Petrotek

APPLICATION FOR AN UNDERGROUND INJECTION CONTROL PERMIT, CLASS I

Lost Creek ISR, LLC - Lost Creek Project

June 2009

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

DEQ/WQD
Application No:
Date received: _____
(Agency Use Only)

1. Type of Application

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

New Permit **XX** Modified Permit _____

2. Name of Facility: Lost Creek Project

The Lost Creek disposal wellfield will include five (5) Class I disposal wells.

LC DW No. 1 (currently Lost Creek Test Well No. 1): NE ¼ , SW ¼ , Section 25, Township 25 North, Range 93 West, 6th Principal Meridian, Sweetwater County, Wyoming.

1,542 feet from the West line; 1,880 feet from the South line of Section 25.

LC DW No. 2: NE ¼, SE ¼, Section 19, Township 25 North, Range 92 West, 6th Principal Meridian, Sweetwater County, Wyoming.

960 feet from the East line; 1,478 feet from the South line of Section 19.

LC DW No. 3: SE ¼, SW ¼, Section 13, Township 25 North, Range 93 West, 6th Principal Meridian, Sweetwater County, Wyoming.

1,575 feet from the West line; 981 feet from the South line of Section 13.

LC DW No. 4: NW ¼, SE ¼, Section 18, Township 25 North, Range 92 West, 6th Principal Meridian, Sweetwater County, Wyoming.

2,263 feet from the East line; 1,558 feet from the South line of Section 18.

LC DW No. 5: NW ¼, SE ¼, Section 17, Township 25 North, Range 92 West, 6th Principal Meridian, Sweetwater County, Wyoming.

1,339 feet from the East line; 2,664 feet from the South line of Section 17.

Mailing Address of the Operator

Lost Creek ISR, LLC
10758 W. Centennial Road
Suite 200
Littleton, CO 80127

Street Address where the records will be kept

Lost Creek ISR, LLC
5880 Enterprise Drive #200
Casper, WY 82609

Name and title of responsible individual

Wayne Heili, President
Lost Creek ISR, LLC
5880 Enterprise Drive #200
Casper, WY 82609

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

Lost Creek ISR, LLC
5880 Enterprise Drive #200
Casper, WY 82609
(307) 265-2373

4. Description of the discharge

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

The wastes consist of operational and restoration bleed streams and liquid waste from plant processes from in-situ recovery (ISR) uranium mining operations, including but not limited to: normal overproduction (wellfield bleed) streams, yellowcake wash water, bleed from eluant and precipitation circuits, sumps, membrane cleaning solutions, laboratory waste, reverse osmosis brine, groundwater sweep solutions and plant washdown water from the Lost Creek operation and other Wyoming ISR facilities. Lost Creek operation wastes will be generated by operations covered under a pending Wyoming Department of Environmental Quality (WDEQ) Land Quality Division (LQD) Permit to Mine and pending U.S. Nuclear Regulatory Commission (NRC) Source Material License. These waste streams are benefication wastes, exempt from RCRA regulation under the Bevill Amendment found in 40 CFR 261.4(b)(7).

The Standard Industrial Classification (SIC) code for this waste is 1094. This is being replaced by the North American Industrial Classification System (NAICS) code, which for this operation is 212291.

5. Area Permit

This permit application is for five (5) Class I non-hazardous injection wells.

This permit request includes disposal of the waste listed in Section 4.0 of this application into the Fort Union Formation through one existing exploratory well and four new wells to be drilled expressly for the purpose of wastewater management for Lost Creek operations. The location of the Lost Creek Project is shown on Figure 1.

Lost Creek Test Well No. 1 (TW1) was drilled during November and December 2008 and tested in February 2009 under a Wyoming Department of Environmental Quality/Land Quality Division (WDEQ/LQD) mineral exploration permit. For the purposes of this permit, TW1 will generally be referred to as the proposed LC DW No. 1 well. The four new wells are referred to as the LC DW No. 2, DW No. 3, DW No. 4, and DW No. 5. The existing well and the proposed new wells are located in the Lost Creek Permit Area, as shown on Figure 2.

Information from Section 2.0 and Attachments A through Q are included for the proposed wells. The Area of Review (AOR) for each of the Class I disposal wells is shown on Figure 3. The calculation of the AOR is provided in Attachment D.

6. Summary of the ownership

a. Land ownership within the Area of Review

Land ownership within the Areas of Review is shown on Figure 4 and listed in Table 1.

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

Oil and gas leases within the Areas of Review are shown on Figure 5 and listed in Table 1.

c. Owners of mineral rights within the Area of Review

Mineral rights within the Areas of Review are shown on Figure 6 and listed in Table 1.

d. Water rights within the Area of Review

There are no water rights within the Areas of Review. The closest water rights to the Lost Creek Project are shown on Figure 7 and listed in Table 5.

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

Lost Creek ISR, LLC (LC ISR) is a subsidiary of Ur–Energy USA, Inc., a publicly traded company.

8. Facility on Indian land? No

9. CERTIFICATION

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

Wayne Heili

President
Lost Creek ISR, LLC

Signature of Applicant

6-23-2009
Date Signed

LIST OF ATTACHMENTS

This permit application is for five (5) Class I non-hazardous injection wells to dispose in the Fort Union Formation. This UIC Permit application is organized and presented as attachments, tables, figures, and appendices summarized below:

A. Discharge Zone(s) and Confining Layer(s)
B. Wells Penetrating Receiver
C. Geologic Cross-Sections
D. Area of Review (AOR)
E. Water Quality Information – Proposed Injection Zone
F. Further Description of Discharge
G. Description of the Wells
H. Operating Data
I. Monitoring Plan
J. Well Abandonment
K. Financial Surety
L. Mechanical Integrity
M. Signatory Requirements
N. Reports
O. Regional Water Quality
P. Location Maps
Q. References

LIST OF TABLES

Table	Title
1	Summary of Surface Ownership, Mineral Rights, and Oil and Gas Leases Within Areas of Review
2	Estimated Physical and Chemical Data, Fort Union Formation, Lost Creek Disposal Wells
3	Gas Permeability Data from Cores, Lost Creek Test Well No. 1
4	Brine Permeability Data from Cores, Lost Creek Test Well No. 1
5	Summary of Water Rights Outside of Areas of Review, Lost Creek Disposal Wells

6	Calculation of COI, ULEW, and AOR for a Single Well, Lost Creek Disposal Wells
7	CHDT Formation Pressure Data, Lost Creek Test Well No. 1, Fort Union Formation
8	Fort Union Formation Fluid Sampling Data, Lost Creek Test Well No. 1
9	Fort Union Formation Water Quality Data, USGS Produced Waters Database, Greater Green River Basin
10	Anticipated Injection Water Quality and Comparison to Fort Union Water Quality Data
11	Summary of Shallow (Wasatch/Battle Spring Formation) Water Quality Data, Lost Creek Baseline Monitoring Program
12	FMT Fluid Sample Summary, Lost Creek Test Well No. 1
13	Calculation of Limiting Surface Pressure, Base of Injection Zone, Lost Creek Disposal Wells
14	Calculation of Limiting Surface Pressure, Top of Injection Zone, Lost Creek Disposal Wells
15	Plugging and Abandonment Cost Estimate - Fort Union Well
16	Water Quality Calculations, Federal 32-22 Well, Sweetwater County, Wyoming
17	Water Quality Calculations, Stratton 1-21 Well, Sweetwater County, Wyoming
18	Lance Formation Water Quality Data, USGS Produced Waters Database, Greater Green River Basin
19	Lance Formation Water Quality Data, WOGCC Data, Greater Green River Basin
20	Fox Hills Sandstone Water Quality Data, USGS Produced Waters Database, Greater Green River Basin
21	Fox Hills Sandstone Water Quality Data, WOGCC Data, Greater Green River Basin
22	Lewis Shale Water Quality Data, USGS Produced Waters Database, Greater Green River Basin
23	Lewis Shale Water Quality Data, WOGCC Data, Greater Green River Basin
24	Mesaverde Group Water Quality Data, USGS Produced Waters Database, Greater Green River Basin
25	Mesaverde Group Water Quality Data, WOGCC Data, Greater Green River Basin

26 Cody/Steele Shales Water Quality Data, USGS Produced Waters Database, Greater Green River Basin

27 Cody/Steele Shales Water Quality Data, WOGCC Data, Greater Green River Basin

28 Frontier Formation Water Quality Data, USGS Produced Waters Database, Greater Green River Basin

29 Frontier Formation Water Quality Data, WOGCC Data, Greater Green River Basin

30 Cloverly/Dakota Formations Water Quality Data, USGS Produced Waters Database, Greater Green River Basin

31 Cloverly/Dakota Formations Water Quality Data, WOGCC Data, Greater Green River Basin

32 Morrison Formation Water Quality Data, USGS Produced Waters Database, Greater Green River Basin

33 Sundance Formation Water Quality Data, USGS Produced Waters Database, Greater Green River Basin

34 Nugget Formation Water Quality Data, USGS Produced Waters Database, Greater Green River Basin

35 Nugget Formation Water Quality Data, WOGCC Data, Greater Green River Basin

36 Phosphoria/Tensleep Formations Water Quality Data, USGS Produced Waters Database, Greater Green River Basin

37 Madison Formation Water Quality Data, USGS Produced Waters Database, Greater Green River Basin

38 Madison Formation Water Quality Data, WOGCC Data, Greater Green River Basin

39 Flathead Sandstone Water Quality Data, USGS Produced Waters Database, Greater Green River Basin

LIST OF FIGURES

Figure	Title
1	Lost Creek Project Location Map
2	Lost Creek Project and Proposed Well Locations
3	Proposed Class I Well Locations and Areas of Review
4	Land Ownership within the Areas of Review
5	Oil and Gas Leases within the Areas of Review

6 Mineral Rights within the Areas of Review
7 Water Rights Outside of the Areas of Review
8 Stratigraphic Column, Sweetwater County, Wyoming
9 Lower Fort Union Formation, TW1
10 Middle Fort Union Formation, TW1
11 Upper Fort Union Formation, TW1
12 Stratton 1-21 Type Log, Lance Formation
13 Stratton 1-21 Type Log, Fox Hills Sandstone
14 Stratton 1-21 Type Log, Lewis Shale
15 Stratton 1-21 Type Log, Mesaverde
16 Lower Fort Union Isopach Map, Northern Great Divide Basin
17 Map of Great Divide Basin and Related Structural Elements
18 Precambrian Basement Map, from Blackstone (1991)
19 Regional Cross-Section J-J', from Blackstone (1991)
20 Regional Cross-Section K-K', from Blackstone (1991)
21 Regional Cross-Section M-M', from Blackstone (1991)
22 Structure Contour Map, Fort Union Formation, Great Divide Basin
23 Oil and Gas Wells Outside AORs of Proposed Injection Wells
24 Water Wells Outside AORs of Proposed Injection Wells
25 Cross-Section Index Map, Lost Creek Area
26 Stratigraphic Cross-Section A-A'
27 Stratigraphic Cross-Section B-B'
28 Areas of Review, Cones of Influence, and Ultimate Limits of Emplaced Waste of Proposed Injection Wells
29 Preliminary Well Completion Schematic, Lost Creek DW No. 2 to No. 5
30 Preliminary Wellhead Schematic
31 Preliminary Surface Facilities Schematic
32 Indication of Gas in Lance Formation, Stratton 1-21 Well
33 TDS Data in Mesozoic Hydrogeologic Units from Produced-Water Samples, Sweetwater County, Wyoming
34 TDS Concentrations in the Nugget Aquifer, Sweetwater County, Wyoming (from Mason & Miller, 2004)
35 Lost Creek Test Well No. 1 Schematic and Sample Depths

LIST OF APPENDICES

APPENDIX A – Summary of Drilling and Formation Testing Conducted at Lost Creek Test Well No. 1

APPENDIX B – Wireline Logs, Lost Creek Test Well No. 1

Surface Logs	Induction (11/17/08)
	CNL-FDC (11/17/08
	BHC/Sonic (11/17/08)
	CBL-VDL (12/6/08)
Production Logs	Induction (12/6/08)
	CNL-FDC (12/6/08)
	BHC/Sonic (12/6/08)
	CBL-VDL (2/19/09)
	Water Salinity Analysis (2/3/09)

APPENDIX C – Laboratory Analytical Data, Lost Creek Test Well No. 1 (Enclosed CD)

INTRODUCTION

The Lost Creek ISR, LLC (LC ISR) Lost Creek uranium project is located in northeastern Sweetwater County, Wyoming. LC ISR plans to develop and extract uranium from the Eocene-age Battle Spring Formation.

This Class I UIC Permit application is for five (5) disposal wells in the Paleocene-age Fort Union Formation. The waters in the injection zone and all formation waters below the injection zone qualify for a Class VI designation, pursuant to Chapter VIII of the WDEQ Water Quality Rules and Regulations. The upper confining zone is the low-permeability basal shale sequence of the Wasatch/Battle Spring Formation. Additional confinement exists in the top of the Fort Union Formation above proposed injection depths. The confining zone separates the injection zone from the overlying Wasatch/Battle Spring Formation that extends from ground surface to depths greater than 6,000 feet in the Lost Creek Project area. The shallow Wasatch/Battle Spring Formation is the only underground source of drinking water (USDW) in the area near Lost Creek.

Formation and water quality tests were conducted in a test well (Lost Creek Test Well No. 1 [TW1]) completed in the Fort Union Formation in the southwest portion of the Lost Creek permit area (Figure 1). For the purposes of permitting, TW1 will be referred to as the proposed LC DW No. 1. Multiple fluid samples were collected from the proposed injection zone and analyzed to evaluate water quality. Laboratory results (Table 8; Appendix C) indicate degraded water quality due to the following:

- Total dissolved solids (TDS) concentrations in excess of 10,000 mg/L
- Exceedances of groundwater quality standards for organic constituents (benzene, ethylbenzene, and oil and grease)
- Exceedances of groundwater quality standards for several inorganic constituents (mercury, manganese, barium, lead, arsenic, and iron)
- Exceedances of groundwater quality standards for radionuclides (gross alpha particle activity and combined radium [226 + 228])

These analytical results clearly demonstrate that the waters in the Fort Union Formation qualify for WDEQ designation as Class VI groundwater, as defined by Chapter VIII of the WDEQ Water Quality Rules and Regulations. This supports the permit application for these wells as Class I injection wells.

Groundwater quality calculations were conducted utilizing well logs near the Lost Creek Project for the underlying Lance Formation, Fox Hills Sandstone, Lewis Shale, and Mesaverde Formation. Calculated salinity values for sand intervals within these formations indicate average TDS concentrations in excess of 10,000 mg/L (as NaCl). In addition, these formations are known hosts of petroleum source rock (excluding the Fox Hills Sandstone, which contains hydrocarbons that likely have migrated from adjacent units) within the northern Great Divide Basin (USGS 2005). Further, there is coalbed methane (CBM) development in the Fort Union Formation located approximately 25 miles west-northwest of Lost Creek in the Scotty Lake area. Based on drilling and logging data,

the units below the injection zone contain elevated levels of organic contaminants which would make the exploitation of these waters for drinking water economically and technologically impractical. Based on TDS calculations and demonstrated petroleum occurrence, these waters (Lance through the Mesaverde) meet the criteria for Class VI groundwater classification under Chapter VIII of the WDEQ regulations. Further, these formations are not considered USDWs due to: 1) lack of demonstrated use, 2) TDS levels in excess of 10,000 mg/L, 3) significant depths, and 4) levels of organic constituents exceeding applicable groundwater standards.

The following table summarizes the stratigraphy as well as observed and calculated water quality at Lost Creek from the Wasatch Formation through the Mesaverde Formation. No wells near Lost Creek penetrated the base of the Mesaverde, so water quality data were compiled from regional produced waters data from oil and gas wells.

Summary of Stratigraphy and Water Quality – Lost Creek Permit Area (Based on Lost Creek Test Well No. 1, Stratton 1-21 Well, and Federal 32-22 Well)

Formation	***Depth (feet)***	***Estimated Water Quality***
Wasatch / Battle Spring Formation[1]	GS – 6,158	300 mg/L (shallow) – 4,000 mg/L TDS
Fort Union Formation[1]	6,158 – 11,000 (estimated)	13,945 mg/L TDS (average from testing at TW1)
Lance Formation[2]	9,150 – 11,960	6,700 – 60,000 ppm NaCl[3]
Fox Hills Sandstone[2]	11,960 – 12,635	12,100 – 12,800 ppm NaCl
Lewis Shale[2]	12,635 – 14,010	10,000 – 36,000 ppm NaCl
Mesaverde Formation[2]	14,010 – 16,000 (estimated)	15,500 – 42,000 ppm NaCl

Notes:
[1] – Formation depths from logging data at TW1; water quality from cased-hole formation testing conducted at TW1.
[2] – Formation depths from Stratton 1-21 well, located 4 miles southwest of Lost Creek, where stratigraphic section is approximately 2,000 feet shallower. Water quality data represents range of water quality calculations (as ppm NaCl) from resistivity and porosity data in sand intervals from Stratton 1-21 Well and Federal 32-22 Well.
[3] – Presence of gas observed in sand intervals in the Lance which results in lower calculated NaCl concentrations.

In the stratigraphic section below the Mesaverde (depths greater than 16,000 ft below ground surface in the Lost Creek area), produced water samples from more distal portions of the Great Divide Basin and regional geological reports indicate that formation waters in these deeper formations have TDS concentrations in excess of 10,000 mg/L. In addition, these waters are located at such great depths as to make the use of these waters for drinking water supplies economically and technologically impractical. Regional data indicate that the waters encountered from the Mesaverde to basement are Class VI groundwater, as defined by Chapter VIII of the WDEQ regulations, and are not considered to be USDWs.

In summary, the waters in the proposed injection zone (Fort Union Formation) and all waters below the injection zone qualify for WDEQ classification as Class VI groundwater;

the formations below the Fort Union are not USDWs. Hence, the proposed wells are Class I injectors, as defined in Federal and State Underground Injection Control (UIC) regulations (40 CFR Part 144 and WDEQ Chapter XIII, respectively). Upper level confinement is provided by a thick (approximately 300 feet) shale sequence in the basal Wasatch/Battle Spring and injection will be confined below by low-permeability shales of the Upper Lance Formation. The following application presents more detailed information relating to the proposed injection wells.

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

The injection zone to be utilized for the five (5) disposal wells under this proposed UIC Permit is the Paleocene-age Fort Union Formation. A thorough analysis of the geologic units was conducted at the Lost Creek ISR site, and the Fort Union Formation is the optimal disposal zone. Confinement above and below the injection zone is provided by low-permeability shales (approximately 300 feet thick) in the basal Wasatch/Battle Spring Formation, and shales within the Upper Lance Formation, respectively. Water quality information for the proposed injection formation is presented in Attachment E. Water quality in formations underlying the injection interval and extending to basement is discussed in detail in Attachment O.

The proposed disposal wells will be located within the Lost Creek Permit Area in northeastern Sweetwater County, Wyoming (Figures 1 and 2). Locations for the five disposal wells are in Sections 13 and 25 of T25N, R93W, and Sections 17, 18, and 19 of T25N, R92W.

The formation characteristics of the Fort Union Formation and overlying confining zone used for this permit application are based primarily on testing conducted at the Lost Creek Test Well No, 1 ("TW1"). LC ISR drilled and installed TW1 at Lost Creek (Section 25, T25N, R93W; see Figure 2). TW1 was drilled through approximately 3,800 feet of the Fort Union Formation, to a total depth of 9,997 feet relative to rig kelly bushing (ft RKB). Multiple zones within the well were perforated, and formation testing was conducted to characterize formation pressure and water quality. A detailed description of testing procedures is included in Appendix A. Logs from TW1 are included in Appendix B, and fluid sample laboratory reports are included in Appendix C. Additional discussions of the geology, lithology, hydrology, and formation characteristics for the Fort Union, overlying and underlying confining zones, and deeper portions of the stratigraphic section are based on: (1) regional and local geology from published sources, (2) oil and gas logs, and (3) logs utilized to construct cross-sections through the site.

<u>Summary of Stratigraphy</u>

At the Lost Creek Permit Area, the Eocene-age Wasatch/Battle Spring Formation conformably overlies the Fort Union Formation and outcrops at the surface. The waters of the Wasatch are relatively fresh and tend to degrade slowly with depth. The Fort Union is the target injection interval since formation testing indicates TDS concentrations exceed 10,000 mg/L. Unconformably underlying the Fort Union Formation is the Late Cretaceous-age Lance Formation. A regional stratigraphic section for Sweetwater County is provided in Figure 8.

At TW1, the Fort Union Formation underlies the Wasatch/Battle Spring Formation and extends from 6,158 ft RKB to below the total depth of the well (9,997 ft RKB). The Fort Union Formation commonly is divided into three units based upon general lithology and the presence or absence of coal-bearing intervals. At TW1, the tops of the Upper, Middle, and Lower Fort Union are 6,158, 7,265, and 9,544 ft RKB, respectively. The

underlying Lance Formation was not penetrated by this well. A resistivity and gamma-ray log from TW1 for the Lower, Middle, and Upper Fort Union Formation is presented in Figures 9 through 11, respectively. Based on offset logs, the top of the Lance Formation at Lost Creek is projected at approximately 11,000 ft below ground surface. A type-log (Stratton 1-21 well) was selected for this site to characterize deeper formations below the Fort Union and is presented on Figures 12 through 15. This type-log extends through the Lance Formation (Figure 12), Fox Hills Sandstone (Figure 13), Lewis Shale (Figure 14), and into the Upper Cretaceous-age Mesaverde Group (Figure 15).

The Wasatch/Battle Spring Formation is the uppermost sedimentary unit in the northern Great Divide Basin. The formation is exposed at the surface and extends to a depth of more than 6,100 feet at Lost Creek, where it conformably overlies the Fort Union Formation. The Wasatch is composed of interbedded sandstone, siltstone, limestone, conglomerate, and lignitic beds, and was deposited in a fluvial and/or lacustrine environment. In the north and northeastern portions of the Great Divide Basin the Wasatch interfingers with the Battle Spring Formation, which is a coarse-grained alluvial sandstone/conglomerate sequence composed primarily of arkosic and siliciclastic materials. The source of sediment for the Wasatch/Battle Spring in this portion of the basin was the ancestral Granite Mountains to the northeast.

Based on neighboring well control, the Lower Fort Union in the Great Divide Basin near Lost Creek is approximately 1,800 feet thick and consists of "fine to coarse-grained quartzose, angular to sub-rounded fluvial sands, interbedded with silts and clays", derived from uplift along basin margins (Russell, 2008). The Lower Fort Union generally consists of over 30% sand, but intervals can be relatively "ratty" due to the presence of re-worked finer grained Lance Formation sediments (Figure 9). Thicknesses of the Lower Fort Union in the area are presented on an isopach map in Figure 16. Formation thicknesses tend to decrease to the north, as sediments were derived from upland areas to the south.

The Middle Fort Union is defined by a rapid transition from sand deposition with no coal to widespread and prominent coals and lignites. The Middle Fort Union contains significant interbedded sands (up to 50 feet thick, or more [Figure 10]) and thinly bedded silts, lignites, and coals up to 20 feet or more in thickness. The Upper Fort Union formation is significantly sandier than underlying units, and contains little to no coal or lignite (Figure 11). The upper fluvial sands are widespread, medium to coarse grained sands that may be more arkosic due to increased exposure of granitic and metamorphic core rocks in uplift areas.

The Late Cretaceous-age Lance Formation unconformably underlies the Fort Union Formation and is a non-marine sequence of silts, fine sands, and coals deposited at the end of the Lewis marine transgression and subsequent to the Laramide Orogeny. On the type-log, the unit is approximately 2,800 feet thick and is separated into two intervals. The lower Lance (approximately 860 feet thick) is composed of thin near shore sands, interbedded with silts, clays, and coals deposited in back-beach marsh

and swamp environments. The upper Lance consists of relatively thinner sands and silts deposited during a relatively quiet tectonic period with little subsidence and with little significant sand accumulations. The lower Lance interval commonly contains hydrocarbon shows, but is not considered a viable hydrocarbon target and there are no known Lance completions in the area. Well testing conducted to the west of Lost Creek in the Lance Formation indicates permeabilities in the range of 0.01 to 0.1 md (Friend, 2009).

Near Lost Creek, data from several wells indicate hydrocarbon shows within the Mesaverde Group below the targeted injection formation. Logs from these offset wells provide characterization of Cretaceous-age sediments underlying the Lance Formation, including the Fox Hills Sandstone, Lewis Shale, and Mesaverde Group. Well logs indicate the occurrence of the Mesaverde at depths of approximately 16,000 feet below ground surface. No wells in the area penetrate below the Mesaverde. Figure 8 presents a regional summary of stratigraphy within the Great Divide Basin.

Injection Interval – Fort Union Formation

The proposed injection interval is the permeable and sand-rich portions of the Fort Union Formation. At TW1, the Fort Union Formation extends from approximately 6,158 ft RKB to below the total depth of the well (9,997 ft RKB). The uppermost perforated interval tested in TW1 is a sand interval at approximately 6,618 ft RKB with the lowermost perforated zone extending to approximately 9,580 ft RKB. As previously mentioned, TW1 is referred to as LC DW No. 1 for this permit. A summary of drilling and testing of TW1 is presented in Appendix A, and a well schematic including perforation intervals is provided on Figure 35.

Specific injection interval depths for proposed disposal wells DW No. 1 to No. 5 will be similar, but will vary slightly due to differences in ground surface elevation and the presence of dipping strata. Therefore, the specific depths of proposed injection zones for DW No. 1 to No. 5 will be based upon subsequent logging conducted on these wells.

The injection interval includes all of the Fort Union Formation, with the Middle and Upper sequences projected as being more favorable for injection use based on sandstone development and permeability. Based on logging conducted at the Lost Creek Test Well 1, porosities in the Fort Union generally range from 11 to 15% (based on an average of neutron, density, and sonic porosity data from DW No. 1 [TW1]), generally decreasing with depth into the Lower Fort Union.

Based on the formation depths encountered at the TW1 location, the proposed injection zone (Fort Union) extends from the formation top at approximately 6,158 ft RKB to the base of the Fort Union, which was not reached at TW1. From offset logs, the base of the Fort Union likely occurs at approximately 11,000 ft RKB. The anticipated perforation intervals for the proposed disposal wells will range from approximately 6,170 to 8,100 ft below ground surface. Anticipated total depths for the proposed wells will extend past the prominent coal horizon encountered at approximately 8,098 ft RKB at TW1. Sand

intervals below this coal and extending deeper into the Fort Union are generally "rattier" and have decreased permeability and porosity, as well as minor natural gas shows. The anticipated surface elevations for the DW No. 1 to DW No. 5 range from approximately 6,800-7,000 feet above mean sea level (ft AMSL). The variable surface elevation, combined with regional structure, will result in the injection interval depths for each well to vary to a small degree.

The following table summarizes formation depths encountered at TW1 (DW No. 1), as well as expected formation depths for DW No. 2 to DW No. 5, accounting for the regional structure at Lost Creek.

Summary of Expected Formation Depths, Proposed Disposal Wells

Formation	*DW No. 1 (TW1)*	*DW No. 2*	*DW No. 3*	*DW No. 4*	*DW No. 5*
Ground Level Elevation (ft AMSL)	6,816	6,873	6,984	6,959	6,995
Top of Fort Union (ft BGS)	6,139	6,323	6,464	6,539	6,685
Top of Fort Union (ft AMSL)	677	550	520	420	310
Prominent Coal Horizon (ft BGS)	8,077	8,260	8,410	8,500	8,650
Prominent Coal Horizon (ft AMSL)	-1,261	-1,387	-1,426	-1,541	-1,655
Top of Lance (ft BGS)	11,000 (est.)	11,200	11,400	11,500	11,650
Top of Lance Formation (ft AMSL)	-4,184 (est.)	-4327	-4,416	-4,541	-4,655

Note:
Depths for DW No. 1 based on logging at TW1; depths for DW No. 2 to No. 5 extrapolated from TW1 logging and regional structure presented on Figure 22.

The following table summarizes pertinent data for the proposed injection zone. Data and depths based on logging conducted at TW1.

Summary of Fort Union Data	
Data Sources	Lost Creek Test Well 1 ("TW1") (Section 25, T25N, R93W; RKB elevation 6,835 feet AMSL; ground surface elevation 6,816 ft AMSL.
Age	Tertiary (Paleocene)
Lithology	Interbedded sandstones, siltstones, shales, and coals deposited in fluvial environment
Upper Confining Zone and Thickness	Wasatch/Battle Spring Formation (~300 feet of shale); 6,158 ft to 5,855 ft RKB (677 to 980 ft AMSL)
Lower Confining Zone and Thickness	Upper Lance Formation (~1,900 feet); 12,900 to 11,000 ft BGS (-6,084 to -4,184 ft AMSL)
Top of Fort Union at Well	677 ft AMSL (6,158 ft RKB)
Estimated Base of Fort Union Injection Interval	-1,259 ft AMSL (approx. 8,094 ft RKB)
Gross Injection Interval Thickness	Approximately 1,940 feet (completing to coal horizon at ~8,094 ft RKB; total thickness of Fort Union Formation is ~4,800 ft)
Fort Union Net Sand Thickness; Porosity > 8%	625 feet (based on log data from TW1 in interval from 6,158 to 8,094 ft RKB)
Permeability, Injection Zone	8.5 md (TW1 core data, logs, and regional information)
Water Saturation, Injection Zone	~100% (occasional gas shows of 1-2% in sands)
Initial Pressure, Injection Zone	2,985 psi @ midpoint depth of 7,107 feet BGS (0.42 psi/ft gradient based on formation testing data in TW1; see Appendix A)

Physical and chemical data for the Fort Union, based on data from the Lost Creek Test Well 1, are presented in Table 2. A type-log for the Fort Union injection interval is shown from TW1 on Figures 9 to 11. Copies of logs from TW1 are provided in Appendix B. It is noted that ground surface elevation on the logs is 6,940 ft AMSL, and elevation relative to rig kelly bushing is 6,958.5 ft, both of which are incorrect. The correct ground surface elevation is 6,816 ft AMSL, and elevation RKB is 6,834.5 ft.

Confining Zones

The Fort Union Formation is confined above by the low-permeability shale sequence at the base of the Wasatch/Battle Spring Formation (encountered at 5,855 ft RKB and approximately 300 feet thick at TW1, see Figure 11). Combined with lower permeability intervals of the shallow Fort Union, this shale sequence will act as the confinement interval to arrest upward fluid movement.

Underlying confinement below the injection zone is provided by the Upper Lance Formation, which is composed of shales, siltstones, and lesser sandstone, and is approximately 1,900 feet thick from the type-log (Figure 12).

Sidewall cores were collected from TW1 to evaluate shale and sand permeabilities. Appendix A summarizes core data collection testing and procedures, and core data testing results are summarized in Tables 3 and 4. Brine permeability measured from the shale core collected at 6,032 ft RKB (2.22×10^{-4} md) was approximately five orders of magnitude less than the permeability measured from the sand core at 6,630 ft RKB (1.53 md). This permeability was evaluated in the horizontal direction. Due to the anisotropic nature of clay minerals in shale (i.e., permeability in the vertical direction is at least an order of magnitude less than in the horizontal), the actual vertical permeability in the shale confining sequence overlying the injection interval is likely at least six orders of magnitude less than the targeted sands in the Fort Union Formation.

Summary of Regional Structure

Lost Creek is located southeast of the Wind River Range, northeast of the Rock Springs Uplift, and northwest of the Rawlins Uplift. Lost Creek is located to the south of the Wind River Thrust, separating the relatively simple local structural setting of Lost Creek from the more complex area north of the fault, where numerous faults, anticlines, and synclines bound or form regional structures. The Lost Creek area is also located to the southwest of the West Lost Soldier Fault, which is west of the Lost Soldier and Wertz oil and gas fields.

A general map of structural features in the Great Divide Basin is presented on Figure 17. A regional Precambrian basement map prepared by Blackstone (1991) is presented in Figure 18 that shows the location of regional features as well as the structural configuration of the Precambrian basement. Cross-sections constructed by Blackstone (1991) are presented on Figures 19 (cross-section J – J'), 20 (K – K'), and 21 (M – M'). A structure contour map of the top of the Fort Union Formation in the northeastern Great Divide Basin is presented on Figure 22.

The Lost Creek site is located on the downthrown sides of both the Wind River and West Lost Soldier Faults. As such, the stratigraphy to the north of these faults is significantly higher in the section than at Lost Creek. These regional structural features likely influence the hydrogeological characteristics within formations observed across the fault. On the northern side of these faults where the section has been upthrown, formations are located closer to the areas of recharge to the north and located higher within the section. To the south of these structures, formations are encountered at greater depths and are located at greater distances and depths from potential recharge areas. Additionally, the regional hydraulics of groundwater flow in the basin may also be affected by the presence of the regional fault systems. If these faults act as full or partial barriers to regional groundwater flow (toward the basin center to the south and southwest), residence times of groundwater are expected to be relatively higher to the south than on the north side. As regional groundwater quality within the Great Divide Basin is generally controlled by depth and distance from areas of recharge, it is likely that formation waters observed on the south

side of these faults exhibit more saline water qualities than in equivalent formations to the north.

The Lost Creek site is located approximately two miles south of the Wind River Thrust, which is the major structural feature in the area. The Wind River Thrust is mapped approximately four miles north of DW No. 1 and more than a mile and a half north of DW No. 5 (Figure 22), and dies out to the northeast of Lost Creek. While there may be associated smaller-scale faulting present on the south side of the thrust front, potential migration of fluid through fault planes within the Fort Union Formation at Lost Creek is unlikely due to lithology. The Fort Union is a relatively young sedimentary unit and is rich in finer grained sediments. The scale of individual fault trace throws in the injection zone is likely minimal. Due to the presence of fine grained clays, fault planes are likely smeared and will have a higher probability of acting as boundaries rather than flow conduits.

B. Wells Penetrating Receiver

As discussed in Attachment D, the Cone of Influence (COI) and the Area of Review (AOR) are calculated based on WDEQ specified formulae for the proposed wells and are small in comparison to the extent of the Fort Union in the Lost Creek Area. No active oil and gas production or plugged exploratory wells penetrate the receiver (the Fort Union) within the Cone of Influence or within the minimum AOR for any of the proposed wells. Figure 23 presents oil and gas wells located near the Lost Creek mine, none of which intersect the minimum AORs of the proposed wells. Further, the Wyoming Oil and Gas Conservation Commission website shows there to be no coal bed methane (CBM) or other wells penetrating the Fort Union Formation within the AOR. Locations for water wells near the AORs (all completed within the Wasatch/Battle Spring Formation) of the proposed Class I wells are shown on Figure 24 and presented in Table 5.

C. Geologic Cross-Sections

A cross-section index map is provided as Figure 25. North-south and east-west geologic cross-sections are included as Figures 26 and 27, respectively. These cross-sections, prepared for TW1 well design, have been updated to include data acquired from the test well.

D. Area of Review (AOR)

The Area of Review (AOR) for the proposed wells has been evaluated in accordance with WDEQ-WQD Chapter XIII, Section 5. Determination of the Fort Union Formation AOR requires calculation of the cone of influence (COI), which has been performed for each individual well as specified by Chapter XIII, Section 5(b)(iv)(A), and calculation of the volumetric fillup (also referred to as the ultimate limit of emplaced waste [ULEW]) as stated in Chapter XIII, Section 5(b)(iv)(B)).

The equations specified by WDEQ for these calculations, including the input data and assumptions required, are summarized in Tables 2 and 6. The calculated values for the

COI and volumetric fillup are summarized in the following sections, and are shown in detail on Table 6. This information is followed by the identification of the final AOR.

AOR calculations were completed utilizing the actual thickness of the expected interval of perforations, which is less than the full thickness of the Fort Union Formation and leads to more conservative calculations of the COI. Calculations were considered for the optimal injection zone between 6,158 to 8,094 ft RKB, which represents the top of the Fort Union Formation and the base of the sand overlying the prominent coal horizon at 8,096 ft RKB, respectively.

TW1 was perforated at a depth of 9,580 ft RKB in an attempt to circulate cement (see Figure 35). Based on logging data from TW1, porosity and injection capacity decreases with depth below approximately 8,100 ft RKB and into the Lower Fort Union. The target zones for perforations for wells DW No. 2 to No. 5 are expected to be similar to TW1 (6,158 to 8,094 ft RKB at this well), with minor variations due to structure. In terms of AOR calculations, utilizing less thickness of the Fort Union results in a COI that is larger than what would be calculated for the entire thickness of the Fort Union.

It is also noted that utilizing data from TW1 for AOR calculations leads to a more conservative (i.e. larger) COI calculation, relative to the expected depths encountered at DW No. 2 to No. 5 due to regional structure. As seen in Figure 22, the elevation of the top of the Fort Union Formation is approximately 400 feet deeper to the northeast at DW No. 5, relative to TW1. Assuming all other data inputs remain constant, the increased depth of the base of the injection zone results in a smaller calculated COI at DW No. 5.

For consistency, all depths in this section are based on the LC ISR Test Well 1 surface elevation of 6,816 feet AMSL.

a. Cone of Influence (COI)

As mentioned previously, the completion interval thicknesses for the proposed wells (DW No. 1 – No. 5) are expected to be similar to that encountered at TW1. Hence the same thicknesses were used for each of the wells. As stated previously, depths do vary and become deeper to the north and east of TW1. To be conservative, the depths from TW1 were utilized to calculate the COIs for all five wells. Reservoir data used in the calculation were obtained from integrating core permeability analysis and logging conducted at the Lost Creek Test Well 1.

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

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

Where: $x = (W/G - B) \cdot (4\pi KH / 2.3Q)$

r = Radius of the cone of influence of an injection well (feet)
K = Hydraulic conductivity of the injection zone (feet/day)

H = Thickness of the injection zone (feet)
t = Time of injection (days)
S = Storage coefficient (dimensionless)
W = Hydrostatic head of underground source of drinking water (feet), measured from the base of the injection zone
G = Specific gravity of fluid in the injection zone (dimensionless)
B = Original hydrostatic head of injection zone (feet) measured from the base of the injection zone
Q = Injection rate (cubic feet/day)
π = 3.142

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

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

Where:

K = Permeability (cm/sec)
K_i = Intrinsic permeability (8.5 md)
ρ = 1.005 gm/cm3 - the density of water
g = 980 cm/sec^2 - the acceleration of gravity
m = 0.01 gm/(sec·cm)
μ = 0.40 centipoise

And 1 Darcy = 9.87×10^{-9} cm^2 and 2,835 ft/day per cm/sec

Based on core analysis and log data and the discussion of results presented in Appendix A, the average intrinsic permeability of the Fort Union Formation is estimated to be 8.5 millidarcies (md). The calculated permeability value was converted to hydraulic conductivity as follows:

$$K_i = 8.5 \text{ millidarcies} = 0.0085 \text{ Darcies}$$

$$K_i = (0.0085 \text{ Darcies}) \cdot (9.87 \times 10^{-9} \text{ cm}^2/\text{Darcy})$$

$$K_i = 8.39 \times 10^{-11} \text{ cm}^2$$

$$K = (8.39 \times 10^{-11} \text{ cm}^2)\cdot(1.005 \text{ gm/cm}^3)\cdot[(980 \text{ cm/sec}^2) / (0.004 \text{ gm/sec}\cdot\text{cm})]$$

$$K = 2.07 \times 10^{-5} \text{ cm/sec}$$

$$K = (2.07 \times 10^{-5} \text{ cm/sec}) \cdot (2835 \text{ ft/day / cm/sec})$$

$$K = 0.059 \text{ ft/day}$$

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

- Per the WDEQ Guidance Document #1, Permitting of Class I Injection Wells (page 4), the Coefficient of Storage (S) has been assigned as the thickness of the injection zone multiplied by 10^{-6}/ft.

- The value for B (specified by WDEQ regulations as the original hydrostatic head of injection zone in feet measured from the base of the injection zone) was based on the results from testing at TW1, which indicate an original pressure gradient in the Fort Union Formation of 0.42 psi/ft. A discussion of formation testing procedures and results is presented in Appendix A and results are summarized in Table 6. Using this gradient, the head in the Fort Union (B) is 7,833 feet.

- Based on water levels from the Lost Creek baseline wells, it is assumed that the head (W) in the overlying USDWs is approximately 8,000 ft. The head (W) was measured from the base of the optimal Fort Union Formation injection zone from 6,158 to 8,094 ft RKB (assumed to be 8,075 feet BGS at TW1).

- Based on log analysis from the TW1 well, the net sand thickness of the injection zone is projected to be 625 feet. This thickness was based on an 8 percent porosity cutoff and minimum sand body thickness of four feet. From TW1, effective porosity was calculated from logging (obtained by multiplying the density-neutron crossplot porosity by the calculated sand volume [$1 - V_{shale}$]). Average effective porosity is approximately 11 percent for the net effective thickness. It is noted that the use of effective porosity in calculations represents a conservative approach for COI determination.

- The injection period is 10 years.

- For each well, the requested injection rate is 1,714 bbl/day (50 gpm), or 9,626 cubic feet per day.

- Based on formation sampling conducted within the Fort Union Formation at LC ISR Test Well 1 (summarized in Appendix A), the average TDS concentration of the injection zone (Fort Union) is 13,945 mg/L; the specific gravity is 1.005 (WDEQ UIC Guidance Document #1, page 5).

- The injection zone fluid viscosity (0.40 cp at 144 degrees F, which represents the midpoint depth of the injection interval at approximately 7,107 ft BGS) was estimated from Figure D-16 in the text "Well Testing" (John Lee; Society of Petroleum Engineers of AIME, 1982).

- The COI and ULEW have been calculated for each well with an assumption of a single well in an isotropic, homogeneous infinite-acting reservoir consistent with WDEQ UIC Guidance Document #1.

AOR calculations are based on the condition of a single and infinite-acting well. Based on the COI equations required by WDEQ regulations, and the input variables shown above, the COI for each of new wells (DW No. 1 to DW No. 5) is 1,036 feet. The detailed calculations are shown on Table 6; the COI for each well is shown on Figure 28.

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

The following formula was used for this calculation:

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

Where:

R = Radius of volumetric fillup (feet)
Q = Injection rate (9,626 feet^3/day)
t = Time of injection (3,650 days)
π = 3.142
H = Thickness of the injection zone (625 feet)
p = porosity expressed as a pure decimal (0.11)

Using the assumptions listed in the previous section, the ULEW for DW No. 1 – No. 5 is 403 feet (Figure 28). These calculations are shown on Table 6.

c. Minimum Area of Review

In accordance with Chapter XIII, Section 5(b)(iv)(C) and (D), the minimum area of review for a Class I non-hazardous well shall never be less than one-quarter (¼) mile, the cone of influence, or the area of emplaced waste, whichever is greatest. As such, the minimum AOR for each of the wells is ¼ mile (1,320 feet).

d. Final Area of Review

In accordance with Chapter XIII, Section 5(b)(iv)(E), the final areas of review shall conform to the public land survey and be legally described by Township, Range and Section to the nearest quarter section. The final AORs for DW No. 1 – No. 5 are presented below and shown on Figure 28.

For reference purposes, the COI and AOR for the disposal wells are shown on Figure 28. Review of that figure indicates that the wells are spaced a sufficient distance from each other that the COI's do not intersect.

DW No. 1 AOR

Township 25 North, Range 93 West, 6th P.M
Section 25: NE ¼, SW ¼
SW ¼, NW ¼

Section 25 : SE ¼, NW ¼
NW ¼, SW ¼
NE ¼, SW ¼
SW ¼, SW ¼,
SE ¼, SW ¼
NW ¼, SE ¼
SW ¼, SE ¼.

DW No. 2 AOR

Township 25 North, Range 92 West, 6th P.M
Section 19: NE ¼, SE ¼
SW ¼, NE ¼
SE ¼, NE ¼
NW ¼, SE ¼
NE ¼, SE ¼
SW ¼, SE ¼
SE ¼, SE ¼
Section 20 : NW ¼, SW ¼
SW ¼, SW ¼.

DW No. 3 AOR

Township 25 North, Range 93 West, 6th P.M
Section 13 : SE ¼, SW ¼
NE ¼, SW ¼
SW ¼, SW ¼
SE ¼, SW ¼
NW ¼, SE ¼
SW ¼, SE ¼
Section 24 : NW ¼, NW ¼
NE ¼, NW ¼

DW No. 4 AOR

Township 25 North, Range 92 West, 6th P.M
Section 18: NW ¼, SE ¼
SE ¼, NW ¼
SW ¼, NE ¼
NE ¼, SW ¼
SE ¼, SW ¼
SW ¼, SE ¼
NW ¼, SE ¼
NE ¼, SE ¼
SE ¼, SE ¼

DW No. 5 AOR

Township 25 North, Range 92 West, 6th P.M
Section 17: SW ¼, NE ¼
SE ¼, NW ¼
NE ¼, SW ¼
SW ¼, NE ¼
SE ¼, NE ¼
NW ¼, SE ¼
NE ¼, SE ¼

E. Water Quality Information - Proposed Injection Zone

a. Water quality data

A thorough evaluation was performed to identify all drinking water wells within a two-mile radius surrounding the proposed well locations. Data were obtained from the Wyoming State Engineer's Office. Available data show there to be no permitted wells that utilize the Fort Union Formation for drinking water within a 2-mile radius of any of the proposed Lost Creek disposal wells.

To further assess Fort Union water quality at Lost Creek, cased-hole formation sampling was conducted at multiple intervals within TW1. Formation sampling was conducted utilizing a formation testing tool (Cased Hole Dynamic Tester [CHDT], Schlumberger Wireline Services, Casper, WY). Fluid samples were collected at discrete intervals (through-casing sample collection) as well as in-bore that produced commingled samples of Fort Union produced water collected within casing after the Fort Union was perforated. Additional fluid samples were collected at the surface from fluid returns during nitrogen jetting conducted at TW1. These samples represent a composite fluid sample over the entire perforated interval of the Fort Union Formation. A more detailed discussion of sample collection and procedures is presented in Appendix A.

Table 8 presents a summary of formation sample analytical results from TW1 compared to applicable EPA Maximum Contaminant Level (MCL) or Secondary Maximum Contaminant Level (SMCL). Fluid samples were submitted for analysis of volatile organic compounds (VOC), metals, and radionuclides. All of the eleven representative fluid samples analyzed for TDS exceeded 10,000 mg/L. The average TDS concentration from TW1 samples is 13,945 mg/L. The MCL for benzene (5 μg/L) was also exceeded in the six samples collected by the CHDT (through-casing samples 7060B and 6843, and in-bore samples BH1-t3, BH1-t4, BH2-t1, and BH2-t2) and ranged from 71.5 to 344 μg/L. The reported concentration of ethyl benzene from sample 6843 (1,860 μg/L) also exceeded the MCL (700 μg/L) for this analyte. It is noted that VOC results from surface samples collected from fluid returns during nitrogen jetting may not be fully representative of formation conditions, due to fluid agitation and volatilization; the true value likely is higher. Additional exceedances of MCL groundwater standards were reported for mercury, barium, lead, arsenic, gross alpha particle activity, radium-

226 + -228, and oil and grease. A complete summary of these results is presented in Table 8.

Additional water quality data were reviewed for the Fort Union Formation in the northern Great Divide Basin from produced waters samples from the Wyoming Oil and Gas Conservation Commission (WOGCC) website (http://wogcc.state.wy.us) and from the USGS Produced Waters Database (http://energy.cr.usgs.gov/prov/prodwat/intro.htm). Table 9 presents a summary of data obtained from the USGS database for the Fort Union. Average TDS concentration of all samples listed for the Fort Union within the basin is in excess of 22,000 mg/L. Upon review of the WOGCC database, no water quality data from Fort Union Formation were available within 30 miles of the Lost Creek area in the WOGCC database.

Based on formation fluid testing and logging data at TW1, the waters of the Fort Union Formation at Lost Creek exceed multiple regulatory standards and are unusable due to high concentrations of TDS (greater than 10,000 mg/L) and hydrocarbon-related organic constituents. The Fort Union waters meet the criteria for Class VI designation, pursuant to Chapter VIII of the WDEQ Water Quality Rules and Regulations. The Fort Union is not a USDW because it is not used as a drinking water supply, has TDS levels exceeding 10,000 mg/L, has naturally occurring organic and inorganic constituents in excess of applicable groundwater standards, and occurs at great depth.

Representative data from ISR mining solutions that are typical of the water to be injected into the Fort Union Formation at Lost Creek were compared to the observed water quality data collected and analyzed from TW1 (Table 10). A comparison of the expected quality of water to be injected to the Fort Union water indicates the two have similar TDS. The anticipated waste stream (injection water) is sodium-bicarbonate type; the Fort Union water is primarily sodium-chloride. However, significant compatibility issues between the injection water and receiver are not anticipated. Due to the similarity of water quality and minimal water compatibility issues, the Fort Union Formation is an optimal receiver for Lost Creek's waste streams.

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

Information from the Wyoming State Engineer's Office (SEO) indicates that there no water supply wells within the ¼-mile AORs. There are four stock wells located within a mile of the Lost Creek Project (outside of the Permit Boundary), which are summarized in Table 5 and shown on Figure 28. However, none of these wells penetrate the Fort Union Formation and well depths indicate that all are completed into the Wasatch/Battle Spring Formation. The maximum depth of these four wells is 900 feet, which is approximately 5,200 feet above the top of the proposed injection formation. There are also numerous LC ISR monitoring wells associated with exploration activities within the proposed Permit Boundary. All monitor wells are completed in the Wasatch/Battle Spring Formation, and all wells are completed to depths of 985 feet or shallower.

Water quality data from the Lost Creek Mine Unit 1 baseline monitoring wells completed within the Wasatch/Battle Spring Formation is provided in Table 11. These data represent the shallow water-bearing zones (DE and LFG Sand aquifers) above the proposed mining zone (HJ Horizon) and immediate underlying zone (UKM Sand). These groundwater data were submitted as part of LC ISR's US NRC Source Material License (Lost Creek ISR, 2007). Groundwater samples were analyzed for major cations and anions, general water quality parameters, radionuclides, and trace elements.

Though not considered to be representative, water quality data were also collected from the Wasatch/Battle Spring Formation and uppermost Fort Union during testing at TW1, utilizing a Baker Atlas Formation Multi-Tester (FMT). A summary of analytical results is presented in Table 12. Multiple fluid samples were collected in the open-hole within the Wasatch/Battle Spring; a single sample from the Fort Union Formation. During drilling approximately 50 mg/L nitrate was added to the drilling mud to act as a tracer. High nitrate levels (ranging between 16 to 24 mg/L) were found in three discrete formation water samples (depths of 3,525, 4,733, and 6,196 ft RKB). Because nitrate concentrations in the native fluid are low, the high nitrate levels indicate the collected samples were primarily drilling mud filtrate and samples therefore are not representative of actual formation fluid. A more detailed summary of testing is provided in Appendix A.

c. Quality assurance data

Data quality information is available on the USGS and WOGCC websites (http://energy.cr.usgs.gov/prov/prodwat/intro.htm and http://wogcc.state.wy.us, respectively).

d. Groundwater classification

According to Section 4(d)(ix) of Chapter VIII of the WDEQ Water Quality Rules and Regulations, groundwater is classified as Class VI water and unusable or unsuitable for use according to the following guidelines:

> *(A) Due to excessive concentration of total dissolved solids or specific constituents; or*
>
> *(B) Is so contaminated that it would be economically or technologically impractical to make the water usable; or*
>
> *(C) Is located in such a way, including depth below the surface, so as to make use economically and technologically impractical.*

The formation waters of the Fort Union Formation at Lost Creek qualify as Class VI water and satisfy all three guidelines for this classification. Total dissolved solids measured within the Fort Union Formation at TW1 exceed 10,000 mg/L. Discrete and commingled concentrations of benzene significantly exceed the USEPA MCL for benzene (5 μg/L), with reported concentrations of benzene as high as 344 μg/L (sample 7060B). The levels of organic contaminants are expected, because the Fort Union Formation is a known host of petroleum source rock in the Great Divide Basin. Due to

this level of contamination, it is not economically or technologically practical to treat waters of the Fort Union Formation to acceptable levels for drinking water supply.

Additionally, the Fort Union Formation at Lost Creek occurs at great depth (>6,000 feet below ground surface). Outside of the uranium ore bodies, groundwater supply within the overlying Wasatch/Battle Spring Formation is more than adequate to supply any and all potential drinking water supply uses in the northern Great Divide Basin, even considering an unlikely significant rise in population. Due to the plentiful supply, more favorable groundwater quality, and relative ease of exploitation of groundwater within the shallow Wasatch/Battle Spring Formation (in comparison to the contaminated and significantly deeper Fort Union Formation), it would not be practical to utilize and treat the Fort Union Formation as a source of drinking water supply in the Lost Creek area.

F. Further description of the discharge

This permit application is for the injection of wastes that are non-hazardous under the Resource Conservation and Recovery Act (RCRA). The anticipated water chemistry of the injected waste stream is presented in Table 10. Minor concentrations of corrosion inhibitors, scale inhibitors, and/or biocides may be used as needed to maintain the wells in optimum condition.

The wastes consist of operational and restoration bleed streams and liquid waste from plant processes from in-situ recovery (ISR) uranium mining operations, including but not limited to: normal overproduction (wellfield bleed) streams, yellowcake wash water, bleed from eluant and precipitation circuits, sumps, membrane cleaning solutions, laboratory waste, reverse osmosis brine, groundwater sweep solutions and plant washdown water from the Lost Creek operation and other Wyoming ISR facilities. Lost Creek operation wastes will be generated by operations covered under a pending Wyoming Department of Environmental Quality (WDEQ) Land Quality Division (LQD) Permit to Mine and pending U.S. Nuclear Regulatory Commission (NRC) Source Material License. These waste streams are benefication wastes, exempt from RCRA regulation under the Bevill Amendment found in 40 CFR 261.4(b)(7).

G. Description of the Wells

A preliminary well schematic is shown on Figure 29; a preliminary wellhead schematic is shown on Figure 30. Based on drilling and logging at TW1, the injection zone targets for DW No. 2 to No. 5 will include designated portions of the Upper and Middle portions of the Fort Union Formation. At TW1, these depths coincide to the top of the Fort Union (6,158 ft RKB) to the base of the sand that lies above the prominent coal marker bed at approximately 8,094 ft RKB (logs are included as Appendix B). These depths will vary for DW No. 2 to No. 5 due to regional structure at Lost Creek, as the top of the Fort Union deepens to the north at Lost Creek (Figure 22).

Drilling Prognosis

A general, preliminary drilling prognosis follows. Final design will be performed prior to mobilizing a drilling rig.

1. Drill and set 16" conductor casing (if needed)
2. Drill 12 ¼" surface hole to 2,000'; run 8 ⅝" casing to bottom; cement to surface (Class A or 50/50 Poz)
3. Drill 7 ⅞" hole to approximately 8,400'
4. Run CBL on surface casing
5. Run 5 ½" casing to bottom; cement to surface; release drilling rig
6. Rig up completion rig; run CBL on production casing
7. Perforate Fort Union and develop as needed (swabbing and/or jetting)
8. Run 2 ⅞" or 3 ½" tubing and packer
9. Run RAT log, temperature log and perform pressure falloff test
10. Perform SAPT and release rig.

a. Packer, Annulus Fluid, Wellhead and Tree

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

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

For each well, the tubing will hang in a 5 ½" x 2 ⅞" tubing head and a tree will be installed above the tubing hanger. It is anticipated that a nominal 3' tree (rated for 2,000 or 3,000 psi by ANSI or API) will include a bottom master valve, a flow tee with one side outlet and valve, a swab valve, and a pressure gauge above the swab valve (Figure 30).

b. Cementing

Each of the proposed wells will be cemented in accordance with Chapter XIII, Section 11. The 8 ⅝" or 9 ⅝" surface casing strings will be cemented from total depth to surface using lite cement (lead) and Class G tail, or suitable equivalent cement.

The 5 ½" production casing will be cemented as follows: (1) Class G or 50/50 Pozmix in the interval from 8,400 to 5,000 feet (approximately 1,000 feet above the top of the Fort Union injection interval) to total depth; and (2) lite cement from 5,000 feet to surface. It is anticipated that the 5 ½" casing will be cemented in two stages, with the DV tool placed at about 5,000 feet depending on conditions at the time of completion. Hole conditions encountered will be used to derive the final cement job procedures and volumes.

c. Log and Cores

Open-hole and cased-hole logs will be run in accordance with Chapter XIII, Section 11. If available data are not sufficient from nearby wells, cores (whole or sidewall) may be collected and standard oil field core testing conducted (e.g. porosity and permeability).

H. Operating Data

a. Discharge Rates

LC ISR, LLC is requesting that the permit limit be equal to a total injection rate under the area permit of 250 gpm (50 gpm for each of the five wells).

b. Injection Pressure

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

$$P = F \times D$$

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

Based on regional data presented in WDEQ UIC Guidance Document #1, a fracture gradient of 0.70 psi/ft was assigned to the Fort Union Formation. This fracture gradient is consistent with a calculated gradient based on the observed pore pressure and estimated overburden and tensile stresses.

Using the equation above, the fracture pressure of the receiver for DW No. 1 (TW1) is calculated to be 5,653 psi (see Table 13 for detailed calculations).

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

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

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

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

- Tubing pressure loss (T) was obtained from Western Company charts. The pressure loss for the maximum injection rate of 50 gpm in 2 ⅞" tubing is 55 psi for

each of the proposed new wells. Tubing pressure loss was considered for new, bare pipe.

- Perforation pressure loss (L_p) was neglected.

Based on the above equation, and the noted assumptions, the Limiting Surface Injection Pressure (LSIP) for each of the proposed wells is 1,974 psi (Table 13). An additional calculation of LSIP was conducted based on the top of the injection zone, which is 6,139 ft BGS at TW1 and summarized in Table 14. The calculated LSIP from the top of the injection zone was 1,513 psi.

Since the fracture gradient was estimated, a step-rate injection test may be performed either (1) during the initial completion, or (2) within the first one year of operation. However, because of potential fines migration in the Fort Union, LC ISR may request to operate at a lower (approved) pressure during the initial stages of the project, rather than run a step-rate injection test to determine fracture pressure to avoid damage of injection capacity. A pressure falloff test will be run on each well within 90 days of the start of injection operations.

c. Proposed stimulation program

The need for formation stimulation will be assessed during the completion of each well. At that time, it is anticipated that each of the wells may be stimulated with 8 to 15 percent HCl. It is possible that mud acid treatments (HCl: HF) may also be performed. The need for subsequent (periodic) treatments will be assessed during operation of the well.

While hydraulic fracture treatments (using sand as a proppant) are not considered necessary at this time, they may be considered to enhance the injection capacity of the wells. Any potential hydraulic (propped) frac job would be (1) designed to contain the fracture within the zone of interest in the Fort Union Formation, and within the cemented interval of the production casing, and (2) performed after approval by WDEQ.

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

d. Injection procedure

The specific injection procedure for each well will depend on (1) the capacity of each well as determined from testing performed during the well completion operations, and (2) LC ISR's disposal requirements at that time. In general, it is anticipated that injection operations will commence at 25 to 50 percent of the well's anticipated injection capacity for a period of 1 to 5 days, with subsequent increases to the maximum rate over the next week. During the startup period, the flow monitoring and injection equipment, the annulus

monitoring system and the pressure shutdown systems will be checked to assure proper operation.

To protect the well tubulars, low concentrations of corrosion inhibitor and antiscalant may be added to the injection stream at the surface. In addition, periodic batch treatments with an oxygen scavenger may be performed. This type of treatment/prevention program is similar to that which has been used on the other Class I wells in Wyoming.

e. Surface Equipment

A schematic drawing of typical surface equipment including storage tanks, pumps, filters, meters, valves, recording devices, wellhead monitoring devices and control valves to be used for the operation of DW No. 1 – No. 5 is included as Figure 31.

f. Description of flow monitoring devices

The surface injection facilities for DW No. 1 through DW No. 5 will include continuous recording devices to monitor injection pressure, flow rate, and annulus pressure between the long string and the tubing.

g. Methods and procedures used for inspection and failure detection

The wells will be equipped with a high-level shutoff switch on the injection tubing to prevent operation of the pumps at pressures greater than the permitted Limiting Surface Injection Pressure. In addition, the wells will be equipped with a low-pressure shut-down switch on the surface injection line that will deactivate the injection pump in the event of a surface leak. Finally, the wells will include a high/low pressure shutdown switch with a pressure sensor on the tubing/casing annulus. This switch will stop the injection pump in the event of either (1) a tubing leak or (2) a casing, packer, or wellhead leak.

h. Staffing and training information

The Lost Creek disposal wells will be staffed and operated consistent with other Class I disposal wells in Wyoming. LC ISR will prepare written standard operating procedures for well startup, operation, and shutdown. Currently, the personnel at LC ISR have over 40 collective years of experience with disposal well operations.

Operation and maintenance will be the responsibility of the Lost Creek Site Management and operating personnel. The on-site organization will include a Radiation Safety Officer. The Lost Creek operating personnel will operate and monitor the disposal well pumps, valves, annulus system, and scale/corrosion inhibitor systems. They will be instructed in the purpose of the continuous recording devices and procedures to implement if a problem is indicated.

Continuous and proper operation of the Lost Creek Project, including uranium production and wellfield restoration, is contingent upon the availability of properly functioning disposal

wells. Hence, operation and monitoring of the disposal wells will be an integral part of the Lost Creek operational activities.

I. Monitoring Plan

a. Monitoring Injected Water

A composite sample of the waste stream will be collected quarterly, or when any major process change occurs that could significantly alter the chemical composition of the waste stream. Samples will be collected upstream of the high-pressure injection pump. Analyses will be performed using approved methods and in accordance with WDEQ Rules and Regulations, Chapter VIII, Section 7. The current proposed minimum parameter list for waste analysis is as follows:

Ra-226 (pCi/L)
Uranium (mg/L)
TDS (mg/L)
pH (units)
Total Alkalinity (mg/L)

It is understood that WDEQ recently has previously requested that an EPA Method 624 analysis be conducted for ISR waste streams. Although these organic constituents are not likely waste components, if this standard should be required by the WDEQ, Lost Creek ISR will comply.

Monitoring records will be submitted to WDEQ quarterly (within 30 days after the end of the quarter) and will include:

1) Date, location and time of sampling
2) Date(s) of analysis
3) Analytical laboratory and Laboratory Chains of Custody
4) Analytical procedures or methods used
5) Analytical results

Reporting will include injection and annulus pressures. Further, the average reservoir pressure will be determined once per year by conducting a pressure falloff test on one of the LC ISR disposal wells per WDEQ regulatory requirements.

Quality control/quality assurance related to sampling and pressure monitoring operations will remain consistent with those already in place for the selected analytical laboratory and other Class I disposal wells.

b. Monitoring wells

Due to the significant depth of the Fort Union Formation, the lack of demonstrated local use of the shallow USDW (Wasatch/Battle Spring Formation), and the presence of suitable

confining zones above and below the injection horizon, the installation of monitoring wells within the final AORs to assess fluid migration in the Fort Union Formation is not necessary.

Shallow water quality monitoring for the Lost Creek ISR operations within the vicinity of the disposal wells will be performed as required under the WDEQ Permit to Mine.

c. Quality assurance plan

Upon final plans to install additional wells, a quality assurance program will be developed as needed for the LC DW No. 1, DW No. 2, DW No. 3, DW No. 4, and DW No. 5.

J. Well Abandonment

a. Abandonment Procedures: LC DW No. 1 to DW No. 5

Well abandonment will be performed in accordance with WDEQ and the Wyoming Oil and Gas Conservation Commission regulations. The general proposed procedures for DW No. 1, DW No. 2, DW No. 3, DW No. 4, and DW No. 5 will include the following:

1. Rig up pulling unit. R/D tree and R/U 3,000 psi BOPs. Test same.

2. Latch tubing, release packer; POOH L/D tubing.

3. P/U workstring. RIH, latch on/off tool and pull packer. POOH and LD same.

3a. (DW No. 1 [TW1] only) Set BP at 9,540'. Squeeze 15 sx 50/50 Pozmix cement below; dump 15 sx on top.

4. Set BP at 8,100'. Squeeze 15 sx 50/50 Pozmix cement below; dump 15 sx on top.

5. RIH and cement well from TD to approximately 4,000' in 2 runs with 425 sx 50/50 Pozmix cement (1.26 ft^3/sx). Tag top of plug. Cement from 4,000' to 20' in 3 runs with 400 sx 50/50 Pozmix cement. Note: This approach is proposed due to the extensive perforated interval in the Fort Union, and may be changed, on approval from WDEQ, to include multiple conventional squeeze jobs rather than filling the casing.

6. Tie into 9 ⅝" x 5 ½" annulus and attempt to bullhead 40 sacks 50/50 Pozmix A cement.

7. R/D BOPs and pulling unit.

8. Cut and remove wellhead at 5-10 feet below ground surface. Place a dry hole monument in a 10-sack cement plug at the surface.

K. Financial Surety

LC ISR will provide a surety instrument equal to the estimated cost for plugging and abandonment of the proposed disposal wells prior to the commencement of construction. A detailed plugging and abandonment estimate can be found in Table 15. The annual updates of LC ISR's financial surety estimate will be reviewed and approved by both the Wyoming Department of Environmental Quality and the U.S. Nuclear Regulatory Commission once a license is issued.

L. Mechanical Integrity

After completion of DW No. 1, DW No. 2, DW No. 3, DW No. 4, or DW No. 5, Part I mechanical integrity will be demonstrated for each well before injection commences, in accordance with the annulus pressure test procedures specified by WDEQ.

After completion, part II integrity will be demonstrated prior to injection by utilizing either a (1) Radioactive Tracer Log and Temperature Survey coupled with a casing pressure check, or (2) an oxygen activation log. Part II MIT will also be demonstrated (1) if any abnormal annulus pressures are observed, (2) every five years at a minimum, and (3) upon the request of WDEQ any time the tubing and packer are removed from the well.

M. Signatory Requirements

In accordance with Chapter XIII, Section 5(b) (xiv), this permit application has been signed by Wayne Heili, President, Lost Creek ISR, LLC.

N. Reports

The required quarterly and annual reports for Class I injection wells will be filed no later than 30 days after the end of the calendar quarter. Annual reports will be submitted along with the 4th Quarterly Report. Those reports will be signed in accordance with Section 5(b)(xiv) and 5(b)(xv) of Chapter XIII of WDEQ Water Quality Rules and Regulations.

O. Regional Water Quality

Water quality information was evaluated and compiled for the stratigraphic section below the injection zone (Fort Union Formation). For underlying units from the Lance Formation (underlying confining zone) through the Mesaverde Group, water quality calculations were evaluated from proximal well logs that penetrate the Mesaverde. Near Lost Creek, two wells were utilized to calculate water quality, including the Federal 32-22 well (Section 22, T25N R93W; located approximately 1.5 miles to the west) and the Stratton 1-21 well (Section 21, T24N R93W; located approximately 5 miles to the southwest). The Federal 32-22 well was a dry hole completed to the Mesaverde and

was subsequently plugged and abandoned. The Stratton 1-21 well had minimal gas production within the Mesaverde (3,114 MCF in 1982) and was plugged in 1984.

Water quality calculations from these well logs were evaluated in relatively "clean" sand zones to calculate concentrations of sodium chloride (NaCl) as a conservative approximation of TDS levels. Additional data from produced waters databases and published reports were also evaluated for these formations (including the Lance Formation, Fox Hills Sandstone, Lewis Formation, and the Mesaverde Group). Due to the lack of nearby wells with reported water quality data, much of the available data are located significant distances away from the Lost Creek site and may not be representative of water quality and hydrogeologic conditions near Lost Creek. In particular, much of the data are available for the fresher waters on the fringes of the Great Divide Basin and north and east of the Wind River Thrust and Lost Soldier Faults. Since no wells penetrated deeper than the Mesaverde near Lost Creek, water quality of formations underlying the Mesaverde Group and extending to basement was evaluated from data reported from the USGS Produced Waters Database and from the WOGCC database. Additional regional water quality information for these units was evaluated from published reports available for the Great Divide Basin. It is noted that many of the wells with water quality information from the USGS and WOGCC databases are located far from Lost Creek in other portions of the Greater Green River Basin where hydrogeologic conditions may not be representative of conditions at Lost Creek. Additionally, there is a paucity of data in published reports within the northern portion of the Great Divide Basin near Lost Creek, and most data are reported for the more prolific hydrocarbon producing areas of the basin.

The following is a unit-specific summary of available water quality data for those formations underlying the Fort Union Formation, beginning with the youngest unit (late Cretaceous-age Lance Formation), and extending to all units overlying the Precambrian basement. All units from the injection zone and extending from the Lance Formation to basement qualify for Class VI designation according to Chapter 8 of the WDEQ Water Quality Rules and Regulations. These formations are not USDW due to 1) lack of use as drinking water supply, 2) TDS levels in excess of 10,000 mg/L, 3) and great depth.

Lance Formation

Water quality within the underlying Lance Formation was calculated from well logs at two proximal wells, the Federal 32-22 and Stratton 1-21 wells. Water quality calculations for the two wells are presented in Tables 16 and 17, respectively. From the Federal 32-22 well, six relatively clean sand zones were identified and calculated TDS concentrations ranged between 16,000 to 60,000 mg/L as NaCl. Within the Stratton 1-21 well, three sand zones were evaluated and calculated TDS concentrations ranged 6,700 to 10,200 mg/L as NaCl. An important point to consider in analyzing these data is the presence of gas within these zones, as illustrated on Figure 32, showing the wireline tool response in two sand intervals from the Stratton 1-21 well. The presence of gas in these zones is seen as the "crossover effect", where the density porosity is greater than the neutron porosity. The presence of gas tends to result in an overestimate of the

actual formation resistivity and the actual porosity of the sand unit. An overestimation of deep resistivity and porosity leads to a higher apparent formation water resistivity calculations, which in turn leads to an underestimation of NaCl concentrations within the formation water. NaCl concentrations calculated in these circumstances will be lower than representative values.

An examination of data from the USGS Produced Waters Database did not yield any pertinent Lance water quality data in the Lost Creek area. The closest available data are from wells located more than 20 miles to the south, with most data from the Lance Formation originating from farther south in the Washakie Basin. Data from the USGS produced waters database and the WOGCC database for the Lance Formation are summarized in Tables 18 and 19. Within the entire Great Divide Basin and from USGS Produced Waters data, the average TDS concentration was in excess of 17,000 mg/L. A review of water quality data from the WOGCC database revealed similar results, with the majority of data to the south and no reported water quality data from the Lance Formation closer than 25 miles. From 12 unique well samples from the WOGCC database in the basin, the average TDS concentration for these wells was 27,624 mg/L.

Mason and Miller (2004) reported 65 produced water samples from the Fort Union Formation in Sweetwater County, Wyoming that had TDS concentrations ranging between 1,170 to 153,000 mg/L, with a median concentration of 15,400 mg/L. The depths of these samples ranged from 1,950 to 7,700 ft, with a median depth of about 4,100 ft.

Within the Greater Green River Basin, the Lance Formation has been identified as a major petroleum system (USGS 2005). Near Lost Creek, the lower Lance interval commonly contains hydrocarbon shows produced from coal beds in the lower portion of the formation. In the Lost Creek area, the Lance has not been considered a viable hydrocarbon target and there are no known Lance completions in the area (Russell 2008).

Due to the poor water quality within the Lance Formation from elevated levels of TDS (in excess of 10,000 mg/L as NaCl), the presence of petroleum source rock within the formation, and the great depth (in excess of 11,000 ft BGS near Lost Creek) the formation waters in the Lance Formation near Lost Creek meet the criteria for Class VI designation according to Chapter 8 of WDEQ Water Quality Rules and Regulations and the Lance is not a USDW at Lost Creek.

Fox Hills Sandstone

Water quality within the Fox Hills Sandstone was calculated from well logs at two proximal wells, the Federal 32-22 and Stratton 1-21 in Tables 16 and 17, respectively. From the Federal 32-22 well, one clean Fox Hills sand zone was identified and the TDS concentration was calculated as 12,500 mg/L as NaCl. Within the Stratton 1-21 well, two sand zones were evaluated and calculated TDS concentrations were 12,100 and 12,800 mg/L as NaCl.

An examination of data from the USGS Produced Waters Database did not yield any pertinent Fox Hills water quality data in the Lost Creek area. The closest available data are from wells located more than 25 miles to the south, as most data from the Fox Hills originates from farther south in the Washakie Basin. Within the Greater Green River Basin, TDS concentrations from the USGS Produced Waters Database were reported for 11 unique sample intervals at an average concentration of 18,316 mg/L. A review of water quality data from the WOGCC database revealed similar results, with majority of data to the southwest and no reported water quality data from the Fox Hills within more than 25 miles of Lost Creek. From seven unique well samples from the WOGCC database, the average TDS concentration for these wells was 30,398 mg/L. Data from the USGS and WOGCC databases for the Fox Hills are presented in Tables 20 and 21.

The Fox Hills consists of superposed, coarsening-upward sequences of shale and fine-grained sands, and is a conformable transitional sequence between the underlying marine shales of the Lewis and overlying terrestrial sediments of the Lance Formation. Within the Greater Green River Basin, the Lewis Shale and Lance Formation are each identified as major petroleum systems containing petroleum source rock (USGS 2005). The Fox Hills often contains minor shows of gas, but is rarely, if ever, completed as a hydrocarbon producer in the southern Great Divide Basin (Russell 2008).

Due to poor water quality within the Fox Hills Sandstone from elevated levels of TDS (calculated to be in excess of 10,000 mg/L as NaCl), the presence of petroleum-related contaminants from adjacent source rock, and the great depth (approximately 14,000 ft BGS near Lost Creek), the formation waters in the Fox Hills Sandstone near Lost Creek meet the criteria for Class VI designation according to Chapter 8 of WDEQ Water Quality Rules and Regulations and the Fox Hills is not a USDW at Lost Creek.

Lewis Shale

Water quality within the Lewis Formation was calculated from well logs at two proximal wells, the Federal 32-22 and Stratton 1-21 wells. Water quality calculations for the two wells are presented in Tables 16 and 17, respectively. From the Federal 32-22 well, four sand zones were identified and the calculated TDS concentration ranged from 10,000 to 36,000 mg/L as NaCl. Within the Stratton 1-21 well, one sand zone was evaluated and the calculated TDS was 17,000 mg/L as NaCl.

Water quality data for the Lewis are not available in the Lost Creek area from the USGS and WOGCC databases. Average reported TDS concentrations for the Lewis from the USGS database was 11,416 mg/L. From the WOGCC database, the two closest wells were located approximately 15 miles south in Sections 15 and 11, T22N, R94W. These two wells have reported TDS concentrations of 10,424 mg/L and 11,777 mg/L. Data from the USGS and WOGCC databases for the Lewis Formation are presented in Tables 22 and 23.

The Lewis Shale has been identified as a major petroleum system within the Greater Green River Basin, complete with source rock, reservoir rock, and seals (USGS 2005). The upper Lewis sands are a viable gas target in some fields located to the west and south from Lost Creek, but there are likely no potential Lewis sands located near Lost Creek (Russell 2008).

Based on the poor water quality within the Lewis Shale due to elevated levels of TDS (calculated in excess of 10,000 mg/L as NaCl), the presence of petroleum source rock and related organic contaminants, and the great depth (in excess of 14,000 ft BGS near Lost Creek) the formation waters in the Lewis at Lost Creek meet the criteria for Class VI designation according to Chapter 8 of WDEQ Water Quality Rules and Regulations and the Lewis is not a USDW at Lost Creek.

Mesaverde Group

Water quality within the Mesaverde was calculated from well logs at two proximal wells, the Federal 32-22 and Stratton 1-21 wells. Water quality calculations for the two wells are presented in Tables 16 and 17, respectively. From the Federal 32-22 well, three sand zones were identified and the calculated TDS concentration ranged from 21,000 to 42,000 mg/L as NaCl. Within the Stratton 1-21 well, two sand zones were evaluated and the calculated TDS was 15,500 mg/L and 17,500 mg/L as NaCl.

Lirnited water quality data were available near Lost Creek from the USGS and WOGCC databases. Table 24 presents the USGS data for the Mesaverde, showing only wells located in T20N and north because of the large number of samples within the entire basin. The average TDS concentration from samples for these wells is in excess of 19,000 mg/L. The closest well identified in the Mesaverde is located in Section 17, T26N, R94W, approximately 12 miles to the northwest. Based on review, the formation tops in this well have been misidentified in state files, as the depth of the perforated zone (3,661 to 3,675 ft) is too shallow to be the Mesaverde. The top of the Fort Union in this well was identified at approximately 2,880 feet, which follows from the regional structural throw of the Wind River Fault in the area (approximately 3,500 to 4,000 feet higher on the north side of the fault). At a depth of approximately 800 feet below the top of the Fort Union, it is likely that this perforated zone is in the Fort Union or upper Lance Formation, not the Mesaverde.

Due to the large number of samples from the WOGCC database (in excess of 1,000 sample records), only those wells located in T22N and north are summarized in Table 25, with an average TDS concentration of 13,094 mg/L. The closest wells to Lost Creek are located in Sections 19, 27, and 29 of T23N, R93W, and indicate completion intervals to the Lewis-Mesaverde. Reported TDS concentrations ranged from 8,140 to 11,000 mg/L.

Mason and Miller (2004) reported 221 produced-waters samples in the Mesaverde, with a median TDS concentration of 13,400 mg/L (see Figure 33).

Near Lost Creek, the Mesaverde (including the Almond, Ericson, and Rock Springs Formations) is the predominant zone of interest for gas completions. The Mesaverde has been identified as a major petroleum system within the Greater Green River Basin (USGS 2005). The entire Mesaverde is moderately overpressured due to a lack of dewatering caused by the presence of the Lewis Shale acting as a regional aquitard. Within the Great Divide Basin, the Mesaverde is a major hydrocarbon producing interval and as Russell (2008) states, "hydrocarbon generation has undoubtedly contributed to the moderately overpressured environment seen beneath the Lewis Shale."

Based on elevated levels of TDS (calculated to be in excess of 10,000 mg/L as NaCl), the presence of petroleum source rock and related organic contaminants, and the great depth (approximately 16,000 ft BGS near Lost Creek) the formation waters in the Mesaverde at Lost Creek meet the criteria for Class VI designation according to Chapter 8 of WDEQ Water Quality Rules and Regulations and the Mesaverde Group is not a USDW at Lost Creek.

Cody Shale

No wells near Lost Creek penetrate deeper than the Mesaverde Group. Water quality information for the Cody Shale is based on data available from the USGS and WOGCC databases, and from published geologic reports. The Cody Formation (including equivalent Baxter and Steele Shales, and associated sands) occurs conformably below and interbedded with the Mesaverde in the northern Great Divide Basin. Based on a Mesaverde thickness of 500 feet, the top of the Cody is projected to be approximately 16,500 ft BGS at Lost Creek.

Water quality data from the USGS Database are limited. The closest well to Lost Creek with water quality data are located in Section 17, T26, R94W (1 R.E. Murphy), approximately 12 miles northwest of Lost Creek and located on the north side of the Wind River Fault. Two TDS values were reported for the well and the average TDS concentration is 9,511 mg/L (see Table 26). It is noted that these samples (indicated as Steele Shale) were collected from a well on the upthrown side of the Wind River Fault, where regional water quality is likely higher than at Lost Creek. As Lost Creek is located farther from recharge areas to the north, and the Cody/Steele is located at greater depths (indicated depths of samples at 1 R.E. Murphy are approximately 5,600 feet; the Cody at Lost Creek is projected to be greater than 16,000 feet), groundwater quality in the Cody at Lost Creek is likely of lesser quality, and contains higher TDS levels.

Data from the WOGCC database is only reported for wells located south of Lost Creek, in the Washakie Basin. The average TDS concentration reported for these wells was approximately 25,000 mg/L and is presented on Table 27.

Mason and Miller (2004) reported TDS values from 34 samples within the Baxter-Mowry confining unit, which includes the Baxter, Cody, Steele, Mowry, and Thermopolis Shales, and includes the underlying Niobrara, Frontier, and Muddy Formations (Figure

33). TDS values ranged from approximately 5,000 mg/L to greater than 50,000 mg/L, with a median value of about 20,000 mg/L.

The Cody Shale and equivalents are a major host for petroleum source rocks, equivalent to the Hilliard-Baxter-Mancos petroleum system in southwestern Wyoming and to the Niobrara petroleum system, located in the eastern portion of the Great Divide Basin (USGS, 2005).

Due to the poor water quality in the Cody and equivalent shales due to elevated TDS levels (in excess of 10,000 mg/L near Lost Creek), the presence of petroleum source rock and associated organic contaminants, and the extreme depth of this unit (projected formation top at 16,500 ft BGS), the waters in the Cody at Lost Creek meet the criteria for Class VI designation according to Chapter 8 of WDEQ Water Quality Rules and Regulations and the Cody is not a USDW at Lost Creek.

Frontier Formation

Water quality information for the Frontier Formation is based on data available from the USGS and WOGCC databases, and from published geologic reports. The Frontier Formation conformably underlies the Cody Shale. It is noted that the Bison Basin Field located approximately 12 miles northwest of Lost Creek (on the north side of the Wind River Thrust Fault) produces from the Frontier Formation. Within the Bison Basin, this unit is mapped as being approximately 900 to 2,100 feet thick (Kirschbaum and Roberts, 2005). Within the northern Great Divide Basin south of the Wind River Fault near Lost Creek, the top of the Frontier Formation likely occurs at depths greater than 18,000 ft BGS.

Few water quality data from the USGS and WOGCC databases near Lost Creek are available. Most data are to the northwest (Bison Basin), northeast (Lost Soldier and Wertz Fields) and to the south and southwest in other more distant hydrocarbon producing areas. Produced-waters data from the USGS and WOGCC databases are presented in Tables 28 and 29, respectively. From the USGS database, the average of all reported Frontier Formation TDS concentrations is in excess of 25,000 mg/L. Eight samples were reported in the Lost Soldier and Wertz Fields (located north and east of the Wind River Fault), ranging from 1,577 to 14,324 mg/L TDS, with an average TDS concentration of about 8,070 mg/L. It is noted that the samples collected from the Frontier in the Lost Soldier and Wertz Fields were collected from wells on the upthrown side of the Lost Soldier Fault, where regional water quality is likely higher than at Lost Creek. As Lost Creek is located farther from recharge areas to the north, and the Frontier is located at greater depths (approximately 400 to 3,700 feet; the Frontier at Lost Creek is projected to be greater than 17,000 feet), groundwater quality in the Cody at Lost Creek is likely of lesser quality, and contains higher TDS levels. The average TDS concentration for Frontier water samples from the WOGCC database was approximately 12,300 mg/L (Table 29).

Mason and Miller (2004) presented available water quality data for the Baxter-Mowry confining unit, which includes the Frontier Formation. Figure 33 presents a summary of this data, and the authors note that most samples were collected from the Frontier Formation. TDS values in this unit range from approximately 5,000 to 50,000 mg/L, with a median value of approximately 20,000 mg/L.

The Frontier Formation has been identified as a minor source of petroleum from the Allen Hollow Shale Member and from coal and lacustrine facies in the terrestrial units of the Frontier Formation (USGS 2005). Additionally, reservoirs have been identified in the sandstones of the Frontier Formation where hydrocarbons migrated from the shale source rock in the underlying Mowry Shale, identified as a major petroleum system in southwestern Wyoming.

Due to the poor water quality in the Frontier Formation due to elevated TDS levels (consistently in excess of 10,000 mg/L near Lost Creek), the migration of hydrocarbons from underlying source rock and minor source rock within this unit, and the extreme depth of this unit (greater than 18,000 ft BGS), the waters in the Frontier at Lost Creek meet the criteria for Class VI designation according to Chapter 8 of WDEQ Water Quality Rules and Regulations and the Frontier is not a USDW at Lost Creek.

Cloverly Formation (including Inyan Kara/Dakota/Lakota Formations)

The formations listed above are relatively time-equivalent units within the Lower Cretaceous stratigraphic section in the Great Divide Basin. This includes the overlying Muddy Sandstone and the Cloverly Formation, and relatively time equivalent Lower Cretaceous Dakota and Lakota/Inyan Kara Formations. The top of the Cloverly Formation likely occurs at depths of approximately 18,000 ft BGS.

Water quality information for these units was evaluated from the USGS and WOGCC databases, and is presented in Tables 30 and 31, respectively. The closest sample is located in Section 17, T26N, R94W, approximately 12 miles northwest of Lost Creek, and located on the north side of the Wind River Fault. Two samples from a single well (R.E. Murphy No. 1, API #4903705970) were reported at TDS concentrations of 16,841 and 17,059 mg/L (Table 30). The majority of the produced waters samples are reported to the southwest in the Baxter Basin and to the south within the Washakie Basin, with an average TDS concentration greater than 18,000 mg/L. The Average TDS concentration for WOGCC samples is greater than 13,000 mg/L (Table 31).

The Cloverly and Dakota Sandstone Formations and Muddy Sandstone represent reservoirs where hydrocarbons have migrated and are included in the Mowry petroleum system, identified by USGS (2005), which primarily includes source rock from the Mowry and Thermopolis Shales, with minor source rock contributions from coals and carbonaceous shales within the Dakota. The Cloverly, Dakota, and Muddy units all represent reservoir rocks for hydrocarbon accumulation.

Due to the poor water quality in these units due to elevated TDS levels (in excess of 10,000 mg/L near Lost Creek), the migration of hydrocarbons from underlying source rock and minor source rock within these units, and the extreme depth of this unit (greater than 19,000 ft BGS), the waters in the Cloverly/Dakota at Lost Creek meet the criteria for Class VI designation according to Chapter 8 of WDEQ Water Quality Rules and Regulations and the Cloverly/Dakota is not a USDW at Lost Creek.

Morrison Formation

Water quality data from the Jurassic-age Morrison Formation is limited in the Lost Creek area. Available USGS water quality data are generally available to the southwest, within the Baxter Basin and is presented in Table 32. The average TDS concentration from USGS sample results is approximately 19,000 mg/L. A single sample was reported approximately 15 miles to the north and east of Lost Creek (T26N, R90W) with a TDS concentration of 9,695 mg/L, near the Lost Soldier/Wertz Fields and from a depth of 2,270 feet. It is noted that this well location is to the north of the Wind River and West Lost Soldier Faults, and closer to areas of recharge than the Lost Creek location. The Morrison at Lost Creek is also encountered at a much greater depth (likely in excess of 19,000 ft BGS) compared to the well to the northeast, where TDS levels are likely higher. An additional sample (WOGCC) located southeast of Lost Creek that is likely more representative of the site (T14N, R91W) has a TDS concentration exceeding 26,000 mg/L.

Mason and Miller (2004) also compiled TDS data from produced-water samples in Sweetwater County. As indicated in Figure 33, samples from the Morrison Formation (and confining unit) reported TDS concentrations from 2,000 to 40,000 mg/L, with a median of about 17,000 mg/L. Lower TDS values likely represent samples collected from the shallower portions of the basin, likely near areas of outcrop and/or recharge areas, and are not considered representative of the Lost Creek site.

The Morrison Formation is a minor hydrocarbon producing interval in the Greater Green River Basin. The largest concentration of Morrison completions is on the eastern side of the Rock Springs Uplift. Closer to Lost Creek, there are two wells in the Lost Soldier Field and one well in Bison Basin (USGS 2005).

Due to the poor water quality in the Morrison (TDS levels in excess of 10,000 mg/L near Lost Creek), the presence of petroleum related contaminants, and the extreme depth of this unit (greater than 19,000 ft BGS), the waters in the Frontier at Lost Creek meet the criteria for Class VI designation according to Chapter 8 of WDEQ Water Quality Rules and Regulations and the Morrison is not a USDW at Lost Creek.

Sundance Formation

Water quality data from the Jurassic-age Sundance Formation (and time-equivalent Entrada Sandstone) are not available in the Lost Creek area. Available water quality data are generally available in fields to the northeast (Lost Soldier) and to the southwest in Baxter Basin.

Water quality data from the USGS Produced Waters database is generally from the Baxter Basin area to the southwest and is presented in Table 33. The average TDS concentration in the Sundance is approximately 17,000 mg/L (Table 33). From wells within the Lost Soldier Field to the northeast (located northeast of the Wind River and West Lost Soldier Faults), limited data indicate TDS values with a mean concentration of about 4,800 mg/L. Wells in the Lost Soldier Field are located on the upthrown side of the West Lost Soldier Fault, and closer to recharge areas to the north, where regional water quality is likely higher than at Lost Creek. The Sundance in the Lost Soldier Field is encountered at approximately 1,900 to 5,100 ft BGS, while this formation is projected to occur at depths of approximately 20,000 ft BGS at Lost Creek. A single well near Baggs, WY has a reported TDS concentration in excess of 36,000 mg/L.

Mason and Miller (2004) also compiled TDS data from produced-water samples. As indicated in Figure 33, samples from the Sundance Formation ranged from approximately 9,000 to 40,000 mg/L, with a median concentration of about 16,000 mg/L.

The Sundance Formation is a viable hydrocarbon producing interval in the Greater Green River Basin. The largest concentration of wells (26) is located in Lost Soldier Field (USGS 2005).

Due to the poor water quality in the Sundance Formation due to elevated TDS levels (in excess of 10,000 mg/L near Lost Creek), the presence of petroleum related contaminants, and the extreme depth of this unit (approximately 20,000 ft BGS), the waters in the Frontier at Lost Creek meet the criteria for Class VI designation according to Chapter 8 of WDEQ Water Quality Rules and Regulations and the Sundance is not a USDW at Lost Creek.

Nugget Formation

Water quality data from the Triassic/Jurassic-age Nugget Formation are not available in the Lost Creek area. Based on Blackstone (1991) and formation thickness data presented by Osborne (1981), it is estimated that the Nugget Formation is present beneath the Lost Creek site at depths of approximately 18,000 ft. The closest available water quality data from the USGS database is to the northeast in the Lost Soldier and Wertz Fields, located north and east of the Wind River Fault, where reported TDS concentrations range from 3,081 to 8,107 mg/L (Table 34). As these wells are located on the upthrown side of the fault system (formation depths of the Nugget at Lost Soldier/Wertz are approximately 2,900 to 5,500 ft BGS; the Nugget at Lost Creek is projected at depths greater than 20,000 ft BGS) and closer to recharge areas to the north, TDS concentrations in the Nugget at Lost Creek are likely much higher. A basin-wide average of TDS concentrations in the Nugget is in excess of 25,000 mg/L.

Limited water quality data are available from the WOGCC to the southeast and south (near Baggs, WY) of Lost Creek, and in areas southwest of Lost Creek near the Rock Springs Uplift. Water quality samples for TDS were generally greater than 10,000 mg/L,

with several wells exhibiting TDS values in excess of 50,000 mg/L. WOGCC data for the Nugget are presented in Table 35.

Mason and Miller (2004) present data from produced-water samples which are presented in Figure 33 indicating the water quality in the Nugget Formation ranges from 5,000 to 40,000 mg/L TDS, with a median TDS concentration of approximately 10,000 mg/L. As presented in Freethey and Cordy (1991), TDS concentrations range from 3,000 to 10,000 mg/L in the Rock Springs Uplift area, to greater than 35,000 mg/L in most other areas of the Great Divide Basin. A basin-wide map of TDS concentrations produced by Mason and Miller (2004) is presented in Figure 34 and indicates that TDS values in the Nugget Formation near the Lost Creek area range from 10,000 to 35,000 mg/L.

Due to the poor water quality in the Nugget Formation due to elevated TDS levels (in excess of 10,000 mg/L near Lost Creek), the likely presence of petroleum related contaminants, and the extreme depth of this unit (greater than 20,000 ft BGS), the waters in the Frontier at Lost Creek meet the criteria for Class VI designation according to Chapter 8 of WDEQ Water Quality Rules and Regulations and the Nugget is not a USDW at Lost Creek.

Tensleep Formation / Phosphoria Formation

Mason and Miller (2004) combined the Pennsylvanian-age Tensleep Sandstone (and time-equivalent Weber Sandstone) and the Permian-age Phosphoria Formation (and time-equivalent Goose Egg Formation) into the Upper Paleozoic Aquifer unit in the Great Divide Basin. Water quality data from these aquifers in the Lost Creek area is not available, and the majority of produced-waters data originates from the Lost Soldier/Wertz Fields area to the northeast, fields to the southeast near Rawlins, and within the Baxter Basin and areas closer to the Rock Springs Uplift to the southwest.

USGS water quality data from the Tensleep and Phosphoria Formations is presented in Table 36. The average TDS concentration in the Lost Solder and Wertz Fields to the northeast of Lost Creek is in excess of 13,000 mg/L, and for the entire basin, the average TDS concentration is greater than 14,000 mg/L.

According to data presented by Lindner-Lunsford (1989), TDS concentrations in the Upper Paleozoic aquifer units where data are available are generally greater than 35,000 ppm. While data are extremely sparse in the northeastern portion of the basin, data presented by Lindner-Lunsford (1989) and Geldon (2003) indicate that Lost Creek is located in an area of the basin where Tensleep TDS values were projected to be greater than 10,000 mg/L.

Due to the poor water quality in the Tensleep and Phosphoria Formations due to elevated TDS levels (in excess of 10,000 mg/L near Lost Creek), the likely presence of petroleum related contaminants, and the extreme depth of this unit (greater than 20,000 ft BGS), the waters in these aquifers at Lost Creek meet the criteria for Class VI

designation according to Chapter 8 of WDEQ Water Quality Rules and Regulations and the Tensleep/Phosphoria is not a USDW at Lost Creek.

Madison Formation

Water quality data for the Mississippian-age Madison Formation, including data from the Mississippian-Pennsylvanian age Darwin Sandstone and Amsden Formation, were compiled from available data from the USGS Produced Waters Database and from the WOGCC website. Within the Great Divide Basin, water quality data from oil and gas wells for this formation are primarily reported within the Lost Soldier and Wertz Fields, located approximately 15 to 20 miles to the northeast, on the north sides of the Wind River and Lost Soldier Faults, in T26N R90W. The Madison Formation in this area is significantly higher in the stratigraphic section, with the top of the formation ranging between 4,000 to 7,000 ft BGS. In the Lost Creek area, the Madison Formation top is estimated to be at approximately 21,000 ft BGS, based on data from Blackstone (1991) and Osborne (1981).

Data from the USGS and WOGCC databases are presented in Tables 37 and 38, respectively. Based on the available water quality data, the TDS values within the Madison Formation to the northeast in the Lost Soldier and Wertz Fields are all greater than 3,000 mg/L, and many wells have reported TDS concentration greater than 10,000 mg/L. The average TDS concentration from available USGS data are approximately 12,500 mg/L (Table 37), and data from the WOGCC indicates an average TDS value of approximately 14,000 mg/L (Table 38). All available data from both sources are from wells located in the Wertz and Lost Soldier Fields area, located northeast of the Wind River and Lost Soldier Faults, relative to the Lost Creek Project area.

The Lost Creek site is located on the basinward and downthrown sides of two major regional structural features, the Wind River Thrust and the Lost Soldier Fault. Water quality data from the Lost Soldier/Wertz Fields are located on the upthrown side of the Lost Soldier Fault, where regional water quality is likely higher than at the Lost Creek site. As Lost Creek is located farther from the recharge areas to the north, and the Madison Formation is located at greater depths, groundwater quality in the Madison at the Lost Creek site is likely of a lesser quality, and contains higher concentrations of TDS. Additionally, the presence of the Lost Soldier Fault likely retards the path of regional groundwater flow from the recharge areas in the north to the basin center, resulting in a higher concentration of TDS within the Madison Formation to the south of these faults.

The previous conclusion is supported by the regional hydrogeologic investigations completed by several authors. Mason and Miller (2004) reported a median TDS value of 11,100 mg/L from produced-water samples, and noted that these samples were collected from depths ranging from 4,800 to 15,800 ft, with a median depth of about 6,100 ft. Within most of the Great Divide Basin, the depth of the Madison Formation is much greater, and as Mason and Miller (2004) reported that the "median TDS value of 11,100 mg/L is more representative of the shallower parts of the aquifer."

Based on the poor water quality in the Madison Formation due to elevated TDS levels (in excess of 10,000 mg/L near Lost Creek) and the extreme depth of this unit (greater than 21,000 ft BGS), the waters in these aquifers at Lost Creek meet the criteria for Class VI designation according to Chapter 8 of WDEQ Water Quality Rules and Regulations and the Madison is not a USDW at Lost Creek.

Flathead Sandstone

Water quality data for the Cambrian-age Flathead Sandstone was compiled from available data from the USGS Produced Waters Database and from the WOGCC website. Data within the Great Divide Basin are sparse, with oil and gas data reported only in the shallower northeastern portion of the basin, within the Lost Soldier and Wertz Fields, located approximately 15 to 20 miles to the northeast, in T26N R90W.

Water quality data from the USGS database indicate an average TDS value of greater than 14,000 mg/L, and a single well from WOGCC data with a TDS value of 10,970 mg/L (Table 39). The depth and thickness of the Flathead in the Lost Creek area is unknown (at least 21,000 ft), but the Cambrian-age sediments in the Lost Creek area are located at greater depths and farther distance from recharge areas, and therefore are expected to exhibit a higher degree of water quality degradation than the formation intervals sampled to the northeast. Mason and Miller (2004) did not present water-quality data for the Flathead aquifer, but noted that throughout most of Sweetwater County, the "water in the Flathead aquifer is likely a brine."

Based on the poor water quality in the Flathead Sandstone due to elevated TDS levels (in excess of 10,000 mg/L near Lost Creek) and the extreme depth of this unit (greater than 21,000 ft BGS), the waters in these aquifers at Lost Creek meet the criteria for Class VI designation according to Chapter 8 of WDEQ Water Quality Rules and Regulations and the Flathead is not a USDW at Lost Creek.

P. Location Maps

All tables, figures, and plates have been previously referenced in this application.
A list of those information sources follows.

Q. REFERENCES

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APPENDIX A

Formation Testing Conducted at Lost Creek Test Well No. 1

This section documents the installation and testing of the Lost Creek ISR, LLC, Lost Creek Test Well No.1 (TW1) in Sweetwater County, Wyoming. The well was drilled during November and December 2008 and most of the testing took place in February 2009.

The objective of the test well was to collect geophysical well log data and water samples, along with cuttings and core samples to ascertain potential uranium mineralization and the probable depth of the USDW and potential injection zones present at the Lost Creek Project. The data collection objectives were successfully achieved and the well has been completed for probable conversion for future use as an injector.

Three strings of carbon steel casing were set and cemented as follows: 16-inch diameter conductor casing at 100 feet (based on an RKB of 19 feet); 9 ⅝-inch surface casing at 2,955 feet RKB; and 5 ½-inch production casing set in the Fort Union Formation at 9,933 feet RKB. Cement bond logs were run on the surface casing and the production casing as part of the demonstration of isolation of the targeted injection zone from possible underground sources of drinking water (USDW). Cement was circulated to the surface on the conductor casing. The top of cement behind surface casing is approximately 180' RKB and the top of cement behind the production string is approximately 500' RKB (more than 2,400' inside the surface casing).

After location preparation, conductor pipe was set on October 24, 2008 and rotary drilling began on November 14, 2008. An attempt was made to drill a directional hole, but holding the desired angle proved to be problematic. A total depth of 9,997 feet RKB was reached on December 3, 2008.

Coring at TW1

Following installation of surface casing to 2,995 ft RKB and open-hole wireline logging, a Schlumberger Rotary Sidewall Coring Tool was used to extract sidewall cores from various depths and lithologies at TW1. Ten sidewall core samples were retrieved from various depths (Figure 35) and lithologies. Cores were submitted for analysis of physical properties, including porosity and permeability (air permeability with Klinkenberg correction), the results of which are summarized in Table 3. Two cores were selected as most representative of shale (6,032 ft) and sand (6,630 ft) and were submitted for brine permeability analysis, which is summarized in Table 4. The shale core had a liquid permeability value of 2.22×10^{-4} md, and the sand core had a liquid permeability of 1.53 md.

The results of permeability analysis of the sand core (6,630 ft RKB) is likely on the lower end of the true formation permeability within the clean sand units of the Fort Union Formation. The results of wireline logging at TW1 indicate a permeability that is likely

higher than the 1.53 md measured from the core. Observed porosities from these clean sands are on the order of 12 to 15%, and there are prominently observed invasion profiles within these sand units (separation between the shallow and deep resistivity readings), both of which indicate a system with permeabilities more on the order of 10 md. Due to the nature of the fluvial depositional environment of the Fort Union Formation, there is also a high degree of heterogeneity within this formation. The core dimensions collected from the coring tool are 2 inches long by 0.92 inches in diameter, and may not be representative of the hydraulic characteristics of a larger sand body that can have thin laminations of finer-grained sediments present. Therefore, for the purposes of AOR calculations, a permeability value of 8.5 md is assigned to the Fort Union Formation.

It is important to note that the core analyzed from a shale (6,032 ft) was analyzed for horizontal permeability. Shales are composed of platy clay minerals which exhibit anisotropy and have a higher permeability in the horizontal direction (assuming an unfractured matrix) relative to vertical permeability. Generally, the anisotropy within a shale unit will cause the vertical permeability to be at least an order of magnitude less than the horizontal. As the analyzed core exhibited a permeability (horizontal) of 2.22×10^{-4} md, the permeability in the vertical direction is likely on the order of 1×10^{-5} md, or less. The contrast in permeability between the sands of the injection zone and the shales overlying the injection zone is at least six orders of magnitude, which indicates adequate vertical confinement above the injection zone.

Formation Fluid Collection and Sampling at TW1 (Open-Hole)

Fluid from the Wasatch/Battle Spring Formation and the uppermost portion of the Fort Union Formation was collected from the open-hole utilizing a Baker Atlas Formation Multi-Tester (FMT). Table 12 presents a summary of TDS values and nitrate levels. Nitrate was added as a tracer to the drilling mud at a concentration of approximately 50 mg/L to evaluate whether formation fluid was representative of the formation (naturally occurring nitrate levels in formation less than 1 mg/L). It is noted that due to the observed nitrate concentrations (approximately 16 to 24 mg/L), all samples were composed primarily of drilling mud filtrate and are not considered to be representative of formation fluid.

Formation Pressure Testing at TW1 (Cased-Hole)

Formation pressure testing was conducted at TW1 utilizing a Schlumberger Cased Hole Dynamics Tester (CHDT). Table 7 presents a summary of calculated reservoir pressures. Excluding the questionable data collected from a depth of 6,843 ft, where a pressure gradient of 0.212 psi/ft was calculated, formation pressure gradients ranged between 0.419 and 0.428 psi/ft. For the purposes of the reservoir calculations presented in this report, a pressure gradient of 0.42 psi/ft was utilized.

Formation Fluid Collection and Sampling at TW1 (Cased-Hole)

Fluid from the Fort Union Formation was collected using the Schlumberger CHDT. A summary of fluid sample analytical results is presented in Table 8. The following is a summary of fluid collection procedures.

The CHDT has four sample collection tanks within the tool and can collect fluid samples and pressure data sets from multiple intervals on a single run into the hole. The tool also has flow-through capability which allows the purging of potential mud filtrate through the tool prior to the collection of a formation sample that is more representative of actual conditions.

Prior to arrival on site, the tool was decontaminated in the Schlumberger shop and cleaned with a non-phosphate detergent. As this was not practical to repeat in the field, the CHDT was flushed prior to all sample runs to reduce potential cross-contamination between sampling runs. The CHDT was then filled with distilled water to collect as an equipment blank.

The CHDT can be used to collect two types of samples referred to as through-casing samples and in-bore samples. Through-casing sampling involved drilling through the casing to collect formation fluid behind cement. In-bore sampling collects a commingled fluid sample from within the casing. In-bore sampling was conducted after perforation of a given interval and jetting with nitrogen using a coil-tubing unit (CTU) to induce flow of formation fluid into the wellbore.

Six samples were collected via through-casing sampling and identified by the depth of collection (in ft RKB). Three samples (6890, 6623.5, and 6488) consisted of drilling mud and were not analyzed. Sample 7060A was compromised due to a complete loss of power to the tool and monitoring equipment during sampling. Only two samples (7060B and 6843) are considered to be representative of formation fluid.

Five commingled samples were collected from the Fort Union utilizing in-bore sampling from inside the casing (8400, BH1-t3, BH1-t4, BH2-t3, and BH2-t4). Sample 8400 was composed of mud and filtrate and was not analyzed. BH1 and BH2 are considered representative and were collected at depths of 7,515 ft RKB and 6,630 ft RKB, respectively.

Six samples (AG1, Jet 1-3, FC, and FC2) were collected at the surface from returns during nitrogen jetting. These composite samples represent an average of overall Fort Union Formation fluid data, as opposed to the discrete samples obtained from the CHDT. It should be noted that this process tends to volatilize any existing organic compounds and thus the analytical results from these samples are likely to exhibit lower volatile organic compound (VOC) concentrations than actual concentrations.

Table 1. Summary of Surface Ownership, Mineral Rights, and Oil and Gas Leases Within Areas of Review

Township 25 North, Range 93 West, 6th P.M

DW No. 1 AOR		Surface Ownership	Mineral Rights	Oil and Gas Leases
Section 25	SW1/4, NW1/4	1	4	1,7
Section 25	SE1/4, NW1/4	1	4	1,7
Section 25	NW1/4, SW1/4	1	4	1,7
Section 25	NE1/4, SW1/4	1	4	1,7
Section 25	SW1/4, SW1/4	1	4	1,7
Section 25	SE1/4, SW1/4	1	4	1,7
Section 25	NE1/4, SE1/4	1	4	1,7
Section 25	SW1/4, SE1/4	1	4	1,7

Township 25 North, Range 92 West, 6th P.M.

DW No. 2 AOR				
Section 19	SW1/4, NE1/4	1	4,6	1
Section 19	SE1/4, NE1/4	1	4	1
Section 19	NW1/4, SE1/4	1	4	1
Section 19	NE1/4, SE1/4	1	4	1
Section 19	SW1/4, SE1/4	1	4	1
Section 19	SE1/4, SE1/4	1	4	1
Section 20	NW1/4, SW1/4	1	4	1
Section 20	SW1/4, SW1/4	1	4	1

Township 25 North, Range 93 West, 6th P.M.

DW No. 3 AOR				
Section 13	NW1/4, SW1/4	1	4	1
Section 13	NE1/4, SW1/4	1	4	1
Section 13	SW1/4, SW1/4	1	4	1
Section 13	SE1/4, SW1/4	1	4	1
Section 13	NW1/4, SE1/4	1	4	1
Section 13	SW1/4, SE1/4	1	4	1
Section 24	NW1/4, NW1/4	1	4	1,7
Section 24	NE1/4, NW1/4	1	4	1,7

Township 25 North, Range 92 West, 6th P.M.

DW No. 4 AOR				
Section 18	SE1/4, NW1/4	1	4	1
Section 18	SW1/4, NE1/4	1	4	1
Section 18	NE1/4, SW1/4	1	4	1
Section 18	SE1/4, SW1/4	1	4	1
Section 18	SW1/4, SE1/4	1	4,6	1
Section 18	NW1/4, SE1/4	1	4	1
Section 18	NE1/4, SE1/4	1	4	1
Section 18	SE1/4, SE1/4	1	4,5	1

Table 1. Summary of Surface Ownership, Mineral Rights, and Oil and Gas Leases Within Areas of Review

DW No. 5 AOR				
Section 17	SE1/4, NW1/4	1	4	1
Section 17	NE1/4, SW1/4	1	4	1
Section 17	SW1/4, NE1/4	1	4	1
Section 17	SE1/4, NE1/4	1	4	1
Section 17	NW1/4, SE1/4	1	4,5	1
Section 17	NE1/4, SE1/4	1	4,5	1

1 - USA (BLM)
2 - State of Wyoming
3 - DAR GAP Lode Claims
4 - DAR Lode Claims
5 - Sage Lode Claims
6 - Tony Lode Claims
7 - Federal Oil and Gas Leases

Table 2. Estimated Physical and Chemical Data, Fort Union Formation, Lost Creek Disposal Wells

Parameter	Value	Source / Measurement Method
Formation Temperature	144° F (at midpoint depth of 7,107 feet BGS)	Lost Creek Test Well No. 1[1]
Formation Pressure	2972 psi (at 7,107 feet BGS)	Lost Creek Test Well No. 1 (0.42 psi/ft)[2]
Est. Static Water Level, Battle Spring Fm.	75 ft bgs	Lost Creek ISR Mine Monitoring Wells[3]
Formation Fracture Gradient (estimated)	0.70 psi/ft (at 6,100 feet bgs)	Regional Data[4]
Formation Porosity	11 percent	Lost Creek Test Well No. 1[5]
Gross Formation Thickness	2,036 feet	Lost Creek Test Well No. 1[5]
Net Formation Thickness	625 feet	Lost Creek Test Well No. 1[5]
Est. Ave. Formation Permeability	8.5 md	Lost Creek Test Well No. 1 and regional data[6]
Formation Transmissivity	5,313 md-ft	Calculated
Formation Transmissivity	37 ft^2/day	Calculated
Formation Storativity	6.3 E-4	Calculated (WDEQ UIC Guidance Doc. #1)
Ave. Formation Water TDS	13,945 mg/l	Lost Creek Test Well No. 1[7]
Form. Water Sp. Grav.	1.005	Calculated (WDEQ UIC Guidance Doc. #1)

Notes:

1 - Based on linear gradient between surface and bottomhole temperature measured during logging at TW1.
2 - Based on cased-hole formation pressure testing conducted at TW1 (see Appendix A).
3 - Estimated water level of uppermost water bearing zone in the Battle Spring Formation.
4 - Regional data, Great Divide Basin.
5 - Logging data from TW1.
6 - Based on core analysis and logging from TW1 and regional data.
7 - Represents average TDS concentration of discrete formation sampling, co-mingled samples, and jetting returns samples from the Fort Union Formation at TW1.

Table 3. Gas Permeability Data from Cores, Lost Creek Test Well No. 1

Petrotek Engineering
UR Energy-Lost Creek Test Well 1
Lost Creek Field
Sweetwater County, Wyoming

CL File No.: HOU-081334
Date: 02/10/09
Analyst(s): ML-JH

CMS-300 ROTARY SIDEWALL ANALYSIS

Sample Number	Depth (ft)	Net Confining Stress (psig)	Porosity (%)	Permeability Klinkenberg (md)	Permeability Kair (md)	b(air) psi	Beta ft(-1)	Alpha (microns)	Grain Density (g/cm3)	Footnote
1	4444.00	1200	8.08	.003	.007	121.70	1.04E+15	9.92E+03	2.700	
2	4645.00	1200	21.99	86.2	96.7	2.09	9.78E+07	2.73E+01	2.666	(3)
3	5758.00	Ambient	6.86	N/A	N/A	N/A	N/A	N/A	2.602	(1), (5)
4	6032.00	1200	4.72	.002	.006	126.37	1.37E+15	1.13E+04	2.751	
5	6185.00	1200	11.93	.667	.893	7.67	3.76E+11	8.11E+02	2.676	(3)
6	6630.00	1200	13.81	5.66	6.75	3.81	5.30E+09	9.69E+01	2.654	
7	7303.00	1200	3.29	Below Instrument Limits		N/A	N/A	N/A	2.711	(2)
8	7433.00	1200	10.63	.284	.418	11.35	1.46E+11	1.33E+02	2.682	
9	7714.00	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
10	8000.00	1200	2.81	.436	.452	0.88	4.01E+11	5.75E+02	2.645	(1)

Footnotes :

(1) : Denotes fractured or chipped sample. Permeability and/or porosity may be optimistic.

(2) : Sample permeability below the measurement range of CMS-300 equipment at indicated net confining stress (NCS). Data unavailable.

(3) : Denotes very short sample, porosity may be optimistic due to lack of conformation of boot material to plug surface.

(5) : Denotes sample unsuitable for measurement at stress. Porosity determined using Archimedes bulk volume at ambient conditions.

Permeability greater than 0.1 mD measured using helium gas. Permeability less than 0.1 mD measured using nitrogen gas. All b values converted to b (air)

Shading denotes most representative cores from a shale (6,032') and sand (6,630') selected for additional analysis (Table 4)

Table 4. Brine Permeability Data from Cores, Lost Creek Test Well No. 1

Core Lab
RESERVOIR OPTIMIZATION

SUMMARY OF LIQUID PERMEABILITY MEASUREMENTS

Net Confining Stress: 1200 psi Temperature: 70°F
Fluid: 10,500 ppm NaCl Brine

PETROLEUM SERVICES

Petrotek Engineering
Well: Lost Creek Test
Field: Lost Creek
Location: Sweetwater County, Wyoming

File: HOU-081334

Sample Number	Depth Interval, feet	Length, cm	Area, cm^2	Permeability to Air, millidarcies	Specific Permeability to Brine, millidarcies
4	6032.00	3.35	4.26	6.00E-03	2.22E-04
6	6630.00	2.97	4.30	6.75	1.53

Table 5. Summary of Water Rights Outside of Areas of Review, Lost Creek Disposal Wells

Permit #	Date	Status	Township	Tns Suffix	Range	Rng Suffix	Section	Qtrqtr	Applicant	Facility Name	Uses	Yield (gpm)	Well Depth (ft)	Static Depth (ft)	Mwbz Top (ft)	Mwbz Bottom (ft)	Well Log	Chem Analysis	County
P13834P	9/21/1968	GST	25	N	92	W	21	NENW	USDI BLM, RAWLINS DISTRICT	BATTLE SPRING DRAW WELL #4451	Stock	19	900	104	Unknown	Unknown	No	No	Sweetwater
P55112W	12/24/1980	GST	25	N	92	W	10	SESE	USDI BLM, RAWLINS DISTRICT	BOUNDARY	Stock	5	280	155	220	280	Yes	No	Sweetwater
P55113W	12/24/1980	GST	25	N	92	W	30	NWSE	USDI BLM, RAWLINS DISTRICT	BATTLE SPRINGS	Stock	5	220	109	184	220	Yes	No	Sweetwater
"1" Unknown	Unknown	Unknown	25	N	93	W	13	NWNW	USDI BLM, RAWLINS DISTRICT	EAST EAGLE NEST DRAW WELL	Stock	5	370	269	Unknown	Unknown	Unknown	Unknown	Sweetwater

Notes:

Data compiled from the Wyoming State Engineers Office (http://seo.state.wy.us).

Table 6. Calculation of COI, ULEW, and AOR for a Single Well
Lost Creek Disposal Wells

Permeability/Hydraulic Conductivity Conversion

K = K = Ki (*p* g/m*u*)

u = 0.40 cp @ 154 deg. F. BHT

mu = 0.40 cp * 0.01 gm-sec/cm = 0.004

Ki (md)	K (ft/day)	Assume kh = 5313 md-ft
8.50	0.059	Source: Core permeability and logs (TW1) and regional data

			Source
Base of Fort Union (lowermost injection zone)	8075	feet; bgs	1
Depth to Water in USDW	75	feet; bgs	2
Head in USDW from base of Fort Union (W) =	8000	feet; bgs	Calculated
Pressure Grad. of Fort Union =	0.42	psi/ft	3
Pressure in Fort Union =	3392	psi	Calculated
Head in Fort Union (B) =	7833	feet	Calculated
W - B =	167	feet	Calculated
Thickness of Fort Union (H) =	625	feet	1
Storage of Fort Union (S)=	6.25E-04		Calculated
Average Fort Union Porosity (f) =	0.11		1
Injection Rate =	50	gpm	Estimated
Injection Rate (Q) =	9626	ft^3/day	Calculated
Injection Period (t) =	10	years	Estimated
Injection Period (t) =	3650	days	Calculated
Fluid in Inj. Zone =	13,945	TDS	3
SP Gravity(G) =	1.005		Calculated based on TDS

CONE OF INFLUENCE CALCULATION

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

Where x = $(W/G-B) * (4*\pi*KH/2.3Q)$

x = 2.652

r = 1036 feet

ULTIMATE LIMIT OF EMPLACED WASTE

R = radius of volumetric fillup (feet)

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

R = 403 feet

MINIMUM AREA OF REVIEW

Cone of Influence =	1036 feet
Radius of Volumetric Fillup (ULEW) =	403 feet
Minimum Radius (1/4 mile) =	**1320 feet**

Notes:

1 - Data based on drilling and logging data at Lost Creek Test Well No. 1

2 - Groundwater monitoring conducted by LC ISR at ISR mine monitoring wells

3 - Formation fluid and pressure testing conducted at Lost Creek Test Well No. 1

Table 7. CHDT Formation Pressure Data, Lost Creek Test Well No. 1, Fort Union Formation

Depth (ft RKB)	Mobility (md/cp)	Assumed Viscosity (cp)	Perm (md)	Residual Pressure (psig)	Pressure Gradient (psig)
6,890	71.71	0.40	28.7	2,899	0.421
6843*	5.12	0.40	2.0	1,452	0.212
6,624	N/A	0.40	0.0	2,837	0.428
6,488	0.36	0.40	0.1	2,717	0.419

Note:
Pressure testing conducted utilizing Schlumber Cased-Hole Dynamics Tester (see Appendix A)
* Indicates questionable pressure data.

Table 8. Fort Union Formation Fluid Sampling Data, Lost Creek Test Well No. 1

Sample Name	Source	TDS (mg/L)	Nitrate + Nitrite as N (mg/L)	Nitrite as N (mg/L)	Sulfate (mg/L)	Fluoride (mg/L)	Selenium (mg/L)	Mercury (mg/L)	Iron (mg/L)	M
EPA Maximum Concentration Levels:		**500***	**10.00**	**1.0**	**250***	**4.0**	**0.05**	**0.002**	**0.3***	
Formation Fluid										
AG 1	Flowline (lower perfs)	**26,500**	0.32	ND	205	1.0	0.007	ND	**0.73**	
7060 B	CHDT- Fm @7060 (t#3)	**13,500**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
6843	CHDT - FM @ 6843	**10,500**	2.49	ND	1,220	0.9	0.028	**0.004**	0.13	
Jet 1	Flowline (coil @~6100')	**12,700**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Jet 2	Flowline (coil @~6100')	**12,300**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Jet 3	FL (coil @ 6850')	**14,000**	1.66	0.4	170	1.7	0.002	ND	0.08	
FC (final clean)	FL (coil @ 7607)	N/A	N/A	N/A	N/A	N/A	ND	ND	ND	
BH 1-t3	Lower FU 7515' in csg	**12,200**	1.02	0.2	115	1.8	0.003	**0.002**	0.26	
BH 1-t4	Lower FU 7515' in csg	**11,300**	1.07	0.2	108	2	ND	0.001	0.09	
BH 2-t1	Mid FU 6630' in csg	**19,200**	0.83	0.2	98	1.9	ND	0.001	0.08	
BH 2-t2	Mid FU 6630' in csg	**10,900**	0.96	0.3	81	1.9	ND	ND	0.06	
FC 2	Flowline (coil @~7600')	**10,300**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Blank										
7060 blank	CHDT Tool Chamber #15	72	ND	ND	2	ND	ND	ND	0.09	
6980 blank	CHDT Tool Chamber	32	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
6888 blank	CHDT Tool Chamber	ND	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
6842 blank	CHDT Tool Chamber	37	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
6473.5 blank	CHDT Tool Chamber (#2)	ND	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
6292 blank	CHDT Tool Chamber (#1)	39	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
#15 blank	CHDT Tool Chamber	90	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
#10 blank	CHDT Tool Chamber	73	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
DW	Distilled Water	ND	ND	ND	ND	ND	ND	ND	ND	
BH 1 blank	HCDT t1	18	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
BH 2 blank	CHDT t2	35	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
BH 3 blank	CHDT t3	153	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
BH 4 blank		48	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Mud										
6890	CHDT - FM @ 6890 (t#2)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
8400	In-bore @ 8400'	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
6623.5	CHDT - FM @ 6623.5 (t#2)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
6488	CHDT - FM @ 6488 (t#1)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Compromised										
7060 A	CHDT- Fm @7060 (t#1)	9,310	7.97	ND	337	2.3	**0.15**	**0.002**	0.11	
7515	In-bore @ 7515	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

ND: Not detected at the reporting limit
N/A: Indicates that analysis for a given parameter was not performed
*Indicates that value is a Secondary MCL
Bold/green: Indicates sample exceeds USDW criteria of 10,000 mg/L.
Bold/yellow: Indicates exceedance of EPA MCLs

Table 9. Fort Union Formation Water Quality Data, USGS Produced Waters Database, Greater Green River Basin

County	Field	Section	Township	Range	API Number	Well Name	Sampled Formation	Upper Depth	Lower Depth	Method	TDS (mg/L)
SWEETWATER		17	N 26	W 94	4903705970	1 R. E. MURPHY	FORT UNION	2,880	2,905	DST	1,174
SWEETWATER		17	N 26	W 94	4903705970	1 R. E. MURPHY	FORT UNION	2,710	2,780	DST	1,381
SWEETWATER	WILDCAT	22	N 26	W 95	4903705953	SUNRAY WYO. FEDERAL D #1	FORT UNION	5,843	5,950	DST	3,086
SWEETWATER	WILDCAT	22	N 26	W 95	4903705953	SUNRAY WYO. FEDERAL D #1	FORT UNION	5,843	5,950	DST	3,080
SWEETWATER		16	N 25	W 105	4903706444	1 STATE I	FORT UNION	4,803	4,843	DST	29,522
SWEETWATER		16	N 25	W 105	4903706444	1 STATE I	FORT UNION	4,803	4,843	DST	29,790
SWEETWATER		16	N 25	W 105	4903706444	1 STATE I	FORT UNION	6,439	6,484	DST	31,561
SWEETWATER		16	N 25	W 105	4903706444	1 STATE I	FORT UNION	6,439	6,484	DST	31,514
SWEETWATER	WILDCAT	16	N 25	W 105	4903706444	1 STATE I	FORT UNION/UPPER	4,803	4,843	DST	28,861
SWEETWATER	WILDCAT	16	N 25	W 105	4903706444	1 STATE I	FORT UNION/UPPER	6,441	6,486	DST	29,545
SWEETWATER	WILDCAT	16	N 25	W 105	4903706444	1 STATE I	FORT UNION/UPPER	6,441	6,486	DST	29,697
SWEETWATER	WILDCAT	7	N 25	W 110	4903706446	NO. 5 MONUMENT BUTTE UNIT	FORT UNION	4,736	4,814	DST	8,004
SWEETWATER	WILDCAT	7	N 25	W 110	4903706446	NO. 5 MONUMENT BUTTE UNIT	FORT UNION	4,190	4,260	DST	11,707
SWEETWATER	WILDCAT	7	N 25	W 110	4903706446	NO. 5 MONUMENT BUTTE UNIT	FORT UNION	4,502	4,568	DST	12,403
SWEETWATER	MONUMENT BUTTE	15	N 25	W 110	4903707011	GOVERNMENT-LOMBARD NO. 1	FORT UNION	4,902	4,930	DST	6,313
SWEETWATER	MONUMENT BUTTE	15	N 25	W 110	4903707011	GOVERNMENT-LOMBARD NO. 1	FORT UNION	5,090	5,200	DST	7,523
SWEETWATER	WILDCAT	4	N 25	W 111	4903705951	1 USA CALCO	FORT UNION	4,549	4,593	DST	6,733
SWEETWATER	WILDCAT	2	N 25	W 111	4903705948	1 MONUMENT FEDERAL	FORT UNION	4,548	4,562	DST	5,225
SWEETWATER	WILDCAT	2	N 25	W 111	4903705948	1 MONUMENT FEDERAL	FORT UNION	4,548	4,562	DST	5,264
SWEETWATER	WILDCAT	2	N 25	W 111	4903705948	1 MONUMENT FEDERAL	FORT UNION	4,554	4,596	DST	7,635
SWEETWATER	WILDCAT	4	N 25	W 111	4903705951	1 USA CALCO	FORT UNION	4,549	4,593	DST	6,723
SWEETWATER	WILDCAT	4	N 25	W 111	4903705951	1 USA CALCO	FORT UNION	4,549	4,593	DST	7,431
SWEETWATER	WILDCAT	4	N 25	W 111	4903705951	1 USA CALCO	FORT UNION	4,549	4,593	DST	7,447
SWEETWATER	MONUMENT BUTTE	2	N 25	W 111	4903705948	1 MONUMENT-FEDERAL 1	FORT UNION-WASATCH/ALMY	4,554	4,596	DST	6,198
SWEETWATER		9	N 24	W 100		UNIT #62A-9	FORT UNION	7,275	7,297	DST	3,973
SWEETWATER		9	N 24	W 100		UNIT #62A-9	FORT UNION	7,237	7,386	DST	3,632
SWEETWATER	HORN CANYON	13	N 23	W 110	4903705915	HORN CANYON NO. 1-A	FORT UNION-WASATCH	4,585	4,623	DST	13,171
SWEETWATER	TABLE ROCK	2	N 18	W 98	4903705456	UNIT NO. 5	FORT UNION	4,043	4,072	DST	14,252
SWEETWATER	TABLE ROCK	2	N 18	W 98	4903705456	5 UNIT	FORT UNION			DST	4,305
SWEETWATER		1	N 14	W 101	4903705205	UNIT NO. 1	FORT UNION	3,078	3,140	DST	47,042
SWEETWATER		11	N 14	W 101	4903705184	UNIT NO. 2	FORT UNION/LOWER	2,930	2,969	DST	20,645
SWEETWATER		1	N 14	W 101	4903705205	1 KENT RANCH UNIT	FORT UNION/LOWER	3,078	3,140	DST	45,996
SWEETWATER		1	N 14	W 101	4903705205	1 KENT RANCH UNIT	FORT UNION/LOWER	3,078	3,140	DST	50,033
SWEETWATER		11	N 14	W 101	4903705184	UNIT NO. 2	FORT UNION/LOWER	2,939	2,969	DST	4,962
SWEETWATER		11	N 14	W 101	4903705184	UNIT NO. 2	FORT UNION/LOWER	2,930	2,969	DST	14,881
SWEETWATER		11	N 14	W 101	4903705184	UNIT NO. 2	FORT UNION/LOWER	2,930	2,969	DST	21,042
SWEETWATER	PIONEER	12	N 13	W 100	4903705151	UNIT NO. 4	FORT UNION	2,529	2,566	DST	5,595
SWEETWATER	TRAIL	20	N 13	W 100	4903720506	UNIT WELL NO 11	FORT UNION	3,902	3,948	DST	145,481
SWEETWATER	TRAIL	20	N 13	W 100	4903720506	UNIT WELL NO 11	FORT UNION	3,838	3,864	DST	104,628
SWEETWATER	CANYON CREEK	24	N 13	W 101	4903705128	1 GOVERNMENT-VERMILLION	FORT UNION	2,519	2,600	DST	5,721
SWEETWATER	CANYON CREEK	24	N 13	W 101	4903705128	1 GOVERNMENT-VERMILLION	FORT UNION	2,868	2,934	DST	28,941
SWEETWATER	CANYON CREEK	24	N 13	W 101	4903705128	1 GOVERNMENT-VERMILLION	FORT UNION	3,753	3,774	DST	4,210
SWEETWATER	CANYON CREEK	24	N 13	W 101	4903705128	1 GOVERNMENT-VERMILLION	FORT UNION	3,787		FM. TEST	3,307
SWEETWATER	CANYON CREEK	24	N 13	W 101	4903705128	1 GOVERNMENT-VERMILLION	FORT UNION	3,870	3,898	DST	75,361
SWEETWATER	SHELL CREEK	15	N 13	W 96	4903705141	1 UNIT C	FORT UNION	7,420	7,484	DST	153,364
SWEETWATER	PIONEER	8	N 13	W 99	4903706345	UNIT NO. 8	FORT UNION	4,545	4,591	DST	58,658
SWEETWATER	WILDCAT	28	N 13	W 99	4903720128	CROOKED WASH NO. 1	FORT UNION	4,692	4,732	DST	15,428
SWEETWATER	PIONEER	5	N 13	W 99	4903706363	UNIT NO. 9	FORT UNION	3,640	3,707	DST	75,184

Table 9. Fort Union Formation Water Quality Data, USGS Produced Waters Database, Greater Green River Basin

County	Field	Section	Township	Range	API Number	Well Name	Sampled Formation	Upper Depth	Lower Depth	Method	TDS (mg/L)
SWEETWATER	WILDCAT	20	N 13	W 99	4903720158	2 UNIT (CROOKED WASH)	FORT UNION	1,948	2,046	DST	2,805
SWEETWATER	HIAWATHA	23	N 12	W 100	4903720173	4 WILSON	FORT UNION	2,717	2,752	DST	23,635
SWEETWATER	HIAWATHA	13	N 12	W 100	4903720185	M.W. NEWBERGER #6	FORT UNION	2,554	2,615	DST	13,217
SWEETWATER	WILDCAT	21	N 12	W 100	4903720129	RADOSEVICH NO. 1	FORT UNION	2,761	2,792	DST	20,405
SWEETWATER	WILDCAT	21	N 12	W 100	4903720129	RADOSEVICH NO. 1	FORT UNION	2,908	2,955	DST	25,431
CARBON	WEST SIDE CANAL	7	N 12	W 91	4900713583	1 JONS	FORT UNION	1,647	1,730	DST	8,374
CARBON	WEST SIDE CANAL	7	N 12	W 91	4900706963	1-A SWEZEY	FORT UNION	1,580		FM. TEST	3,340
CARBON	WEST SIDE CANAL	17	N 12	W 91	4900706938	UNIT NO. 5	FORT UNION	2,092		FM. TEST	1,502
CARBON	WEST SIDE CANAL	17	N 12	W 91	4900706938	UNIT NO. 5	FORT UNION	1,303	1,326	DST	1,495
CARBON	WEST SIDE CANAL	17	N 12	W 91	4900706938	UNIT NO. 5	FORT UNION	1,303	1,326	DST	1,535
CARBON	WEST SIDE CANAL	8	N 12	W 91	4900720016	UNIT NO. 10	FORT UNION	2,008	2,028	DST	1,369
CARBON	WEST SIDE CANAL	8	N 12	W 91	4900720016	UNIT NO. 10	FORT UNION	1,640	1,660	DST	3,100
CARBON	WEST SIDE CANAL	8	N 12	W 91	4900720016	UNIT NO. 10	FORT UNION	1,640	1,660	DST	2,720
CARBON	WEST SIDE CANAL	8	N 12	W 91	4900720016	UNIT NO. 10	FORT UNION	1,640	1,660	DST	2,786
CARBON	WEST SIDE CANAL	8	N 12	W 91	4900720016	UNIT NO. 10	FORT UNION	1,524	1,585	DST	2,715
CARBON	WEST SIDE CANAL	18	N 12	W 91	4900706920	UNIT NO. 6	FORT UNION	1,225	1,261	DST	2,634
CARBON	WEST SIDE CANAL	18	N 12	W 91	4900706920	UNIT NO. 6	FORT UNION	1,225	1,261	DST	2,488
CARBON	WEST SIDE CANAL	18	N 12	W 91	4900720018	UNIT NO. 8	FORT UNION	1,424		FM. TEST	2,094
CARBON	WEST SIDE CANAL	18	N 12	W 91	4900720018	UNIT NO. 8	FORT UNION	1,362		FM. TEST	2,439
CARBON	WEST SIDE CANAL	18	N 12	W 91	4900720018	UNIT NO. 8	FORT UNION	1,424		FM. TEST	2,658
CARBON	WEST SIDE CANAL	18	N 12	W 91	4900720017	9 UNIT	FORT UNION	1,032		FM. TEST	2,208
CARBON	WEST SIDE CANAL	12	N 12	W 92	4900720044	FOUR MILE SHEEP CO. NO. 2	FORT UNION	980	1,816	PRODUCTION	2,168
CARBON	WEST SIDE CANAL	12	N 12	W 92	4900720044	FOUR MILE SHEEP CO. #2	FORT UNION	1,028	1,100	PRODUCTION	24,134
CARBON	WEST SIDE CANAL	12	N 12	W 92	4900720044	FOUR MILE SHEEP CO. NO. 2	FORT UNION	1,028	1,100	PRODUCTION	22,842
CARBON	WEST SIDE CANAL	12	N 12	W 92	4900720044	FOUR MILE SHEEP CO. NO. 2	FORT UNION	1,570	1,580	PRODUCTION	43,150
CARBON	WEST SIDE CANAL	12	N 12	W 92	4900720044	FOUR MILE SHEEP CO. NO. 2	FORT UNION	1,800	1,810	PRODUCTION	25,760
CARBON	WEST SIDE CANAL	12	N 12	W 92	4900720044	4 MILE SHEEP CO WELL #2	FORT UNION			PRODUCTION	2,520
CARBON	WILDCAT	17	N 12	W 93	4900720019	BALTA 1-A	FORT UNION	2,051	2,313	SEPARATOR	98,380
SWEETWATER	LITTLE SNAKE	3	N 12	W 94	4903705079	9 STATE LINE UNIT	FORT UNION	4,080	4,100	DST	32,987
SWEETWATER	LITTLE SNAKE	3	N 12	W 94	4903705079	9 STATE LINE UNIT	FORT UNION	4,546	4,566	UNKNOWN	24,020
SWEETWATER	STATE LINE	18	N 12	W 94	4903705038	STATE LINE UNIT NO. 3	FORT UNION	3,242	3,290	DST	31,565
SWEETWATER	STATE LINE	18	N 12	W 94	4903705031	UNIT NO. 2	FORT UNION	3,221	3,320	DST	29,401
SWEETWATER	STATE LINE	18	N 12	W 94	4903705031	UNIT NO. 2	FORT UNION	3,814	3,875	DST	39,294
SWEETWATER	STATE LINE	11	N 12	W 94	4903705063	STATE LINE - FEDERAL NO. 1	FORT UNION	4,956	5,005	DST	11,907
SWEETWATER	STATE LINE	18	N 12	W 94	4903705031	2	FORT UNION	3,221	3,320	DST	31,797
SWEETWATER	STATE LINE	18	N 12	W 94	4903705031	2	FORT UNION	3,814	3,875	DST	40,220
SWEETWATER	STATE LINE	18	N 12	W 94	4903705041	5 WYOMING 017984-A	FORT UNION	3,184		SEPARATOR	95,802
SWEETWATER		3	N 12	W 94		5 STATE LINE UNIT	FORT UNION	3,410	3,420	DST	34,417
SWEETWATER		8	N 12	W 97	4903705061	UNIT 1	FORT UNION	7,577	7,701	DST	22,682
SWEETWATER		7	N 12	W 99	4903706353	2 HORROCKS	FORT UNION	3,958	4,614	PRODUCTION	24,159
SWEETWATER	HIAWATHA	7	N 12	W 99	4903706353	2 HORROCKS	FORT UNION	3,934	3,997	DST	8,555
SWEETWATER		8	N 12	W 99	4903705055	1 MCALLISTER	FORT UNION	4,708	4,743	PRODUCTION	19,521
SWEETWATER	HIAWATHA	20	N 12	W 99	4903721010	20-1	FORT UNION	3,658	3,684	SWAB	5,960
										Average	22,394

Notes:
Data compiled from USGS Produced Waters Database for Greater Green River Basin, Carbon and Sweetwater Counties (http://energy.cr.usgs.gov/prov/prodwat/intro.htm)

Table 10. Anticipated Injection Water Quality and Comparison to Fort Union Water Quality Data

Chemical Analyte	Estimated Range of UR ISR, LLC Waste Stream Water Quality		Fort Union Water Composition from Lost Creek Test Well No. 1		
	Minimum (mg/l)	Maximum (mg/l)	Minimum (mg/l)	Maximum (mg/l)	Average (mg/l)
pH	6	9	7.67	11.7	8.69
Ammonia as Nitrogen	50	500	12.3	23	16.8
Sodium	150	3,000	2,760	4,080	3,490
Calcium	200	1,000	28	117	68.5
Potassium	10	1,000	73	9,920	1,473
Bicarbonate as HCO_3	1,500	4,000	1	3,390	1,269
Carbonate as CO_3	0	500	1	689	121
Sulfate	80	2,000	81	1220	285
Chloride	200	4,000	1,440	6,271	3,830
Uranium as U_3O_8	1	15	0.0003	0.0021	0.001
Ra-226 (pCi/l)	300	3,000	0.13	0.35	0.26
TDS	4,000	15,000	10,300	26,500	13,945

Note:
Estimated range of waste stream composition from UR Energy engineering estimate.
Fort Union Formation concentrations from water sampling conducted at TW1.

Table 11. Summary of Shallow (Wasatch/Battle Spring Formation) Water Quality Data
Lost Creek Baseline Monitoring Program

	MAJOR CATIONS/ANIONS											
	Na	K	Ca	Mg	Cl	HC03	CO3	SO4	NH4	NO3 (N)	F	SIO2
WDEQ Class I Standard	NA	NA	NA	NA	250	NA	NA	250	0.5	NA[3]	4	NA
EPA MCL	NA	NA	NA	NA	NA[1]	NA	NA	NA[2]	NA	NA[3]	4	NA
All Aquifers (DE,LFG,HJ,UKM)*												
Number of Samples	68	68	68	68	68	68	68	68	68	68	68	68
Average	33.9	5.1	61.2	3.2	5.5	112.1	4.3	128.0	0.11	0.24	0.21	14.9
Max	71.0	52.0	140.0	9.0	15.0	205.0	137.0	316.0	1.07	1.40	0.50	18.1
Min	19.5	1.0	7.0	0.6	1.0	4.0	1.0	21.0	0.05	0.10	0.10	9.4
No. Samples> WDEQ Class I	0	0	0	0	0	0	0	**8**	**4**	0	0	0
No. Samples> MCL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	NA
DE Sand Monitor Wells												
Number of Samples	12	12	12	12	12	12	12	12	12	12	12	12
Average	40.3	2.3	68.1	4.3	6.3	150.1	1.0	135.8	0.2	0.5	0.3	15.7
Max	71	3	140	9	10	205	1	316	1.07	1.4	0.5	18.1
Min	24	1	28	2	4	98	1	21	0.05	0.1	0.1	12
No. Samples> WDEQ Class I	NA	NA	NA	NA	0	NA	NA	**4**	**2**	NA	0	NA
No. Samples> MCL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	NA
LFG Sand Monitor Wells												
Number of Samples	16	16	16	16	16	16	16	16	16	16	16	16
Average	32.3	3.1	58.9	3.3	5.3	114.1	1.3	121.5	0.1	0.4	0.2	14.1
Max	35	9	89	5	8	134	5	180	0.1	1.0	0.3	16.0
Min	30	2	34	2	1	36	1	58	0.1	0.1	0.2	12.4
No. Samples> WDEQ Class I	NA	NA	NA	NA	0	NA	NA	0	0	NA	0	NA
No. Samples> MCL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	NA
HJ Sand Monitor Wells												
Number of Samples	24	24	24	24	24	24	24	24	24	24	24	24
Average	30.3	4.2	65.0	3.2	5.2	111.1	1.2	135.6	0.051	0.1	0.2	15.5
Max	40	13	133	6	7	168	5	269	0.1	0.1	0.3	17.8
Min	20	2	7	1	4	33	1	29	0.1	0.1	0.1	12.8
No. Samples> WDEQ Class I	NA	NA	NA	NA	0	NA	NA	**4**	0	NA	0	NA
No. Samples> MCL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	NA
UKM Sand Monitor Wells												
Number of Samples	16	16	16	16	16	16	16	16	16	16	16	16
Average	36.3	10.9	51.6	2.1	5.5	82.1	14.4	117.5	0.157	0.1	0.2	14.4
Max	64	52	86	4	15	142	137	165	0.9	0.1	0.4	17.2
Min	27	2	12	1	3	4	1	80	0.1	0.1	0.1	9.4
No. Samples> WDEQ Class I	NA	NA	NA	NA	0	NA	NA	0	**2**	NA	0	NA
No. Samples> MCL	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	NA

Table 11. Summary of Shallow (Wasatch/Battle Spring Formation) Water Quality Data
Lost Creek Baseline Monitoring Program

	TRACE METALS															
	Al	As	Ba	B	Cd	Cr	Cu	Fe	Pb	Mn	Hg	Mo	Ni	Se	V	Zn
WDEQ Class I Standard	NA	0.050	2	0.75	0.005	0.1	1	0.3	0.015	0.05	0.002	NA	NA	0.05	NA	5
EPA MCL	NA[4]	0.010	2	NA	0.005	0.1	NA[5]	NA[6]	0.015	NA[7]	0.002	NA	NA	0.05	NA	NA[8]
All Aquifers (DE,LFG,HJ,UKM)*																
Number of Samples	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68
Average	0.10	0.003	0.11	0.10	0.005	0.05	0.01	0.09	0.001	0.03	0.001	0.10	0.05	0.017	0.10	0.01
Max	0.20	0.014	0.30	0.10	0.005	0.05	0.01	0.67	0.002	0.48	0.001	0.10	0.05	0.215	0.10	0.01
Min	0.10	0.001	0.10	0.10	0.005	0.05	0.01	0.03	0.001	0.01	0.001	0.10	0.05	0.001	0.10	0.01
No. Samples> WDEQ Class I	NA	0	0	0	0[a]	0	0	**7**	0	**7**	0	NA	NA	**4**	NA	0
No. Samples> MCL	NA	**5**	0	NA	0[a]	0	NA	NA	0	NA	0	NA	NA	**4**	NA	NA
DE Sand Monitor Wells																
Number of Samples	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Average	0.10	0.003	0.10	0.10	0.005	0.05	0.01	0.15	0.001	0.10	0.001	0.10	0.05	0.061	0.10	0.01
Max	0.10	0.007	0.10	0.10	0.005	0.05	0.01	0.67	0.001	0.48	0.001	0.10	0.05	0.215	0.10	0.01
Min	0.10	0.001	0.10	0.10	0.005	0.05	0.01	0.03	0.001	0.01	0.001	0.10	0.05	0.001	0.10	0.01
No. Samples> WDEQ Class I	NA	0	0	0	0	0	0	**2**	0	**7**	0	NA	NA	**4**	NA	0
No. Samples> MCL	NA	0	0	NA	0	0	NA	NA	0	NA	0	NA	NA	**4**	NA	NA
LFG Sand Monitor Wells																
Number of Samples	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
Average	0.10	0.002	0.10	0.10	0.005	0.05	0.01	0.16	0.001	0.01	0.001	0.10	0.05	0.022	0.10	0.01
Max	0.10	0.004	0.10	0.10	0.005	0.05	0.01	0.67	0.001	0.02	0.001	0.10	0.05	0.040	0.10	0.01
Min	0.10	0.001	0.10	0.10	0.005	0.05	0.01	0.03	0.001	0.01	0.001	0.10	0.05	0.001	0.10	0.01
No. Samples> WDEQ Class I	NA	0	0	0	0	0	0	**4**	0	0	0	NA	NA	0	NA	0
No. Samples> MCL	NA	0	0	NA	0	0	NA	NA	0	NA	0	NA	NA	0	NA	NA
HJ Sand Monitor Wells																
Number of Samples	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
Average	0.10	0.004	0.10	0.10	0.005	0.05	0.01	0.05	0.001	0.01	0.001	0.10	0.05	0.001	0.10	0.01
Max	0.10	0.014	0.10	0.10	0.005	0.05	0.01	0.23	0.001	0.03	0.001	0.10	0.05	0.002	0.10	0.01
Min	0.10	0.001	0.10	0.10	0.005	0.05	0.01	0.03	0.001	0.01	0.001	0.10	0.05	0.001	0.10	0.01
No. Samples> WDEQ Class I	NA	0	0	0	0	0	0	0	0	0	0	NA	NA	0	NA	0
No. Samples> MCL	NA	**1**	0	NA	0	0	NA	NA	0	NA	0	NA	NA	0	NA	NA
UKM Sand Monitor Wells																
Number of Samples	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
Average	0.11	0.005	0.13	0.10	0.005	0.05	0.01	0.06	0.001	0.01	0.001	0.10	0.05	0.002	0.10	0.01
Max	0.20	0.012	0.30	0.10	0.005	0.05	0.01	0.32	0.002	0.01	0.001	0.10	0.05	0.005	0.10	0.01
Min	0.10	0.001	0.10	0.10	0.005	0.05	0.01	0.03	0.001	0.01	0.001	0.10	0.05	0.001	0.10	0.01
No. Samples> WDEQ Class I	NA	0	0	0	0	0	0	**1**	0	0	0	NA	NA	0	NA	0
No. Samples> MCL	NA	**4**	0	NA	0	0	NA	NA	0	NA	0	NA	NA	0	NA	NA

Table 11. Summary of Shallow (Wasatch/Battle Spring Formation) Water Quality Data
Lost Creek Baseline Monitoring Program

	General Water Quality Parameters			Radionuclides					
	TDS	Conduct.	pH (units)	Gross Alpha	Gross Beta	Ra-226	Ra-228	Ra-226 +228	U
WDEQ Class I Standard	500	NA	6.5-8.5	15*	NA	NA	NA	5	NA
EPA MCL	NA[9]	NA	NA[10]	NA*	NA	NA	NA	5	0.03
All Aquifers (DE,LFG,HJ,UKM)*									
Number of Samples	68	59	58	68	68	68	68	68	68
Average	311.1	513.2	8.25	306.6	115.6	53.6	3.8	57.4	0.289
Max	602.0	1720.0	11.60	1470.0	603.0	547.0	78.4	551.1	2.100
Min	111.0	171.0	7.32	2.9	3.9	0.2	0.4	1.2	0.001
No. Samples> WDEQ Class I	**8**	NA	**10**	**64**	NA	NA	NA	**47**	NA
No. Samples> MCL	NA	NA	NA	NA	NA	NA	NA	**47**	**49**
DE Sand Monitor Wells									
Number of Samples	12	10	10	12	12	12	12	12	12
Average	347.7	566.8	7.80	495.9	157.8	2.8	1.7	4.5	0.742
Max	602.0	860.0	8.07	1430.0	405.0	7.2	4.7	8.2	2.100
Min	170.0	288.0	7.33	107.0	31.9	0.9	1.0	2.0	0.130
No. Samples> WDEQ Class I	**4**	NA	**0**	**12**	NA	NA	NA	**5**	NA
No. Samples> MCL	NA	NA	NA	NA	NA	NA	NA	**5**	**12**
LFG Sand Monitor Wells									
Number of Samples	16	13	12	16	16	16	16	16	16
Average	296.1	463.5	8.11	356.1	107.9	25.0	2.6	27.6	0.411
Max	390.0	605.0	8.57	815.0	199.0	230.0	12.0	231.0	0.546
Min	214.0	333.0	7.32	194.0	49.2	0.2	0.9	1.2	0.236
No. Samples> WDEQ Class I	**0**	NA	**1**	**16**	NA	NA	NA	**9**	NA
No. Samples> MCL	NA	NA	NA	NA	NA	NA	NA	**9**	**16**
HJ Sand Monitor Wells									
Number of Samples	24	21	21	24	24	24	24	24	24
Average	311.1	486.0	8.19	395.5	177.5	138.0	6.0	143.9	0.175
Max	554.0	786.0	9.51	1470.0	603.0	547.0	78.4	551.1	0.844
Min	111.0	171.0	7.85	2.9	3.9	0.2	0.4	1.4	0.001
No. Samples> WDEQ Class I	**3**	NA	**3**	**21**	NA	NA	NA	**20**	NA
No. Samples> MCL	NA	NA	NA	NA	NA	NA	NA	**20**	**16**
UKM Sand Monitor Wells									
Number of Samples	16	15	15	16	16	16	16	16	16
Average	297.6	558.6	8.73	41.3	23.1	9.1	3.0	12.1	0.034
Max	526.0	1720.0	11.60	107.0	44.7	47.8	12.9	48.8	0.134
Min	188.0	305.0	7.66	5.3	9.1	1.8	1.0	2.9	0.002
No. Samples> WDEQ Class I	**1**	NA	**6**	**15**	NA	NA	NA	**13**	NA
No. Samples> MCL	NA	NA	NA	NA	NA	NA	NA	**13**	**5**

Data from Lost Creek ISR, LLC US NRC Source Material License Application (LC ISR, 2007)
*DE and LFG are overlying aquifers of the proposed mining zone (HJ Horizon); UKM is underlying aquifer.
Samples that were below detection were valued at the detection limit for purposes of calculating the average.
All samples were reported as non-detect for Al, Ba, B, Cd, Cr, Cu, Hg, Mo, Ni, V and Zn.

1 - EPA Secondary Drinking Water Standard for chloride is 250 mg/L
2 - EPA Secondary Drinking Water Standard for sulfate is 250 mg/L
3 - WDEQ Class I and EPA MCL standards for Nitrate (as N) is 10 mg/L.
4 - EPA Secondary Drinking Water Standard for aluminum is 0.05 to 2.0 mg/l
5 - EPA Secondary Drinking Water Standard for copper is1.0 mg/l
6 - EPA Secondary Drinking Water Standard for iron is 0.3 mg/l
7 - EPA Secondary Drinking Water Standard for manganese is 0.05 mg/l
8 - EPA Secondary Drinking Water Standard for zinc is 5.0 mg/l
9 - EPA Secondary Drinking Water Standard for TDS is 500 mg/l
10 - EPA Secondary Drinking Water Standard for pH is 6.5 to 8.5 s.u.
a - All samples were non-detect for cadmium. Laboratory detection limits equal the WDEQ Class I and EPA MCL (0.005 mg/L).
[a] - Radium standards are for combined Ra226+228. Only two samples exceeded the standard based only on the Radium 228 concentration.
All other samples that exceeded the combined standard did so based only on the Ra226 concentration.

Table 12. FMT Fluid Sample Summary, Lost Creek Test Well No. 1

Sample Location/Depth	Sample Name	Date	Time	TDS (mg/L)	Nitrate + Nitrite as N (mg/L)	Nitrite as N (mg/L)
Equipment Blank/Upper Tank	EB 1A	12/8/2008	11:35	246	0.19	ND
Equipment Blank/Lower Tank	EB 1B	12/8/2008	11:45	246	0.19	ND
3525.6 (Battle Spring)	2A	12/8/2008	14:00	2,130	**24.1**	13.8
6191.6 (Fort Union)	3A	12/8/2008	19:55	2,340	**18.5**	4.5
Equipment Blank/Upper Tank	EB 4A	12/8/2008	21:35	272	0.20	ND
Equipment Blank/Lower Tank	EB 4B	12/8/2008	21:42	284	0.22	ND
Flush Hose Blank	AB	12/8/2008	21:45	249	0.19	ND
Boiler Blank	BB	12/8/2008	21:50	28	ND	ND
			21			
4733 (Battle Spring)	5A	12/8/2008	23:55	2,210	**16.1**	5.4

Notes:

ND- Not detected at the reporting limit.

Nitrate added to drilling mud as a tracer at approximately 50 mg/L. High nitrate levels (in bold) are indicative of drilling mud filtrate rather than formation fluid and samples are not considered to be representative of formation fluid.

Table 13. Calculation of Limiting Surface Pressure, Base of Injection Zone, Lost Creek Disposal Wells

Fracture Pressure

P = F x D

P = fracture pressure at the bottom of the receiver (psi) (0.70 psi/ft)
F = Fracture gradient (psi/ft)
D = Depth to the bottom of the receiver (8,075 feet; bgs)

Hydrostatic Head

h = G x D x 0.433 psi/ft

h = hydrostatic head at the bottom of the receiver (psi)
G = specific gravity of the injection fluid
D = Depth to the bottom of the receiver (feet; bgs)

Limiting Surface Injection Pressure

L = (P - h + T + Lp) x 0.90

L = limiting surface injection pressure (psi)
P = fracture pressure at the bottom of the receiver (psi)
h = hydrostatic head at the bottom of the receiver (feet)
T = tubing pressure loss (psi)
Lp = perforation pressure loss (psi)

Assume: Lp = 0
Injection Rate = 50 gpm
Tubing length = 6,100 feet
From charts, friction loss is 9 psi/1000 feet (2 7/8" tubing at 50 gpm)

	F	D	P	G	h	T	L
Well	(psi/ft)	(ft)	(psi)		(psi)	(psi)	(psi)
DW No. 1 - No.5	0.70	8,075	5,653	1.005	3,514	55	**1,974**

Notes:
Tubing pressure loss calculated for bare, new pipe.

Table 14. Calculation of Limiting Surface Pressure, Top of Injection Zone, Lost Creek Disposal Wells

Fracture Pressure

P = F x D

P = fracture pressure at the top of the receiver (psi) (0.70 psi/ft)
F = Fracture gradient (psi/ft)
D = Depth to the top of the receiver (6,139 feet; bgs)

Hydrostatic Head

h = G x D x 0.433 psi/ft

h = hydrostatic head at the top of the receiver (psi)
G = specific gravity of the injection fluid
D = Depth to the topof the receiver (feet; bgs)

Limiting Surface Injection Pressure

L = (P - h + T + Lp) x 0.90

L = limiting surface injection pressure (psi)
P = fracture pressure at the top of the receiver (psi)
h = hydrostatic head at the top of the receiver (feet)
T = tubing pressure loss (psi)
Lp = perforation pressure loss (psi)

Assume: Lp = 0
Injection Rate = 50 gpm
Tubing length = 6,100 feet
From charts, friction loss is 9 psi/1000 feet (2 7/8" tubing at 50 gpm)

	F	D	P	G	h	T	L
Well	(psi/ft)	(ft)	(psi)		(psi)	(psi)	(psi)
DW No. 1 - No.5	0.70	6,139	4,297	1.005	2,671	55	**1,513**

Notes:
Tubing pressure loss calculated for bare, new pipe.

Table 15. Plugging and Abandonment Cost Estimate - Fort Union Well

Well Depth = 8400' GL for all wells FIELD OPERATIONS	Unit Cost	Units Req'd.	Total Cost
Subcontractors - Direct bill to UR Energy			
Mob/demob & Location Preparation	$6,000	1	$6,000
Workover Rig and Associated Equipment (days)	$5,000	4	$20,000
Rental Tools (days)	$2,500	4	$10,000
Rental Tubing Inspection	$6,000	1	$6,000
Falloff Test	$6,500	1	$6,500
RAT Log	$4,500	1	$4,500
Trucking	$4,000	1	$4,000
Contract Labor	$2,000	2	$4,000
Cement (865 sx), pumping & equipment	$17,300	1	$17,300
Contingency	$8,000	1	$8,000
Total Estimated Subcontractor Charges			$86,300
Test Design and Project Management (hours)	$115	24	$2,760
Supervision (days)	$850	5	$4,250
Travel (hours)	$115	8	$920
Field Truck and Fuel (days)	$150	6	$900
Per Diem (days)	$100	6	$600
Data Analysis (lump sum)	$2,000	1	$2,000
Report Preparation (hours)	$115	24	$2,760
Total Estimated Petrotek Charges			$14,190
TOTAL ESTIMATED COST PER WELL			**$100,490**

Assumptions:

Subcontractors will bill UR Energy directly - otherwise a 12.5% markup will apply.
Field activities can be completed in 5 days; otherwise T&M rates will apply.
Falloff test is required if > 6 months since last test; RAT log required if > 2 years since last log.
The well is cemented from bottom to top in 3-4 stages.
UR will be responsible for disposal of all well equipment.

Table 16. Water Quality Calculations, Federal 32-22 Well
Sweetwater County, Wyoming

Federal 32-22 Well Calculation of Water Quality, Resitivity Method

Equations (adapted from Archie)
SW^2 = FRw/Rt F = 1/porsity^2
Assume porosity =
Asume SW = 1.0
Then, Rw = Rt*porosity^2

Inputs
Temp ground surface 40 degrees
Temp at bottom hole 249 degrees (16,200 ft)
Calculated gradient = (Average Depth/TD) x (BHT - Surface Temp) + Surface Temp

Federal 32-22 Well

Formation	Top Depth (ft; RKB)	Bottom Depth (ft; RKB)	Net Sand (feet)	Rt deep (Ohm-M)	Formation Type	Neutron Porosity %	Density Porosity %	Sonic Porosity %	Temp deg. F	Average (Neut + Den) Ave Porosity	Calc Rw ($F = 1/\phi^2$) (Ohm-M)	**Gen-9 NaCl (ppm)**
Upper Lance	12,168	12,194	26	20	Sandstone	9	3	NA	197	6.0	0.07	**35,000**
	12,250	12,276	26	20	Sandstone	8	7	NA	198	7.5	0.11	**22,000**
Lower Lance	12,688	12,716	28	22	Sandstone	9	4	NA	204	6.5	0.09	**26,000**
	13,424	13,452	28	30	Sandstone	9	4	NA	213	6.5	0.13	**16,000**
	13,654	13,678	24	25	Sandstone	6	2	NA	216	4.0	0.04	**60,000**
	13,838	13,876	38	32	Sandstone	5	5	NA	219	5.0	0.08	**27,000**
Fox Hills	14,048	14,078	30	32	Sandstone	7	7	NA	221	7.0	0.16	**12,500**
Lewis	14,548	14,578	30	22	Sandstone	7	3	NA	228	5.0	0.06	**36,000**
	14,718	14,792	74	40	Sandstone	7	4	NA	230	5.5	0.12	**16,500**
	15,084	15,110	26	40	Sandstone	7	4	NA	235	5.5	0.12	**15,500**
Lower Lewis	15,337	15,356	19	50	Sandstone	8	4	NA	238	6.0	0.18	**10,000**
Mesaverde	15,712	15,748	36	18	Sandstone	6	5	NA	243	5.5	0.05	**42,000**
	15,784	15,816	32	28	Sandstone	5	4	NA	244	4.5	0.06	**33,000**
	15,862	15,906	44	37	Sandstone	5	5	NA	245	5.0	0.09	**21,000**

Table 17. Water Quality Calculations, Stratton 1-21 Well
Sweetwater County, Wyoming

Stratton 1-21 Well Calculation of Water Quality, Resitivity Method

Equations (adapted from Archie)

SW^2 = FRw/Rt F = 1/porsity^2
Assume porosity =
Asume SW = 1.0
Then, Rw = Rt*porosity^2

Inputs

Temp ground surface 40 degrees
Temp at bottom hole 250 degrees (14,884 ft)
Calculated gradient = (Average Depth/TD) x (BHT - Surface Temp) + Surface Temp

Stratton 1-21 Well

Formation	Top Depth (ft; RKB)	Bottom Depth (ft; RKB)	Net Sand (feet)	Rt deep (Ohm-M)	Formation Type	Neutron Porosity %	Density Porosity %	Sonic Porosity %	Temp deg F	Average (Den + Neu) Ave Porosity	Calc Rw ($F = 1/\phi^2$) (Ohm-M)	**Gen-9 NaCl (ppm)**
Lance Formation*	9,826	9,844	18	23	sandstone	11	11	12.5	179	11.0	0.28	**8,400**
	10,664	10,682	18	18	sandstone	12	10	12	191	11.0	0.22	**10,200**
	10,992	11,004	12	25	sandstone	11.5	11	12.5	195	11.3	0.32	**6,700**
Fox Hills Sandstone	12,166	12,186	20	18	sandstone	11	8.5	12	212	9.8	0.17	**12,100**
	12,558	12,578	20	30	sandstone	7	7	9.5	217	7.0	0.15	**12,800**
Lewis	12,815	12,826	11	22	sandstone	10	4.5	9	221	7.3	0.12	**17,000**
Mesaverde	14,014	14,069	55	15	sandstone	8	9	11	238	8.5	0.11	**17,500**
	14,182	14,193	11	20	sandstone	6.5	9	12	240	7.8	0.12	**15,500**

Notes:
*Presence of gas observed in Lance Formation sands; calculation of NaCl concentration is likely underestimated

Table 18. Lance Formation Water Quality Data, USGS Produced Waters Database, Greater Green River Basin

County	Field	Section	Township	Range	API Number	Well Name	Sampled Formation	Upper Depth	Lower Depth	Method	TDS (mg/L)	
SWEETWATER		31	N 24	W 101	4903705931	R. R. MAXWELL NO. 1	LANCE	3,643	3,680	DST	26,728	
SWEETWATER	WILDCAT	33	N 23	W 106	4903705897	WINDMILL NO. 1	LANCE	6,512	6,575	DST	44,459	
SWEETWATER	MONUMENT LAKE	19	N 21	W 92	4903720828	MONUMENT LAKE NO 1	LANCE	8,362	8,506	DST	1,581	
SWEETWATER	MONUMENT LAKE	19	N 21	W 92	4903720828	MONUMENT LAKE NO 1	LANCE	8,830	9,030	DST	3,192	
SWEETWATER	TEN MILE DRAW	33	N 21	W 99	4903705822	#4	LANCE	2,134	2,144	DST	2,747	
SWEETWATER	RED HILL	36	N 20	W 100	4903705742	STATE OF WYOMING	LANCE	1,645		SEPARATOR	5,045	
SWEETWATER	TABLE ROCK	2	N 18	W 98	4903705456	UNIT 5	LANCE	4,535	4,574	DST	28,988	
SWEETWATER	ANTELOPE	8	N 17	W 99	4903720277	FEDERAL C-1	LANCE	3,365	3,658	DST	6,841	
SWEETWATER		14	N 17	W 99	4903706458	1 UNIT	LANCE	5,091	5,093	FORMATION TEST	2,806	
SWEETWATER		14	N 17	W 99	4903706458	1 UNIT	LANCE	4,951	4,956	FORMATION TEST	2,981	
SWEETWATER	JACKKNIFE SPRING	11	N 16	W 101	4903705876	UNIT NO. 4	LANCE	1,880	1,964	DST	4,914	
SWEETWATER	JACKKNIFE SPRING	11	N 16	W 101	4903705286	1 UNIT	LANCE/BASAL	1,700	1,805	DST	3,158	
SWEETWATER	PIONEER	12	N 13	W 100	4903705151	UNIT NO. 4	LANCE	3,580	3,680	DST	11,738	
SWEETWATER	CANYON CREEK	19	N 13	W 100	4903720152	1 GOVERNMENT-SUNDERHAUF	LANCE	4,244	4,250	PRODUCTION	80,420	
SWEETWATER	PIONEER	1	N 13	W 100	4903705160	UNIT NO. 5	LANCE	3,753	3,897	DST	18,285	
SWEETWATER		5	N 12	W 102	4903705105	FISHER CREEK UNIT NO. 1	LANCE	6,980		DST	36,945	
SWEETWATER		5	N 12	W 102	4903705105	FISHER CREEK UNIT NO. 1	LANCE	6,988	7,088	DST	72,059	
CARBON		14	N 12	W 91	4900720081	NO. 1 MAY BLAIR	LANCE	3,540	3,575	DST	2,543	
CARBON		14	N 12	W 91	4900720081	NO. 1 MARY BLAIR	LANCE	3,540	3,575	DST	2,554	
CARBON		14	N 12	W 91	4900720081	NO. 1 MARY BLAIR	LANCE	2,853	2,867	DST	1,443	
CARBON		14	N 12	W 91	4900720081	NO. 1 MARY BLAIR	LANCE	2,853	2,867	DST	1,214	
CARBON		14	N 12	W 91	4900720081	NO. 1 MARY BLAIR	LANCE	2,853	2,867	DST	1,200	
CARBON	WEST SIDE CANAL	18	N 12	W 91	4900706919	UNIT NO. 7	LANCE	3,188	3,216	DST	3,552	
CARBON	WEST SIDE CANAL	18	N 12	W 91	4900706919	UNIT NO. 7	LANCE	3,188	3,216	DST	3,553	
CARBON	WILDCAT	17	N 12	W 91	4900705006	2 GOVERNMENT BAGGS	LANCE	2,644	2,701	DST	2,201	
CARBON	WEST SIDE CANAL	13	N 12	W 92	4900720039	LARAMORE NO. 2	LANCE	3,070	3,338	WELLHEAD	5,050	
CARBON	WEST SIDE CANAL	13	N 12	W 92	4900720039	LARAMORE NO. 2	LANCE	2,588	2,598	PRODUCTION TEST	1,590	
CARBON	WEST SIDE CANAL	13	N 12	W 92	4900720039	LARAMORE NO. 2	LANCE	2,938	2,965	PRODUCTION TEST	4,241	
CARBON	WEST SIDE CANAL	13	N 12	W 92	4900720039	LARAMORE NO. 2	LANCE	3,070	3,090	PRODUCTION TEST	4,508	
CARBON	WEST SIDE CANAL	13	N 12	W 92	4900720039	LARAMORE NO. 2	LANCE	3,322	3,338	PRODUCTION TEST	4,554	
CARBON	WEST SIDE CANAL	13	N 12	W 92	4900760003	LARAMORE NO. 1	LANCE	2,548	2,643	UNKNOWN	4,640	
CARBON	WEST SIDE CANAL	12	N 12	W 92	4900720038	4 MILE SHEEP CO UNIT WELL #1	LANCE			PRODUCTION	4,964	
CARBON	WEST SIDE CANAL	12	N 12	W 92	4900720038	4 MILE SHEEP CO WELL #1	LANCE			PRODUCTION	5,605	
CARBON	WEST SIDE CANAL	12	N 12	W 92	4900720038	4 MILE SHEEP CO WELL #1	LANCE			PRODUCTION	4,120	
CARBON		3	N 12	W 93	4900706961	9-A UNIT	LANCE	4,725	4,756	DST	19,757	
CARBON	WILDCAT	17	N 12	W 93	4900706985	1 BALTA	LANCE	5,050	5,068	SEPARATOR	32,287	
CARBON	BAGGS SOUTH	13	N 12	W 93	4900720052	13-1 CHRISTENSEN RANCH	LANCE	3,801	3,850	DST	5,932	
SWEETWATER	STATE LINE	11	N 12	W 94	4903705063	STATE LINE UNIT-FEDERAL NO. 1	LANCE	6,516	6,532	DST	61,475	
SWEETWATER	STATE LINE	11	N 12	W 94	4903705063	UNIT 1	LANCE	6,516	6,532	DST	58,988	
SWEETWATER		8	N 12	W 97	4903705061	UNIT NO. 1	LANCE	8,794	8,817	DST	31,214	
SWEETWATER	HIAWATHA	18	N 12	W 99	4903705045	NEWBERGER NO. 5	LANCE	4,869	4,887	DST	18,281	
SWEETWATER	HIAWATHA	18	N 12	W 99	4903705045	NEWBERGER NO. 5	LANCE	4,930	5,042	DST	20,657	
SWEETWATER		23	N 12	W 99		UNIT 1	LANCE	6,580	6,600	SWAB	12,666	
CARBON	WEST SIDE CANAL	18	N 12	W 91	4900720018	UNIT NO. 8	LANCE/12	2,580	2,588	SWAB	1,862	*
CARBON	WEST SIDE CANAL	18	N 12	W 91	4900720018	UNIT NO. 8	LANCE/12	2,580	2,588	SWAB	1,779	*
CARBON	WEST SIDE CANAL	18	N 12	W 91	4900720018	UNIT NO. 8	LANCE/12	2,580	2,588	SWAB	2,082	*
CARBON	WEST SIDE CANAL	18	N 12	W 91	4900720018	UNIT NO. 8	LANCE/12	2,580	2,588	SWAB	1,856	*
CARBON	WEST SIDE CANAL	18	N 12	W 91	4900720018	UNIT NO. 8	LANCE/12	2,580	2,588	SWAB	1,763	*
CARBON	WEST SIDE CANAL	18	N 12	W 91	4900720018	UNIT NO. 8	LANCE/12	2,580	2,588	SWAB	1,694	*
CARBON	WEST SIDE CANAL	18	N 12	W 91	4900720018	UNIT NO. 8	LANCE/12	2,580	2,588	SWAB	1,629	*
CARBON		14	N 12	W 91	4900720081	NO. 1 MARY BLAIR	LANCE/LOWER	3,506	3,516	DST	2,470	
										Average	17,131	

Notes:

Data compiled from USGS Produced Waters Database for Greater Green River Basin, Carbon and Sweetwater Counties (http://energy.cr.usgs.gov/prov/prodwat/intro.htm)

* Indicates multiple samples from same interval; average TDS from this interval utilized to calculate formation-wide average.

Table 19. Lance Formation Water Quality Data, WOGCC Data, Greater Green River Basin

API Number	Company	Well Name	Qtr - Qtr	Section	Township	Range	Field	Formation	TDS (mg/L)
3726638	YATES PETROLEUM CORPORATION	9 HI-LINE UNIT SWD	SW NE	22	24	99	WC	LANCE	30,743
3725263	ANADARKO	WAMSUTTER 27-2 SWD	SE NE	27	20	94	WC	LANCE	30,036
720520	BP AMERICA PRODUCTION COMPANY	TIERNEY II UNIT 10-7	C SW	7	19	93	TIERNEY	LANCE	18,400
720520	BP AMERICA PRODUCTION COMPANY	TIERNEY II UNIT 10-7	C SW	7	19	93	TIERNEY	LANCE	24,000
720520	BP AMERICA PRODUCTION COMPANY	TIERNEY II UNIT 10-7	C SW	7	19	93	TIERNEY	LANCE	24,500
720520	BP AMERICA PRODUCTION COMPANY	TIERNEY II UNIT 10-7	C SW	7	19	93	TIERNEY	LANCE	26,700
720520	BP AMERICA PRODUCTION COMPANY	TIERNEY II UNIT 10-7	C SW	7	19	93	TIERNEY	LANCE	28,000
720520	BP AMERICA PRODUCTION COMPANY	TIERNEY II UNIT 10-7	C SW	7	19	93	TIERNEY	LANCE	30,500
720520	BP AMERICA PRODUCTION COMPANY	TIERNEY II UNIT 10-7	C SW	7	19	93	TIERNEY	LANCE	37,000
720520	BP AMERICA PRODUCTION COMPANY	TIERNEY II UNIT 10-7	C SW	7	19	93	TIERNEY	LANCE	37,400
720520	BP AMERICA PRODUCTION COMPANY	TIERNEY II UNIT 10-7	C SW	7	19	93	TIERNEY	LANCE	39,100
720520	BP AMERICA PRODUCTION COMPANY	TIERNEY II UNIT 10-7	C SW	7	19	93	TIERNEY	LANCE	42,000
3724761	BP AMERICA	9-4 FREWEN UNIT	C NE	9	19	94	FREWEN	LANCE	41,100
3724761	BP AMERICA	9-4 FREWEN UNIT	C NE	9	19	94	FREWEN	LANCE	41,800
3724761	BP AMERICA	9-4 FREWEN UNIT	C NE	9	19	94	FREWEN	LANCE	41,900
3725118	BP AMERICA PRODUCTION COMPANY	WDW3	SW NW	13	19	94	TIERNEY	LANCE	35,364
3725118	BP AMERICA PRODUCTION COMPANY	WDW3	SW NW	13	19	94	TIERNEY	LANCE	35,500
3725118	BP AMERICA PRODUCTION COMPANY	WDW3	SW NW	13	19	94	TIERNEY	LANCE	35,600
3724470	INFINITY OIL AND GAS	23-2 PIPELINE	SW NE	23	19	100		LANCE	9,890
3725459	ANADARKO	HIGGINS 19	NE SE	15	18	98	TABLE ROCK	LANCE	59,039
3724861	INFINITY OIL & GAS OF WYOMING	1-9	SW SW	1	18	100	PATRICK DRAW	LANCE	24,242
3724862	INFINITY OIL & GAS OF WYOMING	1-8	NE SE	1	18	100	PATRICK DRAW	LANCE	23,540
3724863	INFINITY OIL & GAS OF WYOMING	1-7	NW NE	1	18	100	PATRICK DRAW	LANCE	22,377
3724863	INFINITY OIL & GAS OF WYOMING	1-7	NW NE	1	18	100	PATRICK DRAW	LANCE	34,203
3723871	YATES PETROLEUM	ORANGE BLOSSOM SPECIAL ST 1	NE NE	16	15	99	WC	LANCE	9,724
706921	MERIT ENERGY COMPANY	16 SOUTH BAGGS	SE SW	4	12	92	BAGGS SOUTH	LANCE	8,140
706921	MERIT ENERGY COMPANY	16 BAGGS SOUTH	SE SW	4	12	92	BAGGS SOUTH	LANCE	8,140
								Average	**27,624 ***

Notes:
Data compiled from Wyoming Oil and Gas Conservation Commission website for Greater Green River Basin, Carbon and Sweetwater Counties (http://wogcc.state.wy.us)
* Duplicate samples from identical wells were averaged to calculate formation-wide average within area of interest.

Table 20. Fox Hills Sandstone Water Quality Data, USGS Produced Waters Database, Greater Green River Basin

County	Field	Section	Township	Range	API Number	Well Name	Sampled Formation	Upper Depth	Lower Depth	Method	TDS (mg/L)
SWEETWATER		8	N 22	W 99	4903705880	UNIT NO. 1	FOX HILLS	3,894	3,929	DST	14,828
SWEETWATER	ARCH	13	N 19	W 99	4903705600	W-13-1 U.P.R.R.	FOX HILLS	3,286	3,610	UNKNOWN	62,172
SWEETWATER	PATRICK DRAW	3	N 18	W 99	4903705447	PILOT WATER INJECTION NO. 1	FOX HILLS	3,112	3,400	DST	55,928
SWEETWATER		11	N 14	W 101	4903705184	UNIT NO. 2	FOX HILLS	3,180	3,240	DST	3,535
SWEETWATER		1	N 14	W 101	4903705205	UNIT NO. 1	FOX HILLS	3,500	3,569	DST	25,445 *
SWEETWATER		1	N 14	W 101	4903705205	1 KENT RANCH UNIT	FOX HILLS	3,500	3,569	DST	26,659 *
SWEETWATER		1	N 14	W 101	4903705205	1 KENT RANCH UNIT	FOX HILLS	3,500	3,569	DST	28,760 *
SWEETWATER		11	N 14	W 101	4903705184	2 UNIT	FOX HILLS	3,180	3,240	DST	3,612
SWEETWATER	TRAIL	29	N 13	W 100	4903705123	1-29 F LAGLORIA-FEDERAL	FOX HILLS	4,410	4,434	DST	16,791
SWEETWATER	TRAIL	21	N 13	W 100	4903705130	UNIT NO. 10	FOX HILLS	4,280	4,450	DST	4,156
CARBON	WEST SIDE CANAL	13	N 12	W 92	4900720039	LARAMORE NO. 2	FOX HILLS	3,366	3,376	PRODUCTION TEST	3,326
CARBON	WEST SIDE CANAL	13	N 12	W 92	4900760003	LARAMORE NO. 1	FOX HILLS	3,379	3,398	UNKNOWN	5,213
CARBON	WEST SIDE CANAL	13	N 12	W 92	4900760003	LARAMORE 1	FOX HILLS			SEPARATOR	4,961
										Average	**18,316**

Notes:

Data compiled from USGS Produced Waters Database for Greater Green River Basin, Carbon and Sweetwater Counties (http://energy.cr.usgs.gov/prov/prodwat/intro.htm)

* Indicates multiple samples from same interval; average TDS from this interval utilized to calculate formation-wide average.

Table 21. Fox Hills Sandstone Water Quality Data, WOGCC Data, Greater Green River Basin

API Number	Company	Well Name	Qtr - Qtr	Section	Township	Range	Field Name	Formation	TDS (mg/L)	
3724479	BP AMERICA PRODUCTION COMPANY	FIVE MILE 03-02	NE NE	3	21	93	FIVE MILE GULCH	FOX HILLS	11,684	
3725263	ANADARKO PETROLEUM	WAMSUTTER 27-2 SWD	SE NE	27	20	94	WC	FOX HILLS	20,137	
3724687	BP AMERICA PRODUCTION COMPANY	RED WASH 01-03	SW SW	1	20	96	WAMSUTTER	FOX HILLS	10,250	
3724470	INFINITY OIL AND GAS	23-2 PIPELINE	SW NE	23	19	100		FOX HILLS	11,040	
3705447	RME PETROLEUM COMPANY	1 PDU WSW	NE SE	3	18	99		FOX HILLS	57,432	*
3705447	RME PETROLEUM COMPANY	1 PDU WSW	NE SE	3	18	99		FOX HILLS	64,783	*
3724509	INFINITY OIL & GAS OF WYOMING	1-11	NE SW	1	18	100	PATRICK DRAW	FOX HILLS	36,701	*
3724509	INFINITY OIL & GAS OF WYOMING	1-11	NE SW	1	18	100	PATRICK DRAW	FOX HILLS	78,035	*
3725004	INFINITY OIL & GAS OF WYOMING	13-11	NE NE	13	18	100	PATRICK DRAW	FOX HILLS	26,973	*
3725004	INFINITY OIL & GAS OF WYOMING	13-11	NE NE	13	18	100	PATRICK DRAW	FOX HILLS	55,423	*
								Average	**30,398**	

Notes:

Data compiled from Wyoming Oil and Gas Conservation Commission website for Greater Green River Basin, Carbon and Sweetwater Counties (http://wogcc.state.wy.us)

* Indicates multiple samples from same interval; average TDS from this interval utilized to calculate formation-wide average.

Table 22. Lewis Shale Water Quality Data, USGS Produced Waters Database, Greater Green River Basin

County	Field	Section	Township	Range	API Number	Well Name	Sampled Formation	Upper Depth	Lower Depth	Method	TDS (mg/L)
SWEETWATER	MUD LAKE	12	N 23	W 98	4903705924	UNIT NO. 1	LEWIS	9090	9110	UNKNOWN	6,006
SWEETWATER	FIVE MILE GULCH	27	N 21	W 93	4903720801	5 MILE GULCH NO 1	LEWIS	9530	9625	DST	1,471
SWEETWATER	DESERT SPRINGS EAST	18	N 21	W 97	4903706359	1 GOVERNMENT	LEWIS	5797	5917	PRODUCTION TEST	11,346
SWEETWATER	DESERT SPRINGS EAST	18	N 21	W 97	4903706359	1 GOVERNMENT	LEWIS	5850	5920	PRODUCTION	10,719
SWEETWATER	DESERT SPRINGS	19	N 21	W 97	4903706417	UNIT NO. 19	LEWIS	5864	5951	DST	6,580
SWEETWATER	DESERT SPRINGS	6	N 21	W 97	4903706431	GOVERNMENT 1-6	LEWIS	5888	5928	DST	6,497
SWEETWATER	DESERT SPRINGS EAST	18	N 21	W 97	4903720199	GOVT 12-18 18-21	LEWIS	5807	5820	PRODUCTION	7,984
SWEETWATER	DESERT SPRINGS EAST	12	N 21	W 98	4903706373	1 UNIT (PRENALTA)	LEWIS	5596	5769	PRODUCTION	5,159
SWEETWATER	DESERT SPRINGS	14	N 21	W 98	4903706390	UNIT NO. 17	LEWIS	5427	5475	SEPARATOR	6,243
SWEETWATER	DESERT SPRINGS	1	N 21	W 98	4903707005	UPRR NO. 4-1	LEWIS	5787	5845	DST	6,315
SWEETWATER	DESERT SPRINGS	28	N 21	W 98	4903720079	28-1 GOVERNMENT	LEWIS	4800		PRODUCTION	24,529
SWEETWATER	DESERT SPRINGS	3	N 20	W 98	4903705812	UNIT NO. 3	LEWIS/E	5326	5350	DST	2,408
CARBON	ECHO SPRINGS	1	N 19	W 93	4900720275	CHAMPLIN 242 AMOCO A-1	LEWIS	8798	8833	DST	3,561
SWEETWATER		31	N 18	W 96	4903721055	CHAMPLIN 534 AMOCO A-1	LEWIS	10368	10426	DST	3,301
SWEETWATER	TABLE ROCK	2	N 18	W 98	4903705456	UNIT NO. 5	LEWIS	5778	5800	DST	3,755
SWEETWATER	STAGE STOP	26	N 18	W 99	4903706356	UNIT NO. 2	LEWIS	4900	4949	DST	2,215
SWEETWATER	ALKALINE CREEK	29	N 16	W 98	4903720782	CHAMPLIN 273 A #1	LEWIS	11454	11472	UNKNOWN	14,161
SWEETWATER	ALKALINE CREEK	29	N 16	W 98	4903720782	CHAMPLIN 273 AMOCO A-1	LEWIS	11454	11477	UNKNOWN	10,228
SWEETWATER	ALKALINE CREEK	29	N 16	W 98	4903720782	CHAMPLIN 273 AMOCO A-1	LEWIS			PRODUCTION	54,556
CARBON	WILDCAT	36	N 13	W 88	4900705036	1 BATTLE MOUNTAIN-STATE	MANCOS	2043	2083	DST	12,209
CARBON	WILDCAT	36	N 13	W 88	4900705036	1 BATTLE MOUNTAIN-STATE	MANCOS	2043	2083	DST	8,859
CARBON	SAVERY	15	N 13	W 89	4900706984	GOV'T 1	MANCOS	1960	2131	DST	25,088
CARBON	WILDCAT	31	N 13	W 91	4900720050	1 JIM BAKER GOVERNMENT	LEWIS	5089	5109	DST	33,425 *
CARBON	WILDCAT	31	N 13	W 91	4900720050	1 JIM BAKER GOVERNMENT	LEWIS	5089	5109	DST	31,491 *
CARBON	WILDCAT	31	N 13	W 91	4900720050	1 JIM BAKER GOVERNMENT	LEWIS	5089	5109	DST	31,140 *
SWEETWATER	WILDCAT	21	N 12	W 100	4903720129	1 RADOSEVICH	LEWIS	4450	4519	DST	27,717
CARBON	WILDCAT	17	N 12	W 91	4900705006	2 BAGGS-GOVERNMENT	LEWIS	3626	3670	DST	3,231
CARBON	WEST SIDE CANAL	17	N 12	W 91	4900705011	UNIT NO. 3	LEWIS	3556	3559	PRODUCTION	3,245
CARBON		14	N 12	W 91	4900720081	NO. 1 MARY BLAIR	LEWIS	3625	3685	DST	2,512 *
CARBON		14	N 12	W 91	4900720081	NO. 1 MARY BLAIR	LEWIS	3625	3685	DST	2,480 *
CARBON	BAGGS SOUTH	10	N 12	W 92	4900705018	8 UNIT	LEWIS	4399	4942	PRODUCTION	8,720
CARBON	BAGGS SOUTH	10	N 12	W 92	4900705018	BAGGS UNIT NO. 8	LEWIS	4692	4720	DST	11,480
CARBON	BAGGS SOUTH	4	N 12	W 92	4900706921	16 CHEY-081348	LEWIS	4265	6221	HEATER/TREATER	21,400
CARBON	BAGGS SOUTH	7	N 12	W 92	4900706940	19 CHEY.-077776	LEWIS	4837		TANK	28,760
CARBON	WEST SIDE CANAL	12	N 12	W 92	4900720038	FOUR MILE SHEEP NO. 1	LEWIS	3360	4380	SEPARATOR	4,107
CARBON	WEST SIDE CANAL	12	N 12	W 92	4900720049	44 RANCH UNIT WELL #1	LEWIS			PRODUCTION	7,979
CARBON	WEST SIDE CANAL	12	N 12	W 92	4900720075	C F JEBINS UNIT WELL #1	LEWIS			PRODUCTION	3,804
										Average	**11,416**

Notes:
Data compiled from USGS Produced Waters Database for Greater Green River Basin, Carbon and Sweetwater Counties (http://energy.cr.usgs.gov/prov/prodwat/intro.htm)
* Indicates multiple samples from same interval; average TDS from this interval utilized to calculate formation-wide average.

Table 23. Lewis Shale Water Quality Data, WOGCC Data, Greater Green River Basin

API Number	Company	Well Name	Qtr - Qtr	Section	Township	Range	Field Name	Formation	TDS (mg/L)
3724421	BP AMERICA PRODUCTION CO	CHAMPLIN 452 E5	SW NE	15	22	94	SIBERIA RIDGE	LEWIS	10,424
3721375	BP AMERICA PRODUCTION CO	CHAMPLIN 452 L	SW NW	11	22	94	SIBERIA RIDGE	LEWIS	11,777
3723793	DEVON ENERGY	SIBERIA RIDGE 11-26	NE SW	26	22	94	WAMSUTTER	LEWIS	8,290
3725429	BP AMERICAN PRODUCTION COMPANY	LUMAN 17-01	NE NE	17	22	95	WC	LEWIS	6,220
3725430	BP AMERICAN PRODUCTION COMPANY	LUMAN 19-02	NE NE	19	22	95	WC	LEWIS	13,215
3724886	DEVON ENERGY	FIVE MILE DITCH 9-30	NW SE	30	21	93	FIVE MILE GULCH	LEWIS	5,830
3720905	ANADARKO PETROLEUM CO	UPRR 4-31 No. 2	c sw	31	21	94	WAMSUTTER	LEWIS	19,993
3725890	BP AMERICA PRODUCTION COMPANY	9-1 CG ROAD UNIT	NE NW	9	20	94	WAMSUTTER	LEWIS	17,700
3724498	DEVON ENERGY	WAMSUTTER 10-2	NW SE	2	20	94	WAMSUTTER	LEWIS	19,200
3725134	DEVON ENERGY	RED DESERT 7-8	SW NE	8	20	95	RED DESERT	LEWIS	7,250
3725015	DEVON ENERGY	RED DESERT 13-4	SW SW	4	20	95	RED DESERT	LEWIS	10,900
3724644	DEVON ENERGY	RED DESERT 4X-18	NW NW	18	20	95	WAMSUTTER	LEWIS	9,290
3725513	BP AMERICA PRODUCTION COMPANY	15-3 RED DESERT	NW NW	15	20	95	WAMSUTTER	LEWIS	13,000
3721164	ANADARKO PETROLEUM CORP	UPRR 3-3	C SE	3	20	95	WAMSUTTER	LEWIS	20,026
3723707	ANADARKO PETROLEUM CORP	UPR 3-1	NE NW	3	20	95	WAMSUTTER	LEWIS	20,377
3723980	YATES DRILLING COMPANY	SPIKE STATES #3	NW NW	16	20	95	WC	LEWIS	9,107
3724694	YATES PETROLEUM	TRESTLE 3	NE SE	14	20	96	WC	LEWIS	4,082
722569	BP AMERICA PRODUCTION COMPANY	15-01 FILLMORE CREEK	SW SW	15	19	91	FILLMORE	LEWIS	14,300
722568	BP AMERICA PRODUCTION COMPANY	9-1 FILLMORE CREEK	SW SW	9	19	91	FILLMORE	LEWIS	26,400
720570	ANADARKO PETROLEUM CORP	FEDERAL BF #1	SW NW	30	19	91	FILLMORE	LEWIS	39,053
721970	YATES PETROLEUM	EUCKER 1	NW SW	24	19	92	WC	LEWIS	8,605
722598	BP AMERICA PRODUCTION COMPANY	27-3 HIGH POINT	SE SW	27	19	92	WC	LEWIS	13,400
720508	AMOCO PRODUCTION COMPANY	1 W USA	C SW	20	19	93		LEWIS	6,260
3720921	RME PETROLEUM COMPANY	5 DELANEY	NE SW	5	18	97		LEWIS	14,432
3705423	RME PETROLEUM COMPANY	9 DELANEY	NE NE	7	18	97		LEWIS	16,325
3721914	HOUSTON OIL AND MINERALS	22-14	SE NW	14	18	98		LEWIS	14,092
3721914	HOUSTON OIL AND MINERALS	22-14B	SE NW	14	18	98		LEWIS	31,433
3725920	BP AMERICA PRODUCTION COMPANY	27-1R LANEY WASH	NW NW	27	17	97	WC	LEWIS	3,870
722978	CABOT OIL AND GAS	Lookout Wash 30-31	NW SE	31	15	93	LOOKOUT WASH	LEWIS	7,042
720779	DEVON SFS OPERATING	14-13 MARA		13	14	93		LEWIS	14,181
722556	CABOT OIL AND GAS	LOOKOUT WASH 40-8L	SW SE	8	14	93	LOOKOUT WASH	LEWIS	11,426
3721883	TINDALL OPERATING COMPANY	26-2		26	13	94		LEWIS	48,684
720730	MERIT ENERGY COMPANY	W.S. CANAL NO. 14	SW NE	18	12	91	WEST SIDE CANAL	LEWIS	36,000
720557	WILLIAMS PRODUCTION	1 4 MI SHE	NE NW	13	12	92		LEWIS	5,334
								Average	**15,221**

Notes:
Data compiled from Wyoming Oil and Gas Conservation Commission website for Greater Green River Basin, Carbon and Sweetwater Counties (http://wogcc.state.wy.us)

Table 24. Mesaverde Group Water Quality Data, USGS Produced Waters Database, Greater Green River Basin

County	Field	Section	Township	Range	API Number	Well Name	Sampled Formation	Upper Depth	Lower Depth	Method	TDS (mg/L)
SWEETWATER		30	N 26	W 102	4903706416	MORROW CREEK FEDERAL NO. 1	MESAVERDE	7,738	7,752	UNKNOWN	64,916
SWEETWATER	WILDCAT	4	N 26	W 94	4903720133	1 FEDERAL AMERICAN NATURAL	MESAVERDE	2,604	2,617	PRODUCTION	2,187
SWEETWATER		17	N 26	W 94	4903705970	1 R. E. MURPHY	MESAVERDE	3,661	3,675	DST	3,697
SWEETWATER		17	N 26	W 94	4903705970	1	MESAVERDE	3,661	3,675	DST	3,683
SWEETWATER	WILDCAT	27	N 25	W 109	4903720167	1-C PRAIRIE HEN UNIT	MESAVERDE	7,197	7,216	DST	3,699
SWEETWATER		2	N 24	W 100	4903706436	NO. 1 GOVERNMENT	MESAVERDE/ERICSON	8,802	8,844	DST	4,589
SWEETWATER		31	N 24	W 101	4903705931	R. R. MAXWELL NO. 1	ALMOND	4,722	4,866	DST	30,081
SWEETWATER	WILDCAT	27	N 24	W 102	4903705932	NO. 1 GOVERNMENT	MESAVERDE			DST	12,387
SWEETWATER	WILDCAT	24	N 24	W 104	4903706437	1 GOVERNMENT DUNE	ALMOND	1,192	1,224	DST	2,607
SWEETWATER	WILDCAT	24	N 24	W 104	4903706437	1 GOVERNMENT DUNE	ALMOND	1,192	1,224	DST	2,998
SWEETWATER	WILDCAT	24	N 24	W 104	4903706437	1 GOVERNMENT DUNE	ALMOND	1,192	1,224	DST	3,262
SWEETWATER	WILDCAT	24	N 24	W 104	4903706437	1 GOVERNMENT DUNE	ROCK SPRINGS	3,395	3,414	DST	64,840
SWEETWATER		4	N 23	W 101	4903705927	NO. 4-1 UNIT	ALMOND	4,963	5,018	DST	12,622
SWEETWATER		4	N 23	W 101	4903705927	NO. 4-1 UNIT	ALMOND	4,963	5,018	DST	12,559
SWEETWATER	WILDCAT	30	N 23	W 101	4903705901	FEDERAL 1-C	MESAVERDE	2,852	2,869	DST	1,667
SWEETWATER	NITCHIE GULCH	30	N 23	W 103	4903720083	UNIT 10-30	ROCK SPRINGS	2,898	2,922	DST	2,203
SWEETWATER	NITCHIE GULCH	30	N 23	W 103	4903720083	UNIT 10-30	ROCK SPRINGS	2,898	2,922	DST	2,020
SWEETWATER		4	N 23	W 104	4903705927	UNIT 4-1	MESAVERDE	4,963	5,018	DST	12,485
SWEETWATER	HORN CANYON	13	N 23	W 110	4903705915	HORN CANYON NO. 1-A	MESAVERDE	6,325	6,359	DST	7,704
SWEETWATER		16	N 22	W 100	4903705871	STATE-HUSKY #1	ALMOND	3,715	3,745	UNKNOWN	27,393
SWEETWATER	WAMSUTTER	36	N 22	W 93	4903720295	1-36 STATE	MESAVERDE	12,067	12,390	DST	4,628
SWEETWATER	SIBERIA RIDGE	33	N 22	W 94	4903720765	SIBERIA RIDGE #3	MESAVERDE			PRODUCTION	12,145
SWEETWATER	STOCK POND	11	N 22	W 95	4903720774	STOCK POND NO 1	MESAVERDE			WELLHEAD	14,243
SWEETWATER	WILDCAT	12	N 21	W 100	4903705848	SKYLINE - FEDERAL A-1	MESAVERDE	3,837		PRODUCTION TEST	39,314
SWEETWATER	SIBERIA RIDGE	27	N 21	W 93	4903720801	5 MILE GULCH NO 1	ALMOND			UNKNOWN	15,812
SWEETWATER	FIVE MILE GULCH	27	N 21	W 93	4903720801	FIVE MILE GULCH NO 1	MESAVERDE	10,803	10,923	DST	3,549
SWEETWATER	SIBERIA RIDGE	27	N 21	W 93	4903720801	5 MILE GULCH NO 1	MESAVERDE/ERICSON			UNKNOWN	15,778
SWEETWATER	FIVE MILE GULCH	35	N 21	W 93	4903721053	UNIT NO 3	MESAVERDE/ERICSON	10,732	10,872	SWAB	5,257
SWEETWATER	WAMSUTTER	1	N 21	W 94		UNIT A #4	ALMOND			PRODUCTION	1,511
SWEETWATER	SIBERIA RIDGE	17	N 21	W 94	4903720596	CHAMPLIN 451 AMOCO A-1	ALMOND			UNKNOWN	15,831
SWEETWATER	SIBERIA RIDGE	17	N 21	W 94	4903720956	CHAMPLIN 451 AMOCO A-1	ALMOND			UNKNOWN	16,377
SWEETWATER	WAMSUTTER	32	N 21	W 94	4903705816	WAMSUTTER A-5	ALMOND-MESAVERDE	9,688	9,796	PRODUCTION	1,447
SWEETWATER	WAMSUTTER	16	N 21	W 94	4903721132	MARATHON STATE NO 1-16	MESAVERDE	10,332	10,700	PRODUCTION	12,901
SWEETWATER	DESERT SPRINGS	19	N 21	W 97	4903706417	UNIT NO. 19	ALMOND	5,827	5,854	SWAB	6,503
SWEETWATER	DESERT SPRINGS	27	N 21	W 98	4903706455	UNIT NO. 18	ALMOND	5,885	5,902	PRODUCTION	82,472
SWEETWATER	DESERT SPRINGS	26	N 21	W 98	4903705829	UNIT 1	MESAVERDE	6,201	6,259	DST	70,981
SWEETWATER	DESERT SPRINGS	34	N 21	W 98	4903705818	PLAYA-FEDERAL 34-1	MESAVERDE	4,778	4,792	PRODUCTION	15,576
SWEETWATER	TEN MILE DRAW	25	N 21	W 99	4903705831	5 UNIT	ALMOND	4,507	4,550	DST	6,269
SWEETWATER	WILDCAT	20	N 20	W 101	4903705774	1 FEDERAL-FERGUSON	MESAVERDE/BLAIR	2,272	2,310	DST	45,026
SWEETWATER	WAMSUTTER	6	N 20	W 94	4903720890	MARATHON FEDERAL 1-6	ALMOND			PRODUCTION	12,490
SWEETWATER	WAMSUTTER	30	N 20	W 94	4903720089	FEDERAL #1-30	ALMOND-MESAVERDE	9,549	9,960	PRODUCTION	10,859
SWEETWATER	WAMSUTTER	1	N 20	W 95	4903705810	UNIT A-4	ALMOND-MESAVERDE	9,646	9,660	SEPARATOR	1,598
SWEETWATER	WAMSUTTER	1	N 20	W 95	4903705810	WAMSUTTER A-4	ALMOND-MESAVERDE	9,646	9,660	PRODUCTION	1,753
SWEETWATER	WAMSUTTER	13	N 20	W 95		UNIT B-1	ALMOND-MESAVERDE	9,955	10,067	DST	14,197
SWEETWATER	WAMSUTTER	12	N 20	W 95	4903705802	UNIT A-1	MESAVERDE	9,690	9,725	SEPARATOR	14,421
SWEETWATER	WAMSUTTER	12	N 20	W 95	4903705802	UNIT NO. 1	MESAVERDE	9,690	9,756	UNKNOWN	17,043
SWEETWATER	WAMSUTTER	14	N 20	W 95	4903705791	UNIT A- WELL NO. 2	MESAVERDE	9,418	10,340	UNKNOWN	9,857
SWEETWATER	WAMSUTTER	14	N 20	W 95	4903705791	UNIT NO. A-2	MESAVERDE	9,440	9,866	UNKNOWN	15,836
SWEETWATER	WAMSUTTER	12	N 20	W 95	4903705802	UNIT 1	MESAVERDE	9,690	9,725	PRODUCTION	14,250
SWEETWATER	WAMSUTTER	14	N 20	W 95	4903705791	UNIT A-2	MESAVERDE	9,440	9,866	PRODUCTION TEST	15,633

Table 24. Mesaverde Group Water Quality Data, USGS Produced Waters Database, Greater Green River Basin

County	Field	Section	Township	Range	API Number	Well Name	Sampled Formation	Upper Depth	Lower Depth	Method	TDS (mg/L)
SWEETWATER	WAMSUTTER	1	N 20	W 95	4903705810	UNIT A-4	MESAVERDE	9,646	9,660	PRODUCTION	5,831
SWEETWATER	TIPTON	32	N 20	W 96	4903705713	TIPTON NO. 1	MESAVERDE	8,870	8,900	DST	9,271
SWEETWATER	DESERT SPRINGS	4	N 20	W 98	4903705811	UNIT NO. 5	ALMOND	5,752	5,878	DST	5,255
SWEETWATER	DESERT SPRINGS	4	N 20	W 98	4903705811	NO. 5	ALMOND	5,814	5,940	DST	4,507
SWEETWATER	DESERT SPRINGS	9	N 20	W 98	4903705804	UNIT NO. 6	ALMOND			PRODUCTION	80,169
SWEETWATER	DESERT SPRINGS	9	N 20	W 98	4903705804	UNIT 6	MESAVERDE	5,740	5,870	PRODUCTION	88,304
SWEETWATER	DESERT SPRINGS	3	N 20	W 98	4903705812	UNIT NO. 3	MESAVERDE	6,061	6,101	DST	9,157
SWEETWATER	DESERT SPRINGS WEST	11	N 20	W 99	4903720217	1	ALMOND	4,622	4,640	DST	14,075
SWEETWATER	PLAYA	11	N 20	W 99	4903705809	10-11D UNIT	ALMOND	4,575	4,610	DST	18,365
SWEETWATER	DESERT SPRINGS WEST	34	N 20	W 99	4903705744	1-34 GOVERNMENT	ALMOND	4,164	4,196	PRODUCTION	28,816
SWEETWATER	PATRICK DRAW NORTH	35	N 20	W 99	4903705706	UP 44-35R	ALMOND	4,511	4,518	DST	28,964
SWEETWATER	PATRICK DRAW	35	N 20	W 99	4903705706	44-35 U.P.R.R.	ALMOND	4,552	4,562	UNKNOWN	29,170
SWEETWATER	PATRICK DRAW	36	N 20	W 99	4903705704	1-36 STATE	ALMOND	4,824	4,834	PRODUCTION	23,531
SWEETWATER	PATRICK DRAW	28	N 20	W 99	4903705751	3-28 WYOMING 027447	ALMOND	3,636	3,838	TANK	21,415
SWEETWATER	DESERT SPRINGS WEST	33	N 20	W 99	4903705718	UPRR 23-33	MESAVERDE	3,870	3,894	PRODUCTION	59,561
SWEETWATER	DESERT SPRINGS WEST	32	N 20	W 99	4903705710	WITHERS BATTERY 3	MESAVERDE	3,550	3,650	PRODUCTION	64,034
										Average	**19,418**

Notes:
Data compiled from USGS Produced Waters Database for Greater Green River Basin, Carbon and Sweetwater Counties (http://energy.cr.usgs.gov/prov/prodwat/intro.htm)

Table 25. Mesaverde Group Water Quality Data, WOGCC Data, Greater Green River Basin

API Number	Company	Well Name	Qtr - Qtr	Section	Township	Range	Field Name	Formation	TDS (mg/L)
3725411	CABOT OIL AND GAS	OSBORNE SPRINGS 32-14	SE SW	32	26	97	WAMSUTTER	LEWIS-ALMOND	3,591
3726569	YATES PETROLEUM CORPORATION	1 FELLER UNIT	NE NE	22	25	97	WC	MESAVERDE	8,211
3726737	YATES PETROLEUM CORPORATION	1 CRONIN DRAW	SW SW	31	24	97	WC	MESAVERDE	34,071
3726132	YATES PETROLEUM CORPORATION	2 WOLD STATE	NW NW	36	24	98	WC	MESAVERDE	5,251
3725221	YATES PETROLEUM CORPORATION	1 WOLD STATE	SE SW	36	24	98	WC	MESAVERDE	20,857
3725386	YATES PETROLEUM CORPORATION	2 LUMAN RIM	C NE	35	24	98	WC	MESAVERDE	157,157
3721771	KENNEDY OIL	1-36 STATE	C NE	36	23	91	HAY RESERVOIR	ALMOND COAL	21,771
3726096	BP AMERICA PRODUCTION COMPANY	19-1 CHAIN LAKES	SE SE	19	23	93	WC	LEWIS-MESAVERDE	8,140
3726024	BP AMERICA PRODUCTION COMPANY	29-2 CHAIN LAKES	C SW	29	23	93	WC	LEWIS-MESAVERDE	8,860
3725874	BP AMERICA PRODUCTION COMPANY	CHAIN LAKE 29-1	NE NW	29	23	93	WC	LEWIS-MESAVERDE	9,190
3725975	BP AMERICA PRODUCTION COMPANY	27-1 CHAIN LAKE	NW NW	27	23	93	WC	LEWIS-MESAVERDE	11,000
3721173	INDUSTRIAL GAS SERVICES	270-B	SW SW	31	23	94		ALMOND	15,088
3721168	INDUSTRIAL GAS SERVICES	USA Q	C SW	28	23	94		ALMOND	32,392
3725196	BP AMERICA PRODUCTION CO	BATTLE SPRINGS 35-01	SW SW	35	23	94	SIBERIA RIDGE	LEWIS-MESAVERDE	5,600
3725850	BP AMERICA PRODUCTION COMPANY	13-1 BATTLE SPRINGS	NW SW	13	23	94	SIBERIA RIDGE	LEWIS-MESAVERDE	7,980
3726376	BP AMERICA PRODUCTION COMPANY	27-3 BATTLE SPRINGS	NW SE	27	23	94	WC	LEWIS-MESAVERDE	7,180
3725937	BP AMERICA PRODUCTION COMPANY	2 CHAMPLIN 270B	SW NE	31	23	94	SENTINEL RIDGE	MESAVERDE	2,130
3725924	BP AMERICA PRODUCTION COMPANY	2 CHAMPLIN 270 A	SE NW	29	23	94	SENTINEL RIDGE	MESAVERDE	8,290
3726408	BP AMERICA PRODUCTION COMPANY	USA Q-2	NE SE	28	23	94	SENTINEL RIDGE	MESAVERDE	10,700
3725784	BP AMERICA PRODUCTION COMPANY	27-1 BATTLE SPRING	SE SW	27	23	94	SIBERIA RIDGE	MESAVERDE	3,060
3725927	BP AMERICA PRODUCTION COMPANY	33-1 BATTLE SPRINGS	SE SW	33	23	94	SIBERIA RIDGE	MESAVERDE	4,120
3725804	BP AMERICA PRODUCTION COMPANY	25-1 BATTLE SPRINGS	NE NW	25	23	94	SIBERIA RIDGE	MESAVERDE	4,320
3725799	BP AMERICA PRODUCTION COMPANY	23-1 BATTLE SPRINGS	SW SW	23	23	94	SIBERIA RIDGE	MESAVERDE	5,400
3725242	PB AMERICA PRODUCTION CO	BATTLE SPRINGS 19-01	SE NW	19	23	94	WC	MESAVERDE	8,404
3725785	BP AMERICA PRODUCTION COMPANY	Battle Springs 13-1	NW SW	13	23	94		MESAVERDE	7,980
3723909	YATES PETROLEUM CORPORATION	2 HARVEST	NE SE	14	23	95	LOST CREEK BUTTE	LEWIS-ALMOND	2,985
3724909	YATES PETROLEUM	HARVEST UNIT 2	NE SE	14	23	95	LOST CREEK BUTTE	LEWIS-ALMOND	7,513
3723759	YATES PETROLEUM CORPORATION	1 HARVEST	NW NW	14	23	95	WC	LEWIS-ALMOND	2,595
3723759	YATES PETROLEUM	HARVEST UNIT 1	NW NW	14	23	95	WC	LEWIS-ALMOND	4,030
3725971	BP AMERICA PRODUCTION COMPANY	2 CHAMPLIN 320 B	SE NW	31	23	95	LOST CREEK BASIN	LEWIS-MESAVERDE	7,400
3725470	BP AMERICAN PRODUCTION COMPANY	LOST CREEK 27-01	SE SE	27	23	95	WC	LEWIS-MESAVERDE	7,810
3725498	YATES PETROLEUM CORPORATION	1 SEAVER	SE NE	9	23	95	WC	LEWIS-MESAVERDE	9,588
3726245	YATES PETROLEUM CORPORATION	3 SEAVER	C SW	9	23	95	WC	LEWIS-MESAVERDE	16,502
3725588	BP AMERICAN PRODUCTION COMPANY	LOST CREEK 29-01	SE SW	29	23	95	LOST CREEK BASIN	MESAVERDE	6,520
3724971	BP AMERICA PRODUCTION CO	LOST CREEK 35-01	C SE	35	23	95	WC	MESAVERDE	4,292
3725589	BP AMERICAN PRODUCTION COMPANY	LOST CREEK 33-01	NE SW	33	23	95	WC	MESAVERDE	5,848
3724961	BP AMERICA PRODUCTION CO	LOST CREEK 25-01	SE SE	25	23	95	WC	MESAVERDE	6,940
3726307	YATES PETROLEUM CORPORATION	1-Y MOLITOR FED	SE SW	2	23	96	WC	LEWIS-MESAVERDE	9,491
3726775	YATES PETROLEUM CORPORATION	2 MOLITOR FED	SW SE	2	23	96	WC	LEWIS-MESAVERDE	11,887
3726740	YATES PETROLEUM CORPORATION	1 RIZZUTO STATE	NE NE	16	23	96	WC	MESAVERDE	9,107
3725945	YATES PETROLEUM CORPORATION	1 YAZ FED	NW SE	33	23	97	WC	MESAVERDE	21,444
3726957	YATES PETROLEUM CORPORATION	9-1 RED LAKES	NW NE	9	23	98	LUMAN RIM	MESAVERDE	9,454
3726609	YATES PETROLEUM CORPORATION	1 STENGLE STATE	NE NE	16	23	98	WC	MESAVERDE	6,285
3721625	WILLIAMS PRODUCTION RMT COMPANY	3 TREASURE	SE NE	4	23	101		ERICSON	25,300
3721625	WILLIAMS PRODUCTION RMT COMPANY	3 TREASURY	SE NE	4	23	101		ERICSON	33,000
3721625	WILLIAMS PRODUCTION RMT COMPANY	3 TREASURE	SE NE	4	23	101		ERICSON	53,162

Table 25. Mesaverde Group Water Quality Data, WOGCC Data, Greater Green River Basin

API Number	Company	Well Name	Qtr - Qtr	Section	Township	Range	Field Name	Formation	TDS (mg/L)
3721625	WILLIAMS PRODUCTION RMT COMPANY	3 TREASURE	SE NE	4	23	101		ERICSON	53,162
3721625	WILLIAMS PRODUCTION RMT COMPANY	3 TREASURE	SE NE	4	23	101		ERICSON	53,162
3721625	WILLIAMS PRODUCTION RMT COMPANY	3 TREASURE	SE NE	4	23	101		ERICSON	69,900
3721625	WILLIAMS PRODUCTION RMT COMPANY	3 TREASURY	SE NE	4	23	101		L.U. ERICS	22,900
3721625	WILLIAMS PRODUCTION RMT COMPANY	3 TREASURY	SE NE	4	23	101		U.U. ERICS	8,890
3723826	ANADARKO PETROLEUM CORPORATION	35-1-2	SW NE	35	23	102	WC	BLAIR	27,956
3725930	BP AMERICA PRODUCTION COMPANY	31-1 JAWBONE	NW NW	31	22	91	WC	MESAVERDE	12,900
3725851	BP AMERICA PRODUCTION COMPANY	35-1 RUBY KNOLL	NW NW	35	22	92	WC	MESAVERDE	7,800
3725940	BP AMERICA PRODUCTION COMPANY	25-1 RUBY KNOLLS	SE SE	25	22	92	WC	MESAVERDE	17,100
3721051	INDUSTRIAL GAS SERVICES	533 AM A-1		13	22	93		ALMOND	5,719
3724027	BP AMERICA PRODUCTION COMPANY	MONUMENT 31-01	C NE	31	22	93	SIBERIA RIDGE	LEWIS-MESAVERDE	10,696
3724277	BP AMERICA PRODUCTION CO	MONUMENT 29-01	C SW	29	22	93	SIBERIA RIDGE	LEWIS-MESAVERDE	10,736
3725187	BP AMERICA PRODUCTION CO	MONUMENT 19-03	NW NW	19	22	93	SIBERIA RIDGE	LEWIS-MESAVERDE	11,676
3725099	BP AMERICA PRODUCTION COMPANY	MONUMENT 29-03	NW SE	29	22	93	SIBERIA RIDGE	LEWIS-MESAVERDE	13,452
3725821	BP AMERICA PRODUCTION COMPANY	7-1 MONUMENT	NW SW	7	22	93	SIBERIA RIDGE	LEWIS-MESAVERDE	13,600
3724325	BP AMERICA PRODUCTION CO	MONUMENT 19-02	SE SE	19	22	93	SIBERIA RIDGE	LEWIS-MESAVERDE	14,058
3725124	BP AMERICA PRODUCTION CO	MONUMENT 29-04	SW NW	29	22	93	SIBERIA RIDGE	LEWIS-MESAVERDE	14,388
3724021	BP AMERICA PRODUCTION CO	MONUMENT 29-02	SE NW	29	22	93	SIBERIA RIDGE	LEWIS-MESAVERDE	33,150
3724018	BP AMERICA PRODUCTION CO	MONUMENT 19-01	C SW	19	22	93	SIBERIA RIDGE	MESAVERDE	9,316
3724186	YATES PETROLEUM CORPORATION	1 MONUMENT LAKE FED	C SW	20	22	93	SIBERIA RIDGE	MESAVERDE	12,522
3725797	BP AMERICA PRODUCTION COMPANY	35-1 MONUMENT	NW NW	35	22	93	SIBERIA RIDGE	MESAVERDE	15,500
3725873	BP AMERICA PRODUCTION COMPANY	17-1 MONUMENT	SW SW	17	22	93	SIBERIA RIDGE	MESAVERDE	18,000
3723808	SNYDER OIL	SIBERIA RIDGE 4-36	NW NW	36	22	94	SIBERIA RIDGE	ALMOND	115
3723889	SNYDER OIL	SIBERIA RIDGE 16-32	SE SE	32	22	94	SIBERIA RIDGE	ALMOND	4,630
3723818	SNYDER OIL	SIBERIA RIDGE 1-20	NE NE	20	22	94	SIBERIA RIDGE	ALMOND	6,006
3723732	SNYDER OIL	SIBERIA RIDGE 2-26	NW NE	26	22	94	SIBERIA RIDGE	ALMOND	6,553
3724083	SNYDER OIL	SIBERIA RIDGE 12-36	SW SW	36	22	94	SIBERIA RIDGE	ALMOND	6,754
3723502	BP AMERICA PRODUCTION COMPANY	CHAMPLIN 263 B2	SE NE	27	22	94	SIBERIA RIDGE	ALMOND	7,042
3724008	SNYDER OIL	SIBERIA RIDGE 2-36	NW NE	36	22	94	SIBERIA RIDGE	ALMOND	8,161
3723612	SNYDER OIL	SIBERIA RIDGE 1-32	NE NE	32	22	94	SIBERIA RIDGE	ALMOND	11,346
3723540	BP AMERICA PRODUCTION COMPANY	CHAMPLIN 452 C2,3,4 PAD	NE SW	23	22	94	SIBERIA RIDGE	ALMOND	12,576
3723652	SNYDER OIL	SIBERIA RIDGE 5-26	SW NW	26	22	94	SIBERIA RIDGE	ALMOND	14,024
3721755	AMOCO PRODUCTION COMPANY	452-I	C SW	17	22	94		ALMOND	16,506
3723544	BP AMERICA PRODUCTION COMPANY	CHAMPLIN 263 B3	C NW	27	22	94	SIBERIA RIDGE	ALMOND	18,818
3723604	DEVON ENERGY	SIBERIA RIDGE 16-20	SE SE	20	22	94	WAMSUTTER	ALMOND	1,570
3723656	ANADARKO PETROLEUM CORP	MANSFIELD 3-30	SW NE	30	22	94	WAMSUTTER	ALMOND	18,570
3724769	ANADARKO PETROLEUM CORP	SIBERIA RIDGE 28-1	SW NW	28	22	94	WAMSUTTER	ALMOND	18,652
3721548	SNYDER OIL	SIBERIA RIDGE 3A-10	C SW	10	22	94	SIBERIA RIDGE	ALMOND-ERICSON	11,902
3721196	AMOCO PRODUCTION COMPANY	263-B	C SW	27	22	94		ERICKSON	9,857
3725798	BP AMERICA PRODUCTION COMPANY	7-1 SOURDOUGH GULCH	SW SW	7	22	94	SIBERIA RIDGE	LEWIS-MESAVERDE	6,740
3724591	BP AMERICA PRODUCTION COMPANY	SOURDOUGH GULCH 16-02	C NE	16	22	94	SIBERIA RIDGE	LEWIS-MESAVERDE	10,682
3725825	BP AMERICA PRODUCTION COMPANY	CHAMPLIN 452 AMOCO	SW SW	11	22	94	SIBERIA RIDGE	LEWIS-MESAVERDE	11,300
3724423	BP AMERICA PRODUCTION COMPANY	CHAMPLIN 263 B5	NE SW	27	22	94	SIBERIA RIDGE	LEWIS-MESAVERDE	16,000
3721458	BP AMERICA PRODUCTION COMPANY	CHAMPLIN 452 B1	C SW	21	22	94	SIBERIA RIDGE	MESAVERDE	324
3721456	BP AMERICA PRODUCTION COMPANY	CHAMPLIN 452 E1	C SW	15	22	94	SIBERIA RIDGE	MESAVERDE	2,882
3723740	BP AMERICA PRODUCTION CO	CHAMPLIN 452 K3	NE SE	29	22	94	SIBERIA RIDGE	MESAVERDE	2,960

Table 25. Mesaverde Group Water Quality Data, WOGCC Data, Greater Green River Basin

API Number	Company	Well Name	Qtr - Qtr	Section	Township	Range	Field Name	Formation	TDS (mg/L)
3721196	AMOCO PRODUCTION COMPANY	B1 CHA 263	NW SW	27	22	94		MESAVERDE	3,212
3721749	BP AMERICA PRODUCTION CO	CHAMPLIN 452 J1	C SW	9	22	94	SIBERIA RIDGE	MESAVERDE	6,310
3724622	BP AMERICA PRODUCTION COMPANY	SOURDOUGH GULCH 03-01	C SW	3	22	94	SIBERIA RIDGE	MESAVERDE	7,876
3725960	BP AMERICA PRODUCTION COMPANY	263H2 CHAMPLIN	NW SE	13	22	94	SIBERIA RIDGE	MESAVERDE	8,020
3723819	BP AMERICA PRODUCTION CO	CHAMPLIN 452 E4	SW NW	15	22	94	SIBERIA RIDGE	MESAVERDE	8,350
2724036	BP AMERICA PRODUCTION COMPANY	SOURDOUGH 01-01	SE NW	1	22	94	SIBERIA RIDGE	MESAVERDE	8,920
3724036	BP AMERICAN PRODUCTION COMPANY	SOURDOUGH 01-01	NE SW	1	22	94	SIBERIA RIDGE	MESAVERDE	8,920
3723918	BP AMERICA PRODUCTION COMPANY	CHAMPLIN 452 E2	SE NE	15	22	94	SIBERIA RIDGE	MESAVERDE	9,084
3724959	BP AMERICA PRODUCTION COMPANY	2 CHAMPLIN 452 AMOCO 1	SW NE	17	22	94	SIBERIA RIDGE	MESAVERDE	9,400
3723778	SNYDER OIL	SIBERIA RIDGE 9-26	NE SE	26	22	94	SIBERIA RIDGE	MESAVERDE	10,501
3721953	BP AMERICA PRODUCTION CO	CHAMPLIN 452 K1	C SW	29	22	94	SIBERIA RIDGE	MESAVERDE	10,786
3721684	BP AMERICA PRODUCTION COMPANY	CHAMPLIN 452 C1	C SW	23	22	94	SIBERIA RIDGE	MESAVERDE	16,434
3723627	BP AMERICA PRODUCTION CO	CHAMPLIN 452 E3	C SE	15	22	94	SIBERIA RIDGE	MESAVERDE	24,412
3725798		Sourdough Gulch 7-1		7	22	94		MESAVERDE	867
3725771	BP AMERICA PRODUCTION COMPANY	13-1 LUMAN	SW SW	13	22	95	SIBERIA RIDGE	LEWIS-MESAVERDE	10,600
3726575	YATES PETROLEUM CORPORATION	5 STRIKE STATE	NE NW	16	22	95	STRIKE	LEWIS-MESAVERDE	6,754
3726577	YATES PETROLEUM CORPORATION	7 STRIKE STATE	SW NE	16	22	95	STRIKE	LEWIS-MESAVERDE	8,135
3725432	BP AMERICA PRODUCTION COMPANY	23-1 LUMAN	SW SW	23	22	95	WC	LEWIS-MESAVERDE	951
3726094	YATES PETROLEUM CORPORATION	4 STRIKE STATE	SW NW	16	22	95	WC	LEWIS-MESAVERDE	4,196
3725230	BP AMERICAN PRODUCTION COMPANY	LUMAN 15-01	NE NW	15	22	95	WC	LEWIS-MESAVERDE	5,930
3725261	BP AMERICAN PRODUCTION COMPANY	LUMAN 09-02	NW NW	9	22	95	WC	LEWIS-MESAVERDE	6,545
3726580	YATES PETROLEUM CORPORATION	6 STRIKE STATE	NE NE	16	22	95	WC	LEWIS-MESAVERDE	6,789
3725234	BP AMERICA PRODUCTION CO	LUMAN 05-01	NW SW	5	22	95	WC	LEWIS-MESAVERDE	8,196
3724719	BP AMERICA PRODUCTION COMPANY	LUMAN UNIT 09-01	NE SW	9	22	95	WC	LEWIS-MESAVERDE	8,372
3726282	BP AMERICA PRODUCTION COMPANY	15-03 LUMAN	SW NW	15	22	95	WC	LEWIS-MESAVERDE	8,960
3725432	BP AMERICAN PRODUCTION COMPANY	LUMAN 23-01	SW SW	23	22	95	WC	LEWIS-MESAVERDE	10,125
3720774	AMOCO PRODUCTION COMPANY	1 STOCK PO	NW SE	11	22	95		MESAVERDE	24,433
3726486	YATES PETROLEUM CORPORATION	1 SPANISH CASTLE	SW NW	12	22	95	WC	MESAVERDE	1,642
3725433	BP AMERICAN PRODUCTION COMPANY	LUMAN 03-01	NW SW	3	22	95	WC	MESAVERDE	6,455
3724760	BP AMERICA PRODUCTION CO	EAST LUMAN 01-01	SW SE	1	22	95	WC	MESAVERDE	6,888
3725231	BP AMERICAN PRODUCTION COMPANY	LUMAN 04-01	SE NW	4	22	95	WC	MESAVERDE	7,012
3725772	BP AMERICA PRODUCTION COMPANY	25-1 LUMAN	SW SW	25	22	95	WC	MESAVERDE	9,400
3723763	YATES PETROLEUM CORPORATION	2 WABASH CANNONBALL	SE NW	18	22	96	WC	ALMOND	9,963
3723763	YATES PETROLEUM	WABASH CANNONBALL 2	SE NW	18	22	96	WC	ALMOND	22,973
3725817	BP AMERICA PRODUCTION COMPANY	4-2 RED LAKE FEDERAL	NE NE	4	22	96	BATTLE SPRINGS	LEWIS-MESAVERDE	8,080
3725897	YATES PETROLEUM CORPORATION	1 LITTLE WING FED	NW NE	14	22	96	WC	LEWIS-MESAVERDE	9,957
3723252	BP AMERICA PRODUCTION COMPANY	CHAMPLIN 320 C 1AH	NW SW	1	22	96	RED DESERT	MESAVERDE	2,176
3726453	YATES PETROLEUM CORPORATION	1 MCGINNITY FED.	NW NE	26	22	96	WC	MESAVERDE	24,993
3723696	YATES PETROLEUM CORPORATION	1 WABASH CANNON BALL	SW NE	4	22	97	SHEEP CAMP	ALMOND	8,917
3724281	ANADARKO PETROLEUM CORPORATION	4-1 UPRC SWD	NW NW	1	22	102	WC	BLAIR	12,300
3722667	RIVER GAS CORPORATION	2 UPRC-1	C SW	1	22	102		BLAIR	15,200
								Average	**13,094**

Notes:

Data compiled from Wyoming Oil and Gas Conservation Commission website for Greater Green River Basin, Carbon and Sweetwater Counties (http://wogcc.state.wy.us)

Table 26. Cody/Steele Shales Water Quality Data, USGS Produced Waters Database, Greater Green River Basin

County	Field	Section	Township	Range	API Number	Well Name	Sampled Formation	Upper Depth	Lower Depth	Method	TDS (mg/L)
SWEETWATER		17	N 26	W 94	4903705970	1 R. E. MURPHY	STEELE	5,593	5,790	DST	9,553
SWEETWATER		17	N 26	W 94	4903705970	1 R. E. MURPHY	STEELE	5,593	5,792	DST	9,468
CARBON	ESPY	34	N 19	W 89	4900705200	1 POWERS-FEDERAL	NIOBRARA	3,806	3,810	UNKNOWN	28,282
CARBON	COW CREEK	6	N 16	W 91	4900706958	23-6 UNIT	MORAPOS	4,080	4,090	UNKNOWN	39,616
CARBON	COW CREEK	13	N 16	W 92	4900705086	2 UNIT	MORAPOS	3,330	3,360	DST	3,055
CARBON	COW CREEK	13	N 16	W 92	4900705086	2 UNIT	MORAPOS	3,939	3,983	DST	44,109
CARBON	CHEROKEE CREEK	14	N 15	W 91	4900705063	14-1	STEELE	2,242	2,610	WELLHEAD	4,222
SWEETWATER	PIONEER	18	N 13	W 99	4903705138	BUTTERWICK GOVERNMENT 1-18	MONTANA/BAXTER	10,271	10,451	DST	1,320
										Average	**17,453**

Notes:
Data compiled from USGS Produced Waters Database for Greater Green River Basin, Carbon and Sweetwater Counties (http://energy.cr.usgs.gov/prov/prodwat/intro.htm)

Table 27. Cody/Steele Shales Water Quality Data, WOGCC Data, Greater Green River Basin

API Number	Company	Well Name	Qtr - Qtr	Section	Township	Range	Field Name	Formation	TDS (mg/L)
705229	THOROFARE RESOURCES	ESPY #5	NW NW	23	19	89	ESPY	NIOBRARA	29,500
721470	THOROFARE RESOURCES	14-23 ESPY	SE SW	23	19	89	HATFIELD	NIOBRARA	31,127
721481	MERIT ENERGY COMPANY	1-5 WILD C	SW NW	14	15	91		SUSSEX-NIOBRARA	25,642
721100	MERIT ENERGY COMPANY	2-19 SIERR	SW NW	19	13	89		SHANNON	20,218
721180	MERIT ENERGY COMPANY	3-18 SWM	SW SE	18	13	89		SHANNON	24,657
721185	MERIT ENERGY COMPANY	4-19 SIERR	NE NE	19	13	89		SHANNON	25,759
721297	MERIT ENERGY COMPANY	5-18 SIERR	NE SE	18	13	89		SHANNON	26,172
721298	MERIT ENERGY COMPANY	6-18 SIERR	NE SW	18	13	89		SHANNON	26,978
721296	MERIT ENERGY COMPANY	4-18 SIERR	SW NE	18	13	89		SHANNON	29,179
720723	MERIT ENERGY COMPANY	1-30 SIERR	NE NW	30	13	89		SHANNON	32,497
721198	MERIT ENERGY COMPANY	1-13 SIERR	NE SE	13	13	90		SHANNON	22,125
721266	VESSELS OIL AND GAS COMPANY	2-13 SIERR	SW NE	13	13	90		SHANNON	26,236
3726841	WEXPRO COMPANY	7A-3J TRAIL UNIT	SW NE	3	13	100	TRAIL UNIT	BAXTER	20,800
3726826	WEXPRO COMPANY	13C-15J	SW SW	15	13	100	TRAIL UNIT	BAXTER	21,800
3726734	WEXPRO COMPANY	30Q TRAIL UNIT	NE SE	4	13	100	TRAIL UNIT	BAXTER	22,200
3725849	WEXPRO COMPANY	41 CCU	NW SW	3	12	100	CANYON CREEK	BAXTER	22,400
3727059	WEXPRO COMPANY	79H CCU	SE SE	4	12	101	CANYON CREEK	BAXTER	17,600
								Average	**24,994**

Notes:
Data compiled from Wyoming Oil and Gas Conservation Commission website for Greater Green River Basin, Carbon and Sweetwater Counties (http://wogcc.state.wy.us)

Table 28. Frontier Formation Water Quality Data, USGS Produced Waters Database, Greater Green River Basin

County	Field	Section	Township	Range	API Number	Well Name	Sampled Formation	Upper Depth	Lower Depth	Method	TDS (mg/L)
SWEETWATER	LOST SOLDIER	11	N 26	W 90	4903706083	OW-5	FRONTIER/1	407	412	BAILER	14,324
SWEETWATER	LOST SOLDIER	11	N 26	W 90	4903706083	5 OW	FRONTIER/2	491	497	BAILER	10,670
CARBON		17	N 26	W 89	4900720077	33-17 FEDERAL	FRONTIER	3,670	3,720	DST	7,811
CARBON	WERTZ	7	N 26	W 89	4900705999	UNIT NO. 8	FRONTIER/WALL CREEK			PRODUCTION	13,081
CARBON	WERTZ	6	N 26	W 89		UNIT NO. 8	FRONTIER/WALL CREEK			UNKNOWN	12,952
CARBON	SHERARD	1	N 25	W 89	4900705816	GOVERNMENT #1	FRONTIER	1,860	1,880	PRODUCTION TEST	1,778
CARBON		6	N 25	W 88	4900705830	W. MAHONEY GOVERNMENT 21-6	FRONTIER	2,161	2,196	DST	1,577
CARBON		6	N 25	W 88	4900705830	UNIT NO. 21-6	FRONTIER	2,040	2,080	DST	2,354
SWEETWATER	MONUMENT BUTTE	7	N 25	W 110	4903706446	#5	FRONTIER	9,654	9,727	UNKNOWN	1,319
CARBON	SEPARATION FLATS	12	N 24	W 88	4900706937	12-1 ROSEN GOVERNMENT	FRONTIER/2	1,682	1,724	DST	2,687
LINCOLN	EMIGRANT SPRINGS	34	N 24	W 112	4902320130	GRAVEL UNIT NO 1	FRONTIER	11,188	11,270	SWAB	16,862
LINCOLN	EMIGRANT SPRINGS	34	N 24	W 112	4902320130	GRAVEL UNIT NO 1	FRONTIER	10,188	10,270	UNKNOWN	16,453
LINCOLN	SHUTE CREEK	32	N 23	W 112	4902320113	SHUTE CREEK UNIT NO 1	FRONTIER	10,754	10,847	HEATER/TREATER	12,828
LINCOLN	SHUTE CREEK	32	N 23	W 112	4902320113	SHUTE CREEK UNIT NO 1	FRONTIER	10,754	10,808	PRODUCTION	15,058
LINCOLN	EMIGRANT SPRINGS	2	N 23	W 112	4902305081	UNIT NO. 5	FRONTIER/2	10,188	10,361	PRODUCTION	14,258
LINCOLN	EMIGRANT SPRINGS	15	N 23	W 112	4902305077	UNIT NO. 3	FRONTIER/2	10,480	10,529	PRODUCTION	17,010
LINCOLN	SHUTE CREEK	32	N 23	W 112	4902320113	WELL NO 1	FRONTIER/SECOND	10,754	10,847	TANK	9,615
LINCOLN	SHUTE CREEK	32	N 23	W 112	4902320113	SHUTE CREEK UNIT #1	FRONTIER/SECOND	10,754	10,808	UNKNOWN	12,726
LINCOLN	SHUTE CREEK	32	N 23	W 112	4902320113	WELL NO 1	FRONTIER/SECOND	10,754	10,847	PRODUCTION	11,882
LINCOLN	SHUTE CREEK	32	N 23	W 112	4902320113	WELL NO 1	FRONTIER/SECOND	10,754	10,847	PRODUCTION	11,491
SWEETWATER	NITCHIE GULCH	11	N 23	W 104	4903706427	GOVERNMENT-AMAX 11-10	FRONTIER/2	8,656	8,756	WELLHEAD	16,890
SWEETWATER	NITCHIE GULCH	11	N 23	W 104	4903706427	GOVERNMENT-AMAX 11-10	FRONTIER/2	8,656	8,756	WELLHEAD	18,719
SWEETWATER	NITCHIE GULCH	12	N 23	W 104	4903705920	ROGERS-GOVERNMENT 1-12	FRONTIER/2, 3	8,067	8,234	PRODUCTION	10,041
SWEETWATER	NITCHIE GULCH	19	N 23	W 103	4903705907	UNIT NO. 5	FRONTIER	7,872	8,017	PRODUCTION	1,325
SWEETWATER			N 23	W 103		NITCHIE GULCH #4	FRONTIER			UNKNOWN	1,241
SWEETWATER	WHISKEY BUTTES	24	N 22	W 111	4903720552	WHISKY BUTTE UNIT NO 1	FRONTIER	10,980	11,056	SWAB	13,400
SWEETWATER	LEUCITE HILLS	29	N 22	W 103	4903720156	UNIT NO. 1	FRONTIER	6,532	6,550	DST	6,771
SWEETWATER	BAXTER BASIN MIDDLE	29	N 22	W 103		FERGUSON GOVERNMENT 26-1	FRONTIER	2,805	2,820	DST	38,617
SWEETWATER		10	N 21	W 102	4903720760	UPPR #11-10		7,563	7,593	DST	23,304
CARBON	WILDCAT	13	N 20	W 88	4900720103	UPRR #1	FRONTIER	4,772	4,876	DST	21,975
CARBON	WILDCAT	13	N 20	W 88	4900720103	UPRR #1	FRONTIER	4,772	4,876	DST	24,797
CARBON	HATFIELD	24	N 20	W 88	4900705435	H. L. NUTTING #1	FRONTIER	4,678	4,707	UNKNOWN	20,735
SWEETWATER	BAXTER BASIN NORTH	23	N 20	W 104	4903705775	UPRR 1	FRONTIER	2,907	2,932	DST	20,155
SWEETWATER	BAXTER BASIN NORTH	13	N 20	W 104	4903720180	#1 UPRR (13-20-104)	FRONTIER	3,007	3,054	DST	22,238
SWEETWATER	BAXTER BASIN NORTH	11	N 20	W 104	4903720196	UP (11-20-104) NO. 2	FRONTIER	3,185	3,234	DST	16,494
SWEETWATER	BAXTER BASIN NORTH	14	N 20	W 104	4903720166	2 FEATHERSTONE-GOV'T.	FRONTIER	2,994	3,032	DST	16,475
SWEETWATER	BAXTER BASIN NORTH	24	N 20	W 104	4903705779	NO. 1 TERESA LAURUNON GOVERNMENT	FRONTIER	3,076		UNKNOWN	22,297
SWEETWATER	BAXTER BASIN NORTH	13	N 20	W 104	4903720180	UP (13-20-24) NO. 1	FRONTIER/UPPER	3,005	3,034	DST	18,651
SWEETWATER	BAXTER BASIN NORTH	26	N 20	W 104	4903705756	CAPPER'S NO. 5	FRONTIER/UPPER	2,680	2,754	DST	20,009
SWEETWATER	DEADMAN WASH	5	N 20	W 101	4903720561	CHAMPLIN 195 AMOCO A-1	FRONTIER	7,756	7,816	UNKNOWN	2,462
SWEETWATER	DEADMAN WASH	9	N 20	W 101	4903720468	CHAMPLIN 172 AMOCO A NO 1	FRONTIER/SECOND	7,791	7,809	SWAB	44,114
CARBON	SUGAR CREEK	35	N 19	W 90	4900720099	SUGAR CREEK UNIT NO. 2	FRONTIER	7,888	7,906	SEPARATOR	32,768
CARBON	SUGAR CREEK	35	N 19	W 90	4900720099	SUGAR CREEK UNIT NO. 2	FRONTIER	7,888	7,906	SEPARATOR	28,006
CARBON	SUGAR CREEK	35	N 19	W 90	4900720099	SUGAR CREEK UNIT NO. 2	FRONTIER	7,888	7,991	SWAB	24,727
CARBON	SUGAR CREEK	35	N 19	W 90	4900720099	2	FRONTIER	7,888	7,891	PRODUCTION	25,230
CARBON	SUGAR CREEK	36	N 19	W 90	490072016	UNIT 5	FRONTIER	7,840	7,896	DST	16,786
CARBON	SUGAR CREEK	36	N 19	W 90	490072016	UNIT 5	FRONTIER	7,840	7,896	DST	16,728
CARBON	SUGAR CREEK	36	N 19	W 90	490072016	UNIT 5	FRONTIER	7,840	7,896	DST	16,783
CARBON	SUGAR CREEK	26	N 19	W 90		UNIT #1	FRONTIER			PRODUCTION	24,482
CARBON	SUGAR CREEK	26	N 19	W 90	4900720034	GOV'T-TROWBRIDGE NO. 1	FRONTIER	7,754	7,778	PRODUCTION	29,986
CARBON	SUGAR CREEK	26	N 19	W 90	4900720034	GOV'T TROWBRIDGE NO. 1	FRONTIER	8,900		PRODUCTION	39,189

Table 28. Frontier Formation Water Quality Data, USGS Produced Waters Database, Greater Green River Basin

County	Field	Section	Township	Range	API Number	Well Name	Sampled Formation	Upper Depth	Lower Depth	Method	TDS (mg/L)
CARBON	SUGAR CREEK	26	N 19	W 90	4900720034	1 USA TROWBRIDGE	FRONTIER	7,620	7,689	DST	11,222
CARBON	SUGAR CREEK	35	N 19	W 90	4900720099	2 UNIT	FRONTIER/2	7,855	7,915	DST	9,334
CARBON	SUGAR CREEK	35	N 19	W 90	4900720099	2 UNIT	FRONTIER/3	7,855	8,008	DST	22,995
CARBON	ESPY	23	N 19	W 89	4900705229	UNIT NO. 1 UPRR-ESPY	FRONTIER	5,704	5,722	SEPARATOR	26,390
CARBON	ESPY	34	N 19	W 89	4900705200	1 POWERS-FEDERAL (ESPY UNIT 4)	FRONTIER/2			PRODUCTION	30,820
SWEETWATER	BAXTER BASIN NORTH	12	N 19	W 104	4903705657	CAPPERS 2	FRONTIER	2,450	2,460	UNKNOWN	28,626
SWEETWATER	BAXTER BASIN NORTH	13	N 19	W 104	4903705621	1	FRONTIER	3,040		BAILER	32,905
SWEETWATER	BAXTER BASIN NORTH	11	N 19	W 104	4903705632	CAMERON - UP. WELL NO. 2	FRONTIER			UNKNOWN	9,088
SWEETWATER	BAXTER BASIN NORTH	12	N 19	W 104	4903705630		FRONTIER	1,724		UNKNOWN	29,383
SWEETWATER	BAXTER BASIN NORTH	11	N 19	W 104	4903705632	2 CAMERON-UNION PACIFIC	FRONTIER-NUGGET			UNKNOWN	25,197
SWEETWATER	WILDCAT	10	N 19	W 103	4903705658	GOVT - LANMON B-1	FRONTIER	3,086	3,111	DST	45,867
SWEETWATER	BLACK BUTTE CREEK	8	N 19	W 102	4903705631	UPRR 8-2 UNIT	FRONTIER	4,200		DST	48,333
SWEETWATER	BLACK BUTTE CREEK	8	N 19	W 102	4903705631	UPRR 8-2	FRONTIER	4,215		UNKNOWN	3,024
SWEETWATER	BAXTER BASIN SOUTH	35	N 18	W 104	4903705339	UNIT NO. 10	FRONTIER	1,751	1,796	DST	25,259
SWEETWATER	BAXTER BASIN SOUTH	35	N 18	W 104	4903705339	UNIT NO. 10	FRONTIER	1,801	1,846	DST	17,322
SWEETWATER	BAXTER BASIN MIDDLE	26	N 18	W 104	4903720162	26-1 FERGUSON-GOV'T.	FRONTIER	2,849	2,874	DST	35,806
SWEETWATER	BAXTER BASIN MIDDLE	24	N 18	W 104	4903720410	E S LAUZER NO 2	FRONTIER	1,749	1,820	DST	33,453
SWEETWATER	BAXTER BASIN MIDDLE	24	N 18	W 104	4903720410	E S LAUZER NO 2	FRONTIER	2,540	2,590	DST	35,249
SWEETWATER	BAXTER BASIN MIDDLE	8	N 18	W 103	4903705407	C. R. HETZLER 3	FRONTIER	2,012	2,030	DST	54,100
SWEETWATER	BAXTER BASIN MIDDLE	18	N 18	W 103	4903705395	1 GH MOSEY	FRONTIER			PRODUCTION	51,746
SWEETWATER	BAXTER BASIN MIDDLE	6	N 18	W 103	4903705440	2	FRONTIER	1,948	1,972	DST	58,769
SWEETWATER	BAXTER BASIN SOUTH	18	N 18	W 103	4903705395	1	FRONTIER	1,760	2,345	UNKNOWN	53,660
SWEETWATER	BAXTER BASIN MIDDLE	6	N 18	W 103	4903720423	C R HETZLER NO 6	FRONTIER/FIRST	2,301	2,318	DST	39,141
SWEETWATER	BAXTER BASIN MIDDLE	6	N 18	W 103	4903720423	C R HETZLER NO 6	FRONTIER/FIRST	2,301	2,318	UNKNOWN	40,072
SWEETWATER	BAXTER BASIN MIDDLE	6	N 18	W 103	4903720423	C R HETZLER NO 6	FRONTIER/SECOND	2,349	2,365	DST	54,576
SWEETWATER	GOLDEN WALL	28	N 18	W 101	4903705354	UNIT NO. 1	FRONTIER	6,842	6,866	DST	60,169
SWEETWATER	BAXTER BASIN SOUTH	12	N 17	W 104	4903705328	UNIT NO. 9	FRONTIER	2,342	2,418	SEPARATOR	4,519
SWEETWATER	BAXTER BASIN SOUTH	11	N 17	W 104	4903705333	UP NO 1 11-17-104	FRONTIER	1,977	2,005	SWAB	13,734
SWEETWATER	WILDCAT	16	N 17	W 104	4903705325	1 HUSKY STATE	FRONTIER/2	4,190	4,235	DST	31,789
SWEETWATER	BAXTER BASIN SOUTH	12	N 17	W 104	4903720345	13 UNIT	FRONTIER/THIRD	2,489	2,536	DST	11,931
SWEETWATER		17	N 17	W 102	4903720589	CHAMPLIN #198-AMOCO A #1	FRONTIER/SECOND	4,369	4,511	DST	65,388
CARBON	COW CREEK	1	N 16	W 92	4900705098	3 UNIT	FRONTIER	8,921	8,940	DST	55,804
CARBON	COW CREEK	12	N 16	W 92		UNIT 1 - 12	FRONTIER-NUGGET			UNKNOWN	55,050
CARBON	COW CREEK	22	N 16	W 91	4900720252	DEEP GULCH NO 1	FRONTIER	8,046		DST	55,073
CARBON	WILDCAT	21	N 16	W 90	4900720240	ILABELLE FEDERAL NO 1	FRONTIER	7,546	7,554	SWAB	13,540
SWEETWATER		16	N 16	W 103	4903705273	2-X UNIT	FRONTIER	3,810	3,849	DST	26,126
CARBON	CHEROKEE CREEK	23	N 15	W 91	4900705062	32-23	FRONTIER	7,703	7,721	PRODUCTION	47,654
CARBON	CHEROKEE CREEK	23	N 15	W 91	4900705062	UNIT 32-23	FRONTIER	7,703	7,721	PRODUCTION	41,745
CARBON	CHEROKEE CREEK	23	N 15	W 91	4900705062	UNIT 32-23	FRONTIER	7,703	7,721	UNKNOWN	73,631
CARBON	CHEROKEE CREEK	2	N 15	W 91	4900705069	UNIT 13-2	FRONTIER	7,862	7,906	SEPARATOR	52,337
CARBON	CHEROKEE CREEK	2	N 15	W 91	4900705069	UNIT 13-2	FRONTIER	7,862	7,906	PRODUCTION	60,497
CARBON	CHEROKEE CREEK	2	N 15	W 91	4900705069	UNIT 13-2	FRONTIER	7,862	7,906	PRODUCTION	62,063
CARBON	CHEROKEE CREEK	2	N 15	W 91	4900705069	UNIT 13-2	FRONTIER	7,862	7,906	PRODUCTION	58,645
SWEETWATER	SALT WELLS	11	N 14	W 103	4903705196	UNIT 1	FRONTIER	5,810	5,836	PRODUCTION	3,921
										Average	**25,875**

Notes:
Data compiled from USGS Produced Waters Database for Greater Green River Basin, Carbon and Sweetwater Counties (http://energy.cr.usgs.gov/prov/prodwat/intro.htm)

Table 29. Frontier Formation Water Quality Data, WOGCC Data, Greater Green River Basin

API Number	Company	Well Name	Qtr - Qtr	Section	Township	Range	Field Name	Formation	TDS (mg/L)
1305204	QUESTAR EXPLORATION AND PRODUCTION	13	SE SW	4	28	93		FRONTIER	5,172
1305144	RICHARDSON OPERATING	4	NE SE	17	28	93		FRONTIER	17,319
1321277	RICHARDSON OPERATING	26 BISON B	NW NW	20	27	95		FRONTIER	9,271
1321277	RICHARDSON OPERATING	26 BISON B	NW NW	20	27	95		FRONTIER	9,981
1305084	SAYERS OPERATING COMPANY	3 BBU	SW SE	17	27	95		FRONTIER	13,106
1305084	RICHARDSON OPERATING	3 BISON B	SW SE	17	27	95		JN & KF	13,307
1305087	RICHARDSON OPERATING	19 Bison B	SE NE	17	27	95		Kf "D"/"E"	10,077
3722606	ENERVEST OPERATING LLC	10-29	C SW	29	23	103		FRONTIER	3,827
3722605	ENERVEST OPERATING LLC	9-32	C SW	32	23	103		FRONTIER	5,434
3722575	ENERVEST OPERATING LLC	6-32 PC	NW NW	32	23	103		FRONT/DAKO	4,753
3722613	ENERVEST OPERATING LLC	4-29 PC	NW SE	29	23	103		FRONT/DAKO	7,317
3723696	YATES PETROLEUM	WABASH CANNONBALL 1	SW NE	26	22	97	SHEEP CAMP	FRONTIER-2	7,939
3721067	BHP PETROLEUM USA	31-1 BL RM	NW	31	22	106		FRONTIER	1,423
3721067	BHP PETROLEUM USA	31-1 BL RM	NW	31	22	106		FRONTIER	1,611
3721067	BHP PETROLEUM USA	31-1 BL RM	NW	31	22	106		FRONTIER	1,485
3720711	INTERMOUNTAIN PROD LLC	11-16 CROOKED CANYON STATE	NW NW	16	21	103	CROOKED CANYON	FRONTIER-2	7,553
3729711	INTERMOUNTAIN PROD LLC	11-16 CROOKED CANYON STATE	NW NW	16	21	103	CROOKED CANYON	FRONTIER-2	7,700
705215	MERIT ENERGY COMPANY	ESPY #3	NW NW	26	19	89	ESPY	FRONTIER	21,700
3724099	ANADARKO PETROLEUM CORP	ROCK ISLAND 4-H	SW	6	19	97	WAMSUTTER	FRONTIER	39,061
720236	BENSON-MONTIN-GREER DRILLING	J-31X	NE SE	31	16	90		2ND FRONTR	14,416
720236	BENSON-MONTIN-GREER DRILLING	J-31X BRNS	NE SE	31	16	90		2ND FRONTR	16,730
720236	BENSON-MONTIN-GREER DRILLING	J-31X BRNS	NE SE	31	16	90		2ND FRONTR	18,974
3726757	WEXPRO COMPANY	31Q TRAIL UNIT	NW SW	16	13	100	TRAIL UNIT	BAXTER-FRONTIER-DAKOTA	24,700
3726710	WEXPRO COMPANY	Canyon Creek Unit 61Q	SE NW	36	13	101	Canyon Creek	FRONTIER	27,400
3726756	WEXPRO COMPANY	74 CCU	NW SE	4	12	101	CANYON CREEK	BAXTER-FRONTIER-DAKOTA	18,600
								Average	**12,354**

Notes:
Data compiled from Wyoming Oil and Gas Conservation Commission website for Greater Green River Basin, Carbon and Sweetwater Counties (http://wogcc.state.wy.us)

Table 30. Cloverly/Dakota Formations Water Quality Data, USGS Produced Waters Database, Greater Green River Basin

County	Field	Section	Township	Range	API Number	Well Name	Sampled Formation	Upper Depth	Lower Depth	Method	TDS (mg/L)
SWEETWATER		17	N 26	W 94	4903705970	1	CLOVERLY	9,513	9,728	DST	16,841
SWEETWATER		17	N 26	W 94	4903705970	R. E. MURPHY NO. 1	DAKOTA-INYAN KARA/LAKOTA	9,513	9,728	DST	17,059
SWEETWATER	LOST SOLDIER	2	N 26	W 90	4903706281	M-7	MUDDY	2,870	2,920	DST	5,000
SWEETWATER		4	N 26	W 90	4903706287	BATZER-LOVE GOVERNMENT NO. 1	MUDDY	4,170	4,184	SWAB	4,417
SWEETWATER		4	N 26	W 90	4903706287	BATZER-LOVE GOVERNMENT NO. 1	MUDDY	4,170	4,184	SWAB	5,163
SWEETWATER	LOST SOLDIER	3	N 26	W 90	4903706200	HUGHES 42 A	INYAN KARA/LAKOTA			PRODUCTION	13,219
SWEETWATER	LOST SOLDIER	11	N 26	W 90	4903706157	67A	CLOVERLY	2,335	2,338	PRODUCTION	5,562
SWEETWATER	LOST SOLDIER	3	N 26	W 90		A-42	INYAN KARA/LAKOTA			PRODUCTION	13,089
SWEETWATER	LOST SOLDIER	3	N 26	W 90		50	INYAN KARA/LAKOTA	1,951	1,954	TANK	4,992
SWEETWATER		4	N 26	W 90	4903706287	BATZER-LOVE GOVERNMENT NO. 1	DAKOTA	4,300		SWAB	5,692
CARBON	BAILEY DOME	21	N 26	W 89	4900705945	UNIT 1	CLOVERLY	4,652		DST	3,673
CARBON	WERTZ	7	N 26	W 89	4900705996	UNIT 7-B	DAKOTA			PRODUCTION	7,100
CARBON	BAILEY DOME	21	N 26	W 89	4900705945	1 UNIT	DAKOTA	4,505		DST	6,364
CARBON	MAHONEY DOME	34	N 26	W 88	4900705864	MAHONEY CF #7	INYAN KARA/LAKOTA	2,203	2,250	UNKNOWN	8,371
CARBON		6	N 25	W 88	4900705830	UNIT NO. 21-6	CLOVERLY	3,312	3,342	DST	2,991
CARBON		6	N 25	W 88	4900705830	UNIT NO. 21-6	CLOVERLY	3,353	3,444	DST	2,911
CARBON	BELL SPRINGS	32	N 24	W 88	4900705682	FEDERAL MOHAWK 1	CLOVERLY	1,956	1,985	DST	9,274
SWEETWATER	PINE CANYON	29	N 23	W 103	4903720032	SOHIO PINE CANYON 3	DAKOTA/THIRD	8,318	8,528	WELLHEAD	9,246
SWEETWATER	TWIN ROCKS	29	N 21	W 103	4903705826	UNIT 1	CLOVERLY	4,571	4,593	DST	20,003
SWEETWATER	BAXTER BASIN NORTH	32	N 21	W 103	4903705813	WALTER SCOVILLE 1	CLOVERLY	4,120	4,290	UNKNOWN	16,986
SWEETWATER	TWIN ROCKS	29	N 21	W 103	4903705826	UNIT NO. 1	DAKOTA	4,571	4,593	DST	20,323
SWEETWATER	BAXTER BASIN NORTH	32	N 21	W 103	4903705813	WELL #1	DAKOTA			UNKNOWN	17,401
SWEETWATER	BAXTER BASIN NORTH	32	N 21	W 103	4903705813	1	DAKOTA-MUDDY	4,120	4,290	UNKNOWN	17,228
CARBON	HATFIELD	35	N 20	W 88	4900705338	UPRR 2	CLOVERLY	3,893	3,945	DST	11,215
CARBON	HATFIELD	35	N 20	W 88	4900705341	4 UP	DAKOTA	3,923	3,962	DST	14,534
CARBON	HATFIELD	35	N 20	W 88	4900705341	U. P. NO. 4	DAKOTA	3,932	3,944	PRODUCTION	12,462
CARBON	HATFIELD	35	N 20	W 88	4900705357	3 UP	DAKOTA	1,965	1,998	DST	11,642
CARBON		35	N 20	W 88		1	DAKOTA			UNKNOWN	24,051
CARBON		32	N 20	W 88	4900720182	USA TRIGG #1	DAKOTA	7,395	7,423	DST	6,827
CARBON	HATFIELD	35	N 20	W 88	4900705338	UNION PACIFIC #2	DAKOTA-TENSLEEP	3,895	6,072	WELLHEAD	5,822
SWEETWATER	BAXTER BASIN NORTH	24	N 20	W 104	4903705779	TERESA LAURUNEN - GOV'T 1	CLOVERLY	3,599	3,610	DST	11,546
SWEETWATER	BAXTER BASIN NORTH	26	N 20	W 104	4903705757	G. W. CAPPERS 4	CLOVERLY	3,420	3,446	DST	28,586
SWEETWATER	BAXTER BASIN NORTH	26	N 20	W 104	4903705756	G. W. CAPPERS 5	CLOVERLY	3,287	3,336	DST	35,558
SWEETWATER	BAXTER BASIN NORTH	13	N 20	W 104	4903720180	#1 UPRR (13-20-104)	DAKOTA	3,695	3,723	DST	25,632
SWEETWATER	BAXTER BASIN NORTH	12	N 20	W 104	4903720187	LEMANN GOV'T. #2	DAKOTA	3,702	3,775	DST	19,804
SWEETWATER	BAXTER BASIN NORTH	14	N 20	W 104	4903720166	2 FEATHERSTONE-GOV'T.	DAKOTA	3,676	3,712	DST	24,294
SWEETWATER		24	N 20	W 104	4903705779	TERESA LAURUNON GOVERNMENT NO. 1	DAKOTA	3,585	3,612	DST	1,274
SWEETWATER		24	N 20	W 104	4903705789	NO. 1 FEATHERSTONE	DAKOTA	3,670	3,671	DST	31,443
SWEETWATER		24	N 20	W 104	4903705789	NO. 1 FEATHERSTONE	DAKOTA	3,548	3,623	UNKNOWN	5,126
SWEETWATER		24	N 20	W 104	4903705789	1 FEATHERSTONE	DAKOTA	3,670	3,671	DST	24,848
SWEETWATER		24	N 20	W 104	4903705789	1 FEATHERSTONE	DAKOTA	3,670	3,671	DST	18,552
SWEETWATER		24	N 20	W 104	4903705789	O. F. FEATHERSTONE NO. 1	DAKOTA	3,672	3,695	UNKNOWN	28,797
SWEETWATER	BAXTER BASIN NORTH	26	N 20	W 104	4903705756	CAPPERS NO. 5	DAKOTA	3,340	3,384	DST	34,646
SWEETWATER	BAXTER BASIN NORTH	26	N 20	W 104	4903705757	CAPPERS #4	DAKOTA	3,462	3,568	DST	36,597
SWEETWATER	BAXTER BASIN NORTH	35	N 20	W 104	4903705725	UP 35-20-104: WELL NO. 1	DAKOTA	3,556	3,594	UNKNOWN	1,305
SWEETWATER	BAXTER BASIN NORTH	23	N 20	W 104	4903705775	U. P. NO. 1	DAKOTA	3,448	3,630	UNKNOWN	11,735
SWEETWATER	BAXTER BASIN NORTH	23	N 20	W 104	4903705775	CAMERON U.P. NO. 1	DAKOTA	3,448	3,638	PRODUCTION	10,563
SWEETWATER	BAXTER BASIN NORTH	11	N 20	W 104	4903705830	WELL #1	DAKOTA			UNKNOWN	15,395
SWEETWATER	BAXTER BASIN NORTH	26	N 20	W 104	4903705761	GOVT 1	DAKOTA	3,439	3,470	UNKNOWN	1,298
SWEETWATER	DEADMAN WASH	5	N 20	W 101	4903720561	CHAMPLIN 195 AMOCO A-1	DAKOTA			UNKNOWN	2,777
CARBON	SUGAR CREEK	36	N 19	W 90	490072016	UNIT 5	MUDDY	8,516	8,556	DST	13,202
CARBON	HATFIELD	2	N 19	W 88	4900705312	#3 GOVERNMENT	MUDDY	3,909	3,937	UNKNOWN	11,569
CARBON	HATFIELD	2	N 19	W 88	4900705302		MUDDY	3,850		UNKNOWN	18,337
CARBON		2	N 19	W 88	4900705299	3	MUDDY	3,850		UNKNOWN	7,225

Table 30. Cloverly/Dakota Formations Water Quality Data, USGS Produced Waters Database, Greater Green River Basin

County	Field	Section	Township	Range	API Number	Well Name	Sampled Formation	Upper Depth	Lower Depth	Method	TDS (mg/L)
CARBON	HATFIELD	2	N 19	W 88	4900705312	#3 GOVERNMENT	DAKOTA	3,975	4,405	DST	9,454
CARBON		2	N 19	W 88	4900705299	3	DAKOTA	3,931	3,938	UNKNOWN	11,869
SWEETWATER	BAXTER BASIN NORTH	11	N 19	W 104	4903705641	1	DAKOTA	3,850	3,919	DST	16,137
SWEETWATER	BAXTER BASIN NORTH	13	N 19	W 104	4903705622	UP 13-2	DAKOTA			UNKNOWN	34,128
SWEETWATER	BAXTER BASIN NORTH	2	N 19	W 104	4903705693	CAPPERS #3	DAKOTA	3,122	3,147	UNKNOWN	32,904
SWEETWATER	BAXTER BASIN NORTH	13	N 19	W 104	4903705621	1	DAKOTA	3,040		BAILER	33,741
SWEETWATER		30	N 19	W 103	4903705528	#1 HILL	DAKOTA	3,400	3,424	DST	23,573
SWEETWATER	SIXMILE SPRING	20	N 18	W 104	4903705361	GOV'T 20-1	CLOVERLY	4,656	4,658	DST	21,110
SWEETWATER	BAXTER BASIN SOUTH	35	N 18	W 104	4903705334	UNIT NO. 10	DAKOTA	2,243	2,270	DST	12,633
SWEETWATER	BAXTER BASIN SOUTH	35	N 18	W 104	4903705339	UNIT NO. 10	DAKOTA	2,350	2,370	DST	7,936
SWEETWATER	BAXTER BASIN MIDDLE	26	N 18	W 104	4903720162	26-1 FERGUSON-GOV'T.	DAKOTA	3,382	3,425	DST	36,132
SWEETWATER	BAXTER BASIN MIDDLE	8	N 18	W 103	4903705407	C. R. HETZLER #3	DAKOTA	2,370	2,390	DST.	13,506
SWEETWATER	BAXTER BASIN MIDDLE	18	N 18	W 103	4903705395	1	DAKOTA	2,579	2,614	BAILER	33,611
SWEETWATER	BAXTER BASIN SOUTH	18	N 18	W 103	49037005394	Mar-49	DAKOTA	2,270	2,345	OPEN HOLE	50,485
SWEETWATER	GOLDEN WALL	28	N 18	W 101	4903705354	1 UNIT	DAKOTA	7,308	7,378	DST	98,462
SWEETWATER	GOLDEN WALL	28	N 18	W 101	4903705354	1 UNIT	DAKOTA	7,386	7,512	DST	98,451
SWEETWATER	BAXTER BASIN NORTH	2	N 17	W 104		#11	MUDDY	2,383		UNKNOWN	10,309
SWEETWATER	WILDCAT	16	N 17	W 104	4903705325	NO. 1 HUSKY-STATE	DAKOTA	4,648	4,683	DST	30,756
SWEETWATER	WILDCAT	16	N 17	W 104	4903705325	NO. 1 HUSKY-STATE	DAKOTA	4,648	4,683	DST	26,990
SWEETWATER	BAXTER BASIN SOUTH	11	N 17	W 104	4903705333	1	DAKOTA	2,383	2,435	WELLHEAD	12,574
SWEETWATER	BAXTER BASIN SOUTH	26	N 17	W 104	4903705306	1	DAKOTA	3,540	3,557	OPEN HOLE	5,528
CARBON	COW CREEK	13	N 16	W 92	4900705087	UNIT 22-13	DAKOTA			SEPARATOR	1,982
SWEETWATER	BAXTER BASIN SOUTH	22	N 16	W 104	4903705259	A. J. POSTEN 2	CLOVERLY	2,820	2,867	SWAB	12,297
SWEETWATER		24	N 16	W 104	4903705252	GOV'T 1	CLOVERLY	3,683	3,789	DST	24,051
SWEETWATER	BAXTER BASIN SOUTH	10	N 16	W 104	4903706381	UNIT NO. 11	DAKOTA	3,020	3,050	DST	9,982
SWEETWATER	BAXTER BASIN SOUTH	10	N 16	W 104	4903706381	UNIT NO. 11	DAKOTA	3,080	3,100	DST	10,393
SWEETWATER	BAXTER BASIN SOUTH	10	N 16	W 104	4903705290	8 UNIT	DAKOTA	3,010	3,056	DST	7,557
SWEETWATER	BAXTER BASIN SOUTH	10	N 16	W 104	4903705290	8 UNIT	DAKOTA	2,815	2,900	DST	8,009
SWEETWATER	BAXTER BASIN SOUTH	10	N 16	W 104	4903705275	UNIT NO. 6	DAKOTA	2,645	2,672	SWAB	8,700
SWEETWATER	BAXTER BASIN SOUTH	22	N 16	W 104	4903705259	A. J. POSTON NO. 2	DAKOTA	2,813	2,868	DST	5,617
SWEETWATER	BAXTER BASIN SOUTH	10	N 16	W 104		UNIT NO. 2	DAKOTA	2,610	2,635	SWAB	9,901
SWEETWATER	BAXTER BASIN SOUTH	21	N 16	W 104	4903705257	UNION PACIFIC NO. 1	DAKOTA-FRONTIER	2,820	2,925	SWAB	10,970
SWEETWATER	WILDCAT	16	N 16	W 103	4903705273	2-X BURNT CANYON	DAKOTA	4,216	4,252	DST	27,138
SWEETWATER	BAXTER BASIN MIDDLE	7	N 16	W 103		2	DAKOTA			UNKNOWN	30,666
CARBON		11	N 15	W 91	4900705066	UNIT 1	CLOVERLY	8,291	8,341	DST	7,445
CARBON	CHEROKEE CREEK	23	N 15	W 91	4900705062	UNIT 32-23	MUDDY	8,226	8,261	PRODUCTION	25,677
CARBON	CHEROKEE CREEK	23	N 15	W 91	4900705062	UNIT 32-23	DAKOTA	8,289	8,346	PRODUCTION	30,674
CARBON	CHEROKEE CREEK	23	N 15	W 91	4900705062	UNIT 32-23	DAKOTA	8,289	8,346	SEPARATOR	33,676
CARBON		11	N 15	W 91	4900705066	DAD UNIT #1	DAKOTA	8,241	8,341	UNKNOWN	8,716
CARBON		11	N 15	W 91	4900705066	1	DAKOTA	8,291	8,341	DST	6,650
CARBON	CHEROKEE CREEK	23	N 15	W 91	4900705062	32-23 CHEY-075340-B	DAKOTA	8,287	8,395	TANK	27,018
CARBON	CHEROKEE CREEK	23	N 15	W 91	4900705062	UNIT 32-23	DAKOTA-MUDDY	8,289	8,346	PRODUCTION	26,152
SWEETWATER	JOYCE CREEK	7	N 15	W 103	4903705228	UNIT 24-7A	DAKOTA	3,882		PRODUCTION	51,927
SWEETWATER	JOYCE CREEK	8	N 15	W 103	4903705233	UNIT 23-8A	DAKOTA	3,952	3,980	DST	11,459
SWEETWATER	JOYCE CREEK	8	N 15	W 103	4903705233	32-8A WYOMING 04433	DAKOTA	3,859	4,420	HEATER/TREATER	68,331
SWEETWATER	SALT WELLS	11	N 14	W 103	4903705196	UNIT NO. 1	DAKOTA	6,262	6,286	PRODUCTION	22,135
SWEETWATER	SALT WELLS	11	N 14	W 103	4903705196	1	DAKOTA	6,262	6,286	PRODUCTION	23,658
SWEETWATER	SALT WELLS	11	N 14	W 103	4903705196	1 WYOMING 045810	DAKOTA-FRONTIER	5,792	6,402	SEPARATOR	22,815
CARBON	SAVERY	15	N 13	W 89	4900706984	LUFF-MARTINETS-ALPINE GOV'T #1	DAKOTA	6,053	6,066	DST	4,615
										Average	18,428

Notes:
Data compiled from USGS Produced Waters Database for Greater Green River Basin, Carbon and Sweetwater Counties (http://energy.cr.usgs.gov/prov/prodwat/intro.htm)

Table 31. Cloverly/Dakota Formations Water Quality Data, WOGCC Data, Greater Green River Basin

API Number	Company	Well Name	Qtr - Qtr	Section	Township	Range	Field Name	Formation	TDS (mg/L)
1321869	FLYING J OIL AND GAS	H.S. #39 TREATER	SW SW	16	28	93	HAPPY SPRINGS	DAKOTA	14,464
1305209	RICHARDSON OPERATING	18	SE SW	4	28	93		DAKOTA-LAKOTA	8,159
1305160	ATLANTIC RICHFIELD COMPANY	Crooks Gap Unit 14	SE NE	13	28	93	Crooks Gap	MUDDY	10,288
3721724	MERIT ENERGY COMPANY	142 UNIT PATENTED	SW NE	10	26	90	LOST SOLDIER	LAKOTA	5,650
3722285	MERIT ENERGY COMPANY	142 LSU	SE SW	11	26	90		LAKOTA	8,856
3722295	WESTPORT OIL AND GAS	146 WM4	NE SE	10	26	90		LAKOTA	9,234
3722041	MERIT ENERGY COMPANY	127 LSU	NE SE	10	26	90		LAKOTA	11,512
3725820	BP AMERICA PRODUCTION COMPANY	25-01 MONUMENT LAKE	NW NW	25	22	93	WC	LAKOTA	6,640
720686	THOROFARE RESOURCES	2 UPRR	SE SE	35	20	88	HATFIELD	LAKOTA	5,870
720561	THOROFARE RESOURCES	1 UPRR	SW SE	35	20	98	HATFIELD	MUDDY-DAKOTA	8,200
3720468	INDUSTRIAL GAS SERVICES	172A 1	SE NW	9	20	101		DAKOTA	21,291
3720468	INDUSTRIAL GAS SERVICES	172A 1	SE NW	9	20	101		KD/KF	23,695
3720468	INDUSTRIAL GAS SERVICES	172A 1	SE NW	9	20	101		KD/KF	25,171
721175	THOROFARE RESOURCES	41-2 DAKOTA FED	NE NE	2	19	88	HATFIELD	DAKOTA	6,672
722600	BP AMERICA PRODUCTION COMPANY	23-3 HIGH POINT	NE NE	23	19	92	WC	LAKOTA	18,200
3720623	RME PETROLEUM COMPANY	19D	SE NW	31	17	101		DAKOTA	9,510
3720671	RME PETROLEUM COMPANY	28D	NE NW	22	16	101		DAKOTA	3,119
721533	MERIT ENERGY COMPANY	14-14 WILD	SE SW	14	15	91	CHEROKEE CREEK	MUDDY-DAKOTA	31,898
720184	SOUTHERN MINERAL CORP	1 BROWNING	NE NW	13	14	91		MORRISON	26,139
								Average	**13,398**

Notes:
Data compiled from Wyoming Oil and Gas Conservation Commission website for Greater Green River Basin, Carbon and Sweetwater Counties (http://wogcc.state.wy.us)

Table 32. Morrison Formation Water Quality Data, USGS Produced Waters Database, Greater Green River Basin

County	Field	Section	Township	Range	API Number	Well Name	Sampled Formation	Upper Depth	Lower Depth	Method	TDS (mg/L)	
SWEETWATER		11	N 26	W 90		P & R #9	MORRISON	2,270		UNKNOWN	9,695	
SWEETWATER	PINE CANYON	29	N 23	W 103	4903720032	UNIT NO. 3	MORRISON	8,551	8,576	PRODUCTION	7,016	
SWEETWATER	PINE CANYON	29	N 23	W 103	4903720032	UNIT 3	MORRISON	8,500		UNKNOWN	18,761	
SWEETWATER	DEADMAN WASH	9	N 20	W 101	4903720468	CHAMPLIN 172-AMOCO 1	MORRISON	8,510	8,565	DST	21,921	
SWEETWATER	BAXTER BASIN NORTH	7	N 20	W 103	4903720288	CHAMPLIN 104; AMOCO NO. 1	MORRISON	4,127	4,164	DST	3,841	
SWEETWATER	BAXTER BASIN NORTH	7	N 20	W 103	4903720288	CHAMPLIN 104; AMOCO NO. 1	MORRISON	4,164	4,177	DST	3,932	
SWEETWATER	BAXTER BASIN NORTH	26	N 20	W 104	4903705757	G. W. CAPPERS 4	MORRISON	3,670	3,691	DST	40,803	
SWEETWATER	BAXTER BASIN NORTH	26	N 20	W 104	4903705756	G. W. CAPPERS 5	MORRISON	3,459	3,481	DST	33,717	
SWEETWATER	BAXTER BASIN NORTH	13	N 20	W 104	4903720180	#1 UPRR (13-20-104)	MORRISON	3,830	3,860	DST	24,851	
SWEETWATER	BAXTER BASIN NORTH	14	N 20	W 104	4903720166	2 FEATHERSTONE-GOV'T.	MORRISON	3,794	3,850	DST	21,379	
SWEETWATER	BAXTER BASIN NORTH	23	N 20	W 104	4903705775	U. P. NO. 1	MORRISON	4,087	4,101	DST	20,154	
SWEETWATER	BAXTER BASIN NORTH	14	N 20	W 104	4903720265	FEATHERSTONE NO 3	MORRISON	3,896	3,921	DST	22,058	
SWEETWATER	BAXTER BASIN NORTH	1	N 20	W 104	4903720331	CHAMPLIN 104 AMOCO B-1	MORRISON	4,374	4,396	PRODUCTION	17,665	
SWEETWATER	AIRPORT	30	N 19	W 103	4903705528	C. S. HILL 1	MORRISON	3,695	3,710	DST	44,496	
SWEETWATER		30	N 19	W 103	4903705528	#1 HILL	MORRISON	3,825	3,850	DST	34,750	
SWEETWATER	BAXTER BASIN NORTH	13	N 19	W 104	4903705621	1	MORRISON	3,473		WELLHEAD	24,588	
SWEETWATER	BAXTER BASIN NORTH	3	N 19	W 104	4903720322	CHAMPLIN 137 AMOCO NO 1	MORRISON	3,661	3,673	DST	2,225	*
SWEETWATER	BAXTER BASIN NORTH	3	N 19	W 104	4903720322	CHAMPLIN 137 AMOCO NO 1	MORRISON	3,661	3,673	DST	2,193	*
SWEETWATER	BAXTER BASIN NORTH	3	N 19	W 104	4903720322	CHAMPLIN 137 AMOCO NO 1	MORRISON	3,661	3,673	DST	2,163	*
SWEETWATER	BAXTER BASIN NORTH	3	N 19	W 104	4903720322	CHAMPLIN 137 AMOCO NO 1	MORRISON	3,661	3,673	DST	1,925	*
SWEETWATER	BAXTER BASIN NORTH	12	N 19	W 104	4903705630	1	MORRISON/BASAL	3,563	3,625	DST	10,875	
SWEETWATER	BAXTER BASIN NORTH	12	N 19	W 104	4903705630	1	MORRISON-?	3,383	3,397	WELLHEAD	28,397	
SWEETWATER	BAXTER BASIN MIDDLE	19	N 18	W 103	4903720401	CHAMPLIN 162 AMOCO 1	MORRISON	2,301	2,332	DST	6,185	
SWEETWATER	BAXTER BASIN MIDDLE	19	N 18	W 103	4903720401	CHAMPLIN 162; AMOCO 1	MORRISON	2,751	2,761	DST	11,647	*
SWEETWATER	BAXTER BASIN MIDDLE	19	N 18	W 103	4903720401	CHAMPLIN 162; AMOCO 1	MORRISON	2,751	2,761	DST	11,430	*
SWEETWATER	BAXTER BASIN MIDDLE	19	N 18	W 103	4903720401	CHAMPLIN 162; AMOCO 1	MORRISON	2,751	2,761	DST	11,568	*
SWEETWATER	BAXTER BASIN MIDDLE	19	N 18	W 103	4903720401	CHAMPLIN 162; AMOCO 1	MORRISON	2,751	2,761	DST	16,056	*
SWEETWATER	BAXTER BASIN SOUTH	10	N 16	W 104	4903706381	UNIT NO. 11	MORRISON	3,282	3,395	DST	8,131	
SWEETWATER	CANYON CREEK	3	N 12	W 101	4903705104	UNIT NO. 17	MORRISON	13,155	13,345	DST	27,036	
										Average	**19,350**	*

Notes:

Data compiled from USGS Produced Waters Database for Greater Green River Basin, Carbon and Sweetwater Counties (http://energy.cr.usgs.gov/prov/prodwat/intro.htm)

* Duplicate samples from identical wells were averaged to calculate formation-wide average within area of interest.

Table 33. Sundance Formation Water Quality Data, USGS Produced Waters Database, Greater Green River Basin

County	Field	Section	Township	Range	API Number	Well Name	Sampled Formation	Upper Depth	Lower Depth	Method	TDS (mg/L)	
CARBON	BAILEY DOME	21	N 26	W 89		1	SUNDANCE	5,098	5,222	DST	3,227	
SWEETWATER	LOST SOLDIER	10	N 26	W 90	4903706117	BLAIR OIL 79 A	SUNDANCE	1,888	1,967	UNKNOWN	4,202	
SWEETWATER	LOST SOLDIER	3	N 26	W 90		INJECTION WATER	SUNDANCE			UNKNOWN	4,214	
SWEETWATER	LOST SOLDIER	2	N 26	W 90		UTAH OIL RFG. CO. 7 A	SUNDANCE			BAILER	9,191	
SWEETWATER	LOST SOLDIER		N 26	W 90			SUNDANCE			UNKNOWN	4,198	
SWEETWATER	LOST SOLDIER	3	N 26	W 90		47	SUNDANCE	2,005	2,010	TANK	3,799	
CARBON	BELL SPRINGS	6	N 23	W 88	4900705671	1 JOHNSON	SUNDANCE	2,272	2,360	UNKNOWN	4,730	
SWEETWATER	BAXTER BASIN NORTH	26	N 20	W 104	4903705757	G. W. CAPPERS 4	ENTRADA	4,100	4,140	DST	37,378	
SWEETWATER	BAXTER BASIN NORTH	23	N 20	W 104	4903705775	U.P. NO. 1	ENTRADA/UPPER	4,267	4,277	DST	12,830	
SWEETWATER	BAXTER BASIN NORTH	23	N 20	W 104	4903705775	U. P. NO. 1	ENTRADA/LOWER	4,300	4,341	DST	12,398	
SWEETWATER	BAXTER BASIN NORTH	36	N 20	W 104	4903705712	1	SUNDANCE-NUGGET	4,506	4,555	DST	10,387	
SWEETWATER	BAXTER BASIN NORTH	11	N 20	W 104	4903705803	1	SUNDANCE	4,500	4,535	DST	30,943	
SWEETWATER	AIRPORT	30	N 19	W 103	4903705528	C. S. HILL 1	SAN RAFAEL	4,107	4,188	DST	11,059	
SWEETWATER	BAXTER BASIN NORTH	18	N 19	W 103	4903705593	1	SUNDANCE	4,090	4,119	DST	9,286	
SWEETWATER	BAXTER BASIN NORTH	2	N 19	W 104	4903705693	CAPPERS 3	ENTRADA	3,794		DST	23,680	
SWEETWATER	BAXTER BASIN NORTH	22	N 19	W 104	4903705584	1	SUNDANCE	4,241	4,259	WELLHEAD	17,984	
SWEETWATER	BAXTER BASIN NORTH	24	N 19	W 104	4903705582	1	SUNDANCE	3,506	3,528	SEPARATOR	18,223	
SWEETWATER	BAXTER BASIN NORTH	12	N 19	W 104	4903705630	1	SUNDANCE	3,388	3,392	TANK	27,930	
SWEETWATER	BAXTER BASIN NORTH	2	N 19	W 104	4903705694	1	SUNDANCE	3,598	3,645	BAILER	50,377	
SWEETWATER	BAXTER BASIN NORTH	2	N 19	W 104	4903705694	1	SUNDANCE	3,598	3,660	UNKNOWN	41,912	
SWEETWATER	BAXTER BASIN NORTH	13	N 19	W 104	4903705621	1	SUNDANCE	3,465	3,473	WELLHEAD	28,923	*
SWEETWATER	BAXTER BASIN NORTH	13	N 19	W 104	4903705621	1	SUNDANCE	3,465	3,473	BAILER	26,344	*
SWEETWATER	BAXTER BASIN NORTH	13	N 19	W 104	4903705621	1	SUNDANCE	3,465	3,473	BAILER	24,894	*
SWEETWATER	BAXTER BASIN NORTH	10	N 19	W 104	4903705644	1	SUNDANCE	3,604	3,641	UNKNOWN	35,865	
SWEETWATER	BAXTER BASIN NORTH		N 19	W 104		1	SUNDANCE			UNKNOWN	16,292	
SWEETWATER	CHIMNEY ROCK	12	N 18	W 102	4903705405	1 GOVERNMENT	ENTRADA	6,490	6,630	DST	16,201	
SWEETWATER	BAXTER BASIN MIDDLE	18	N 18	W 103	4903705377	AGNES FAY 1	ENTRADA	3,120	3,235	DST	9,469	
SWEETWATER	BAXTER BASIN SOUTH	10	N 16	W 104	4903705278	1	SUNDANCE			BAILER	9,151	
SWEETWATER	BAXTER BASIN SOUTH	10	N 16	W 104	4903705278	WELL #1	SUNDANCE			UNKNOWN	7,864	
SWEETWATER	SALT WELLS	11	N 14	W 103	4903705196	UNIT #1	ENTRADA	6,995	7,023	DST	12,566	
SWEETWATER	WILDCAT	17	N 12	W 104	4903720754	TEPEE MOUNTAIN 11 NO 1	ENTRADA	11,870	11,944	SWAB	28,231	
CARBON	BAGGS SOUTH	10	N 12	W 92	4900705018	UNIT NO. 8	SUNDANCE	14,140	14,273	DST	36,315	
										Average	**17,887**	

Notes:
Data compiled from USGS Produced Waters Database for Greater Green River Basin, Carbon and Sweetwater Counties (http://energy.cr.usgs.gov/prov/prodwat/intro.htm)

Table 34. Nugget Formation Water Quality Data, USGS Produced Waters Database, Greater Green River Basin

County	Field	Section	Township	Range	API Number	Well Name	Sampled Formation	Upper Depth	Lower Depth	Method	TDS (mg/L)
CARBON	WERTZ	6	N 26	W 89		21 UNIT	NUGGET	4,240	4,250	PRODUCTION	8,107
SWEETWATER	LOST SOLDIER	11	N 26	W 90	4903720134	#1 FEATHERSTONE	NUGGET	5,460	5,500	PRODUCTION	4,450
SWEETWATER	LOST SOLDIER	10	N 26	W 90	4903706001	C-115 UNIT TRACT 13	NUGGET	2,883	2,918	DST	3,785
SWEETWATER	LOST SOLDIER	10	N 26	W 90		UNIT T-109	NUGGET-SUNDANCE			PRODUCTION	4,015
CARBON		6	N 25	W 88	4900705830	UNIT NO. 21-6	NUGGET	3,871	3,913	DST	3,081
CARBON	WILDCAT	1	N 25	W 89	4900705816	GOVERNMENT NO. 1	NUGGET	3,429	3,475	DST	3,141
CARBON	WILDCAT	1	N 25	W 89	4900705816	GOV'T 1	NUGGET	3,429	3,475	DST	3,132
SWEETWATER	LEUCITE HILLS	29	N 22	W 103	4903720156	UNIT NO. 1	NUGGET	8,115	8,160	DST	95,670
SWEETWATER	BAXTER BASIN NORTH	26	N 20	W 104	4903705757	G. W. CAPPERS 4	NUGGET	4,365	4,375	DST	10,372
SWEETWATER	BAXTER BASIN NORTH	23	N 20	W 104	4903705775	U. P. NO. 1	NUGGET	4,577	4,587	DST	10,793
SWEETWATER	BAXTER BASIN NORTH	36	N 20	W 104	4903705712	1	NUGGET	4,169	4,223	DST	4,998
SWEETWATER	AIRPORT	30	N 19	W 103	4903705528	C. S. HILL 1	NUGGET	4,377	4,396	DST	9,787
SWEETWATER	WILDCAT	10	N 19	W 103	4903705658	GOVERNMENT-LANMON B-1	NUGGET	4,680	4,754	UNKNOWN	71,823
SWEETWATER	WILDCAT	10	N 19	W 103	4903705658	GOVERNMENT-LANMON B-1	NUGGET	4,245	4,291	DST	31,237
SWEETWATER	BAXTER BASIN NORTH	18	N 19	W 103	4903705593	1	NUGGET-SUNDANCE	4,090	4,120	DST	17,692
SWEETWATER	BAXTER BASIN NORTH	10	N 19	W 104	4903705644	J. S. LEE 1	NUGGET	4,132	4,700	DST	14,004
SWEETWATER	BAXTER BASIN NORTH	11	N 19	W 104	4903705641	1	NUGGET	4,095	4,135	PRODUCTION	10,186
SWEETWATER	BAXTER BASIN NORTH	11	N 19	W 104	4903705660	2	NUGGET	4,290	4,300	DST	9,011
SWEETWATER	BAXTER BASIN NORTH	12	N 19	W 104	4903705630	1	NUGGET	3,774	3,879	DST	11,847
SWEETWATER	BAXTER BASIN NORTH	22	N 19	W 104	4903705584	1	NUGGET	4,010	4,078	DST	10,425
SWEETWATER	BAXTER BASIN NORTH	12	N 19	W 104	4903705630	1	NUGGET	4,049		DST	9,111
SWEETWATER	BAXTER BASIN NORTH	13	N 19	W 104	4903705622	U.P. #2	NUGGET	4,015	4,034	WELLHEAD	9,590
SWEETWATER	BAXTER BASIN NORTH	13	N 19	W 104	4903705622	U.P. 2	NUGGET	4,015	4,027	UNKNOWN	3,017
SWEETWATER	BAXTER BASIN NORTH	13	N 19	W 104	4903705622	U.P. #2	NUGGET	4,015	4,027	UNKNOWN	8,835
SWEETWATER	BAXTER BASIN NORTH	2	N 19	W 104	4903705693	3 CAPPERS	NUGGET	4,064	4,076	UNKNOWN	10,369
SWEETWATER	BAXTER BASIN NORTH	2	N 19	W 104		W W	NUGGET			PRODUCTION	9,899
CARBON	HATFIELD	2	N 19	W 88	4900705312	#3 GOVERNMENT	NUGGET	4,406	4,451	DST	8,363
CARBON	SUGAR CREEK	26	N 19	W 90	4900720034	1 USA TROWBRIDGE	NUGGET	8,928	8,995	DST	10,316
SWEETWATER	CHIMNEY ROCK	12	N 18	W 102	4903705405	GOV'T 1	NUGGET	6,673	6,683	DST	24,462
SWEETWATER	CHIMNEY ROCK	12	N 18	W 102	4903705405	1 GOVERNMENT	NUGGET	6,701	6,714	DST	25,276
SWEETWATER	BAXTER BASIN MIDDLE	6	N 18	W 103	4903705440	2	NUGGET	3,542		DST	8,916
SWEETWATER	BAXTER BASIN MIDDLE	18	N 18	W 103	4903705377	1	NUGGET	3,333	3,350	DST	9,677
SWEETWATER	SIXMILE SPRING	26	N 18	W 104	4903705353	GOV'T 1	NUGGET	4,533	4,554	DST	11,764
SWEETWATER	SIXMILE SPRING	26	N 18	W 104	4903705353	GOVERNMENT ABE - 1	NUGGET			UNKNOWN	12,471
SWEETWATER	TABLE ROCK	2	N 18	W 98	4903706394	UNIT NO. 15	NUGGET	15,213	15,568	SEPARATOR	1,737
SWEETWATER	TABLE ROCK	2	N 18	W 98	4903706394	UNIT NO. 15	NUGGET	15,200		UNKNOWN	8,143
SWEETWATER	TABLE ROCK	2	N 18	W 98	4903706394	UNIT 15	NUGGET	15,213	15,568	DST	21,761
SWEETWATER	TABLE ROCK	2	N 18	W 98	4903706394	UNIT 15	NUGGET	15,213	15,568	DST	16,498
SWEETWATER	BAXTER BASIN SOUTH	10	N 16	W 104	4903705290	UNIT NO. 8	NUGGET	3,826	3,842	UNKNOWN	8,038
SWEETWATER	BAXTER BASIN SOUTH	16	N 16	W 104	4903720396	UNIT NO 15	NUGGET	3,619	3,630	DST	7,189
CARBON	COW CREEK	12	N 16	W 92	4900705095	UNIT 1	NUGGET	9,835	9,854	DST	26,868
CARBON	COW CREEK	13	N 16	W 92	4900705087	22-13	NUGGET	9,632	9,652	PRODUCTION	51,895
CARBON	COW CREEK	13	N 16	W 92	4900705087	UNIT 22-13	NUGGET	9,622	9,645	UNKNOWN	138,221
CARBON	COW CREEK	13	N 16	W 92	4900705087	UNIT 22-13	NUGGET	9,645	9,646	SWAB	118,380
CARBON	COW CREEK	13	N 16	W 92	4900705087	22-13 UNIT	NUGGET	9,632	9,652	SEPARATOR	73,240
CARBON	COW CREEK	12	N 16	W 92	4900705095	UNIT NO. 1	NUGGET	9,665	9,675	DST	51,289

Table 34. Nugget Formation Water Quality Data, USGS Produced Waters Database, Greater Green River Basin

County	Field	Section	Township	Range	API Number	Well Name	Sampled Formation	Upper Depth	Lower Depth	Method	TDS (mg/L)
CARBON	COW CREEK	12	N 16	W 92	4900705095	UNIT NO. 1	NUGGET	9,700		SWAB	83,446
CARBON	COW CREEK	12	N 16	W 92		UNIT 1 - 12	NUGGET			DST	66,343
CARBON	COW CREEK	12	N 16	W 92		1 - 12 UNIT	NUGGET			SEPARATOR	55,165
CARBON	COW CREEK	12	N 16	W 92		UNIT NO. 1 - 12	NUGGET	9,630	9,650	PRODUCTION	45,947
SWEETWATER	BITTER CREEK	22	N 16	W 99	4903720522	BITTER CREEK II UNIT NO 1	NUGGET			UNKNOWN	9,754
CARBON		11	N 15	W 91	4900705066	UNIT 1	NUGGET	8,773	8,805	DST	3,292
CARBON	CHEROKEE CREEK	23	N 15	W 91	4900705062	UNIT 22-23	NUGGET	8,774	8,800	DST	5,143
SWEETWATER	SALT WELLS	11	N 14	W 103	4903705196	UNIT 1	NUGGET	7,180	7,207	DST	8,617
CARBON	SAVERY	15	N 13	W 89	4900706984	LUFF-MARTINETS-ALPINE GOV'T #1	NUGGET	6,647	6,674	DST	4,432
CARBON	SAVERY	17	N 13	W 89	4900705219	NO. 1 UNIT	NUGGET	6,655	6,700	DST	5,213
SWEETWATER	KINNEY	18	N 13	W 99	4903705131	UNIT WELL NO 1	NUGGET	14,722	14,940	SEPARATOR	39,360
SWEETWATER	CANYON CREEK	3	N 12	W 101	4903705104	UNIT 17	NUGGET	13,790	14,253	DST	20,518
SWEETWATER	MIDDLE MOUNTAIN	11	N 12	W 103	4903720007	UNIT NO. 7	NUGGET	14,422	14,465	SWAB	61,117
SWEETWATER		11	N 12	W 103	4903720007	UNIT NO. 7	NUGGET	14,450	14,516	SWAB	50,835
SWEETWATER		17	N 12	W 104	4903720754	TEPEE MOUNTAIN 2 NO 1	NUGGET	12,040	12,080	SWAB	45,003
										Average	**25,034**

Notes:
Data compiled from USGS Produced Waters Database for Greater Green River Basin, Carbon and Sweetwater Counties (http://energy.cr.usgs.gov/prov/prodwat/intro.htm)

Table 35. Nugget Formation Water Quality Data, WOGCC Data, Greater Green River Basin

API Number	Company	Well Name	Qtr - Qtr	Section	Township	Range	Field Name	Formation	TDS (mg/L)
3724281	BARRETT RESOURCES	UPRC #4-1 SWD	NW NW	1	22	102		NUGGET	115,100
721168	THOROFARE RESOURCES	44-35 UPRR	SE SE	35	20	88	HATFIELD	NUGGET	5,120
721175	THOROFARE RESOURCES	41-2 HATFI	NE NE	2	19	88		L. NUGGET	4,450
3721114	TEXACO	32 TRU	SE SW	36	19	98		NUGGET	3,533
3721243	DEVON SFS OPERATING INC	12X-14B	NW	14	18	98		NUGGET	850
3721243	DEVON SFS OPERATING	12X-14B	NW	14	18	98		NUGGET	894
3721394	TEXACO EXPLORATION AND PRODUCTION	40 TRU	NW SW	1	18	98		NUGGET	4,538
3720832	RME PETROLEUM COMPANY	6 HIGGINS		14	17	99		NUGGET	61,900
3720832	RME PETROLEUM COMPANY	6 HIGGINS		14	17	99		NUGGET	67,574
3722327	RME PETROLEUM COMPANY	35N	NE SE	4	17	100		NUGGET	92,944
3720595	RME PETROLEUM COMPANY	17N	NW NE	9	17	100		NUGGET	94,430
3722402	RME PETROLEUM COMPANY	39N	NE NE	9	17	100		NUGGET	94,455
3720662	RME PETROLEUM COMPANY	25N	SW SE	4	17	100		NUGGET	95,323
720403	DOUBLE EAGLE PETROLEUM	CCU 3-12 I	SE SW	12	16	92	COW CREEK	NUGGET	57,900
720027	KCS MOUNTAIN RESOURCES INC	1 UNIT	NW SE	12	16	92	COW CREEK	NUGGET	84,760
								Average	**52,251**

Notes:
Data compiled from Wyoming Oil and Gas Conservation Commission website for Greater Green River Basin, Carbon and Sweetwater Counties (http://wogcc.state.wy.us)

Table 36. Phosphoria/Tensleep Formations Water Quality Data, USGS Produced Waters Database, Greater Green River Basin

County	Field	Seciton	Township	Range	API Number	Well Name	Sampled Formation	Upper Depth	Lower Depth	Method	TDS (mg/L)
CARBON	MAHONEY DOME	34	N 26	W 88	4900705841	C-5	TENSLEEP	4,300	4,445	UNKNOWN	4,538
CARBON	MAHONEY DOME	34	N 26	W 88	4900705841	MAHONEY C-5	TENSLEEP	4,300	4,413	UNKNOWN	3,618
CARBON	MAHONEY DOME	34	N 26	W 88	4900705841	C-5	TENSLEEP	4,300	4,445	UNKNOWN	4,660
CARBON	MAHONEY DOME	34	N 26	W 88	4900706860	F-4	TENSLEEP	4,300		SWAB	2,559
CARBON	MAHONEY DOME	34	N 26	W 88	4900706860	F-4	TENSLEEP			PRODUCTION	2,902
CARBON	MAHONEY DOME	34	N 26	W 88	4900706860	F-4	TENSLEEP			PRODUCTION	2,938
CARBON	MAHONEY DOME	34	N 26	W 88	4900705866	3-A	TENSLEEP	4,351		BAILER	5,900
CARBON	MAHONEY DOME	34	N 26	W 88	4900705861	3	TENSLEEP	4,293	4,505	PRODUCTION	5,437
CARBON	MAHONEY DOME	34	N 26	W 88	4900705861	F-3	TENSLEEP	4,293	4,505	WELLHEAD	3,164
CARBON	MAHONEY DOME	34	N 26	W 88	4900705860	F-4	TENSLEEP	4,408	4,532	WELLHEAD	3,330
CARBON	MAHONEY DOME	34	N 26	W 88	4900705867	F-5	TENSLEEP	4,346	4,536	UNKNOWN	4,965
CARBON	MAHONEY DOME	34	N 26	W 88	4900705861	3	TENSLEEP	4,293	4,505	TANK	5,470
CARBON	MAHONEY DOME	34	N 26	W 88	4900705866	3-A	TENSLEEP	4,351		BAILER	5,976
CARBON	MAHONEY DOME	34	N 26	W 88	4900705845	CHEY-029612(A)	TENSLEEP	4,324	4,433	UNKNOWN	2,961
CARBON	BAILEY DOME	21	N 26	W 89	4900705950	3	TENSLEEP	6,966	7,320	SWAB	2,932
CARBON	BAILEY DOME	21	N 26	W 89	4900705950	UNIT 3	TENSLEEP	6,966	7,320	SWAB	2,924
CARBON	BAILEY DOME	21	N 26	W 89	4900705950	3	TENSLEEP	6,966	7,320	SWAB	3,202
CARBON	BAILEY DOME	21	N 26	W 89	4900705950	3	TENSLEEP	6,966	7,320	SWAB	3,046
CARBON	WERTZ	7	N 26	W 89	4900705978	UNIT NO. 24	TENSLEEP	5,757	6,044	PRODUCTION	10,937
CARBON	WERTZ	7	N 26	W 89	4900705978	UNIT 24	TENSLEEP	5,757	6,044	PRODUCTION	10,829
CARBON	WERTZ	7	N 26	W 89	4900705978	ABC #24	TENSLEEP	6,044		UNKNOWN	11,935
CARBON	WERTZ	7	N 26	W 89		UNIT 26	TENSLEEP			UNKNOWN	8,735
CARBON	WERTZ	7	N 26	W 89		UNIT NO. 11	TENSLEEP	5,964	6,238	PRODUCTION	22,787
CARBON	WERTZ	7	N 26	W 89	4900705987	UNIT NO. 14	TENSLEEP	6,085	6,115	DST	17,598
CARBON	WERTZ	7	N 26	W 89	4900705987	UNIT NO. 14	TENSLEEP	6,045	6,085	DST	35,695
CARBON	WERTZ	7	N 26	W 89	4900705987	UNIT NO. 14	TENSLEEP	5,742	6,043	PRODUCTION	12,633
CARBON	WERTZ	7	N 26	W 89	4900705987	14 UNIT	TENSLEEP	5,742	6,043	PRODUCTION	13,982
CARBON	WERTZ	7	N 26	W 89	4900705987	14 UNIT	TENSLEEP	5,976	6,040	SWAB	13,321
CARBON	WERTZ	7	N 26	W 89	4900705985	10 UNIT	TENSLEEP	5,869	5,883	PRODUCTION	8,891
CARBON	WERTZ	7	N 26	W 89	4900705985	UNIT NO. 10	TENSLEEP	6,111	6,161	DST	9,212
CARBON	WERTZ	7	N 26	W 89	4900705990	UNIT NO. 34	TENSLEEP	6,022	6,192	PRODUCTION	11,387
CARBON	WERTZ	7	N 26	W 89	4900705990	UNIT NO. 34	TENSLEEP	6,022	6,192	PRODUCTION	11,340
CARBON	WERTZ	7	N 26	W 89	4900705982	UNIT NO. 15	TENSLEEP	5,754	6,103	PRODUCTION	11,795
CARBON	WERTZ	7	N 26	W 89	4900705987	UNIT 14	TENSLEEP	6,043	6,140	PRODUCTION	12,496
CARBON	WERTZ	7	N 26	W 89	4900705990	UNIT 34	TENSLEEP	6,022	6,193	PRODUCTION	11,275
CARBON	WERTZ	7	N 26	W 89	4900705985	UNIT 10	TENSLEEP	5,853	5,960	PRODUCTION	8,821
CARBON	WERTZ	6	N 26	W 89		UNIT NO. 23	TENSLEEP			PRODUCTION	16,946
CARBON	WERTZ	7	N 26	W 89	4900705982	UNIT NO. 15	TENSLEEP	5,754	6,103	SWAB	14,971
CARBON	WERTZ	6	N 26	W 89	4900706007	UNIT NO. 27	TENSLEEP	6,262	6,309	WELLHEAD	8,883
CARBON	WERTZ	6	N 26	W 89	4900706007	UNIT NO. 27	TENSLEEP	6,389	6,428	PRODUCTION	10,228
CARBON	WERTZ	6	N 26	W 89	4900706007	27	TENSLEEP	6,000	6,336	TANK	17,956
CARBON	WERTZ	6	N 26	W 89	4900706007	27	TENSLEEP	6,000	6,336	TANK	24,052
CARBON	WERTZ	6	N 26	W 89	4900706007	27	TENSLEEP	6,000	6,336	TANK	15,052
CARBON	WERTZ	6	N 26	W 89	4900706007	27	TENSLEEP	6,000	6,336	TANK	20,237
SWEETWATER		12	N 26	W 90	4903705961	55-14-G	TENSLEEP	7,081	7,164	UNKNOWN	7,199
SWEETWATER		12	N 26	W 90	4903705961	55-14-G	TENSLEEP	7,081	7,164	UNKNOWN	7,456
SWEETWATER		14	N 26	W 90	4903705961	55-14	TENSLEEP	7,080	7,164	UNKNOWN	7,404
SWEETWATER	LOST SOLDIER	14	N 26	W 90	4903705968	SHARPLES-DENKMAN NO. 1	TENSLEEP			PRODUCTION	10,179

Table 36. Phosphoria/Tensleep Formations Water Quality Data, USGS Produced Waters Database, Greater Green River Basin

County	Field	Seciton	Township	Range	API Number	Well Name	Sampled Formation	Upper Depth	Lower Depth	Method	TDS (mg/L)
SWEETWATER	LOST SOLDIER	11	N 26	W 90	4903705985	UNIT T-109	TENSLEEP	5,400		SWAB	5,605
SWEETWATER	LOST SOLDIER	11	N 26	W 90	4903705985	UNIT T-109	TENSLEEP	5,445	5,487	SWAB	5,378
SWEETWATER	LOST SOLDIER	11	N 26	W 90	4903705997	SINCLAIR 110 A	TENSLEEP	4,606	4,975	PRODUCTION	11,983
SWEETWATER	LOST SOLDIER	11	N 26	W 90	4903705997	110 UNIT	TENSLEEP	4,500		PRODUCTION	11,677
SWEETWATER	LOST SOLDIER	11	N 26	W 90	4903705997	A-110	TENSLEEP	4,500		PRODUCTION	11,644
SWEETWATER	LOST SOLDIER	10	N 26	W 90	4903705994	103	TENSLEEP	5,163	5,575	UNKNOWN	9,717
SWEETWATER	LOST SOLDIER	10	N 26	W 90	4903706012	NO. 1 GOVT.	TENSLEEP	6,583	6,633	DST	10,481
SWEETWATER	LOST SOLDIER	10	N 26	W 90	4903706018	TRACT 13; T-118	TENSLEEP	5,420	5,530	PRODUCTION	15,596
SWEETWATER	WERTZ	12	N 26	W 90	4903706019	SINCLAIR WERTZ 31	TENSLEEP	6,643		DST	8,552
SWEETWATER	LOST SOLDIER	11	N 26	W 90	4903705997	SINCLAIR 110 A	TENSLEEP	4,604	4,873	PRODUCTION	11,853
SWEETWATER	LOST SOLDIER	14	N 26	W 90	4903705968	1	TENSLEEP	5,961	6,015	PRODUCTION	10,079
SWEETWATER	LOST SOLDIER	10	N 26	W 90	4903706012	GOV'T 1	TENSLEEP	6,583	6,633	DST	10,419
SWEETWATER	LOST SOLDIER	11	N 26	W 90	4903705997	LOST SOLDIER A # 110	TENSLEEP	4,570		WELLHEAD	10,496
SWEETWATER	LOST SOLDIER	11	N 26	W 90		TRACT 13 T-78	TENSLEEP	4,063	4,441	OPEN HOLE	28,310
SWEETWATER	LOST SOLDIER	14	N 26	W 90	4903705968	1	TENSLEEP	5,940		HEATER/TREATER	21,144
SWEETWATER	LOST SOLDIER	11	N 26	W 90	4903705985	109 PATENTED	TENSLEEP	5,355		TANK	14,011
SWEETWATER	LOST SOLDIER	11	N 26	W 90		UNIT NO. 110	TENSLEEP	4,074	4,456	UNKNOWN	11,929
SWEETWATER	LOST SOLDIER	10	N 26	W 90	4903706108	TRACT 8; WELL T-2	TENSLEEP	6,106	6,138	PRODUCTION	34,009
SWEETWATER	LOST SOLDIER	2	N 26	W 90	4903706218	UNIT T-10 (TRACT 14)	TENSLEEP	5,270	5,585	SWAB	14,553
SWEETWATER	WERTZ	12	N 26	W 90	4903706130	WERTZ ABC NO. 36	TENSLEEP	6,276	6,464	PRODUCTION	13,732
SWEETWATER	WERTZ	12	N 26	W 90	4903706130	UNIT 36	TENSLEEP	6,270	6,464	PRODUCTION	15,488
SWEETWATER	WERTZ	12	N 26	W 90	4903706146	UNIT NO. 41	TENSLEEP	6,335	6,730	SWAB	14,565
SWEETWATER	WERTZ	12	N 26	W 90	4903706146	UNIT NO. 41	TENSLEEP	6,616	6,636	SWAB	24,727
SWEETWATER	WERTZ	12	N 26	W 90	4903706146	UNIT NO. 41	TENSLEEP	6,616	6,636	SWAB	27,451
SWEETWATER	WERTZ	12	N 26	W 90	4903706146	WERTZ "B" NO. 41	TENSLEEP	6,616	6,636	PRODUCTION	21,207
SWEETWATER	WERTZ	12	N 26	W 90	4903706146	WERTZ "B" 41	TENSLEEP	6,812	6,916	SWAB	10,534
SWEETWATER	LOST SOLDIER	10	N 26	W 90	4903706156	TRACT 8; T-1	TENSLEEP	5,635	6,015	PRODUCTION	21,169
SWEETWATER	LOST SOLDIER	10	N 26	W 90	4903706045	L. SOLDIER A TR 3 MLL2	TENSLEEP	5,676		PRODUCTION	23,263
SWEETWATER	LOST SOLDIER	11	N 26	W 90			TENSLEEP	4,074	4,456	SEPARATOR	12,474
SWEETWATER	LOST SOLDIER	11	N 26	W 90	4903706087	10	TENSLEEP	5,262	6,475	TANK	6,505
SWEETWATER	LOST SOLDIER	11	N 26	W 90	4903706087	10	TENSLEEP	5,262	6,475	TANK	6,679
SWEETWATER	LOST SOLDIER	11	N 26	W 90	4903706087	10	TENSLEEP	5,262	6,449	SWAB	6,392
SWEETWATER	WERTZ	1	N 26	W 90	4903706214	28	TENSLEEP	6,130		DST	6,416
SWEETWATER	LOST SOLDIER	11	N 26	W 90	4903706084	109	TENSLEEP	5,355	5,704	WELLHEAD	14,368
SWEETWATER	LOST SOLDIER		N 26	W 90		LOST SOLDIER A	TENSLEEP	4,074	4,456	UNKNOWN	16,339
SWEETWATER	WERTZ	1	N 26	W 90	4903706222	42 WERTZ-B	TENSLEEP	6,904	7,058	SWAB	29,178
SWEETWATER	WERTZ	2	N 26	W 90	4903706228	2 MCDERMOTT ESTATE	TENSLEEP	7,111	7,149	PRODUCTION	29,563
SWEETWATER	WERTZ	2	N 26	W 90	4903706228	NO. 2 MCDERMOTT ESTATE	TENSLEEP	7,239	7,291	DST	33,146
SWEETWATER	WERTZ	1	N 26	W 90	4903706238	UNIT 35-B	TENSLEEP			UNKNOWN	16,329
SWEETWATER	LOST SOLDIER	3	N 26	W 90	4903706285	TRACT 10; T-2	TENSLEEP	7,625	7,807	PRODUCTION	13,858
SWEETWATER	WERTZ	1	N 26	W 90	4903706262	UNIT D-2	TENSLEEP	6,400	6,476	SWAB	10,870
SWEETWATER	WERTZ	2	N 26	W 90	4903706273	SINCLAIR WERTZ WEST 3	TENSLEEP	7,209	7,270	SWAB	9,825
SWEETWATER	WERTZ	1	N 26	W 90	4903706245	WERTZ "ABC" #29	TENSLEEP	6,180	6,280	UNKNOWN	15,112
SWEETWATER	LOST SOLDIER	3	N 26	W 90		TRACT 13; T107	TENSLEEP	4,391	4,785	UNKNOWN	14,393
SWEETWATER	LOST SOLDIER	3	N 26	W 90		TRACT 10 UNIT C-2	TENSLEEP	6,204	6,244	SWAB	23,392
SWEETWATER	LOST SOLDIER	3	N 26	W 90		TRACT 10 UNIT C-2	TENSLEEP	6,204	6,244	SWAB	23,175
SWEETWATER	WERTZ	2	N 26	W 90		MCDERMOTT ESTATE NO. 2	TENSLEEP			PRODUCTION	27,841
SWEETWATER	WERTZ	1	N 26	W 90		WERTZ NO. 40	TENSLEEP	6,738	6,964	PRODUCTION	29,234

Table 36. Phosphoria/Tensleep Formations Water Quality Data, USGS Produced Waters Database, Greater Green River Basin

County	Field	Seciton	Township	Range	API Number	Well Name	Sampled Formation	Upper Depth	Lower Depth	Method	TDS (mg/L)
SWEETWATER	WERTZ	1	N 26	W 90		WERTZ NO. 40	TENSLEEP	6,738	6,964	PRODUCTION	28,616
SWEETWATER	WERTZ	1	N 26	W 90	4903706262	UNIT D-2	TENSLEEP	6,533	6,560	SWAB	8,853
SWEETWATER	WERTZ	1	N 26	W 90	4903706262	NO. D-2	TENSLEEP	6,400	6,476	SWAB	10,989
SWEETWATER	LOST SOLDIER	3	N 26	W 90		TRACT 5 - T - 11	TENSLEEP	5,431	5,800	PRODUCTION	12,513
SWEETWATER	WERTZ	1	N 26	W 90		28	TENSLEEP	6,130		DST	6,073
SWEETWATER	LOST SOLDIER	3	N 26	W 90		T1 TRACT 10	TENSLEEP	5,994	6,244	PRODUCTION	16,114
SWEETWATER	WERTZ	1	N 26	W 90		2	TENSLEEP	6,178		UNKNOWN	8,431
SWEETWATER	LOST SOLDIER	3	N 26	W 90		TRACT 13 T - 102	TENSLEEP	4,197	4,240	PRODUCTION	3,815
SWEETWATER		1	N 26	W 90	4903706470	UNIT NO. 4	TENSLEEP	7,142	7,176	PRODUCTION	10,820
CARBON	SHERARD	31	N 25	W 88	4900705746	1	TENSLEEP	5,047		UNKNOWN	3,317
CARBON	SHERARD	14	N 25	W 89	4900705776	1	TENSLEEP	4,966		DST	2,931
CARBON	SHERARD	14	N 25	W 89	4900705776	1	TENSLEEP	4,966		DST	2,826
CARBON	SHERARD	14	N 25	W 89	4900705776	1	TENSLEEP	4,966		DST	2,895
CARBON	SHERARD	1	N 25	W 89		1	TENSLEEP	4,966		DST	2,845
CARBON	BELL SPRINGS	32	N 24	W 88	4900705680	1	TENSLEEP	3,404		DST	6,773
CARBON	BELL SPRINGS	32	N 24	W 88	4900705680	1	TENSLEEP	3,404		DST	6,903
CARBON	BELL SPRINGS	32	N 24	W 88	4900705682	FEDERAL MOHAWK #1	TENSLEEP	3,857	3,887	UNKNOWN	6,556
CARBON	BELL SPRINGS	6	N 23	W 88	4900705671	JOHNSON 1	TENSLEEP	3,778	3,796	DST	5,968
CARBON	BELL SPRINGS	1	N 23	W 89	4900705673	#1 UPRR	TENSLEEP	4,776		DST	5,476
CARBON	ALLEN LAKE EAST	18	N 22	W 98	4900705603	#1-18	TENSLEEP	3,984	4,009	DST	17,748
CARBON	ALLEN LAKE EAST	18	N 22	W 98	4900705603	#1-18	TENSLEEP	3,984	4,009	DST	15,755
CARBON	ALLEN LAKE EAST	18	N 22	W 98	4900705603	#1-18	TENSLEEP	3,983	3,993	SWAB	5,579
SWEETWATER	BAXTER BASIN NORTH	36	N 20	W 104	4903705712	1	TENSLEEP	6,339		DST	33,219
CARBON	HATFIELD	36	N 20	W 88	4900705333	#1 STATE	TENSLEEP	6,332	6,450	SWAB	1,021
CARBON	HATFIELD	35	N 20	W 88	4900705338	U.P. NO. 2	TENSLEEP	5,784	6,072	PRODUCTION	8,144
CARBON	HATFIELD	35	N 20	W 88	490070533,	1,2,3, & 4	TENSLEEP	6,347	6,390	UNKNOWN	8,958
CARBON	HATFIELD	35	N 20	W 88	4900705357	3 UNION PACIFIC	TENSLEEP	5,855	6,084	PRODUCTION	11,192
SWEETWATER	BAXTER BASIN NORTH	22	N 19	W 104	4903705584	1	TENSLEEP	6,502	6,527	DST	12,619
SWEETWATER	BAXTER BASIN NORTH	13	N 19	W 104	4903705622	2	TENSLEEP	6,277	6,300	DST	42,595
SWEETWATER	BAXTER BASIN NORTH	13	N 19	W 104	4903705622	U.P. #2	TENSLEEP	6,260		UNKNOWN	11,360
SWEETWATER	BAXTER BASIN NORTH	11	N 19	W 104	4903705655	U P NO. 4	WEBER	6,632	6,705	DST	72,300
SWEETWATER	BAXTER BASIN NORTH	11	N 19	W 104	4903705655	4 U.P.	WEBER	6,217	6,247	DST	3,388
SWEETWATER	BAXTER BASIN NORTH		N 19	W 104	4903705660	2	TENSLEEP	6,280	6,305	DST	12,834
CARBON	HATFIELD	2	N 19	W 88	4900705280	#2 GOV'T	TENSLEEP	6,122	6,176	UNKNOWN	6,054
CARBON	HATFIELD	2	N 19	W 88	4900705280	GOV'T #2 CHEYENNE 032122-A	TENSLEEP	5,986		DST	5,481
CARBON	HATFIELD	2	N 19	W 88	4900705280	2 CHEYENNE 032122-A	TENSLEEP	5,986	6,176	TANK	5,074
CARBON	HATFIELD	2	N 19	W 88	4900705280	GOV'T #2 CHEYENNE 032122 A	TENSLEEP	5,986		DST	6,640
CARBON	HATFIELD	2	N 19	W 88	4900705311	GOVERNMENT NO. 4	TENSLEEP	5,750	5,935	PRODUCTION	5,611
CARBON	SUGAR CREEK	36	N 19	W 90	490072016	UNIT NO. 5	TENSLEEP	10,705	10,795	DST	11,608
CARBON	SUGAR CREEK	36	N 19	W 90	490072016	UNIT NO. 5	TENSLEEP	10,705	10,795	DST	12,054
CARBON	SUGAR CREEK	26	N 19	W 90	4900720034	UNIT #1 TROWBRIDGE	TENSLEEP	10,505	10,546	PRODUCTION	44,246
CARBON	SUGAR CREEK	26	N 19	W 90	4900720034	GOV'T TROWBRIDGE NO. 1	TENSLEEP	12,000		PRODUCTION	94,819
CARBON	SUGAR CREEK	26	N 19	W 90	4900720034	1 USA TROWBRIDGE	TENSLEEP	10,505	10,546	DST	13,926
CARBON	SUGAR CREEK	26	N 19	W 90	4900720034	1 USA TROWBRIDGE	TENSLEEP	10,505	10,546	DST	14,993
CARBON	SUGAR CREEK	26	N 19	W 90	4900720034	1 USA TROWBRIDGE	TENSLEEP	10,505	10,546	DST	15,486
CARBON	SUGAR CREEK	26	N 19	W 90	4900720034	1 WYO-037767-A	TENSLEEP	10,488	11,020	TANK	80,198
SWEETWATER	BAXTER BASIN MIDDLE	18	N 18	W 103	4903705377	AGNES FAY 1	PHOSPHORIA (EMBAR)	5,217	5,245	DST	15,552
SWEETWATER	BAXTER BASIN MIDDLE	18	N 18	W 103	4903705377	1 EVANSTON 018132	TENSLEEP	5,339		DST	8,237

Table 36. Phosphoria/Tensleep Formations Water Quality Data, USGS Produced Waters Database, Greater Green River Basin

County	Field	Seciton	Township	Range	API Number	Well Name	Sampled Formation	Upper Depth	Lower Depth	Method	TDS (mg/L)
SWEETWATER	BAXTER BASIN MIDDLE	18	N 18	W 103	4903705395	1	PHOSPHORIA	5,339	5,411	DST	9,121
SWEETWATER	BAXTER BASIN MIDDLE	18	N 18	W 103	4903705395	1	PHOSPHORIA	5,270	5,324	DST	13,220
SWEETWATER	BAXTER BASIN MIDDLE	18	N 18	W 103	4903705395	1 EVANSTON 018132	WEBER	5,485		DST	15,918
SWEETWATER	BAXTER BASIN MIDDLE	6	N 18	W 103	4903705440	HETZLER 2	PHOSPHORIA (EMBAR)	5,229	5,470	DST	5,500
SWEETWATER	BAXTER BASIN MIDDLE	6	N 18	W 103	4903705440	2	WEBER	5,515	5,535	DST	33,354
SWEETWATER	BRADY	15	N 16	W 101	4903720384	BRADY #3	WEBER	13,858	14,440	SEPARATOR	21,871
SWEETWATER	BRADY	2	N 16	W 101	4903720385	BRADY #2	WEBER	13,920	14,388	UNKNOWN	33,003
CARBON	DEEP CREEK	31	N 16	W 90	4900720097	DEEP CREEK UNIT 31-31	TENSLEEP	10,082	10,191	DST	10,254
CARBON	DEEP CREEK	31	N 16	W 90	4900720097	DEEP CREEK UNIT #31-31	TENSLEEP	9,994	10,066	DST	10,156
CARBON		8	N 16	W 91	4900720209	DOTY MOUNTAIN NO 1	TENSLEEP	10,865	10,913	DST	2,046
CARBON		11	N 15	W 91	4900705066	DAD UNIT WELL #1	PHOSPHORIA	10,088	10,100	UNKNOWN	23,996
CARBON		11	N 15	W 91	4900705066	G. H. VAUGHN PROD. CO. #1	TENSLEEP	10,256	10,278	UNKNOWN	28,416
CARBON		11	N 15	W 91	4900705066	DAD UNIT #1	TENSLEEP	10,230	10,307	UNKNOWN	33,181
CARBON		11	N 15	W 91	4900705066	DAD UNIT #1	TENSLEEP	10,224	10,244	UNKNOWN	25,675
SWEETWATER	POTTER MOUNTAIN	18	N 14	W 101	4903720724	KENT RANCH II WELL NO 2	WEBER	12,800		DST	101,685
CARBON	WILDCAT	36	N 13	W 88	4900705036	BATTLE MOUNTAIN STATE NO. 1	PHOSPHORIA	7,546	7,641	DST	6,062
CARBON	WILDCAT	36	N 13	W 88	4900705036	BATTLE MOUNTAIN STATE NO. 1	PHOSPHORIA	7,546	7,641	DST	5,259
CARBON		36	N 13	W 88	4900705036	BATTLE MT. STATE 1	TENSLEEP	7,642	7,670	DST	1,669
CARBON	WILDCAT	36	N 13	W 88	4900705036	BATTLE MOUNTAIN STATE NO. 1	TENSLEEP	7,642	7,670	DST	2,533
CARBON	WILDCAT	36	N 13	W 88	4900705036	BATTLE MOUNTAIN STATE NO. 1	TENSLEEP	7,642	7,670	DST	1,979
CARBON		8	N 13	W 88	4900705046	1 GOVERNMENT	PHOSPHORIA-TENSLEEP	8,010	8,089	DST	1,363
CARBON		8	N 13	W 88	4900705046	1 GOVERNMENT	PHOSPHORIA-TENSLEEP	8,010	8,089	DST	1,615
										Average	**14,378**

Notes:
Data compiled from USGS Produced Waters Database for Greater Green River Basin, Carbon and Sweetwater Counties (http://energy.cr.usgs.gov/prov/prodwat/intro.htm)

Table 37. Madison Formation Water Quality Data, USGS Produced Waters Database, Greater Green River Basin

County	Field	Section	Township	Range	API Number	Well Name	Sampled Formation	Upper Depth	Lower Depth	Method	TDS (mg/L)
CARBON	BELL SPRINGS	32	N 24	W 88	4900705680	1	MADISON	4,059	4,444	DST	6,395
CARBON	MAHONEY DOME	34	N 26	W 88	4900705864	C-7	MADISON	5,000	5,259	DST	1,200
CARBON		24	N 26	W 89	4900705934	1	MADISON	6,604	6,905	DST	2,178
CARBON		21	N 26	W 89	4900705945	GOV'T-HINTZE 1	MADISON	6,604	6,905	DST	2,242
CARBON	WERTZ	7	N 26	W 89	4900705990	UNIT NO. 34	MADISON	6,662	6,680	SWAB	8,090
CARBON	WERTZ	7	N 26	W 89	4900705993	NO. 12	MADISON	6,450	6,577	DST	14,820
CARBON	WERTZ	7	N 26	W 89	4900706000	UNIT A-13	MADISON			PRODUCTION	12,378
CARBON	WERTZ	6	N 26	W 89	4900706001	B-16	MADISON	6,975	7,028	DST	10,440
CARBON	WERTZ	6	N 26	W 89	4900706001	16	MADISON	6,550	7,004	SWAB	10,214
CARBON	WERTZ	6	N 26	W 89	4900706003	UNIT NO. 25	MADISON	6,670	7,028	UNKNOWN	15,075
CARBON	WERTZ	6	N 26	W 89	4900706003	UNIT NO. 25	MADISON	6,675	6,745	UNKNOWN	15,240
CARBON		31	N 25	W 88	4900706932	#1 SHERARD SOUTH	MADISON	5,935	6,015	PRODUCTION	4,467
CARBON	WERTZ	6	N 26	W 89	4900720380	UNIT 52	MADISON	6,838	6,921	DST	6,290
SWEETWATER	LOST SOLDIER	11	N 26	W 90	4903705985	109	MADISON	6,129	6,145	DST	9,465
SWEETWATER	LOST SOLDIER	10	N 26	W 90	4903706011	UNIT A - 114	MADISON	5,654	5,786	SWAB	24,142
SWEETWATER	WERTZ	12	N 26	W 90	4903706019	UNIT #31	MADISON	7,534	7,599	DST	3,888
SWEETWATER	LOST SOLDIER	10	N 26	W 90	4903706045	L. SOLDIER TRI 3# WELL 2	MADISON	5,814	5,841	PRODUCTION	17,459
SWEETWATER	LOST SOLDIER	11	N 26	W 90	4903706084	109 PATENTED	MADISON	6,120		DST	8,973
SWEETWATER	LOST SOLDIER	11	N 26	W 90	4903706087	10	MADISON-TENSLEEP	5,262	6,475	SEPARATOR	14,925
SWEETWATER	LOST SOLDIER	11	N 26	W 90	4903706087	10 U.S. PETROLEUM (PATENTED)	MADISON-TENSLEEP	5,262		SEPARATOR	15,246
SWEETWATER	LOST SOLDIER	10	N 26	W 90	4903706108	M-2; TRACT 8	MADISON	6,471	6,487	PRODUCTION	10,618
SWEETWATER	LOST SOLDIER	3	N 26	W 90	4903706232	DRAYTON 4 CONSOLIDATED	MADISON	5,072	5,591	PRODUCTION	13,019
SWEETWATER	LOST SOLDIER	3	N 26	W 90	4903706232	DRAYTON CONSOL. #4	MADISON	5,100	5,600	WELLHEAD	10,021
SWEETWATER	LOST SOLDIER	3	N 26	W 90	4903706232	DRAYTON 4 CONSOLIDATED	MADISON	5,072	5,591	UNKNOWN	13,920
SWEETWATER	LOST SOLDIER	3	N 26	W 90	4903706232	4 GOOD (PAT.)	MADISON	5,070	5,590	UNKNOWN	17,612
SWEETWATER	WERTZ	1	N 26	W 90	4903706238	35	MADISON	7,046	7,102	DST	3,823
SWEETWATER	WERTZ	1	N 26	W 90	4903706238	SINCLAIR WERTZ 35 B	MADISON			DST	4,034
SWEETWATER	LOST SOLDIER	2	N 26	W 90	4903706253	TRACT 14; T-10	MADISON-TENSLEEP	5,274	5,600	PRODUCTION	13,325
SWEETWATER	LOST SOLDIER	2	N 26	W 90	4903706253	C-14 UNIT TRACT 4	MADISON	6,047	6,122	UNKNOWN	17,421
SWEETWATER	LOST SOLDIER	2	N 26	W 90	4903706253	TRACT 4; C-14	MADISON	6,129	6,145	SWAB	13,257
SWEETWATER	LOST SOLDIER	3	N 26	W 90	4903706258	H WILBURN 2	MADISON	5,570	5,863	PRODUCTION	8,818
SWEETWATER	WERTZ	1	N 26	W 90	4903706262	SINCLAIR WERTZ D 2	MADISON			SWAB	8,255
SWEETWATER	WERTZ	1	N 26	W 90	4903706262	UNIT D-2	MADISON	6,762	6,800	SWAB	8,190
SWEETWATER	WERTZ	1	N 26	W 90	4903706262	UNIT D-2	MADISON	6,762	6,800	UNKNOWN	7,074
SWEETWATER	LOST SOLDIER	2	N 26	W 90	4903706281	TRACT 9; M-7	MADISON	6,045	6,140	PRODUCTION	11,725
SWEETWATER	LOST SOLDIER	2	N 26	W 90	4903706281	M-7 (TRACT 9)	MADISON	6,736	6,754	SWAB	13,769
SWEETWATER	LOST SOLDIER	2	N 26	W 90	4903706281	TRACT 9; M-7	MADISON	6,247	6,277	SWAB	9,970
SWEETWATER	LOST SOLDIER	2	N 26	W 90	4903706281	TRACT 9; M-7	MADISON	6,323	6,354	SWAB	10,875
SWEETWATER	LOST SOLDIER	2	N 26	W 90	4903706281	TRACT 9; M-7	MADISON	6,499	6,526	SWAB	11,693
SWEETWATER	LOST SOLDIER	2	N 26	W 90	4903706281	M-7 (TRACT 9)	MADISON	6,832	6,887	SWAB	32,081
SWEETWATER	LOST SOLDIER	3	N 26	W 90	4903706281	TRACT 9; M-7	MADISON	6,045	6,140	PRODUCTION	13,322
SWEETWATER		17	N 12	W 104	4903720754	TEEPEE MOUNTAIN UNIT 1	MADISON	15,840	16,097	DST	76,777
CARBON	WERTZ	7	N 26	W 89		WERTZ A #13	MADISON	6,750	6,800	UNKNOWN	12,514
SWEETWATER	LOST SOLDIER	2	N 26	W 90		TRACT 4; WELL M-3	MADISON	4,986	5,412	PRODUCTION	22,937
SWEETWATER	LOST SOLDIER	10	N 26	W 90		M-115	MADISON	7,250	7,630	PRODUCTION	14,450
SWEETWATER	LOST SOLDIER	11	N 26	W 90			MADISON	4,794	5,410	SEPARATOR	12,218
SWEETWATER	LOST SOLDIER	3	N 26	W 90		UNIT 109	MADISON	6,129	6,145	DST	10,478
SWEETWATER	LOST SOLDIER	3	N 26	W 90		UNIT NO. 109	MADISON	6,120	6,130	DST	8,483
SWEETWATER	LOST SOLDIER		N 26	W 90		LOST SOLDIER UNIT	MADISON	4,794	5,410	PRODUCTION	11,115
SWEETWATER	LOST SOLDIER	3	N 26	W 90		DRAYTON NO. 4	MADISON	4,794	5,410	PRODUCTION	13,149

Table 37. Madison Formation Water Quality Data, USGS Produced Waters Database, Greater Green River Basin

County	Field	Section	Township	Range	API Number	Well Name	Sampled Formation	Upper Depth	Lower Depth	Method	TDS (mg/L)
CARBON	WERTZ	6	N 26	W 89	4900706007	UNIT 27	AMSDEN	6,000	6,365	PRODUCTION	14,956
CARBON	WERTZ	7	N 26	W 89	4900705990	WERTZ #34	AMSDEN	6,410	6,480	UNKNOWN	11,073
SWEETWATER	WERTZ	1	N 26	W 90	4903706210	WERTZ ABC 22	AMSDEN			PRODUCTION	15,924
SWEETWATER	WERTZ	1	N 26	W 90	4903706238	35-B	AMSDEN/DARWIN	6,761	6,836	UNKNOWN	14,502
SWEETWATER	WERTZ	1	N 26	W 90	4903706238	SINCLAIR WERTZ 35 B	AMSDEN/DARWIN	6,761	6,836	DST	17,404
SWEETWATER	WERTZ	1	N 26	W 90	4903706262	D-2	AMSDEN/DARWIN	6,708	6,740	UNKNOWN	6,482
SWEETWATER	WERTZ	1	N 26	W 90	4903706230	SINCLAIR WERTZ 26	AMSDEN			PRODUCTION	7,460
SWEETWATER	WERTZ	1	N 26	W 90	4903706230	SINCLAIR WERTZ 26	AMSDEN/DARWIN			UNKNOWN	8,080
SWEETWATER	WERTZ	1	N 26	W 90	4903706230	SINCLAIR WERTZ 26	AMSDEN			PRODUCTION	7,659
SWEETWATER	WERTZ	1	N 26	W 90	4903706210	WERTZ ABC 22	AMSDEN	6,494	6,570	PRODUCTION	15,736
SWEETWATER	WERTZ	1	N 26	W 90	4903706230	WERTZ #26	AMSDEN			UNKNOWN	9,448
SWEETWATER	WERTZ	1	N 26	W 90	4903706238	WERTZ #35	AMSDEN/DARWIN	6,761	6,820	UNKNOWN	17,233
SWEETWATER	WERTZ	12	N 26	W 90	4903706168	WERTZ UNIT #37	AMSDEN	6,842	6,889	UNKNOWN	11,168
SWEETWATER	WERTZ	1	N 26	W 90	4903706230	UNIT NO. 26	AMSDEN/DARWIN			UNKNOWN	8,024
SWEETWATER	WERTZ	1	N 26	W 90	4903706262	UNIT D-2	AMSDEN			PRODUCTION	5,945
										Average	**12,449**

Notes:
Data compiled from USGS Produced Waters Database for Greater Green River Basin, Carbon and Sweetwater Counties (http://energy.cr.usgs.gov/prov/prodwat/intro.htm)

Table 38. Madison Formation Water Quality Data, WOGCC Data, Greater Green River Basin

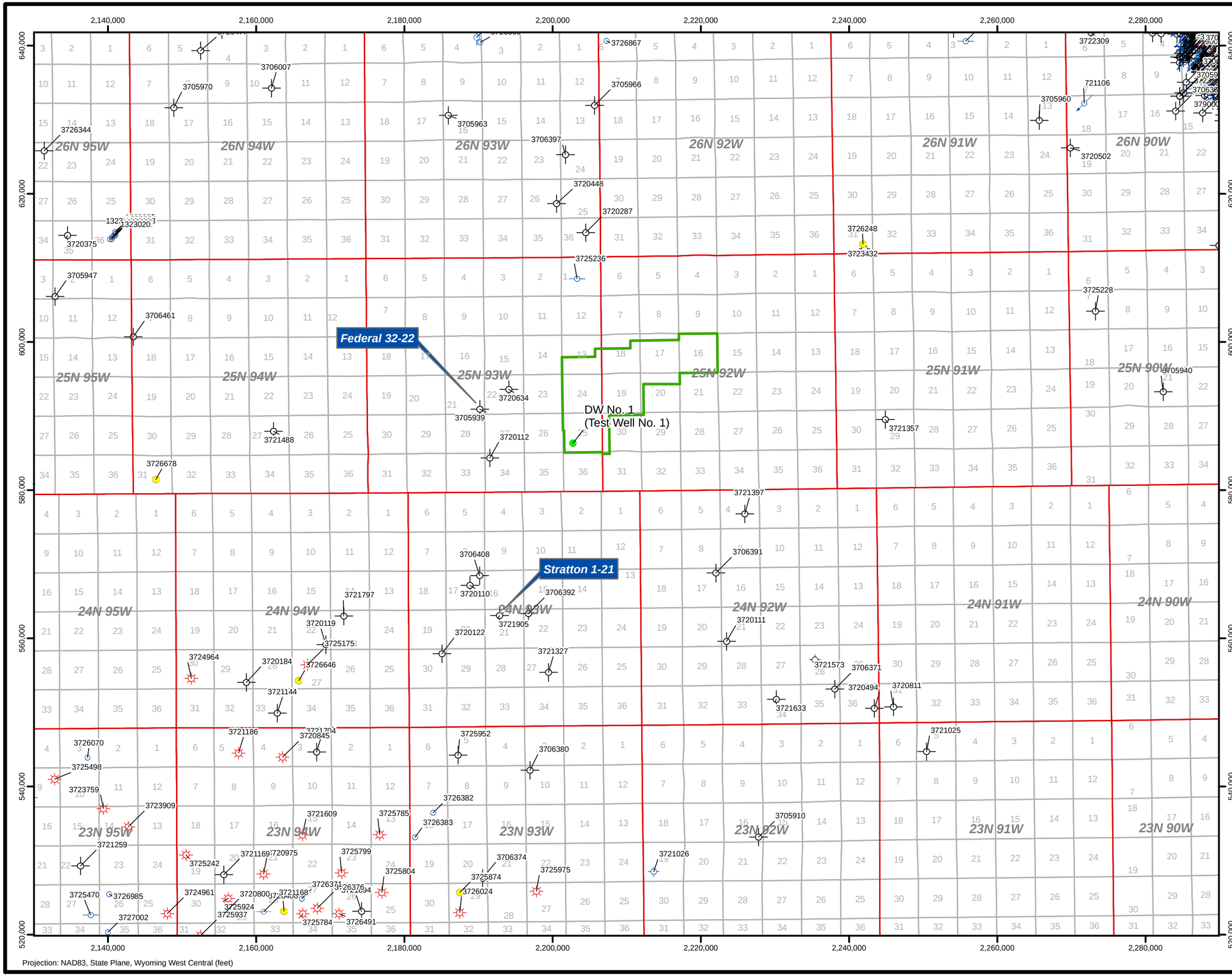
API Number	Company	Well Name	Qtr-Qtr	Section	Township	Range	Field Name	Formation	TDS (mg/L)
720993	MERIT ENERGY COMPANY	93	SW SE	6	26	89		MADISON	5,644
3706221	MERIT ENERGY COMPANY	28 WIW	SE SW	3	26	90		MADISON	6,887
3706221	MERIT ENERGY COMPANY	28 WIW	SE SW	3	26	90		MADISON	6,943
3706245	MERIT ENERGY COMPANY	29 ABC WERTZ UNIT	NE SE	1	26	90	WERTZ	DARWIN-MADISON	9,865
3706469	MERIT ENERGY COMPANY	LSU 1	NW NE	3	26	90	LOST SOLDIER	DARWIN-MADISON	9,865
3720948	TEXACO EXPLORATION AND PROD	23 TRU	NW NE	2	18	98		MADISON	54,545
3721645	MERIT ENERGY COMPANY	M119 LSU	SW NE	3	26	90		MADISON	7,387
3721713	AMOCO PRODUCTION COMPANY	139 FEDERAL	SE NW	3	26	90	LOST SOLDIER	MADISON	9,492
3721725	MERIT ENERGY COMPANY	158 LSU	SW NE	10	26	90		DARWIN/MM	16,557
								Average	**14,132**

Notes:
Data compiled from Wyoming Oil and Gas Conservation Commission website for Greater Green River Basin, Carbon and Sweetwater Counties (http://wogcc.state.wy.us)

Table 39. Flathead Sandstone Water Quality Data, USGS Produced Waters Datbase, Greater Green River Basin

County	Field	Section	Township	Range	API Number	Well Name	Sampled Formation	Upper Depth	Lower Depth	TDS (mg/L)
SWEETWATER	LOST SOLDIER	14	N 26	W 90	4903705968	TRACT 11 ; T-1	CAMBRIAN	9,012	9,062	17,018
SWEETWATER	LOST SOLDIER	10	N 26	W 90	4903706001	C-115 UNIT; TRACT 13	CAMBRIAN	7,250	7,300	12,318
SWEETWATER	LOST SOLDIER	10	N 26	W 90	4903706001	UNIT C-115	CAMBRIAN	8,208	8,268	10,308
SWEETWATER	LOST SOLDIER	10	N 26	W 90	4903706001	UNIT C-115	CAMBRIAN	8,208	8,268	13,258
SWEETWATER	LOST SOLDIER	10	N 26	W 90	4903706001	UNIT C-115	CAMBRIAN	8,283	8,457	8,418
SWEETWATER	LOST SOLDIER	10	N 26	W 90	4903706001	C-115	CAMBRIAN	8,283	8,457	9,303
SWEETWATER	LOST SOLDIER	10	N 26	W 90	4903706001	C-115	CAMBRIAN	8,283	8,457	8,736
SWEETWATER	LOST SOLDIER	10	N 26	W 90	4903706001	C-115 UNIT	CAMBRIAN	8,283	8,457	10,482
SWEETWATER	LOST SOLDIER	10	N 26	W 90	4903706045	SINCLAIR 112 A	CAMBRIAN	6,510	6,710	39,547
SWEETWATER	LOST SOLDIER	10	N 26	W 90	4903706045	SINCLAIR 112 A	CAMBRIAN	6,510	6,710	21,747
SWEETWATER	LOST SOLDIER	10	N 26	W 90	4903706045	SINCLAIR 112 A	CAMBRIAN	6,510	6,710	21,405
SWEETWATER	LOST SOLDIER	10	N 26	W 90	4903706045	LOST SOLDIER FIELD 112 A	CAMBRIAN	6,510	6,710	36,497
SWEETWATER	LOST SOLDIER	10	N 26	W 90	4903706045	LOST SOLDIER "A" #112	CAMBRIAN	5,898	6,712	24,876
SWEETWATER	LOST SOLDIER	3	N 26	W 90	4903706221	HUGHES B-12	CAMBRIAN	6,771	7,300	15,131
SWEETWATER	LOST SOLDIER	3	N 26	W 90	4903706221	TRACT 5; C-12	CAMBRIAN	7,098	7,302	13,709
SWEETWATER	LOST SOLDIER	3	N 26	W 90	4903706221	TRACT 5; C-12	CAMBRIAN	7,100	7,300	16,241
SWEETWATER	LOST SOLDIER	3	N 26	W 90	4903706221	HUGHES B-12	CAMBRIAN	7,316		20,162
SWEETWATER	WERTZ	1	N 26	W 90	4903706230	HERTZ UNIT WELL #26	CAMBRIAN	7,515	7,627	6,683
SWEETWATER	WERTZ	1	N 26	W 90	4903706230	SINCLAIR WERTZ 26	CAMBRIAN	7,515	7,627	9,332
SWEETWATER	LOST SOLDIER	2	N 26	W 90	4903706253	TRACT 4; C-14	CAMBRIAN	7,371	7,446	8,556
SWEETWATER	LOST SOLDIER	2	N 26	W 90	4903706253	TRACT 4; C-14	CAMBRIAN	7,533	7,573	9,484
SWEETWATER	LOST SOLDIER	11	N 26	W 90	4903720213	TR-13-T-127	CAMBRIAN FLATHEAD	5,831	5,998	15,140
SWEETWATER	LOST SOLDIER	11	N 26	W 90	4903720213	TR 13-C-127	CAMBRIAN	5,831	5,998	14,484
SWEETWATER	LOST SOLDIER	11	N 26	W 90	4903720213	C-127; TRACT 13	CAMBRIAN	5,831	5,998	14,401
CARBON	WERTZ	6	N 26	W 89		WERTZ NO 52	FLATHEAD	7,700	7,785	3,932
SWEETWATER	LOST SOLDIER	3	N 26	W 90		CAMBRIAN FREE WATER KNOCK OUT	CAMBRIAN FLATHEAD			12,461
SWEETWATER	LOST SOLDIER	3	N 26	W 90		TR-13-C-111	CAMBRIAN FLATHEAD	5,215	6,099	17,657
SWEETWATER	LOST SOLDIER	3	N 26	W 90		TR-9-C-9	CAMBRIAN FLATHEAD	6,052	6,752	13,232
SWEETWATER	LOST SOLDIER	3	N 26	W 90		TR-9-C-6	CAMBRIAN FLATHEAD	6,409	6,482	11,730
CARBON	WERTZ	7	N 26	W 89		WERTZ A #13	CAMBRIAN	7,600	7,620	4,030
SWEETWATER	LOST SOLDIER	11	N 26	W 90			CAMBRIAN	6,348	7,323	10,510
SWEETWATER	LOST SOLDIER	10	N 26	W 90		TRACT 13 C - 13	CAMBRIAN	6,245	7,068	17,093
SWEETWATER	LOST SOLDIER	14	N 26	W 90		TE 11 T - 1	CAMBRIAN	6,348	7,323	33,538
									Average	**15,195**

Notes:
Data compiled from USGS Produced Waters Database for Greater Green River Basin, Carbon and Sweetwater Counties (http://energy.cr.usgs.gov/prov/prodwat/intro.htm)



Legend

- Lost Creek Permit Boundary
- Test Well
- AI - Active Injector Well
- AP - Permit to Drill
- DH - Dry Hole
- DP - Drilling or Drilled Permit
- DR - Dormant
- FL - Flowing
- GL - Gas Lift
- MW - Monitor Well
- ND - Never Drilled
- NI - Notice of Intent to Abandon
- NR - No Report
- PA - Plugged and Abandoned
- PG - Producing Gas Well
- PH - Pumping Hydraulic
- PL - Plunger Lift
- PO - Producing Oil Well
- PR - Pumping Rods
- PS - Pumping Submersible
- SI - Shut - In
- SO - Suspended Operation
- SP - Well Spudded
- SR - Subsequent Report to Abandonment
- TA - Temporarily Abandoned

Note: Well Data from WOGCC as of 4/23/09

N

0 2 4 Miles

Lost Creek ISR, LLC
Littleton, Colorado, USA

Figure 1
Lost Creek Project Location Map

Lost Creek Class I UIC Permit

Project: 315-15	Date: June 2009	
LC_Class_I_UICP_Figure_1.mxd	By: JLM	Checked: AP

Petrotek
10288 West Chatfield Ave., Suite 201
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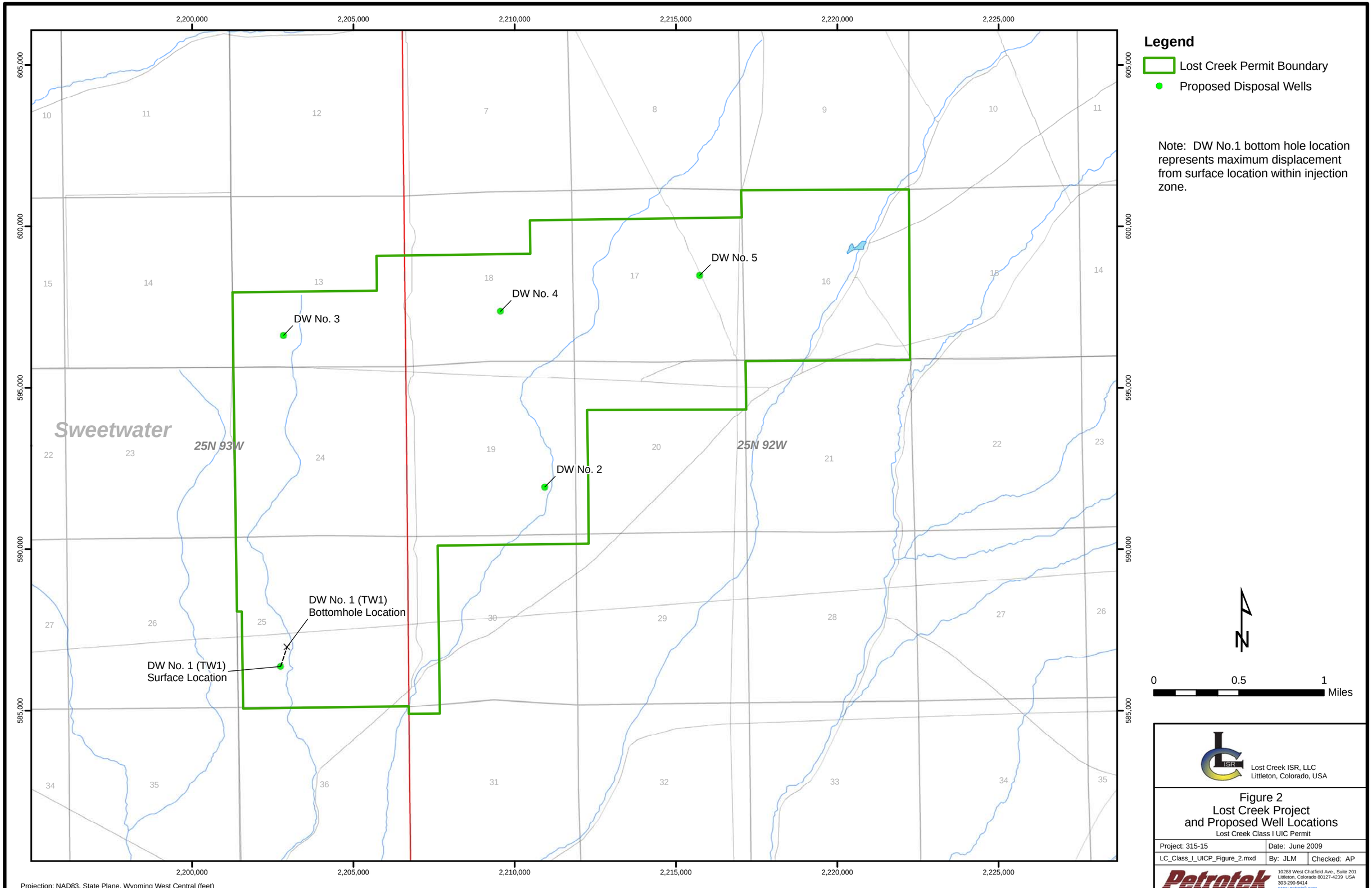
303-290-9414
www.petrotek.com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2,205,000
2,210,000
2,215,000
2,220,000
2,225,000
605,000
600,000
595,000
590,000
585,000
Sweetwater
25N 93W
25N 92W
DW No. 1 (TW1)
Bottomhole Location
DW No. 1 (TW1)
Surface Location
DW No. 2
DW No. 3
DW No. 4
DW No. 5
Legend
Lost Creek Permit Boundary
Proposed Disposal Wells
Note: DW No.1 bottom hole location represents maximum displacement from surface location within injection zone.
N
0
0.5
1
Miles
Lost Creek ISR, LLC
Littleton, Colorado, USA
Figure 2
Lost Creek Project
and Proposed Well Locations
Lost Creek Class I UIC Permit
Project: 315-15
Date: June 2009
LC_Class_I_UICP_Figure_2.mxd
By: JLM
Checked: AP
Petrotek
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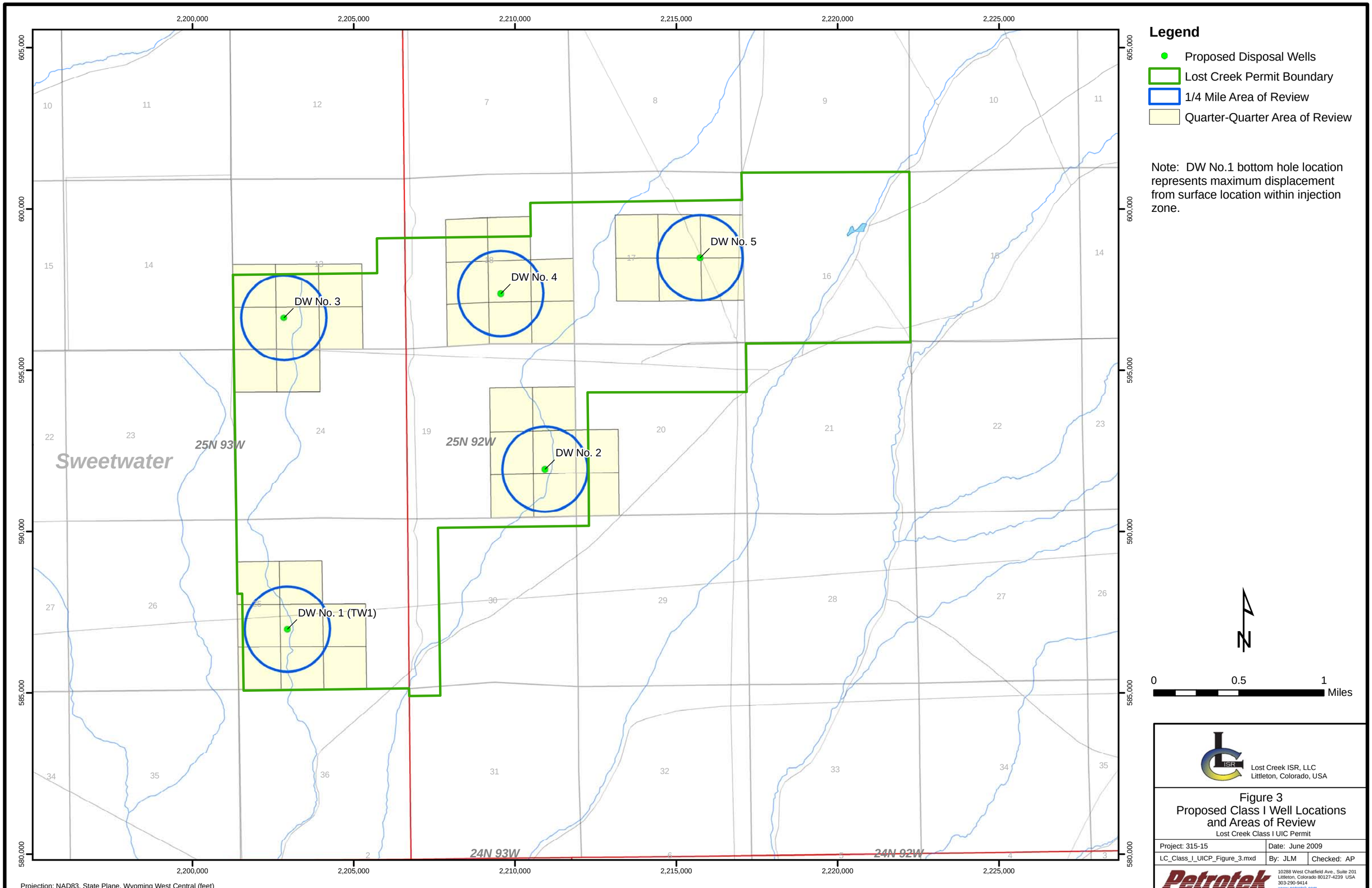
Projection: NAD83, State Plane, Wyoming West Central (feet)


Legend
Proposed Disposal Wells
Lost Creek Permit Boundary
1/4 Mile Area of Review
Quarter-Quarter Area of Review
Note: DW No.1 bottom hole location represents maximum displacement from surface location within injection zone.
DW No. 1 (TW1)
DW No. 2
DW No. 3
DW No. 4
DW No. 5
Sweetwater
25N 93W
25N 92W
24N 93W
24N 92W
0
0.5
1
Miles
N
Lost Creek ISR, LLC
Littleton, Colorado, USA
Figure 3
Proposed Class I Well Locations and Areas of Review
Lost Creek Class I UIC Permit
Project: 315-15
Date: June 2009
LC_Class_I_UICP_Figure_3.mxd
By: JLM
Checked: AP
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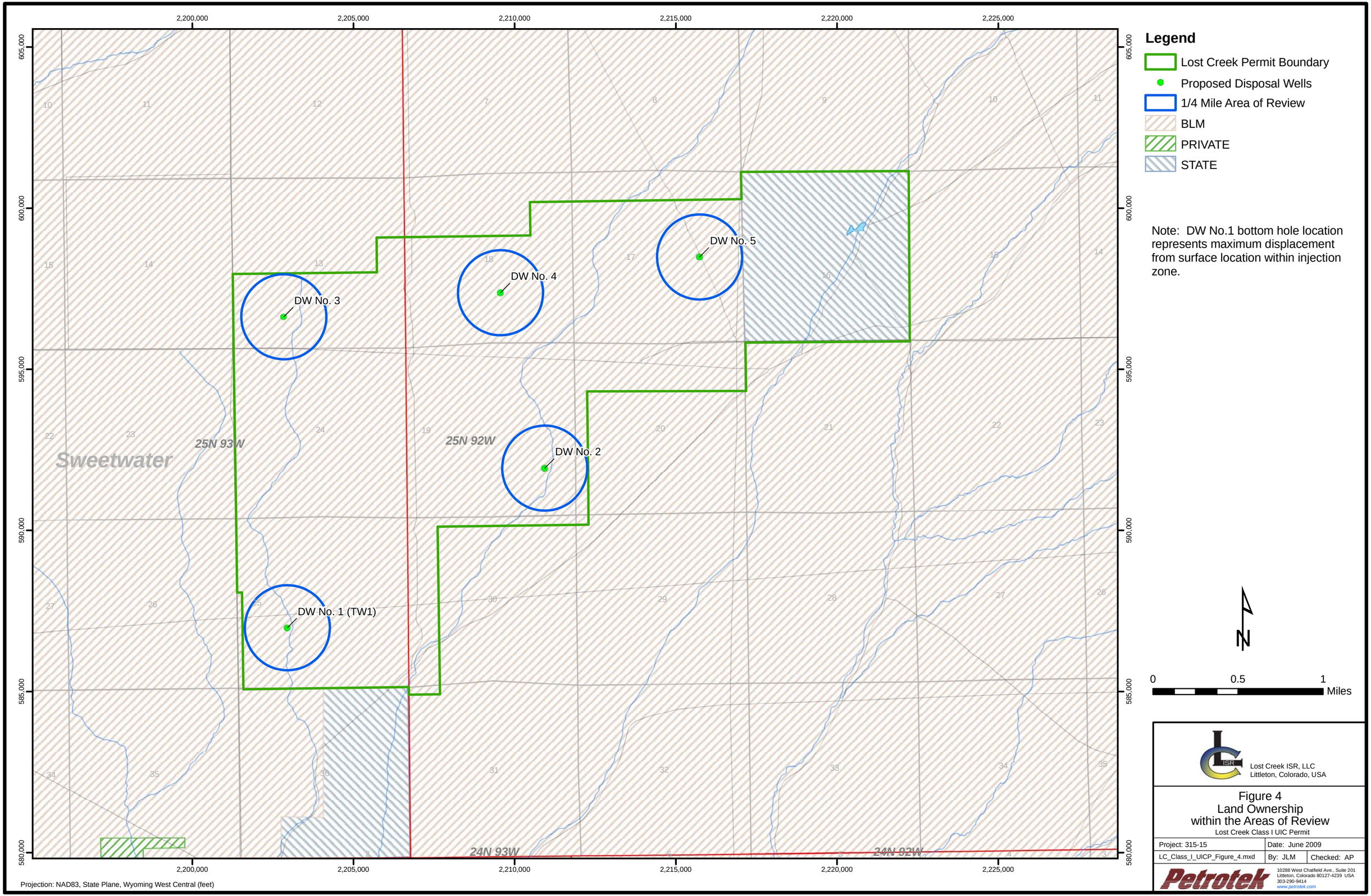
Projection: NAD83, State Plane, Wyoming West Central (feet)


Legend
Lost Creek Permit Boundary
Proposed Disposal Wells
1/4 Mile Area of Review
BLM
PRIVATE
STATE
Note: DW No.1 bottom hole location represents maximum displacement from surface location within injection zone.
DW No. 1 (TW1)
DW No. 2
DW No. 3
DW No. 4
DW No. 5
Sweetwater
25N 93W
25N 92W
24N 93W
24N 92W
0
0.5
1
Miles
N
Lost Creek ISR, LLC
Littleton, Colorado, USA
Figure 4
Land Ownership
within the Areas of Review
Lost Creek Class I UIC Permit
Project: 315-15
Date: June 2009
LC_Class_I_UICP_Figure_4.mxd
By: JLM
Checked: AP
Petrotek
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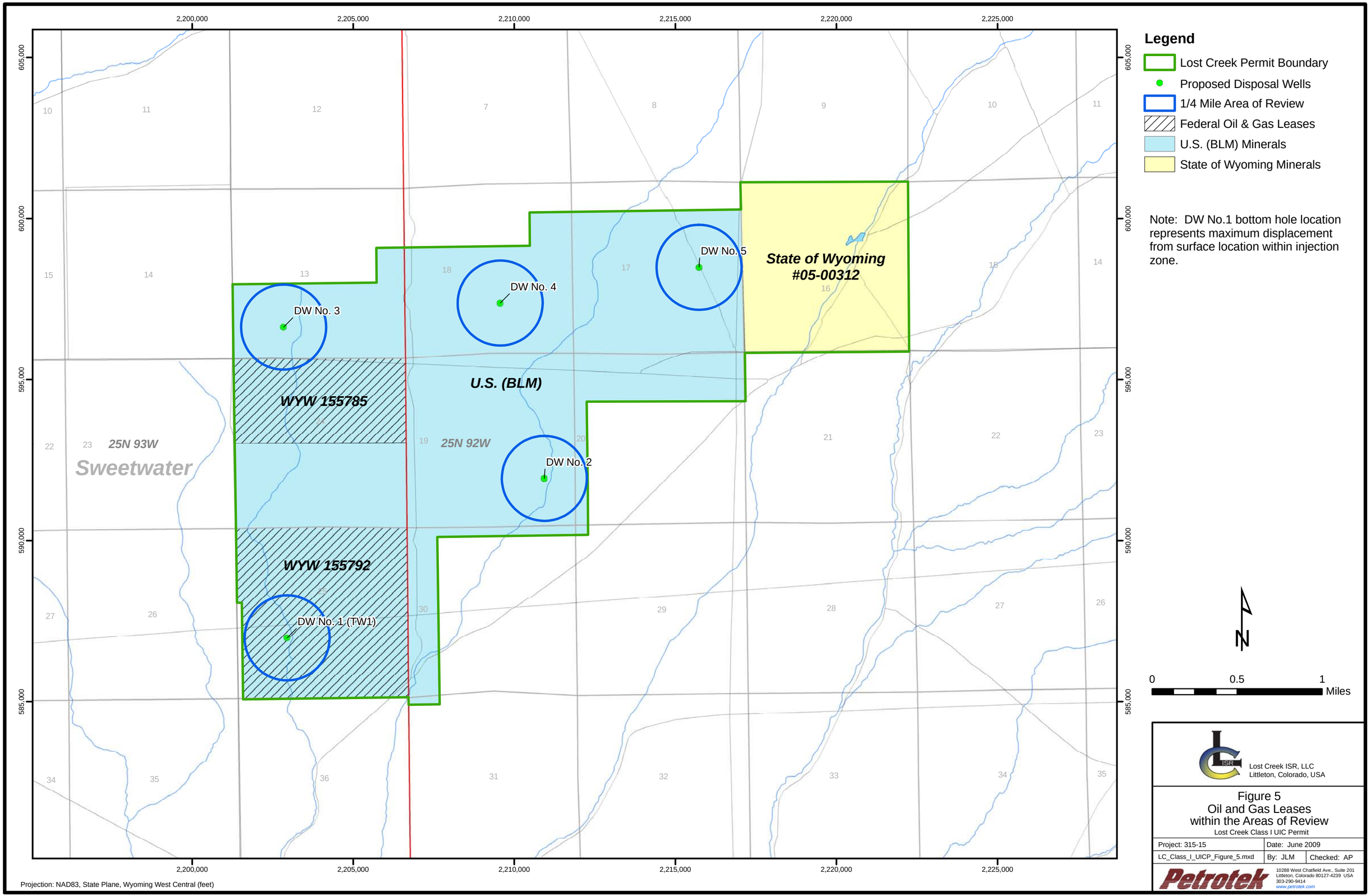
Projection: NAD83, State Plane, Wyoming West Central (feet)


Legend
Lost Creek Permit Boundary
Proposed Disposal Wells
1/4 Mile Area of Review
Federal Oil & Gas Leases
U.S. (BLM) Minerals
State of Wyoming Minerals
Note: DW No.1 bottom hole location represents maximum displacement from surface location within injection zone.
State of Wyoming #05-00312
U.S. (BLM)
WYW 155785
WYW 155792
DW No. 1 (TW1)
DW No. 2
DW No. 3
DW No. 4
DW No. 5
25N 93W
25N 92W
Sweetwater
2,200,000
2,205,000
2,210,000
2,215,000
2,220,000
2,225,000
605,000
600,000
595,000
590,000
585,000
0
0.5
1
Miles
N
Lost Creek ISR, LLC
Littleton, Colorado, USA
Figure 5
Oil and Gas Leases
within the Areas of Review
Lost Creek Class I UIC Permit
Project: 315-15
Date: June 2009
LC_Class_I_UICP_Figure_5.mxd
By: JLM
Checked: AP
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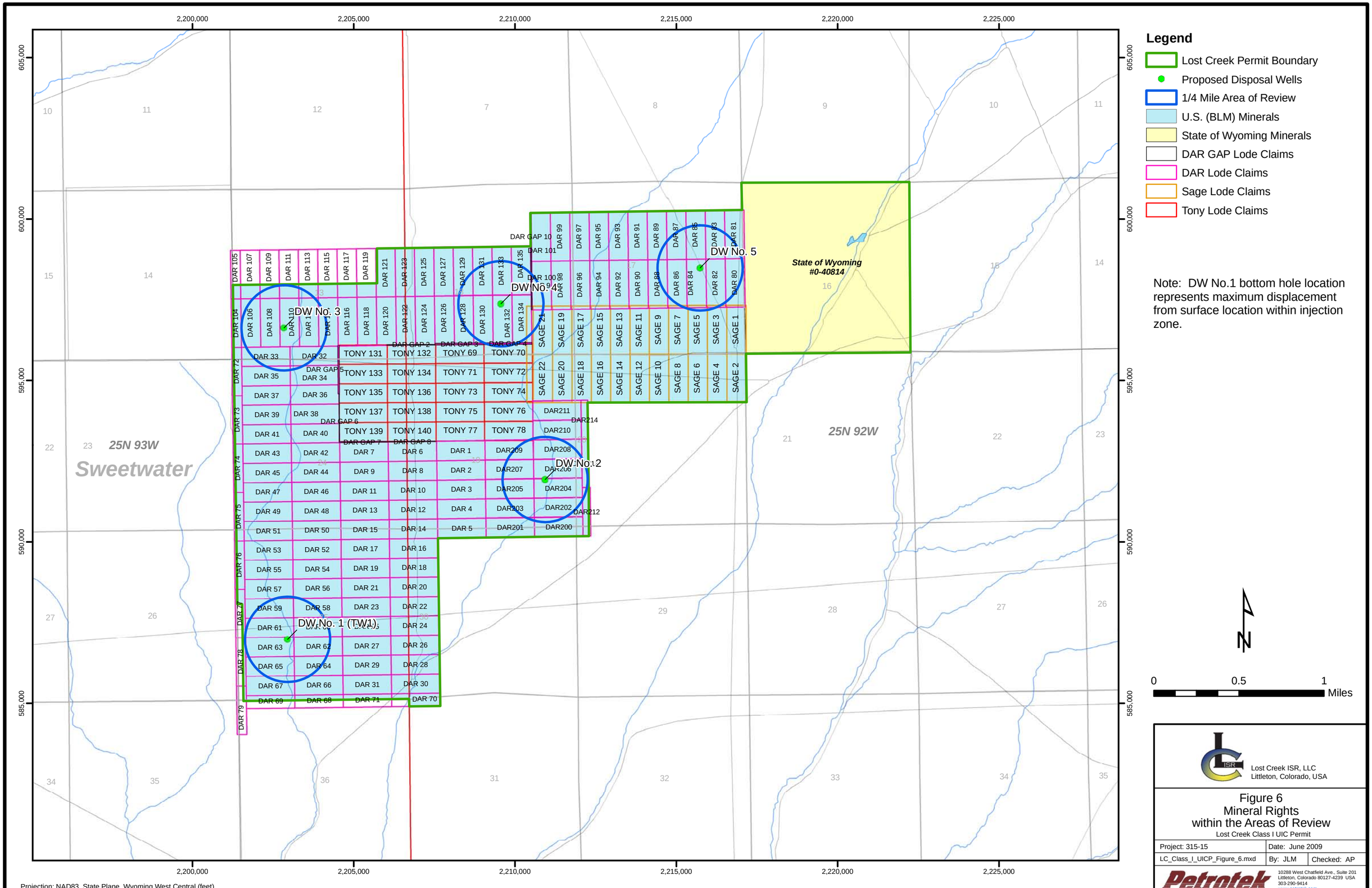
Projection: NAD83, State Plane, Wyoming West Central (feet)


Legend
Lost Creek Permit Boundary
Proposed Disposal Wells
1/4 Mile Area of Review
U.S. (BLM) Minerals
State of Wyoming Minerals
DAR GAP Lode Claims
DAR Lode Claims
Sage Lode Claims
Tony Lode Claims
Note: DW No.1 bottom hole location represents maximum displacement from surface location within injection zone.
DW No. 1 (TW1)
DW No. 2
DW No. 3
DW No. 4
DW No. 5
State of Wyoming #0-40814
25N 93W
25N 92W
Sweetwater
0 0.5 1 Miles
Projection: NAD83, State Plane, Wyoming West Central (feet)
Lost Creek ISR, LLC
Littleton, Colorado, USA
Figure 6
Mineral Rights
within the Areas of Review
Lost Creek Class I UIC Permit
Project: 315-15
Date: June 2009
LC_Class_I_UICP_Figure_6.mxd
By: JLM
Checked: AP
Petrotek
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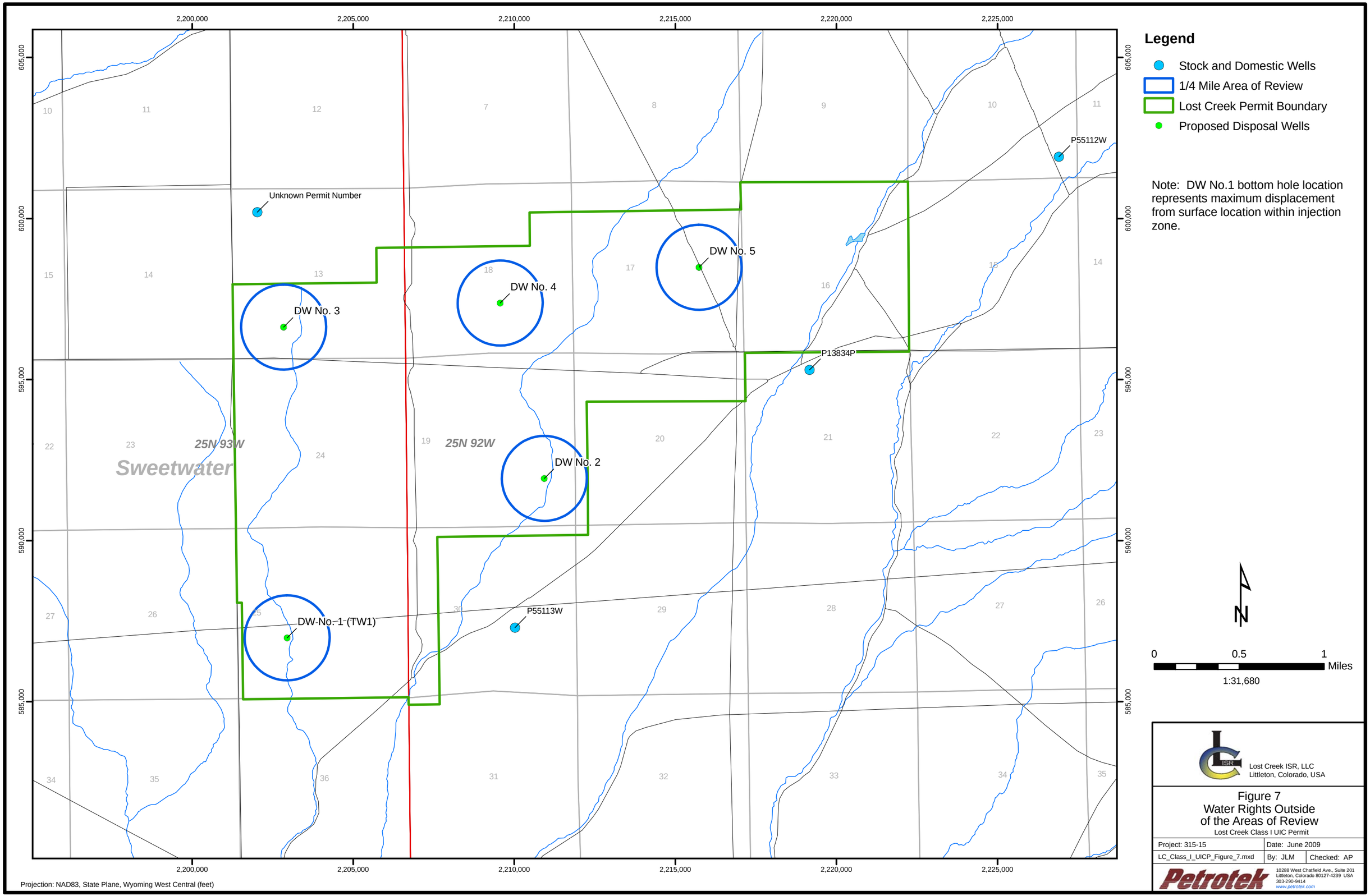
2,200,000
2,205,000
2,210,000
2,215,000
2,220,000
2,225,000
605,000
600,000
595,000
590,000
585,000
25N 93W
25N 92W
Sweetwater
Unknown Permit Number
DW No. 3
DW No. 4
DW No. 5
DW No. 2
DW No. 1 (TW1)
P55112W
P13834P
P55113W
Legend
Stock and Domestic Wells
1/4 Mile Area of Review
Lost Creek Permit Boundary
Proposed Disposal Wells
Note: DW No.1 bottom hole location represents maximum displacement from surface location within injection zone.
N
0
0.5
1
Miles
1:31,680
Lost Creek ISR, LLC
Littleton, Colorado, USA
Figure 7
Water Rights Outside
of the Areas of Review
Lost Creek Class I UIC Permit
Project: 315-15
Date: June 2009
LC_Class_I_UICP_Figure_7.mxd
By: JLM
Checked: AP
Petrotek
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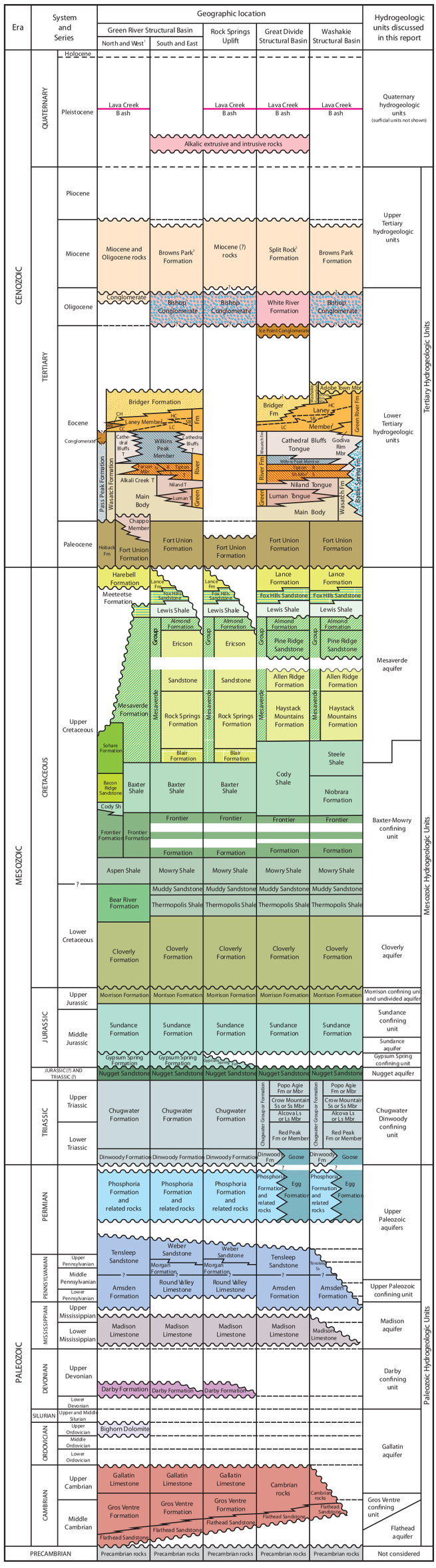
Littleton, Colorado 80127-4239 USA
303-290-9414
www.petrotek.com
Projection: NAD83, State Plane, Wyoming West Central (feet)



Lost Creek ISR, LLC
Littleton, Colorado, USA

Figure 8
Stratigraphic Column, Sweetwater County, Wyoming
Lost Creek Class I UIC Permit

Project: 315-15	Date: May 2009	
LC_Class_I_UICP_Figure_8.ai	By: JLM	Checked: AP

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Schlumberger

Company: **UR ENERGY INC**

Well: **LOST CREEK TEST WELL 1**
Field: **LOST CREEK**
County: **SWEETWATER** State: **WYOMING**

PLATFORM EXPRESS

ARRAY INDUCTION TOOL

County: SWEETWATER
Field: LOST CREEK
Location: SEC. 25, T25N, R93W
Well: LOST CREEK TEST WELL 1
Company: UR ENERGY INC

LOCATION

SEC. 25, T25N, R93W

Elev.: K.B. 6958.50 ft
G.L. 6940.00 ft
D.F.

Permanent Datum: GROUND LEVEL Elev.: 6940.00 ft
Log Measured From: KELLY BUSHING 18.50 ft above Perm. Datum
Drilling Measured From: KELLY BUSHING

API Serial No.	Section	Township	Range
	25	25N	93W

Logging Date		6-Dec-2008		
Run Number		ONE		
Depth Driller		9997 ft		
Schlumberger Depth		9946 ft		
Bottom Log Interval		9946 ft		
Top Log Interval		2958 ft		
Casing Driller Size @ Depth		9.625 in @ 2955 ft		@
Casing Schlumberger		2958 ft		
Bit Size		7.875 in		
Type Fluid In Hole		WATER BASED MUD		
MUD Density	Viscosity	9.4 lbm/gal	53 s	
Fluid Loss	PH	7 cm3	9	
Source Of Sample		MUD TANK		
RM @ Measured Temperature		5.520 ohm.m @ 38 degF		@
RMF @ Measured Temperature		4.416 ohm.m @ 38 degF		@
RMC @ Measured Temperature		6.624 ohm.m @ 38 degF		@
Source RMF	RMC	CALCULATED	CALCULATED	
RM @ MRT	RMF @ MRT	1.268 @ 186	1.014 @ 186	@ @
Maximum Recorded Temperatures		186 degF		
Circulation Stopped	Time	5-Dec-2008	18:30	
Logger On Bottom	Time	6-Dec-2008	11:07	
Unit Number	Location	2345	CASPER, WY	
Recorded By		B. ANDEREGG		
Witnessed By		MR. GLEN REFFITT		

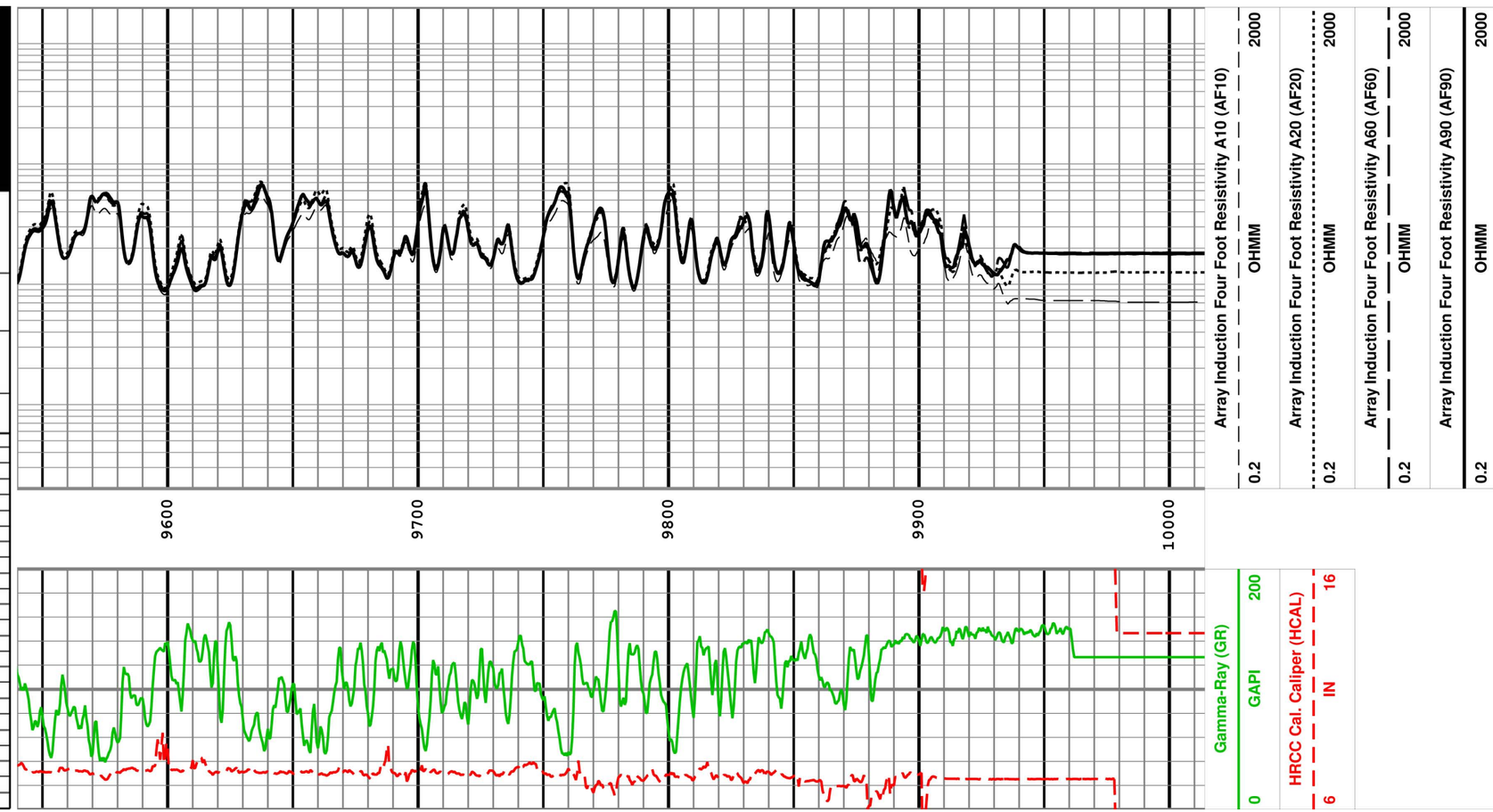

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Figure 9
Lower Fort Union Formation, TW1

Lost Creek Class I UIC Permit

Project: 315-15 | Date: May 2009
LC_Class_I_UICP_Figure_9.ai | By: JLM | Checked: AP

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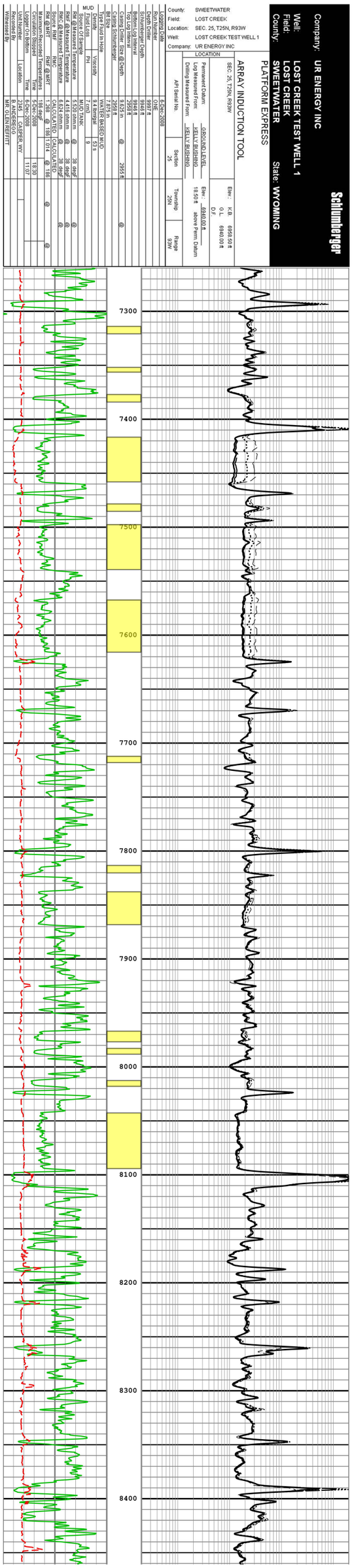

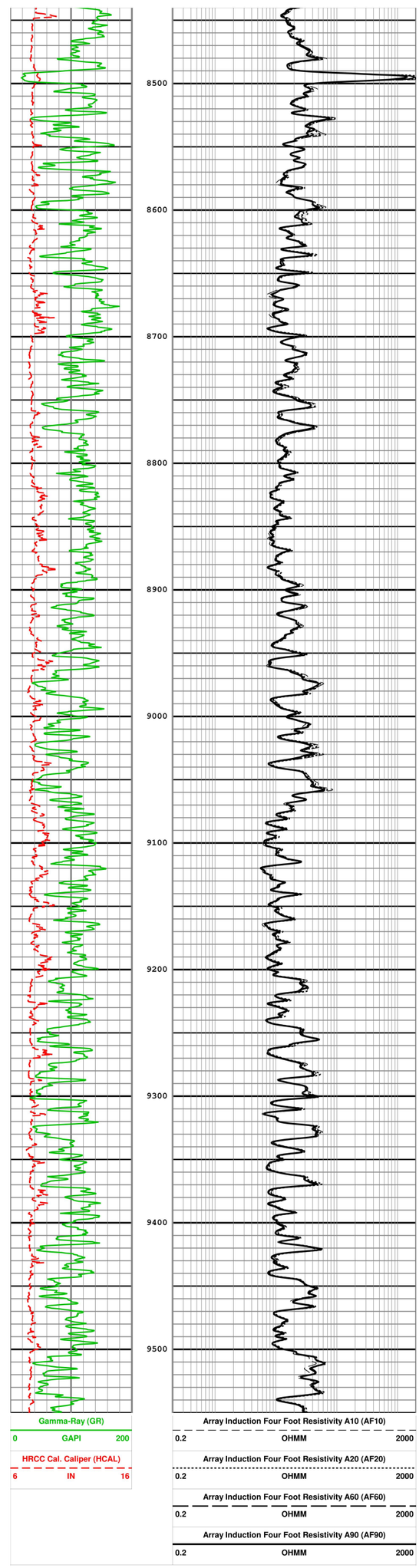

Legend

Fort Union Sand Picks

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Figure 10
Middle Fort Union Formation, TW1

Lost Creek Class I UIC Permit

Project: 315-15	Date: May 2009	
LC_Class_I_UICP_Figure_10.ai	By: JLM	Checked: AP

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Figure 11
Upper Fort Union Formation, TW1

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Project: 315-15 | Date: May 2009

LC_Class_I_UICP_Figure_11.ai | By: JLM | Checked: AP

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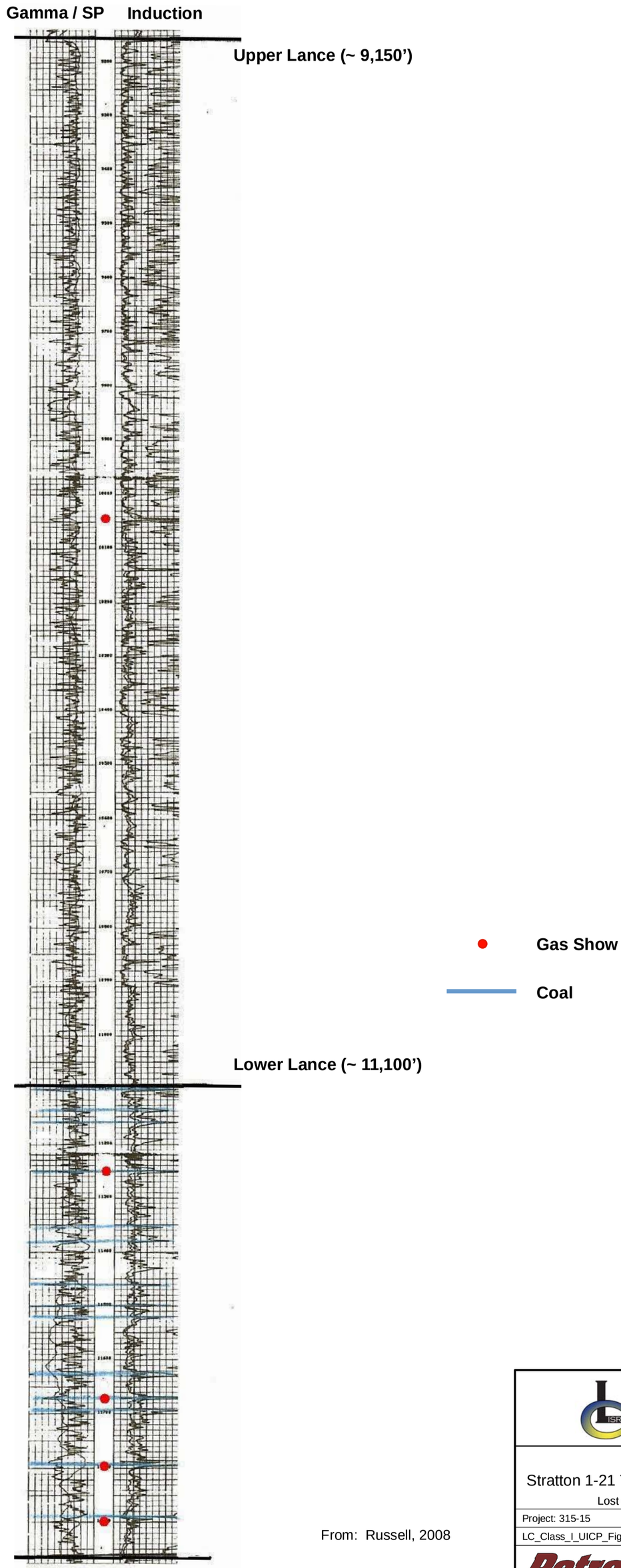

From: Russell, 2008

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Figure 12

Stratton 1-21 Type Log, Lance Formation

Lost Creek Class I UIC Permit

Project: 315-15	Date: June 2009	
LC_Class_I_UICP_Figure_12.ai	By: JLM	Checked: AP

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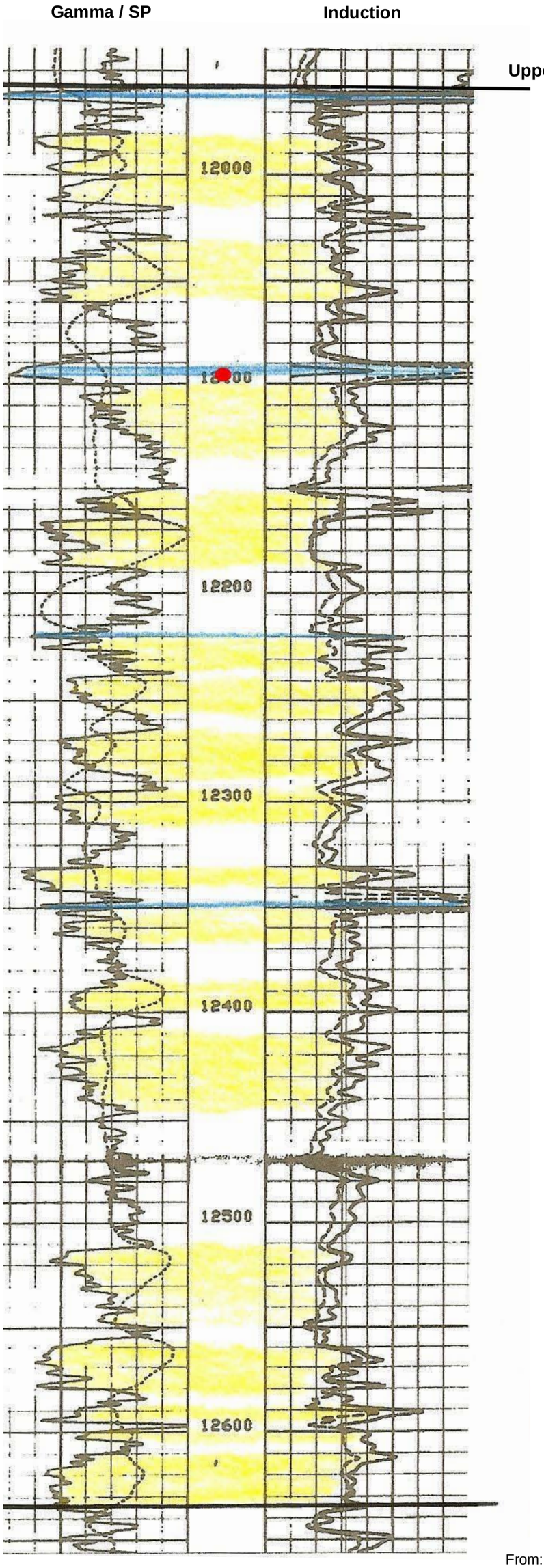

Fox Hills Picks

Gas Show

Coal

From: Russell, 2008

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Figure 13
Stratton 1-21 Type Log,
Fox Hills Sandstone
Lost Creek Class I UIC Permit

Project: 315-15	Date: May 2009	
LC_Class_I_UICP_Figure_13.ai	By: JLM	Checked: AP

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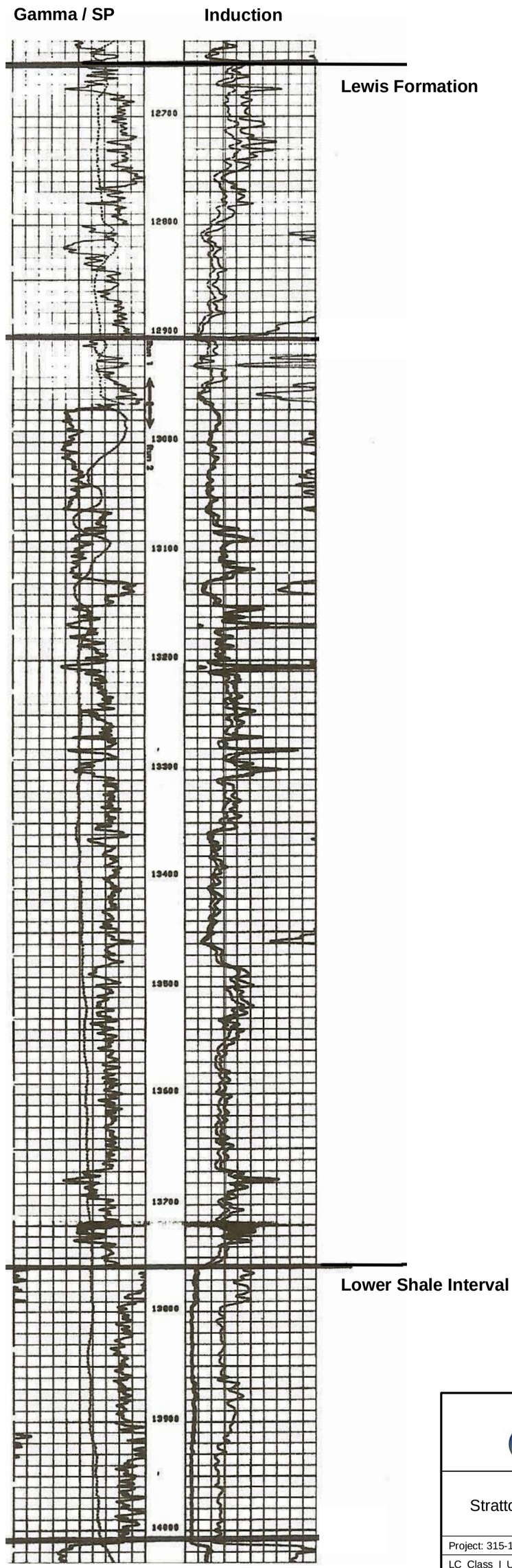

From: Russell, 2008

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Figure 14
Stratton 1-21 Type Log, Lewis Shale

Lost Creek Class I UIC Permit

Project: 315-15	Date: May 2009	
LC_Class_I_UICP_Figure_14.ai	By: JLM	Checked: AP

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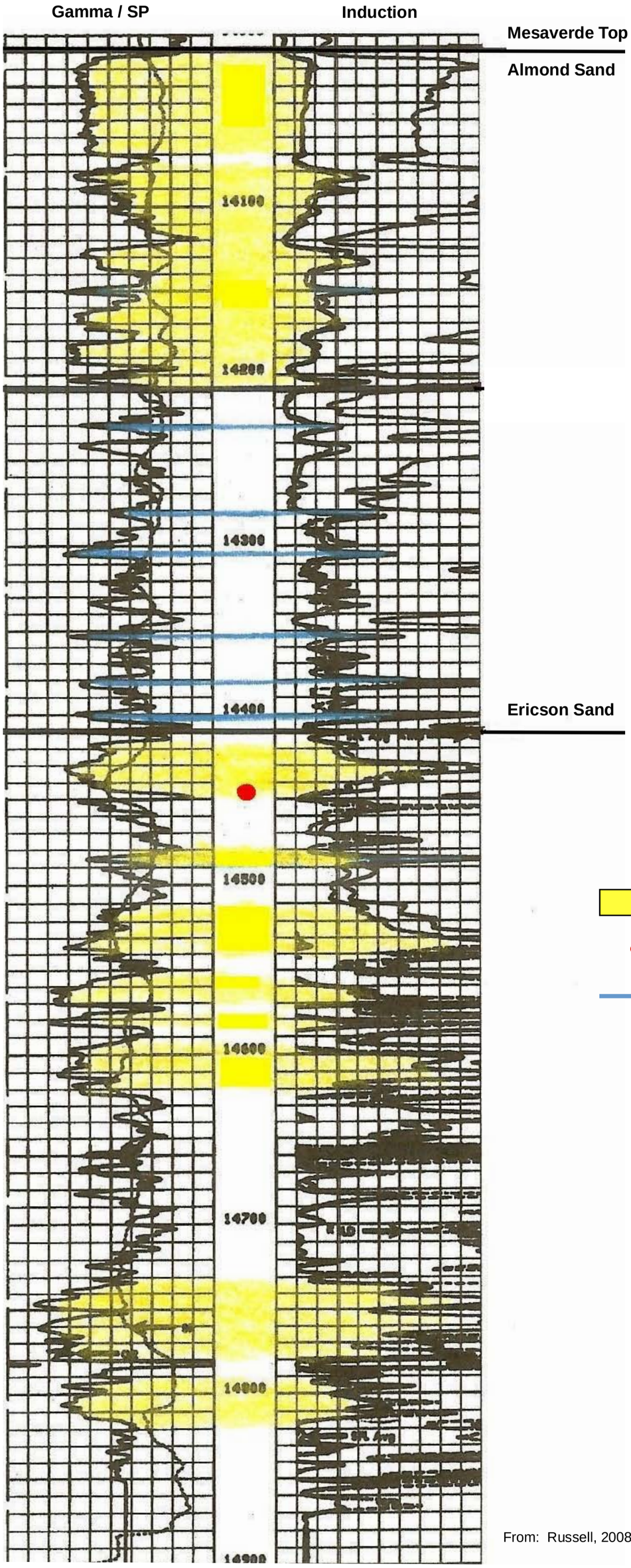

From: Russell, 2008

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Figure 15
Stratton 1-21 Type Log, Mesaverde

Lost Creek Class I UIC Permit

Project: 315-15	Date: June 2009	
LC_Class_I_UICP_Figure_15.ai	By: JLM	Checked: AP

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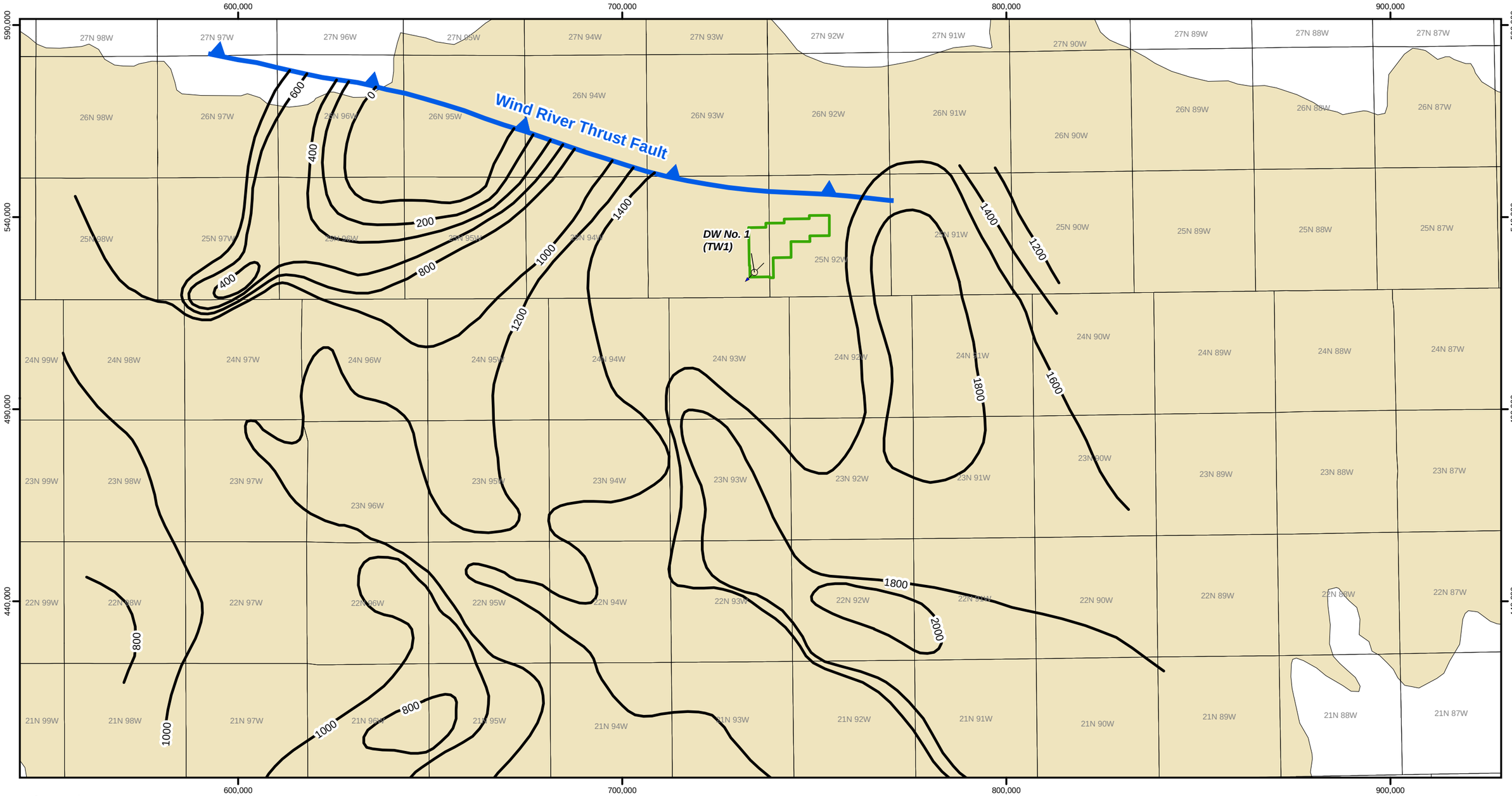

Legend

- DW No.1 Well
- Lost Creek Permit Boundary
- Great Divide Basin
- Lower Fort Union Interval, Gross Thickness (feet)

0 5 10 15 Miles

From: Russell, 2008

Projection: NAD 1927, State Plane, Wyoming West Central (feet)

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Figure 16
Lower Fort Union Isopach Map,
Northern Great Divide Basin
Lost Creek Class I UIC Permit

Project: 315-15	Date: May 2009	
LC_Class__UICP_Figure_16 .mxd	By: JLM	Checked: AP

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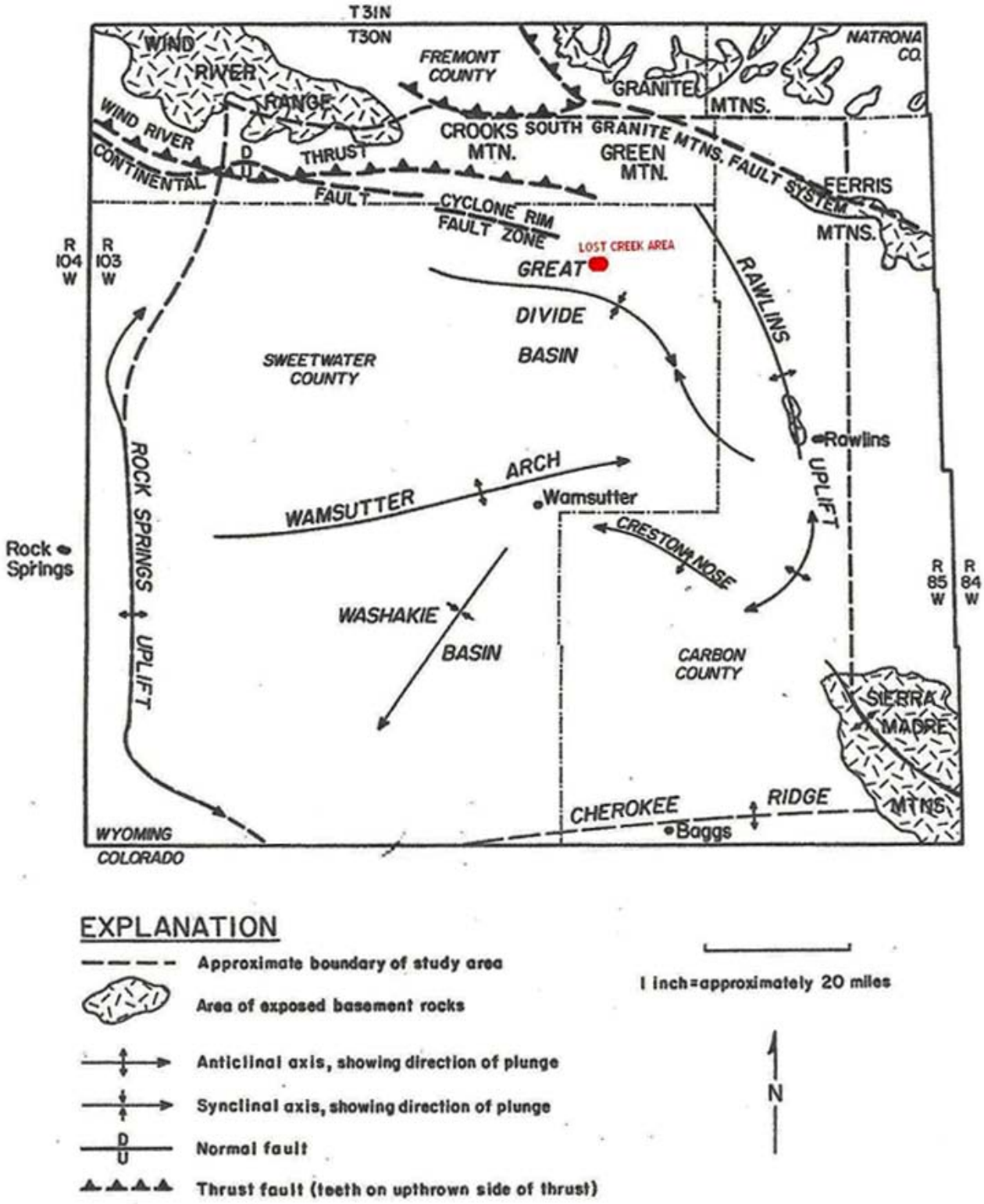

EXPLANATION

- Approximate boundary of study area
- Area of exposed basement rocks
- Anticlinal axis, showing direction of plunge
- Synclinal axis, showing direction of plunge
- D U Normal fault
- Thrust fault (teeth on upthrown side of thrust)

1 inch=approximately 20 miles

N

From: Collatine, 1981

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Figure 17
Map of Great Divide Basin
and Related Structural Elements
Lost Creek Class I UIC Permit

Project: 315-15	Date: May 2009	
LC_Class_I_UICP_Figure_17.ai	By: JLM	Checked: AP

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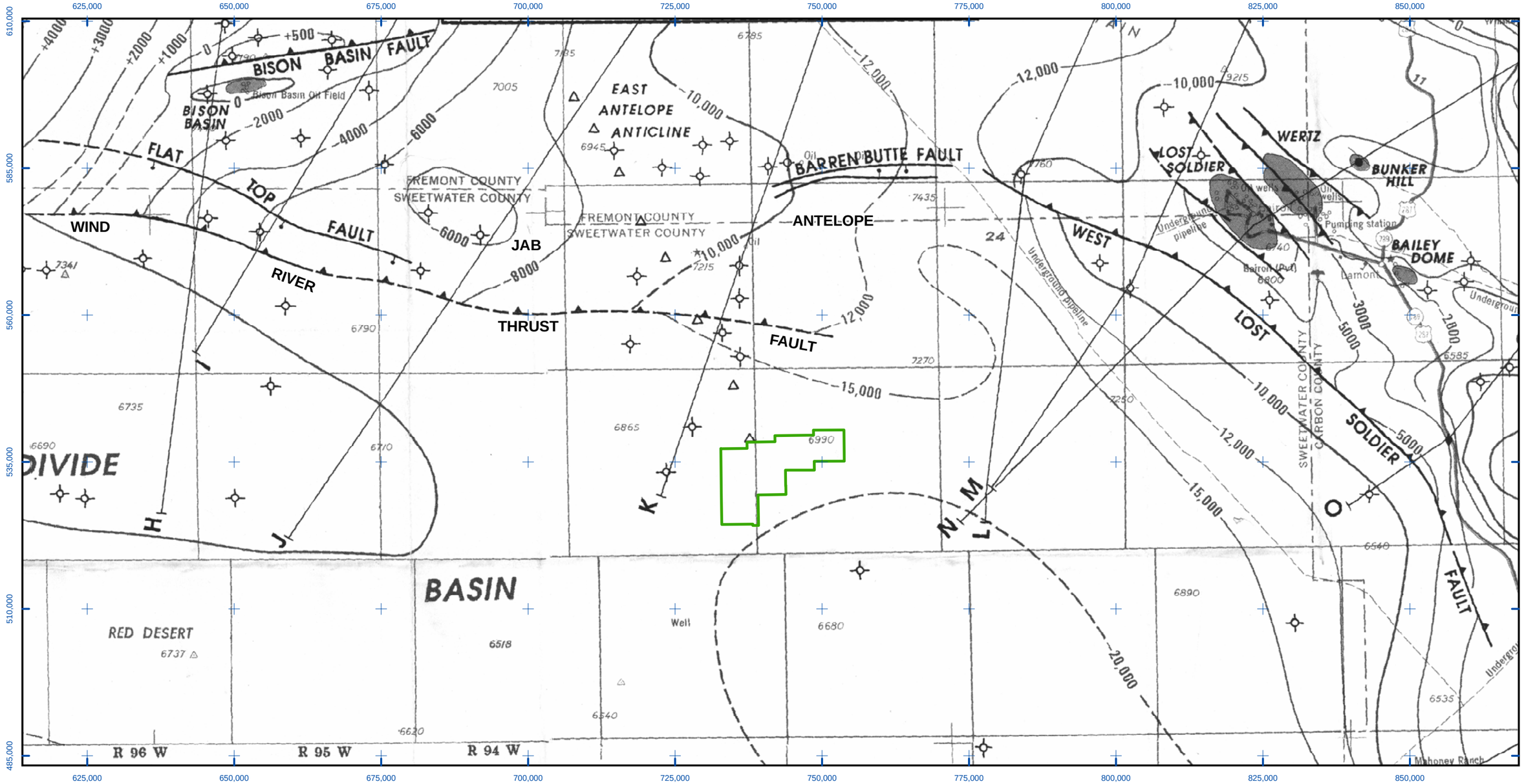

Legend

Lost_Creek_Permit_Bndy

N

0 2 4 6 Miles

Projection: NAD 1927, State Plane, Wyoming West Central (feet)

Lost Creek ISR, LLC
Littleton, Colorado, USA

Figure 18
Precambrian Basement Map
from Blackstone, (1991)
Lost Creek Class I UIC Permit

Project: 315-15	Date: May 2009	
LC_Class_I_UICP_Figure_18.mxd	By: JLM	Checked: AP

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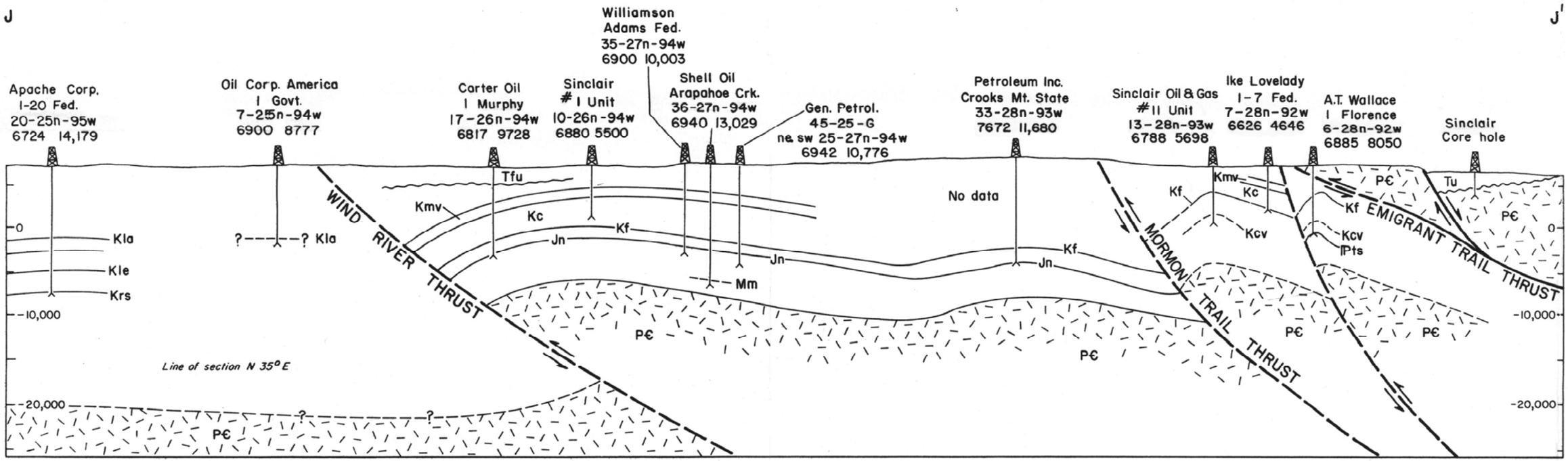

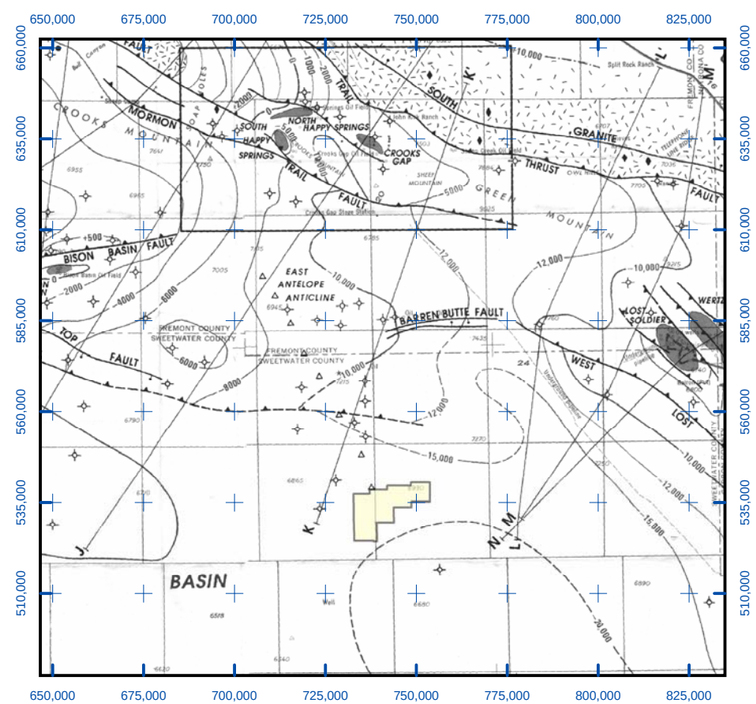

Legend

Lost Creek Permit Boundary

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Figure 19
Regional Cross Section J - J',
from Blackstone (1991)

Lost Creek Class I UIC Permit

Project: 315-15	Date: May 2009
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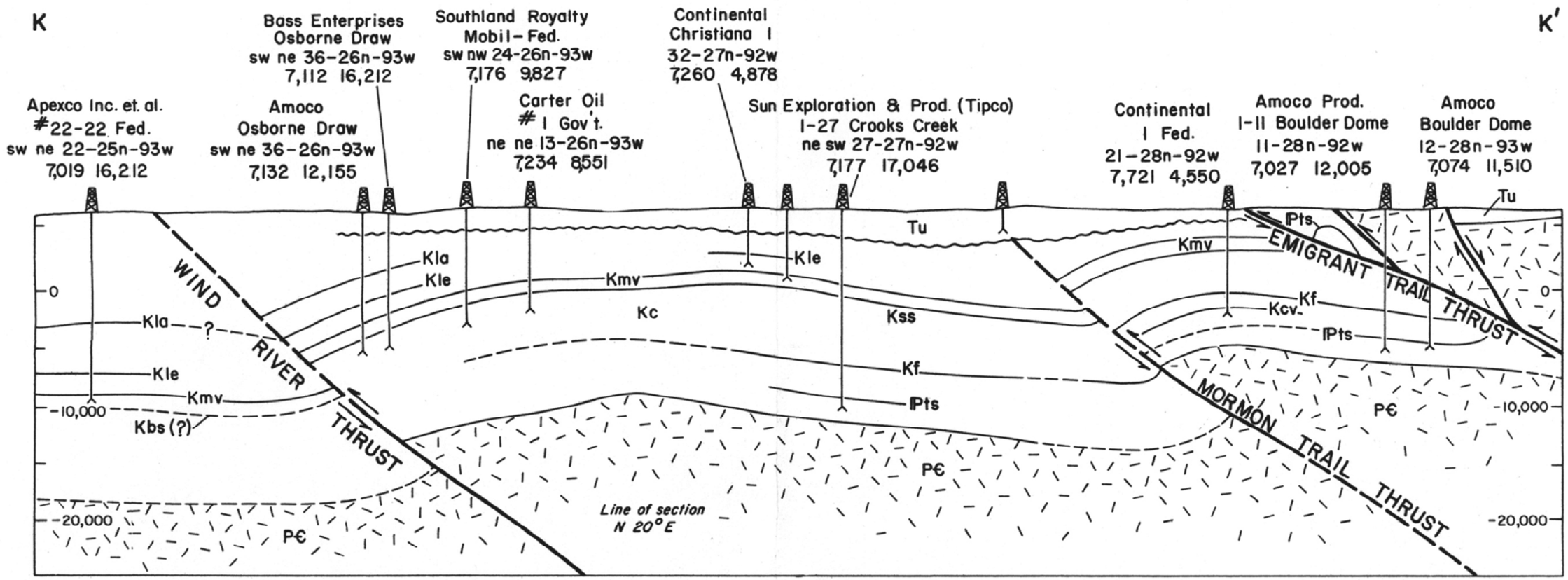
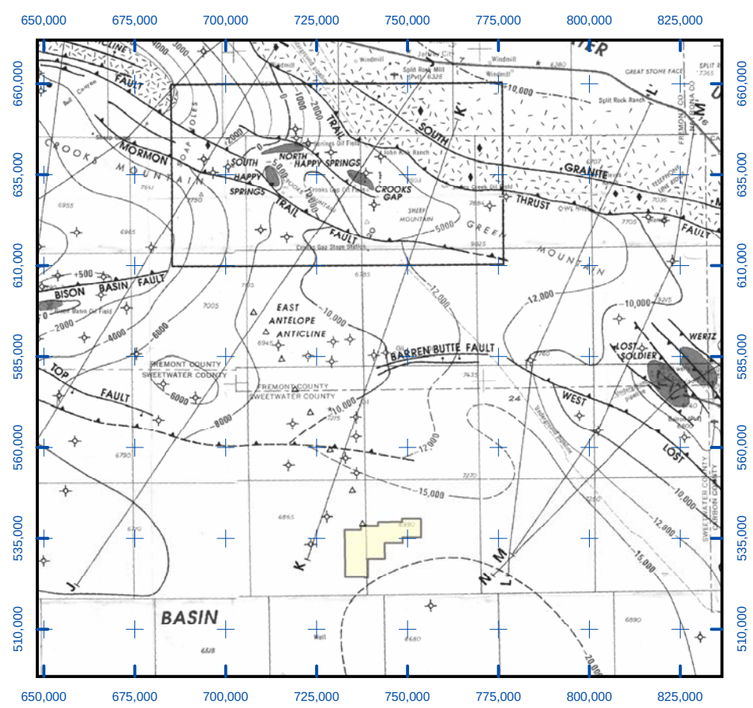
Projection: NAD 1927, State Plane, Wyoming West Central (feet)





N
W
E
S

Legend

Lost Creek Permit Boundary

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Figure 20
Regional Cross Section K - K',
from Blackstone (1991)
Lost Creek Class I UIC Permit

Project: 315-15	Date: May 2009	
LC_Class_I_UICP_Figure_20.mxd	By: JLM	Checked: AP

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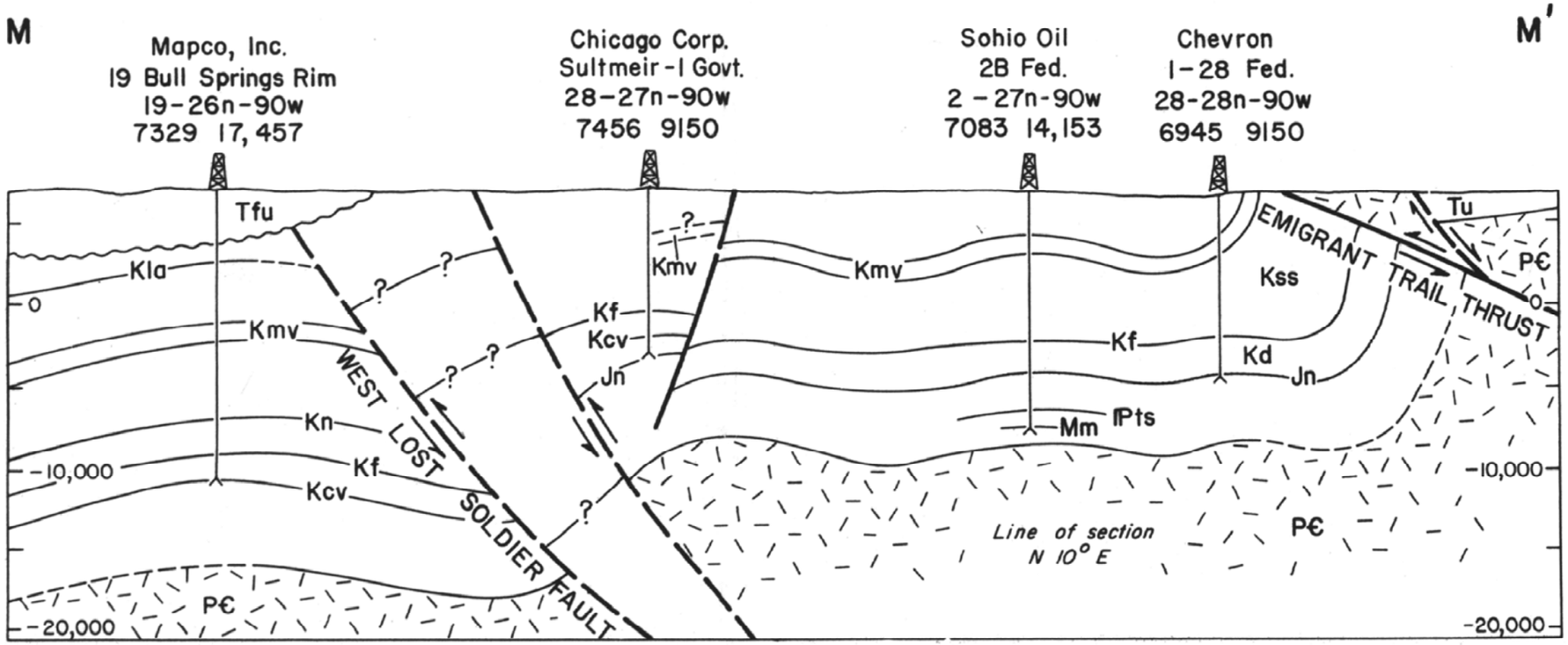
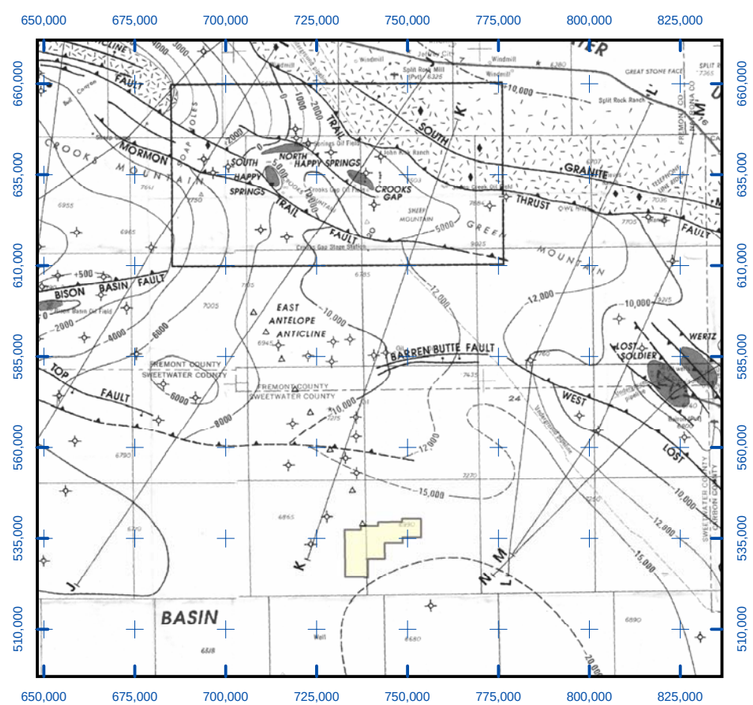
Projection: NAD 1927, State Plane, Wyoming West Central (feet)





Legend

Lost Creek Permit Boundary

Lost Creek ISR, LLC
Littleton, Colorado, USA

Figure 21
Regional Cross Section M - M',
from Blackstone (1991)
Lost Creek Class I UIC Permit

Project: 315-15	Date: May 2009
LC_Class_I_UICP_Figure_21.mxd	By: JLM Checked: AP

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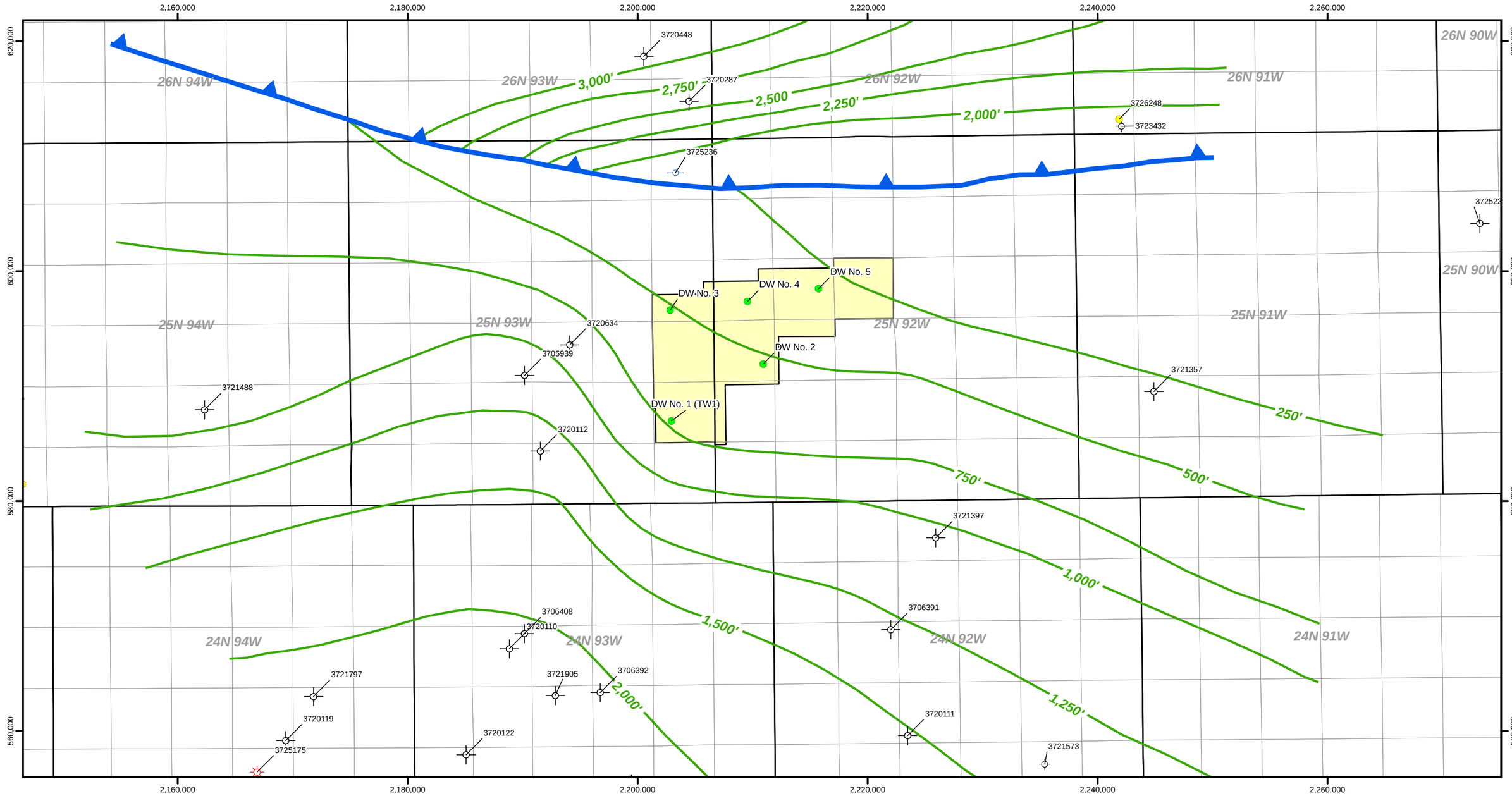
Projection: NAD 1927, State Plane, Wyoming West Central (feet)



Legend

- Proposed Disposal Wells
- AI - Active Injector Well
- AP - Permit to Drill
- DH - Dry Hole
- DP - Drilling or Drilled Permit
- DR - Dormant
- FL - Flowing
- GL - Gas Lift
- MW - Monitor Well
- ND - Never Drilled
- NI - Notice of Intent to Abandon
- ? NR - No Report
- PA - Plugged and Abandoned
- PG - Producing Gas Well
- PH - Pumping Hydraulic
- PL - Plunger Lift
- PO - Producing Oil Well
- PR - Pumping Rods
- PS - Pumping Submersible
- SI - Shut - In
- SO - Suspended Operation
- SP - Well Spudded
- SR - Subsequent Report to Abandonment
- TA - Temporarily Abandoned
- 250' Contour Interval (feet AMSL)
- Lost Creek Permit Boundary

Projection: NAD83, State Plane, Wyoming West Central (feet)

Note: DW No.1 bottom hole location represents maximum displacement from surface location within injection zone.

0 2 4 6 Miles

N

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Littleton, Colorado, USA

Figure 22
Structure Contour Map,
Fort Union Formation, GDB
Lost Creek Class I UIC Permit

Project: 315-5	Date: June 2009
LC_Class_I_UICP_Figure_22.mxd	By: JLM Checked: AP

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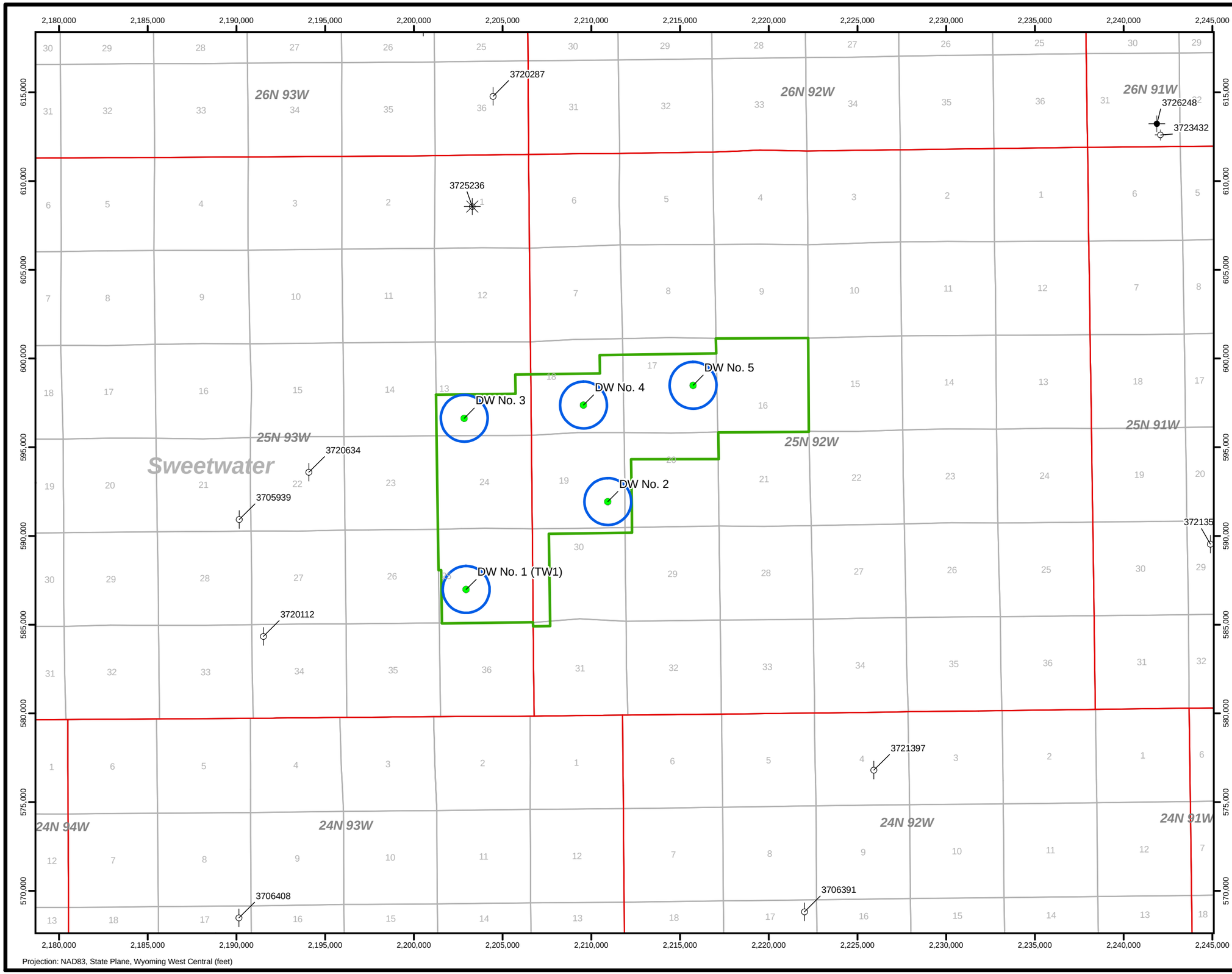

Legend

- Lost Creek Permit Boundary
- Proposed Disposal Wells
- 1/4 Mile Area of Review
- Active Injector
- Permit to Drill
- Dry Hole
- Drilling or Drilled Permit
- Dormant
- Flowing
- Gas Lift
- Monitor Well
- ND
- Notice of Intent to Abandon
- No Report
- Permanently Abandoned
- Producing Gas Well
- Pumping Hydraulic
- Plunger Lift
- Producing Oil Well
- Pumping Rods
- Pumping Submersible
- Shut - In
- Well Spudded
- Subsequent Report of Abandonment
- Temporarily Abandoned
- Shut - In

Note: DW No.1 bottom hole location represents maximum displacement from surface location within injection zone.

N

0 1 2 Miles

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Figure 23
Oil and Gas Wells Outside AORs of Proposed Injection Wells
Lost Creek Class I UIC Permit

Project: 315-15	Date: June 2009	
LC_Class_I_UICP_Figure_23.mxd	By: JLM	Checked: AP

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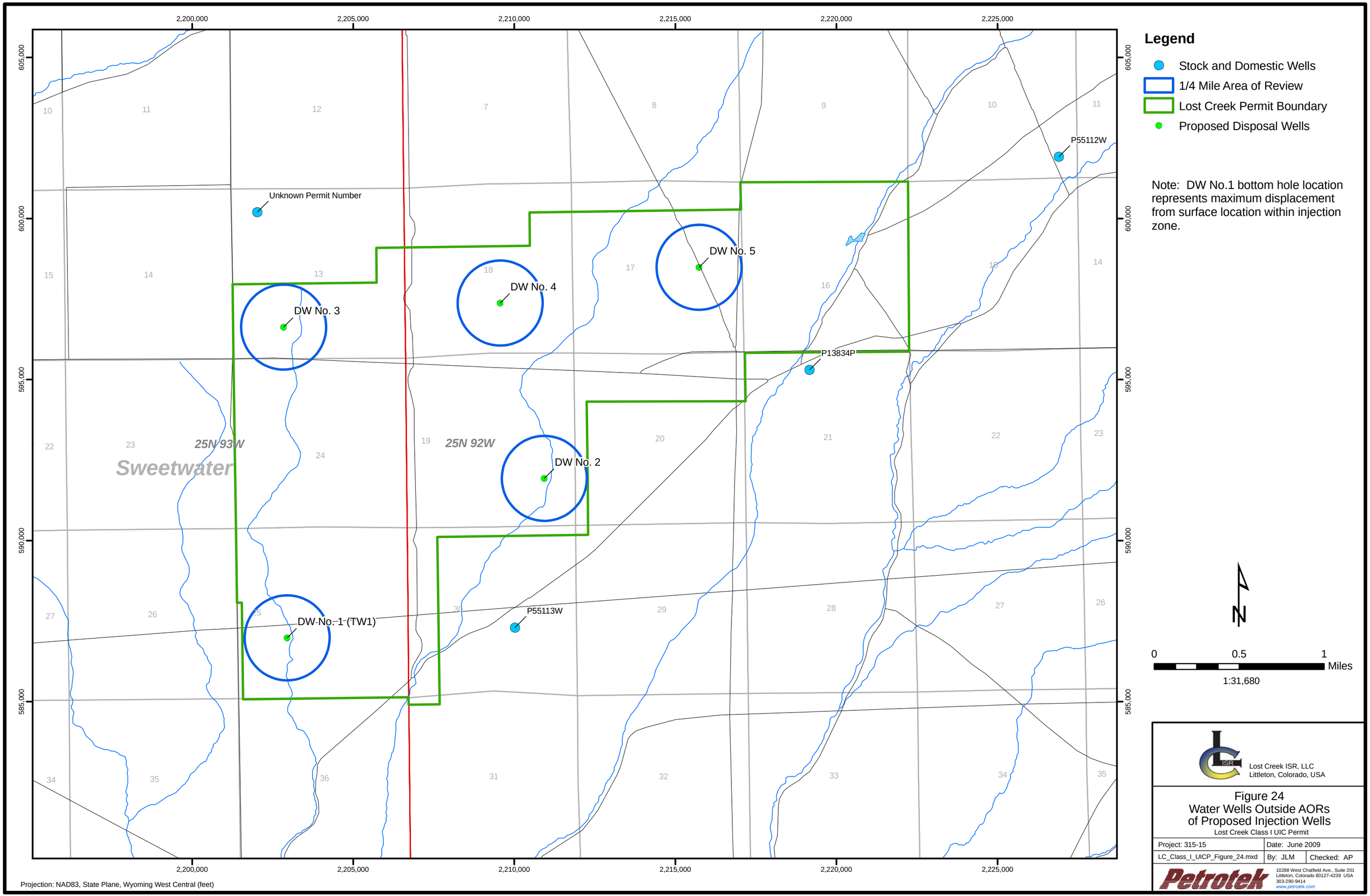
2,200,000
2,205,000
2,210,000
2,215,000
2,220,000
2,225,000
605,000
600,000
595,000
590,000
585,000
25N 93W
25N 92W
Sweetwater
Unknown Permit Number
DW No. 3
DW No. 4
DW No. 5
DW No. 2
DW No. 1 (TW1)
P55112W
P13834P
P55113W
Legend
Stock and Domestic Wells
1/4 Mile Area of Review
Lost Creek Permit Boundary
Proposed Disposal Wells
Note: DW No.1 bottom hole location represents maximum displacement from surface location within injection zone.
N
0
0.5
1
Miles
1:31,680
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Littleton, Colorado, USA
Figure 24
Water Wells Outside AORs
of Proposed Injection Wells
Lost Creek Class I UIC Permit
Project: 315-15
Date: June 2009
LC_Class_I_UICP_Figure_24.mxd
By: JLM
Checked: AP
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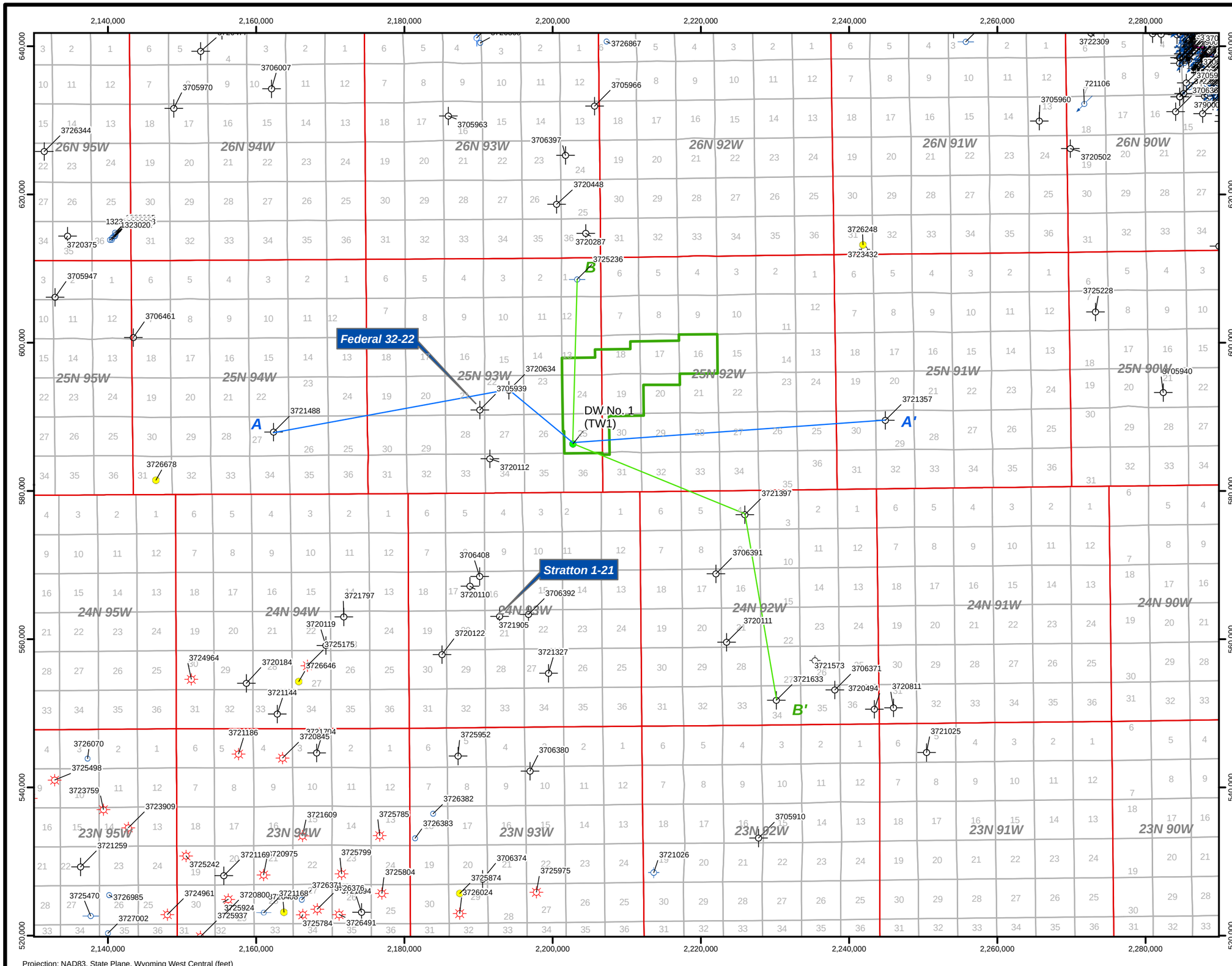
Projection: NAD83, State Plane, Wyoming West Central (feet)



Legend

- Lost Creek Permit Boundary
- Test Well
- AI - Active Injector Well
- AP - Permit to Drill
- DH - Dry Hole
- DP - Drilling or Drilled Permit
- DR - Dormant
- FL - Flowing
- GL - Gas Lift
- MW - Monitor Well
- ND - Never Drilled
- NI - Notice of Intent to Abandon
- NR - No Report
- PA - Plugged and Abandoned
- PG - Producing Gas Well
- PH - Pumping Hydraulic
- PL - Plunger Lift
- PO - Producing Oil Well
- PR - Pumping Rods
- PS - Pumping Submersible
- SI - Shut - In
- SO - Suspended Operation
- SP - Well Spudded
- SR - Subsequent Report to Abandonment
- TA - Temporarily Abandoned

Note: Well Data from WOGCC as of 4/23/09

N

0 2 4 Miles

Lost Creek ISR, LLC
Littleton, Colorado, USA

Figure 25
Cross Section Index Map,
Lost Creek Area
Lost Creek Class I UIC Permit

Project: 315-15	Date: June 2009	
LC_Class_I_UICP_Figure_25.mxd	By: JLM	Checked: AP

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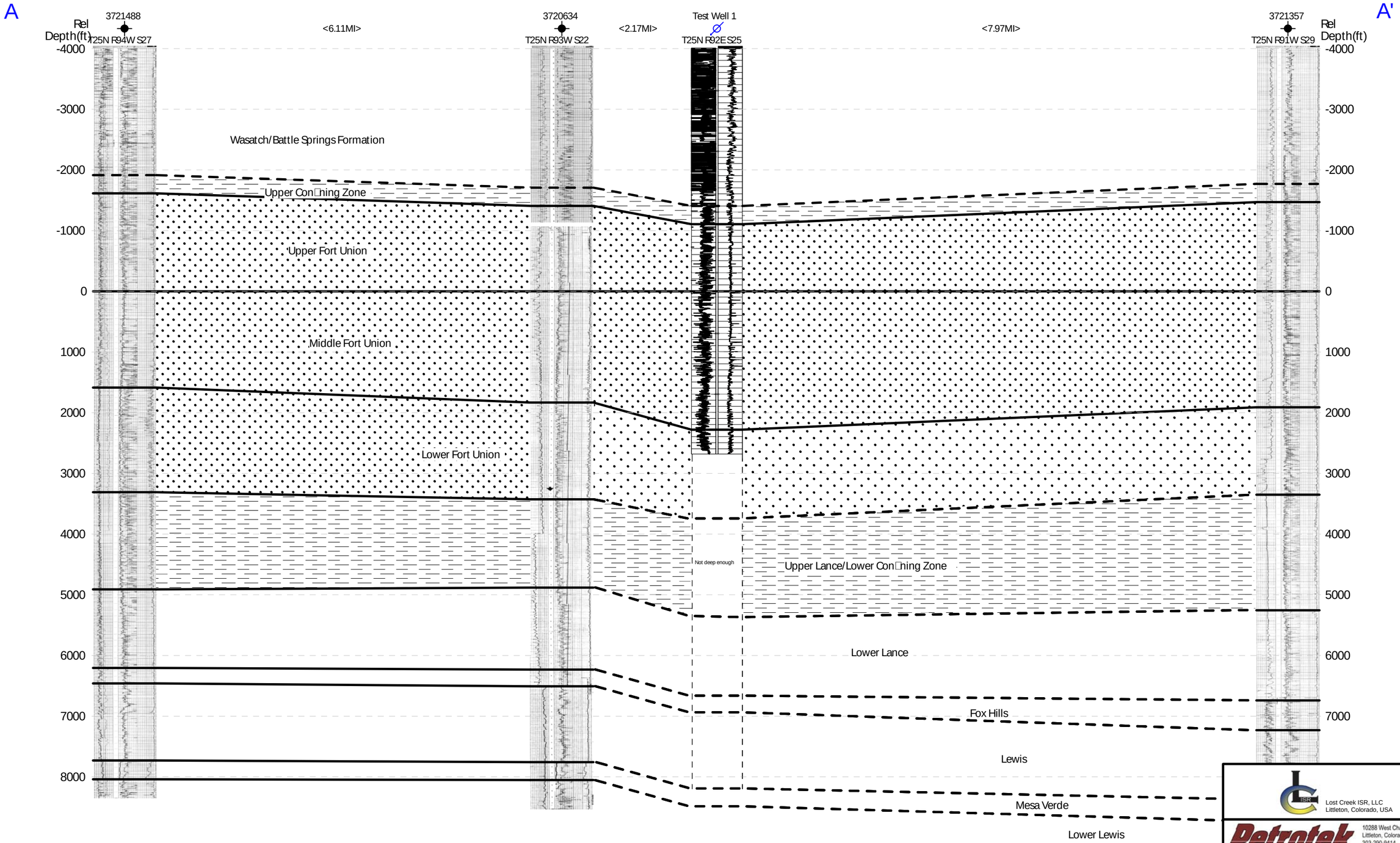

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Figure 26

Lost Creek Class I Permit

Stratigraphic Cross Section A-A'

By: KRS Checked: AAP

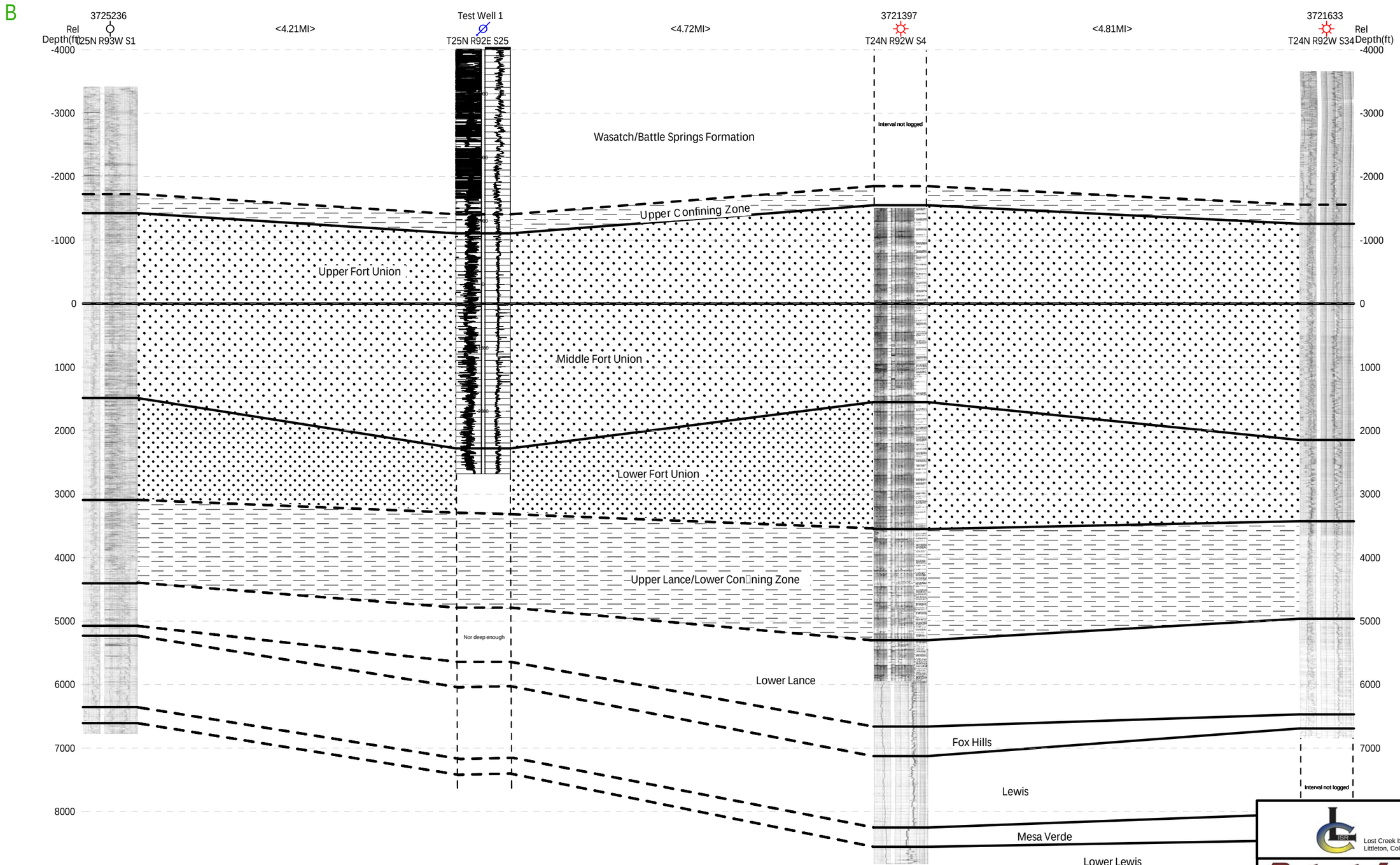

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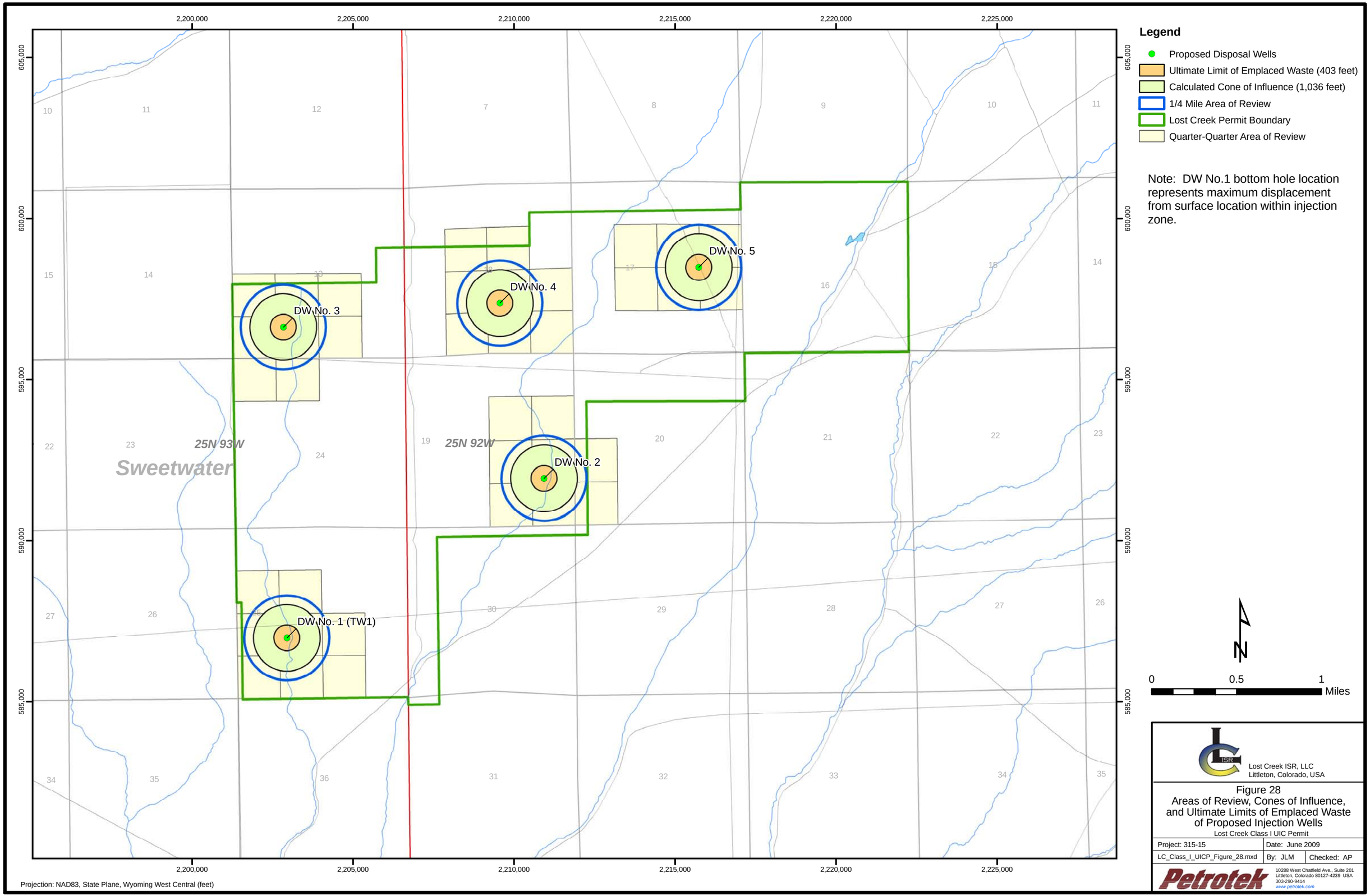
Figure 27

Lost Creek Class I Permit

Stratigraphic Cross Section B-B'

By: KRS Checked: AAP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2,205,000
2,210,000
2,215,000
2,220,000
2,225,000
605,000
600,000
595,000
590,000
585,000
DW No. 1 (TW1)
DW No. 2
DW No. 3
DW No. 4
DW No. 5
25N 93W
25N 92W
Sweetwater
Legend
Proposed Disposal Wells
Ultimate Limit of Emplaced Waste (403 feet)
Calculated Cone of Influence (1,036 feet)
1/4 Mile Area of Review
Lost Creek Permit Boundary
Quarter-Quarter Area of Review
Note: DW No.1 bottom hole location represents maximum displacement from surface location within injection zone.
N
0
0.5
1
Miles
Lost Creek ISR, LLC
Littleton, Colorado, USA
Figure 28
Areas of Review, Cones of Influence, and Ultimate Limits of Emplaced Waste of Proposed Injection Wells
Lost Creek Class I UIC Permit
Project: 315-15
Date: June 2009
LC_Class_I_UICP_Figure_28.mxd
By: JLM
Checked: AP
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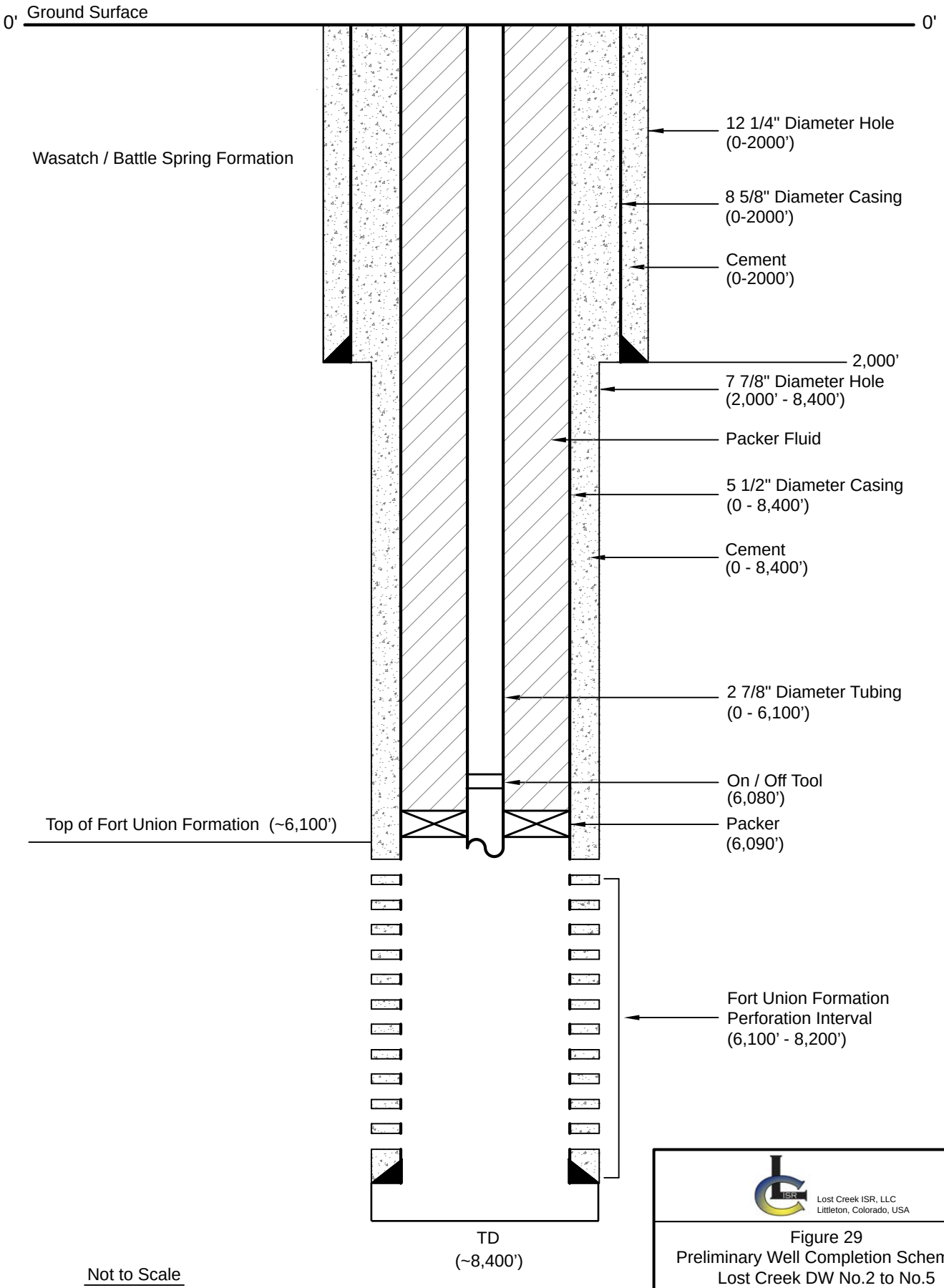
Projection: NAD83, State Plane, Wyoming West Central (feet)



Not to Scale

Lost Creek ISR, LLC
Littleton, Colorado, USA

Figure 29
Preliminary Well Completion Schematic
Lost Creek DW No.2 to No.5

Lost Creek Class I UIC Permit

Project: 315-15	Date: June 2009	
LC_Class_I_UICP_Figure_29.ai	By: JLM	Checked: AP

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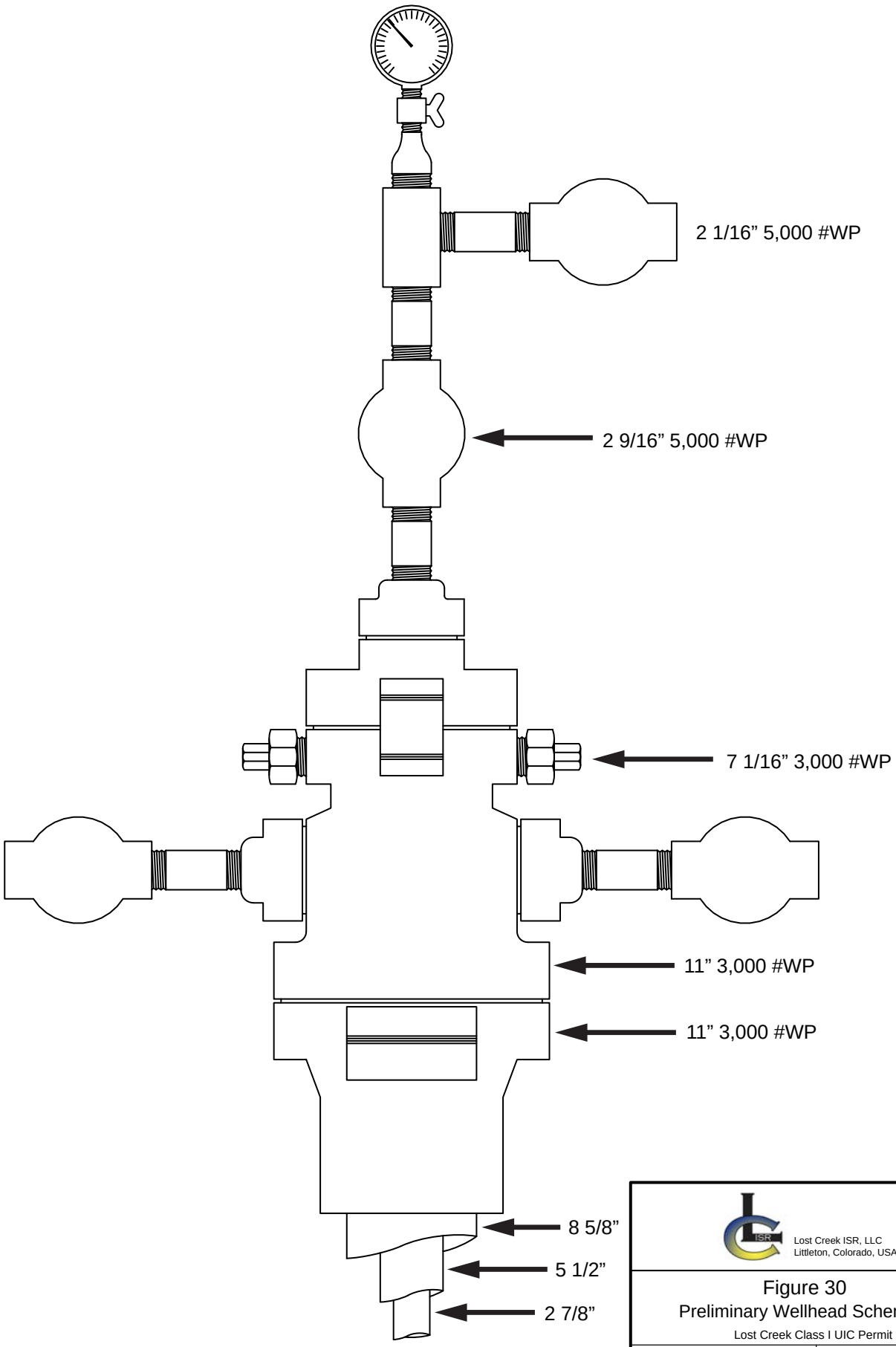
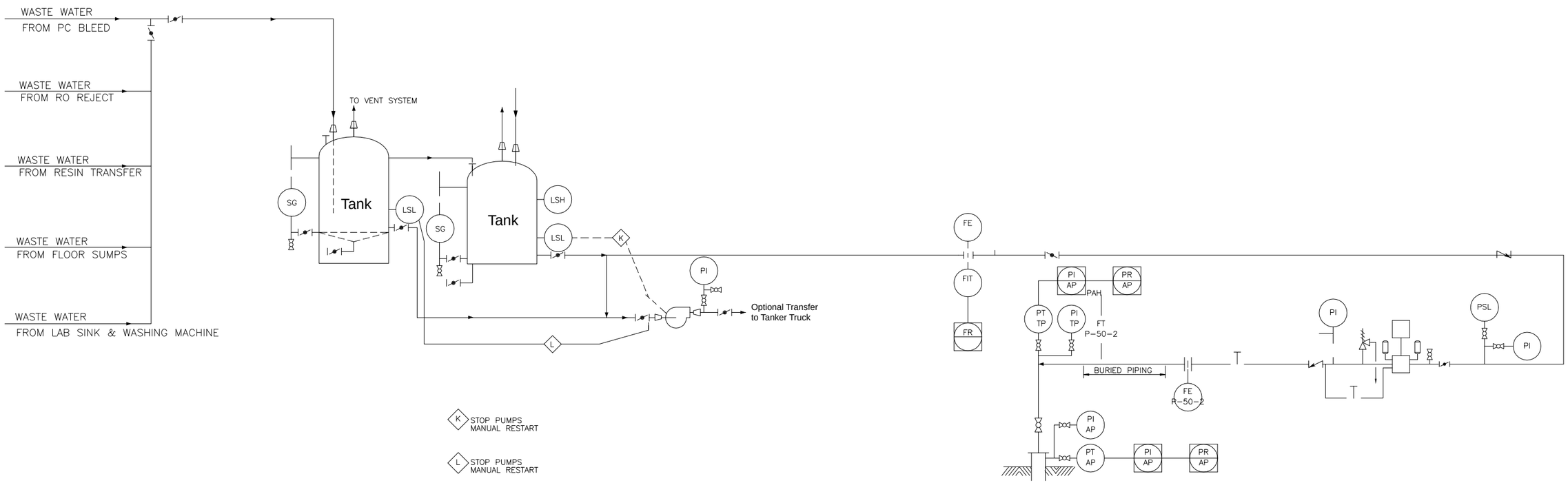


Lost Creek ISR, LLC
Littleton, Colorado, USA

Figure 30
Preliminary Wellhead Schematic
Lost Creek Class I UIC Permit

Project: 315-15	Date: May 2009	
LC_Class_I_UICP_Figure_30.ai	By: JLM	Checked: AP

Petrotek
10288 West Chatfield Ave., Suite 201
Littleton, Colorado 80127-4239 USA
303-290-9414
www.petrotek.com



Lost Creek ISR, LLC
Littleton, Colorado, USA

Figure 31
Preliminary Surface Facilities Schematic

Lost Creek Class I UIC Permit

Project: 315-15	Date: June 2009	
LC_Class_I_UICP_Figure_31.ai	By: JLM	Checked: AP

Petrotek
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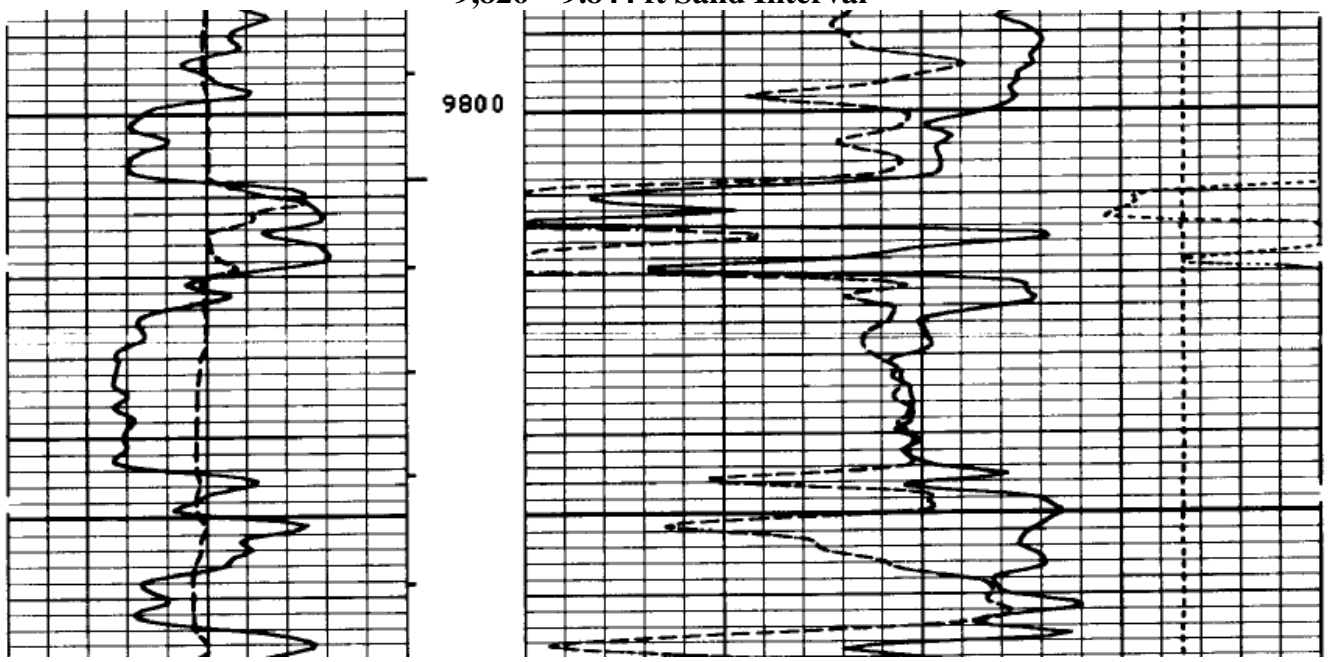
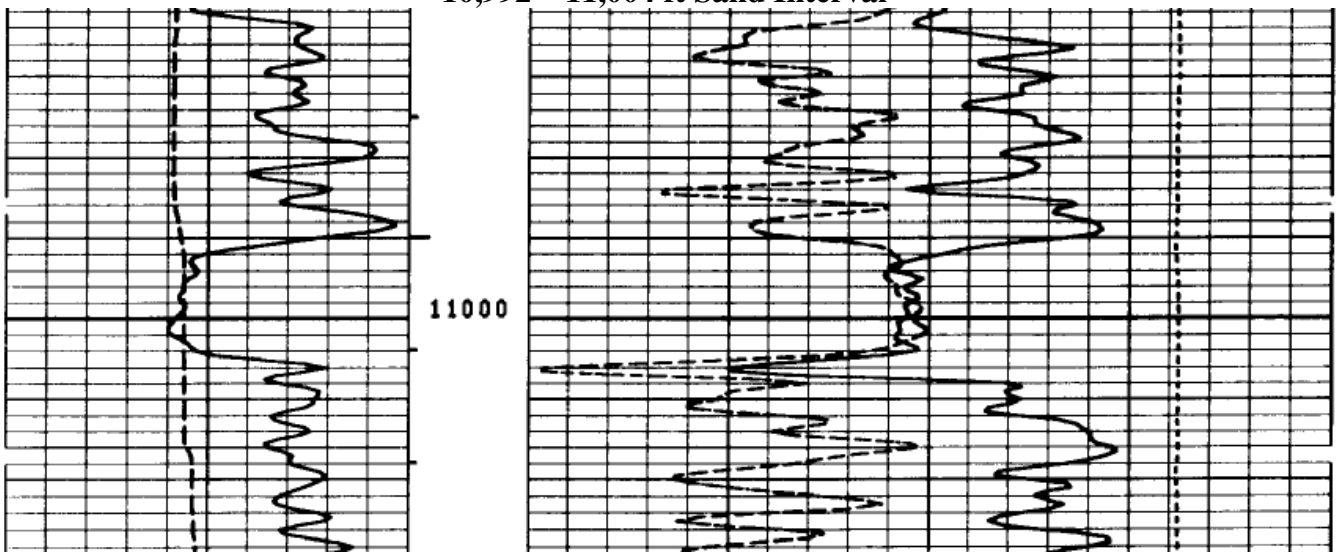
Littleton, Colorado 80127-4239 USA
303-290-9414
www.petrotek.com

Lance Formation, Neutron-Density Log
9,826 – 9.844 ft Sand Interval



Lance Formation, Neutron-Density Log
10,992 – 11,004 ft Sand Interval



Note:
Left column includes caliper (dashed) and natural gamma (solid).
Right column includes compensated neutron (dashed) and formation density (solid). Scale is from 0.3 to -0.1.
See Table 15 for water quality calculations.

Lost Creek ISR, LLC
Littleton, Colorado, USA

Figure 32
Indications of Gas in Lance Formation, Stratton 1-21 Well

Lost Creek Class I UIC Permit

Project: 315-15	Date: June 2009	
LC_Class_I_UICP_Figure_32.ai	By: JLM	Checked: AP

Petrotek
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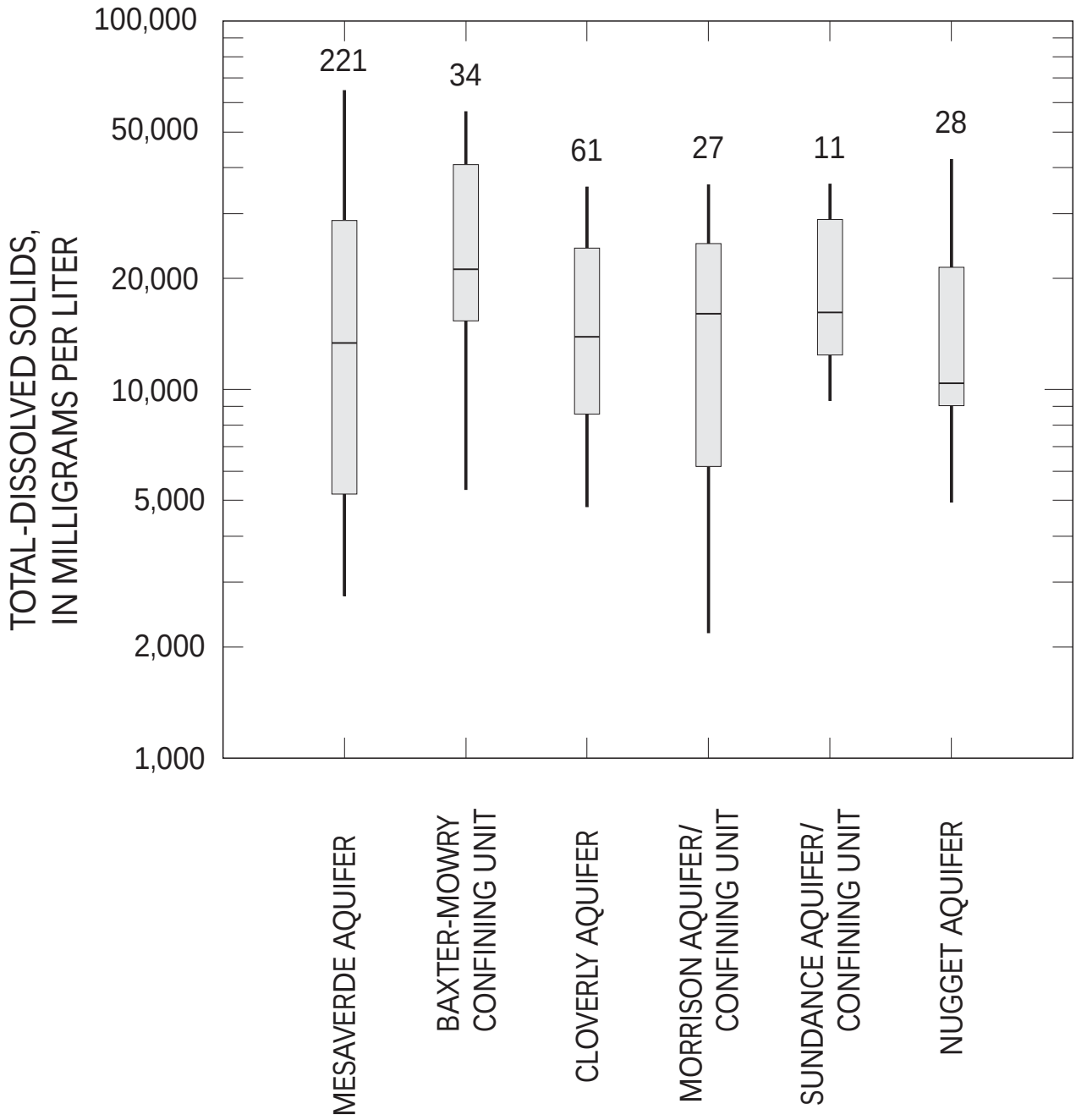
Littleton, Colorado 80127-4239
303-290-9414
www.petrotek.com



EXPLANATION

10 Number of samples

90th percentile
75th percentile
Median
25th percentile
10th percentile

After Mason and Miller, 2004

Lost Creek ISR, LLC
Littleton, Colorado, USA

Figure 33
TDS Data in Mesozoic Hydrogeologic Units from Produced-Water Samples, Sweetwater County, Wyoming

Lost Creek Class I UIC Permit

Project: 315-15	Date: June 2009	
LC_Class_I_UICP_Figure_33.ai	By: JLM	Checked: AP

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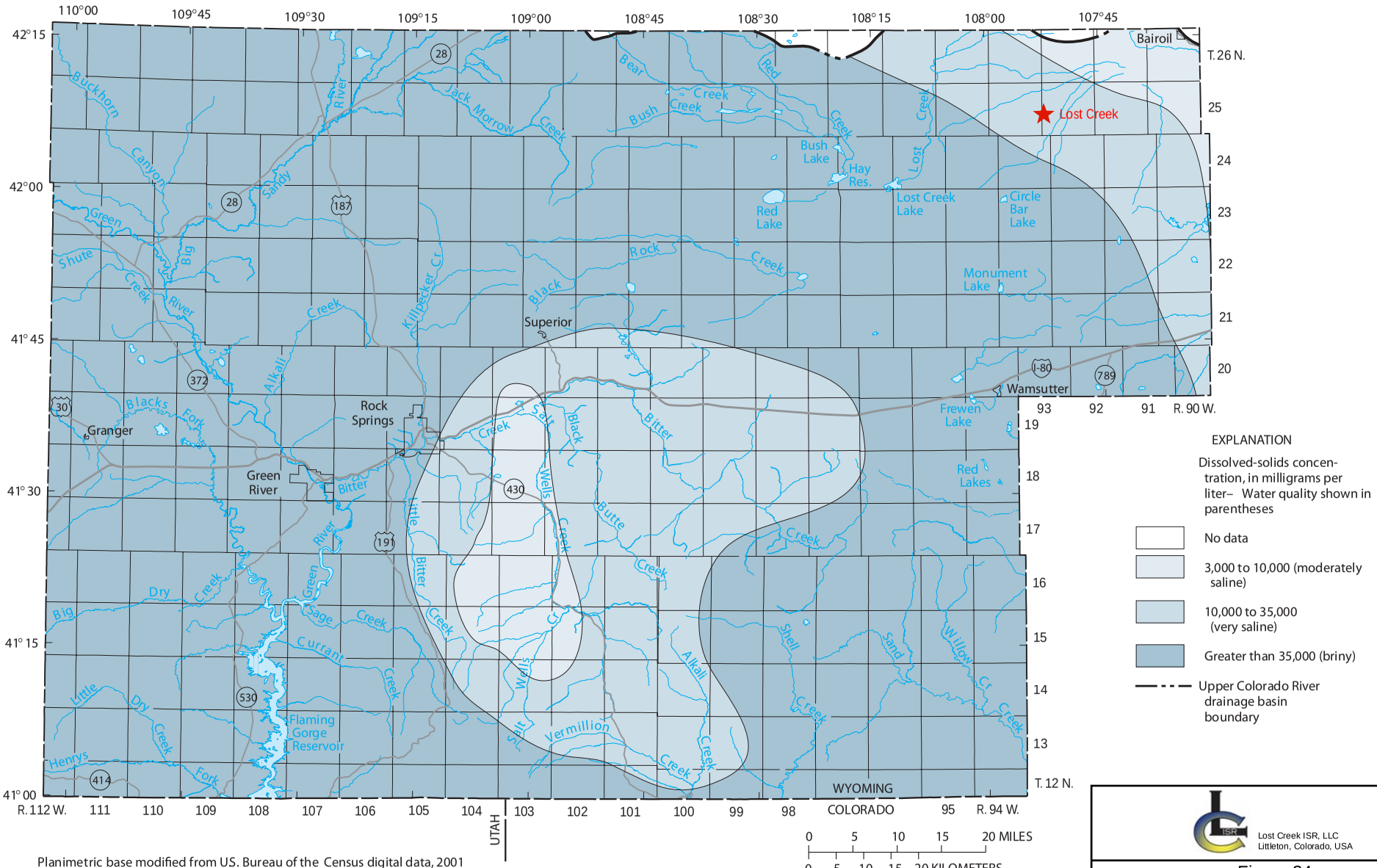

EXPLANATION

Dissolved-solids concentration, in milligrams per liter– Water quality shown in parentheses

- No data
- 3,000 to 10,000 (moderately saline)
- 10,000 to 35,000 (very saline)
- Greater than 35,000 (briny)
- Upper Colorado River drainage basin boundary

Planimetric base modified from US. Bureau of the Census digital data, 2001
Public land survey system from Wyoming Water Resources Center digital data, 1994
Hydrography modified from USGS National Hydrography Dataset (NHD) digital data, 1999
Lambert Conformal Conic projection, Standard parallels 41° and 42°, central meridian -108°45

After Mason and Miller, 2004.

Lost Creek ISR, LLC
Littleton, Colorado, USA

Figure 34
TDS Concentrations in the Nugget Aquifer, Sweetwater County, Wyoming
Lost Creek Class I UIC Permit

Project: 315-15	Date: June 2009	
LC_Class_I_UICP_Figure_34.ai	By: JLM	Checked: AP

Petrotek
10288 West Chatfield Ave., Ste 201
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303-290-9414
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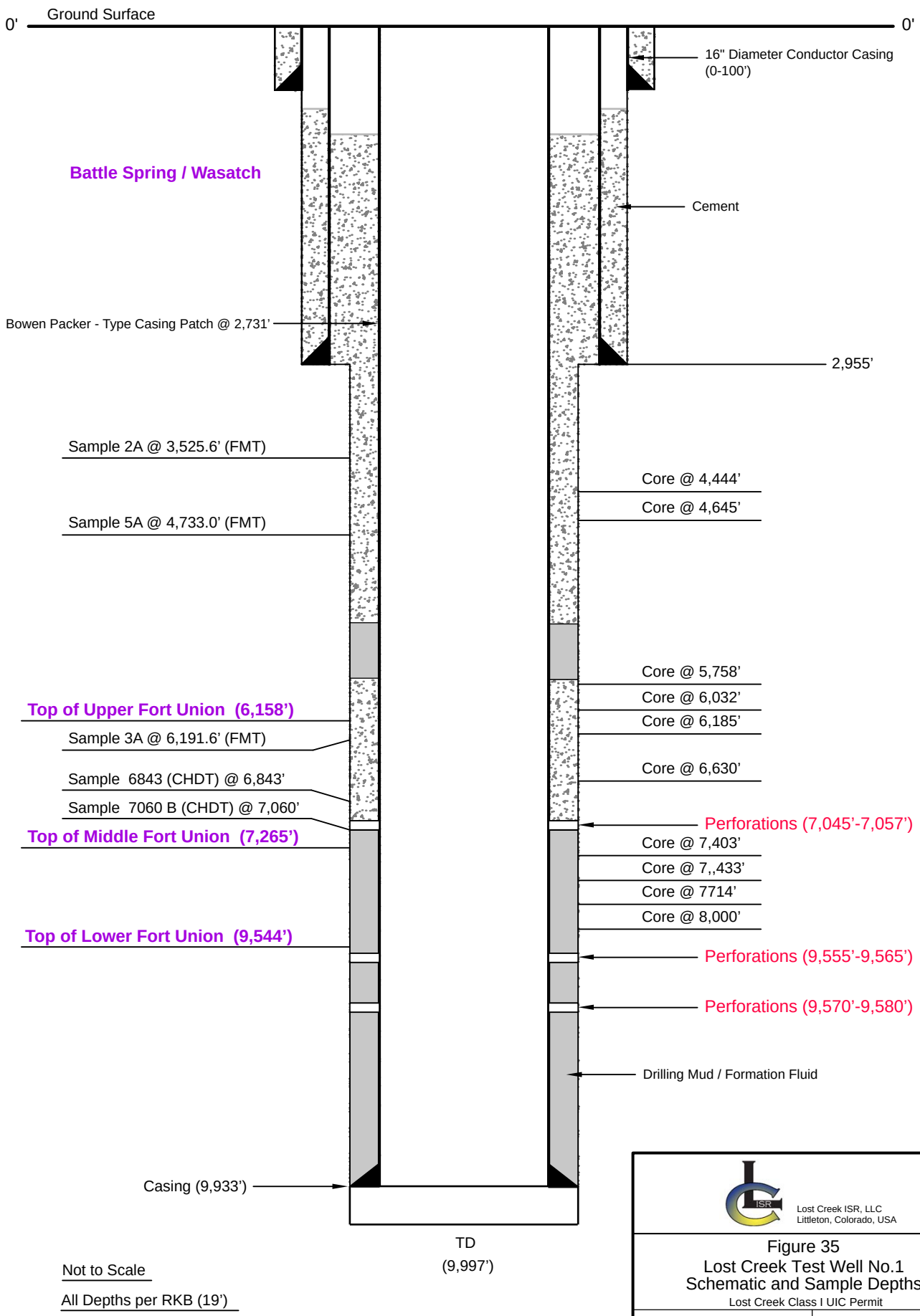

Not to Scale

All Depths per RKB (19')

Lost Creek ISR, LLC
Littleton, Colorado, USA

Figure 35
Lost Creek Test Well No.1
Schematic and Sample Depths
Lost Creek Class I UIC Permit

Project: 315-15	Date: May 2009	
LC_Class_I_UICP_Figure_35.ai	By: JM	Checked: AP

Petrotek
10288 West Chatfield Ave., Suite 201
Littleton, Colorado 80127-4239 USA
303-290-9414
www.petrotek.com

Schlumberge

Company: **UR ENERGY INC**

Well: **LOST CREEK TEST WELL 1**
Field: **LOST CREEK**
County: **SWEETWATER** State: **WYOMING**

County: SWEETWATER
Field: LOST CREEK
Location: SEC. 25, T25N, R93W
Well: LOST CREEK TEST WELL 1
Company: UR ENERGY INC

PLATFORM EXPRESS

ARRAY INDUCTION TOOL

LOCATION			
SEC. 25, T25N, R93W		Elev.: K.B.	6958.50 ft
		G.L.	6940.00 ft
		D.F.	
Permanent Datum:	GROUND LEVEL	Elev.:	6940.00 ft
Log Measured From:	KELLY BUSHING	18.50 ft	above Perm. Da
Drilling Measured From:	KELLY BUSHING		

API Serial No.	Section	Township	Rang
	25	25N	93W

Logging Date			17-Nov-2008					
Run Number			ONE					
Depth Driller			2951 ft					
Schlumberger Depth			2694 ft					
Bottom Log Interval			2951 ft					
Top Log Interval			102 ft					
Casing Driller Size @ Depth			16.000 in @ 81 ft			@		
Casing Schlumberger			102 ft					
Bit Size			12.250 in					
Type Fluid In Hole			WATER BASED MUD					
MUD	Density	Viscosity	9.2 lbm/gal	50 s				
MUD	Fluid Loss	PH	15 cm3	9.5				
MUD	Source Of Sample		MUD PIT					
RM @ Measured Temperature			7.580 ohm.m @ 78 degF			@		
RMF @ Measured Temperature			6.064 ohm.m @ 78 degF			@		
RMC @ Measured Temperature			9.120 ohm.m @ 78 degF			@		
Source RMF	RMC		CALCULATED	CALCULATED				
RM @ MRT	RMF @ MRT		7.035 @ 85	5.628 @ 85		@		@
Maximum Recorded Temperatures			85 degF					
Circulation Stopped		Time	17-Nov-2008		12:00			
Logger On Bottom		Time	17-Nov-2008		21:11			
Unit Number	Location		2211	CASPER, WY				
Recorded By			B. ANDEREGG, P. GRANT					
Witnessed By			MR. GLEN REFFITT					

Schlumberge

Company: **UR ENERGY INC**

Well: **LOST CREEK TEST WELL 1**
Field: **LOST CREEK**
County: **SWEETWATER** State: **WYOMING**

County: SWEETWATER
Field: LOST CREEK
Location: SEC. 25, T25N, R93W
Well: LOST CREEK TEST WELL 1
Company: UR ENERGY INC

PLATFORM EXPRESS
COMPENSATED NEUTRON POROSTIY
THREE DETECTOR LITHO-DENSITY

LOCATION

SEC. 25, T25N, R93W

Elev.: K.B. 6958.50 f
G.L. 6940.00 f
D.F.

Permanent Datum: GROUND LEVEL Elev.: 6940.00 ft
Log Measured From: KELLY BUSHING 18.50 ft above Perm. Da
Drilling Measured From: KELLY BUSHING

API Serial No.	Section	Township	Rang
	25	25N	93W

Logging Date			17-Nov-2008				
Run Number			ONE				
Depth Driller			2951 ft				
Schlumberger Depth			2694 ft				
Bottom Log Interval			2951 ft				
Top Log Interval			102 ft				
Casing Driller Size @ Depth			16.000 in	@	81 ft	@	
Casing Schlumberger			102 ft				
Bit Size			12.250 in				
Type Fluid In Hole			WATER BASED MUD				
MUD	Density	Viscosity	9.2 lbm/gal	50 s			
MUD	Fluid Loss	PH	15 cm3	9.5			
MUD	Source Of Sample		MUD PIT				
RM @ Measured Temperature			7.580 ohm.m	@	78 degF	@	
RMF @ Measured Temperature			6.064 ohm.m	@	78 degF	@	
RMC @ Measured Temperature			9.120 ohm.m	@	78 degF	@	
Source RMF	RMC		CALCULATED	CALCULATED			
RM @ MRT	RMF @ MRT		7.035 @ 85	5.628 @ 85		@	@
Maximum Recorded Temperatures			85 degF				
Circulation Stopped		Time	17-Nov-2008		12:00		
Logger On Bottom		Time	17-Nov-2008		21:11		
Unit Number	Location		2211	CASPER, WY			
Recorded By			B. ANDEREGG, P. GRANT				
Witnessed By			MR. GLEN REFFITT				

Schlumberge

Company: **UR ENERGY INC**

Well: **LOST CREEK TEST WELL 1**
Field: **LOST CREEK**
County: **SWEETWATER** State: **WYOMING**

County: SWEETWATER
Field: LOST CREEK
Location: SEC. 25, T25N, R93W
Well: LOST CREEK TEST WELL 1
Company: UR ENERGY INC

PLATFORM EXPRESS

BOREHOLE COMPENSATED SONIC

LOCATION

SEC. 25, T25N, R93W		Elev.: K.B.	6958.50 ft
		G.L.	6940.00 ft
		D.F.	
Permanent Datum:	GROUND LEVEL	Elev.:	6940.00 ft
Log Measured From:	KELLY BUSHING	18.50 ft	above Perm. Da
Drilling Measured From:	KELLY BUSHING		

API Serial No.	Section	Township	Rang
	25	25N	93W

Logging Date			17-Nov-2008					
Run Number			ONE					
Depth Driller			2951 ft					
Schlumberger Depth			2694 ft					
Bottom Log Interval			2951 ft					
Top Log Interval			102 ft					
Casing Driller Size @ Depth			16.000 in	@	81 ft		@	
Casing Schlumberger			102 ft					
Bit Size			12.250 in					
Type Fluid In Hole			WATER BASED MUD					
MUD	Density	Viscosity	9.2 lbm/gal	50 s				
	Fluid Loss	PH	15 cm3	9.5				
	Source Of Sample		MUD PIT					
RM @ Measured Temperature			7.580 ohm.m	@	78 degF		@	
RMF @ Measured Temperature			6.064 ohm.m	@	78 degF		@	
RMC @ Measured Temperature			9.120 ohm.m	@	78 degF		@	
Source RMF	RMC		CALCULATED	CALCULATED				
RM @ MRT	RMF @ MRT		7.035 @ 85	5.628	@ 85	@		@
Maximum Recorded Temperatures			85 degF					
Circulation Stopped		Time	17-Nov-2008		12:00			
Logger On Bottom		Time	17-Nov-2008		21:11			
Unit Number	Location		2211	CASPER, WY				
Recorded By			B. ANDEREGG, P. GRANT					
Witnessed By			MR. GLEN REFFITT					

Schlumberge

Company: **UR ENERGY INC**

Well: **LOST CREEK TEST WELL 1**
Field: **LOST CREEK**
County: **SWEETWATER** State: **WYOMING**

County: SWEETWATER
Field: LOST CREEK
Location: SEC. 25, T25N, R93W
Well: LOST CREEK TEST WELL 1
Company: UR ENERGY INC

PLATFORM EXPRESS

CBL-VDL

LOCATION

SEC. 25, T25N, R93W		Elev.: K.B.	6958.50 f
		G.L.	6940.00 f
		D.F.	
Permanent Datum:	GROUND LEVEL	Elev.:	6940.00 ft
Log Measured From:	KELLY BUSHING	18.50 ft	above Perm. Da
Drilling Measured From:	KELLY BUSHING		

API Serial No.	Section	Township	Rang
	25	25N	93W

Logging Date			6-Dec-2008					
Run Number			ONE					
Depth Driller			9997 ft					
Schlumberger Depth			9946 ft					
Bottom Log Interval			3090 ft					
Top Log Interval			0 ft					
Casing Driller Size @ Depth			9.625 in	@	2955 ft		@	
Casing Schlumberger			2958 ft					
Bit Size			12.250 in					
Type Fluid In Hole			WATER BASED MUD					
MUD	Density	Viscosity	9.4 lbm/gal	53 s				
MUD	Fluid Loss	PH	7 cm3	9				
MUD	Source Of Sample		MUD TANK					
RM @ Measured Temperature			5.520 ohm.m	@	38 degF		@	
RMF @ Measured Temperature			4.416 ohm.m	@	38 degF		@	
RMC @ Measured Temperature			6.624 ohm.m	@	38 degF		@	
Source RMF	RMC		CALCULATED	CALCULATED				
RM @ MRT	RMF @ MRT		1.268 @ 186	1.014 @ 186		@		@
Maximum Recorded Temperatures			186 degF					
Circulation Stopped		Time	5-Dec-2008		18:30			
Logger On Bottom		Time	6-Dec-2008		11:07			
Unit Number	Location		2345	CASPER, WY				
Recorded By			B. ANDEREGG					
Witnessed By			MR. GLEN REFFITT					

Schlumberge

Company: **UR ENERGY INC**

Well: **LOST CREEK TEST WELL 1**
Field: **LOST CREEK**
County: **SWEETWATER** State: **WYOMING**

PLATFORM EXPRESS

ARRAY INDUCTION TOOL

County: SWEETWATER
Field: LOST CREEK
Location: SEC. 25, T25N, R93W
Well: LOST CREEK TEST WELL 1
Company: UR ENERGY INC

LOCATION: SEC. 25, T25N, R93W

Elev.: K.B. 6958.50 f
G.L. 6940.00 f
D.F.

Permanent Datum: GROUND LEVEL — Elev.: 6940.00 ft
Log Measured From: KELLY BUSHING — 18.50 ft above Perm. Da
Drilling Measured From: KELLY BUSHING

API Serial No.	Section	Township	Rang
	25	25N	93W

Logging Date			6-Dec-2008				
Run Number			ONE				
Depth Driller			9997 ft				
Schlumberger Depth			9946 ft				
Bottom Log Interval			9946 ft				
Top Log Interval			2958 ft				
Casing Driller Size @ Depth			9.625 in	@	2955 ft	@	
Casing Schlumberger			2958 ft				
Bit Size			7.875 in				
Type Fluid In Hole			WATER BASED MUD				
MUD	Density	Viscosity	9.4 lbm/gal	53 s			
MUD	Fluid Loss	PH	7 cm3	9			
MUD	Source Of Sample		MUD TANK				
RM @ Measured Temperature			5.520 ohm.m	@	38 degF	@	
RMF @ Measured Temperature			4.416 ohm.m	@	38 degF	@	
RMC @ Measured Temperature			6.624 ohm.m	@	38 degF	@	
Source RMF	RMC		CALCULATED	CALCULATED			
RM @ MRT	RMF @ MRT		1.268 @ 186	1.014 @ 186		@	@
Maximum Recorded Temperatures			186 degF				
Circulation Stopped	Time		5-Dec-2008	18:30			
Logger On Bottom	Time		6-Dec-2008	11:07			
Unit Number	Location		2345	CASPER, WY			
Recorded By			B. ANDEREGG				
Witnessed By			MR. GLEN REFFITT				

Schlumberge

Company: **UR ENERGY INC**

Well: **LOST CREEK TEST WELL 1**
Field: **LOST CREEK**
County: **SWEETWATER** State: **WYOMING**

THREE DETECTOR LITHO-DENSITY

County: SWEETWATER
Field: LOST CREEK
Location: SEC. 25, T25N, R93W
Well: LOST CREEK TEST WELL 1
Company: UR ENERGY INC

PLATFORM EXPRESS
COMPENSATED NEUTRON POROSITY, THREE DETECTOR LITHO-DENSITY

LOCATION: SEC. 25, T25N, R93W

Elev.: K.B. 6958.50 f
G.L. 6940.00 f
D.F.

Permanent Datum: GROUND LEVEL — Elev.: 6940.00 ft
Log Measured From: KELLY BUSHING — 18.50 ft above Perm. Da
Drilling Measured From: KELLY BUSHING

API Serial No.	Section	Township	Rang
	25	25N	93W

Logging Date		6-Dec-2008			
Run Number		ONE			
Depth Driller		9997 ft			
Schlumberger Depth		9946 ft			
Bottom Log Interval		9946 ft			
Top Log Interval		2958 ft			
Casing Driller Size @ Depth		9.625 in	@ 2955 ft	@	
Casing Schlumberger		2958 ft			
Bit Size		7.875 in			
Type Fluid In Hole		WATER BASED MUD			
MUD: Density	Viscosity	9.4 lbm/gal	53 s		
MUD: Fluid Loss	PH	7 cm3	9		
MUD: Source Of Sample		MUD TANK			
RM @ Measured Temperature		5.520 ohm.m	@ 38 degF	@	
RMF @ Measured Temperature		4.416 ohm.m	@ 38 degF	@	
RMC @ Measured Temperature		6.624 ohm.m	@ 38 degF	@	
Source RMF	RMC	CALCULATED	CALCULATED		
RM @ MRT	RMF @ MRT	1.268 @ 186	1.014 @ 186	@	@
Maximum Recorded Temperatures		186 degF			
Circulation Stopped	Time	5-Dec-2008	18:30		
Logger On Bottom	Time	6-Dec-2008	11:07		
Unit Number	Location	2345	CASPER, WY		
Recorded By		B. ANDEREGG			
Witnessed By		MR. GLEN REFFITT			

Schlumberge

Company: **UR ENERGY INC**

Well: **LOST CREEK TEST WELL 1**
Field: **LOST CREEK**
County: **SWEETWATER** State: **WYOMING**

County: SWEETWATER
Field: LOST CREEK
Location: SEC. 25, T25N, R93W
Well: LOST CREEK TEST WELL 1
Company: UR ENERGY INC

PLATFORM EXPRESS

BOREHOLE COMPENSATED SONIC

LOCATION

SEC. 25, T25N, R93W

Elev.: K.B. 6958.50 f
G.L. 6940.00 f
D.F.

Permanent Datum: GROUND LEVEL — Elev.: 6940.00 ft
Log Measured From: KELLY BUSHING — 18.50 ft above Perm. Da
Drilling Measured From: KELLY BUSHING

API Serial No.	Section	Township	Rang
	25	25N	93W

Logging Date			6-Dec-2008				
Run Number			ONE				
Depth Driller			9997 ft				
Schlumberger Depth			9946 ft				
Bottom Log Interval			9946 ft				
Top Log Interval			2958 ft				
Casing Driller Size @ Depth			9.625 in	@	2955 ft	@	
Casing Schlumberger			2958 ft				
Bit Size			7.875 in				
Type Fluid In Hole			WATER BASED MUD				
MUD	Density	Viscosity	9.4 lbm/gal	53 s			
MUD	Fluid Loss	PH	7 cm3	9			
MUD	Source Of Sample		MUD TANK				
RM @ Measured Temperature			5.520 ohm.m	@	38 degF	@	
RMF @ Measured Temperature			4.416 ohm.m	@	38 degF	@	
RMC @ Measured Temperature			6.624 ohm.m	@	38 degF	@	
Source RMF	RMC		CALCULATED	CALCULATED			
RM @ MRT	RMF @ MRT		1.268 @ 186	1.014 @ 186		@	@
Maximum Recorded Temperatures			186 degF				
Circulation Stopped	Time		5-Dec-2008	18:30			
Logger On Bottom	Time		6-Dec-2008	11:07			
Unit Number	Location		2345	CASPER, WY			
Recorded By			B. ANDEREGG				
Witnessed By			MR. GLEN REFFITT				

Schlumberger

Company: **UR ENERGY INC**

Well: **LOST CREEK TEST WELL 1**
Field: **LOST CREEK**
County: **SWEETWATER** State: **WYOMING**

CEMENT MAPPING TOOL
MAPPING IMAGES
CBL-VDL

County: SWEETWATER
Field: LOST CREEK
Location: SEC. 25, T-25N, & R-93W
Well: LOST CREEK TEST WELL 1
Company: UR ENERGY INC

LOCATION: SEC. 25, T-25N, & R-93W

Elev.: K.B. 6958.50 ft
G.L. 6940.00 ft
D.F.

Permanent Datum: GROUND LEVEL — Elev.: 6940.00 ft
Log Measured From: KELLY BUSHING — 18.50 ft above Perm. Datum
Drilling Measured From: KELLY BUSHING

API Serial No.	Section	Township	Range
	25	25N	93W

Logging Date	19-Feb-2009		
Run Number	1		
Depth Driller	9950 ft		
Schlumberger Depth	8965 ft		
Bottom Log Interval	8965 ft		
Top Log Interval	0 ft		
Casing Fluid Type	FRESH WATER BASED MUD		
Salinity			
Density	9.2 lbm/gal		
Fluid Level	0 ft		
BIT/CASING/TUBING STRING			
Bit Size	7.875 in		
From			
To			
Casing/Tubing Size	5.500 in		
Weight	17 lbm/ft		
Grade	N-80		
From			
To			
Maximum Recorded Temperatures	194 degF		
Logger On Bottom — Time	19-Feb-2009	12:00	
Unit Number — Location	355	CASPER WYOMING	
Recorded By	LAW DICKERSON		
Witnessed By	MR. RICK LYLE		

Schlumberger

GEOFRAME
PROCESSED
INTERPRETATION

Formation Evaluation
Water Salinity Analysis

annot, and do not guarantee the accuracy or
our part, be liable or responsible for any loss,
by any of our officers, agents or employees.
our current Price Schedule.

0-147	Engineer: B. ANDEREGG
04	Log Analyst: Joe Magdits