan,
Brian Reddick, Rocky Bailey, Paula Read

1230-1260 Sandstone, white to translucent, gray to green in part, very fine grained, well sorted, sub rounded, hard, calcareous, occasional pyrite, no staining, fluorescence, or cut

1260-1290 Sandstone, white to translucent, gray to green in part, gray in part, black in part, very fine grained, well sorted, sub rounded, hard to friable, calcareous, occasional pyrite, no staining, fluorescence, or cut

1290-1320 poor sample, abundant LCM Sandstone, translucent to white, salt and pepper in part, very fine to fine grained, well sorted, sub rounded, unconsolidated to friable, calcareous, no staining, fluorescence, or cut

1320-1350 Sandstone, translucent to white, salt and pepper in part, very fine to fine grained, well sorted, sub rounded, unconsolidated to friable, calcareous, occasional tan calcite, no staining, fluorescence, or cut

1350-1380 Sandstone, translucent to white, salt and pepper in part, very fine to fine grained, well sorted, sub rounded, unconsolidated to friable, calcareous, abundant Sandstone green, very fine grained, silty, silica cemented, abundant pyrite, no staining, fluorescence, or cut

1410-1440 Sandstone gray to white, salt and pepper in part, rare tan, rare brown, very fine grained, silty, calcareous, trace pyrite, no staining, fluorescence, or cut

1440-1470 Sandstone white to translucent, fine grained, sub angular, well sorted, moderately hard, calcareous, no staining, fluorescence, or cut, with Shale gray, silty, moderately hard, trace pyrite

1470-1500 Sandstone translucent to white, fine grained, well sorted, sub rounded, unconsolidated to friable, calcareous, no staining, fluorescence, or cut, trace Shale, gray, silty, moderately hard, trace pyrite

1500-1530 Sandstone translucent to white, fine grained, well sorted, sub rounded, unconsolidated to friable, calcareous, fine to good porosity, occasional bright mineral fluorescence, no stain or cut, trace Shale, gray, silty, moderately hard, trace pyrite

1530-1560 Sandstone translucent to white, very fine to fine grained, well sorted, unconsolidated to friable, calcareous, good porosity, occasional bright mineral fluorescence, no stain or cut, trace Shale, light green, firm, silty in part

1560-1590 Sandstone translucent to white, very fine to fine grained, well sorted, unconsolidated to friable, calcareous, good porosity, occasional pyrite, no staining, fluorescence, or cut, trace Shale, light green, firm, silty in part, sub rounded, sub waxy

1590-1620 Sandstone translucent to white, occasional gray, very fine to fine grained, well sorted, unconsolidated to friable, calcareous, good porosity, occasional pyrite, no staining, fluorescence, or cut, trace Shale, light green to gray to dark gray trace black carbonaceous, firm, silty in part, sub rounded, sub waxy, abundant pyrite, no staining, fluorescence, or cut

1620-1650 Sandstone translucent to white, occasional gray, very fine to fine grained, well sorted, unconsolidated to friable, calcareous, good porosity, occasional pyrite, occasional Limestone tan to brown, hard, silty, dense, trace Shale, light green to gray to dark gray trace black carbonaceous,

firm, silty in part, sub rounded, sub waxy, abundant pyrite, no staining, fluorescence, or cut

1650-1680 Sandstone translucent to white, occasional gray, very fine to fine grained, well sorted, unconsolidated to friable, calcareous, good porosity, occasional pyrite, rare Limestone tan to brown, hard, silty, dense, abundant calcite, trace Shale light green to gray to dark gray, firm, silty in part, sub rounded, sub waxy, no staining, fluorescence, or cut

1680-1710 Sandstone white to off to gray to tan, very fine to fine grained, well sorted, hard, well cemented, calcareous, poor porosity, Siltstone, gray, sandy in part, calcareous, firm, trace Shale light green to gray to dark gray, firm, silty in part, sub rounded, sub waxy, rare Limestone tan to brown, hard, silty, dense, abundant calcite, abundant mineral fluorescence, no stain or cut

1710-1740 Sandstone translucent to white to off white to gray to tan, very fine to fine grained, well sorted, hard, well cemented, calcareous, poor porosity, trace Shale light green to gray to dark gray, firm, silty in part, sub rounded, sub waxy, rare Limestone tan to brown, hard, silty , dense, abundant calcite, abundant mineral fluorescence, no stain or cut

1740-1770 Sandstone translucent to white to off white, gray to tan, very fine to fine grained, well sorted, hard, well cemented, very calcareous, poor porosity, occasional unconsolidated, trace Shale light green to gray , firm, silty in part, sub rounded, abundant calcite, abundant mineral fluorescence, trace Siltstone, gray no stain or cut

1770-1800 Sandstone translucent to white, off white to tan, very fine to fine grained, well sorted, hard, well cemented, very calcareous, poor porosity, occasional unconsolidated, no staining, fluorescence, or cut, abundant mineral fluorescence, no staining, fluorescence, or cut

1800-1830 Sandstone white to off white, tan to gray, very fine to fine grained, well sorted, hard, well cemented, very calcareous, poor porosity, rare Limestone tan to brown, hard, silty in part, dense, abundant calcite no staining, fluorescence, or cut, occasional mineral fluorescence,

1830-1860 Sandstone white to off white, to tan to gray, very fine to fine grained, well sorted, hard, occasional salt and pepper, very well cemented, very calcareous, poor porosity, no staining, fluorescence, or cut, occasional mineral fluorescence, trace Siltstone, gray, sandy

1860-1890 Sandstone translucent to white, gray, very fine to fine grained, well sorted, very well cemented, very calcareous, occasional glauconitic inclusion, poor porosity, occasional unconsolidated calcareous, good porosity, occasional pyrite, Siltstone gray to green, soft, calcareous, no staining, fluorescence, or cut

1890-1920 Sandstone white to off white, gray, very fine to fine grained, well sorted, very well cemented, very calcareous, occasional glauconitic inclusion, poor porosity, calcareous, occasional pyrite, Siltstone brown to rounded, firm, sandy, rare Limestone off white to tan to brown, hard, silty in part, dense, no staining, fluorescence, or cut

1920-1950 Sandstone white to off white, gray, as above, hard, occasional pyrite, Siltstone brown to rounded, occasional gray to dark gray, firm to hard, sandy in part, rare Limestone off white to tan to brown, hard, silty , dense, no staining, fluorescence, or cut, occasional pyrite, trace Shale no staining, fluorescence, or cut

1950-1980 Sandstone white to off white, gray, as above, hard, occasional pyrite, Siltstone brown to rounded, occasional gray to dark gray, firm to hard, sandy in part, rare Limestone off white to tan to brown, hard, silty , dense, occasional Shale no staining, fluorescence, or cut

1980-2010 Sandstone white to off white, gray, very fine to fine grained, occasional medium grained, well sorted, very well cemented, very calcareous, hard, poor porosity, occasional pyrite, Siltstone brown to rounded, gray to dark gray, firm, sandy, occasional Limestone off white to tan to brown, hard, silty in part, dense, sandy, occasional mineral fluorescence, occasional Shale no staining,

fluorescence, or cut

2010-2040 Sandstone white to off white, gray, very fine to fine grained, moderately sorted, very well cemented, very calcareous, hard, poor porosity, Siltstone brown to rounded, gray to dark gray, firm, sandy, occasional Limestone off white to tan to brown, hard, silty in part, dense, sandy, occasional mineral fluorescence, occasional Shale gray to dark gray, trace green, trace pyrite, occasional mineral fluorescence, no stain or cut

2040-2070 Sandstone white to off white, tan to gray, very fine to fine grained, moderately sorted, very well cemented, very calcareous, hard, poor porosity, occasional Siltstone brown to rounded, gray to dark gray, firm to hard, sandy in part, trace Limestone off white to tan to brown, hard, dense, sandy, occasional mineral fluorescence, trace Shale gray to dark gray, trace green, trace pyrite, occasional mineral fluorescence, no stain or cut

2070-2100 Sandstone white to tan trace gray, very fine to fine grained, moderately sorted, well cemented, very calcareous, hard, poor porosity, occasional Siltstone brown to rounded, gray to dark gray, firm to hard, sandy in part, trace Limestone off white to tan to brown, hard, dense, occasional mineral fluorescence, trace Shale gray to dark gray to green, occasional mineral fluorescence, no stain or cut

2100-2130 Sandstone white to tan, trace gray, occasional translucent, very fine to fine grained, moderately sorted, well cemented, very calcareous, hard, poor porosity, glauconitic inclusion, occasional Siltstone brown to rounded, gray to dark gray, green in part, firm to hard, sandy in part, occasional mineral fluorescence, no stain or cut

2130-2160 Sandstone white to tan to trace gray, occasional translucent, very fine to fine grained, moderately sorted, well cemented, very calcareous, hard, poor porosity, glauconitic inclusion, occasional Siltstone brown to rounded as above, trace Shale gray to dark gray, occasional mineral fluorescence, no stain or cut

2160-2190 Sandstone white to tan, translucent in part, fine to medium grained, moderately sorted, sub rounded, calcareous, moderately hard to friable, trace glauconitic, trace pyrite, trace mineral fluorescence, trace Shale gray to green, trace Siltstone, brown, no stain or cut

2190-2220 Siltstone red to brown, moderately hard, abundant Shale gray green, sub platy, moderately hard, silty to earthy, slightly calcareous, occasional Limestone light tan, trace Sandstone very fine to fine grained, sub rounded, well sorted, hard, calcareous, trace pyrite, no stain or cut

2220-2250 Siltstone red to brown, moderately hard, abundant Shale gray green, sub platy, moderately hard, silty to earthy, slightly calcareous, trace Limestone light tan, occasional Sandstone very fine to fine grained, gray to tan, sub rounded, well sorted, hard, calcareous, trace pyrite, no stain or cut

2250-2280 Siltstone red to brown, moderately hard, occasional Sandstone very fine to fine grained, gray to tan, sub rounded, well sorted, hard, calcareous, trace pyrite, occasional Shale gray green, sub platy, moderately hard, silty to earthy, slightly calcareous, no staining, fluorescence, or cut

2280-2310 Sandstone white, fine grained, well sorted, sub rounded, moderately hard, calcareous, abundant pyrite, trace Shale gray, trace Siltstone, rounded brown, no staining, fluorescence, or cut

2310-2340 Shale (Mudstone) red brown to gray green, earthy to silty, sub platy to platy, moderately hard, abundant Sandstone white to gray, very fine to fine grained, sub rounded, well sorted, hard, calcareous, trace mineral fluorescence, no stain or cut

2340-2370 Sandstone white to gray in part, fine to medium grained, well sorted, sub rounded, hard, calcareous, poor porosity, occasional pyrite, occasional Shale (Mudstone) rounded brown, earthy to silty, moderately hard, trace Shale gray green, silty, trace Limestone, trace mineral

fluorescence, no stain or cut

2370-2400 Sandstone white to gray in part, fine to medium grained, well sorted, sub rounded, hard, calcareous, poor porosity, occasional pyrite, occasional Shale (Mudstone) rounded brown, earthy to silty, moderately hard, trace Shale gray green, silty, trace Limestone, trace mineral fluorescence, no stain or cut

2400-2430 Shale gray to brown, green in part, platy to sub platy, silty, moderately hard, occasional Mudstone , rounded brown, occasional Sandstone, gray, very fine grained, silty, hard, calcareous, well sorted, trace pyrite, trace Limestone, light tan, mineral fluorescence, no stain or cut

2430-2460 Siltstone, gray, hard, calcareous, abundant Shale, gray to light brown, slightly calcareous, silty, hard, sub platy, occasional Sandstone white to translucent, gray salt and pepper in part, fine grained, well sorted, hard, calcareous, poor porosity, trace Mudstone , red brown, trace Limestone, mineral fluorescence, no stain or cut

2460-2490 Sandstone white to translucent to tan, fine grained, sub rounded to sub angular, moderately well sorted, calcareous, hard, abundant Shale, gray to brown, silty, moderately hard, sub platy, trace Limestone, mineral fluorescence, no stain or cut

2490-2520 Sandstone tan to translucent to white, very fine to fine grained, moderately well sorted, unconsolidated in part, calcareous, sub rounded, trace Shale a/a, no staining, fluorescence, or cut

2520-2550 Shale gray to gray green, moderately hard, silty, sub platy, occasional Sandstone tan to white to translucent, fine grained, sub rounded, friable, calcareous, poor porosity, occasional pyrite, occasional fossiliferous Limestone, gray, occasional Mudstone red brown, no staining, fluorescence, or cut

2550-2580 Shale gray to gray green, moderately hard, silty, sub platy, occasional Sandstone tan to white to translucent, fine grained, sub rounded, friable, calcareous, poor porosity, occasional Mudstone red brown, trace Limestone, mineral fluorescence, occasional pyrite no stain or cut

2580-2610 Shale gray to gray green, moderately hard, silica, sub platy, occasional Sandstone tan to white to translucent, fine grained, sub rounded, friable, calcareous, poor porosity, occasional Mudstone red brown, trace oolitic Limestone, mineral fluorescence, occasional pyrite, no stain or cut

2610-2640 Sandstone tan to white, very fine to fine grained, moderately well sorted, moderately hard, calcareous, abundant pyrite, abundant Shale green to gray, sub waxy to silty, Limestone, oolitic gray to tan, dull orange mineral fluorescence, no stain or cut

2640-2670 Shale variegated, firm, silty in part, Mudstone rounded to brown, silty in part, firm, Sandstone tan to white, very fine to fine grained, moderately well sorted, moderately hard, calcareous, Limestone, gray to tan, fossiliferous, dull orange mineral fluorescence, no stain or cut

2670-2700 Shale variegated, firm, sub blocky, waxy in part, silty in part, slightly calcareous, Limestone, gray to tan, fossiliferous, dull orange mineral fluorescence, Mudstone rounded to brown, silty in part, firm, trace Sandstone tan to white, very fine to fine grained, moderately well sorted, moderately hard, calcareous, no stain or cut

2700- 2730 Shale variegated, green, purple, brown, gray, firm, sub blocky, sub waxy, silica, non calcareous to very slightly calcareous, Mudstone rounded to brown, silty in part, firm, calcareous, Sandstone very fine grained, white to light gray, well cemented, calcareous, hard, occasional Siltstone, gray, trace Limestone, white to tan to gray, mineral fluorescence, no stain or cut

2730-2760 Sandstone very fine grained, white to light gray to tan, well cemented, very fine grained, calcareous, hard, Shale variegated, green, purple, brown, gray, firm, sub blocky, sub waxy, silica, non calcareous to very slightly calcareous, Mudstone, rounded to brown, silty in part, firm,

slightly calcareous, occasional Siltstone tan, no staining, fluorescence, or cut

2760-2790 Sandstone very fine grained, white to light gray to tan, well cemented, very fine grained, calcareous, hard, Shale variegated, firm, sub blocky, sub waxy, silica, non calcareous to very slightly calcareous, Mudstone, rounded to brown, silty in part, firm, slightly calcareous, occasional Siltstone tan, no staining, fluorescence, or cut

2790-2820 Mudstone, rounded to brown, silty in part, sandy in part, soft, very slightly calcareous, Siltstone tan, slightly calcareous, firm, sandy, Shale variegated, firm, sub blocky, sub waxy, silica, non calcareous to very slightly calcareous, Sandstone very fine grained, occasional fine grained to medium grained, hard, no staining, fluorescence, or cut

2820-2850 Mudstone, rounded to brown, silty in part, sandy in part, soft, slightly calcareous, Siltstone tan, rounded to brown, slightly calcareous, firm, sandy, Shale variegated, firm, sub blocky, sub waxy, silica, non calcareous to very slightly calcareous, trace Sandstone very fine grained, occasional fine grained to medium grained, hard, no staining, fluorescence, or cut

2850-2880 Siltstone, rounded to brown, sandy in part, soft, slightly calcareous, Siltstone tan, rounded to brown, slightly calcareous, firm, sandy, Shale variegated, firm, sub blocky, sub waxy, silica, non calcareous to very slightly calcareous, Sandstone maroon to white, fine grained, occasional fine grained to medium grained, hard, well cemented, no staining, fluorescence, or cut

2880-2910 Mudstone, rounded to brown, silty in part, sandy in part, soft, slightly calcareous, Sandstone maroon to white, fine grained, occasional fine grained to medium grained, hard, Siltstone tan, rounded to brown, slightly calcareous, firm, sandy, Shale variegated, firm, sub blocky, sub waxy, silica, non calcareous to very slightly calcareous, no staining, fluorescence, or cut

2910-2940 Sandstone white to off white, fine grained, well sorted, calcareous, well cemented, firm to hard, sub rounded, glauconitic inclusion, pyrite inclusion, Shale variegated, soft, sub waxy, silica, Siltstone tan to gray, Mudstone rounded to brown, as above no staining, fluorescence, or cut

2940-2970 Sandstone white to off white, tan, very fine grained well sorted, sub rounded to sub angular, hard, well cemented, calcareous, poor porosity, occasional pyrite inclusion, Mudstone, rounded to brown, no staining, fluorescence, or cut

2970-3000 Sandstone white to off white to tan, very fine grained well sorted, sub rounded to sub angular, hard, well cemented, calcareous, poor porosity, occasional pyrite inclusion, Mudstone, rounded to brown, trace Shale, no staining, fluorescence, or cut

3000-3030 Sandstone white to off white to tan, very fine grained well sorted, sub rounded, hard, well cemented, occasional unconsolidated grained, calcareous, poor porosity, pyrite inclusion, Siltstone, rounded to brown, trace Shale gray to dark gray, green, silty in part, silica, sub waxy, no staining, fluorescence, or cut

3030-3060 Sandstone, very fine grained, sub rounded, off white to tan, very well cemented, hard, calcareous, poor porosity, Mudstone rounded to brown, silty to sandy, soft, trace Shale no staining, fluorescence, or cut

3060-3090 Mudstone rounded to brown, sandy in part, silty, firm to soft, Sandstone, very fine grained, sub rounded, off white to tan, very well cemented, hard, calcareous, poor porosity, Shale variegated, firm, trace pyrite, trace Siltstone, gray, no staining, fluorescence, or cut

3090-3120 Sandstone white to off white, fine grained, well sorted, calcareous, well cemented, firm to hard, sub rounded, glauconitic inclusion, pyrite inclusion, Shale variegated, soft, sub waxy, silica, Siltstone tan to gray, Mudstone rounded to brown, as above no staining, fluorescence, or cut

3120-3150 Sandstone very fine grained, white to light gray to tan, well cemented, very fine grained, calcareous, hard, Shale variegated, green, brown, gray, firm, sub blocky, sub waxy, silica, non calcareous to very slightly calcareous, Siltstone, rounded to brown, sandy in part, firm, slightly calcareous, occasional Siltstone tan, no staining, fluorescence, or cut

3150-3180 Sandstone, white to off white, very fine grained, very well cemented, hard, Shale variegated, firm, very slightly to non calcareous, Mudstone, rounded to brown as above, occasional mineral fluorescence, no stain or cut

3180-3210 Sandstone white to off white to tan, very fine grained, sub rounded to sub angular, moderately well sorted, calcareous, hard, poor porosity, Shale variegated, soft to firm, sub blocky, Siltstone, gray, firm, Mudstone, brown to rounded, no staining, fluorescence, or cut

3210-3240 Siltstone red to brown, slightly calcareous, soft, Sandstone white to off white to light green in part, fine grained, firm, occasional unconsolidated, sub rounded, calcareous, occasional Shale variegated, firm, trace Siltstone tan firm, calcareous, no staining, fluorescence, or cut

3240-3270 Sandstone white to off white, fine grained to medium good unconsolidated to friable, sub rounded, calcareous, fair porosity, Mudstone, rounded to brown, soft, trace Siltstone, trace Shale, no staining, fluorescence, or cut

3270-3300 Sandstone white to off white, very fine to fine grained occasional medium grained consolidated to occasional unconsolidated, sub rounded, calcareous, fair porosity, Mudstone, rounded to brown, soft, occasional Siltstone, gray to tan firm, calcareous, occasional Shale, trace Limestone, fossiliferous, no staining, fluorescence, or cut

3300-3330 Sandstone white to off white to gray, very fine to fine grained occasional medium good, consolidated to occasional unconsolidated, sub rounded, calcareous, fair porosity, as above, Mudstone, rounded to brown occasional Siltstone rounded to brown, firm to soft, slightly calcareous, occasional Shale variegated, soft, no staining, fluorescence, or cut

3330-3360 Siltstone, rounded brown, soft, occasional Shale gray green to tan, platy, firm, occasional Sandstone white to off white to gray, very fine to fine grained, friable, calcareous, occasional mineral fluorescence, no stain or cut

3360-3390 Siltstone, rounded brown, soft, trace Shale green to gray green, firm, sub platy, sub waxy, trace Sandstone fine grained, sub angular, calcareous, hard, pyrite, no staining, fluorescence, or cut

3390-3420 Mudstone, rounded brown, soft, occasional Sandstone tan to white to translucent, fine grained, sub angular to sub rounded, moderately hard, calcareous, poor porosity, well sorted, trace Shale, gray to gray green, sub waxy, sub platy, no staining, fluorescence, or cut

3420-3450 Sandstone tan to translucent to white, fine grained to trace medium grained, rounded to sub rounded, unconsolidated, calcareous, pyrite, occasional Mudstone, a/a, trace Shale gray green, sub waxy, sub platy, no staining, fluorescence, or cut

3450-3480 Sandstone white to translucent, fine to medium grained, sub rounded, moderately hard, calcareous, pyrite, occasional Mudstone, rounded brown, soft, trace Shale, gray to green, sub blocky, no staining, fluorescence, or cut

3480-3510 No Sample

3510-3540 Sandstone translucent to off white, very fine to medium grained, moderately sorted, sub angular to sub rounded, unconsolidated, calcareous, occasional Mudstone, rounded brown, occasional Shale, variegated, trace Coal, black, sub vitreous to earthy, pyrite, no staining, fluorescence, or cut

3540-3570 Sandstone translucent to off white, very fine to medium grained, moderately sorted, sub angular to sub rounded, unconsolidated, calcareous, occasional Shale, variegated, moderately firm, sub blocky, sub waxy, trace Mudstone, rounded brown, trace Coal, black, sub vitreous to earthy, pyrite, no staining, fluorescence, or cut

3570-3600 Sandstone translucent to off white, very fine to medium grained, moderately sorted, sub angular to sub rounded, unconsolidated, calcareous, occasional Shale, variegated, moderately firm, sub blocky, sub waxy, trace Mudstone, rounded brown, trace Coal, black, sub vitreous, pyrite, no staining, fluorescence, or cut

3600-3630 Sandstone translucent to off white, very fine to medium grained, moderately sorted, sub angular to sub rounded, unconsolidated, calcareous, occasional Shale, variegated, moderately firm, sub blocky, sub waxy, trace Mudstone, rounded brown, trace Coal, black, sub vitreous, pyrite, no staining, fluorescence, or cut

3630-3660 Sandstone translucent to off white, very fine to medium grained, moderately sorted, sub angular to sub rounded, unconsolidated, calcareous, occasional Shale, variegated, moderately firm, sub blocky, sub waxy, trace Mudstone, rounded brown, trace Coal, black, sub vitreous, pyrite, no staining, fluorescence, or cut

3660-3690 Sandstone translucent to white to off white, very fine to fine grained, rare medium grained, sub angular to rounded, well sorted, unconsolidated, calcareous, trace pyrite, occasional Mudstone, rounded brown, soft, trace Shale, variegated, sub waxy, trace Coal, black, with pyrite, no staining, fluorescence, or cut

3690-3720 Sandstone translucent to white to off white, fine to coarse grained, sub angular to rounded, moderately sorted, unconsolidated, calcareous, trace pyrite, occasional Mudstone, rounded brown, soft, trace Shale, variegated, sub waxy, rare Coal, black, with pyrite, no staining, fluorescence, or cut

3720-3750 Sandstone pink to translucent to white to off white, coarse to medium grained, sub angular to sub rounded, moderately sorted, unconsolidated, calcareous, trace Mudstone, rounded brown, soft, trace Shale, variegated, sub waxy, rare Coal, black, with pyrite, no staining, fluorescence, or cut

3750-3780 Sandstone pink to translucent to white to off white, very fine to medium grained, sub angular to sub rounded, moderately sorted, unconsolidated, calcareous, trace pyrite, trace Mudstone, rounded brown, soft, trace Shale, variegated, sub waxy, rare Coal, black, with pyrite, no staining, fluorescence, or cut

3780-3810 Sandstone translucent to white to trace pink, fine to medium grained, sub angular to sub rounded, hard to unconsolidated, trace pyrite, calcareous, poor porosity, occasional Mudstone, rounded brown, occasional Shale, variegated, moderately firm, sub platy, no staining, fluorescence, or cut

3810-3840 Sandstone translucent to white, fine to medium grained, sub angular to sub rounded, unconsolidated, calcareous, trace pyrite, abundant Mudstone, rounded brown, soft, trace Shale gray green, sub waxy, moderately firm, no staining, fluorescence, or cut

3840-3870 Sandstone fine to medium grained, moderately well sorted, white to translucent, unconsolidated to hard, calcareous, abundant Siltstone, pink to rounded, soft, occasional Shale, variegated, silty, sub waxy, moderately hard, no staining, fluorescence, or cut

3870-3900 Sandstone translucent to white to tan in part, fine to medium grained, sub angular, moderately well sorted, unconsolidated to hard, calcareous, abundant Siltstone, pink to rounded, soft, occasional Shale, variegated, silty, sub waxy, moderately hard, no staining, fluorescence, or cut

3900-3930 Sandstone translucent to off white, very fine to medium grained, moderately sorted, unconsolidated, calcareous, trace pyrite, sub angular to sub rounded, trace Shale, gray, sub blocky, moderately firm, sub waxy, trace Siltstone, red to pink, no staining, fluorescence, or cut

3930-3960 Sandstone translucent to off white, very fine to medium grained, moderately sorted, sub angular, unconsolidated, calcareous, occasional calcite, trace Siltstone, rounded brown, soft, trace Shale variegated, moderately hard, no staining, fluorescence, or cut

3960-3990 Sandstone translucent to off white, very fine to medium grained, moderately sorted, sub angular, unconsolidated, calcareous, occasional calcite, trace Siltstone, rounded brown, soft, trace Shale variegated, moderately hard, no staining, fluorescence, or cut

3990-4020 Sandstone translucent to off white, very fine to medium grained, moderately sorted, sub angular to sub rounded, unconsolidated to hard, calcareous, trace calcite, occasional Shale variegated, moderately hard, trace Siltstone, rounded brown, soft, no staining, fluorescence, or cut

4020-4050 Sandstone translucent to off white, very fine to medium grained, moderately sorted, sub angular to sub rounded, unconsolidated, calcareous, trace pyrite, trace Siltstone, rounded brown, soft, rare Shale variegated, moderately hard, no staining, fluorescence, or cut

4050-4080 Sandstone translucent to off white, very fine to medium grained, moderately sorted, sub angular, hard, calcareous, trace calcite, trace pyrite, trace Siltstone, rounded brown, soft, rare Shale variegated, moderately hard, no staining, fluorescence, or cut

4080-4110 Sandstone translucent to off white, very fine to medium grained, moderately sorted, sub angular, unconsolidated, calcareous, trace calcite, trace pyrite, trace Siltstone, rounded brown, soft, rare Shale variegated, moderately hard, as above, no staining, fluorescence, or cut

4110-4140 Sandstone translucent to off white, very fine to medium grained, moderately sorted, sub angular, unconsolidated, calcareous, trace calcite, trace Siltstone, rounded brown, soft, rare Shale variegated, moderately hard, no staining, fluorescence, or cut

4140-4170 Sandstone white to off white, tan, light gray to gray, very fine grained, occasional medium grained, sub angular, moderately sorted, unconsolidated in part, calcareous, Siltstone, brown, sandy, firm to soft, very slightly calcareous, trace Shale, variegated, no staining, fluorescence, or cut

4170-4200 Siltstone rounded to brown, sandy, very slightly calcareous, soft, Sandstone white to off white, tan, light gray to gray, very fine grained, occasional medium grained, sub angular, moderately sorted, unconsolidated in part, calcareous, no staining, fluorescence, or cut

4200-4230 Poor Sample due to lost circulation Siltstone rounded to brown, sandy, very slightly calcareous, soft, Sandstone white to off white, tan, very fine grained, sub angular, moderately sorted, unconsolidated in part, calcareous, no staining, fluorescence, or cut

4230-4260 Sandstone off white to white, very fine to medium grained, moderately sorted, sub angular, unconsolidated in part, moderately cemented in part, calcareous, Siltstone, rounded brown, soft, rare Shale variegated, moderately hard, as above, no staining, fluorescence, or cut

4260-4290 Sandstone off white, salt and pepper, very fine to fine grained, well sorted, sub angular, unconsolidated in part, moderately cemented in part, fair porosity, calcareous, Siltstone, rounded brown, soft, rare Shale gray, firm, , no staining, fluorescence, or cut

4290-4320 Siltstone grading Mudstone, rounded to brown, firm, slightly sandy in part, slightly calcareous, Sandstone off white, salt and pepper, very fine to fine grained, well sorted, sub angular, moderately cemented in part, fair porosity, calcareous, no staining, fluorescence, or cut

4320-4350 Siltstone rounded to brown, sandy in part, soft to slightly firm, calcareous, occasional Sandstone off white, salt and pepper, very fine to fine grained, well sorted, sub angular, well cemented in part, poor porosity, calcareous, no staining, fluorescence, or cut

4350-4380 Sandstone white to light gray, occasional translucent, very fine to fine grained, moderately sorted, well cemented, calcareous, firm, poor porosity, glauconitic inclusion, salt and pepper in part, occasional Siltstone brown to rounded, firm, sandy in part, trace Shale, variegated, occasional pyrite, no staining, fluorescence, or cut

4380-4410 Sandstone white to light gray, occasional translucent, very fine to fine grained, moderately sorted, well cemented, calcareous, firm, poor porosity, glauconitic inclusion, salt and pepper in part, as above, Siltstone grading to Mudstone, brown to rounded, firm, sandy in part, trace Shale, variegated, occasional pyrite, no staining, fluorescence, or cut

4410-4440 Sandstone white to light gray, translucent in part, very fine to fine grained, well sorted, moderately cemented, calcareous, firm, poor porosity, glauconitic inclusion, salt and pepper in part, abundant unconsolidated, Siltstone, brown to rounded, firm, sandy in part, occasional Shale green to gray, no staining, fluorescence, or cut

4440-4470 Sandstone tan, translucent in part, very fine to fine grained, occasional medium grained, sub angular to sub rounded, moderately cemented, calcareous, firm, fair porosity, salt and pepper in part, glauconitic inclusion, Siltstone, brown to rounded, firm, sandy in part, occasional Shale green to gray, variegated, no staining, fluorescence, or cut

4470-4500 Sandstone tan, translucent in part, very fine to fine grained, occasional medium grained, sub angular to sub rounded, moderately cemented, calcareous, firm, fair porosity, salt and pepper in part, glauconitic inclusion, as above, Siltstone, brown to rounded, firm, sandy in part, occasional Shale to gray, firm, variegated, no staining, fluorescence, or cut

4500-4530 Sandstone tan to white, translucent in part, very fine to fine grained, occasional medium grained, sub angular to sub rounded, moderately cemented, calcareous, firm, fair porosity, glauconitic inclusion, Siltstone, brown to rounded, firm, sandy in part, occasional Shale gray, firm, variegated, no staining, fluorescence, or cut

4530-4560 Sandstone tan to white, pink to brown translucent in part, very fine to fine grained, occasional medium grained, sub angular to sub rounded, moderately cemented, calcareous, firm, Siltstone, grading to Mudstone, brown to rounded, firm, sandy in part, Shale gray, firm, variegated, no staining, fluorescence, or cut, as above

4560-4590 Sandstone tan to white, pink to brown, gray, very fine to fine grained, medium grained in part, hard, sub angular to sub rounded, moderately cemented, calcareous, Siltstone, brown to rounded, firm, sandy in part, trace Shale no staining, fluorescence, or cut

4590-4620 Sandstone white, fine grained to medium grained, hard, sub angular, moderately sorted, consolidated, calcareous, salt and pepper, glauconitic inclusion, occasional Siltstone brown to rounded, firm, sandy in part, trace Shale no staining, fluorescence, or cut

4620-4650 Sandstone white, fine grained to medium grained, hard, sub angular, moderately sorted, consolidated, calcareous, salt and pepper, glauconitic inclusion, occasional Siltstone, brown to rounded, firm, sandy in part, trace Shale no staining, fluorescence, or cut

4650-4680 Sandstone gray to maroon, very fine grained, hard, sub angular, moderately sorted, very consolidated, calcareous, Siltstone brown to rounded, firm, sandy in part, Shale, variegated, firm, sub waxy no staining, fluorescence, or cut

4680-4710 Sandstone gray, very fine grained to fine grained, hard, sub angular. moderately sorted, very consolidated, calcareous, siltstone, brown to rounded, firm, sandy in part, Shale, variegated, firm,

sub waxy no staining, fluorescence, or cut

4710-4740 Sandstone gray, very fine grained, hard, sub angular, moderately sorted, very consolidated, calcareous, Siltstone brown to rounded, firm, sandy in part, Shale, variegated, firm, sub waxy no staining, fluorescence, or cut

4740-4770 Sandstone gray, very fine to fine grained, soft to firm, sub angular to sub rounded, consolidated, calcareous, Siltstone, brown to rounded, firm, sandy in part, occasional Shale, variegated, firm, waxy, no staining, fluorescence, or cut

4770-4800 Siltstone rounded, firm, sandy in part, Sandstone gray, very fine grained, firm, angular to sub angular, consolidated, calcareous trace Shale variegated, firm, waxy, no staining, fluorescence, or cut

4800-4830 Siltstone rounded, firm, sandy in part, Sandstone gray, very fine grained, firm, angular to sub angular, consolidated, calcareous trace Shale variegated, firm, waxy, no staining, fluorescence, or cut

4830-4860 Siltstone rounded, firm, sandy in part, Sandstone gray, very fine grained, firm, angular to sub angular, unconsolidated, calcareous trace Shale variegated, firm, waxy, no staining, fluorescence, or cut

4860-4890 Shale rounded, firm, silty, soft , occasional variegated, waxy, Sandstone gray to white, very fine to fine grained, firm, angular to sub angular, consolidated, calcareous, no staining, fluorescence, or cut

4890-4920 Shale, rounded, soft to firm, silty, occasional variegated, waxy, Sandstone gray to white, very fine grained, firm, angular to sub angular, consolidated, calcareous, no staining, fluorescence, or cut

4920-4950 Shale, rounded, soft to firm, silty, occasional variegated, waxy, Sandstone gray to white, very fine to fine grained, firm, angular to sub angular, consolidated, calcareous, no staining, fluorescence, or cut

4950-4980 Shale, rounded, soft to firm, silty, occasional variegated, waxy, occasional Sandstone gray, very fine grained firm, angular to sub angular, consolidated, calcareous, no staining, fluorescence, or cut

4980-5010 Shale, rounded, soft to firm, silty, occasional variegated, waxy, trace Sandstone gray, very fine grained, firm, angular to sub angular, consolidated, calcareous, no staining, fluorescence, or cut

5010-5040 Siltstone grading to Shale, rounded, soft to firm, occasional variegated, waxy, calcareous, Sandstone gray, very fine grained, firm, angular to sub angular, consolidated, calcareous, no staining, fluorescence, or cut

5040-5070 Siltstone rounded to brown very shaly, firm, Shale rounded to brown very silty, sandy in part, calcareous Sandstone gray to white, very fine grained, to firm, angular to sub angular, consolidated, calcareous, no staining, fluorescence, or cut

5070-5100 Siltstone rounded to brown very shaly, firm, Shale rounded to brown very silty, sandy in part, calcareous occasional Sandstone gray to white, very fine to fine grained, firm, angular to sub angular, consolidated, calcareous, no staining, fluorescence, or cut

5100-5130 Siltstone rounded to brown very shaly, firm, calcareous Shale rounded to brown very silty, sandy in part, slightly calcareous, occasional Sandstone gray to white, very fine to fine grained, firm, angular to sub angular, consolidated, calcareous, no staining, fluorescence, or cut

5130-5160 Siltstone rounded to brown very shaly, firm, Shale rounded to brown very silty, sandy in part, occasional, Sandstone gray to white, very fine to fine grained, firm, angular to sub angular, consolidated, slightly calcareous, no staining, fluorescence, or cut

5160-5190 Siltstone rounded to brown very shaly, firm, Shale rounded to brown very silty, sandy in part, slightly calcareous, Sandstone gray to white, very fine to fine grained, firm, angular to sub angular, consolidated, calcareous, no staining, fluorescence, or cut

5190-5220 Siltstone rounded to brown very shaly, firm, slightly calcareous, Shale rounded to brown very silty, sandy in part, slightly calcareous, trace Sandstone gray to white, very fine to fine grained, firm, sub angular to sub rounded, consolidated, slightly calcareous, no staining, fluorescence, or cut

5220-5250 Siltstone, rounded to brown slightly calcareous, sandy in part, soft to slightly firm, calcareous, occasional shale, rounded to brown, silty, trace Sandstone gray, salt and pepper in part, very fine grained to fine grained, sub angular, calcareous, firm, no staining, fluorescence, or cut

5250-5280 Siltstone, rounded to brown, soft, sandy in part, very calcareous, occasional Sandstone light gray to gray, very fine grained, calcareous, as above, occasional Shale, rounded to brown, soft, sub rounded, silty, very slightly calcareous, no staining, fluorescence, or cut

5280-5310 Shale rounded to brown, soft , clay filled, silty in part, calcareous, Siltstone, rounded to brown, sandy in part, very calcareous, occasional Sandstone, gray, very fine grained, sub angular to sub rounded, calcareous, firm, no staining, fluorescence, or cut

5310-5340 Shale rounded to brown, soft, clay filled, silty in part, calcareous, Siltstone, rounded to brown, sandy in part, very calcareous, occasional Sandstone, gray, very fine grained, sub angular to sub rounded, calcareous, firm, no staining, fluorescence, or cut

5340-5370 Siltstone, rounded to brown, sandy in part, very calcareous, Sandstone, white to gray, tan fine to very fine grained, sub angular to sub rounded, salt and pepper in part, firm, moderately sorted, calcareous, occasional Shale brown to rounded, no staining, fluorescence, or cut

5370-5400 Siltstone, rounded to brown, sandy in part, very calcareous, Sandstone, white to gray, tan fine to very fine grained, sub angular to sub rounded, salt and pepper in part, firm, moderately sorted, calcareous, occasional Shale brown to rounded, no staining, fluorescence, or cut

5400-5430 Siltstone, rounded to brown, sandy in part, very calcareous, Sandstone, white gray, tan fine to very fine grained, sub angular to sub rounded, salt and pepper in part, firm, moderately sorted, calcareous, occasional Shale brown to rounded, soft, no staining, fluorescence, or cut

5430-5460 Siltstone, rounded to brown, sandy in part, calcareous, as above, Limestone tan, gray, cream, hard, dense, cryptocrystalline, trace fossiliferous, occasional Shale brown to rounded, soft, trace Sandstone, gray to tan, glauconitic inclusion, as above, no staining, fluorescence, or cut

5460-5490 Siltstone, rounded to brown, sandy in part, calcareous, Sandstone, gray to tan, glauconitic inclusion, very fine grained to fine grained, sub angular to sub rounded, well cemented, calcareous, Limestone tan, gray, cream, hard, dense, cryptocrystalline, trace fossiliferous, occasional Shale brown to rounded, soft, no staining, fluorescence, or cut

5490-5520 Siltstone, rounded to brown, sandy in part, calcareous, occasional Sandstone, gray to tan, glauconitic inclusion, very fine grained to fine grained, sub angular to sub rounded, well cemented, calcareous, trace Limestone tan, gray, cream, hard, dense, cryptocrystalline, trace fossiliferous, trace Shale brown to rounded, soft, no staining, fluorescence, or cut

5520-5550 Siltstone rounded to brown, sandy in part, calcareous, occasional Sandstone, gray to tan, glauconitic inclusion, very fine grained to fine grained, sub angular to sub rounded, well cemented, salt and pepper in part, calcareous, Limestone tan, gray, cream, hard, dense,

cryptocrystalline, trace fossiliferous, trace Shale brown to rounded, soft, no staining, fluorescence, or cut

5550-5580 Siltstone rounded to brown, sandy in part, calcareous, occasional Sandstone, light gray to gray, tan, very fine grained to fine grained, sub angular, moderately cemented, salt and pepper in part, calcareous, Limestone tan, cream, hard, dense, cryptocrystalline, trace fossiliferous, trace Shale brown to rounded, soft, no staining, fluorescence, or cut

5580-5610 Siltstone rounded to brown, sandy in part, calcareous, occasional Sandstone, light gray to gray, tan, very fine grained to fine grained, sub angular, moderately cemented, salt and pepper in part, calcareous, trace Limestone tan, cream, hard, dense, cryptocrystalline, trace fossiliferous, trace Shale brown to rounded, soft, no staining, fluorescence, or cut

5610-5640 Siltstone rounded to brown, sandy in part, calcareous, Sandstone, light gray to gray, tan, very fine grained to fine grained, sub angular, moderately cemented, salt and pepper in part, calcareous, occasional Shale brown to rounded, soft, no staining, fluorescence, or cut

5640-5670 Siltstone rounded to brown, sandy in part, calcareous, Sandstone, light gray to gray, tan, very fine grained to fine grained, sub angular, consolidated, moderately cemented, salt and pepper in part, calcareous, occasional Shale brown to rounded, soft, no staining, fluorescence, or cut

5670-5700 Siltstone rounded to brown, sandy in part, calcareous, Sandstone, light gray to gray, tan, very fine grained to fine grained, sub angular, consolidated, moderately cemented, salt and pepper in part, calcareous, Shale brown to rounded, soft to firm, trace Limestone tan, cream, hard, dense, cryptocrystalline, trace fossiliferous, no staining, fluorescence, or cut

5700-5730 Siltstone rounded to brown, sandy in part, calcareous, Sandstone, light gray to gray, tan, very fine grained to fine grained, sub angular, consolidated, moderately cemented, salt and pepper in part, calcareous, occasional Shale brown to rounded, soft to firm, trace Limestone tan, cream, hard, dense, cryptocrystalline, trace fossiliferous, no staining, fluorescence, or cut

5730-5760 Siltstone rounded to brown, sandy in part, calcareous, Sandstone, light gray to gray, tan, very fine grained to fine grained, sub angular, consolidated, moderately cemented, salt and pepper in part, calcareous, Shale brown to rounded, soft to firm, trace Limestone tan, cream, hard, dense, cryptocrystalline, trace fossiliferous, no staining, fluorescence, or cut

5760-5790 Sandstone, light gray to gray, tan, very fine grained to medium grained, poorly sorted, sub angular, consolidated, moderately cemented, salt and pepper in part, calcareous, Siltstone rounded to brown, sandy in part, calcareous, Shale brown to rounded, soft, trace Limestone tan, cream, hard, dense, cryptocrystalline, trace fossiliferous, no staining, fluorescence, or cut

5790-5810 Siltstone rounded to brown, sandy in part, calcareous, Sandstone, light gray to gray, tan, very fine grained to moderately grained, sub angular, consolidated, moderately cemented, salt and pepper in part, calcareous, occasional Shale brown to rounded, soft, trace Limestone off white to tan, cream, hard, dense, cryptocrystalline, trace fossiliferous, no staining, fluorescence, or cut

5810-5830 Siltstone rounded to brown, sandy in part, calcareous, Sandstone, light gray to gray, tan, very fine grained to medium grained, sub angular, consolidated, moderately cemented, salt and pepper in part, calcareous, Shale brown to rounded, soft, no staining, fluorescence, or cut

5730-5850 Siltstone rounded to brown, sandy in part, calcareous, Sandstone, light gray to gray, tan, very fine grained, sub angular, consolidated, moderately cemented, salt and pepper in part, calcareous, Shale brown to rounded, soft, trace Limestone off white to tan, cream, hard, dense, cryptocrystalline, trace fossiliferous, no staining, fluorescence, or cut

5850-5870 Siltstone rounded to brown very shaly, firm, slightly calcareous, Shale rounded to brown very silty, sandy in part, slightly calcareous, Sandstone gray to white, very fine to fine grained, firm,

sub angular to sub rounded, consolidated, slightly calcareous, no staining, fluorescence, or cut

5870-5900 Siltstone rounded to brown very shaly, firm, slightly calcareous, Sandstone gray to white, very fine to fine grained, soft to firm, sub angular to sub rounded, consolidated, slightly calcareous, Shale rounded to brown very silty, sandy in part, slightly calcareous, no staining, fluorescence, or cut

5900-5920 Siltstone rounded to brown very shaly, firm, slightly calcareous, Sandstone gray to white, very fine to fine grained, firm, sub angular to sub rounded, consolidated, slightly calcareous, Shale rounded to brown very silty, sandy in part, slightly calcareous, trace Limestone, no staining, fluorescence, or cut

5920-5940 Shale rounded to brown, variegated shaly, firm, sub waxy, slightly calcareous , Siltstone rounded to brown sandy in part, slightly calcareous, trace Sandstone, gray, very fine grained no staining, fluorescence, or cut

5940-5960 Sandstone gray to white, very fine grained, firm, sub angular to sub rounded, consolidated, slightly calcareous, Shale rounded to brown, variegated sub waxy, silty, slightly calcareous, no staining, fluorescence, or cut

5960-5980 Shale rounded to brown very silty, variegated, slightly calcareous, Sandstone gray to white, very fine to fine grained, soft to firm, sub angular to sub rounded, consolidated, slightly calcareous, Siltstone rounded to brown very shaly, firm, slightly calcareous, trace Limestone, no staining, fluorescence, or cut

5980-6000 Siltstone , rounded to brown, occasional pink, sandy in part, calcareous, Shale variegated, sub blocky, sub waxy in part, silty in part, firm to soft, Sandstone, light gray to gray, very fine grained, firm, very calcareous, sub angular to sub rounded, no staining, fluorescence, or cut

6000-6020 Siltstone , rounded to brown, occasional pink to brown, sandy in part, calcareous, Shale variegated, sub blocky, sub waxy in part, silty in part, firm to soft, Sandstone, light gray to gray, very fine grained, firm, very calcareous, sub angular to sub rounded, no staining, fluorescence, or cut

6020-6040 Shale variegated, green , gray, rounded, brown, soft to firm, waxy in part, sub blocky to sub platy, silica, Sandstone very fine grained, sub angular, moderately cemented, firm, moderately sorted, very calcareous, Siltstone rounded to brown, sandy in part, calcareous, trace Limestone, no staining, fluorescence, or cut

6040-6060 Shale, variegated, sub waxy, silty in part, firm to soft, sub blocky, silica, very slightly calcareous, Sandstone white to gray, very fine grained, consolidated, firm, poor porosity, sub angular, calcareous, Siltstone rounded to rounded a/a, no staining, fluorescence, or cut

6060-6080 Shale, variegated, sub waxy, silty in part, firm to soft, sub blocky, silica, very slightly calcareous, Sandstone white to gray, very fine grained, consolidated, firm, poor porosity, sub angular, calcareous, Siltstone rounded to brown a/a, no staining, fluorescence, or cut

6080-6100 Sandstone white to gray, translucent in part, fine to medium grained, poorly sorted, sub angular to sub rounded, moderately cemented, calcareous, firm, fair porosity, salt and pepper in part, glauconitic inclusion, unconsolidated in part, Limestone off white to gray cream, hard, dense, cryptocrystalline, occasional Shale and Siltstone as above, slightly dull fluorescence, trace Limestone, no stain or cut

6100-6120 Sandstone gray, fine grained, moderately sorted, sub angular to sub rounded, moderately cemented, calcareous, firm, poor porosity, consolidated, Shale, variegated, Siltstone as above, no staining, fluorescence, or cut

6120-6140 Sandstone gray, fine grained, moderately sorted, sub angular to sub rounded, moderately cemented, calcareous, firm, poor porosity, consolidated, Shale, variegated, sub waxy to waxy, very slightly calcareous, firm to soft, Siltstone rounded to brown, sandy in part, calcareous , no staining, fluorescence, or cut

6140-6160 Sandstone gray, fine grained, moderately sorted, sub angular to sub rounded, moderately cemented, calcareous, firm, poor porosity, consolidated, Shale, variegated, sub waxy to waxy, very slightly calcareous, firm to soft, Siltstone rounded to brown, sandy in part, calcareous , no staining, fluorescence, or cut

6160-6180 Shale variegated, firm to soft, silty, silica, Siltstone rounded to brown, maroon, calcareous, Sandstone white to tan, fine grained, moderately sorted, sub angular to sub rounded, moderately cemented, calcareous, firm, poor porosity, consolidated, trace Limestone, no staining, fluorescence, or cut

6180-6200 Shale variegated, firm to soft, silty, silica, Siltstone rounded to brown, maroon, calcareous, Sandstone white to tan, fine grained, moderately sorted, sub angular to sub rounded, moderately cemented, calcareous, firm, poor porosity, consolidated, no staining, fluorescence, or cut

6200-6220 Siltstone rounded to brown, firm, brittle, black inclusion, calcareous, Shale rounded to brown, variegated, firm to soft, Sandstone white to gray, very fine grained to medium good, poorly sorted, calcareous, angular to sub angular, calcite, trace Limestone, no staining, fluorescence, or cut

6220-6240 Siltstone, rounded to brown, as above Sandstone white to off white, light brown, gray, very fine grained, occasional loose medium quartz grained, consolidated, firm, calcareous, sub angular to sub rounded, Limestone tan, cream, gray, hard, dense, cryptocrystalline, Shale, variegated no staining, fluorescence, or cut,

6240-6260 Siltstone, rounded to brown, Sandstone white to off white, light brown, gray, very fine to fine grained, occasional loose medium quartz grained, consolidated, firm, calcareous, sub angular to sub rounded, Limestone white to tan, cream, gray, hard, dense, cryptocrystalline, Shale variegated no staining, fluorescence, or cut,

6260-6280 Siltstone, rounded to brown, Sandstone white to off white, light brown, gray, very fine to fine grained, occasional loose medium quartz grains, consolidated, firm, calcareous, sub angular to sub rounded, occasional Limestone white to tan, cream, gray, hard, dense, cryptocrystalline, Shale, variegated, as above, no staining, fluorescence, or cut,

6280-6300 Sandstone gray, white, pink, fine grained, moderately sorted, sub angular to sub rounded, moderately cemented, calcareous, firm, poor porosity, consolidated, Shale rounded to brown, variegated, silty, silica, soft, calcareous, Siltstone, rounded to brown, sandy in part, calcareous, no staining, fluorescence, or cut

6300-6320 Sandstone white to off white, gray, trace pink, salt and pepper in part, very fine to fine grained, sub angular, firm, consolidated, moderately cemented, calcareous, Siltstone, rounded to brown, Shale variegated, soft, no staining, fluorescence, or cut

6320-6340 Sandstone white to off white, gray, trace pink, salt and pepper in part, very fine to fine grained, occasional medium grained, sub angular to sub rounded, firm, consolidated, moderately cemented, calcareous, Siltstone, rounded to brown, firm, brittle, calcareous, Shale variegated, soft, slightly calcareous, sub blocky, silty to waxy, silica, rare Limestone, no staining, fluorescence, or cut

6340-6360 Sandstone white to off white, gray, translucent, salt and pepper in part, very fine to fine grained, occasional medium grained, sub angular to sub rounded, firm, consolidated, moderately cemented, calcareous, Siltstone, rounded to brown, firm, brittle, calcareous, Shale variegated,

soft, slightly calcareous, sub blocky, silty to waxy, silica, trace Limestone, no staining, fluorescence, or cut

6360-6380 Sandstone white to light gray, salt and pepper in part, very fine to fine grained, sub angular to sub rounded, firm, consolidated, moderately cemented, calcareous, Siltstone, rounded to brown, firm, brittle, Shale variegated, soft, slightly calcareous, sub blocky, silty to waxy, silica, no staining, fluorescence, or cut

6380-6400 Sandstone white to light gray, occasional medium grained, salt and pepper in part, very fine to fine grained, sub angular to sub rounded, firm, consolidated, moderately cemented, calcareous, Siltstone, rounded to brown, firm, brittle, calcareous, Shale variegated, rounded to brown, soft, slightly calcareous, sub blocky, silty to waxy, silica, occasional Limestone tan, cream, gray, hard, dense, cryptocrystalline, no staining, fluorescence, or cut

6400-6420 Sandstone white to light gray, gray, salt and pepper in part, very fine to fine grained, sub angular to sub rounded, firm, moderately cemented, calcareous, Siltstone, rounded to brown, tan, firm, brittle, calcareous, Shale variegated, rounded to brown, soft, slightly calcareous, sub blocky, silty to waxy, occasional Limestone tan, cream, gray, as above, no staining, fluorescence, or cut

6420-6440 Siltstone, rounded to brown, trace purple, tan, soft, calcareous, Sandstone white to light gray, gray, very fine to fine grained, sub angular to sub rounded, firm, well cemented, calcareous, Shale variegated, rounded to brown, soft, slightly calcareous, sub blocky, occasional Limestone tan, cream, gray, as above, no staining, fluorescence, or cut

6440-6460 Shale red to brown to yellow to green, variegated, silty to earthy, grading to siltstone in part, slightly to moderately calcareous, sub blocky to sub platy, abundant very fine grained sandstone, good trace siltstone a/a

6460-6480 Sandstone salt and pepper to light gray to off white, fine grained, occasional very fine grained to silty, grading to siltstone in part, sub angular to sub rounded, occasional well rounded, moderately cemented, calcareous, white clay filled, good trace shale and siltstone a/a, no visible porosity, no staining, fluorescence, or cut

6480-6500 Shale red to brown to yellow to green to tan, variegated, sub blocky to platy, earthy to silty, grading to siltstone in part, slightly to moderately calcareous, firm to slightly hard, trace tan limestone, good trace sandstone continued a/a

6500-6520 Sandstone light gray to salt and pepper, very fine to fine grained, sub angular to sub rounded, well sorted, moderately cemented, firm, moderately calcareous, white clay filled in part, no visible porosity, trace white clay filled, no staining, fluorescence, or cut

6520-6540 Shale variegated, rounded to brown, soft, slightly calcareous, sub blocky, silty to waxy, occasional Limestone tan to cream to light gray, a/a, abundant sandstone off white to salt and pepper, very fine to fine grained, sub angular to sub rounded, well sorted, moderately cemented, moderately calcareous, white clay filled in part, no visible porosity, trace white clay filled, no staining, fluorescence, or cut

6540-6560 Shale red brown to gray to yellow to green, variegated, sub blocky, silty to earthy, occasional limestone a/a, good trace very fine grained light gray sandstone, abundant inter-bedded argillaceous siltstone

6560-6580 Siltstone, rounded to brown, trace purple to yellow to green, variegated, occasional tan, soft to firm, calcareous, abundant shale and sandstone a/a, trace limestone

6580-6600 Shale red brown to gray to yellow to green, variegated, sub blocky, silty to earthy, firm, grading to siltstone in part, rare limestone, abundant Sandstone salt and pepper to light gray, very fine to fine grained, sub angular to sub rounded, well sorted, moderately cemented, calcareous, white

clay filled to argillaceous matrix, no visible porosity, no staining, fluorescence, or cut

6600-6620 Shale red brown to yellow green, variegated, slightly to moderately calcareous, earthy to silty, occasional smooth to sub waxy, some grading to siltstone, rare tan to cream limestone fragments, abundant light gray to off white sandstone, no staining, fluorescence, or cut

6620-6640 Shale red brown to yellow green, variegated, mottled in part, slightly to moderately calcareous, earthy to silty, occasional smooth to sub waxy, some grading to siltstone, rare tan to cream limestone fragments, abundant salt and pepper to off white sandstone, no staining, fluorescence, or cut

6640-6660 Siltstone light gray to off white to red to brown, sub blocky to sub platy, firm to slightly hard, slightly to moderately calcareous, some grading to shale a/a, trace tan limestone, abundant sandstone light gray to salt and pepper, very fine to fine grained, sub angular to sub rounded, well sorted, moderately cemented, firm, moderately calcareous, white clay filled in part, no visible porosity, trace white clay filled, no staining, fluorescence, or cut

6660-6680 Shale red brown to light gray, sub blocky to platy, earthy to slightly silty, some grading to siltstone, good trace siltstone and sandstone a/a, abundant limestone tan to cream to light gray, cryptocrystalline to chalky, grading to marl in part, no staining, fluorescence, or cut

6680-6700 Shale red brown to light gray to yellow green, mottled in part, variegated, sub blocky to splintery, earthy to silty, grading to siltstone, some medium to dark gray shale, splintery, sub waxy, good trace sandstone and siltstone a/a, good trace limestone a/a

6700-6720 Sandstone off white to translucent to light blue, salt and pepper, very fine to medium grained, rounded to sub rounded, poorly sorted, poorly cemented to unconsolidated, slightly to moderately calcareous, some white clay filled, abundant unconsolidated sand, abundant limestone a/a, good trace siltstone and shale a/a, no staining, fluorescence, or cut

6720-6740 Sandstone off white to translucent, salt and pepper, very fine grained to silty, grading to siltstone in part, no visible porosity, white clay filled in part, no staining, fluorescence, or cut, Shale red to brown to gray, sub blocky to platy, firm, fissile in part, smooth to earthy, occasional sub waxy, trace limestone a/a, no staining, fluorescence, or cut

6740-6760 Sandstone off white to translucent, salt and pepper, very fine grained to silty, grading to siltstone in part, no visible porosity, white clay filled in part, no staining, fluorescence, or cut, Shale red to brown to gray, sub blocky to platy, firm, fissile in part, smooth to earthy, occasional sub waxy, trace Limestone a/a, no staining, fluorescence, or cut

6760-6780 Shale red brown to light gray to yellow green, mottled in part, variegated, sub blocky to splintery, earthy to silty, grading to siltstone, some medium to dark gray shale, splintery, sub waxy, good trace Sandstone and Siltstone a/a, no staining, fluorescence, or cut

6780-6800 Sandstone salt and pepper to light gray to off white, fine grained, occasional very fine grained, sub angular to sub rounded, very well cemented, calcareous, white clay filled, no visible porosity, Shale and Siltstone a/a, trace Limestone, occasional dull mineral fluorescence, no stain or cut

6800-6820 Siltstone light gray to off white, red to brown, sub blocky to sub platy, firm to slightly hard, slightly to moderately calcareous, Sandstone white to light gray, gray, very fine grained, sub angular to sub rounded, firm, well cemented, calcareous, Shale red to brown to gray, sub blocky to platy, firm, fissile in part, smooth to earthy, occasional sub waxy, trace Limestone a/a, occasional dull mineral fluorescence, no stain or cut

6820-6840 Sandstone white to light gray, very fine grained, sub angular to sub rounded, firm, well cemented, calcareous, Siltstone light gray to off white, red to brown, sub blocky to sub platy, firm to slightly hard, slightly to moderately calcareous, Shale red to brown to gray, sub blocky to platy, firm, smooth to earthy, occasional sub waxy, trace Limestone a/a, occasional bentonite, dull mineral fluorescence, no stain or cut

6840-6860 Sandstone, white to off white, gray to light gray, very fine grained, sub angular, firm, consolidated, moderately cemented, well sorted, calcareous, Siltstone, light gray, red to brown, calcareous, brittle, Shale, variegated, soft, slightly calcareous, occasional dull mineral fluorescence, no stain or cut

6860-6880 Sandstone, white to off white, gray to light gray, brown, very fine grained to fine grained, sub angular, firm, consolidated, moderately cemented, well sorted, calcareous, Siltstone, light gray, red to brown, calcareous, brittle, Shale, variegated, soft, slightly calcareous, Shale variegated, soft, mottled in part, sub waxy, occasional Bentonite dull mineral fluorescence, no stain or cut

6880-6900 Siltstone light gray to off white, red to brown, sub blocky to sub platy, firm, slightly calcareous, Sandstone white to light gray, gray, very fine grained, sub angular to sub rounded, firm, well cemented, calcareous, Shale red to brown to gray, sub blocky to platy, firm, occasional sub waxy, trace Limestone a/a, no staining, fluorescence, or cut

6900-6920 Sandstone, white to off white, gray to light gray, very fine grained, sub angular, firm, consolidated, well cemented, moderately cemented, moderately sorted, calcareous, Siltstone, light gray, red to brown, calcareous, brittle, Shale, variegated, soft, slightly calcareous, occasional dull fluorescence, no staining, fluorescence, or cut

6920-6940 Sandstone, white to light gray, very fine grained, sub angular to sub rounded, moderately sorted, firm, calcareous, no visible porosity, moderately cemented in part, unconsolidated in part, Siltstone, brown to rounded, white, light gray, calcareous, soft, Shale, variegated, soft, sub waxy, smooth to earthy, trace Limestone, Bentonite white, fluorescence, no staining, fluorescence, or cut

6940-6960 Sandstone, white to light gray, translucent in part, very fine grained, grading to fine grained, trace medium grained, sub angular to sub rounded, clay filled in part, calcite filled in part, well cemented, moderately sorted, firm, Siltstone gray, rounded to brown, soft, calcareous, sandy in part, Shale variegated, smooth, silty in part, very slightly calcareous, soft, occasional Bentonite, fluorescence, trace Limestone, cream, dense, no stain or cut

6960-6980 Sandstone, white to light gray, translucent in part, very fine grained, grading to fine grained, sub angular to sub rounded, clay filled in part, calcareous, well cemented, moderately sorted, firm, poor porosity, Siltstone gray, rounded to brown, soft, calcareous, sandy in part, Shale variegated, smooth, silty in part, very slightly calcareous, soft, trace Limestone, cream, dense, no staining, fluorescence, or cut

6980-7000 Sandstone, white to light gray, very fine grained, sub angular to sub rounded, moderately sorted, firm, calcareous, no visible porosity, well cemented , unconsolidated in part, Siltstone, brown to rounded, white, light gray, calcareous, soft, Shale, variegated, soft, sub waxy, smooth to earthy, occasional Claystone, calcareous, soft, trace Limestone, Bentonite white, dull fluorescence, no stain or cut

7000-7020 Siltstone light gray to off white, red to brown, sub blocky to sub platy, firm, slightly calcareous, Shale red to brown to gray, sub blocky to platy, firm, occasional sub waxy, Sandstone white to light gray, gray, very fine grained, sub angular to sub rounded, firm, well cemented, calcareous, occasional Claystone, white, soft, calcareous trace Limestone, occasional dull yellow fluorescence, no stain or cut

7020-7040 Siltstone light gray to off white, red to brown, firm, slightly calcareous, Shale red to brown to gray, sub blocky, firm to soft, sub waxy, Sandstone white to light gray, gray, very fine grained,

sub angular to sub rounded, firm, well cemented, calcareous, occasional Claystone, white, soft, calcareous, trace Limestone, fossiliferous in part, trace dull yellow fluorescence. no stain or cut

7040-7060 Shale gray to brown to red to yellow to green, variegated to mottled, earthy to silty, grading to siltstone in part, non to slightly calcareous, abundant inter-bedded siltstone light gray to red brown, sub blocky to platy, argillaceous, sandy in part, grading to very fine grained sandstone in part

7060-7080 Sandstone light gray to red brown, very fine grained to silty, grading to siltstone in part, sub angular to sub rounded, moderately sorted, moderately cemented, calcareous, white clay filled in part, no visible porosity, good trace shale and siltstone a/a, trace tan to cream limestone, no staining, fluorescence, or cut

7080-7100 Sandstone light gray to off white to salt and pepper, very fine grained to silty, grading to siltstone in part, moderately cemented, calcareous, some white clay filled, laminated in part, good trace shale red brown to variegated, occasional gray green, earthy to silty, occasional smooth to sub waxy, soft to firm, non to slightly calcareous

7100-7120 Sandstone translucent to off white to salt and pepper, fine to very fine grained, rounded to sub angular, moderately sorted, poorly cemented to unconsolidated, slightly calcareous, friable in part, some white clay filled, rare pyrite cemented, good trace siltstone and shale a/a, no staining, fluorescence, or cut

7120-7140 Sandstone translucent to off white to salt and pepper, fine to very fine grained, rounded to sub angular, moderately sorted, poorly cemented to unconsolidated, slightly calcareous, friable in part, some white clay filled, abundant Shale gray to brown to red to yellow to green, variegated to mottled, earthy to silty, grading to siltstone in part, non to slightly calcareous

7140-7160 Sandstone off white to light gray to translucent, very fine to fine grained, sub angular to sub rounded, well sorted, moderately cemented to unconsolidated, some white clay filled, slightly to moderately calcareous, poor sample abundant LCM

7160-7180 Sandstone translucent to off white to salt and pepper, fine to very fine grained, rounded to sub angular, moderately sorted, poorly cemented to unconsolidated, slightly calcareous, friable in part, some white clay filled, trace white to translucent crystalline calcite, abundant Shale gray to brown to red to yellow to green, variegated to mottled, earthy to silty, grading to siltstone in part, non to slightly calcareous,

7180-7200 Shale light to medium gray, occasional red brown to variegated, smooth to earthy, occasional sub waxy to silty, non to slightly calcareous, some siltstone, abundant sandstone translucent to off white to salt and pepper, very fine to fine grained, sub angular to sub rounded, well sorted, moderately cemented to unconsolidated, slightly to moderately calcareous, no staining, fluorescence, or cut

7200-7220 Sandstone translucent to off white to salt and pepper, fine to very fine grained, occasional medium grained, angular to rounded, very poorly sorted, poorly cemented to unconsolidated, no visible porosity, slightly calcareous, predominantly unconsolidated sand grained, good trace shale a/a

7220-7240 Sandstone salt and pepper to light gray, fine to very fine grained, occasional medium grained, angular to sub rounded, poorly sorted, poor to well cemented, predominantly calcareous cemented, some white clay filled, tight, no staining, fluorescence, or cut

7240-7260 Shale light to medium gray, occasional red brown to green to yellow, sub blocky to splintery, firm to soft, earthy to sub waxy, occasional silty, rare fossiliferous limestone fragment, rare pyrite, good trace siltstone, abundant sandstone continued a/a, no staining, fluorescence, or cut

7260-7280 Shale light to medium gray, occasional red brown to green to yellow, sub blocky to splintery, firm to soft, earthy to sub waxy, occasional silty, rare fossiliferous limestone fragment, rare pyrite, good trace siltstone, abundant sandstone continued a/a, no staining, fluorescence, or cut

7280-7300 Shale light to medium gray, occasional red brown to green to yellow, sub blocky to splintery, firm to soft, earthy to sub waxy, occasional silty, occasional firm to brittle, rare Limestone fragment, trace Siltstone gray, rounded to brown, abundant Sandstone gray to white, no staining, fluorescence, or cut

7300-7320 Shale light to gray to gray, as above, occasional red brown to green to yellow, sub blocky, firm to soft, occasional brittle, earthy to sub waxy, occasional silty, rare Limestone, occasional Siltstone, gray, rounded to brown, abundant Sandstone gray to white, no staining, fluorescence, or cut

7320-7340 Sandstone translucent to off white to salt and pepper in part, fine to very fine grained, occasional medium grained, sub angular to rounded, poorly sorted, poorly cemented to unconsolidated in part, occasional consolidated, no visible porosity, slightly calcareous, Shale as above, Siltstone, no staining, fluorescence, or cut

7340-7360 Shale red to brown to gray, occasional green to yellow to variegated, sub blocky to sub platy, occasional splintery, firm to slightly hard, earthy to silty to smooth, moderately to very calcareous, some grading to argillaceous limestone, occasional sub waxy, abundant siltstone and sandstone a/a

7360-7380 Sandstone salt and pepper to off white, occasional translucent, very fine to fine grained, sub angular to sub rounded, poorly sorted, moderately cemented to unconsolidated, trace massive pyrite, some white clay filled, moderately calcareous, some grading to siltstone, no staining, fluorescence, or cut

7380-7400 Shale red to brown to gray, occasional green to yellow to variegated, sub blocky to sub platy, occasional splintery, firm to slightly hard, earthy to silty to smooth, moderately to very calcareous, some grading to argillaceous limestone, abundant sandstone a/a, abundant siltstone light gray to off white to red brown, sub blocky to sub platy, argillaceous, calcareous, firm to hard

7400-7420 Sandstone off white to salt and pepper, very fine to fine grained, grading to siltstone in part, sub angular to sub rounded, well sorted, moderately cemented, calcareous, grading to siltstone in part, white clay filled to argillaceous matrix, abundant shale and siltstone a/a, trace argillaceous limestone, no staining, fluorescence, or cut

7420-7440 Sandstone off white to salt and pepper, very fine grained, sub angular to sub rounded, well sorted, clean, sub angular to sub rounded, non to slightly calcareous, no visible porosity, no staining, fluorescence, or cut, abundant shale red to brown to gray, occasional green to yellow to variegated, sub blocky to sub platy, occasional splintery, firm to slightly hard,

7440-7460 Sandstone white to salt and pepper, fine grained, sub angular to sub rounded, well sorted, moderately to very well cemented, non to slightly calcareous, predominantly silica cemented, some broken through grains, white clay filled in part, no visible porosity, no staining, fluorescence, or cut

7460-7480 Sandstone light gray to off white to salt and pepper, very fine grained to silty, grading to siltstone in part, hard, blocky to platy, silica cemented, some white clay filled to argillaceous matrix, no visible porosity, abundant light gray to red shale a/a, no staining, fluorescence, or cut

7480-7500 Sandstone light gray to salt and pepper to off white, very fine to fine grained, some grading to siltstone, firm, poor to moderately cemented, non calcareous, predominantly white clay filled, no visible porosity, abundant shale and siltstone a/a, no staining, fluorescence, or cut

7500-7520 Sandstone light gray to salt and pepper to off white, laminated in part, very fine grained to silty, occasional fine to medium grained, angular to rounded, poorly sorted, moderately cemented, silica cemented, abundant interlaminated siltstone, some carbonaceous lams, no visible porosity, some white clay filled, no staining, fluorescence, or cut

7520-7540 Sandstone light gray to salt and pepper to off white, laminated in part, very fine grained to silty, occasional fine to medium grained, angular to rounded, poorly sorted, moderately cemented, silica cemented, abundant interlaminated siltstone, occasional glauconitic inclusion, some carbonaceous lams, no visible porosity, some white clay filled, as above, no staining, fluorescence, or cut

7540-7560 Sandstone white to light gray, salt and pepper, fine to medium grained, angular to sub rounded, poorly sorted, well cemented, silica cemented, non calcareous, glauconitic inclusion, no visible porosity, some white clay filled, abundant shale and siltstone a/a, no staining, fluorescence, or cut

7560-7580 Sandstone white to light gray, salt and pepper, very fine to medium grained, angular to sub rounded, poorly sorted, well cemented, silica cemented, non calcareous, glauconitic inclusion, no visible porosity, abundant shale and siltstone a/a, no staining, fluorescence, or cut

7580-7600 Sandstone off white to white, light gray, salt and pepper, very fine to medium grained, sub angular to sub rounded, poorly sorted, firm to hard, consolidated, well cemented, silica cemented, non calcareous, glauconitic inclusion, no visible porosity, some white clay filled, Shale variegated, firm to soft, Siltstone light gray, rounded to brown, no staining, fluorescence, or cut

7600-7620 Sandstone white, light gray, salt and pepper in part, very fine to fine grained, occasional medium grained, sub angular to sub rounded, poorly sorted, firm to hard, consolidated, well cemented, silica cemented, non calcareous, glauconitic inclusion, poor porosity, Shale variegated, firm to soft, silty in part, sub waxy, Siltstone light gray to gray, rounded to brown, no staining, fluorescence, or cut

7620-7640 Sandstone gray, white to off white, light gray, tan, salt and pepper in part, very fine to fine grained, abundant medium grained, angular to sub rounded, poorly sorted, firm to hard, consolidated, well cemented, silica cemented, poor porosity, Shale variegated, firm to soft, silty in part, sub waxy, Siltstone light gray to gray, rounded to brown, no staining, fluorescence, or cut

7640-7660 Sandstone white, light gray, salt and pepper in part, very fine to medium grained, angular to sub angular, poorly sorted, hard, consolidated, moderately cemented, silica cemented, poor porosity, Shale variegated, firm, silty in part, sub waxy, silica, Siltstone light gray to gray, rounded to brown, firm to soft, no staining, fluorescence, or cut

7660-7680 Sandstone white, light gray, tan, salt and pepper in part, very fine to medium grained, angular to sub rounded, poorly sorted, hard, consolidated, moderately cemented, silica cemented in part, slightly calcareous in part, poor porosity, Shale variegated, firm, silty in part, sub waxy, silica, Siltstone light gray to gray, rounded to brown, firm to soft, no staining, fluorescence, or cut

7680-7700 Sandstone white, gray, tan, salt and pepper, occasional clay filled, very fine to fine grained, angular to sub angular, poorly sorted, hard, consolidated, moderately cemented, abundant medium grained, Shale and Siltstone as above, no staining, fluorescence, or cut

7700-7720 Sandstone white to salt and pepper, abundant gray, fine grained to medium grained, sub angular to sub rounded, poorly sorted, moderately cemented, non calcareous, predominantly silica cemented, clay filled in part, poor porosity, glauconitic inclusion, Shale variegated, firm to soft, Siltstone light gray, rounded to brown, no staining, fluorescence, or cut

7720-7740 Sandstone off white to light gray, salt and pepper, fine grained, occasional medium grained, sub angular to sub rounded, poorly sorted, well cemented, very slightly calcareous, silica cemented, clay filled in part, poor porosity, glauconitic inclusion, Shale variegated, firm to soft, Siltstone

light gray, rounded to brown, no staining, fluorescence, or cut

7740-7760 Sandstone off white to light gray, salt and pepper, fine grained, abundant medium grained, sub angular to sub rounded, poorly sorted, well cemented, slightly calcareous, silica cm in part, clay filled in part, poor porosity, rare glauconitic inclusion, Shale as above, variegated, firm to soft, Siltstone light gray, rounded to brown, no staining, fluorescence, or cut

7760-7780 Sandstone light gray to gray, medium gray and dark gray, salt and pepper, fine grained, sub angular, moderately sorted, well cemented, slightly calcareous, silica cemented in part, clay filled in part, poor porosity, Shale variegated, firm to soft, Siltstone light gray, rounded to brown, no staining, fluorescence, or cut

7780-7800 Sandstone gray to dark gray, occasional white, salt and pepper, fine grained, trace medium grained, sub angular, moderately sorted, well cemented, slightly calcareous, silica cemented in part, clay filled in part, poor porosity, Shale variegated, firm to soft, sub waxy to earthy, Siltstone light gray, rounded to brown, no staining, fluorescence, or cut

7700-7820 Sandstone white, gray to dark gray, salt and pepper, fine grained, occasional medium grained, sub angular, moderately sorted, well cemented, slightly calcareous, clay filled, poor porosity, Shale gray to dark gray, silty, firm, splintery to sub blocky, Siltstone, gray, sandy in part, firm, calcareous, no staining, fluorescence, or cut

7820-7840 Sandstone gray to dark gray, abundant white, salt and pepper, very fine to fine grained, occasional medium grained, sub angular, moderately sorted, well cemented, slightly calcareous, clay filled, poor porosity, Shale gray to dark gray, silty, firm, splintery to sub blocky, calcareous, Siltstone, gray, sandy in part, firm, brittle, calcareous, no staining, fluorescence, or cut

7840-7860 Sandstone gray to light gray, very fine grained to fine grained sub angular, moderately sorted, calcareous, hard, abundant medium grained, white, non calcareous, salt and pepper, occasional unconsolidated, Shale gray to dark gray, silica, firm to brittle, sub blocky, silty, very calcareous, Siltstone, carbonaceous inclusion gray to dark gray, firm, no staining, fluorescence, or cut

7860-7880 Sandstone gray to light gray, very fine grained to fine grained sub angular, moderately sorted, calcareous, hard, abundant medium grained, white, non calcareous, salt and pepper, occasional unconsolidated, Shale gray to dark gray, silica, firm to brittle, sub blocky, silty, very calcareous, Siltstone, gray to dark gray, sandy, carbonaceous inclusion, firm, brittle, no staining, fluorescence, or cut

7880-7900 Sandstone gray to light gray, very fine grained to fine grained sub angular, moderately sorted, calcareous, hard, abundant medium grained, abundant white, translucent in part, non calcareous, salt and pepper, occasional unconsolidated, Shale gray to dark gray, silica, firm to brittle, sub blocky, silty, very calcareous, Siltstone, gray to dark gray, sandy, carbonaceous inclusion, firm, brittle, no staining, fluorescence, or cut

7900-7920 Sandstone off white, gray, salt and pepper, very fine grained, abundant medium grained, sub angular to sub rounded, moderately sorted, clean, occasional clay filled, slightly calcareous, no visible porosity, Shale gray to dark gray, silica, firm to brittle, sub blocky, silty, carbonaceous inclusion, Siltstone, gray to dark gray, sandy, carbonaceous inclusion, firm, brittle, no staining, fluorescence, or cut

7920-7940 Sandstone white to salt and pepper, translucent in part, gray, very fine grained to medium grained, sub angular to sub rounded, moderately sorted, clean, sub angular to sub rounded, non to slightly calcareous, no visible porosity, Shale gray to dark gray, silica, firm to brittle, sub blocky, silty, carbonaceous inclusion, Siltstone, gray to dark gray, sandy, carbonaceous inclusion, firm, brittle, no staining, fluorescence, or cut

7940-7960 Sandstone white to gray, very fine to fine grained, abundant medium grained, firm to hard, non calcareous to calcareous, Shale medium gray, firm, brittle in part, occasional Siltstone gray, firm, non calcareous, no staining, fluorescence, or cut

7960-7980 Sandstone white to gray, medium gray, clay filled in part, occasional dark gray, very fine to fine grained, abundant medium grained, salt and pepper, firm to hard, non calcareous to calcareous, Shale medium gray, occasional dark gray, firm, carbonaceous in part, occasional Siltstone gray, firm, no staining, fluorescence, or cut

7980-8000 Sandstone gray to medium gray, clay filled in part, occasional dark gray, very fine to fine grained, salt and pepper, firm to hard, slightly calcareous, Shale medium gray, occasional dark gray, firm, non calcareous, Siltstone gray to dark gray, firm, sandy, very slightly calcareous, no staining, fluorescence, or cut

8000-8020 Sandstone gray to medium gray, clay filled in part, occasional dark gray, very fine to fine grained, firm to hard, slightly calcareous, occasional white, medium grained. silica, Shale medium gray, occasional dark gray, firm, non calcareous, Siltstone gray to dark gray, firm, sandy, very slightly calcareous, as above, no staining, fluorescence, or cut

8020-8040 Sandstone medium gray to dark gray, clay filled in part, very fine to fine grained, firm to hard, no visible porosity, slightly calcareous, occasional white, fine to medium grained, silica, Shale medium gray to dark gray, occasional firm to soft, non calcareous, Siltstone gray to dark gray, firm, sandy, very slightly calcareous, no staining, fluorescence, or cut

8040-8060 Sandstone gray to dark gray, clay filled in part, very fine to fine grained, firm to hard, slightly calcareous, poor porosity, occasional white, salt and pepper, fine to medium grained, silica, Shale medium gray to dark gray, occasional firm to soft, non calcareous, Siltstone gray to dark gray, firm, sandy, very slightly calcareous, no staining, fluorescence, or cut

8060-8080 Sandstone white, salt and pepper, fine to medium grained, poorly sorted, slightly calcareous, gray to dark gray, fine grained, sub angular, moderately sorted, well cemented, clay filled, poor porosity, Shale gray to dark gray, silty in part, carbonaceous inclusion, , firm, splintery to sub blocky, Siltstone, gray, sandy in part, firm, calcareous, no staining, fluorescence, or cut

8080-8100 Sandstone gray to dark gray, clay filled in part, very fine to fine grained, firm to hard, slightly calcareous, poor porosity, occasional white, salt and pepper, fine to medium grained, silica, Shale medium gray to dark gray, occasional firm to soft, non calcareous, carbonaceous inclusion, Siltstone gray to dark gray, firm, sandy, very slightly calcareous, no staining, fluorescence, or cut

8100-8120 Sandstone white, salt and pepper, fine to medium grained, poorly sorted, slightly calcareous, gray to dark gray, fine grained, sub angular, moderately sorted, well cemented, clay filled, poor porosity, Shale gray to dark gray, silty in part, carbonaceous inclusion, firm, splintery to sub blocky, Siltstone, gray, sandy in part, firm, calcareous, carbonaceous in part, no staining, fluorescence, or cut

8120-8140 Sandstone white to salt and pepper, gray, fine grained to medium grained, sub angular to sub rounded, poorly sorted, clean, sub angular to sub rounded, non calcareous to slightly calcareous, poor porosity, Shale gray to dark gray, silica, firm, sub blocky, slightly carbonaceous inclusion, Siltstone, gray to dark gray, sandy, carbonaceous inclusion, firm, brittle in part, no staining, fluorescence, or cut

8140-8160 Shale medium to dark gray, sub blocky to sub platy, firm, non calcareous, silty to earthy, grading to siltstone in part, abundant sandstone white to gray, very fine to fine grained, occasional medium grained, sub angular to sub rounded, poorly sorted, clean, sub angular to sub rounded, non calcareous to slightly calcareous, no visible porosity, no staining, fluorescence, or cut

8160-8180 Sandstone salt and pepper to off white, predominantly fine grained, occasional very fine to medium grained, sub angular to rounded, moderately sorted, moderately cemented to unconsolidated, moderately calcareous, white clay filled in part, no visible porosity, no staining, fluorescence, or cut

8180-8200 Sandstone salt and pepper to off white, predominantly fine grained, occasional very fine to medium grained, sub angular to rounded, moderately sorted, moderately cemented to unconsolidated, moderately calcareous, white clay filled in part, no visible porosity, grading to medium gray laminated siltstone in part, good trace unconsolidated coarse grained sand, no staining, fluorescence, or cut

8200-8220 Sandstone translucent to salt and pepper to light gray, fine to very fine grained, occasional medium grained, rounded to sub angular, moderately to poorly sorted, unconsolidated to poorly cemented, slightly to moderately calcareous, white clay filled to argillaceous matrix in part, grading to siltstone in part, no visible porosity, good trace shale and siltstone a/a, no staining, fluorescence, or cut

8220-8240 Shale medium to dark gray, blocky to sub blocky, firm to hard, earthy to silty, grading to siltstone in part, trace carbonaceous material, abundant sandstone a/a, some light gray laminated siltstone

8240-8260 Sandstone translucent to salt and pepper to light gray, fine to very fine grained, occasional medium grained, rounded to sub angular, moderately to poorly sorted, unconsolidated to poorly cemented, slightly to moderately calcareous, white clay filled in part, no visible porosity, good trace shale and siltstone a/a, no staining, fluorescence, or cut

8260-8280 Sandstone translucent to salt and pepper to light gray, fine to very fine grained, rounded to sub angular, moderately sorted, unconsolidated to poorly cemented, slightly to moderately calcareous, white clay filled in part, no visible porosity, no staining, fluorescence, or cut, abundant shale medium to dark gray, blocky to sub blocky, firm to hard, earthy to silty, grading to siltstone in part, some siltstone, no staining, fluorescence, or cut

8280-8300 Sandstone translucent to salt and pepper to light gray, fine to medium grained, sub rounded to rounded, well sorted, poorly cemented to unconsolidated, no visible porosity, slightly calcareous, some white clay filled, no staining, fluorescence, or cut

8300-8320 Sandstone translucent to salt and pepper to light gray, fine to medium grained, sub rounded to rounded, well sorted, poorly cemented to unconsolidated, tight, slightly to moderately calcareous, some white clay filled, no staining, fluorescence, or cut, Shale dark gray to black, sub blocky, firm to soft, earthy, non to slightly calcareous, carbonaceous in part, rare crystalline calcite

8320-8340 Sandstone translucent to salt and pepper to light gray, predominantly fine grained, occasional very fine to medium grained, rounded to sub angular, moderately sorted, unconsolidated to poorly cemented, slightly to moderately calcareous, white clay filled in part, no visible porosity, no staining, fluorescence, or cut

8340-8360 Shale dark gray to black, sub blocky to sub platy, firm to soft, earthy to silty, occasional sandy, carbonaceous, non calcareous, abundant sandstone translucent to salt and pepper, fine grained, occasional very fine to medium grained, sub angular to rounded, moderately sorted, slightly calcareous, predominantly unconsolidated to poorly cemented, no staining, fluorescence, or cut

8360-8380 Sandstone translucent to salt and pepper, fine grained, occasional very fine to medium grained, sub angular to rounded, moderately sorted, slightly calcareous, predominantly unconsolidated to poorly cemented, no staining, fluorescence, or cut

8380-8400 Sandstone translucent to salt and pepper, fine grained, occasional very fine to medium grained, sub angular to rounded, moderately sorted, slightly calcareous to moderately calcareous, trace

crystalline calcite, predominantly unconsolidated to poorly cemented, no staining, fluorescence, or cut, abundant shale dark gray to black, sub blocky to sub platy, firm to soft, earthy to silty, non calcareous

8400-8420 Sandstone translucent to salt and pepper, predominantly fine grained, occasional very fine to medium grained, sub angular to rounded, moderately sorted, unconsolidated to moderately cemented, friable in part, predominantly unconsolidated fine grained sand, some white clay filled, moderately calcareous, some transparent crystalline calcite, trace Siltstone some dull orange mineral fluorescence, no stain or cut

8420-8440 Sandstone translucent to salt and pepper, fine grained, occasional very fine to medium grained, sub angular to rounded, moderately sorted, unconsolidated to moderately cemented, friable in part, fine grained sand, some white clay filled, moderately calcareous, some transparent crystalline calcite, Shale gray to very dark gray, black, carbonaceous, no stain or cut

8440-8460 Sandstone translucent to salt and pepper, gray to medium gray, fine grained, occasional very fine to medium grained, sub angular to rounded, moderately sorted, unconsolidated to moderately cemented, friable in part, fine grained sand, some white clay filled, calcareous, Shale gray to very dark gray, black, carbonaceous, trace Siltstone, no stain or cut

8460-8480 Sandstone white to off white, gray, occasional dark gray, translucent to salt and pepper, fine grained, occasional very fine to medium grained, sub angular to rounded, moderately sorted, slightly calcareous, consolidated, poor porosity, moderately cemented, Shale medium gray to dark gray, black, silty in part, sub waxy in part, earthy, carbonaceous inclusion, trace Siltstone, no staining, fluorescence, or cut

8480-8500 Sandstone white to off white, gray, occasional dark gray, translucent to salt and pepper, fine grained, occasional medium grained, sub angular to rounded, moderately sorted, slightly calcareous, consolidated, fair porosity in part, Shale medium gray to dark gray, black, silty in part, sub waxy in part, earthy to silica, carbonaceous inclusion, trace Siltstone, no staining, fluorescence, or cut

8500-8520 Sandstone white to off white, gray, occasional dark gray, salt and pepper in part, fine grained, abundant medium grained, sub angular to rounded, moderately sorted, slightly calcareous, consolidated, poor porosity, Shale medium gray to dark gray, black, silty in part, sub waxy in part, earthy to silica, carbonaceous inclusion, trace Siltstone, no staining, fluorescence, or cut

8520-8540 Sandstone gray to medium gray, occasional dark gray, fine grained, moderately sorted, calcareous, moderately cemented, occasional white, sub angular to rounded, moderately sorted, slightly calcareous, unconsolidated in part, Shale medium gray to dark gray, black, silty in part, sub waxy in part, earthy to silica, carbonaceous inclusion, trace Siltstone, no staining, fluorescence, or cut

8540-8560 Sandstone off white to translucent, gray, silica, occasional dark gray, fine grained, occasional medium grained, sub angular to rounded, moderately sorted, slightly calcareous, consolidated, hard, abundant unconsolidated, fair porosity, in part, Shale medium gray to dark gray, silica, hard, occasional black, silty in part, sub waxy in part, earthy to silica, carbonaceous inclusion, occasional Siltstone, no staining, fluorescence, or cut

8560-8580 Sandstone translucent to white, fine grained, abundant medium grained, occasional coarse grained, sub angular to sub rounded, poorly sorted, salt and pepper, clean, very well cemented, non calcareous to very slightly calcareous, very silica, very hard, no visible porosity, occasional un consolidated, medium grained, abundant, gray, very fine to fine grained, very hard, very silica, salt and pepper, Shale as above, trace Siltstone, no staining, fluorescence, or cut

8580-8600 Sandstone translucent to white, fine grained, abundant medium grained, occasional coarse grained, sub angular to sub rounded, poorly sorted, salt and pepper, in part, clean, non calcareous

to very slightly calcareous, very silica, very hard, poor porosity, predominantly un consolidated, abundant gray, very fine to fine grained, very hard, very silica, salt and pepper, Shale as above, trace Siltstone, no staining, fluorescence, or cut

8600-8620 Sandstone translucent to white, fine grained, abundant medium grained, occasional coarse grained, abundant clear grained, sub angular to sub rounded, poorly sorted, salt and pepper, in part, clean, non calcareous to very slightly calcareous, un consolidated, occasional Shale medium gray to dark gray, firm, silty in part, occasional black, sub waxy in part, earthy to silica, carbonaceous inclusion, no staining, fluorescence, or cut

8620-8640 Sandstone translucent to white, fine grained, abundant medium grained, occasional coarse grained, angular to sub rounded, poorly sorted, clean, non calcareous to very slightly calcareous, very silica, predominantly un consolidated, consolidated in part, occasional Shale medium gray to dark gray, firm, silty in part, occasional black, sub waxy in part, carbonaceous inclusion, no staining, fluorescence, or cut

8640-8660 Sandstone translucent to white, fine grained, abundant medium grained, occasional coarse grained, abundant clear grained, occasional milky, angular to sub rounded, poorly sorted, clean, non calcareous to very slightly calcareous, very silica, predominantly un consolidated, consolidated in part, hard, trace Shale dark gray, firm, silty in part, occasional black, sub waxy to earthy, carbonaceous inclusion, no staining, fluorescence, or cut

8660-8680 Sandstone translucent to white, fine grained, abundant medium grained, occasional coarse grained, abundant clear grained, good to sub rounded, poorly sorted, clean, non calcareous to very slightly calcareous, very silica, predominantly un consolidated, consolidated in part, hard, abundant calcite rhomb, trace Shale dark gray, firm, silty in part, occasional black, sub waxy to earthy, carbonaceous inclusion, no staining, fluorescence, or cut

8680-8700 Sandstone translucent to white, fine grained, abundant medium grained, occasional coarse grained, abundant clear grained, angular to sub rounded, poorly sorted, clean, non calcareous to very slightly calcareous, very silica, hard, rare pyrite, abundant variegated shale cavings from trips, no staining, fluorescence, or cut

8700-8710 Sandstone white to gray, fine grained, sub angular to sub rounded, moderately sorted, clean, non calcareous, very silica, hard, predominantly variegated shale cavings, no staining, fluorescence, or cut

8710-8720 predominantly Shale variegated cavings, Sandstone white to gray, fine grained, sub angular to sub rounded, moderately sorted, clean, non calcareous, very silica, hard, no staining, fluorescence, or cut

8720-8730 predominantly variegated Shale cavings, Sandstone white to gray, fine grained to medium grained, sub angular to sub rounded, poorly sorted, clean, non calcareous, very silica, hard, no staining, fluorescence, or cut

8730-8740 Sandstone white to gray, fine grained to medium grained, sub angular to sub rounded, poorly sorted, clean, non calcareous, very silica, hard, abundant unconsolidated, clear to milky grained, abundant Shale, variegated, as above, no staining, fluorescence, or cut

8740-8750 Sandstone white to light gray, very fine to medium grained, translucent, consolidated to unconsolidated, porosity sorted, hard, silica to calcite fill, non calcareous to very calcareous, sub angular to sub rounded, s and poor in part, Shale variegated, trace Siltstone, no staining, fluorescence, or cut

8750-8760 Shale, gray to dark gray, carbonaceous to coal inclusion in part, firm to soft, Siltstone dark gray, black in part, sandy, carbonaceous to coal inclusion in part, Sandstone as above , no

staining, fluorescence, or cut

8760-8770 Sandstone gray, light gray, tan, very fine to fine grained, non calcareous to slightly calcareous, sub angular to sub rounded, hard Siltstone, gray to brown, hard, carbonaceous inclusion, Shale, carbonaceous inclusion in part, no staining, fluorescence, or cut

8770-8780 Sandstone continued a/a, good trace shale, by to dark gray, sub blocky to sub platy, earthy to silty, grading to carbonaceous siltstone in part, some grading to argillaceous coal in part

8780-8790 Sandstone salt and pepper to off white, very fine to fine grained, sub angular to sub rounded, moderately sorted, hard, predominantly very well cemented, silica to slightly calcareous, tight, abundant shale continued a/a, good trace variegated shale, rare crystalline calcite, poor sample abundant LCM, no staining, fluorescence, or cut

8790-8800 Sandstone salt and pepper to off white to translucent, fine to very fine grained, sub angular to rounded, moderately sorted, well cemented in part, predominantly unconsolidated sand, silica to slightly calcareous, no visible porosity, abundant LCM and shale cavings, no staining, fluorescence, or cut

8800-8810 Sandstone translucent to salt and pepper, very fine to fine grained, sub angular to sub rounded, well sorted, poorly cemented to unconsolidated, predominantly unconsolidated fine grained sand, slightly calcareous, some crystalline calcite, poor sample abundant LCM, no staining, fluorescence, or cut

8810-8820 very poor sample, predominantly cedar fiber, Sandstone translucent to salt and pepper, very fine to fine grained, sub angular to sub rounded, well sorted, poorly cemented to unconsolidated, predominantly unconsolidated very fine grained sand, slightly calcareous, some crystalline calcite, cavings, no staining, fluorescence, or cut

8820-8830 Sandstone predominantly a/a, good trace shale, light to dark gray, splintery to sub blocky, firm to slightly hard, rare coal fragments, abundant LCM, no staining, fluorescence, or cut

8830-8840 Sandstone salt and pepper to off white to tan, very fine grained, sub angular to angular, well sorted, grading to siltstone in part, non to moderately calcareous, white clay filled, no visible porosity, abundant gray to variegated shale and siltstone, cavings, no staining, fluorescence, or cut

8840-8850 Shale medium to dark gray to variegated, firm to slightly hard, earthy to silty, occasional smooth, abundant cavings, non to slightly calcareous, good trace crystalline calcite, continued abundant sand a/a

8850-8860 Shale light to medium gray to variegated, firm, smooth to earthy, good trace siltstone, non to slightly calcareous, trace crystalline calcite, sub blocky to splintery, abundant cavings, good trace LCM, good trace hard silica sandstone

8860-8870 Sandstone off white to tan to salt and pepper, very fine grained, sub angular to sub rounded, well sorted, very well cemented, hard, silica to slightly calcareous, some white clay filled, tight, continued abundant variegated to gray shale cavings, no staining, fluorescence, or cut

8870-8880 Sandstone continued a/a, shale light gray to brown to dark gray, sub blocky to blocky to splintery, firm to slightly hard, earthy to smooth, non to slightly calcareous, trace crystalline calcite a/a, continued abundant cavings,

8880-8890 Sandstone off white to tan to salt and pepper, gray, very fine grained, sub angular to sub rounded, well sorted, very well cemented, hard, silica to slightly calcareous, some white clay filled, tight, Shale variegated to gray, dark gray, abundant silty, sub blocky to blocky to splintery, firm to slightly hard, earthy to smooth, non to slightly calcareous

8990-8900 Sandstone light gray, off white, tan, salt and pepper in part, very fine grained, sub and to sub rounded, well sorted, calcareous to non calcareous, very hard, well cemented, silica to calcite fill, tight, no visible porosity, Shale variegated and black, hard, brittle, carbonaceous, non calcareous, no staining, fluorescence, or cut

8900-8910 Sandstone light gray, off white, tan, salt and pepper in part, very fine grained, sub and to sub rounded, well sorted, calcareous to non calcareous, very hard, well cemented, silica to calcite fill, tight, no visible porosity, Shale variegated and black, hard, brittle, carbonaceous, non calcareous, no staining, fluorescence, or cut

8910-8920 Predominately cavings, Shale variegated, gray to dark gray, green, black, light brown, rounded, brittle, firm, sub waxy to earthy, Siltstone gray to dark gray, sandy, occasional Sandstone light gray, off white, very fine grained, hard, no staining, fluorescence, or cut

8920-8930 Predominately cavings, Shale variegated, gray to dark gray, green, black, light brown, rounded, brittle, firm, sub waxy to earthy, Siltstone gray to dark gray, sandy, tan, Sandstone light white, very fine grained, hard, no staining, fluorescence, or cut

8930-8940 Abundant cavings, as above, Shale variegated, gray to dark gray, black, light brown to rounded, brittle to , firm, sub waxy to black, carbonaceous, Siltstone dark gray, sandy in part, Sandstone light gray to gray, off white, tan, very fine grained, hard, very slightly calcareous to non calcareous, no staining, fluorescence, or cut

8940-8950 Predominately cavings, Shale variegated, gray to dark gray, occasional red to yellow green, firm, smooth, sub blocky to splintery, firm, abundant siltstone and sandstone cont, rare coal a/a

8950-8960 Sample continued predominantly cavings, Sandstone tan to light gray to salt and pepper, very fine grained to silty, grading to siltstone in part, sub angular to angular, well sorted, well to poorly cemented, silica to moderately calcareous, no visible porosity, grading to siltstone in part, no staining, fluorescence, or cut

8960-8970 Sample continued predominantly cavings, Sandstone light gray to salt and pepper, very fine grained to silty, grading to siltstone in part, sub angular to angular, well sorted, well to poorly cemented, silica to moderately calcareous, some dark gray carbonaceous shale, no staining, fluorescence, or cut

8970-8980 Abundant cavings, as above, Shale variegated, gray to dark gray, black, light brown to rounded, brittle to , firm, sub waxy to black, carbonaceous, Siltstone dark gray, sandy in part, Sandstone light gray to gray, off white, tan, very fine grained, hard, very slightly calcareous to non calcareous, no staining, fluorescence, or cut

8980-8990 Predominately cavings, Shale variegated, gray to dark gray, occasional red to yellow green, brown, firm, brittle in part, smooth, sub blocky to splintery, firm, abundant siltstone and sandstone continued a/a

8990-9000 Abundant cavings, as above, Shale variegated, gray to dark gray, black, light brown to rounded, brittle to , firm, sub waxy, black, carbonaceous in part, Siltstone dark gray, sandy in part, Sandstone light gray to gray, off white, tan, very fine grained, hard, very slightly calcareous to non calcareous, no staining, fluorescence, or cut

9000-9010 Predominately cavings as above, occasional coal, sub vitreous, black, non calcareous, soft, very argillaceous, no staining, fluorescence, or cut

9010-9020 Predominately cavings, Shale variegated, gray to dark gray, occasional red to yellow green, brown, firm, brittle in part, smooth, sub blocky to splintery, firm, abundant siltstone and sandstone continued a/a, rare argillaceous coal, no staining, fluorescence, or cut

9020-9030 Sample continued predominantly cavings, Shale variegated, firm to brittle, sub waxy, occasional black to carbonaceous, Siltstone gray to dark gray, sandy, occasional Sandstone light gray to salt and pepper, very fine grained to silty, grading to siltstone in part, sub angular to angular, well sorted, well to poorly cemented, silica to moderately calcareous, no staining, fluorescence, or cut

9030-9040 Predominately cavings, Shale variegated, gray to dark gray, green, brittle, firm, sub waxy to earthy, silty in part, Siltstone gray to dark gray, occasional Sandstone light gray, off white, very fine grained, hard, no staining, fluorescence, or cut

9040-9050 Predominately cavings, Shale variegated, gray to dark gray, green, black, light brown, rounded, brittle, firm, occasional soft, sub waxy to earthy, occasional, black, carbonaceous, Siltstone gray to dark gray, very dark gray, carbonaceous in part, sandy in part, occasional Sandstone light gray to gray, off white, tan, very fine grained, hard, no staining, fluorescence, or cut

9050-9060 Shale gray to dark gray, black in part, non calcareous, slightly silty, slightly rounded to sub blocky, carbonaceous in part, earthy, firm, abundant cavings as above, Sandstone, Siltstone, no staining, fluorescence, or cut

9060-9070 Shale gray to dark gray, black in part, non calcareous, slightly silty, sub blocky, occasional platy, carbonaceous, earthy, firm, rare Coal, abundant cavings as above, sandstone, siltstone, variegated shale, no staining, fluorescence, or cut

9070-9080 Shale gray to dark gray, black in part, non calcareous, slightly silty, slightly rounded to sub blocky, occasional platy, carbonaceous, earthy, firm, soft in part, rare Coal, occasional cavings as above, sandstone, siltstone, variegated shale, no staining, fluorescence, or cut

9080-9090 Shale gray to dark gray, black in part, non calcareous, slightly silty, slightly rounded to sub blocky, occasional platy, carbonaceous, earthy, firm, soft in part, occasional cavings

9090-9100 Shale medium to dark gray, occasional black, blocky to splintery, firm to slightly hard, earthy to slightly silty, some siltstone, carbonaceous in part, some grading to argillaceous coal, trace coal, black, sub vitreous to dull, some bright bands, predominantly argillaceous, grading to carbonaceous shale in part, non calcareous, continued abundant cavings

9100-9110 Shale gray to dark gray, occasional black, sub blocky to platy, earthy to slightly silty, non calcareous, some salt and pepper sandstone, trace coal fragments

9110-9120 Shale gray to dark gray, occasional black, car b in part, sub blocky to platy, earthy to slightly silty, non calcareous, Sandstone, unconsolidated in part, fine to medium grained, sub angular to sub rounded, trace coal fragments

9120-9130 Predominately cavings, Shale variegated, gray to dark gray, occasional red to yellow green, brown, black, carbonaceous, firm, brittle in part, smooth, sub blocky to splintery, firm, abundant siltstone and sandstone continued

9130-9140 Sandstone, unconsolidated, clear grained, sub angular to sub rounded, fine to medium grained, poorly sorted, abundant cavings as above, Shale, variegated Siltstone, no staining, fluorescence, or cut

9140-9150 Shale gray to dark gray, black in part, non calcareous, slightly silty, sub blocky, occasional platy, carbonaceous, earthy, firm, abundant cavings as above, Sandstone, Siltstone, variegated Shale, no staining, fluorescence, or cut

9150-9160 Shale gray to dark gray, black in part, non calcareous, slightly silty, sub blocky, occasional platy, carbonaceous, earthy, firm, abundant cavings as above, Sandstone consolidated in part,

gray, very fine to fine grained, sub angular to sub rounded, unconsolidated in part, clear to frosted grained, Siltstone, variegated Shale, no staining, fluorescence, or cut

9160-9170 Predominately cavings. Shale variegated, gray to dark gray, occasional red to yellow green, brown, firm, brittle in part, smooth, sub blocky to splintery, firm, occasional black, carbonaceous, abundant siltstone and sandstone continued a/a, no staining, fluorescence, or cut

9170-9180 Less cavings, Shale gray to dark gray, black in part, non calcareous, slightly silty, sub blocky, occasional platy, carbonaceous inclusion, earthy, firm to brittle, trace Coal, black, argillaceous, soft, abundant cavings as above, Sandstone, Siltstone, variegated Shale, no staining, fluorescence, or cut

9180-9190 Shale gray to dark gray, variegated cavings as above, occasional black, carbonaceous in part, sub blocky to platy, earthy to slightly silty, non calcareous, Sandstone, unconsolidated in part, fine to medium grained, sub angular to sub rounded, consolidated, gray to white, translucent, hard, abundant LCM, no staining, fluorescence, or cut

9190-9200 Shale predominantly cavings, variegated, light green, red to brown, soft to hard, sub blocky to sub platy, silty, very slightly calcareous, Sandstone white to translucent, salt and pepper, fine medium grained, sub angular to sub rounded, moderately hard, consolidated, moderately sorted, non calcareous, no visible porosity, no staining, fluorescence, or cut

9200-9210 Shale predominantly cavings, variegated as above, red to brown, light green, soft to moderately hard, sub blocky to sub platy, silty, very slightly calcareous, Sandstone salt and pepper, white to translucent, fine medium grained, sub angular, hard, consolidated, moderately sorted, non calcareous, no visible porosity,

9210-9220 Predominately cavings Shale variegated, Siltstone gray, dark gray, firm, calcareous, Sandstone white to off white, light gray, tan, fine grained to occasional medium grained, slightly calcareous to non calcareous, sub angular to sub rounded, hard, no visible porosity, salt and pepper in part, no staining, fluorescence, or cut

9220-9230 Predominately cavings, Shale variegated in part, gray to dark gray, red to brown, light green, brittle to firm, sub waxy to earthy, silty in part, black, carbonaceous in part, Siltstone gray to dark gray, occasional Sandstone light gray, off white, very fine grained, hard, no staining, fluorescence, or cut

9230-9240 Predominately cavings, Shale, variegated, soft to slightly hard, earthy, non to moderately silty, sub fissile to sub blocky, some carbonaceous, Siltstone, medium to dark gray, irregular, firm to slightly hard, Sandstone, very light gray, salt and pepper, very fine grained, occasional fine grained, angular to sub angular, moderately to slightly hard, non to slightly calcareous cemented, trace mineral fluorescence, no stain or cut

9240-9250 Predominately cavings, Shale, variegated, soft to slightly hard, earthy, to moderately silty, sub fissile to sub blocky, some carbonaceous, Sandstone, light gray, salt and pepper, very fine grained, occasional fine grained, angular to sub angular, moderately to slightly hard, non to slightly calcareous cemented, trace mineral fluorescence, no stain or cut

9250-9260 Sandstone white to off white, translucent, gray, fine grained to medium grained, abundant fine grained, sub angular to sub rounded, poorly sorted, very well cemented, hard, non calcareous to very slightly calcareous, silica cemented, no visible porosity, salt and pepper in part, Shale gray to medium gray, firm to hard, trace carbonaceous, no staining, fluorescence, or cut

9260-9270 Less cavings, Sandstone light gray, off white, translucent in part, fine grained, abundant medium grained, sub angular to sub rounded, poorly sorted, occasional fair sorted, salt and pepper in part, well cemented, hard, non calcareous to slightly calcareous, poor porosity, Shale light gray

to medium gray, no staining, fluorescence, or cut

9270-9280 Sandstone salt and pepper, off white to translucent, fine grained, trace coarse grained, sub angular to sub rounded, fair sorted, well consolidated, hard, no calcareous, poor porosity, Shale cavings, gray to dark gray, red, green in part, soft to moderately firm, no calcareous, no staining, fluorescence, or cut

9280-9290 Sandstone white to off white, translucent in part, salt and pepper, very fine to medium grained, sub angular to sub rounded, poorly sorted, well consolidated, slightly calcareous, brittle to firm, poor porosity, siliceous in part, Shale cavings, gray to dark gray, red, soft to moderately firm, slightly calcareous, no staining, fluorescence, or cut

9290-9300 Sandstone off white to white, salt and pepper, translucent in part, very fine to medium grained, trace coarse grained, sub angular to angular, poorly sorted, well consolidated, slightly calcareous, soft to moderately firm, poor porosity, occasional Shale cavings, gray to dark gray, red, green in part, soft, moderately calcareous, no staining, fluorescence, or cut

9300-9310 Sandstone off white to white, salt and pepper, very fine to fine grained, sub and to sub rounded, poorly sorted, well consolidated, moderately firm to hard, non calcareous, siliceous in part, poor porosity, Shale, cavings, dark gray to gray, red, green in part, moderately firm, red mottled calcareous, gray green non calcareous, no staining, fluorescence, or cut

9310-9320 Sandstone off white, salt and pepper, fine to medium grained, sub angular to sub rounded, poorly sorted, well consolidated, hard, very slightly calcareous, siliceous in part, poor porosity, Shale cavings, dark gray to gray, red, green in part, moderately soft, red calcareous, gray green non calcareous, no staining, fluorescence, or cut

9320-9330 Sandstone off white, salt and pepper, fine to medium grained, sub angular to sub rounded, well consolidated, moderately firm, non calcareous, poor porosity, Shale occasional cavings, dark gray to gray, red in part, moderately soft, red calcareous, gray non calcareous, no staining, fluorescence, or cut

9330-9340 Sandstone off white to white, salt and pepper, very fine to fine grained, sub angular to sub rounded, poorly sorted, well consolidated, soft to moderately firm, poor porosity, very slightly calcareous, Shale cavings, gray to dark gray, red and green in part, soft, very slightly calcareous, no staining, fluorescence, or cut

9340-9350 Sandstone off white to white, salt and pepper, fine to medium grained, sub angular to sub rounded, moderately hard, poorly sorted, poor porosity, non calcareous, Shale dark gray to gray, occasional red and green, soft, non calcareous, trace pyrite, no staining, fluorescence, or cut

9300-9310 Sandstone off white to white, salt and pepper, very fine to fine grained, sub angular to sub rounded, poorly sorted, well consolidated, moderately firm to hard, non calcareous, siliceous in part, poor porosity, Shale cavings, dark gray to gray, red, green in part, moderately firm, red moderately calcareous, gray green non calcareous, no staining, fluorescence, or cut

9350-9360 Sandstone off white to white, salt and pepper, very fine to fine grained, sub angular to sub rounded, moderately hard, well consolidated, poor porosity, poorly sorted, siliceous in part, non calcareous, Shale cavings, gray to dark gray, occasional red, green in part, very slightly to non calcareous, no staining, fluorescence, or cut

9360-9370 Sandstone off white to white, translucent in part, salt and pepper, very fine to fine grained, sub rounded to sub angular, moderately firm, well consolidated, poor porosity, poorly sorted, non calcareous, occasional Shale cavings, dark gray to gray, occasional red, green in part, red slightly calcareous, gray and green non calcareous, no staining, fluorescence, or cut

9370-9380 Sandstone off white to white, salt and pepper, translucent in part, very fine to fine grained, sub rounded, firm, well consolidated, poor porosity, poorly sorted, non calcareous, Shale cavings, gray to black, occasional red, green in part, soft, non calcareous, no staining, fluorescence, or cut

9380-9390 Sandstone light gray, off white, translucent in part, fine grained to medium grained, sub angular to sub rounded, poorly sorted, unconsolidated in part, salt and pepper, well cemented, hard, non calcareous, poor porosity, Shale medium gray to dark gray, firm to brittle, non calcareous, siliceous in part, no staining, fluorescence, or cut

9390-9400 Sandstone off white, gray, translucent in part, fine grained to medium grained, sub angular to sub rounded, poorly sorted, unconsolidated in part, salt and pepper, well cemented, hard, non calcareous, no visible porosity, Shale medium gray to dark gray, firm, non calcareous, siliceous in part, no staining, fluorescence, or cut

9400-9410 Sandstone as above, off white, gray, translucent in part, fine grained to medium grained, sub angular to sub rounded, poorly sorted, unconsolidated in part, salt and pepper, well cemented, hard, non calcareous, no visible porosity, occasional Shale gray to dark gray, firm, non calcareous, siliceous in part, occasional carbonaceous, black, no staining, fluorescence, or cut

9410-9420 Sandstone off white, light gray, translucent, fine grained to medium grained, sub angular to sub rounded, poorly sorted, unconsolidated in part, salt and pepper, well cemented, hard, non calcareous, poor porosity, Shale gray to dark gray, firm, non calcareous, siliceous in part, occasional carbonaceous, black, no staining, fluorescence, or cut

9420-9430 Sandstone off white, light gray, fine grained to medium grained, sub angular to sub rounded, poorly sorted, consolidated, salt and pepper in part, well cemented, hard, non calcareous, no visible porosity, Shale gray to dark gray, firm, non calcareous, siliceous in part, occasional carbonaceous, black, no staining, fluorescence, or cut

9430-9440 Sandstone light gray to off white, fine grained to medium grained, sub angular to sub rounded, poorly sorted, consolidated, salt and pepper in part, well cemented, hard, non calcareous, clay filled in part, Shale gray to dark gray, as above, Siltstone gray to very dark gray, firm to hard, sandy, non calcareous, no staining, fluorescence, or cut

9440-9450 Sandstone light gray to off white, fine grained to medium grained, sub angular to sub rounded, poorly sorted, consolidated, salt and pepper in part, well cemented, hard, non calcareous, clay filled in part, as above, Shale gray to dark gray, as above, Siltstone gray to very dark gray, firm to hard, sandy, non calcareous, no staining, fluorescence, or cut

9450-9460 Sandstone gray to dark gray, white, very to fine grained, sub angular to sub rounded, moderately sorted, consolidated, well cemented, hard, non calcareous, clay filled in part, grading siltstone, Siltstone gray to very dark gray, black, firm to hard, very sandy, non calcareous, hard, Shale gray to dark gray, occasional black, carbonaceous, no staining, fluorescence, or cut

9460-9470 Sandstone light to dark gray, off white, fine to very fine grained, sub angular to sub rounded, fair sorted, some silty, well consolidated, well cemented, hard, non calcareous, some grading to siltstone, Siltstone, medium to dark gray, irregular to sub fissile, firm to hard, slightly to very slightly argillaceous, non calcareous

9470-9480 Sandstone light to dark gray, off white to white, fine grained, sub angular to sub rounded, poorly sorted, well consolidated, silica, moderately hard, non calcareous, some grading to siltstone, Siltstone dark gray, sub platy, soft to moderately firm, non calcareous, no staining, fluorescence, or cut

9480-9490 Sandstone light to dark gray, off white to translucent, salt and pepper, very fine to fine grained, sub angular to sub rounded, poorly sorted, well consolidated, hard, non calcareous, trace pyrite, some grading to siltstone, Siltstone medium to dark gray, soft, non calcareous, no staining,

fluorescence, or cut

9490-9500 Sandstone light gray to off white, salt and pepper, fine grained, sub angular to sub rounded, poorly sorted, poor porosity, moderately hard, non calcareous, some grading to siltstone, Siltstone dark gray, soft, non calcareous, Shale red and green in part, no staining, fluorescence, or cut

9500-9510 Sandstone light gray to off white, salt and pepper, very fine to fine grained, sub angular to sub rounded, poorly sorted, poor porosity, moderately firm, slightly calcareous, very rare pale yellow fluorescence, good streaming cut, trace pyrite, Siltstone dark gray to gray, sub platy, soft, very slightly calcareous

9510-9520 Siltstone dark gray to gray, sub platy to sub blocky, soft, non calcareous, Sandstone light gray to off white, salt and pepper, fine grained, sub angular to sub rounded, poorly sorted, poor porosity, moderately hard, very slightly calcareous, no staining, fluorescence, or cut

9520-9530 Siltstone dark gray to gray, irregular to sub platy, moderately firm, non calcareous, Sandstone off white to white, salt and pepper, fine to medium grained, sub angular to sub rounded, poorly sorted, poor porosity, firm, non calcareous, silica, occasional Shale, black, carbonaceous, no staining, fluorescence, or cut

9530-9540 Siltstone dark gray to gray, moderately firm, non calcareous, sandy, Sandstone off white to gray, salt and pepper, fine to medium grained, sub angular to sub rounded, poorly sorted, poor porosity, firm, non calcareous, occasional calcite, silica, occasional Shale black, very carbonaceous, no staining, fluorescence, or cut

9540-9550 Siltstone dark gray, firm, non calcareous, sandy, Sandstone off white to gray, salt and pepper, fine to medium grained, sub angular to sub rounded, poorly sorted, poor porosity, firm, non calcareous, occasional calcite, silica, occasional Shale black, very carbonaceous, as above, occasional calcite, no staining, fluorescence, or cut

9550-9560 Siltstone gray to dark gray, firm to hard, non calcareous, sandy, blocky sub rounded, moderately cemented, Sandstone off white to gray, salt and pepper, fine to medium grained, as above, occasional Shale dark gray to occasional black, carbonaceous, as above, occasional calcite, trace mineral fluorescence, no stain or cut

9560-9570 Siltstone medium gray to dark gray, firm, non calcareous sandy, blocky sub rounded, moderately cemented Shale dark gray, occasional black, carbonaceous, sandy in part, soft, occasional Sandstone off white to gray, tan, salt and pepper, fine to medium grained, trace calcite, trace mineral fluorescence, no stain or cut

9570-9580 Siltstone medium gray to dark gray, firm to hard, non calcareous, sandy in part, very argillaceous, carbonaceous, blocky to sub rounded, moderately cemented, Shale dark gray to black, carbonaceous, silty in part, soft, trace calcite, trace mineral fluorescence, occasional Sandstone as above, no stain or cut

9580-9590 Siltstone dark gray to gray, irregular to sub platy, firm to hard, non calcareous, very argillaceous, Sandstone off white to white, salt and pepper, fine to medium grained, sub angular to sub rounded, poorly sorted, poor porosity, firm, non calcareous, silica, occasional Shale, black, carbonaceous, no staining, fluorescence, or cut

9590-9600 Siltstone gray to dark gray, firm to hard, non calcareous, sandy, blocky sub rounded, moderately cemented, Sandstone off white to gray, salt and pepper, fine to medium grained, as above, occasional Shale dark gray to occasional black, carbonaceous, as above, occasional calcite, no staining, fluorescence, or cut

9600-9620 Siltstone gray to dark gray, firm to hard, slightly calcareous, sandy in part, blocky, moderately cemented, Sandstone tan to off white, very fine to fine grained, sub angular to sub rounded, moderately sorted, fair porosity, consolidated, very calcareous, firm, dull blue fluorescence, no cut, occasional Shale dark gray to occasional black, carbonaceous, as above, occasional calcite, no stain or cut

9620-9640 Sandstone tan to off white, fine to medium grained, sub angular to sub rounded, moderately sorted, trace fair porosity, predominantly poor porosity, consolidated, calcareous, firm, Siltstone gray to dark gray, firm to hard, slightly calcareous, sandy in part, blocky, very argillaceous, black in part, moderately cemented, Shale gray to medium gray, earthy, sub waxy in part, no staining, fluorescence, or cut

9640-9660 Siltstone gray to dark gray, firm to hard, slightly calcareous, sandy in part, blocky, very argillaceous, black in part, carbonaceous, Shale gray to medium gray, earthy, sub waxy in part, occasional Sandstone off white to gray, salt and pepper, fine to medium grained, sub angular to sub rounded, very slightly calcareous, firm, poorly sorted, poor porosity, no staining, fluorescence, or cut

9660-9670 Siltstone gray to dark gray, firm to hard, slightly calcareous, sandy in part, blocky, very argillaceous, black in part, very carbonaceous in part, Shale black, very carbonaceous soft, smooth, blocky to sub rounded. Sandstone, tan to gray, very fine to fine grained, occasional medium grained, no staining, fluorescence, or cut

9670-9680 Sandstone tan to off white, fine to medium grained, sub angular to sub rounded, pf sorted, trace fair porosity, predominantly poor porosity, consolidated, calcareous, firm, Siltstone gray to dark gray, firm to hard, slightly calcareous, sandy in part, blocky, very argillaceous, black in part, moderately cemented, Shale gray to medium gray, earthy, sub waxy in part, no staining, fluorescence, or cut

9680-9690 Siltstone gray to dark gray, black in part, firm to hard, slightly calcareous, sandy in part, blocky, very argillaceous, very carbonaceous in part, Shale gray to medium gray, silty in part, black in part, very carbonaceous soft, smooth, blocky to sub rounded, no staining, fluorescence, or cut

9690-9700 Siltstone gray to dark gray, black in part, firm to hard, slightly calcareous, sandy in part, blocky, very argillaceous, very carbonaceous in part, Shale gray to medium gray, silty in part, black in part, very carbonaceous soft, smooth, blocky to sub rounded, Sandstone tan to off white, fine to medium grained, sub angular to sub rounded, moderately sorted, no staining, fluorescence, or cut

9700-9720 Sandstone tan to off white, fine to medium grained, sub angular to sub rounded, poorly sorted, trace fair porosity, predominantly poor porosity, consolidated, slightly calcareous, moderately firm, Siltstone gray to dark gray, firm to hard, blocky, very argillaceous, black in part, Shale gray to medium gray, earthy, occasional black, carbonaceous, sub waxy in part, no staining, fluorescence, or cut

9720-9730 Sandstone tan to off white, fine to medium grained, sub angular to sub rounded, poorly sorted, trace fair porosity, abundant poor porosity, consolidated, slightly calcareous, moderately firm, Siltstone gray to dark gray, firm to hard, blocky, very argillaceous, black in part, Shale gray to medium gray, earthy, occasional black, carbonaceous, sub waxy in part, no staining, fluorescence, or cut

9730-9740 Sandstone translucent, white to off white, gray fine to medium grained, sub angular to sub rounded, poorly sorted, trace moderately porosity, predominantly poor porosity, consolidated, unconsolidated in part, calcareous, firm to slightly soft, Siltstone gray to dark gray, firm to hard, blocky, very argillaceous, black in part, Shale gray to medium gray, earthy, occasional black,

carbonaceous, sub waxy in part, no staining, fluorescence, or cut

9740-9750 Sandstone as above, white, translucent, gray, tan, dark gray, fine grained, abundant medium grained, Siltstone, gray to dark gray, firm, Shale, medium gray to gray, no staining, fluorescence, or cut

9750-9760 Sandstone light gray to gray, sub angular to sub rounded, moderately sorted, very fine to fine grained, poor porosity, trace fine porous, moderately cemented, calcareous, consolidated, moderately firm, occasional hard, Siltstone gray dark gray, moderately cemented, sandy in part, moderately soft, occasional firm, calcareous, Shale as above, medium gray to dark gray, occasional black, no staining, fluorescence, or cut

9760-9770 Sandstone white to translucent, occasional salt and pepper, sub angular to sub rounded, moderately sorted, very fine to fine grained, abundant medium grained, poor porosity, moderately cemented, calcareous, consolidated, firm, occasional hard, Siltstone gray dark gray, moderately cemented, sandy in part, firm to soft, calcareous, occasional Shale medium gray to dark gray, occasional black, no staining, fluorescence, or cut

9770-9780 Sandstone white to translucent, occasional gray, sub angular to sub rounded, moderately sorted, very fine to fine grained, abundant medium grained, poor porosity, moderately cemented, calcareous, consolidated, firm, occasional hard, Siltstone as above, no staining, fluorescence, or cut

9780-9790 Siltstone, light to medium gray, some dark gray to gray brown, firm, very slightly to moderately calcareous, occasional carbonaceous, grading to silty sandstone, Sandstone off white, some salt and pepper, very fine grained, angular to sub angular, poor to moderately cemented, poor to moderately consolidated, very slightly calcareous, no staining, fluorescence, or cut

9790-9800 Siltstone, light to dark gray, some dark gray brown, firm, very slightly to moderately calcareous, some carbonaceous, trace Co, grading to silty sandstone, Sandstone light gray to off white, very fine grained, angular to sub angular, silty, poor to moderately well consolidated, some arkose, very slightly calcareous, no staining, fluorescence, or cut

9800-9810 Siltstone very light to dark gray, dark gray brown, firm, non to very slightly calcareous, some sandy, some argillaceous, rare carbonaceous to Co, some grading to silty Sandstone, off white to very light gray, very fine grained, angular, silty, poor to moderately well consolidated, very slightly calcareous, no staining, fluorescence, or cut

9810-9820 Sandstone off white to gray, very fine grained, angular, poorly sorted, poor to moderately well cemented, non to very slightly calcareous, some arkose, silty and grading to siltstone, no staining, fluorescence, or cut, Siltstone, medium to dark gray, firm, some sandy, some argillaceous, non to very slightly calcareous, rare carbonaceous material

9820-9830 Sandstone off white to light gray, fine to very fine grained, angular, poorly sorted, silty, non to very slightly calcareous cemented, poorly to moderately consolidated, some arkose and grading to Siltstone, light to dark gray, firm, some sandy, firm, non to very slightly calcareous, rare carbonaceous material

9830-9840 Siltstone light gray brown, firm, slightly argillaceous, very slightly sandy in part, slightly to very slightly calcareous, some slightly carbonaceous, Sandstone, light gray, fine to very fine grained, angular, poorly sorted, moderately consolidated, silty and grading to siltstone, , very slightly calcareous cemented, some arkose, no staining, fluorescence, or cut

9840-9850 Sandstone off white to light gray, fine to very fine grained, angular, poorly sorted, moderately to moderately well consolidated , silty and grading siltstone, very slightly calcareous cemented, no staining, fluorescence, or cut, Siltstone gray, gray brown, irregular, firm, slightly argillaceous,

some slightly sandy, very slightly calcareous, some slightly carbonaceous, trace pyrite

9850-9860 Sandstone off white to light gray, very fine to medium grained, trace coarse grained, angular to sub rounded, poorly sorted, moderately to unconsolidated, generally silty and grading to siltstone, some arkose,

9860-9870 Sandstone, off white to light gray, some salt and pepper, fine to very fine grained, angular to sub angular, poorly sorted, moderately consolidated, generally silty and grading to sandy siltstone, some arkose, Siltstone light to medium grained, gray brown, firm, non to very slightly calcareous, slightly argillaceous, trace carbonaceous material

9870-9880 Siltstone light to medium gray, irregular to sub fissile, firm, slightly calcareous, very slightly argillaceous, generally very fine sandy, trace carbonaceous material, Sandstone off white to very light gray, fine to very fine grained, angular, poorly sorted, very slightly calcareous, silty and grading to siltstone, no staining, fluorescence, or cut

9880-9890 Siltstone gray to gray brown, irregular, firm, slightly calcareous, slightly to very slightly argillaceous, trace very fine sandy, rare pyrite, Sandstone off white, fine to very fine grained, angular, poorly sorted, very slightly calcareous, silty and grading to siltstone, no staining, fluorescence, or cut

9890-9900 Siltstone gray to gray brown, irregular, firm, slightly calcareous, slightly to very slightly argillaceous, trace very fine sandy, rare pyrite, Sandstone off white, fine to very fine grained, angular, poorly sorted, very slightly calcareous, silty and grading to siltstone, as above, no staining, fluorescence, or cut

9900-9920 Siltstone gray to gray brown, dark gray, blocky to sub rounded, slightly calcareous, slightly argillaceous, firm to slightly soft, trace very fine sandy, grading to shale, rare pyrite, occasional Sandstone, trace Shale, gray to medium gray, , earthy, firm, as above, no staining, fluorescence, or cut

9920-9940 Siltstone grading to shale, gray to dark gray, blocky to sub rounded, slightly calcareous to non calcareous, slightly argillaceous, firm to slightly soft, carbonaceous in part, Shale, medium gray to very dark gray, carbonaceous in part, non calcareous, firm, earthy, silty in part, trace Sandstone as above, no staining, fluorescence, or cut

9940-9960 Siltstone grading to shale, gray to dark gray, blocky to sub rounded, slightly calcareous to non calcareous, slightly argillaceous, firm to slightly soft, sandy in part, carbonaceous in part, Shale, medium gray to very dark gray, carbonaceous in part, non calcareous, firm, earthy, silty in part, trace Sandstone as above, trace calcite, rare pyrite, no staining, fluorescence, or cut

9960-9980 Siltstone gray to dark gray, blocky to sub rounded, slightly calcareous to non calcareous, argillaceous, slightly soft, sandy in part, carbonaceous in part, Shale, medium gray to very dark gray, carbonaceous in part, non calcareous, firm, earthy, silty in part, trace Sandstone gray to dark gray, argillaceous, fine grained, trace calcite, rare pyrite, no staining, fluorescence, or cut

9980-10000 Siltstone gray to dark gray, blocky to sub rounded, slightly calcareous to non calcareous, argillaceous, slightly soft, very sandy, carbonaceous in part, grading to sandstone, occasional Sandstone gray to dark gray, tan, white, fine grained, poor porosity, very argillaceous in part, trace Shale medium gray, sub waxy, firm, blocky=platy, no staining, fluorescence, or cut

10000-10020 Siltstone medium gray to dark gray, blocky, carbonaceous in part, slightly calcareous, moderately cemented, brittle, argillaceous, sandy in part, grading to shale, Shale medium gray, trace Sandstone, gray, very fine grained, sub angular to sub rounded, calcareous, moderately cemented, moderately sorted, poor porosity, argillaceous, no staining, fluorescence, or cut

10020-10040 Siltstone very sandy, grading to sandstone, medium gray to dark gray, blocky, carbonaceous in part, slightly calcareous, moderately cemented, moderately firm, argillaceous, occasional Sandstone, gray, very fine grained, sub angular to sub rounded, calcareous, moderately cemented, moderately sorted, poor porosity, argillaceous, trace Shale no staining, fluorescence, or cut

10040-10060 Siltstone very sandy, grading to sandstone, medium gray to dark gray, blocky, carbonaceous in part, slightly calcareous, moderately cemented, moderately firm, argillaceous, occasional Sandstone grading to siltstone, gray, very fine grained, sub angular to sub rounded, calcareous, poorly cemented, very argillaceous, moderately sorted, poor porosity, argillaceous, trace Shale no staining, fluorescence, or cut

10060-10080 Siltstone very sandy, grading to sandstone, medium gray to dark gray, blocky, carbonaceous in part, slightly calcareous, moderately cemented, moderately firm, argillaceous, Sandstone grading to siltstone in part, gray to off white, very fine grained, sub angular to sub rounded, slightly calcareous, poorly cemented, very silty, moderately sorted, poor porosity, trace Shale light gray to medium gray, earthy, sub waxy in part, firm, no staining, fluorescence, or cut

10880-10100 Siltstone very sandy, grading to sandstone, medium gray to dark gray, blocky, carbonaceous in part, slightly calcareous, moderately cemented, moderately firm, argillaceous, Sandstone grading to siltstone in part, gray to dark gray, tan, very fine grained, sub angular to sub rounded, slightly calcareous, poorly cemented, very silty, moderately sorted, poor porosity, rare Shale light gray to medium gray, dark gray, earthy, sub waxy in part, firm, no staining, fluorescence, or cut

10100-10110 Siltstone light gray to gray brown, irregular, firm, slightly to m argillaceous, very slightly calcareous, slightly to very sandy and grading to silty Sandstone off white, salt and pepper, very fine grained, angular to occasional sub rounded, poorly sorted, moderately to very silty, generally non calcareous, no staining, fluorescence, or cut

10110-10120 Siltstone light gray to gray brown, irregular, firm, slightly to moderately argillaceous, very slightly calcareous, moderately to very sandy and grading to silty Sandstone off white, salt and pepper, fine to very fine grained, angular to sub rounded, poorly sorted, slightly to very silty and grading to sandy siltstone, generally non calcareous, no staining, fluorescence, or cut

10120-10130 Siltstone, light gray to gray brown, irregular, moderately to very firm, slightly to moderately argillaceous, very slightly calcareous, very slightly to very sandy and grading to silty Sandstone off white, salt and pepper, fine to very fine grained, angular to sub angular, poorly sorted, slightly to very silty and grading to sandy Siltstone, generally non calcareous, no staining, fluorescence, or cut

10130-10140 Siltstone light gray to gray brown, irregular, moderately to very firm, very slightly to moderately argillaceous, slightly to very slightly calcareous, very slightly to very sandy and grading to silty Sandstone off white to very light gray, very fine grained, occasional fine grained, angular to sub angular, poorly sorted, slightly to very silty , non to very slightly calcareous

10140-10150 Siltstone light to moderately gray brown, irregular, firm, slightly to moderately argillaceous, slightly to very slightly calcareous, trace to very sandy and grading to silty Sandstone, Sandstone off white, some S and poor, very fine grained, occasional fine grained, angular to sub angular, poorly sorted, slightly to very silty, non to very slightly calcareous

10150-10160 Siltstone light gray to gray brown, irregular, firm, slightly to very slightly argillaceous, slightly to very slightly calcareous, very fine sandy and grading to silty Sandstone, Sandstone, off white, very fine grained, angular to sub angular, moderately well consolidated, rare very slightly calcareous, silty and grading to sandy Siltstone

1016010170 Siltstone very light to light gray, sub platy to sub splintery, hard, well consolidated, non calcareous, some very slightly sandy, trace very fine grained Sandstone, no staining, fluorescence,

or cut

10170-10180 Siltstone light to medium gray, gray brown, irregular, moderately to very firm, moderately to moderately well consolidated, some slightly sandy, non to slightly calcareous, trace Sandstone off white, very fine grained, no staining, fluorescence, or cut

10180-10190 Siltstone light to medium gray, gray brown, irregular, m to very firm, moderately to moderately well consolidated, non to slightly calcareous, some slightly to very sandy, Sandstone off white, very fine grained, angular to sub angular, poorly sorted, silty cemented, moderately consolidated, occasional very silty and grading to siltstone

10190-10200 Siltstone light to medium gray, gray brown, irregular, firm, moderately consolidated, non to slightly calcareous, some slightly argillaceous, occasional very slightly to very sandy, trace very fine to fine grained Sandstone off white, angular to sub rounded, moderately consolidated, no staining, fluorescence, or cut

10200-10210 Siltstone, light gray to gray brown, irregular, firm, moderately consolidated, non to very slightly calcareous, some slightly argillaceous, trace slightly sandy, no staining, fluorescence, or cut

10210-10220 Siltstone, light to medium gray, gray brown, irregular, firm, moderately consolidated, non to very slightly calcareous, some argillaceous, some slightly sandy, no staining, fluorescence, or cut

10220-10230 Siltstone light to medium gray, gray brown, irregular, m firm, moderately consolidated, non to very slightly calcareous, some slightly argillaceous, some very fine sandy, trace Sandstone tan to gray, very fine grained, poor porosity, no staining, fluorescence, or cut

10230-10240 Siltstone light to medium gray to light green, gray brown, irregular, soft to moderately firm, moderately consolidated, non calcareous, some slightly argillaceous, some very fine sandy, no staining, fluorescence, or cut

10240-10250 Siltstone light to medium gray, light green, gray brown, irregular, yellow mottled in part, soft to moderately firm, hard in part, brittle, moderately consolidated, non calcareous, some slightly argillaceous, some very fine sandy, trace rounded to brown Shale, no staining, fluorescence, or cut

10250-10260 Siltstone medium gray, gray to light green, blocky to sub rounded, yellow mottled in part, moderately firm, hard in part, brittle, consolidated, non calcareous, some slightly argillaceous, some very fine sandy, trace Sandstone, gray, very fine grained, firm, trace red to brown Shale, no staining, fluorescence, or cut

10260-10270 Siltstone medium gray to dark gray, gray to light green, blocky to sub rounded, yellow mottled in part, moderately firm, hard in part, brittle, consolidated, non calcareous, some slightly argillaceous, some very fine sandy, yellow mottled in part, trace Sandstone, gray, very fine grained, firm, trace Shale, red to brown, gray, silty in part, no staining, fluorescence, or cut

10270-10280 Siltstone medium gray to dark gray, gray to light green, blocky to sub rounded, yellow mottled in part, moderately firm, hard in part, brittle, consolidated, non calcareous, some slightly argillaceous, some very fine sandy, yellow mottled in part, rare Sandstone, gray, very fine grained, firm, trace Shale, red to brown, gray, silty in part, no staining, fluorescence, or cut

10280-10290 Siltstone medium gray to dark gray, gray to light green, moderately firm, brittle, non calcareous, slightly argillaceous, some very fine sandy, yellow mottled in part, rare Sandstone, gray, very fine grained, firm, trace Shale, red to brown, gray, silty in part, no staining, fluorescence, or cut

10290-10300 Siltstone medium gray to dark gray, very calcareous, gray to light green in part, firm, brittle, silica cemented, non calcareous, slightly argillaceous, some very fine sandy, yellow mottled in

part, rare Sandstone, gray, very fine grained, firm, trace Shale, red to brown, gray, silty in part, no staining, fluorescence, or cut

10300-10310 Siltstone medium gray to dark gray, very sandy, very calcareous gray to light green in part, firm, brittle, silica cemented, non calcareous, slightly argillaceous, yellow mottled in part, trace Sandstone, gray, very fine grained, firm, trace Shale, red to brown, gray, silty in part, no staining, fluorescence, or cut

10310-10320 Sandstone, gray to medium gray, very fine grained, argillaceous, sub angular, moderately sorted, well cemented, hard, very calcareous, moderately sorted, poor porosity, grading to siltstone, Siltstone medium gray, as above, trace Shale, no staining, fluorescence, or cut

10320-10330 Siltstone medium gray to dark gray, calcareous, gray to light green, firm, brittle, non calcareous, very fine sandy in part, Sandstone, gray, very fine grained, firm, calcareous, grading to siltstone, trace Shale, gray, silty in part, no staining, fluorescence, or cut

10330-10340 Siltstone medium gray to dark gray, calcareous, gray to light green, firm, brittle, non calcareous, very fine sandy in part, Sandstone, gray, very fine grained, firm to hard, calcareous, clay filled, moderately hard, no visible porosity, trace Shale, gray, silty in part, no staining, fluorescence, or cut

10340-10350 Sandstone gray to dark gray, very fine grained, firm to slightly hard, calcareous, clay fill, moderately cemented, sub angular, moderately sorted, no visible porosity, Siltstone medium gray to dark gray, calcareous, firm, gray to light green, firm, brittle, non calcareous, very fine sandy in part, trace Shale, no staining, fluorescence, or cut

10350-10360 Sandstone, gray, very fine to fine grained, firm slightly to hard, calcareous, clay filled, sub angular to sub rounded, moderately sorted, moderately cemented, no visible porosity, Siltstone medium gray to dark gray, calcareous, firm, gray to light green, firm to brittle, slightly hard, non calcareous, silica cemented, trace Shale, medium gray, no staining, fluorescence, or cut

10360-10370 Sandstone gray, very fine to fine grained, occasional off white, firm slightly to hard, calcareous, clay filled, sub angular to sub rounded, moderately sorted, moderately cemented, no visible porosity, Siltstone medium gray to dark gray, calcareous, firm, gray to light green, firm, slightly hard, non calcareous, no staining, fluorescence, or cut

10370-10380 Siltstone gray to dark gray brown, hard, calcareous, light gray to green, firm, non to calcareous, Sandstone, white to gray, very fine to fine grained, sub angular to sub rounded, firm, well sorted, no visible porosity, trace Shale, gray, hard, no staining, fluorescence, or cut

10380-10390 Siltstone medium to dark gray, gray brown, firm to hard, calcareous, gray green, firm, non calcareous, Sandstone trace very fine to occasional fine grained, angular to sub angular, poorly sorted, argillaceous, silty, moderately consolidated, Shale, trace, light to medium gray firm to hard, very slightly calcareous

10390-10400 Siltstone medium to dark gray brown, irregular, firm to hard, slightly to moderately calcareous, moderately to very sandy, argillaceous, some grading to argillaceous sandstone, Sandstone off white to brown, very fine grained to occasional medium grained, sub angular to sub rounded, poorly sorted, very silty, very argillaceous, rare Chert, tan

10400-10410 Siltstone medium to dark gray brown, irregular, firm to slightly hard, slightly to moderately calcareous, argillaceous, generally sandy, some very sandy and grading to Silty Sandstone, off white to light brown, fine to very fine grained, sub angular to sub rounded, poorly sorted, moderately consolidated, very silty, very argillaceous in part

10410-10420 Siltstone light to dark gray brown, irregular, moderately to very firm, slightly to moderately calcareous, argillaceous, slightly to very sandy and grading to silty Sandstone, Sandstone off

white to light brown, fine to very fine grained, sub angular to sub rounded, poorly sorted, moderately consolidated, very silty, some very argillaceous

10420-10430 Siltstone light gray, medium to dark gray brown, irregular, firm, moderately calcareous, argillaceous, slightly to very sandy and grading to silty Sandstone, Sandstone off white to light brown, fine to very fine grained, sub angular to sub rounded, poorly sorted, moderately consolidated, very silty, some very argillaceous

10430-10440 Siltstone light gray, medium to dark gray brown, irregular, firm, moderately calcareous, argillaceous, slightly to very sandy and grading to silty Sandstone, Sandstone off white to occasional brown, fine to very fine grained, sub angular to sub rounded, poorly sorted, moderately consolidated, moderately to very silty, trace moderately to very argillaceous

10440-10450 Siltstone, medium to dark gray brown, gray, irregular, firm, moderately calcareous, moderately to very argillaceous, moderately to very sandy and grading to Sandstone, Sandstone, off white, fine to very fine grained, sub angular to sub rounded, poorly sorted, slightly very silty, moderately consolidated, some very argillaceous,

10450-10460 Siltstone gray brown, gray, irregular, firm, moderately calcareous, moderately to very argillaceous, slightly to very sandy and grading to Sandstone, Sandstone off white, salt and pepper, fine to very fine grained, sub angular to sub rounded, poorly sorted, silty, moderately to moderately well consolidated, moderately to moderately well cemented, hard, no staining, fluorescence, or cut

10460-10470 Siltstone gray brown, gray, irregular, firm, moderately calcareous, moderately to very argillaceous, slightly to very sandy and grading to Sandstone, Sandstone off white, salt and pepper, fine to very fine grained, sub angular to sub rounded, poorly sorted, silty, moderately to moderately well consolidated, moderately well cemented, non to moderately calcareous

10470-10480 Siltstone gray brown, irregular, firm, moderately calcareous, moderately to very argillaceous, some slightly to very sandy and grading to Sandstone, Sandstone, off white, salt and pepper, fine to very fine grained, sub angular to sub rounded, poorly sorted, silty, moderately well consolidated, moderately well cemented, non to moderately calcareous

10480-10490 Siltstone gray brown, irregular, firm, moderately calcareous, very argillaceous, some slightly to very sandy and grading to Sandstone, Sandstone off white, some salt and pepper, fine to very fine grained, sub angular to sub rounded, poorly sorted, silty, moderately well consolidated, moderately well cemented, non to moderately calcareous

10490-10500 Siltstone, gray brown, irregular, firm, moderately calcareous, moderately to very argillaceous, some slightly to very sandy and grading to Sandstone, Sandstone, off white, fine to very fine grained, sub angular to sub rounded, poorly sorted, silty, moderately well consolidated, moderately well cemented, non to moderately calcareous, no staining, fluorescence, or cut

10500-10520 Siltstone, gray brown, gray, irregular, firm, slightly to moderately calcareous, moderately to very argillaceous, some slightly sandy and grading to Sandstone, Sandstone off white, very fine grained, sub angular to sub rounded, poorly sorted, generally silty, moderately well consolidated, moderately well cemented, non to moderately calcareous, no staining, fluorescence, or cut, scattered Shale light to medium gray, light brown, soft to firm, probably cavings

10520-10540 Siltstone light to moderately gray brown, gray, irregular, firm, slightly to moderately calcareous, moderately to very argillaceous, some slightly sandy and grading to Sandstone, Sandstone off white, some salt and pepper, very fine grained, sub angular to sub rounded, non to slightly calcareous, moderately well consolidated, moderately well cemented, poorly sorted, generally silty, no staining, fluorescence, or cut

10540-10560 Siltstone light to moderately gray brown, irregular, firm, slightly to moderately calcareous, moderately to very argillaceous, generally slightly to very sandy and grading to Sandstone, very fine grained, angular to sub rounded, poorly sorted, moderately well consolidated, moderately well cemented, non to slightly calcareous, silty, non to very argillaceous, no staining, fluorescence, or cut, Shale, gray, light brown, occasional off white, sub splintery, very firm, non calcareous,

10560-10580 Siltstone, light to moderately gray brown, irregular, firm, slightly to moderately calcareous, moderately to very argillaceous, moderately to very sandy and grading to Sandstone, Sandstone, off white to light brown, very fine grained, sub angular to sub rounded, poorly sorted, silty, some argillaceous, non to very slightly calcareous, moderately well consolidated, moderately well cemented, rare yellow mineral fluorescence, no stain or cut, Shale, light brown, off white, sub platy, very firm, non calcareous

10580-10600 Siltstone, light to moderately gray brown, irregular, firm, moderately to very argillaceous, moderately to very sandy, slightly to moderately calcareous, some grading to Sandstone, Sandstone off white to light brown, very fine grained, sub angular to sub rounded, poorly sorted, generally very silty and grading to siltstone, Shale light gray to green, light brown, sub splintery, very firm, non calcareous

10600-10620 Siltstone, light to moderately gray brown, irregular, firm, moderately to very argillaceous, moderately to very sandy, slightly to moderately calcareous, grading to Sandstone, Sandstone off white to tan, light brown, very fine grained, angular to sub angular, poorly sorted, silty, some slightly argillaceous, generally very silty and grading siltstone, trace Shale light gray to green, light brown, sub splintery, very firm, non to very slightly calcareous

10620-10640 Siltstone, light to medium gray, light to moderately gray brown, irregular, firm, moderately to very argillaceous, slightly to moderately calcareous, some very sandy and grading to Sandstone, Shale, light gray to green, irregular to sub splintery, very firm, slightly silty, non calcareous, trace Sandstone off white, very fine grained, angular to sub angular, poorly sorted, silty, moderately well consolidated, non calcareous

10640-10660 Siltstone, light to medium gray, gray brown, irregular, firm, moderately to very argillaceous, slightly to moderately calcareous, some very sandy and grading to Sandstone, Sandstone off white to light brown, angular to sub angular, poorly sorted, silty, some argillaceous, moderately well consolidated, non to slightly calcareous, Shale, light gray to green, irregular to sub platy, very firm, slightly silty, non to very slightly calcareous

10660-10680 Siltstone, light to medium gray to gray brown, irregular to sub platy, moderately to very argillaceous, calcareous, some very sandy grading to Sandstone, Sandstone, white to off white to light tan, salt and pepper in part, sub angular to sub rounded, firm, poorly sorted, silty, calcareous, Shale, light gray to green, sub platy, m firm, slightly silty, non calcareous, no staining, fluorescence, or cut

10680-10700 Siltstone, light to medium gray, gray brown, irregular, firm, moderately to very argillaceous, calcareous, some very sandy and grading to Sandstone, Shale, light gray green, sub platy, slightly silty in part, very firm, non to very slightly calcareous, Sandstone, off white to light brown, some salt and pepper, very fine grained, angular to sub angular, poorly sorted, silty in part, non to very slightly calcareous

10700-10720 Siltstone medium gray brown, irregular to sub platy, firm, moderately to very argillaceous, very calcareous, smooth very sandy grading to Sandstone, Shale light gray green, sub platy, silty in part, moderately firm to firm, non to very slightly calcareous, trace Sandstone, clear to off white to light brown, some salt and pepper, very fine grained, angular to sub angular, poorly sorted, n visible porosity, silty in part, n visible calcareous to slightly calcareous, trace pyrite

10720-10740 Siltstone gray brown, irregular to sub platy, moderately firm to firm, argillaceous, very calcareous, Shale, light gray green, irregular to sub platy, firm, silty in part, non to very slightly calcareous, trace Sandstone off white to light brown, some salt and pepper, very fine grained, angular to sub angular, poorly sorted, n visible porosity, silty in part, slightly calcareous

10740-10760 Siltstone gray brown, irregular to sub platy, firm, argillaceous, very calcareous, grading to Sandstone, Shale, light gray to gray green, irregular to sub platy, firm, silty in part, non to very slightly calcareous, trace Sandstone off white to light brown, some salt and pepper, very fine grained, angular to sub angular, poorly sorted, non to very slightly porosity, silty in part, n visible calcareous to slightly calcareous, no staining, fluorescence, or cut

10760-10780 Siltstone gray brown, irregular to sub platy, firm to very firm, argillaceous, very calcareous, grading to Sandstone, trace Foss, Shale, light gray to gray green, irregular to sub platy, firm to very firm, silty in part, non to very slightly calcareous, Sandstone off white, some salt and pepper, moderately to very fine grained, angular to sub rounded, poorly sorted, non to very slightly porosity, non to very slightly calcareous to calcareous

10780-10800 Siltstone gray brown, irregular to sub platy, firm to very firm, argillaceous, very calcareous, grading to Sandstone, Shale, light gray to gray green, irregular to sub platy, firm, silty in part, non to very slightly calcareous, trace Sandstone off white to light gray, some salt and pepper, moderately to very fine grained, angular to sub rounded, poorly sorted, non to very slightly porosity, non to very slightly calcareous

10800-10820 Siltstone gray brown, irregular to sub platy, firm to very firm, argillaceous, very calcareous, grading to Sandstone, Shale, light gray to gray green, irregular to sub platy, firm, silty in part, non to very slightly calcareous, trace Sandstone white to off white, some salt and pepper, moderately to very fine grained, angular to sub rounded, poorly sorted, non to very slightly porosity, non to very slightly calcareous

10820-10840 Siltstone gray brown, irregular to sub platy, firm to very firm, argillaceous, very calcareous, very sandy in part, Shale, light gray to gray green to green, irregular to sub platy, firm, silty in part, non to very slightly calcareous, trace Sandstone off white to light gray, some salt and pepper, moderately to very fine grained, angular to sub rounded, poorly sorted, non to very slightly porosity, non to very slightly calcareous, no staining, fluorescence, or cut

10840-10860 Siltstone gray brown, irregular to sub platy, firm to very firm, argillaceous, very calcareous, sandy in part, grading to Sandstone, Shale, off white to light gray to gray green, irregular to sub platy, firm, silty in part, non to very slightly calcareous, trace Sandstone, clear to off white, some salt and pepper, m to fine grained, angular to sub rounded, poorly sorted, non to very slightly porosity, non to very slightly calcareous

10860-10880 Siltstone gray brown, irregular to sub platy, firm to very firm, argillaceous, very calcite, grading to Sandstone, Shale, light gray to gray green to green, irregular to sub platy, firm, silty in part, non to very slightly calcareous, trace Sandstone, clear to off white, some salt and pepper, m to fine grained, angular to sub rounded, poorly sorted, non to very slightly porosity, non to very slightly calcareous

10880-10900 Siltstone gray brown, irregular to sub platy, firm to very firm, argillaceous, very calcareous, sandy in part, grading to Sandstone, trace Shale, light gray to gray green, irregular to sub platy, firm, non to very slightly calcareous, trace Sandstone, clear to off white, some salt and pepper, m to fine grained, angular to sub rounded, poorly sorted, non to very slightly porosity, non to very slightly calcareous

10900-10920 Siltstone light gray to gray brown, irregular to sub platy, firm to very firm, argillaceous, very calcareous, sandy in part, grading to Sandstone, trace Shale, light gray to gray green, irregular to sub platy, firm, non to very slightly calcareous, trace Sandstone, to off white to light gray, some salt and pepper, very fine grained, sub angular to sub rounded, poorly sorted, non to very slightly

porosity, calcareous, no staining, fluorescence, or cut

10920-10940 Siltstone light gray to gray brown to dark gray, irregular to sub platy, firm to very firm, argillaceous, very calcareous, sandy in part, Shale, light gray to gray green, irregular to sub platy, firm, non to very slightly calcareous, trace Sandstone, to off white, some salt and pepper, very fine grained, sub angular to sub rounded, poorly sorted, non to very slightly porosity, calcareous

10940-10960 Siltstone light gray to gray brown, irregular to sub platy, firm to very firm, argillaceous, very calcareous, sandy in part, grading to Sandstone, Shale, light gray to green, irregular to sub platy, firm, non to very slightly calcareous, trace Sandstone, to off white to light tan, some salt and pepper, very fine grained, sub angular to sub rounded, poorly sorted, non to very slightly porosity, calcareous

10960-10980 Siltstone gray to gray brown, irregular to sub platy, firm to very firm, argillaceous, very calcareous, sandy in part, grading to Sandstone, Shale, light gray to green, irregular to sub platy, firm, non to very slightly calcareous, Sandstone, off white to light tan, some salt and pepper, fine to very fine grained, sub angular to sub rounded, poorly sorted, non to very slightly porosity, calcareous

10980-11000 Siltstone tan to gray brown, irregular to sub platy, firm to very firm, argillaceous, very calcareous, sandy in part, Shale, gray to light green, irregular to sub platy, firm, non to very slightly calcareous, trace Sandstone, off white to light tan, some salt and pepper, fine to very fine grained, sub angular to sub rounded, poorly sorted, non to very slightly porosity, calcareous, trace pyrite, no staining, fluorescence, or cut

11000-11020 Siltstone tan to brown to gray brown, irregular to sub platy, firm to very firm, argillaceous, very calcareous, sandy in part, Shale, gray to light green, irregular to sub platy, firm, non to very slightly calcareous, Sandstone, off white to light tan, some salt and pepper, moderately to very fine grained, angular to sub angular, poorly sorted, non to very slightly porosity, calcareous,

11020-11040 Siltstone tan to brown to gray brown, irregular to sub platy, firm to very firm, argillaceous, very calcareous, sandy in part, Shale, gray to light green, irregular to sub platy, firm, non to very slightly calcareous, Sandstone, off white to light tan, some salt and pepper, moderately to very fine grained, angular to sub angular, poorly sorted, non to very slightly porosity, calcareous,

11040-11060 Siltstone, tan to gray brown, irregular to sub platy, firm to very firm, argillaceous, very calcareous, sandy in part, Shale, gray to light green, irregular to sub platy, firm, non to very slightly calcareous, trace Sandstone, off white to light tan, some salt and pepper, moderately to very fine grained, angular to sub angular, poorly sorted, non to very slightly porosity, calcareous,

11060-11080 Siltstone, light to medium gray to light tan, irregular to sub platy, firm to very firm, argillaceous, very calcareous, sandy in part, Shale, gray to light green, irregular to sub platy, firm, non to very slightly calcareous, trace Sandstone, off white to light tan, some salt and pepper, moderately to very fine grained, sub angular to sub rounded, poorly sorted, non to very slightly porosity, calcareous,

11080-11100 Siltstone light to medium gray, sub blocky to platy, argillaceous, grading to silty shale in part, calcareous, some sandy, grading to very fine grained sandstone, firm to slightly hard, off white to salt and pepper, very fine grained, sub angular to sub rounded, poorly sorted, tight, calcareous, no staining, fluorescence, or cut

11100-11120 Siltstone m gray, some light to dark gray, sub blocky to platy, firm to slightly hard, calcareous, argillaceous, some grading to shale dark gray, sub blocky to platy, silty to earthy, occasional smooth, moderately calcareous, carbonaceous in part

11120-11140 Siltstone medium to dark gray, some light gray, sub blocky to platy, argillaceous to sandy, grading to very fine grained sandstone in part, good trace shale a/a, some sandstone salt and

pepper to off white, very fine grained, sub angular to sub rounded, well sorted, moderately cemented, calcareous, no visible porosity, some white clay filled, no staining, fluorescence, or cut

11140-11160 Siltstone and shale continued a/a, sandstone salt and pepper to m gray, occasional tan, sub angular to sub rounded, very fine to fine grained, moderately sorted, moderately cemented, calcareous, some white clay filled, no staining, fluorescence, or cut

11160-11180 Siltstone light to medium gray, sub blocky to platy, argillaceous, grading to silty shale in part, calcareous, some sandy, grading to very fine grained sandstone, firm to slightly hard, off white to salt and pepper, very fine grained, sub angular to sub rounded, poorly sorted, tight, calcareous, no staining, fluorescence, or cut

11180-11200 Siltstone medium to dark gray, occasional light gray to gray brown, laminated in part, sub blocky to platy, argillaceous to sandy, some grading to very fine grained sandstone in part, good trace off white to salt and pepper sandstone

11200-11220 Shale medium to dark gray to gray brown, sub blocky to sub platy, earthy to very silty, grading to siltstone in part, firm to slightly hard, calcareous, abundant inter-bedded siltstone and sandstone a/a

11220-11240 Siltstone medium to dark gray, some light gray, sub blocky to platy, argillaceous to sandy, grading to very fine grained sandstone in part, good trace shale a/a, some sandstone salt and pepper to off white, very fine grained, sub angular to sub rounded, well sorted, moderately cemented, calcareous, no visible porosity, some white clay filled, no staining, fluorescence, or cut

11240-11260 Siltstone medium to dark gray, occasional light gray to gray brown, laminated in part, sub blocky to platy, argillaceous to sandy, some grading to very fine grained sandstone in part, good trace off white to salt and pepper, some unconsolidated sand

11260-11280 Siltstone gray to dark gray, sub blocky to sub platy, argillaceous to sandy, grading to very fine grained sandstone in part, laminated in part, firm, calcareous, abundant sandstone translucent to salt and pepper, fine to very fine grained, angular to sub rounded, well sorted, predominantly unconsolidated, no visible porosity, some white clay filled, no staining, fluorescence, or cut

11280-11300 Sandstone salt and pepper to light gray, very fine to fine grained, grading to siltstone a/a in part, sub angular to sub rounded, moderately cemented, calcareous, some white clay fill to argillaceous matrix, some shale a/a, no visible porosity, no staining, fluorescence, or cut

11300-11320 Siltstone medium to dark gray, occasional light gray, sub blocky to sub platy, firm, argillaceous to sandy, grading to sandstone salt and pepper to light gray, very fine to fine grained, sub angular to sub rounded, moderately cemented, calcareous, some white clay fill to argillaceous matrix, some shale a/a, no visible porosity, no staining, fluorescence, or cut

11320-11340 Siltstone medium to dark gray, occasional light gray to gray brown, laminated in part, sub blocky to platy, argillaceous to sandy, some grading to very fine grained sandstone in part, some laminated sandstone and siltstone, no staining, fluorescence, or cut

11340-11360 Siltstone medium to dark gray, occasional light gray to medium gray brown, laminated in part, sub blocky to platy, argillaceous to sandy, some grading to very fine grained sandstone in part, some shale dark gray to m gray, sub blocky to splintery, firm, calcareous, flesh in part

11360-11380 Siltstone continued a/a, some sandstone light gray to salt and pepper to translucent, very fine to fine grained, sub angular to sub rounded, well sorted, moderately cemented to friable, calcareous, occasional unconsolidated sand grained, white clay filled in part, no visible porosity, no staining, fluorescence, or cut

11380-11400 Siltstone medium to dark gray, sub blocky to sub platy, firm, argillaceous to sandy, grading to sandstone salt and pepper to light gray, very fine to fine grained, sub angular to sub rounded, moderately cemented, calcareous, some white clay fill to argillaceous matrix, some shale a/a, no visible porosity, no staining, fluorescence, or cut

11400-11420 Siltstone medium to dark gray, sub blocky to sub platy, firm, argillaceous to sandy, grading to sandstone coarse, some dark gray platy shale a/a, no visible porosity, no staining, fluorescence, or cut

11420-11440 Siltstone m to light gray, sub blocky to sub platy, firm to hard, argillaceous to sandy, grading to siltstone medium to dark gray, sub blocky to sub platy, firm, argillaceous to sandy, grading to sandstone salt and pepper to light gray, very fine to fine grained, sub angular to sub rounded, moderately cemented, calcareous, some white clay fill to argillaceous matrix, some shale a/a, no visible porosity, no staining, fluorescence, or cut, rare inoceramus fragment, no staining, fluorescence, or cut

11440-11460 Siltstone medium to dark gray, sub blocky to sub platy, firm, argillaceous to sandy, grading to sandstone salt and pepper to light gray, very fine to fine grained, sub angular to sub rounded, moderately cemented, calcareous, some white clay fill to argillaceous matrix, some shale a/a, no visible porosity, no staining, fluorescence, or cut

11460-11480 Siltstone medium to dark gray, sub blocky to sub platy, argillaceous, some grading to very fine grained sandstone, calcareous, hard, laminated in part, abundant sandstone salt and pepper to light gray, very fine grained, sub angular to sub rounded, well sorted, moderately cemented, calcareous, some argillaceous matrix, no staining, fluorescence, or cut

11480-11500 Siltstone medium to dark gray to gray brown, sub blocky to sub platy, argillaceous, firm, some grading to very fine grained Sandstone, calcareous, hard, laminated in part, abundant sandstone salt and pepper to light gray, very fine grained, sub angular to sub rounded, well sorted, moderately cemented, calcareous, some argillaceous matrix, some Shale, trace Foss, slightly fluorescence, no stain or cut

11500-11520 Siltstone medium to dark gray, irregular to sub platy, argillaceous, firm, some grading to very fine grained s, calcareous, hard, laminated in part, Sandstone salt and pepper to light gray, very fine grained, sub angular to sub rounded, well sorted, moderately cemented, calcareous, non to very slightly porosity, some argillaceous matrix, trace Shale, slightly fluorescence, no stain or cut

11520-11540 Siltstone medium to dark gray, irregular to sub platy, argillaceous, firm, some grading to very fine grained sandstone, calcareous, hard, laminated in part, Sandstone salt and pepper to light gray, very fine grained, sub angular to sub rounded, well sorted, moderately cemented, calcareous, trace Shale, no staining, fluorescence, or cut

11540-11560 Siltstone medium to dark gray, irregular to sub platy, argillaceous, moderately firm to firm, some grading to very fine grained sandstone, calcareous, hard, Sandstone salt and pepper, off white to light gray, very fine grained, sub angular to sub rounded, well sorted, moderately cemented, calcareous, no staining, fluorescence, or cut

11560-11580 Siltstone medium to dark gray, irregular to sub platy, argillaceous, moderately firm to firm, some grading to very fine grained sandstone, calcareous, hard, Sandstone salt and pepper, off white to light gray, very fine grained, sub angular to sub rounded, well sorted, moderately cemented, calcareous, trace Shale, no staining, fluorescence, or cut

11580-11600 Siltstone medium to dark gray, irregular to sub platy, argillaceous, moderately firm to firm, some grading to very fine grained sandstone, calcareous, hard. Sandstone salt and pepper, off white to light gray, very fine grained, sub angular to sub rounded, well sorted, moderately

cemented, calcareous, trace Shale, no staining, fluorescence, or cut

11600-11620 no sample pumps down

11620-11640 no sample pumps down

11640-11660 Siltstone medium gray to gray brown, irregular to sub platy, argillaceous, moderately firm to firm, some grading to very fine grained sandstone, calcareous, hard, Sandstone salt and pepper , off white to light gray, fine to very fine grained, sub angular to sub rounded, well sorted, moderately cemented, calcareous, no staining, fluorescence, or cut

11660-11680 Siltstone medium to dark gray, irregular to sub platy, argillaceous, moderately firm to firm, some grading to very fine grained sandstone, calcareous, hard, abundant Sandstone salt and pepper, off white to light gray, fine to very fine grained, sub angular to sub rounded, well sorted, moderately cemented, calcareous, trace Shale, gray, no staining, fluorescence, or cut

11680-11700 Siltstone medium to dark gray, irregular to sub platy, argillaceous, moderately firm to firm, Sandstone salt and pepper, off white to light gray, fine to very fine grained, sub angular to sub rounded, well sorted, moderately cemented, calcareous, trace Shale, gray to green, no staining, fluorescence, or cut

11700-11720 Siltstone medium to dark gray, irregular to sub platy, argillaceous, moderately firm to firm, some grading to very fine grained sandstone, calcareous, hard, Sandstone salt and pepper, off white to light gray, fine to very fine grained, sub angular to sub rounded, well sorted, moderately cemented, calcareous, trace Shale, gray to green, no staining, fluorescence, or cut

11720-11740 Siltstone medium to dark gray, irregular to sub platy, argillaceous, moderately firm to firm, some grading to very fine grained sandstone, calcareous, hard, Sandstone salt and pepper, off white to light gray, fine to very fine grained, sub angular to sub rounded, well sorted, moderately cemented, calcareous, no staining, fluorescence, or cut

11740-11760 Siltstone medium to dark gray to gray brown, irregular to sub platy, argillaceous, moderately firm to firm, some grading to very fine grained sandstone, calcareous, hard, some Sandstone salt and pepper, off white to light gray, fine to very fine grained, sub angular to sub rounded, well sorted, moderately cemented, calcareous, some argillaceous matrix, trace clay, white, no staining, fluorescence, or cut

11760-11780 Siltstone medium to dark gray to gray brown, irregular to sub platy, argillaceous, moderately firm to firm, some grading to very fine grained sandstone, calcareous, hard, some Sandstone salt and pepper, off white to light gray, fine to very fine grained, sub angular to sub rounded, well sorted, moderately cemented, calcareous, some argillaceous matrix, no staining, fluorescence, or cut

11780-11800 Siltstone medium to dark gray to gray brown, irregular to sub platy, argillaceous, moderately firm to firm, some grading to very fine grained sandstone, calcareous, hard, trace Sandstone salt and pepper, off white to light gray, fine to very fine grained, sub angular to sub rounded, well sorted, moderately cemented, calcareous, trace Shale, no staining, fluorescence, or cut

11800-11820 Siltstone medium to dark gray to gray brown, irregular to sub platy, argillaceous, moderately firm to firm, some grading to very fine grained sandstone, laminated in part, calcareous, hard, trace Sandstone salt and pepper, off white to light gray, fine to very fine grained, sub angular to sub rounded, well sorted, moderately cemented, calcareous, trace Shale, trace clay, no staining, fluorescence, or cut

11820-11840 Siltstone medium to dark gray to gray brown, irregular to sub platy, argillaceous, moderately firm to firm, some grading to very fine grained sandstone, laminated in part, calcareous, hard, trace Sandstone salt and pepper, off white to light gray, fine to very fine grained, sub angular to

sub rounded, well sorted, moderately cemented, calcareous, some clay matrix, no staining, fluorescence, or cut

11840-11860 Siltstone medium to dark gray to gray brown, irregular to sub platy, argillaceous, moderately firm to firm, some grading to very fine grained sandstone, calcareous, hard, trace Sandstone salt and pepper, off white to light gray, fine to very fine grained, sub angular to sub rounded, well sorted, moderately cemented, calcareous, some clay matrix, no staining, fluorescence, or cut

11860-11880 Siltstone medium to dark gray to gray brown, irregular to sub platy, argillaceous, moderately firm to firm, trace Sandstone salt and pepper, off white to light gray, fine to very fine grained, sub angular to sub rounded, well sorted, moderately cemented, calcareous, some clay matrix, trace Shale, light gray to green, no staining, fluorescence, or cut

11880-11900 no sample by pass shaker

11900-11920 no sample by pass shaker

11920-11940 Siltstone medium to dark gray to gray brown, irregular to sub platy, argillaceous, moderately firm to firm, some grading to very fine grained sandstone, laminated in part, calcareous, hard, Sandstone salt and pepper, off white to light tan, to very fine grained, sub angular to sub rounded, well sorted, moderately cemented, calcareous, trace Shale, trace clay, no staining, fluorescence, or cut

11940-11960 Siltstone medium to dark gray to gray brown, irregular to sub platy, argillaceous, moderately firm to firm, some grading to very fine grained sandstone, laminated in part, calcareous, hard, Sandstone salt and pepper, off white to light tan, very fine grained, sub angular to sub rounded, well sorted, moderately cemented, calcareous, trace Shale, trace Foss, no staining, fluorescence, or cut

11960-11980 Siltstone medium to dark gray to gray brown, irregular to sub platy, argillaceous, moderately firm to firm, some grading to very fine grained sandstone, laminated in part, calcareous, hard, Sandstone salt and pepper, off white to light tan, very fine grained, sub angular to sub rounded, well sorted, moderately cemented, calcareous, trace Shale, trace Foss, no staining, fluorescence, or cut

11980-12000 Siltstone medium to dark gray to gray brown, irregular to sub platy, argillaceous, moderately firm to firm, some grading to very fine grained sandstone, laminated in part, calcareous, hard, Sandstone salt and pepper, off white to light tan, very fine grained, sub angular to sub rounded, well sorted, moderately cemented, calcareous, some clay matrix, trace Shale, no staining, fluorescence, or cut

CONFIDENTIAL

FORM 9

STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

SUNDRY NOTICES AND REPORTS ON WELLS

Do not use this form for proposals to drill new wells, significantly deepen existing wells below current bottom-hole depth, reenter plugged wells, or to drill horizontal laterals. Use APPLICATION FOR PERMIT TO DRILL form for such proposals.

5. LEASE DESIGNATION AND SERIAL NUMBER: UTU-077547

6. IF INDIAN, ALLOTTEE OR TRIBE NAME: N/A

7. UNIT or CA AGREEMENT NAME: N/A

1. TYPE OF WELL: OIL WELL ☐ GAS WELL ☑ OTHER

8. WELL NAME and NUMBER: COTTONWOOD FED 23-13

2. NAME OF OPERATOR: Petro-Canada Resources (USA) Inc

9. API NUMBER: 43-007-31252

3. ADDRESS OF OPERATOR: 999 18th St., Ste. 600 CITY Denver STATE CO ZIP 59101

PHONE NUMBER: (303) 297-2300

10. FIELD AND POOL, OR WILDCAT: undesignated

4. LOCATION OF WELL

FOOTAGES AT SURFACE: 2213 FNL and 2309' FEL, SW/4 NE/4, Section 23, T13S, R15E, SLB&M COUNTY: CARBON

QTR/QTR, SECTION, TOWNSHIP, RANGE, MERIDIAN: SWNE 23 13S 15E STATE: UTAH

11. CHECK APPROPRIATE BOXES TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION		
☐ NOTICE OF INTENT (Submit in Duplicate)	☐ ACIDIZE	☐ DEEPEN	☐ REPERFORATE CURRENT FORMATION
Approximate date work will start:	☐ ALTER CASING	☐ FRACTURE TREAT	☐ SIDETRACK TO REPAIR WELL
	☐ CASING REPAIR	☐ NEW CONSTRUCTION	☐ TEMPORARILY ABANDON
	☐ CHANGE TO PREVIOUS PLANS	☐ OPERATOR CHANGE	☐ TUBING REPAIR
	☐ CHANGE TUBING	☐ PLUG AND ABANDON	☐ VENT OR FLARE
☐ SUBSEQUENT REPORT (Submit Original Form Only)	☐ CHANGE WELL NAME	☐ PLUG BACK	☐ WATER DISPOSAL
Date of work completion:	☐ CHANGE WELL STATUS	☐ PRODUCTION (START/RESUME)	☐ WATER SHUT-OFF
	☐ COMMINGLE PRODUCING FORMATIONS	☐ RECLAMATION OF WELL SITE	☑ OTHER: Current Status
	☐ CONVERT WELL TYPE	☐ RECOMPLETE - DIFFERENT FORMATION	

12. DESCRIBE PROPOSED OR COMPLETED OPERATIONS. Clearly show all pertinent details including dates, depths, volumes, etc.

Petro-Canada (PCR) spud the noted well on 6/30/2007 and drilled to a TD of 12,000' on 8/14/2007.

The well is currently shut in, pending evaluation. A sundry notice will be submitted advising the state of PCR's plans once the evaluation has been completed.

NAME (PLEASE PRINT) Susan Miller TITLE Regulatory Analyst

SIGNATURE DATE 2/8/2008

(This space for State use only)

RECEIVED
FEB 11 2008
DIV. OF OIL, GAS & MINING

(5/2000) (See Instructions on Reverse Side)

RECEIVED
FEB 1 1 2008
DIV. OF OIL, GAS & MINING

Cottonwood Fed 23-13
Operator: Petro-Canada Resources (USA) Inc.
Section 23, T13S, R15E, SLB&M
Carbon County, Utah
API No. 43-007-31252
Daily Reports
TIGHT HOLE

CONFIDENTIAL

06/30/07 Day 1. PO: drilling 70' of Mouse hole. Moved in Pete Martin Drilling to drill, set and cement 80' of 16" conductor pipe. **Spud well at 0900 hrs, 06/30/2007**. The following people were notified 24 hours prior to spudding the well. Don Stevens and Eric Jones with the BLM, Carol Daniels and Dennis Ingram with the State of Utah. Drilled to 80' with bucket rig.

07/03/07 Day 2. PO: Drilling surface hole. Finished drilling mouse hole. Drill to 70', set 70' of 14" casing. BLM Representative inspected location – OK.

07/04/07 Day 3. 1230' (1230'). PO: Dig out cellar, move in Nabors Rig no. 266. Drill 12-1/4" hole from 425' to 1230'. **Rig up and ran 29 joints of 36# 9-5/8" surface casing. Set casing shoe at 1205'.** Move in and rig up Big 4 cementers and cement surface casing with 450 sacks of Class G cement with 2% CACL and 1/4# Flowseal. Cement slurry 15.5 ppg, with a yield of 1.15. Good circulation throughout job. Circulated 15 bbls of good cement to surface. Cement standing full at ground level. Bump plug with 600 psi, held OK. Wait 1 hour to see if cement would drop below ground level. Standing full. RD Big 4.

07/05/07 Day 4. 1230' (0'). PO: Moving in Nabors Rig 266.

07/06/07 Day 5. 1230' (0'). PO: Moving in Nabors Rig 266.

07/07/07 Day 6. 1230' (0'). PO: MIRU. Continue to move in rig.

07/08/07 Day 7. 1230' (0'). PO: MIRU. Continue to move in rig.

07/09/07 Day 8. 1230' (0'). PO: MIRU. Continue to move in rig.

07/10/07 Day 9. 1230' (0'). PO: Finish MIRU. Cut off 9-5/8" surface casing and dressed for wellhead. Install 11" x 9-5/8" casing head assembly. Test same to 1000 psi - OK. Held safety meeting with Toolpushers and both crews. Distributed Petro-Canada Safety & Loss Prevention Handbooks. Discuss various topics including no smoking except in designated areas, observe speed limit in 9 Mile Canyon and several other safety issues.

07/11/07 Day 10. 1230' (0'). PO: Continue to rig up. Held pre-spud meeting conducted by Peter Hampton, PCR Operations Manager on location.

07/12/07 Day 11. 1230' (0'). PO: RU. Continue to rig up.

07/13/07 Day 12. 1230' (0'). PO: RU. Raise Derrick at 1300 hrs.

07/14/07 Day 13. 1230' (0'). PO: Finish RU. Prepare to test BOP's at 0900 hrs. BLM notified of same.

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07/15/07	Day 14. 1230' (0'). PO: Continued to rig up. Test BOPE and Top Drive.
07/16/07	Day 15. 2150' (920'). PO: DRILLING F/ 1850' TO 2150'.
07/17/06	Day 16. 3391' (1241'). PO: DRILLING F/2150 TO 3391'.
07/18/07	Day 17. 4282' (891'). PO: DRILLING F/3391 TO 4282'.
07/19/07	Day 18. 5583' (1301'). PO: DRILLING F/4282 TO 5583'.
07/20/07	Day 19. 6097' (514'). PO: DRILLING @ 6097
07/21/07	Day 20. 6282' (185'). PO: WASHING 90' TO BOTTOM.
07/22/07	Day 21. PO: DRILLING @ 6890'.
07/23/07	Day 22. PO: DRILLING @ 7337'.
07/24/07	Day 23. PO: DRILLING @ 8178'.
07/25/07	Day 24. DRILLING @ 8500'.
07/26/07	Day 25. DRILLING @ 8590'.
07/27/07	Day 26. DRILLING @ 8670'.
07/28/07	Day 27. 8685' (15'). DRILLING F/8670' TO 8685'.
07/29/07	Day 28. 8742' (57'). PO: DRILLING.
07/30/07	Day 29. 8805' (63'). PU MOTOR & BIT. DRILLING F/ 8742' TO 8805'.
07/31/07	Day 30. 8931' (126'). PO: DRILLING.
08/01/07	Day 31. 9018' (87'). DRILLING.
08/02/07	Day 32. 9168' (150'). DRILLING.
08/03/07	Day 33. 9219' (51'). PO: Drilling.
08/04/07	Day 34. 9246' (27'). PO: DRILLING.
08/05/07	Day 35. 9420' (201'). PO: DRILLING.
08/06/07	DAY 36. 9440' (20'). PO: DRILLING.

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08/07/07	DAY 37. 9564' (124'). PO: DRILLING.
08/08/07	DAY 38. 9679' (115'). PO: DRILLING.
08/09/07	DAY 39. 10,023' (344'). PO: DRILLING.
08/10/07	DAY 40. 10,318' (295'). PO: DRILLING.
08/11/07	DAY 41. 10,498' (180'). PO: DRILLING.
08/12/07	DAY 42. 10,886' (388'). PO: DRILLING.
08/13/07	DAY 43. 11,876' (990'). PO: DRILLING.
08/14/07	DAY 44. 12,000 TD (124'). PO: WO loggers. TD WELL AT 12,000 FT AT 05:00 HRS, 08/14/2007. WAITING ON LOGGERS.
08/15/07	DAY 45. 12,000' TD (0'). PO: LOGGING.
08/16/07	DAY 46. 12,000' TD (0'). PO: RIH WITH LOG.
08/17/07	DAY 47. 12,000' TD (0'). PO: LDDP.
08/18/07	DAY 48. 12,000' TD (0'). PO: WO FREE POINT TRUCK.
08/19/07	DAY 49. 12,000' TD (0'). PO: WORK PIPE.
08/20/07	DAY 50. 12,000 TD (0'). PO: WORK STUCK CSG.
08/21/07	DAY 51. 12,000' TD (0'). PO: CMT CSG.
08/22/07	DAY 52. 12,000' TD (0'). PO: RD TOP DRIVE.
08/23/07	DAY 53. 12,000' TD (0'). PO: RD.
08/24/07	WO WORKOVER RIG TO DRILL OUT AND SET LINER.
08/25/07	WO WORKOVER RIG TO DRILL OUT AND SET LINER.
08/26/07	WO WORKOVER RIG TO DRILL OUT AND SET LINER.
08/27/07	WO WORKOVER RIG TO DRILL OUT AND SET LINER.
08/28/07	WO WORKOVER RIG TO DRILL OUT AND SET LINER.

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COMPLETION REPORTS -

08/29/07 Completion day 1. Crew Travel, Travel from Roosevelt, Utah, 2-1/2 hours. Wood Group installed 7 1/16 X 10K tubing hanger, tested same to 8K - OK. Rig up pump, tank, and pipe racks. Crew travel.

08/30/07 Completion day 2. Crew Travel, 2-1/2 hours. Finish NU BOPE. Crew Travel.

08/31/07 Completion day 3. Crew Travel, 2 1/2 hours. Unloaded Annular, choke manifold, and lines (required by BLM). Finish rigging up pump and tank. Crew travel.

09/01/07 SD for holiday.

09/02/07 SD for holiday.

09/03/07 SD for holiday.

09/04/07 Completion day 4. Crew travel, 2 1/2 Hours. Rigged up Double Jack and tested BOP's. BLM rep was on location and witnessed entire test (Walton Willis).

09/05/07 No report

09/06/07 Completion day 5. Crew Travel. Drill cement to top of plug at 8263. Shut down for night.

09/07/07 Completion day 6. Crew Travel. Safety Meeting. Washed and ream 90' to bottom. Pulled up in casing. Ordered out Pre-Mix tank. Contacted MI Swaco and ordered out chemicals to treat mud.

09/08/07 Completion day 7. Rig SD for Sunday.

09/09/07 Completion day 8. Crew Travel. Safety Meeting. Wait on Pre-mix tank and Generator. Set up pre-mix tank. Crew travel.

09/10/07 Completion day 9. Crew travel. RIH, tag fill at 8475'. Trying to maintain 9.8, 48, and 5 ppg Dap. Circulate hole clean, pull up in casing for night.

09/11/07 Completion day 10. Crew travel. RIH, tag fill at 8475'. Crew travel. Correction on depth, washed and reamed to 8980'.

09/12/07 Completion day 11. Safety Meeting, RIH and tag fill at 8810'. Hole cleaning up. Shale returns dropped to about 1/2 of what they were. This

is due to the good mud we are circulating with. Mud weight 9.8 ppg, Visc 48, dap 5.5 ppg. Circulated hole clean, pulled up in casing.

09/13/07 Completion day 12. Crew Travel. Washed and reamed to 10860, mud continues to be cut from 9.8 to 9.3 ppg. Unable to rotate. Clutch not working pipe properly. Mechanic bring new clutch from Rangley. Safety Meeting. Continued to wash and ream. Made crew change at 1930. Held safety meeting discussing working at night with service rig. Location well lit with 5 portable light towers. Held BOP drill. Circulate and condition mud.

09/14/07 Completion day 13. Continued to work stuck pipe. Mechanic arrived at 10 AM and repaired clutch. Full circulation and returns. Repairs completed.

09/15/07 no report

09/16/07 Completion day 14. Ran in hole with DCT Free Point Tool. Found pipe stuck at 8577. Pipe free at 8546. Pipe dropped free after setting for 30 minutes. Circulated and conditioned mud. Pulled up in casing. RIH, no fill, washed 30' to bottom.

09/17/07 Completion day 15. Prepare to run in hole with liner. Weatherford tool hand brought packer for 17# casing. Casing in hole is 20#. He will take packer to machine shoe to be turned down. We will RIH and circulate.

09/18/07 Completion day 16. At 1730 hours on 9-17-07 drawworks chain broke and unable to work pipe. Replacing draw work chain. Held safety meeting and discuss running the 3 1/2" liner. Make up 3.5" Float Shoe, 1 JT. of 3.5 ,9.3#, P-110 CASING, 1- 3.5 LANDING Collar and run in hole with casing.

09/19/07 Completion day 17. Made up and RIH with liner. RU to cement. Safety Meeting, tested lines to 3500 psi. Mixed and pumped 227 sacks of 50/50poz premium cement with 12.54 #, 2.12 yield. Followed by 593 sacks of 50/50 poz premium with 13.0#, 1.62 Yield. Estimate TOC at 8660'.

09/20/07 No report

09/21/07 No report

09/22/07 No report

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09/23/07 Completion day 18. Crew at mancamp. Heavy rains all night. Circulated hole clean, going over shaker. Continued to drill out cement. Liner top at 7839'. Will circulate hole clean. Crew staying in man camp.

09/24/07 Completion day 19. Crew staying in man camp. Heavy rains during the night turning to heavy snow. Drilled cement to 7839'. Tagged liner, Picked up to circulate.

09/25/07 No report

09/26/07 No report

09/27/07 No report

09/28/07 Completion day 20. Crew travel, warm up rig. Pulled out of hole. Rigged up JW Operating logging unit and ran 2.75" Gauge Ring. Tag at 11978. Ran in with Gamma-Ray, C.C.L., Cement bond, V.D.L. Logged from 11978' to 1000', Estimated top of cement at 6940'.

09/29/07 No report

09/30/07 No report

10/01/07 No report

10/02/07 No report

10/03/07 Completion day 21. Wait on replacement elevators, arrived at 1700 hours.

10/04/07 Completion day 22. WOD, Crew Travel. RIH to top of fish, Latched on to fish worked same up and down, set down on fish. Overshot appears to be latched on to fish. POOH, no recovery. Change out leaking rubber in annular. Make up overshot on 1.90 tubing, RIH with same. RIH with 45 stands of 2 7/8" tubing. Running in slow due to high winds. Top plate broke on top of YT elevators.

10/05/07 Completion day 23. WOD, Crew Travel. High winds may prevent us from running in hole. RIH with overshot, 1.90 tubing, and 2 7/8" tubing. Tagged fish, worked over shot over fish several times. High winds with heavy rain. WOW, heavy rain, hail, and 40 50 mile winds. Pulled out of hole with 1.90 tubing, 2 7/8' tubing and over shot. Recovered cable head. While trying to get over fish cable head backed off. Indications are that the top of the cable head was bent, leaning next to liner. Lay down joint

of 1.90 tubing with overshot. Broke out cable head. Heavy rain and hoigh wind continue.

10/06/07 Completion day 24. Crew off for weekend. Fabricating a joint of wash pipe with grapples inside.

10/07/07 Completion day 25. Crews off.

10/08/07 No report.

10/09/07 No report.

10/10/07 Completion day 26. WOD. Finish pulling out of hole to set plug and perforate. RU JW operating Wire Line. RIH with 2.75 " gauge ring with junk basket. Tag up at 8640'. Worked up and down several times trying to get through tight spot. Unable to get below 8640'. Tagging up solid. POH, picked up 2.125" gauge ring and ran in hole. Tag up at exactly the same spot 8640'. Worked line trying to get through tight spot. Unable to get below 8640'. POH with WL. RD Wire Line. Cancelled Slick Water Frac Stage #2 schelued for Thursday 10-11-05. Ordered out 2.75 mill to run in and attempt to clean out ostruction in 3 1/2" liner.

10/11/07 Completion day 27. WOD, Crew Travel. Make up 2.75" mill and RIH, Rotated from 8600 to 8800'. Did not touch anything. POH with 2.75' mill.

10/12/07 Completion day 28. WOD, crew travel. RU JWO Wire Line and RIH with 2.75 Gauge Ring and junk Basket. Ran 2, 11/16" weight bars. Hit tight spot at exactly as before. POH, Lay down GR, JB, and weight bars. PU 2, 2' weight bars and RIH to 11700'. Did not tag up on anything. MU 2.75' GR, JB, 2-2" weight bars and RIH. Tag tight spot again at 8640. Picked up and set down hard. Could not get down. POH with wire line. Junk basket bent, deep cuts all around GR. RD WL.

10/13/07 Completion day 29. WOD, crew travel. Safety Meeting. Make up 2.80" flat bottom mill with a 2.80 string mill above it. Mill gauges a full 2.80 from top to bottom. Added length of mill to make it 4.30'. Laid down 6 joints. RIH to Top of liner. Rigged up power swivel. Rotated and circulated with 2.80' mill from 8550' to 8800'. Worked each joint up and down several times. Did NOT TOUCH ANYTHING. RIH to 11,750'. Circulate. POOH and SDFN.

10/14/07 Completion day 30. WOD, Crew Travel. Safety Meeting. RU JWO wire Line and RIH with 2.69" Frac Plug, ran with 2-2" X 7' sinker bars. Plug set down at exactly the same spot the wire line tools have been stopping 8640'. Attemped to work through tight spot. Unable to get below 8640'. POH with WL, Frac Plug had markings on bottm indicating we were sitting

down on something solid. Wait on Halliburton plug. Made up Halliburton 2.75 TP plug and ran in hole on 1.90" tubing. Ran in hole very slow once we entered 3 1/2" liner. Tagged 1 tight spot 60' inside liner. Ran in and set plug at 11720', Released and pulled up 1 stand. RU and attemped to test with rig pump to 3500 psi. Pressured up to 1400 psi and began pumping into formation at 4 BPM. RIH with 1 stand to check plug, plug in place. Indications are a hole in the 3 1/2" line at about 8640'.

10/15/07 Completion day 31. WOD, Crew Travel. Pull up to 8620' (20') above tight spot. Set plug at 8620' and pressured up to 3500 psi, held pressure for 15 minutes with no leads. Bleed down pressure, release plug and run in to 8660', (20') below tight spot. Set plug and attempt to pressure up. At 1600 psi pumping in at a raqte of 4 BPM. Pressure bled back to 0 in 2 minutes. Release plug. Hole in 3 1/2" casing at about 8640'. Pull out of hole with Halliburton TS retreivable plug. Rubbers on plug were stripped off. 1 slip segment missing. LD Halliburton tools and released same. Basic Energy mechanics on location performing maintaince. Changing out drill line and installing new brakes.

10/16/07 Completion day 32. WOD, Crew travel. Rig repairs, replace broken chain, change brakes, replace clutch sprocket, general service and repairs. SDFN, crew travel.

10/17/07 Completion day 33. WOD, Crew Travel. RIH with 1.90" tubing, pull out of the hole laying down tubing. RIH with 2 7/8" tubing open ended. Pull out of hole laying down tubing, laid down 140 joints. SDFN, Crew Travel.

10/18/07 Completion day 34. WOD, Crew Travel. Laid down rental 2 7/8" tubing. Released and loaded out same. Left location at 1000 hours on 10-18-07 (Stop Rent). Note: Every pin and box had thread protectors. Off loaded and strapped 243 joints of2 7/8", 6.5#, L-80, LT&C , 8rd tubing. Recieved a total of 9400'. Picked up and ran in hole with 200 joints. Ran s/n on bottom. Ran rabbit through each joint. SDFN, Crew Travel.

10/19/07 Completion day 35. WOD, Crew Change. Finish in hole with 2 7/8", 6.5, L-80 tubing. S/N at 7820'. RU to Swab. Swabbing and made a totaL OF 25 swab runs. Tagged fluid on 1st run at 1550', pulled from 3000'. Revovered 20 bbls of fluid. Fluid on all runs is clear fresh water. Recovered a total of 250 bbls of water. Fluid level staying at about 1500'. Casing pressure 75 psi, Slight smell of gas on last 3 runs. Shut well in for weekend. SDFN, Crew Travel.

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10/20/07 Completion day 36. SD for weekend.

10/21/07 Completion day 37. Shut in Tubing Pressure: 90 PSI. Shut in casing pressure; 470 psi. Shut down for weekend. Check pressures.

10/22/07 Completion day 38. WOD, Crew Travel. SITP: 200 psi; SICP: 640 psi. RU to Swab, RIH and tag dluid at 700', pull from 2200', recovered 10 bbls of oily fluid. Made a total of 38 runs. Average fluid level staying at about 2500'. Casing pressure is at 700 psi on last run. Small amounts of gas at the end of swab run. Fluid samples sent in to Halliburton this afternoon. Total Fluid pumped in this zone is 3425 bbls. Total bbls recovered from swabbing is 630 bbls. Total bbls of fluid left to recover is 2795 bbls. SDFN.

10/23/07 Completion day 39. WOD, Crew Travel. RU to swab, Tag fluid at 1300', pulled from 2800', recovered 10 bbls of fluid. Fluid is a oily, gassy, milky colored water. Made a total of 35 runs recovering a total of 350 bbls of fluid. Casing pressure at 750 psi all day. Slight traces of gas at the end of each swab run. Average run was from tagging at 2200' , pulling from 3700'. Total bbls of fluid left to recover = 2445 bbls. SDFN, Crew travel.

10/24/07 Completion day 40. WOD, Crew Change. RU to Swab, RIH tagged fluid at 1300', pulled from 2800', recovered 10 bbls of oily, gassy fluid. Made a total of 36 runs recovering a total of 423 bbls of gassy fluid. Casing pressure held at 900 psi all day. Fluid has increased on each run due to the help of the gas. Gas is increasing on swab runs. At the end of each swab run well flows for 45 seconds to 1 1/2 minutes. SICP this AM: 900 psi, SITP 160 psi. SDFN, Crew Travel.

10/25/07 Completion day 41. SDFN, Crew had mandatory safety meeting in Vernal. Crew travel, crew arrived on location at 0930. SITP; 200 psi, SICP 980 psi. RU to swab. Tag fluid at 1700', pulled from 3200'. Recovered 12 BBLS of milky fluid. No gas with or after swab. Swabbing, made a total of 33 runs recovering a total of 386 bbls of fluid. Very little gas with fluid and very little gas behind swab runs today. Average tag on each run about 2100'. Pulling from 4100'. Casing pressure at 900 psi. Fluid left to recover: 1636 bbls. SDFN, crew travel.

10/26/07 Completion day 42. WOD, Crew Travel. Safety Meeting, RU to Swab. RIH tag fluid at 2000', pull from 4000'. Recovered 12 bbls of milky water, no gas during or after swab. SICP overnight: 1000 psi; SITP " 160 psi. Made a total of 37 runs. Tagging fluid at 2100' to 2200', pulling from 4300'. Recocered a total of 438 bbls of fluid. Very little gas with fluid, no gas after each swab. 1198 bbls of fluid left to recover. SDFN, Crew travel.

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10/27/07 Completion day 43. SDF Weekend. SICP 1060 psi, SITP 190 psi.

10/28/07 Completion day 44. Shut Down For Weekend

10/29/07 Completion day 45. WOD, Crew travel. Safety Meeting, RU to Swab. RIH tag solid fluid at 1600'. Made a total of 40 runs. Average tag at 2000', pulling from 4000'. Recovered a total of 442 bbls of milky water. Small traces of gas at the end of each swab. Total of 1194 bbls of fluid left to recover. SITP 60 psi, SICP 1160 psi. SDFN.

10/30/07 Completion day 46. WOD, Crew travel. RU to Swab. SICP 1100 psi, SITP 50 psi. Correction on fluids recovered. Correct number is 2666 bbls. Fluid left to recover is 159 bbls. RIH tag solid fluid at 1800'. Pulled from 3800', recovered 12 bbls of milky water with slight traces of gas. Made a total of 40 swab runs, recovered a total of 456 bbls. Fluid is a milky water with slight traces of gas. Water samples have been sent in to Halliburton. Results were reported to Greg Olson and Morgan Hocker this PM. Total fluid recovered is 3122 bbls. Again this fluid has very little gas on each swab run.

10/31/07 Completion day 47. Wait on Daylight, Crew Travel. Bleed down well, SICP 1100 psi, SITP 50 psi. RIH tagged solid fluid at 1800', pulled from 3000'. Recovered 12 bbls of milky water, no gas. RD Swab Equipment. POH with 2 7/8" tubing. Stood back in derrick. PU 4000' of 1.90 tubing from pipe racks. Stand back in derrick 1.90 pipe. Will run in hole with CIBP on 1.90 tubing and set at 11000'+-. SDFN, Crew travel.

11/01/07 Completion day 48. WOD, Crew Travel. Tool man arrived on location with wrong X over. raveled back to Vernal and had correct one made. Made up CIBP and RIH with 4000' of 1.90 tubing. Ran in with 2 7/8" tubing to top of liner at 7879'. Crew travel , WOD.

11/02/07 No report

11/03/07 No report

11/04/07 Completion day 49. WOD, CREW TRAVEL, SERVICE, FUEL, & WARM RIG & EQUIP. MI RU JWO EL UNIT, RU SAME, MU 5-1/2" CIBP. RIH & SET SAME @ 7879'. POH, RD MOL W/ JWO EL UNIT & CREW. RIH W/1.990" TBG. POH LD 1.990" J-55 TBG TO RACK. RIH W/ 2-7/8" TBG FROM DERRICK TO 7876', STING INTO CMT RET, TEST BS TO 500 PSI. SIWFN, CREW TRAVEL, WOD.

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11/05/07 Completion day 50. WOD, CREW TRAVEL, FUEL, SERVICE, AND WARM RIG & EQUIPMENT. MI, RU HALCO CMT'RS. TEST SURFACE IRON TO 5000 PSI. EST INJ RATES @ 1 BPM 0 PSI, 2 BPM @ O PSI, AND 4 BPM @ 1500 PSI. w/17 BBL AWAY. WELL LOCKED UP SD PUMP @ 5000 PSI. ESTABLISH 3-1/2" CIBP HAS MOVED AND SET. RETEST SURFACE LINES TO 9000 PSI, ATT TO PUMP IN AGAIN W/NO SUCCESS. RD HALCO CMT'RS, MOL W/SAME. POH 1330 1600 2:50 7876 POH RACKING TBG IN DERRICK. CHANGE OUT TWO (2) 10 K ANNULAR VALVES ON BOP STACK. VALVES WERE HARD TO OPEN/CLOSE. SWFN, CREW TRAVEL, WAIT ON DAYLITE.

11/06/07 Completion day 51. WOD, CREW TRAVEL, FUEL, SERVICE, AND START RIG & EQUIP. MI & OL FISHING TOOLS AND EQUIP, MIC & TALLY ALL TOOLS AND TUBULARS. PU 6 3-1/8" DC'S, OJ, BJ, TAPER TAP, J-SLOTTED SUB, 4-5/8" WAVEY BOTTOM BURN MOVER MILL, X-O TO 2-7/8" WS. RIH W/ WS & BHA. RU P/SWIVEL, TAG TOP OF CMT RET @ 7876',BRING ON PUMP @ 2 BPM & MILL ON RET, BURN THRU SLIPS, HAVE DRAG UP HOLE, RACK SWIVEL IN DERRICK, CONT POH W/2 STDS, RACK SAME. SWFN, CREW

11/07/07 Completion day 52. WOD, CREW TRAVEL, SERVICE, FUEL, WARM UP RIG & EQUIPMENT. OPEN WELL W/ 0 PSI TBG & 0 PSI CSG. CONT POH W/ WS, BHA, & CORED CMT RET. LD TOOLS AND INSPECT SAME, NO FISH, MU TOOLS AND PREP TO GO IN HOLE AND SCREW INTO J-LOCK ASSY AND TAPER TAP. RIH W/ WS AND BHA TAG TOF. 3-1/2" PLUG SEEMS TO HAVE BLOWN OUT OF LINER. STAB TIW AND CLOSE SAME, CIRC WELL DEAD W/40 BBL 8.3# FW. REMOVE TIW AND CONT IN HOLE W/ WS & BHA TAG TOF @ 7,820'. TAG UP ON FISH, ROTATE AND WORK TORQUE IN TO TIGHTEN TOOL JT @ SCREW IN POINT. SET WT ON FISH & PUSH INTO TIGHT SPOT. ROTATE TOQUE INTO TO TOOL JT @ FISH AGAIN. POH WATCHING WEIGHT IND TO ENSURE TOOL JT IS LATCHED. POH RACKING STDS IN DERRICK. WELL TRYING TO COME IN AGAIN. STAB TIW. RU PUMP LINES AND ATT TO REV CIRC WELL CLEAN. CAN'T PUMP IN. ELECT TO SI WELL AND LET GAS MIGRATE OVERNITE. SWFN, CREW TRAVEL, WOD.

11/08/07 Completion day 53. WOD, CREW TRAVEL. SERVICE, FUEL, AND WARM UP RIG AND EQUIPMENT. OPEN WELL W/ 100 PSI TBG AND 0 PSI CSG. CONT POH RACING STDS IN DERRICK. RACK BACK 3-1/8" DC'S, RECOVER 100% OF 5-1/2" FISH. MU 4" OD MAGNET AND X-0'S BACK TO SWAB LINE CONN, GIH & TAG @ 8039' SLM. MAKE TWO (2) RUNS RETRIEVING DEBRIS F/ 5-1/2" PLUG. ID MAGNET. MU 4-3/8" OD IMP BLK & GIH W/SAME TO TOL & TAG. POH & INSP BLK. SHOW SOME DEBRIS STILL ON TOL W/3-1/2" CIBP. MU OS W/WIRE FINGERED GRAPPLE, 6 3-1/8" DC'S OJ, BUMPER SUB AND

136 STDS 2-7/8" WS. RIH & REV CIRC OVER TOF IN REV W/ WIRE CATCH. SWFN, CREW TRAVEL, WOD.

11/09/07 Completion day 54. WOD, CREW TRAVEL, FUEL, SERVICE, AND WARM UP RIG AMD EQUIP. POH W/ WS AND BHA. ID & INSPECT WIRE CATCH OS. NO RECOVERY. ATT TO PRESSURE PLUG INTO LINER NO SUCCESS. SD PUMP. MU 2-7/8" MILL, 2 JT 1-1/4" DC, XO TO 2-7/8" TBG & TIH W/SAME. TAG PLUG @ TOL @ 7876'. VERIFY THAT PLUG IS AT TOL. POH WWS AND BHA. LEAVE 20 STD IN HOLE. SWIFN, CREW TRAVEL, WOD.

11/10/07 Completion day 55. CHECK WELL @ 7 AM 50 PSI TBG & CSG, RIG CREW ON DAYS OFF.

11/11/07 Completion day 56. CHECK TBG & CSG, 50 PSIG ON TBG & CSG, FUEL GENERATOR, RIG CREW ON DAYS OFF.

11/12/07 Completion day 57. WOD, CREW TRAVEL. SERICE, FUEL, AND WARM UP RIG AND EQUIP. OPEN WELL W/50 PSI ON CSG, POH W/20 STDS RACKING IN DERRICK. MI RU BWWC WIRELINE UNIT AND 3"X20' BAILER. MIX CMT & RIH, TAG T-O-F & DROP CMT ON FISH, POH, RD MOL W/WIRELINE. MU 4-3/4" ROCK BIT, JUNK SUB, BUMPER SUB, OIL JAR, (3) 3-1/8" SDC'S, X0 TO 2-7/8" WS. RIH W/ WS & BHA TO 7,700'. WOC, RIG MAINT, CLEAN LOC. SWFN, CREW TRAVEL, WOD.

11/13/07 Completion day 58. WOD, CREW TRAVEL, FUEL, SERVICE, AND WARM UP EQUIPMENT. OPEN WELL W/ 10 PSI CSG & 0 PSI TBG. TIH W/ 3 STDS 2-7/8" WS. TAG TOC. FILL CSG & PRESSURE 250 PSI TO ASSURE CMT IS IN PLACE. SET 3K ON FISH & ROTATE, GETTING CMT,IRON, & RUBBER RETURNS TO SHAKER. BIT RATTLING ON LINER TOP. STILL CAN'T PUMP INTO FORMATION. ELECT TO POH. RACK SWIVEL, POH W/ 100 STDS WS AND BHA. SWFN, CREW TRAVEL.

11/14/07 Completion day 59. CREW TRAVEL, START AND WARM EQUIP. TAILGATE SAFETY MEETING. POH W/ TBG STAND BACK DRILL COLLARS-LAY DOWN BHA. TBG AND CSG NO PRESSURE. PU AND MU MAGNET ON RIG SAND LINE, RIH TO LINER TOP @ 7879', POH W/METAL SHAVINGS AND THIN FLAKES. 2ND AND THIRD RUNS RETRIEVED ONLY FINE SHAVINGS, RD MAGNET AND SAND LINE. PU AND MU 2 7/8" JUNK MILL, RIH ON 1 JT 1.6" TBG, 2 3/8" TO 1 1/4" X-OVER, 2-7/8" TO 1 1/4" x-over, 234 jts 2 7/8" tbg, EOT @ 7674'. SI well and SDFN.

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11/15/07 Completion day 60. WOD, crew had safety meeting, start and warm equip. Finish RIH w/ tbg. Tag CIBP @ liner top. RU power swivel and rig pump, 4 bbls to catch circulation. Push CIBP in 3' to 7882'. Mill on CIBP fall loose, chase to 7903'. Circ bottoms up, get injection rate- pump 2.5 bbls per min. @ 1300# bleed pressure. POOH w/ 48 jts 2 7/8" tbg. EOT @ 6371'. SDFN, crew travel.

11/16/07 Completion day 61. WOD, CREW TRAVEL, START AND WARM EQUIP, SAFETY TAILGATE MEETING. CSG AND TBG 0 PSI ON VAC. FINISH POH W/ TBG, LD BHA. JW wireline move in rig up. RIH w/ 5 1/2" cast iron cmt retainer, set @ 7872' POOH w/ wire line, rig down wireline and equip. PU AND MU CMT RETAINER STINGER, RIH ON 238 JTS TBG, EOT @ 7750' load equip on hot shot truck. Crew travel.

11/17/07 Completion day 62. WOD, CREW TRAVEL, START AND WARM EQUIP, TAILGATE SAFETY MEETING. FINISH RIH W/ TBG. STING IN CMT RETAINER CLEAR LOCATION. Help rig up cmt crew and squeeze hand with manifold, procedure safety meeting. Pressure test pump lines to 4000#, test and hold, 6 bbls to fill backside pressure test to 1000# no leaks. Sting out of retainer spot 30.7 bbls cmt to 7012'. Sting in cmt retainer, pump 21 bbls cmt @ 3.5 bbls per min, catch pressure squeeze cmt @ 3350# 1.8 bbls per min. Leave 1/2 bbl cmt in tbg sting out let cmt cover retainer +- 25', cmt top @ 7847. Pull EOT to 7841' flush reversed with 130 bbls. Rig down cmt squeeze equip. POOH w/ tbg, lay down stinger rig up jw wireline . RIH w/ 4" slick perf gun. **Perfs shot @ 7814'-7824'** w/ 22.7 gm, .43" diameter holes, 2spf, 10', 20 holes total. POOH with gun verify shots fired. RD wire line. Crew travel home.

11/18/07 No report

11/19/07 Completion day 64. WOD, crew travel, start and warm equipment, tailgate safety meeting. RU halliburton frac equip. Wait on well head saver "stinger". RD frac equip, perfed in wrong area. Wait on wireline and cmt retainer. RU wireline rih w/ 5 1/2" cmt retainer, set @ open hole log +/- 7824', 6" below csg collar and 2' above top squeeze perf. POOH w/ wireline RD wire line. RU rig pump pressure test retainer to 600# test and hold no leaks. Crew travel.

11/20/07 Completion day 65. WOD crew travel, start and warm equip, tailgate safety meeting. Csg and tbg 0 pressure, PU and make up cmt retainer stinger, RIH on239 jts 2 7/8" tbg to cmt retainer @ 7802', sting in retainer. RU swab equip, fluid level @ surface RIH to 1500' poh, connection threads stripped off and lose sinker bars down hole. RD swab equip, POH w/ tbg, swab sinker bar was on stinger LD sinker bar (3/4" pin over torqued). PU and MU stinger, RIH on 239 jts 2 7/8" tbg, sting in retainer

@ 7802. RU halliburton cmt trucks and squeeze manifold, safety meeting, test pump lines to 3500#, fill and test csg to 1000# fill tbg, perfs break down @ 3200# injection rate 1 ½ bbl per min @ 2430# bleed pressure, sting out of retainer,spot cmt in tbg, squeez perfs @ 7814'-24 w/ 8.5bbls of 10.3 bbls, cmt-50sks, mixing density-lbm/gal 15.8, yield 1.19, gal/sk 5.12. RD halliburton line and equip, poh w/ 4 jts tbg eot @ 7682'. Crew travel.

11/21/07 Completion day 66. WOD, crew travel, start and warm equip, tailgate sefety meeting. RIH w/ 3 jts tbg to 7998' clear no cmt. POH w/ tbg lay down cmt retainer stinger. RU rig pump (rig pump and lines frozen) 15 bbls to fill csg fluid level @ +/- 675', pressure test csg and retainer to 2000# test and hold no leaks bleed pressure. RU jw wire line pu and RIH w/ 10', 4" slick perf gun, shoot perfs @ 7806'-16' @ 120degrees, 22.7 gm, .43" dia holes, 2spf, 20 holes total. POH w/ gun, varify shots fired. RD wire line. PU & MU pinned notched collar,RIH on 1jt- psn- 237 jts 7771', POH w/9 jts to displace fluid, EOT @ 7479'. CREW TRAVEL.

11/22/07 Completion day 67. SD for holiday weekend.

11/23/07 Completion day 68. SD for holiday weekend.

11/24/07 Completion day 69. SD for holiday weekend.

11/25/07 Completion day 70. SD for holiday weekend.

11/26/07 Completion day 71. WOD, crew travel, start and warm equip, tailgate safety meeting. RIH w/ 9 jts tbg to 7770', RU swab equip. Fluid level @ surface, make 15 swab runs, 135 bbls recovered, swabbed dry no gas cut, wait an hour to make hourly run. RIH w/ swab to seat nipple, dry run no fluid. Wait 2 hours. Make swab run to seat nipple, dry run poh with swab. RD swab equip, drain lines, eot @ 7772'. Crew travel.

11/27/07 Completion day 72. WOD, crew travel, start and warm equip, yailgate safety meeting. Tbg and csg 0 psi, RIH w/ swab tag fluid @ 7700' lost fluid on run. RD swab equip. POH / tbg lay down pump seating nipple and notch collar clear location ready for frac equip. Crew travel, rig on standby ready to frac Nov. 30, 2007.

11/28/07 Completion day 73. Rig on standby, wait for frac. Alex Thompson on location to make sure right tanks were emptied.

11/29/07 Completion day 74. Rig on standby wait for frac.

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11/30/07 Completion day 75. WOD, crew travel, start and warm equip, tailgate safety meeting. RU halliburton frac equip and stinger, to well, wait on pump truck, pump truck arrive pressure test lines to 9500# test and hold no leaks, safety meeting. Fracture treatment on upper price river, load hole and break down @4407#, avg. treating pressure3302#, max terating pressure 7820# avg slurry rate 8.6 bpm, max 13.9 bpm co2 total use 75.3 ton, ISIP 3461#, 5 min SIP 2870#, 10 min SIP 2796#, 15 min. SIP 2766# 20375 gals used, and 43800# 20/40 white sand. Final injection 3843# 18.4 bpm. RD halliburton frac equip and stinger, RU flow manifold. Open on a +/- 17" choke flow back 1.5 bpm @2500#, 16:00 17" choke @ .5 bpm 2300# unload co2, 18:00 flow back line to rig tnk plugged off, RU line to pit. 18:30 unload water +/- 1bpm @ 2000# on 20 choke 60 bbls to 19:30 then unload co2 1800#, 20:00 open to 30" choke 1600# gas and co2, 21:00 1000# co2 open to 40" choke, 23:00 450# choke to 20" flow steady @ 250# 24:00 had to shut well in gas stay on location getting in my trailer. +/- 110 bbls recovered.

12/01/07 Completion day 76. WOD. ISIP 250# open on 20 choke unload co2 flow @ 200# try to flair will not ignite , 9:00 flow rate slow down open to 40 choke start to unload fluid and sand, 10:00 sand and fluid clean up pressure @ 100# slowly loose pressure try to choke to 20 but still losin pressure, 11:00 open choke all the way, well @ slight blow try to flair but no ignition. WOD.

12/02/07 Completion day 77. SEC.

12/03/07 Completion day 78. WOD, crew travel, start and warm equip, tailgate safety meeting. ISIP 500#, open on 20 choke bleed down to 0 psi. slight or no gas vented, vented co2. Wait on hot oiler to thaw tanks and BOPs, nipple down hydril bag and nipple up washington head. Called hot oiler and he was broke down, contacted another and on his way. PU & MU pinned notch collar and pump seating nipple on 2 jts 2 7/8" tbg, drill no ice inside BOPs, clear BOPs. RIH w/ notch collar, seat nipple, 240 jts 2 7/8" tbg. tag sand @ +/- 7766', 40' above top perf @ 7806', POH w/ 18 jts. EOT @ 7179' help hot oiler thaw lines and rig tank. No displacement of fluid over the BOPs. Crew travel.

12/04/07 Completion day 79. WOD, crew travel, start and warm equip. SITP 250#, SICP 250#, bleed pressures, RU rig pump and lines, RIH w/ 16 jts 2 7/8" tbg eot @ 7700', 82 bbls to catch circulation, fluid level @ +/- 4142', clean out sand @ 7766' to cement retainer @ 7824'(depths to open hole log). let clean up, pumped conventionally, 2bbls loss during clean out, 58' of sand recovered. 84 bbls pumped in well total of 429 needed to recover, 485 bbls fracced. Swab test well, fluid level @ 500', runs #2-6 fluid level stayed @ 2000', runs #7;9 fluid level @ 2500', runs #10-11 2800' run # 11

gas cut, run #12 3500', #13 @ 4000', #14-15 @ 5000'. 135 bbls recovered, 294 bbls needed to recover, 485 bbls fracced. Crew travel.

12/05/07 Completion day 80. WOD, crew travel, start and warm equip, tailgate safety meeting. SITP 300#, SITP 250#. Bleed off tbg pressure no fluid 20 min. bleed off, RU swab equip. fluid level @ 4000' for 1st and 2nd run csg drop to150#, runs #3-5 f.l. @ 5000', #6 5500'csg @ 100#, runs #7-8 f.l. @ 5800', #9-11 f.l. @ 6000' csg @ 70#, runs #12-13 f.l. @ 6500', runs #14-15 dry runs. Ending csg pressure 70#, 92 bbls recovered, 202bbls need to recover 485 bbls fracced. 15 runs total runs 8-13 gas chasing runs but no fluid with gas. PU & MU 1 jt tbg RIH and tag cement retainer check for sand, no sand. RD swab equip drain lines. Crew travel, WOD.

12/06/07 Completion day 81. WOD, crew travel, start and warm equip, tailgate safety meeting. SITP 250#, SICP 300#, bleed off tbg, 20 minutes, RU swab equip, fluid level @ 6500' fluid gas cut vent small amount after the run, runs #2-3 f.l. @ 6800', run #4 f.l. @ 7500', wait 1/2 hour to make a swab run, make runs #5-7 fluid level @ 7500' csg @ 100#, wait 1/2 hour to make swab run, last run f.l. @ 7500' csg @ 100#, 14 bbls recovered, 188 bbls to recover from 485 bbl frac. RD swab equip, bleed csg 100#. RIH w/ 1 jt 2 7/8 tbg, tag cement retainer, no sand, POH w/ tbg, LD seat nipple and notched collar. RU wireline truck and equip, RIH w/ 10k composite flow through frac plug set @ 7400'. POH w/ wireline, RU rig pump fill csg w/ 155 bbls pressure test plug to 1000# test and hold no leaks. RIH w/ 4" csg gun, 120 degree phasing, 23.5 gm, .43" dia holes, shoot **perfs @ 7192'-97'**, 5', 2jspf, 10 holes. **7224'-29',** 5', 2jspf, 10 holes. **7234'-39'**, 5', 2jspf, 10 holes. 7244'-49', 5', 2jspf, 10 holes. 20' footage, 40 holes total. POH w/ gun verified all shots fired.

12/07/07 Completion day 82. WOD, crew travel, start and warm equip, tailgate safety meeting. SICP 175#, RU stinger wellhead saver to BOPs, HALCO frac crew RU equipment and test lines to 9500#. Test and hold no leaks, safety meeting. Break down @ 3704# pumping @ 10.2 bpm, avg. slurry rate 16.11 bpm, max slurry rate 20.45 bpm. avg. co2 rate 21.69, max co2 rate 26.28 bpm. avg. wellhead rate 40.12 bpm, max wellhead rate 41.37 bpm. avg. pressure 4884#, max pressure 5526#. **Total sand pumped 143,800 # premium white- 20/40** (90mi). 185 tons co2. 655. 12 bbls fluid pumped. Final injection rate 39.47 bpm @ 5380#. frac gradient .95 ISIP 3690#, 5 min 3098#, 10 min 2966#, 15 min 2883# fraced 655 bbls and load hole yesterday w/155 bbls, 810 bbls needed to recover. Rig down stinger and HALCO frac equip. RU manifold and flow lines. Flow back well on a 10 choke, 2200# flow fluid. -14:00 1600# on a 10 choke 30 bbls fluid. -15:00 1200# 10 choke flowing co2. 16:00 1020# 10 choke co2 frost. 16:40 840# 16 choke start unloading sand and fluid. 1700# trace of sand 750# co2 frost. 17:00 680# 17 choke sand and co2. 20:00 460# 17 choke unload sand and fluid. 21:00 620# 17 choke. 24:00 440# 17 choke.

+/- 78 bbls flow back. 810 bbls loaded & fracced, 732 bbls neede to recover.

12/08/07 Completion day 83. Flow test. 1:00 17 choke 330# unload co2 frost and slight sand. -2:00 17 choke 240# co2. -3:00 17 choke 250# co2. -4:00 17 choke 190# co2 frost. -5:00 start to unload fluid open on 40 choke 130#. -6:00 choke back to 10, 90# co2 frost. -7:00 10 choke 140# crew show up. Crew take over flow test. -7:30 open choke all the way 140# die @ 9:00, SWI let it build pressure 3 hrs. - 12:00 open on 10 choke 400# unload 50bbls stop flowing @ 13:00 SWI 3hrs. crew SDFN travel home. Choke 245# 25 bbls stop flow 16:45 SWI. -19:45 30 choke15 choke 252# stop flowing @ 20:30 10 bbls fluid SWI. -23:00 30 choke 270# stop flowing @24:00 10 bbls SWI 3hrs. 119 bbls flowed back, 810 bbls fracced and loaded, 613 bbls neede to recover.

12/09/07 Completion day 84. Well shut in to build pressure @ 24:00, 3:00 open on 15 choke 258# stop flowig @ 3:30 6 bbls SWI, 6:30 open on 15 265# bleed off @ 7:00 nno fluid or frost unloaded. 10:00 open on 30 choke 240# bleed down to 40# @ 10:17 choke to 8. 10:30 16#. 10:43 2# choke to 4 10:54 0# venting co2 not much gas tried to ingnite did not ignite. avg.SI pressure built up in 3 hr. period 250# avg. flow back time 40 min. 10 bbls recovered, 207 total flowed back. 603 bbls neede to recover. SDFN.

12/10/07 Completion day 85. WOD, crew travel, start and warm equip, tailgate safety meeting. SICP 700# open on 11 choke no fluid. -8:00 11 choke 375# no fluid. -8:15 open choke all the way to +/- 74 bleed off no fluid, get tbg equip ready to RIH, well start to unload. Well unloading fluid and gas cut flowing to rig tank. -10:30 open choke 140# 30 bbls flow back. -11:00 10 bbls @ 80#. -11:30 stopped unloading, slight blow 10 bbls flow back, 50 bbls total flow back. wait to make sure well does not flow. PU & MU pinned notched collar & pump seating nipple, RIH on 80 jts 2 7/8" tbg, tbg start to unload slight fluid and gas. RU line to rig tank unload 2 bbls, tbg stop unloading venting RU rig pump to tbg pump 10 bbls kill tbg, csg on slight blow. Stab washington rubber, finish RIH w/ tbg, tg sand @ +/- 7340' 91' below btm **perf @ 7249' 224** JTS 2 7/8" TBG, POH w/ 4 jts EOT @ 7185' PSN @ 7183' top perf @ 7192'. RU swab equip RIH fluid level @ 1200# pull from 3300' gas cut low fluid vent off after run no fluid fallowing, run #2 fluid level @ 2200' gas cut low fluid pressure vent off no fluid, 3 bbls recovered CSG @ 200# after 1 hour shut in. 50 bbls flowed back, 10 bbls to kill tbg, 3 bbls swabbed, 560 bbls to recover.

12/11/07 Completion day 86. No report.

Cottonwood Fed 23-13
Operator: Petro-Canada Resources (USA) Inc.
Section 23, T13S, R15E, SLB&M
Carbon County, Utah
API No. 43-007-31252
Daily Reports
TIGHT HOLE

12/12/07 Completion day 87. WOD, crew travel, start and warm rig, tailgte safety meeting. SITP 750#, SICP 800#, bleed off tbg pressure no fluid bleed off fast, RU swab equip, RIH w/ swab run tag fluid @ +/- 5500', pull from PSN @ 7183', recover 6 bbls fluid very gas cut vent down after swab run. csg @ 700# after run. 6 bbls recovered, 480 bbls to recover. Bleed csg pressure, POH w/ tbg, LD PSN & notch collar. Dig and chip frozen mud using forklift to get to surface csg valve, locate valve and check pressure- 0 pressure, take off pressure guage, open valve, surface csg on a vac. RD flow manifold and clear location. SEC, WOD, crew travel.

12/13/07 Completion day 88. WOD. WO wireline, crew had safety meeting @ shop, csg pressure @ 700# bleed off pressure to rig tank, no fluid, wireline show up, and rig crew. RU wireline equip, run in tandem CIBP, 1' 4 spf 16gm perf gun, set CIBP @ 5850', shot **perfs @ 5812'-13'**, POH w/ gun. RU rig pump fill csg, break down @ 1700# pump 2 bpm @ 1500#, bleed pressure. RIH 1145 1300 1.25 119857820 PU & RIH w/ wireline set cement retainer, set @ 5785', POH w/ wireline, RD wireline & equip. RU rig pump pressure test cement retainer to 1000#, test and hold no leaks. PU & MU stinger RIH on 176 jts 2 7/8" tbg 4' sub 8' sub and 1 jt to space out. RU HALCO cement equip. Sting in retainer pressure test lines to 4000# test and hold no leaks, hold pressure on csg 1000# displace 33 bbls tbg volume into perf @ 1800# @ 3bpm, when cement started in perfs pressure went up to 2000# to 2400# then break down, max pressure 2700# avg. 2300# displace 4.4 bbls leave 1/2 bbl in tbg, sting out, reverse out 9 inches above retainer, fluid data- 200 sks cement,-15.8 ppg- yield 1.19- mix fluid gal/sk 5.12- 40.9 bbls cement 40.4 dispaced. RD halco cement equip, LD 1 jt tbg and subs, POH w/ 10 jts tbg EOT @ 5415', drain lines. SEC, SFDN, crew travel, WOD.

12/14/07 Completion day 89. WOD, crew travel, start and warm rig, tailgate safety meeting, no pressure on tbg and csg, finish POH w/ tbg, LD stinger, RU wireline equip. RIH w/ bond log tool to cement retainer @ 5785' log cement, perf area has good bond from 5785 to +/- 5320'. PU and RIH w/ 3 3/8" perf gun w/ 25 gm, .42" dia holes, 37" penetration @ 120 degree phasing, shoot perfs @ 5765'-5775', POH w/ gun, varify shots fired. RD wireline and equip, SEC, SDFN, crew travel, WOD.

12/15/07 Completion day 89. WOD, off for weekend.

12/16/07 Completion day 90. WOD, off for weekend.

12/17/07 Completion day 91. WOD, crew travel, start and warm rig, tailgate safety meeting. Wait on HALCO frac trucks, they were supposed to be here on sunday the 16th but there deisel in there trucks gelled and could'nt start them, no one notified me on the situation. They are being pulled up the dugways by grader. RU stinger well head saver. RU HALCO frac equip

as they come in, prime pumps and pressure test lines to 9500#, test and hold no leaks. Safety meeting and head count. Load and break down @ 3515# stimulate w/ 70q co2 foam frac. -76.7 tons co2, -40900# 20/40 white sand, - frac gradient .87, -312 bbls fluid,-avg. treating pressure 3119# max 3455#, -avg slurry rate 7.0 bpm, max 9.2, -avg co2 rate 8.3 bpm, max 19.0 bpm, -ISIP 2519#, 5min 2355#, 10min 2335#, 15min 2319#, 115 bbls to load hole on 12/14/07, 312 bbls fracced, 427 bbls to recover. RD HALCO frac equip and stinger well head saver, RU flow manifold and hardlines. Open on 11 choke 2200# unload 10 bbls fluid then co2, -18:30 11 choke @ 1900# co2 and frost, -19:30 11 choke @ 1800#, -20:30 11 choke @ 1700#, -21:30 14 choke @ 1600# starting to plug off w/ frost, -22:30 14 choke 1500# co2 frost, -23:00 plugged off w/ frost, got line cleared 1400#, -24:00 14 choke @ 1200# +/- 30 bbls flowed back.

12/18/07 Completion day 92. Choke@ 800# co2 frost, -2:00 14 choke @ 600# co2 frost, -3:00 manifold plugged off flow to rig tank clear lines to pit open on 20 choke @ 700# unloading heavy frost, -4:00 20 choke @ 500# unloading heavy frost, -5:00 18 choke @ 400#, light co2 frost, -6:00 18 choke @ 425# light frost, -7:00 18 choke @ 300# light frost, between 4:00 and 7:00 unloaded 15 bbls, -8:00 14 choke @ 250# start to unload fluid and slight sand, -9:00 14 choke @ 180# unload fluid, -11:00 14 choke @ 60# slight fluid. Open choke 0# slight blow tried to ignite, did not ignite, tried to ignite @ 7:00, between 7:00 and 11:00 unloaded 45 bbls fluid. SWI 3 hr pressure test. At 13:00 @ 70#, 13:30 @ 150#, 15:00 SIP, 125# open on a 25 choke, 15:15 25 choke @ 60# no fluid, 15:30 25 choke 0# 90 bbls flowed back, 337 needed to recover. SEC crew travel, WOD.

12/19/07 Completion day 93. WOD, crew travel, start and warm rig, tailgate safety meeting. SICP, 600#, open on 15 choke did not ignite when lit, csg bleed down to 0# no fluid, PU and MU pinned notched collar and PSN RIH on 177 jts 2 7/8" tbg to cement retainer @ 5785' no sand, LD 61 jts on pipe racks, RIH w/ tbg from derick, 176 jts PSN pinned notched collar, EOT @ 5744'. top perf @ 5765'. RU swab equip and hardlnes, run # 1 fluid level @ 4600' gas cut slight flow after run 7 bbls recovered, runs #2-6 fluid level @ 4600' 6 bbls recovered on each run, runs #5-9 fluid level @ 4600' 2bbls per run recovered, gas cut on each run didnt flow after runs more than 2 min, 35 bbls recovered 302 bbls left to recover. SEC, crew travel, WOD.

12/20/07 Completion day 94. WOD, crew travel, start and warm rig, tailgate safety meeting. SITP 400#, SICP 375#, open tbg on 15 choke 20 min bleed off, RU swab equip RIH w/swab fluid level # 4400' 7 bbls, flowed 5 min after gas cut, run #2 FL @ 4200' 6 bbls slight gas after run, #3 5400' 2bbls slight gas after run, # 4-5 dry runs no fluid, wait for 1 hour to make a swab run dry run, 15 bbls recovered. POH w/ tbg LD pinned notched collar.

Cottonwood Fed 23-13
Operator: Petro-Canada Resources (USA) Inc.
Section 23, T13S, R15E, SLB&M
Carbon County, Utah
API No. 43-007-31252
Daily Reports
TIGHT HOLE

PU and MU 2 7/8 collar, RIH on PSN, 178 jts 2 7/8" tbg, tag cement retainer @ 5785'. LD 5 JTS land tbg in well head, 173 jts 2 7/8" tbg, pump seating nipple, 2 7/8" tbg collar, EOT @ 5661.55 ND BOP, NU well head valve. Clear location for rig down, wait on truck and trailer to load weatherford equip. SDFN, crew travel, WOD. Trailor didnt show up.

12/21/07 Completion day 95. WOD crew travel. RD equip. log tracer, move out. FINAL COMPLETION REPORT.

P 7A

Form 3160-5
(August, 1999)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
OMB No. 1004-0135
Expires November 30, 2000

SUNDRY NOTICES AND REPORTS ON WELLS

Do not use this form for proposals to drill, or to re-enter an abandoned well. Use Form 3160-3 (APD) for such proposals.

SUBMIT IN TRIPLICATE

5. Lease Serial No.
UTU-077547

6. If Indian, Allotte or Tribe Name
N/A

1. Type of Well
☐ Oil Well ☑ Gas Well ☐ Other Dry

7. If Unit or CA/Agreement Designation
N/A

2. Name of Operator:
Petro-Canada Resources (USA) Inc
Contact: Amy Karwan
Phone: 303/297-2300

8. Well Name and No.
Cottonwood Fed 23-13

3. Address and Telephone No.
999 18th Street, Suite 600, Denver, CO 80202

9. API Well No.
43-007-31252

4. Location of Well (Footage, T, R, M, or Survey Description)
Surface and bottomhole location:
2213' FNL and 2309' FEL, SW/4 NE/4
Section 23, T13S, R15E, SLB&M

10. Field and Pool, or Exploratory Area
undesginated

11. County or Parish, State
Carbon County, Utah

12. CHECK APPROPRIATE BOX(ES) TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION			
☐ Notice of Intent	☐ Acidize	☐ Deepen	☐ Production (start/resume)	☐ Water Shut-Of
	☐ Alter Casing	☐ Reclamation	☐ Reclamation	☐ Well Integrit
☐ Subsequent Report	☐ Casing Repair	☐ New Construction	☐ Recomplete	☐ Other
☑ Final Abandonment Notice	☐ Change Plans	☑ Plug and Abandon	☐ Temporarily Abandon	
	☐ Convert to Injection	☐ Plug Back	☐ Water Disposal	

13. Describe Proposed or completed Operation (clearly state all pertinent details, including estimated starting date of any proposed work and approximate duration thereof. If the proposal is to deepen directionally or recomplete horizontally, give subsurface locations and measured and true vertical depths of all pertinent markers and zones. Attach the Bond under which the work will be performed or provide the Bond No. on file with the BLM/BIA. Required subsequent reports shall be filed within 30 days following completion of the involved operations. If the operation results in a multiple completion or recompletion in a new interval, A form 3160-4 shall be filed once testing has been completed. Final Abandonment Notices shall be filed only after all requirements, including reclamation, have been completed, and the operator has determined that the site is ready for final inspection.)

Petro-Canada plugged and abandoned the subject well on 9/8/2008.
Please see attached P&A Report and wellbore diagram.

14. I hereby certify that the foregoing is true and correct

Name (Printed/Typed)	Title
Amy Karwan	Operations Technician
Signature Amy Karwan	Date 9/17/2008

THIS SPACE FOR FEDERAL OR STATE OFFICE USE

Approved by	Title	Date
Conditions of approval, if any, are attached. Approval of this notice does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.	Office	

Title 18 U.S.C. Section 1001 and Title 43 U.S.C. Section 1212, make it a crime for ny person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

RECEIVED
SEP 22 2008
DIV. OF OIL, GAS & MINING

Cottonwood Fed 23-13
Operator: Petro-Canada Resources (USA) Inc.
Section 23, T13S, R15E, SLB&M
Carbon County, Utah
API No. 43-007-31252

P&A Report

08/26/08 Report 1 – Moved rig, Notified BLM of our plans to test BOP's and casing on Tuesday 9/2/08.

08/27/08 Report 2 – Prepared to P&A well. Halliburton unable to cement until next week.

08/28/08 Report 3 – Line up and schedule equipment for P&A.

08/29/08 Report 4 – Well shut down.

08/30/08 Report 4 – Well shut down.

08/31/08 Report 4 – Well shut down.

09/01/08 Report 5 – Talked to all service companies and line up same.

09/02/08 Report 6 – Wait on Halliburton. Unable to get to the location due to the roads being washed out. Tagged cement at 5753'.

09/03/08 Report 7 – Moved in and rigged up Halliburton. At 3 PM primed up and prepared to pump cement. Mixed and **pumped 96 sacks of Class G cement with 2% CACL. 15.6 ppg, 1.15 cu ft/sack yield.** Displaced plug with 5 gallons per 100 bbls of corrosion inhibitor and biocide. Plug witnessed by BLM inspector Rand Knight. Pulled 20 stands and circulated hole clean. SDFN. Will tag plug at 7 hours.

09/04/08 Report 8 – RIH and tagged firm cement @ 4921'. Set down on plug with 3 K, plug in place, POH, RU BWWL and Perforate 1' with 4" casing gun @ 2760'. RD BWWL, establish circulation at 3 bpm. PU and RIH with cement retainer. **Set @ 2648'. Mixed and pumped 85 sacks of Class G cement.** O pressure while pumping. **Stung out of retainer and left 11 sacks on top of retainer.** Displaced all fluid with biocide and corrosion inhibitor. Pulled 15 stands and circulated hole clean. RIH and **perforate 1' with 4" casing gun @ 1305'.** RD BWWL. RIH with retainer and set @ 1100'. **Mixed and pumped 80 sacks Class G cement.** All cement pumped had 2% CACL. Pulled 10 stands and circulated hole clean. Laid down 122 joints of 2 7/8" tubing. SDFN @ 1900 hours. All plugs witnessed by BLM Inspector, Rand Knight.

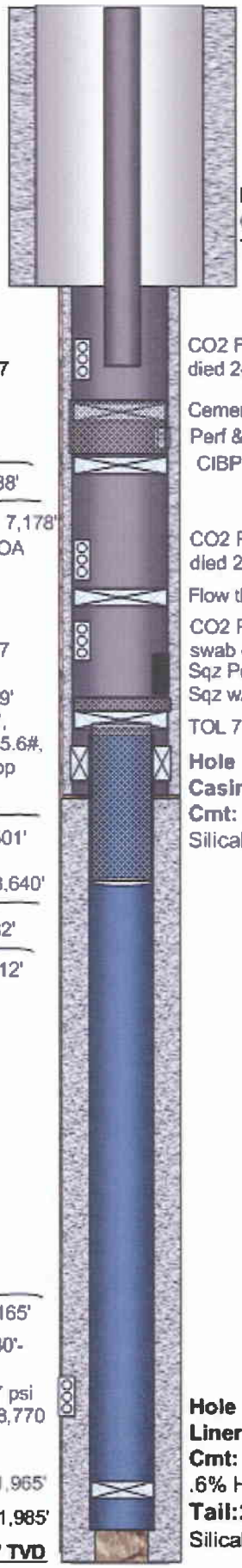
RECEIVED
SEP 2 2 2008
DIV. OF OIL, GAS & MINING

Cottonwood Fed 23-13
Operator: Petro-Canada Resources (USA) Inc.
Section 23, T13S, R15E, SLB&M
Carbon County, Utah
API No. 43-007-31252

09/05/08 **Report 9 – Mix and pump 10 sacks of Class G cement with 2% CACL.** EOT @ 50'. Circulated out cement. Wait 10 minutes to see where cement settles. Cement staying at 3' below well head. Laid down 3 joints of tubing. RD rig floor. ND BOP's, cut off casing. Pulled out and laid down well head. PU 50' of 1' and run between 9 5/8" and 5 ½" casing. **Mixed and pumped last 50 sacks of Class G cement.** Cement at top of cut off casing. Welded ½" plate on top of casing. Welded full description of well information on top of plate. BLM inspector Rand Knight on location at all times during P&A operations. He approved the P&A.

09/08/08 **Report 10** – Rig down. For our records I notified Don Stevens with the BLM that we would begin reclaiming this well this week. He advised he would want to meet me on location 1 day before finishing in case he wants to do additional work. He was nice and is good to work with. Any questions let me know.

Cottonwood Federal 23-13 Well
Section 23, T13S - R15E
Carbon County, Utah
Wellbore 7/15/08



Tubing: 5,366' (173 jts, 2-7/8" 6.5 ppf N-80 EUE 8rd, EOT 5,661.6' (0.00579 bbl/ft cap)

Hole Size: 12-1/4" **TOC:** Surface (note:15 bbls cement to surface)
Casing:1,205', 9-5/8" 36 ppf K-55 STC (0.0479 bbl/ft annular csg-csg vol)
Tail Cmt: 450 sx Class "G" cement, 2% CaCl, 1/4 pps flowseal, 15.5 ppg, yld 1.15 cfs

1,205' TVD

Wasatch Fm.

Perfs 5,765'-5,775'
CO2 Frac'd 12/17/07

CO2 Frac'd 12/17/07 brk 3,515#, 427 BW. 40.900# 2040 White, 77T CO2, Trace Ir, ISIP 2,519#, 15 min 2,319#, died 24 hrs, swab dry w/ 280 BW LTR

Cement Retainer @ 5,785'
Perf & squeeze 5812-13' w/ 200 sx 15.8 ppg G, 1.19 cuft/sx, good bond to 5320'
CIBP 5,850'

North Horn Fm. 5,938'

Upper Price River Fm. 7,178'
Perfs 7,192'-7,249' OA
CO2 Frac'd 12/7/07

CO2 Frac'd 12/7/07 brk 3,704#, 655 BW. 143.800# 2040 White, 185T CO2, Trace Sc, ISIP 3,690#, 15 min 2,833#, died 24 hrs, swab dry w/ 480 BW LTR

Flow thru frac plug 7,400'

Perfs 7,806'-7,816'
CO2 Frac'd 11/30/07

CO2 Frac'd 11/30/07 brk 4,407#, 485 BW. 43.800# 2040 White, 75T CO2, Trace Ir, ISIP 3,461#, 15 min 2,766#, swab dry w/ 188 BW LTR
Sqz Perfs 7,814'-7,824'
Sqz w/ 8.5 bbls cmt

TOC +/- 7,849'
Cmt Retainer 7,872', sqz'd w/ 30.7 bbls 15.6#, 1.18 yld, .5 bbl on top

TOL 7,879'

Hole Size: 7-7/8" **TOC: ±7200' (CBL)**
Casing:8,268', 5-1/2", 20 ppf L80 LTC (0.0309 bbl/ft annular-hole vol / 0.0221 bbl/ft csg vol)
Cmt: 1,470 sx Premium 50/50 Poz Cement + 3% bwoc KCl + 0.2% WG17 + 0.1% HR12 + 3 pps Silicalite.125 pps Polyflake + 1 pps Granulite . Yield 1.46 cfs, 13.4 ppg slurry.

Blue Castle Fm. 8,501'

Burst liner 8,640'

Castlegate Fm. 9,182'

Black Hawk Fm. 9,412'

Mancos Fm. 10,165'

Mancos Perfs 11,880'-11905' OA
Break down – 5,877 psi
Frac'd – burst liner 8,770 psi

Hole Size: 7-7/8" **TOL / TOC:** 7,839'
Liner:4,136', 3-1/2" 9.3 ppf P-110 ULTF (.0246 bbl/ft annular vol/.0149 bbl/ft csg vol/.0262 bbl/ft lap v
Cmt: Lead: 227 sx 50/50 Poz Prem w/ 20% SSA1, 4% Gel, 3 pps Silicalite, .2% Super CBL (expansio .6% Halad344 (fluid loss), .2% HR12 (retarder), .2% Suspend HT 12.5 ppg, 2.1 cfs
Tail:240 sx (994 ft3 – xx.7 bbls) 50/50 Poz Prem w/ 3% KCl (accelerator), .2% WG17 (gel), 3 pps Silicalite, .125% PolyEflake, .75% Halad322 (fluid loss), 1 pps Granulite TR, 13.0 ppg, 1.62 cfs

PBTD 11,965'

SHOE 11,985'

12,000' TVD

43-007-31252

HALLIBURTON

Cementing Job Summary

The Road to Excellence Starts with Safety

Sold To #: 344912	**Ship To #:** 2605298	**Quote #:**	**Sales Order #:** 6146630
Customer: PETRO-CANADA		**Customer Rep:** SESSIONS, LARRY	
Well Name: Cottonwood Federal	**Well #:** 23-13		**API/UWI #:**
Field:	**City (SAP):**	**County/Parish:** Carbon	**State:** Utah
Legal Description: Section 23 Township 13S Range 15E			
Contractor: WORKOVER	**Rig/Platform Name/Num:** WORKOVER WORKOVERN/A		
Job Purpose: Plug to Abandon Service			
Well Type: Development Well	**Job Type:** Plug to Abandon Service		
Sales Person: JAMES, AARON	**Srvc Supervisor:** MCKEE, RALPH	**MBU ID Emp #:** 259268	

Job Personnel

HES Emp Name	Exp Hrs	Emp #	HES Emp Name	Exp Hrs	Emp #	HES Emp Name	Exp Hrs	Emp #
ARGUMEDO, JACOB		329409	BRUCE, JEREMY Scott		452260	FAVATELLA, DYLAN		453115
JURGENSEN, MICHAEL William		445566	KASPERZAK, JOHNATHAN		453115	MCKEE, RALPH R		259268
PAY, THOMAS Darrell		331893	ROSENLUND, DEWAYNE Max		380841	SARVER, ZACHARY S		219539

Equipment

HES Unit #	*Distance-1 way*	HES Unit #	*Distance-1 way*	HES Unit #	*Distance-1 way*	HES Unit #	*Distance-1 way*
10261036	145 mile	10574660C	145 mile	10897817	145 mile		

Job Hours

Date	*On Location Hours*	Operating Hours	Date	*On Location Hours*	Operating Hours	Date	*On Location Hours*	Operating Hours
TOTAL				*Total is the sum of each column separately*				

Job

Formation Name			
Formation Depth (MD)	**Top**	**Bottom**	
Form Type		**BHST**	
Job depth MD	3500. ft	**Job Depth TVD**	3500. ft
Water Depth		**Wk Ht Above Floor**	. ft
Perforation Depth (MD)	*From*	**To**	

Job Times

	Date	Time	Time Zone
Called Out	03 - Sep - 2008	04:00	MST
On Location	03 - Sep - 2008	08:45	MST
Job Started	03 - Sep - 2008	09:00	MST
Job Completed	05 - Sep - 2008	11:35	MST
Departed Loc			

Well Data

Description	New / Used	Max pressure psig	Size in	ID in	Weight lbm/ft	Thread	Grade	Top MD ft	Bottom MD ft	Top TVD ft	Bottom TVD ft
5 1/2" Production Casing			5.5	4.778	20.		P-110	.	7800.		
2 3/8" Production Tubing	Unknown		2.375	1.995	4.7			.	3500.		

Tools and Accessories

Type	Size	Qty	Make	Depth	Type	Size	Qty	Make	Depth	Type	Size	Qty	Make
Guide Shoe					**Packer**					**Top Plug**			
Float Shoe					**Bridge Plug**					**Bottom Plug**			
Float Collar					**Retainer**					**SSR plug set**			
Insert Float										**Plug Container**			
Stage Tool										**Centralizers**			

Miscellaneous Materials

Gelling Agt		**Conc**		**Surfactant**		**Conc**		**Acid Type**		**Qty**		*Conc*	%
Treatment Fld		**Conc**		*Inhibitor*		**Conc**		**Sand Type**		*Size*		*Qty*	

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Cementing Job Summary

Fluid Data

Stage/Plug #: 1

Fluid #	Stage Type	Fluid Name	Qty	Qty uom	Mixing Density lbm/gal	Yield ft3/sk	Mix Fluid Gal/sk	Rate bbl/min	Total Mix Fluid Gal/sk
1	Water Spacer		10.0	bbl	8.34	.0	.0	.0	
2	Premium Cement	CMT - PREMIUM - CLASS G, 94 LB SK (100003685)	350.0	sacks	15.8	1.17	5.02		5.02
94 lbm		CMT - PREMIUM - CLASS G REG OR TYPE V, BULK (100003685)							
2 %		CALCIUM CHLORIDE - HI TEST PELLET (100005053)							
5.019 Gal		FRESH WATER							
3	Water Displacement			bbl	8.34	.0	.0	.0	

Calculated Values		Pressures		Volumes					
Displacement		Shut In: Instant		Lost Returns		*Cement Slurry*		Pad	
Top Of Cement		5 Min		Cement Returns		Actual Displacement		Treatment	
Frac Gradient		15 Min		Spacers		Load and Breakdown		Total Job	

Rates

Circulating		*Mixing*		*Displacement*		Avg. Job	

Cement Left In Pipe		Amount	*0 ft*	*Reason*	*Shoe Joint*										
Frac Ring # 1 @		*ID*		*Frac ring # 2 @*		*ID*		*Frac Ring # 3 @*		*ID*		*Frac Ring # 4 @*		*ID*	

The Information Stated Herein Is Correct	***Customer Representative Signature***

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Cementing Job Log

The Road to Excellence Starts with Safety

Sold To #: 344912	**Ship To #:** 2605298	**Quote #:**	**Sales Order #:** 6146630
Customer: PETRO-CANADA		**Customer Rep:** SESSIONS, LARRY	
Well Name: Cottonwood Federal	**Well #:** 23-13		**API/UWI #:**
Field:	**City (SAP):**	**County/Parish:** Carbon	**State:** Utah
Legal Description: Section 23 Township 13S Range 15E			
Lat: N 0 deg. OR N 0 deg. 0 min. 0 secs.		**Long:** E 0 deg. OR E 0 deg. 0 min. 0 secs.	
Contractor: WORKOVER	**Rig/Platform Name/Num:** WORKOVER WORKOVERN/A		
Job Purpose: Plug to Abandon Service			**Ticket Amount:**
Well Type: Development Well	**Job Type:** Plug to Abandon Service		
Sales Person: JAMES, AARON	**Srvc Supervisor:** MCKEE, RALPH		**MBU ID Emp #:** 259268

Activity Description	Date/Time	Cht #	Rate bbl/min	Volume bbl Stage	Volume bbl Total	Pressure psig Tubing	Pressure psig Casing	Comments
Pre-Convoy Safety Meeting	09/03/2008 05:00							
Arrive At Loc	09/03/2008 08:45							
Assessment Of Location Safety Meeting	09/03/2008 08:49							
Pre-Rig Up Safety Meeting	09/03/2008 08:55							
Rig-Up Equipment	09/03/2008 09:00							
Pressure Test	09/03/2008 10:51					4000.0		
Pressure Test	09/03/2008 10:54						2200.0	BACKSIDE
Other	09/03/2008 11:00							WENT TO GET CAL/CLORIDE----WAIT
Pre-Job Safety Meeting	09/03/2008 13:00							
Pump Water	09/03/2008 14:47		3	10		258.0		AT 76 BBL AWAY WELL CIRCI;ATES
Shutdown	09/03/2008 14:54							SHUTDOWN TO MIX CEMENT
Pump Cement	09/03/2008 14:57		3	20		258.0		96 SKS @ 15.8 PPG, 1.17 YEILD, 5.02 GPS
Pump Displacement	09/03/2008 15:04		4	27		50.0		BALANCED PLUG
Other	09/03/2008 15:36							RIG PULLS TUBING/ WASH RCM-CLEAN LINES
Other	09/03/2008 16:30							WAIT UNTILL TOMARROW FOR NEXT PLUG
Call Out	09/03/2008 18:59							

HALLIBURTON

Cementing Job Log

Activity Description	Date/Time	Cht #	Rate bbl/ min	Volume bbl Stage	Volume bbl Total	Pressure psig Tubing	Pressure psig Casing	Comments
Arrive At Loc	09/04/2008 09:30							WAIT ON LOGGING
Safety Meeting - Pre Job	09/04/2008 14:00							PLUG #2
Pressure Test	09/04/2008 14:42					3700.0		
Pressure Test	09/04/2008 14:46						300.0	BACKSIDE
Pump Water	09/04/2008 14:52		3	10		60.0		
Shutdown	09/04/2008 15:00							MIX CEMENT
Pump Cement	09/04/2008 15:01		3	17.7		65.0		85 SKS. @ 15.8 LBS/GAL 1.17 YEILD, 5.02 GPS,. 16.4 BBL BELOW RETAINER 1.3 BBL ABOVE
Pump Displacement	09/04/2008 15:07		2.5	14.5		50.0		H2O WITH CORRISION INHABITOR .5 GAL/10BBL
Shutdown	09/04/2008 15:15							STING OUT / PULL TUBING / WASH RCM
Other	09/04/2008 15:20							WAIT ON PERFORATIONS
Other	09/04/2008 15:24							PLUG #3
Pressure Test	09/04/2008 15:24					1000.0		
Pressure Test	09/04/2008 15:24						300.0	BACKSIDE
Pump Water	09/04/2008 15:25		3			25.0		
Shutdown	09/04/2008 15:29							MIX CEMENT
Pump Cement	09/04/2008 15:32		2.8	16.6		60.0		80 SKS @ 15.8 LBS/GAL 1.17 YEILD, 5.02 GPS. 15.5 BBL BELOW RETAINER 1 BBL ABOVE
Pump Displacement	09/04/2008 15:37		2.9	6.3		250.0		
Other	09/04/2008 15:39							STING OUT / WASH RCM / RIG DOWN
Other	09/04/2008 17:57							WAIT TILL TOMARROW
Call Out	09/05/2008 04:00							

Sold To # : 344912 Ship To # :2605298 Quote # : Sales Order # : 6146630

SUMMIT Version: 7.20.130 Monday, December 08, 2008 03:04:00

HALLIBURTON

Cementing Job Log

Activity Description	Date/Time	Cht #	Rate bbl/ min	Volume bbl		Pressure psig		Comments
				Stage	Total	Tubing	Casing	
Pre-Convoy Safety Meeting	09/05/2008 05:00							
Arrive At Loc	09/05/2008 08:50							
Assessment Of Location Safety Meeting	09/05/2008 08:55							
Rig-Up Equipment	09/05/2008 09:00							
Safety Meeting	09/05/2008 09:05							SAFETY MEETING WITH RIG CREW
Pump Water	09/05/2008 09:10		1	5		.0		TOOK 3 BBLS TO GET CIRCULATION
Pump Cement	09/05/2008 09:15		1	2.5				PUMP 10 SKS CEMENT @ 15.8 PPG 1.15 YEILD 5.02 GPS
Shutdown	09/05/2008 09:18							WAIT ON RIG TO CUT WELL HEAD
Pump Cement	09/05/2008 11:25		1	10				PUMP 50. SKS CEMENT @ 15.8 PPG, 1.15 YEILD, 5.02 GPS
End Job	09/05/2008 11:25							