Saxton, John

From: Kevin Shelburne <kevin.shelburne@UR-Energy.com>
Sent: Monday, February 08, 2016 1:16 PM
To: Saxton, John
Cc: John Cash
Subject: [External_Sender] Lost Creek Class V UIC April Re-submittal
Attachments: UIC CLASS V PERMIT APPLICATION_revised_4-17-15.docx; Table 3-3 MCL Table.xlsx; Table 4-1 AOR_14 yrs.xlsx; Table 4-2 Water Rights from State Engineer's Database.xlsx; Fig2-4 Injector Well M-FG6 Construction 8.5x11.pdf; Fig2-5 Injection Well M-FG7 Construction Schematic.pdf; Fig4-1_Area of Review_14yrs.pdf; Fig4-2_Area of Review_5yrs.pdf; Fig4-3_WaterRightMap.pdf; Fig5-1_Water Treatment Flow Diagram.pdf

John,

As we discussed, attached is the revised permit application (text) that we re-submitted April 2015. Also attached are the changed, amended and new tables and figures. If this doesn't clear up the confusion, please let me know.

Regards,
Kevin

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UIC CLASS V PERMIT APPLICATION
SUBCLASS 5C3

Lost Creek ISR, LLC
3424 Wamsutter Crooks Gap Road
Wamsutter, Wyoming 82336 USA

LOST CREEK ISR, LLC
PERMIT TO MINE #788

April 2015

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Abbreviations:

bgs	below ground surface
BLM	U.S. Bureau of Land Management
dpm	disintegrations per minute
EPA	U.S. Environmental Protection Agency
ft.	feet
gpm	gallons per minute
LQD	Land Quality Division
MCL	Maximum Contaminant Limit
NRC	U.S. Nuclear Regulatory Commission
RO	Reverse Osmosis
ROFD	Radius of Fluid Displacement
RSO	Radiation Safety Officer
SOP	Standard Operating Procedure
UIC	Underground Injection Control
U_{nat}	Uranium occurring in the natural ratio of its isotopes
WDEQ	Wyoming Department of Environmental Quality
WQD	Water Quality Division
WY	Wyoming

1.0 INTRODUCTION

Lost Creek ISR, LLC (LCI) is engaged in *in situ* uranium recovery at its Lost Creek Project in northeastern Sweetwater County, Wyoming, see **Figure 1-1**. Facility construction began in October 2012 after receipt of Permit to Mine 788 from the Wyoming Department of Environmental Quality – Land Quality Division (WDEQ-LQD), License SUA-1598 from the U.S. Nuclear Regulatory Commission (NRC), approval of a Plan of Operations from the U.S. Bureau of Land Management (BLM), and numerous other regulatory approvals. Production commenced in early August 2013 upon completion of construction.

1.1 Facility Overview

In situ uranium recovery is a mining method that utilizes a series of injection and production wells completed in the mineralized aquifer. A solution consisting of ground water, oxygen and a source of bicarbonate is injected into the mineralized aquifer where it dissolves the naturally occurring uranium minerals. The uranium laden ground water is then pumped to the surface via the production wells and sent to the processing plant where the uranium is recovered. The ground water is then refortified with oxygen and bicarbonate and re-injected into the formation where it repeats the process until the mineralization is recovered. In situ mining requires the maintenance of a hydrologic sink, or area of low ground-water pressure, so the mining solution can be contained within the mineralized body instead of migrating outward into potentially clean ground water. The hydrologic sink is generated by removing about 0.5 to 1.5% of the water from the flow circuit prior to re-injection; this is often referred to as a bleed. For example, if the production rate is 1,000 gallons per minute (gpm), then the bleed rate would typically be 5 to 15 gpm. The water generated from the bleed, as well as plant process water and waste water generated from ground-water restoration, must be disposed of as waste.

The original mine site plan for waste water disposal called for utilizing up to five (5) Underground Injection Control (UIC) Class I deep disposal wells. To date, three of the five Class I wells have been installed and put into use. LCI desires to utilize technology that will be more cost effective than Class I disposal wells and also reduce water consumption. Therefore, LCI is proposing with this application, to treat various streams of waste water to a quality that can be disposed of in shallow wells using a UIC Class V Subclass 5C3 Permit (referred to as an "Industrial Process Water and Waste Disposal Facility" in the WDEQ-Water Quality Division Chapter 16 regulations). If approved, this practice would allow for increased production rates while maintaining the required bleed rate, and would also significantly expedite the rate of future ground-water restoration. Most importantly, the consumption of ground water could be reduced by as much as 90%.

As described in greater detail in **Section 2.0**, LCI has selected shallow horizons within the Battle Spring Formation, as the receiving zones because these horizons are:

- relatively shallow and easy to access;

- the water quality of these horizons are relatively poor due to naturally occurring radionuclides and associated metals;
- the horizons are naturally oxidized and barren of uranium mineralization;
- vertical confinement is sufficient so fluids will not migrate to the surface;
- structural and lithologic boundaries, as well as distance, will significantly reduce communication with in situ uranium mining monitor wells or the mining aquifer. These factors will prevent Class V injection from having an impact on mining operations; and
- the horizons possess sufficient transmissivity to serve as receiving zones.

Prior to Class V injection, the waste water will be treated with: 1) ion exchange to remove uranium, 2) with reverse osmosis (RO) to remove total dissolved solids, radionuclides and metals, and 3) with Dowex Complexer resin to ensure radium levels are less than effluent limits. A slip stream of well water which contains low concentrations of sulfate may be added to the circuit prior to the radium removal in order to minimize dissolution of barium sulfate from the resin surface.

During commercial uranium production, the flow rate through the Class V treatment circuit is expected to be on the order of 10 to 70 gpm (exclusive of the sulfate rich slip stream). During ground-water restoration, the flow rate through the Class V treatment circuit will be much greater, on the order of 50 to 200 gpm, due to ground-water sweep and RO treatment of the wellfield fluids.

The facility will be located on Federal lands managed by the Bureau of Land Management, Rawlins Field Office. The nearest commercial neighbor is the Sweetwater Uranium Mine and Mill located approximately four miles to the southwest. No residences are in the vicinity. The village of Bairoil is located about 15 miles to the northeast. The prevailing wind direction, based on over seven years of nearly continuous onsite monitoring, is from the west southwest to the east northeast. The terrain consists of gently rolling high plains desert steppe.

1.2 Facility Operator Information

Pursuant to Section 6(c)(ii) of the WDEQ-WQD Chapter 16 Regulations, the company information is as follows:

Company Name: Lost Creek ISR, LLC

Address: 5880 Enterprise Drive, Suite 200
Casper, WY 82609

Telephone #: (307) 265-2373

Ownership Status: Lost Creek ISR, LLC is a wholly owned subsidiary of Ur-Energy USA, Inc., which in turn is wholly owned by Ur-Energy, Inc. Ur-Energy, Inc. is a publicly traded company in Canada and the United States.

Pursuant to Section 6(c)(iii) of WDEQ-WQD Chapter 16 Regulations, the facility information is as follows:

Facility Name: Lost Creek ISR Project

Address: 3424 Wamsutter Crooks Gap Road, the nearest town is Bairoil, WY

Telephone #: (307) 324-4100

Location: T25N, R92W, Section 18, NW1/4 of the SE1/4, Sweetwater County, WY

2.0 HYDROGEOLOGIC SETTING

The Lost Creek Mine Permit Area is geographically located in the northeastern portion of the Great Divide Basin, an oval shaped structural depression encompassing approximately 3,500 square miles. The basin is broadly bounded on the north and east by mountains and hills. The regional sagebrush-dominated plains are characterized by low ridges and shallow draws with few rock outcroppings. Drainage is strictly ephemeral. No drainages exhibit perennial surface water flow or permanent water bodies.

2.1 Geology, Stratigraphy and Structure

Geology

Outcrop within the entire Mine Permit area is represented solely by the upper portions of the Battle Spring Formation, which is also the host to uranium mineralization and the planned Class V injection. The Battle Spring Formation, in the vicinity of the Lost Creek Project, was deposited within a major alluvial fan system resulting in a multitude of thin to thick beds of sandstones separated by numerous thin to medium thick layers of mudstone, claystone and siltstone. The sandstone facies represent fluvial channel fill depositional environments. The intervening shaly units represent channel margin and overbank depositional environments. The anastomosing nature of the fluvial channels has resulted in stratigraphy which tends to be erratic and lacking long-range continuity.

Lithology of the Battle Spring Formation, within the Mine Permit area, consists of approximately 60% to 80% clean arkosic sands, weakly consolidated, medium to coarse-grained, commonly conglomeratic, in units from five to 50 feet thick; separated by 20% to 40% interbedded mudstone, claystone, siltstone, and fine sandstone, generally less than 25 feet thick (see Cross Section **Plates 1** and **2**, and **Appendix A**: Well Completion Logs). This Battle Spring Formation lithological assemblage remains relatively consistent throughout the entire vertical section of interest, such that the lithology of the shallowest units is virtually identical to that of the deepest units of interest. Economic uranium mineralization is generally associated with medium to coarse-grained sand facies.

Uranium deposits within the Lost Creek Project occur as roll front type deposits. The most significant mineral resources occur within two major stratigraphic horizons within the Battle Spring Formation, which underlie the proposed Class V injection interval.

These resources occur within a trend called the Main Mineral Trend, most of which is overlain by Mine Unit 1 (MU1) and planned Mine Unit 2 (MU2) (**Figure 2-1**).

The proposed injection interval is barren of mineralization in the Class V area of interest. However, elsewhere in the Lost Creek Project, subordinate mineralization has been identified within the injection interval and remains to be investigated for economic viability. The nearest occurrence to the Class V area is approximately one-half mile to the south.

Stratigraphy

Being the product of an alluvial fan depositional environment, the Battle Spring Formation can be described as a very thick sequence composed of innumerable individual channel sands occurring as sand sheets typically from five to 50 feet thick interfingered with shales typically two to 25 feet thick, which represent channel margin and overbank environments. Lateral extent of both of these lithologies can range from 100 feet to miles. Where multiple sand channels are stacked on top of each other, the cumulative sand thickness and width can be considerable. The erratic nature of these narrow channels results in stratigraphy which can be highly variable. The outcome can be very complex, where interfingering or abrupt facies changes may result in drastic changes in shale or sand thickness over short distances.

Sedimentary and depositional patterns throughout the entire Battle Spring interval of interest remained quite consistent and uniform. Consequently, from a lithological and stratigraphic perspective there is little difference between deeper units and those near the surface. Characteristics of given stratigraphic intervals are subtle and generally are not consistent regionally; consequently, partitioning into meaningful stratigraphic units remains largely arbitrary. In the Class V area of interest, the top 500 feet of the Battle Spring Formation represents the interval of interest.

The proposed injection interval represents a depth interval from approximately 190 feet to 455 feet. It is dominated by numerous relatively thin sands separated from each other by numerous shaley intervals (see Cross Sections **Plates 1** and **2**). Sands range in thickness from five to 50 feet, typically being 15-25 feet thick. Shales may range in thickness from two to 20 feet thick and commonly occur in en-echelon configuration. Collectively, the shales exhibit considerable influence on aquifer characteristics, particularly with regard to vertical migration of fluids. Note also that the term “shale” is used here loosely to reference low permeability horizons that my include siltstone and fine silty sands. Both sands and shaley facies tend to be erratic in extent. They rarely exhibit regional continuity, but typically show only local continuity on the scale of hundreds to thousands feet. Notable exceptions to this are two shales which have been named by LCI as the Lost Creek Shale (LCS) and the EF Shale (**Plates 1** and **2**). Both show continuity throughout the Class V area of interest. Regional continuity of the LCS Shale is significant, and is consequently employed as a stratigraphic datum throughout

the Project. The LCS Shale also represents the underlying confining aquiclude to the proposed Class V injection zone. Current ISR uranium production is occurring approximately ½ mile to the south of the Class V area of interest in a 120 foot thick interval immediately below the LCS Shale.

Note that for internal purposes, LCI has sub-divided the Battle Spring stratigraphy into "horizons" employing an alphabetical system. As such, the proposed injection interval encompasses the entire FG Horizon and most or all of the overlying DE Horizon, as is illustrated in the Well Completion Logs in **Appendix A**.

Structure

Bedding within the Battle Spring Formation in the Lost Creek Project area is nearly flat-lying, dipping gently to the west and northwest at roughly three degrees. This regional pattern of strike and dip is locally modified due to horst and graben features resulting from normal faulting in the Lost Creek area.

The dominant geologic structural features within the Lost Creek Project area are a series of normal faults as shown on **Figure 2-1**. The faults exhibit variable displacement ranging from 10 feet to 80 feet. Geographically these appear to be related to the Chicken Springs fault system; however, there is no evidence that the faults are currently active. Detailed correlation of drill data supports this, and there is virtually no surface expression of the faults. Fault movement post-dates and displaces mineralization, which is estimated by some studies to be approximately 20-25 million years ago.

Mine Unit 1 is bisected by a pair of normal faults which are collectively referred to as the Lost Creek Fault. This consists essentially of two faults, lying roughly parallel and en-echelon, trending from east-northeast to west-southwest. The 'main' Lost Creek Fault trends northeast to southwest and dissects the central portion of the Lost Creek Permit area. Downward displacement occurs on the south block. Throw is approximately 70 to 80 feet in the eastern portion of the Project area, decreasing to the west and eventually losing identity in the western one-third of the Project area. In that area a second parallel fault becomes dominant, with throw opposite that of the main fault. Both faults are nearly vertical in orientation, as are the majority of normal faults in the Lost Creek area. The dominant fault in the Class V area of interest is the North Fault (**Figures 2-2** and **2-3**). It closely parallels the Lost Creek Fault, approximately 2,500 feet to the north of that fault and roughly 1,300 feet to the north of the Mine Unit 1 monitor well ring. Downward displacement is approximately 70 feet to the north, opposite that of the Lost Creek Fault.

Pump tests have demonstrated that the Lost Creek Fault plane in Mine Units 1 and 2 acts as a substantial barrier to ground-water flow within the current production horizon. Likewise, a recent pump test has shown that the North Fault plane is relatively well sealed within the proposed injection horizon, thus restricting the movement of ground water across the fault. Observed drawdown differences across the North Fault are typically 8:1. A secondary "splay" fault, named the Plant Fault, emanates from the North Fault

immediately to the south of the Plant site (**Figure 2-3**). Displacement is less than in the North Fault and in the opposite direction. The Plant Fault also exhibits a considerably lower angle of dip than is typical of most normal faults within the Project (see **Plate 1**).

A third, unnamed fault is found north of the plant site and lies between wells M-FG7 and M-FG10 (see **Figures 2-2**, **2-3** and **Plate 1**). Displacement is approximately 20 feet with downward displacement to the south, placing proposed injection wells M-FG6 and M-FG7 in a small graben structure between this fault and the North Fault.

To date, no evidence has been found to indicate the faults are active; including:

- There are no visible surface lineaments or topography that suggest the movement on the faults exceeds the natural erosion rate;
- According to the Historic Wyoming Earthquakes map generated by the Wyoming Geological Survey, no earthquakes in the vicinity of the project have been recorded; and
- There is no evidence of offset sediment in the relatively young surface alluvium.

The potential for reactivation of the faults by fluid injection is viewed to be negligible to nil for the following reasons:

- The proposed injection rate is low and the pressure build-up limited to only 45.7 psi;
- The shallow receiving aquifer is unconfined; therefore, the mechanism permitting pressure build-up is absent;
- The areal extent of injection fluid impact is small due to the low injection rate (see **Section 4.2** calculation);
- In situ mining operations in and around the Lost Creek Fault system have been operating at higher injection pressures (100 psi) for the past 18 months without having induced seismic activity; and
- Based on LCI's geologic studies, the Lost Creek Fault system is inactive.

In summary, lubrication or pressurization of the faults, should that occur, would not in itself activate movement given the tensile nature of normal faults, and the belief that the those stresses are no longer active within the Lost Creek Project area.

2.2 Class V Wells

Five Class V wells, two injection wells and three monitor wells, were installed on and around the Plant facility as shown on **Figures 2-2** and **2-3**. The four wells located north of the North Fault are considered current or potential future injection wells, and were constructed as such. The well located south of the North Fault (M-FG8) is considered strictly a monitor well. LCI proposes to use M-FG7 as its primary injection well with M-FG6 designated as the backup injection well should the need arise. Per this application, LCI seeks Class V permits for both injection wells (M-FG6 and M-FG7). Currently, wells M-FG6, M-FG8, M-FG9 and M-FG10 are considered injection monitoring wells for M-

FG7. Should well M-FG6 be activated to injection well status, LCI commits to adding a replacement monitor well; likely located up gradient and 600 feet directly east of M-FG6. Should a well fail for any reason, injection or monitor, LCI will install a replacement well immediately adjacent to the failed well.

2.2.1 Injection and Monitor Well Siting Criteria

The primary rationale for siting injection wells M-FG6 and M-FG7 close to the Plant was to minimize infrastructure build-out, and facilitate disposal and monitoring. Secondarily, the Plant site location is separated from Mine Unit 1 by two faults (North and Plant Faults) which have been shown to be hydrologic barriers, thus isolating or limiting the injection pressure wave to the north side of the faults.

The four injection monitor wells were located radially around M-FG7 at distances ranging from 765 to 1,362 feet as shown on **Figures 2-2** and **2-3**. Note that three of the four monitor wells are located north of the North Fault. A fourth monitor well (M-FG8) was intentionally installed south of the North Fault as an observation well for the M-FG6 pump test. The purpose of this observation well was to help in assessing whether the North Fault was a ground-water flow barrier. The observation well spacing criteria was based on a "radius of fluid displacement" (ROFD) calculation, which is discussed in **Section 4.0**. The ROFD is the distance at which the injectate should be detectable after 14 years of continuous injection.

2.2.2 Well Construction and Completion Design

Monitor and injection wells were drilled, logged and then reamed to accommodate casing. Casing was set to the top of the planned completion interval and cemented in place to isolate the completion interval from overlying horizons. All injection and monitor wells were constructed with either 4.5-inch or 6-inch I.D. polyvinyl chloride (PVC) casing. After the cement set, the pilot hole was deepened below the casing to the desired total depth, after which the completion interval was under-reamed to a diameter of 10.5 or 12-inches.

Slotted or wire wrap, flush-joint PVC, schedule 80 well screen was installed on a K-packer system in the open completion interval. **Table 2-1** presents a compilation of well completion information. Well Completion Logs are provided in **Appendix A**. **Figures 2-4** and **2-5** are well construction schematics for injection well M-FG7 and back-up injection well M-FG6, respectively.

After the well screen was set, a mechanical integrity test (MIT) of the well casing was conducted. The MIT method entails performing a pressure test whereby a packer is placed near the casing bottom (just above the well screen) and another at the wellhead, and the interval between is pressurized to 160 psi. The well successfully passes if the pressure remains within 5 percent of the initial pressure

for a period of 10 minutes. All of the Class V wells passed the MIT; the field test records are presented in **Appendix A**.

The top of the injection well casing will rise at least 18-inches above the ground level, and a sloped cement pad at least 4-inch thick will be placed around the casing to divert water away from the well. The wellhead will be sealed in order to prevent artesian flow to the surface in the event the well pressures up. A pressure gauge with an automatic kill switch (set to activate at 45 psi), e-line port, and manual vent controlled by a ball valve will be placed on the wellhead so appropriate measurements can be taken. The wellhead will be covered by a weather resistant cover.

The proposed injection wells are within the secured fence surrounding the Lost Creek processing Plant. The facility is occupied by employees around the clock during operations. Two, all-weather graveled roads provide access to the Plant facility.

Wells M-FG6 and M-FG7 are located at an elevation of approximately 6,980 feet above mean sea level, which is estimated to be above the 100 year flood level. The wells sit on a small gentle hillside within a local drainage basin of about 0.5 square miles.

Each of the injection and monitor wells were constructed to standards enumerated in LQD Chapter 11 Section 6 regulations on Class III UIC wells and further described in the Permit to Mine. These construction standards have been used successfully at Lost Creek and other in situ mines for several decades. The LQD Chapter 11 standards generally comport with WQD's Chapter 26 standards; however, the following differences should be noted.

1. LQD Chapter 11 Section 6 requires the annulus space to be 3-inches greater in diameter than the casing while WQD Chapter 26 Section 6(b)(iii) requires the difference to be at least 4-inches. The Class V injection wells at Lost Creek were constructed to the LQD standard.
2. LQD Chapter 11 Section 6 requires the cement weight to be approximately 15 pounds per gallon while WQD Chapter 26 Section 6(c)(ii) requires a weight based on 4.5 to 6.5 gallons of water per 94 pound bag of cement. The cement weight in the Lost Creek Class V injection and monitor wells followed the LQD Chapter 11 standard.
3. LCI does not proposed to utilize injection tubing or packers as required by Chapter 26 Section 10(d) regulations since the injection aquifer is the same aquifer as the dry overlying horizon. If leakage were to occur there would be no impact to overlying aquifers since there are none.
4. The casing is PVC therefore a cement bond log was not run as required in WQD Chapter 26 Section 10(e).

2.2.3 State Engineer's Permits

The State Engineer's Office was consulted to determine the need for permitting injection wells. According to the State Engineer, permits are not required for monitor wells or for Class V wells permitted through the WDEQ-Water Quality Division.

2.3 Confining Horizons

Underlying confinement of the injection interval is provided by a shale unit locally named the Lost Creek Shale (LCS) (see **Plates 1** and **2**). This shale lies at a depth of approximately 500 feet (+/- 25 feet) and ranges in thickness from five feet to 25 feet. Extensive drilling throughout the Project has demonstrated that the LCS is regionally continuous. The top of the injection interval is near the static water table, consequently true overlying confinement is absent. However, the presence of numerous shale units above the injection interval will impede vertical migration to the surface.

2.4 Receiving Aquifer Characteristics

A pump test was performed on monitor well M-FG6 for the purpose of establishing the receiving aquifer characteristics in the specific area of interest. The test was initiated at 10:00 Hours on December 10, 2014 and terminated at 15:00 Hours on December 11, 2014. The duration of the test was 1,740 minutes, and the time weighted average pumping rate was 49.65 gpm.

Water levels in observation wells M-FG7, M-FG8, M-FG9 and M-FG10 were monitored with In-Situ LevelTROLL datalogger pressure transducers and or manually e-lined. Analysis of the drawdown data yielded transmissivity values ranging from 2,000 to 3,300 gallons per day per foot (gpd/ft.) with an average storage coefficient of 3.4×10^{-4}. The specific capacity calculation was approximately 1 gpm per foot of drawdown.

Drawdown in monitor well M-FG8, located on the opposite side of the North Fault from the pumping well, was about an eighth of the drawdown observed in a monitor, at a comparable distance from the pumped well, but located on the same side of the fault as the pumping well. This difference in drawdown indicates that the North Fault acts as a low-flow barrier to the movement of ground water. This impediment to ground-water flow will serve to confine injectate to the north side of the fault, thus limiting or negating the effect on nearby Mine Unit 1 and 2 receiving aquifer monitor well water levels.

2.5 Fracture Pressure Calculation

As indicated in **Table 2-1**, injection well M-FG6 is cased to a depth of 190 ft. below ground surface and screened from 190 to 410 feet bgs, and M-FG7 is cased to a depth of 190 ft. below ground surface and screened from 190 to 455 feet bgs. Permeate will be injected into the screened intervals which has a phreatic surface at approximately 205 feet bgs. The water table resides in the upper portion of the injection interval approximately 15 feet

below the top of the screened interval; therefore, about 15 feet of unsaturated formation may receive injectate.

The receiving aquifer is comprised of alternating sand and shale layers that are saturated except for the uppermost sand layer, which is under atmospheric conditions. In calculating the formation fracture pressure it was assumed that the 15 feet of unsaturated formation would eventually fill and become confined thus becoming the limiting factor in the calculation. Based on this assumption, the bottom of the well casing was used in the following fracture pressure calculation (note this calculation is very conservative).

Fracture pressure was calculated using the following equation:

$$P_f = S_f \times D_c \times (O_p - V_g)$$

Where: S_f = safety factor; 90%
D_c = depth of casing in feet; 190 ft.
O_p = overburden pressure gradient; 0.7 psi/ft.
V_g = vertical pressure gradient of water; 0.433 psi/ft.

$$P_f = 0.90 \times 190 \text{ ft.} \times (0.7 - 0.433) = 45.7 \text{ psi}$$

Accordingly, the M-FG7 and M-FG6 injection pressure will be restricted to 45.7 psi. The injection pressure limit will be revised, if appropriate, based on the results of the injection testing program described in **Section 5.5**.

3.0 RECEIVING AQUIFER AND PERMEATE WATER QUALITY

3.1 Ground Water Classification

The water quality of the proposed injection well and four surrounding monitor wells, all completed in the receiving aquifer, is provided in **Table 3-1**. The receiving aquifer in other areas of the Project hosts uranium roll front mineralization and contains significant quantities of radionuclides and associated metals; especially in areas proximal to roll fronts. The concentrations of combined total radium and gross alpha exceed Class I, II, and III standards as shown in **Table 3-3**. Therefore, LCI believes the receiving aquifer should be classified as Class VI due to excessive concentrations of specific constituents.

3.2 Regional Receiving Aquifer Background Water Quality

Regional water quality data for all Lost Creek receiving aquifer monitor wells (**Figure 3-1**) are summarized in **Table 3-2**, which presents a data summary and statistical analysis of each individual analyte. The data show that the mean dissolved uranium concentration exceeds EPA's MCL criteria. Additionally, the mean Gross Alpha and Ra-226+Ra-228 concentrations exceed both the EPA MCLs, as well as the WDEQ-WQD livestock class-of-

use (Class III). The exceedance of EPA's MCLs and WDEQ-LQD criteria was paramount in LCI's decision to dispose of permeate into the upper Battle Spring Formation.

All five Class V wells (injection and monitoring) were sampled for the first time in November/December 2014. The samples were analyzed for LQD Guideline 8 Appendix 1 Tables IV and VA1 parameters which includes major ions, several dissolved and suspended metals and numerous radionuclides. **Table 3-1** presents a summary of analytical results compiled from raw laboratory data presented in **Appendix E** (CD ROM).

In accordance with the WDEQ-WQD permit application response letter directive dated April 1, 2015, LCI will resample all five baseline monitoring wells. Water samples will be analyzed for Chapter 8 Table 1 parameters exclusive of the eight analytes common to both LQD and WQD guidelines. The laboratory results will be tendered to LQD when available.

3.3 Permeate Description / Characterization

Prior to initiating uranium production, LCI sent the RO manufacturer the baseline water quality of the current mine production horizon and the expected RO feed chemistry. Using that data, the RO manufacturer calculated the expected brine and permeate quality. The data from the RO manufacturer was adjusted to account for the addition of pH neutralizing caustic soda, and is presented in **Table 3-3** (Expected Post Treatment Quality column).

3.4 Ground Water / Permeate Compatibility

In June 2014, a series of geochemical models using PHREEQC version 3 (Parkhurst and Appelo, 2013) and PHAST for Windows (Parkhurst et al. 2010) were run to check the compatibility of injecting a reverse osmosis produced permeate with natural formation water (Mahoney Geochemical Consulting Memorandum, **Appendix B**). Details about water compositions and formation details were provide to Mahoney Geochemical Consulting by LCI staff.

This geochemical evaluation was primarily aimed at major elements such as calcium, magnesium, sodium, potassium, alkalinity (including carbon dioxide partial pressures), chloride and sulfate. Some minor elements such as silicon as silica (SiO_2) and aluminum were also considered.

The Battle Spring sediments in the vicinity of the proposed injection well are already oxidized so there is virtually no reduced material to be oxidized or uranium to be released. Furthermore, the approximately three percent calcite present in the receiving aquifer should neutralize any acid and form ferric hydroxide minerals such as ferrihydrite [$Fe(OH)_3$].

Because permeate is dilute (i.e., has a low total dissolved solid concentration), well clogging via mineral precipitation is not expected to be an issue. Similarly, because the carbonic acid concentration is also relatively low, the dissolution of minerals in the formation is expected to be slight. The mineral showing the greatest potential for dissolution will be calcite, but the dissolution volume will be slight relative to the amount of calcite present in the receiving aquifer.

Permeate is too dilute to cause any well plugging. But, mineral dissolution has a *slight* potential to cause detrimental effects, and that was the major focus of the modelling. Trace metal concentrations were generally at or less than detection limits in permeate and also in the formation water; consequently, trace metals will not be an issue.

In summary, the models demonstrated that the injection permeate is essentially benign and its impact on the receiving aquifer water quality will be minor.

4.0 AREA OF REVIEW

4.1 Method of Calculation

LCI used the "radius of fluid displacement" (ROFD) calculation method for this permit application. The input parameters are derived from field/laboratory tests, and an assumed total operational period of 14 years. Two, sequential operational scenarios are presented that assumes an initial pre-restoration injection rate of 60 gpm followed by restoration injection that scales up from 60 gpm to 200 gpm during life of mine activities. The computed injection volumes are additive, thus the radial effect presented is the compounded ROFD. The assumed injection rates, timing and duration of each scenario used in these calculations are best guess estimates, and are in no way meant to be limiting or constraining factors to actual operational needs.

For the first five years, before restoration commences, the following conditions are assumed: 1) a continuous initial injection rate of 60 gpm into M-FG7, 2) a 265 foot thick receiving horizon, and 3) a lab measured core porosity of 25 percent.

ROFD Formula: $r = \sqrt{(V/(pi*h*\phi))}$ where: r = radius of fluid displacement
V = injection volume (ft^3)
ϕ = porosity

Elapse Time (yrs.)	Inj. Vol. (ft^3)	r (ft.)
1	4,215,479	142
5	21,077,396	318

For years six through 14, after restoration commences, the following conditions are assumed: 1) a continuous injection rate of 100 gpm into each well (M-FG7 and M-FG6), 2) a 265 foot thick receiving horizon in M-FG7 and M-FG6, and 3) a lab measured core porosity of 25 percent.

M-FG7	Elapse Time (yrs.)	Cumulative Inj. Vol. (ft^3)
	6	7,025,799
	10	35,128,995
	14	63,232,191

M-FG6	Elapse Time (yrs.)	Cumulative Inj. Vol. (ft^3)
	6	7,025,799
	10	35,128,995
	14	63,232,191

Total injectate generated after 14 years is 147,541,778 ft^3. Using a porosity of 0.25, 590,167,112 ft^3 of aquifer would be required to accommodate the generated injectate volume. Due the presence of several faults in the proposed injection site, the typical cylindrical calculation for AOR is not directly applicable once the radial extent interacts with the faults. Alternatively, the AOR was computed by assuming: that the faults are no-flow boundaries, the Plant Fault connects the North Fault to the unnamed fault adjacent to M-FG10, and the local hydraulic gradient is irrelevant due to faulting.

Figure 4-1 shows the AOR after 14 years. The maximum area of impact extends approximately 2,100 feet west of injection well M-FG7 and 500 feet east of M-FG6. **Table 4-1** provides the legal description of the AOR.

4.2 Maximum Area of Impact

The amount of void space required to accept the injectate generated after five years is contained in a cylinder with a radius of approximately 318 feet as calculated above. The effect on the local hydraulic gradient due to permeate injection is calculated as follows (note that gradient effect is additive to the ROFD):

Linear Velocity: $v_l = (K*\Delta h) / \phi$ Hydraulic Gradient Displacement = (v_l) * (Time)

Where: K = hydraulic conductivity = 1.136 ft/day
ϕ = porosity = 0.25
Δh = hydraulic gradient = 0.006 ft/ft

Elapse Time (yrs.)	Injection Displacement (ft.)	Hyd. Grad. Displacement (ft.)	Total Fluid Displacement (ft.)
1	142	9.95	152
5	318	49.7	368

Figure 4-2 shows the AOR after five years of continuously injecting 60 gpm. Note that the ROFD has not yet interacted with the nearby faults.

4.3 Existing Water Rights Within Impact Area

Figure 4-3 identifies existing water rights located within a 1-mile radius of the injection well's ROFD (**Table 4-2** is a compilation of water rights obtained from the State Engineer's database shown on **Figure 4-3**). Note that there are no private water rights within the impact area other than those owned by LCI/NFU (NFU is a subsidiary of Ur-Energy, Inc.). There are however, eleven listed BLM wells that were jointly registered water rights with LCI, but are functionally part of LCI's operation.

Note that the closest water supply wells (potable LC1148W and fire water LC229W) belong to LCI, and are completed in different hydrostratigraphic horizons separated vertically by over 400 feet of sand/shale interbedded layers, and horizontally by approximately 240 feet (**Plate 1** and **Figure 2-3**).

5.0 FACILITY CONSTRUCTION AND OPERATION

5.1 Source Water Characterization

The water to be treated and injected will be derived from a combination of sources including:

- Mining solutions captured during the maintenance of the hydrologic sink;
- Water derived from plant processing including but not limited to solutions from: plant wash-down, washing of product, chemical makeup, and dryer condensate;
- Chemistry lab waste water;
- Water derived from ground-water restoration;
- Water derived from UIC Class I and Class III wells during drilling, completion and maintenance; and
- Water captured from spills of mining solutions.

Most of the source waters listed above are defined by the NRC as byproduct material because they were generated during the recovery of uranium. As such, the average analyte composition of the fluids must be less than the corresponding effluent standard in 10 CFR 20 Appendix B, Table 2, Column 2 prior to being injected into a UIC Class V well or better than the background quality of the ground water. In other words, the average quality of the effluent must be better than the NRC effluent standard or the baseline water quality; whichever is higher.

The WDEQ-WQD also regulates the quality of water injected into a UIC Class V well. Specifically, the WQD regulates the parameters described in the Primary Drinking Water MCLs listed in 40 CFR §141. In cases where the water quality of the receiving horizon is of poorer quality than the respective EPA MCL, the quality of the injection fluid must be equal to or better than the receiving horizon. In other words, the quality of the effluent must be better than the MCL or the baseline water quality; whichever is higher.

The treatment process will consist of several steps in order to remove the contaminants of concern to the NRC and WQD (EPA Drinking Water MCLs).

5.2 Injection Infrastructure

5.2.1 Construction and Engineering Design

The water treatment system will consist of the following major components (listed in order of treatment):

1. Ion exchange using Dowex 21k, or similar, anionic exchange resin to remove uranium. The water will be treated using either the existing commercial or existing restoration ion exchange circuit.
2. Bag filtration down to at least 5 micron size.
3. Reverse osmosis to remove approximately 98% of total dissolved solids, radionuclides and metals. The existing pumps prior to the RO skid were specified by the RO manufacturer, and will generate sufficient pressure to push water through the remainder of the circuit and into the Class V well(s). The brine generated from the RO will be sent to the sites' waste disposal systems (temporary storage in the plant, holding ponds and UIC Class I disposal wells). The RO system may utilize multiple passes depending on the need to minimize waste water generation.
4. Sodium hydroxide (NaOH) will be added, via a positive displacement chemical metering pump, to increase pH to at least 6.0. A small, caustic day storage tank will be utilized to simplify chemical metering. Due to the temporary, short-term nature of the day storage tank usage, no biocide chemicals will be added.
5. Dowex Radium Selective Complexer (RSC) resin will be used to remove radium (**Appendix C**). Two fiberglass vessels, approximately 4 feet in diameter and 6 feet tall, will be placed next to the resin water transfer tanks on the north end of the processing plant (see Figure 5-2).
6. On occasion, treated water may be sent to temporary storage to allow for ease of handling prior to injection. If the large storage tank is utilized, then a biocide will be added.
7. A 3-inch diameter, High Density Polyethylene (HDPE) SDR 13.5 pipeline will convey water from the radium resin vessels to the Class V injection well(s). The length of the pipeline from the radium resin vessel to injection well M-FG7 is approximately 410 feet. The pipeline will be buried at least 6 feet deep to minimize the likelihood of freezing.

The location of each of the major components is shown on **Figures 5-1** and **5-2**. The uranium ion exchange, bag filtration and RO treatment equipment are already installed as described and approved in the WDEQ-LQD Permit to Mine and NRC Technical Report. Each component will be able to treat approximately 200 gpm. Valves will be placed before and after each of the major components so each

component can be easily isolated from the remainder of the system to allow for maintenance, as appropriate.

5.3 Injection Controls

The injection pipeline will be monitored after the addition of sodium hydroxide for pressure, flow rate, and pH. Each of these automated systems, with local displays, will communicate with the Plant operations computer system. If any parameter exceeds the respective limit, the system will alarm and shutdown the RO circuit pump. The water feeding the RO will be diverted to the waste management system while the plant operator shuts down the system in a safe and orderly manner or corrects the problem.

The initial maximum permissible injection pressure will be 45.7 psi at the injection wellhead, but may be adjusted based on the results of testing. The actual automated measurement will occur at the wellhead, and an automated kill switch will be installed to prevent injection pressure limit exceedance.

The acceptable pH range will be 6.0 to 9.0 standard units measured post sodium hydroxide addition. The pH probe will be calibrated as directed by the manufacturer with the results of the calibration documented and maintained for inspection. In order to smooth out pH fluctuations, which will occur with system start up and shut down, the pH values will be averaged over five minutes with the results electronically documented.

The flow rate, measured post addition of sodium hydroxide, will be designed for 200 gpm, but ultimately limited by the formation injection pressure. This flow rate limit is not based on a regulatory standard or environmental concern, but is based on the design criteria of the facility. The totalizing flow meter will be either a magnetic or turbine type meter, and will be maintained as described in the owner's manual.

The Plant Operator shall visually check and document the injection pressure, flow rate and pH once per day during operations.

The sodium hydroxide injection pump shall be interlocked with the flow meter and pH probe and automatically turn on when there is flow and turn off when there is no flow.

The Wellfield Operator shall visually inspect the Class V injection well(s) daily to ensure the wellhead is in good working condition with no leakage. The results of the inspection will be documented and available for agency inspection.

5.4 Process Controls

In order to detect RO membrane failure, permeate will be continuously monitored by an automated system for conductivity. If the conductivity falls outside the preset value, the system will alarm and automatically divert flow to the waste water system until the Plant Operator shuts down the system in a safe and orderly manner or corrects the problem.

The acceptable conductivity ranges will be determined once the efficiency of the RO unit is determined. The acceptable range will change over time depending on the quality of the feed water and efficiency of the RO membranes. The automated systems will be calibrated pursuant to manufacturer recommendations with the results documented and maintained for inspection. The Plant Operator will inspect the conductivity meter daily and record the values from the local display screen.

5.5 Injection Test Protocol

Preliminary testing, using Battle Spring Formation water, will be performed to test the injection parameters exhibited by the wells designated as injection wells for the Class V program. Currently, well M-FG7 is designated as the primary injection well with well M-FG6 designated as the back-up option; however, both wells will be tested. The well completion schematics, included as **Figures 2-4** and **2-5,** detail the casing and screen sizes for each constructed injection well. Well M-FG7 is a 4.5-inch ID cased PVC well with a 3-inch diameter slotted PVC screen insert, while well M-FG6 is a 6-inch ID cased well with a 5-inch diameter wire wrapped PVC screen insert.

The primary objectives of the injection tests are to: 1) confirm that the proposed rates and pressures are executable, 2) potentially identify upper operating limits, and 3) determine the formation frac pressure/gradient if possible, which is dependent on the well completion effectiveness. Testing will be accomplished by connecting a pump to a stored water supply source and injecting at increasing rates for specified periods of time. The wellhead will be sealed with only the injection connection and a pressure gauge attached. The injection rates and surface wellhead pressures will be monitored for the duration of the test. The proposed testing rates are as follows:

Rate (gpm)	Duration (minutes)	Step Volume (gallons)	Cumulative Volume (gallons)
50	30	1,500	1,500
100	30	3,000	4,500
150	30	4,500	9,000
200	30	6,000	15,000

Initial calculations (**Section 2.5**) show the operating pressure limit to be 45.7 psig at the wellhead based on the formation frac pressure with a 10 percent safety factor included. Each well will be tested and data analyzed to determine if the fracture pressure was reached and, if so, what the final fracture gradient is.

6.0 PERMEATE MONITORING PROGRAM

In order to ensure treatment processes are working properly and that EPA MCLs and NRC effluent standards are being met, the injectate quality will be monitored as described in **Table 3-3** and as discussed in **Section 5.3**.

Continuous monitoring of pH and conductivity will be performed by automated systems with the results used to ensure the treatment systems are functioning properly. In the event the automated monitoring system fails, the treatment system may still be operated but LCI will record the pH and conductivity of the effluent at least every three (3) hours, and retain the records for inspection.

The monthly effluent samples will consist of daily aliquot samples that are physically combined into a composite. The monthly composite sample will be submitted to a commercial laboratory for analysis of the dissolved fraction of the parameters which have an NRC effluent limit listed in **Table 3-3**. A quarterly grab sample will be collected and analyzed for each EPA MCL parameter listed in **Table 3-3**.

The water level in each of the four (4) monitor wells will be measured quarterly, and water samples will be collected and analyzed for alkalinity, chloride and conductivity in order to determine if treated injectate has migrated to the monitor well. Fluid (permeate) migration to one or more monitor wells will not constitute a violation.

7.0 ENVIRONMENTAL MONITORING PROGRAM

7.1 Operation Monitoring and Testing

The operational monitoring and testing are described in **Sections 5.3** and **6.0**.

7.2 Standard Operating Procedure

The Manager of EHS, or their designee, will ensure samples of the injection fluid are collected and supplied to the laboratory pursuant to the scheduled provided in **Table 3-3**. A chain of custody, generally provided by the contract laboratory, will be completed for each set of samples collected and submitted to a contract laboratory. The analytical results will be maintained on file until license termination. The anion/cation balance and measured TDS versus calculated TDS will be reviewed for each analytical result that includes measurements of major ions. A duplicate sample will be submitted to the commercial lab at least twice per year to verify lab results. Only approved EPA analytical methods will be used by the commercial laboratory.

The Plant Operator will verify that the injection pressure and flow rate are within limitations at least once per day. Any non-conformance will be corrected immediately and reported to the Manager of EHS. If the non-conformance cannot be immediately corrected, the system will be shut down until corrections can be made and verified.

LCI has developed and implemented extensive health physics SOPs that will be followed when working on the treatment system. These procedures include, but are not limited to: Contamination Control, Screening and Decontamination of Materials, Personnel Surveys, Radiation Work Permits, Gamma Surveys, Surface Contamination Surveys, Byproduct Waste Management, Radiation Dose Determinations and Radiation Safety Inspections. These SOPs already consider the radiologic hazards that will be generated by the treatment and injection system including the potential for significant alpha, beta, and

gamma emissions, as well as, the release of radon during maintenance and upset conditions.

7.3 Point of Compliance

The point of compliance for effluent concentration, flow rate, and injection pressure will be at the wellhead. Corrections to the injection pressure will be made to account for change in elevation between the plant and Class V well(s), as appropriate.

7.4 Health Physics

The main health physics concern will result from the gamma emitters, which will be concentrated in the brine solution derived from the RO and radium resin. Since the brine will be disposed of in the deep well or sent to the holding ponds, the opportunity for exposure to its radioactive components will be minimal.

The radium resin vessel will concentrate radium. The majority of alpha and beta emitters will be absorbed by the water and vessel. However, gamma rates could become elevated and will pass through the sides of the vessel. The Health Physics department will monitor the gamma rates in the vicinity of the vessel at least weekly during the first charge of resin in order to determine how quickly the gamma rates increase. After the first charge of resin is disposed of, the Radiation Safety Officer (RSO) may reduce the frequency of gamma readings, but shall take readings at least monthly.

Since the majority of alpha and beta particles will be absorbed by the water and containing vessels, the potentially significant routes of exposure to these particles would only exist during maintenance or a spill event. LCI has developed SOPs to address these situations and may also rely on the established Radiation Work Permit practice if the SOP(s) is inadequate to address the radiologic hazard. Since the radium resin vessel has the increased radiologic hazard of radium, all personnel will wear waterproof clothing, gloves, and rubber boots as minimum protection when performing maintenance, which may result in exposure to radium resin. Upon completion of the work, the area will be washed down and a representative removable alpha survey performed once the area is dry. Since the work is within a restricted area, there is no regulatory limit on removable alpha. However, in order to maintain ALARA (an NRC acronym defined in 10 CFR 20 regulations meaning As Low As Reasonably Achievable), a removable alpha action limit of 1,000 dpm/100 cm^2 will be utilized. If the removable action limit is exceeded, the area will be washed and resurveyed as many times as necessary to get below the action limit. All workers will wash their protective clothing upon completion of work on the system. If contamination may have breached the protective clothing, the affected worker will wash the affected area or shower and then get assistance from the Health Physics department to scan out to the appropriate standard defined in Regulatory Guide 8.30.

Radon, which will not be removed by any of the treatment processes, is not expected to be released as an airborne effluent since it will be within closed vessels. If effluent is sent to the holding ponds the water is expected to trap the radon gas and prevent release as outlined in EPA 520/1-86-009, Final Rule for Radon-222 Emissions from Licensed

Uranium Mill Tailings, August 1986, Background Information Document, section 3.4.3. Since the concentration of radium-226 in the treated water will be less than 60 pCi/L, there will be little in growth of radon in permeate. The half-life of radon-222 is 3.8 days, so it will rapidly decay.

The unrestricted release of materials involved in radium treatment would be handled as follows:

Items from the radium treatment circuit would be thoroughly washed and then released to the radium standard in Table 1 of NRC's Reg Guide 1.86 *"Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source or Special Nuclear Material*," August 1987. Specifically, the average acceptable surface contamination level would be 100 dpm/100 cm^2 with a maximum reading of 300 dpm/100 cm^2. The removable limit would be 20 dpm/100 cm^2. However, in most cases, items removed from the radium treatment circuit will be disposed of as byproduct material instead of being released for unrestricted use.

Materials from all other portions of the treatment circuit would be released to the U-nat, line 1, standard from Table 1 unless there is reason to believe that radium has been chemically enriched.

Radium resin removed from the extraction vessel will be stored outdoors in a shipping container. The RSO or Health Physics Technician will ensure the gamma rate in the area does not exceed any applicable standards. The waste radium resin will be shipped in a strong tight container to a licensed disposal facility after ensuring the gamma rates do not exceed any DOT standards and all applicable DOT standards are met.

7.5 Sage Grouse

The proposed injection wells and associated trunk lines fall within the boundary of the Lost Creek plant complex. The three existing monitor wells, which fall just outside the plant complex, resulted in a total disturbance of 0.08 acres. The activities completed to date, as well as the proposed activities, fall within the sage grouse PIAA (now known as DDCT) that was approved during the original review of the Permit to Mine application. The PIAA anticipated construction of the plant facility, several wellfields, roads, power lines, monitor and injection wells, trunk lines and other infrastructure required to mine uranium. The approval letter from the Wyoming Department of Game and Fish, as well as a map showing the area of disturbance, is included in **Appendix D**.

8.0 FACILITY ABANDONMENT

Once the useful life of the project has ended, the injection well(s) and each of the monitor wells will be abandoned by pumping high solids bentonite grout from the bottom to the top with a tremmie pipe. After allowing the grout to settle for at least 24-hours, additional high solids bentonite grout or bentonite pellets will be added until the grout is

approximately seven feet below ground surface. The casing will be cut off at least two feet below ground surface. Approximately five feet of cement will be placed on the grout plug. The last two feet will be backfilled with native soil and the affected area will be re-vegetated using the seed mix approved in the Permit to Mine.

Table 3-3 Effluent Limits

Frequency	Parameter (dissolved)	EPA MCL: 40 CFR 141	NRC Effluent Limit: 10 CFR Part 20 App B	Receiving Aquifer Background [2]	Effluent Limit	Expected Post Treatment Quality	Groundwater Classification from WDEQ-WQD R&R Chapter 8 Table I	Sample Point(s)
Continuous	pH (standard units)	N/A	N/A	8.94	N/A	6.0 to 9.0	II	Post Treatment[1]
	Conductivity (µmhos/cm)	N/A	N/A	443	N/A	150	N/A	Post RO & Post Treatment[1]
Quarterly Grab	Selenium (mg/L)	0.05	N/A	0.01	0.05	0.0015	I	Post Treatment
	Arsenic (mg/L)	0.01	N/A	0.004	0.01	0.0005	I	
	Barium [3] (mg/L)	2	N/A	ND	2	0.0001	I	
	Beryllium [3] (mg/L)	0.004	N/A	ND	0.004	[5]	I	
	Cadmium [3]	0.005	N/A	ND	0.005	0.001	I	
	Chromium[3] (mg/L)	0.1	N/A	ND	0.1	0.0004	I	
	Copper [3] (mg/L)	1.3	N/A	ND	1.3	0.0005	I	
	Flouride [3] (mg/L)	4	N/A	0.4	4	0.0001	I	
	Lead [3] (mg/L)	0.015	N/A	ND	0.015	0.0001	I	
	Mercury [3] (mg/L)	0.002	N/A	ND	0.002	0.0001	I	
Quarterly Grab & Monthly Composite	Unat (mg/L)	0.03	0.44	0.158	0.158	0.012	N/A	
	Ra-226 (pCi/L)	5	60	3.6	5.5	0.78	Exceeds all Classes	
	Ra-228 (pCi/L)		60	1.9		[5]		
	Gross Alpha [6] (pCi/L)	15	N/A	57	57	[5]	Exceeds all Classes	
	Gross Beta (pCi/L)	4	N/A	15.1	15.1	[5]	N/A	
Monthly Composite	Th-230 (pCi/L)	N/A	100	1.9[4]	100	[5]	N/A	
	Pb-210 (pCi/L)	N/A	10	3.5[4]	10	[5]	N/A	
	Po-210 (pCi/L)	N/A	40	5.1[4]	40	[5]	N/A	

(1) Sample collected to verify treatment systems are working as designed.
(2) Receiving aquifer background water quality is based on the maximum value from samples collected from injection well and surrounding monitor wells.
(3) Since these parameters are not expected to be in the feed stock, LCI proposes to halt routine analysis for these parameters if four consecutive monthly grab samples of the feed stock contain less than the EPA MCL of the respective parameter.
(4) Includes dissolved and particulate fractions.
(5) Value not determined, but RO rejection estimated to be approximatly 98% of feed concentration.
(6) Gross Alpha value presented does not include uranium or radon contributions.
N/A = Not Applicable

Table 4-1 Area of Review Legal Description (at 14 years)

QTR-QTR-QTR	SEC	TWN	RNG	Block Area (sq. ft.)	Block Area (Acres)	Influence Area (sq. ft.)	Influence Area (Acres)
SW/SE/NW	18	25N	92W	429,654.3	9.9	17,610.2	0.4
SE/SE/NW	18	25N	92W	429,824.6	9.9	100,620.1	2.3
SW/SW/NE	18	25N	92W	430,377.8	9.9	199,633.7	4.6
SE/SW/NE	18	25N	92W	430,504.1	9.9	243,619.3	5.6
SW/SE/NE	18	25N	92W	430,630.5	9.9	53.6	0.0
NW/NW/SW	18	25N	92W	429,632.0	9.9	5,778.4	0.1
NE/NW/SW	18	25N	92W	429,777.9	9.9	146,961.8	3.4
NW/NE/SW	18	25N	92W	429,865.5	9.9	326,435.0	7.5
NE/NE/SW	18	25N	92W	430,036.7	9.9	421,805.9	9.7
NW/NW/SE	18	25N	92W	430,616.8	9.9	430,616.8	9.9
NE/NW/SE	18	25N	92W	430,742.4	9.9	422,312.1	9.7
NW/NE/SE	18	25N	92W	430,868.0	9.9	10,700.9	0.2
SE/NE/SW	18	25N	92W	430,248.9	9.9	20,870.9	0.5
SW/NW/SE	18	25N	92W	430,855.7	9.9	111,723.0	2.6
SE/NW/SE	18	25N	92W	430,980.6	9.9	63,005.8	1.4
						TOTAL	**57.9**

Table 4-2: Water Rights Table from State Engineer's Database

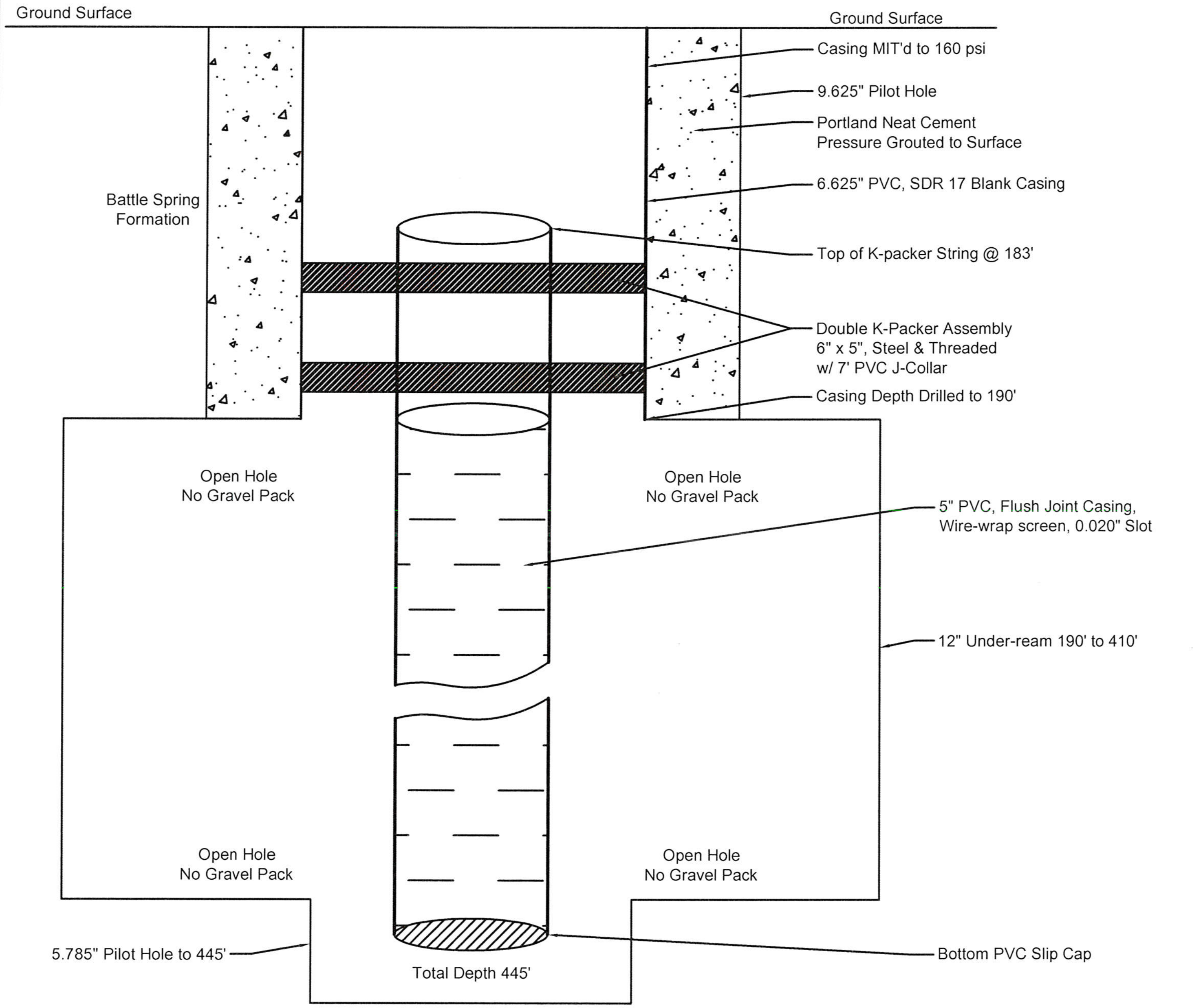
Water Rights Number	Priority Date	Summary WR Status	Company	First Name	Last Name	Facility Name	Uses	Twn	Rng	Sec	QTRQTR	Survey Type, Survey Number, Survey Suffix	Total Flow(CFS) / Appropriation (GPM)	Total depth (Ft)	Static Water Level (Ft)	Well Log (Y/N)	Depth Of Pump (Ft)	Stream Source	Active Capacity (AF)	Size of Reservoir (AF)	Facility type	Chemical Analysis (Y/N)	Latitude	Longitude	Created By
P179826.0W	02/28/2007	Unadjudicated	LOST CREEK ISR, LLC			LC 32W	MIS	025N	092W	17	NWSE	A	20	878	450	N	714		0	0	Well	N	42.136339	-107.839733	External
P186531.0W	04/08/2008	Complete	LOST CREEK ISR, LLC			ENLARGEMENT OF WELL LC32W	MIS	025N	092W	17	NWSE	A	30						0	0	Well		42.136686	-107.840703	External
P189584.0W	02/04/2009	Complete	LOST CREEK ISR, LLC			KMP-2	MON	025N	092W	17	SENE	A	0	590	226	N	400		0	0	Well	N	42.140903	-107.834978	External
P187650.0W	07/03/2008	Complete	LOST CREEK ISR, LLC			SESW17M	MON	025N	092W	17	SESW	A	0	436	173	N	0		0	0	Well	N	42.132298	-107.846011	External
P189585.0W	02/04/2009	Complete	LOST CREEK ISR, LLC			KMP-3	MON	025N	092W	17	SESW	A	0	565	204	N	400		0	0	Well	N	42.133006	-107.845522	External
P189590.0W	02/04/2009	Complete	LOST CREEK ISR, LLC			KMU-3	MON	025N	092W	17	SESW	A	0	650	205	N	400		0	0	Well	N	42.133638	-107.844056	External
P194690.0W	12/17/2010	Complete	LOST CREEK ISR, LLC			M-M6	MON	025N	092W	17	SESW	A	0	750	209	N	0		0	0	Well	N	42.133669	-107.84414	External
P175261.0W	06/09/2006	Complete	USDI - BLM[2]			LC18M, LC19M, LC20M	MON	025N	092W	17	SWSW	A	0	543	201	N	240		0	0	Well	Y	42.132444	-107.85275	External
P175263.0W	06/09/2006	Complete	USDI - BLM[2]			LC24M	MON	025N	092W	17	SWSW	A	0	531	192	N	275		0	0	Well	Y	42.131957	-107.848881	External
P179890.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJMU-110	MON	025N	092W	17	SWSW	A6-	0	532	197	N	0		0	0	Well	N			External
P179891.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJMP-110	MON	025N	092W	17	SWSW	A6-	0	476	175	N	0		0	0	Well	N			External
P179892.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJMO-110	MON	025N	092W	17	SWSW	A6-	0	330	162	N	0		0	0	Well	N			External
P179893.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJMU-111	MON	025N	092W	17	SWSW	A11-	0	545	199	N	0		0	0	Well	N			External
P179894.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJMP-111	MON	025N	092W	17	SWSW	A11-	0	440	176	N	0		0	0	Well	N			External
P179895.0W	03/01/2007	Complete	NFU WYOMING, LLC[1]			HJMO-111	MON	025N	092W	17	SWSW	A11-	0	330	164	N	0		0	0	Well	N			External
P179908.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			UKMU-102	MON	025N	092W	17	SWSW	A11-	0	580	190	N	0		0	0	Well	N			External
P179909.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			UKMP-102	MON	025N	092W	17	SWSW	A11-	0	498	189	N	0		0	0	Well	N			External
P179910.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			UKMO-102	MON	025N	092W	17	SWSW	A11-	0	420	165	N	0		0	0	Well	N			External
P179911.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			UKMU-103	MON	025N	092W	17	SWSW	A11-	0	590	196	N	0		0	0	Well	N			External
P179912.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			UKMP-103	MON	025N	092W	17	SWSW	A11-	0	537	196	N	0		0	0	Well	N			External
P179913.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			UKMP-103	MON	025N	092W	17	SWSW	A11-	0	430	173	N	0		0	0	Well	N			External
P187649.0W	07/03/2008	Complete	LOST CREEK ISR, LLC			SWSW17M	MON	025N	092W	17	SWSW	A	0	428	177	N	0		0	0	Well	N	42.133455	-107.850035	External
P198903.0W	07/06/2012	Incomplete	LOST CREEK ISR, LLC			SWSW17P (UP TO 50 WELLS)	IND_GW; MIS	025N	092W	17	SWSW	A	2500						0	0	Well		42.133592	-107.850406	External
P189586.0W	02/04/2009	Complete	LOST CREEK ISR, LLC			KMP-4	MON	025N	092W	18	NESE	A	0	600	217	N	400		0	0	Well	N	42.136692	-107.855281	External
P13595.0R	02/17/2010	Complete	LOST CREEK ISR, LLC			PONDS 1 AND 2	IND_SW	025N	092W	18	NWSE	A						Blue Gulch	4.58	4.58	Reservoir		42.138278	-107.858333	SEO
P198794.0W	05/17/2012	Incomplete	LOST CREEK ISR, LLC			LC229W	MIS	025N	092W	18	NWSE	A	150	1000	300	N	813		0	0	Well	N	42.13866	-107.86179	External
P199978.0W	03/20/2013	Incomplete	LOST CREEK ISR, LLC			LC1148W	IND_GW; MIS	025N	092W	18	NWSE	A	150						0	0	Well		42.138637	-107.861808	External
P179870.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJMP-103	MON	025N	092W	18	SESE	A16-	0	432	168	N	0		0	0	Well	N			External
P179878.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJMU-106	MON	025N	092W	18	SESE	A16-	0	546	192	N	0		0	0	Well	N			External
P179879.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJMP-106	MON	025N	092W	18	SESE	A16-	0	480	170	N	0		0	0	Well	N			External
P179880.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJMO-106	MON	025N	092W	18	SESE	A16-	0	326	159	N	0		0	0	Well	N			External
P179884.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJMU-108	MON	025N	092W	18	SESE	A16-	0	540	201	N	0		0	0	Well	N			External
P179885.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJMP-108	MON	025N	092W	18	SESE	A16-	0	434	180	N	0		0	0	Well	N			External
P179886.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJMO-108	MON	025N	092W	18	SESE	A16-	0	333	167	N	0		0	0	Well	N			External
P188861.0W	09/26/2008	Complete	LOST CREEK ISR, LLC	JOHN	CASH	MB-10	MON	025N	092W	18	SESE	A	0	160	160	N	0		0	0	Well	N	42.133397	-107.855292	External
P187663.0W	07/03/2008	Complete	LOST CREEK ISR, LLC			SESE18PW	MON	025N	092W	18	SESE	A	0	467	171	N	0		0	0	Well	N	42.131901	-107.85631	External
P187648.0W	07/03/2008	Complete	LOST CREEK ISR, LLC			SESE18M	MON	025N	092W	18	SESE	A	0	451	183	N	0		0	0	Well	N	42.133959	-107.855212	External
P194698.0W	12/17/2010	Complete	LOST CREEK ISR, LLC			M-M8	MON	025N	092W	18	SESE	A	0	740	203	N	0		0	0	Well	N	42.132304	-107.853619	External
P194699.0W	12/17/2010	Incomplete	LOST CREEK ISR, LLC			M-L5	MON	025N	092W	18	SESE	A	0						0	0	Well		42.13229	-107.85379	External
P198900.0W	07/06/2012	Incomplete	LOST CREEK ISR, LLC			SESE18P (UP TO 100 WELLS)	IND_GW; MIS	025N	092W	18	SESE	A	5000						0	0	Well		42.133633	-107.855275	External
P187646.0W	07/03/2008	Complete	LOST CREEK ISR, LLC			SESW18M	MON	025N	092W	18	SESW	A	0	459	183	N	0		0	0	Well	N	42.133028	-107.864972	External
P187647.0W	07/03/2008	Complete	LOST CREEK ISR, LLC			SWSE18M	MON	025N	092W	18	SWSE	A	0	459	185	N	0		0	0	Well	N	42.132969	-107.859539	External
P193897.0W	09/02/2010	Complete	LOST CREEK ISR, LLC			TW1-1	MON	025N	092W	18	SWSE	A	0	483	167	N	0		0	0	Well	N	42.13258	-107.857867	External
P198899.0W	07/06/2012	Incomplete	LOST CREEK ISR, LLC			SWSE18P (UP TO 10 WELLS)	IND_GW; MIS	025N	092W	18	SWSE	A	500						0	0	Well		42.133632	-107.860142	External
P198926.0W	08/22/2012	Incomplete	LOST CREEK ISR, LLC			LC1007W	MIS	025N	092W	18	SWSE	A	50						0	0	Well		42.134944	-107.860463	External
P201134.0W	09/20/2013	Incomplete	LOST CREEK ISR, LLC			SWSW18P (UP TO 17 WELLS)	IND_GW; MIS	025N	092W	18	SWSW	L4	850						0	0	Well		42.133392	-107.869728	External
P175264.0W	06/09/2006	Complete	USDI - BLM[2]			LC25M	MON	025N	092W	19	NENE	A	0	349	164	N	280		0	0	Well	Y	42.130396	-107.853233	External
P179856.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJT 101	MON	025N	092W	19	NENE	A1-	0	477	174	N	0		0	0	Well	N			External
P179857.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJT-102	MON	025N	092W	19	NENE	A1-	0	417	171	N	0		0	0	Well	N			External
P179858.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJT 103	MON	025N	092W	19	NENE	A1-	0	450	188	N	0		0	0	Well	N			External
P179863.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJMU-101	MON	025N	092W	19	NENE	A1-	0	535	199	N	0		0	0	Well	N			External
P179864.0W	03/01/2007	Complete	USDI - BLM[2]			HJMP-101	MON	025N	092W	19	NENE	A1-	0	465	179	N	0		0	0	Well	N			External
P179865.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJMO-101	MON	025N	092W	19	NENE	A1-	0	326	167	N	0		0	0	Well	N			External
P179866.0W	03/01/2007	Complete	USDI - BLM[2]			HJMV-102	MON	025N	092W	19	NENE	A1-	0	525	179	N	0		0	0	Well	N	42.130822	-107.856467	External
P179867.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJMP-102	MON	025N	092W	19	NENE	A1-	0	435	171	N	0		0	0	Well	N			External
P179868.0W	03/01/2007	Complete	USDI - BLM[2]			HJMO-102	MON	025N	092W	19	NENE	A1-	0	330	155	N	0		0	0	Well	N			External
P179869.0W	03/01/2007	Complete	USDI - BLM[2]			HJMU-103	MON	025N	092W	19	NENE	A16-	0	540	190	N	0		0	0	Well	N			External
P179871.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJMO-103	MON	025N	092W	19	NENE	A16-	0	327	156	N	0		0	0	Well	N			External
P179872.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJMU-104	MON	025N	092W	19	NENE	A1-	0	550	193	N	0		0	0	Well	N			External
P179873.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJMP-104	MON	025N	092W	19	NENE	A1-	0	430	173	N	0		0	0	Well	N			External
P179874.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJMO-104	MON	025N	092W	19	NENE	A1-	0	326	160	N	0		0	0	Well	N			External
P179875.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJMU-105	MON	025N	092W	19	NENE	A1-	0	542	191	N	0		0	0	Well	N			External
P179876.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJMP-105	MON	025N	092W	19	NENE	A1-	0	463	168	N	0		0	0	Well	N			External
P179877.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJMO-105	MON	025N	092W	19	NENE	A1-	0	323	157	N	0		0	0	Well	N			External
P187653.0W	07/03/2008	Complete	LOST CREEK ISR, LLC			NENE19M	MON	025N	092W	19	NENE	A	0	424	177	N	0		0	0	Well	N	42.128861	-107.85539	External
P189591.0W	02/04/2009	Complete	LOST CREEK ISR, LLC			KMU-4	MON	025N	092W	19	NENE	A	0	635	197	N	400		0	0	Well	N	42.130939	-107.855778	External
P189593.0W	02/04/2009	Complete	LOST CREEK ISR, LLC			KPW-2	MON	025N	092W	19	NENE	A	0	590	193	N	470		0	0	Well	N	42.130911	-107.856412	External
P198898.0W	07/06/2012	Incomplete	LOST CREEK ISR, LLC			NENE19P (UP TO 190 WELLS)	IND_GW; MIS	025N	092W	19	NENE	A	9500						0	0	Well		42.129991	-107.855256	External
P187656.0W	07/03/2008	Complete	LOST CREEK ISR, LLC			NENW19M	MON	025N	092W	19	NENW	A	0	472	188	N	0		0	0	Well	N	42.129326	-107.863214	External
P193898.0W	09/02/2010	Incomplete	LOST CREEK ISR, LLC			TW1-2	MON	025N	092W	19	NENW	A	25						0	0	Well		42.130123	-107.862661	External

Table 4-2: Water Rights Table from State Engineer's Database

Water Rights Number	Priority Date	Summary WR Status	Company	First Name	Last Name	Facility Name	Uses	Twn	Rng	Sec	QTRQTR	Survey Type, Survey Number, Survey Suffix	Total Flow(CFS) / Appropriation (GPM)	Total depth (Ft)	Static Water Level (Ft)	Well Log (Y/N)	Depth Of Pump (Ft)	Stream Source	Active Capacity (AF)	Size of Reservoir (AF)	Facility type	Chemical Analysis (Y/N)	Latitude	Longitude	Created By
P201137.0W	09/20/2013	Incomplete	LOST CREEK ISR, LLC			NENW19P (UP TO 460 WELLS)	IND_GW; MIS	025N	092W	19	NENW	A	23000						0	0	Well		42.129948	-107.864969	External
P187659.0W	07/03/2008	Complete	LOST CREEK ISR, LLC			NWNE19MP	MON	025N	092W	19	NWNE	A	0	438	180	N	0		0	0	Well	N	42.130632	-107.860055	External
P187658.0W	07/03/2008	Complete	LOST CREEK ISR, LLC			NWNE19MO	MON	025N	092W	19	NWNE	A	0	342	165	N	0		0	0	Well	N	42.130616	-107.860081	External
P187657.0W	07/03/2008	Complete	LOST CREEK ISR, LLC			NWNE19MU	MON	025N	092W	19	NWNE	A	0	539	195	N	0		0	0	Well	N	42.130633	-107.860125	External
P193899.0W	09/01/2010	Complete	LOST CREEK ISR, LLC			OW1-1	MON	025N	092W	19	NWNE	A	0	525	188	N	0		0	0	Well	N	42.129796	-107.860133	External
P198897.0W	07/06/2012	Incomplete	LOST CREEK ISR, LLC			NWNE19P (UP TO 280 WELLS)	IND_GW; MIS	025N	092W	19	NWNE	A	14000						0	0	Well		42.130002	-107.86013	External
P201138.0W	09/20/2013	Incomplete	LOST CREEK ISR, LLC			NWNE19P (UP TO 35 WELLS)	IND_GW; MIS	025N	092W	19	NWNE	A	1750						0	0	Well		42.130004	-107.860127	External
P200773.0W	07/18/2013	Incomplete	LOST CREEK ISR, LLC			PW202A	TST	025N	092W	19	NWNW	L1	0						0	0	Well		42.129534	-107.871701	External
P200774.0W	07/18/2013	Incomplete	LOST CREEK ISR, LLC			M-HJ211	TST	025N	092W	19	NWNW	L1	0						0	0	Well		42.128148	-107.867853	External
P201136.0W	09/20/2013	Incomplete	LOST CREEK ISR, LLC			NWNW19P (UP TO 230 WELLS)	IND_GW; MIS	025N	092W	19	NWNW	L1	11500						0	0	Well		42.129803	-107.869729	External
P201147.0W	09/20/2013	Incomplete	LOST CREEK ISR, LLC			NWSW19P (UP TO 58 WELLS)	IND_GW; MIS	025N	092W	19	NWSW	L3	2900						0	0	Well		42.122518	-107.869742	External
P201143.0W	09/20/2013	Incomplete	LOST CREEK ISR, LLC			SENW19P (UP TO 46 WELLS)	IND_GW; MIS	025N	092W	19	SENW	A	2300						0	0	Well		42.126241	-107.864977	External
P187655.0W	07/03/2008	Complete	LOST CREEK ISR, LLC			SWNE19M	MON	025N	092W	19	SWNE	A	0	488	180	N	0		0	0	Well	N	42.127847	-107.860481	External
P189587.0W	02/04/2009	Complete	LOST CREEK ISR, LLC			KMP-5	MON	025N	092W	19	SWNE	A	0	585	184	N	400		0	0	Well	N	42.125728	-107.860144	External
P201144.0W	09/20/2013	Incomplete	LOST CREEK ISR, LLC			SWNE19P (UP TO 6 WELLS)	IND_GW; MIS	025N	092W	19	SWNE	A	300						0	0	Well		42.126267	-107.860127	External
P201142.0W	09/20/2013	Incomplete	LOST CREEK ISR, LLC			SWNW19P (UP TO 202 WELLS)	IND_GW; MIS	025N	092W	19	SWNW	L2	10100						0	0	Well		42.126135	-107.869737	External
P175265.0W	06/09/2006	Complete	USDI - BLM[2]			LC26M	MON	025N	092W	20	NENE	A	0	431	169	N	259		0	0	Well	Y	42.130835	-107.835541	External
P179827.0W	02/28/2007	Unadjudicated	LOST CREEK ISR, LLC			LC 33W	MIS	025N	092W	20	NENE	A	20	945	400	N	762		0	0	Well	N			External
P186532.0W	04/08/2008	Complete	LOST CREEK ISR, LLC			ENLARGEMENT OF WELL LC33W	MIS	025N	092W	20	NENE	A	30						0	0	Well		42.129411	-107.835783	External
P189583.0W	02/04/2009	Complete	LOST CREEK ISR, LLC			KMP-1	MON	025N	092W	20	NENE	A	22	505	167	N	400		0	0	Well	N	42.129369	-107.835847	External
P179862.0W	03/01/2007	Complete	USDI - BLM[2]			HJT 107	MON	025N	092W	20	NENW	A5-	0	163	162	N	0		0	0	Well	N			External
P179902.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJMU-114	MON	025N	092W	20	NENW	A5-	0	553	187	N	0		0	0	Well	N			External
P179903.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJMP-114	MON	025N	092W	20	NENW	A5-	0	460	179	N	0		0	0	Well	N			External
P179904.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJMO-114	MON	025N	092W	20	NENW	A5-	0	360	156	N	0		0	0	Well	N			External
P187662.0W	07/03/2008	Complete	LOST CREEK ISR, LLC			NENW20MP	MON	025N	092W	20	NENW	A	0	439	172	N	0		0	0	Well	N	42.130023	-107.845391	External
P187661.0W	07/03/2008	Complete	LOST CREEK ISR, LLC			NENW20MO	MON	025N	092W	20	NENW	A	0	340	159	N	0		0	0	Well	N	42.130059	-107.845409	External
P187660.0W	07/03/2008	Complete	LOST CREEK ISR, LLC			NENW20MU	MON	025N	092W	20	NENW	A	0	541	188	N	0		0	0	Well	N	42.130018	-107.845453	External
P187651.0W	07/03/2008	Complete	LOST CREEK ISR, LLC			NENW20M	MON	025N	092W	20	NENW	A	0	442	177	N	0		0	0	Well	N	42.129301	-107.844586	External
P189588.0W	02/04/2009	Complete	LOST CREEK ISR, LLC			KMU-1	MON	025N	092W	20	NENW	A	0	675	192	N	400		0	0	Well	N	42.129339	-107.845486	External
P189592.0W	02/04/2009	Complete	LOST CREEK ISR, LLC			KPW-1	MON	025N	092W	20	NENW	A	0	610	188	N	490		0	0	Well	N	42.13101	-107.845192	External
P192102.0W	01/22/2010	Incomplete	LOST CREEK ISR, LLC			M-M2	MON	025N	092W	20	NENW	A	0						0	0	Well		42.129422	-107.845528	External
P192103.0W	01/22/2010	Incomplete	LOST CREEK ISR, LLC			M-UKM1	MON	025N	092W	20	NENW	A	0						0	0	Well		42.129525	-107.845486	External
P192104.0W	01/22/2010	Complete	LOST CREEK ISR, LLC			M-L1	MON	025N	092W	20	NENW	A	0	670	0	N	0		0	0	Well	N	42.129444	-107.845403	External
P192106.0W	01/22/2010	Complete	LOST CREEK ISR, LLC			M-M1	MON	025N	092W	20	NENW	A	0	770	0	N	0		0	0	Well	N	42.129631	-107.845756	External
P194694.0W	12/17/2010	Complete	LOST CREEK ISR, LLC			M-KM2	MON	025N	092W	20	NENW	A	0	580	193	N	0		0	0	Well	N	42.128156	-107.844983	External
P194696.0W	12/17/2010	Complete	LOST CREEK ISR, LLC			KPW-3	MON	025N	092W	20	NENW	A	0	590	97	N	0		0	0	Well	N	42.130117	-107.845331	External
P194697.0W	12/17/2010	Complete	LOST CREEK ISR, LLC			M-N1	MON	025N	092W	20	NENW	A	0	850	205	N	0		0	0	Well	N	42.130093	-107.84575	External
P194709.0W	12/20/2010	Incomplete	LOST CREEK ISR, LLC			5S-L1	MON	025N	092W	20	NENW	A	0						0	0	Well		42.130417	-107.845494	External
P194710.0W	12/20/2010	Complete	LOST CREEK ISR, LLC			5S-M1	MON	025N	092W	20	NENW	A	0	900	210	N	0		0	0	Well	N	42.13118	-107.845134	External
P198902.0W	07/06/2012	Incomplete	LOST CREEK ISR, LLC			NENW20P (UP TO 140 WELLS)	IND_GW; MIS	025N	092W	20	NENW	A	7000						0	0	Well		42.129901	-107.845518	External
P189589.0W	02/04/2009	Complete	LOST CREEK ISR, LLC			KMU-2	MON	025N	092W	20	NWNE	A	0	650	194	N	400		0	0	Well	N	42.129403	-107.840675	External
P190176.0W	04/20/2009	Complete	LOST CREEK ISR, LLC			NWNE20	MON	025N	092W	20	NWNE	A	0	438	174.7	N	0		0	0	Well	N	42.130261	-107.842644	SEO
P192101.0W	01/22/2010	Complete	LOST CREEK ISR, LLC			M-M3	MON	025N	092W	20	NWNE	A	0	770	0	N	0		0	0	Well	N	42.131008	-107.84287	External
P192105.0W	01/22/2010	Complete	LOST CREEK ISR, LLC			M-L2	MON	025N	092W	20	NWNE	A	0	675	0	N	0		0	0	Well	N	42.129631	-107.840717	External
P194689.0W	12/17/2010	Complete	LOST CREEK ISR, LLC			M-M5	MON	025N	092W	20	NWNE	A	0	775	204	N	0		0	0	Well	N	42.130937	-107.840508	External
P194695.0W	12/17/2010	Complete	LOST CREEK ISR, LLC			M-KM1	MON	025N	092W	20	NWNE	A	0	590	194	N	0		0	0	Well	N	42.130979	-107.840751	External
P194708.0W	12/20/2010	Complete	LOST CREEK ISR, LLC			5S-KM5	MON	025N	092W	20	NWNE	A	0	610	190	N	0		0	0	Well	N	42.130961	-107.842928	External
P175260.0W	06/09/2006	Complete	LOST CREEK ISR, LLC			LC15M, LC16M, LC17M, LC29M	MON	025N	092W	20	NWNW	A	0	565	184	N	280		0	0	Well	Y	42.130963	-107.848961	External
P179859.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJT 104	MON	025N	092W	20	NWNW	A6-	0	460	170	N	0		0	0	Well	N			External
P179860.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJT 105	MON	025N	092W	20	NWNW	A6-	0	438	170	N	0		0	0	Well	N			External
P179861.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJT 106	MON	025N	092W	20	NWNW	A6-	0	162	151	N	0		0	0	Well	N			External
P179881.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJMU-107	MON	025N	092W	20	NWNW	A1-	0	580	188	N	0		0	0	Well	N			External
P179882.0W	03/01/2007	Complete	USDI - BLM[2]			HJMP-107	MON	025N	092W	20	NWNW	A1-	0	460	182	N	0		0	0	Well	N			External
P179883.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJMO-107	MON	025N	092W	20	NWNW	A1-	0	369	161	N	0		0	0	Well	N			External
P179887.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJMU-109	MON	025N	092W	20	NWNW	A6-	0	574	189	N	0		0	0	Well	N			External
P179888.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJMP-109	MON	025N	092W	20	NWNW	A6-	0	512	183	N	0		0	0	Well	N			External
P179889.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJMO-109	MON	025N	092W	20	NWNW	A6-	0	370	160	N	0		0	0	Well	N			External
P179896.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJMU-112	MON	025N	092W	20	NWNW	A6-	0	560	182	N	0		0	0	Well	N			External
P179897.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJMP-112	MON	025N	092W	20	NWNW	A6-	0	400	176	N	0		0	0	Well	N			External
P179898.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJMO-112	MON	025N	092W	20	NWNW	A6-	0	350	155	N	0		0	0	Well	N			External
P179899.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJMU-113	MON	025N	092W	20	NWNW	A6-	0	555	185	N	0		0	0	Well	N			External
P179900.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJMP-113	MON	025N	092W	20	NWNW	A6-	0	462	179	N	0		0	0	Well	N			External
P179901.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			HJMO-113	MON	025N	092W	20	NWNW	A6-	0	356	157	N	0		0	0	Well	N			External
P179905.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			UKMU-101	MON	025N	092W	20	NWNW	A6-	0	630	191	N	0		0	0	Well	N			External
P179906.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			UKMP-101	MON	025N	092W	20	NWNW	A6-	0	575	190	N	0		0	0	Well	N			External
P179907.0W	03/01/2007	Complete	LOST CREEK ISR, LLC			UKMO-101	MON	025N	092W	20	NWNW	A6-	0	487	178	N	0		0	0	Well	N			External
P187664.0W	07/03/2008	Complete	LOST CREEK ISR, LLC			NWNW20PW	MON	025N	092W	20	NWNW	A	0	495	185	N	0		0	0	Well	N	42.130254	-107.851717	External
P187652.0W	07/03/2008	Complete	LOST CREEK ISR, LLC			NWNW20M	MON	025N	092W	20	NWNW	A	0	436	174	N	0		0	0	Well	N	42.12867	-107.850202	External
P194691.0W	12/17/2010	Complete	LOST CREEK ISR, LLC			M-M7	MON	025N	092W	20	NWNW	A	0	770	195	N	0		0	0	Well	N	42.130476	-107.84975	External
P194693.0W	12/17/2010	Complete	LOST CREEK ISR, LLC			M-L3	MON	025N	092W	20	NWNW	A	0	700	189	N	0		0	0	Well	N	42.130522	-107.849895	External

Table 4-2: Water Rights Table from State Engineer's Database

Water Rights Number	Priority Date	Summary WR Status	Company	First Name	Last Name	Facility Name	Uses	Twn	Rng	Sec	QTRQTR	Survey Type, Survey Number, Survey Suffix	Total Flow(CFS) / Appropriation (GPM)	Total depth (Ft)	Static Water Level (Ft)	Well Log (Y/N)	Depth Of Pump (Ft)	Stream Source	Active Capacity (AF)	Size of Reservoir (AF)	Facility type	Chemical Analysis (Y/N)	Latitude	Longitude	Created By
P198901.0W	07/06/2012	Incomplete	LOST CREEK ISR, LLC			NWNW20P (UP TO 170 WELLS)	IND_GW; MIS	025N	092W	20	NWNW	A	8500						0	0	Well		42.129961	-107.850387	External
P194688.0W	12/17/2010	Incomplete	LOST CREEK ISR, LLC			M-M4	MON	025N	092W	20	SENW	A	0						0	0	Well		42.12799	-107.84479	External
P194692.0W	12/17/2010	Complete	LOST CREEK ISR, LLC			M-L4	MON	025N	092W	20	SENW	A	0	670	197	N	0		0	0	Well	N	42.127993	-107.845191	External
P198446.0W	06/05/2012	Incomplete	LOST CREEK ISR, LLC			M-HJ3	MON	025N	092W	20	SWSE	A	0						0	0	Well		42.118028	-107.842266	External
P198447.0W	06/05/2012	Incomplete	LOST CREEK ISR, LLC			M-KM6	MON	025N	092W	20	SWSE	A	0						0	0	Well		42.118333	-107.842262	External
P201133.0W	09/20/2013	Incomplete	LOST CREEK ISR, LLC			SESE13P (UP TO 6 WELLS)	IND_GW; MIS	025N	093W	13	SESE	A	300						0	0	Well		42.133339	-107.874554	External
P188852.0W	09/26/2008	Complete	LOST CREEK ISR, LLC	JOHN	CASH	MB-01	MON	025N	093W	13	SWSE	A	0	280	233	N	0		0	0	Well	N	42.134021	-107.879655	External
P188853.0W	09/26/2008	Complete	LOST CREEK ISR, LLC	JOHN	CASH	MB-02	MON	025N	093W	13	SWSE	A	0	450	242	N	0		0	0	Well	N	42.134038	-107.879448	External
P188854.0W	09/26/2008	Complete	LOST CREEK ISR, LLC	JOHN	CASH	MB-03	MON	025N	093W	13	SWSE	A	0	587	259	N	0		0	0	Well	N	42.134023	-107.879275	External
P188855.0W	09/26/2008	Complete	LOST CREEK ISR, LLC	JOHN	CASH	MB-04	MON	025N	093W	13	SWSE	A	0	640	274	N	0		0	0	Well	N	42.134069	-107.879101	External
P189581.0W	02/04/2009	Complete	LOST CREEK ISR, LLC			MB-12	MON	025N	093W	13	SWSE	A	17	770	277	N	400		0	0	Well	N	42.132911	-107.87945	External
P198928.0W	09/06/2012	Incomplete	LOST CREEK ISR, LLC			LC1008W	MIS	025N	093W	13	SWSW	A	50						0	0	Well		42.133808	-107.887072	External
P201135.0W	09/20/2013	Incomplete	LOST CREEK ISR, LLC			NENE24P (UP TO 87 WELLS)	IND_GW; MIS	025N	093W	24	NENE	A	4350						0	0	Well		42.129727	-107.87455	External
P201146.0W	09/20/2013	Incomplete	LOST CREEK ISR, LLC			NESE24P (UP TO 12 WELLS)	IND_GW; MIS	025N	093W	24	NESE	A	600						0	0	Well		42.122507	-107.874559	External
P201145.0W	09/20/2013	Incomplete	LOST CREEK ISR, LLC			NWSE24P (UP TO 29 WELLS)	IND_GW; MIS	025N	093W	24	NWSE	A	1450						0	0	Well		42.122543	-107.879489	External
P200456.0W	06/07/2013	Incomplete	LOST CREEK ISR, LLC			M-HJ203	TST	025N	093W	24	SENE	A	0						0	0	Well		42.126006	-107.876517	External
P200772.0W	07/18/2013	Incomplete	LOST CREEK ISR, LLC			PW201	TST	025N	093W	24	SENE	A	0						0	0	Well		42.124898	-107.874467	External
P200775.0W	07/18/2013	Incomplete	LOST CREEK ISR, LLC			M-HJ202A	TST	025N	093W	24	SENE	A	0						0	0	Well		42.127401	-107.875944	External
P201141.0W	09/20/2013	Incomplete	LOST CREEK ISR, LLC			SENE24P (UP TO 202 WELLS)	IND_GW; MIS	025N	093W	24	SENE	A	10100						0	0	Well		42.12612	-107.874555	External
P201139.0W	09/20/2013	Incomplete	LOST CREEK ISR, LLC			SENW24P (UP TO 12 WELLS)	IND_GW; MIS	025N	093W	24	SENW	A	600						0	0	Well		42.126163	-107.884415	External
P175262.0W	06/09/2006	Complete	USDI - BLM[2]			LC21M, LC22M, LC23M, LC30M	MON	025N	093W	24	SWNE	A	0	630	219	N	275		0	0	Well	Y	42.125696	-107.879523	External
P189618.0W	02/06/2009	Complete	LOST CREEK ISR, LLC			MB-14	MON	025N	093W	24	SWNE	A	0	740	222	N	400		0	0	Well	N	42.125698	-107.879717	External
P201140.0W	09/20/2013	Incomplete	LOST CREEK ISR, LLC			SWNE24P (UP TO 357 WELLS)	IND_GW; MIS	025N	093W	24	SWNE	A	17850						0	0	Well		42.126142	-107.879485	External

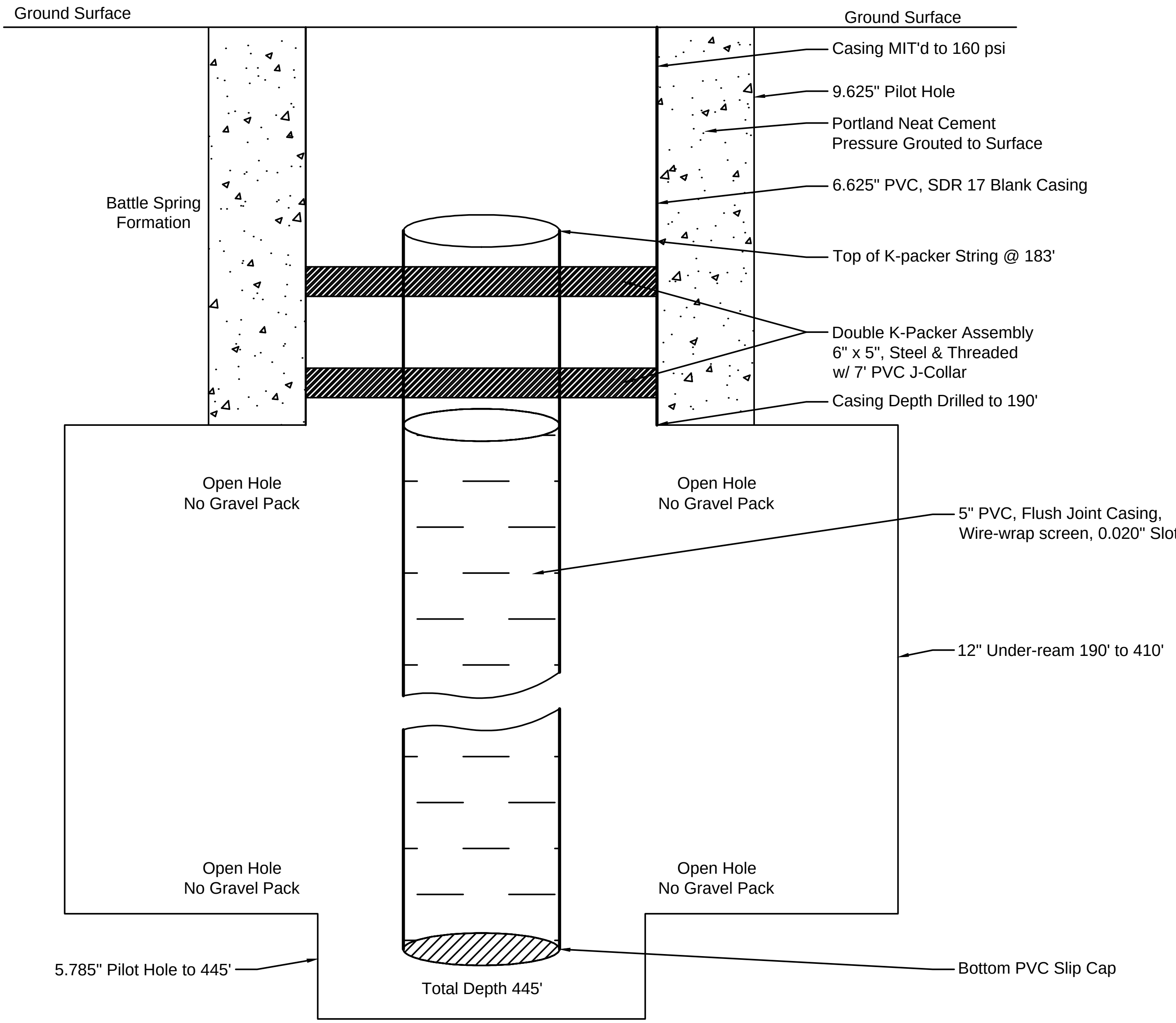


Lost Creek ISR, LLC
Casper, Wyoming

Figure 2-4

Injection Well M-FG6 Construction Schematic

Scale: Not To Scale	Drawn By: JHC
Issued / Revised: 02.10.2015	
Drawing Name: Injection Well M-FG6 Construction Diagram.dwg	
File Path: S:\GIS\LostCreek\Class V Wells	



Lost Creek ISR, LLC
Casper, Wyoming

Figure 2-5

Injection Well M-FG6 Construction Schematic

Scale: Not To Scale	Drawn By: JHC
Issued / Revised: 04.09.2015	
Drawing Name: Injection Well M-FG6 Construction Schematic.dwg	
File Path: S:\GIS\LostCreek\Plant	

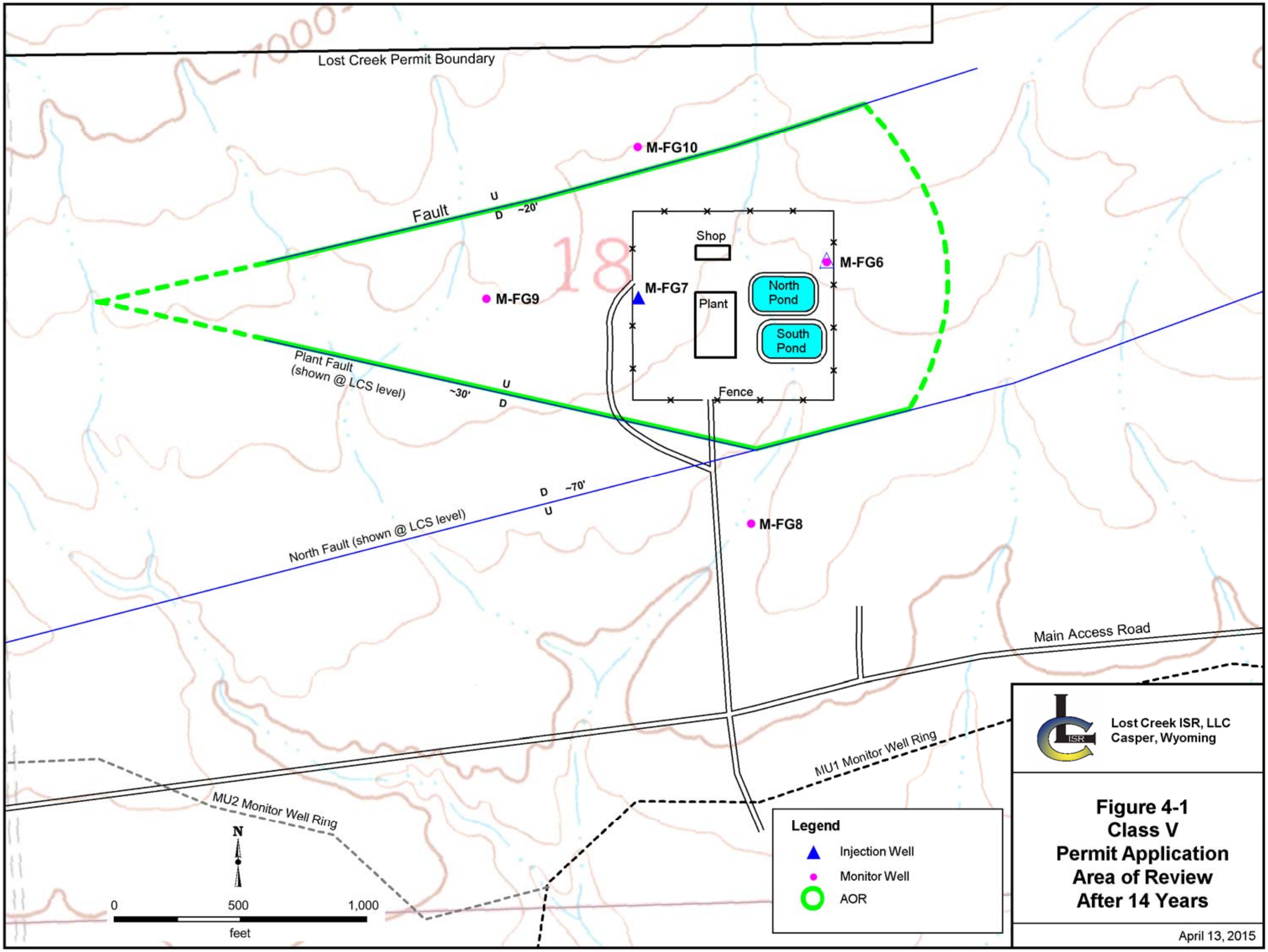
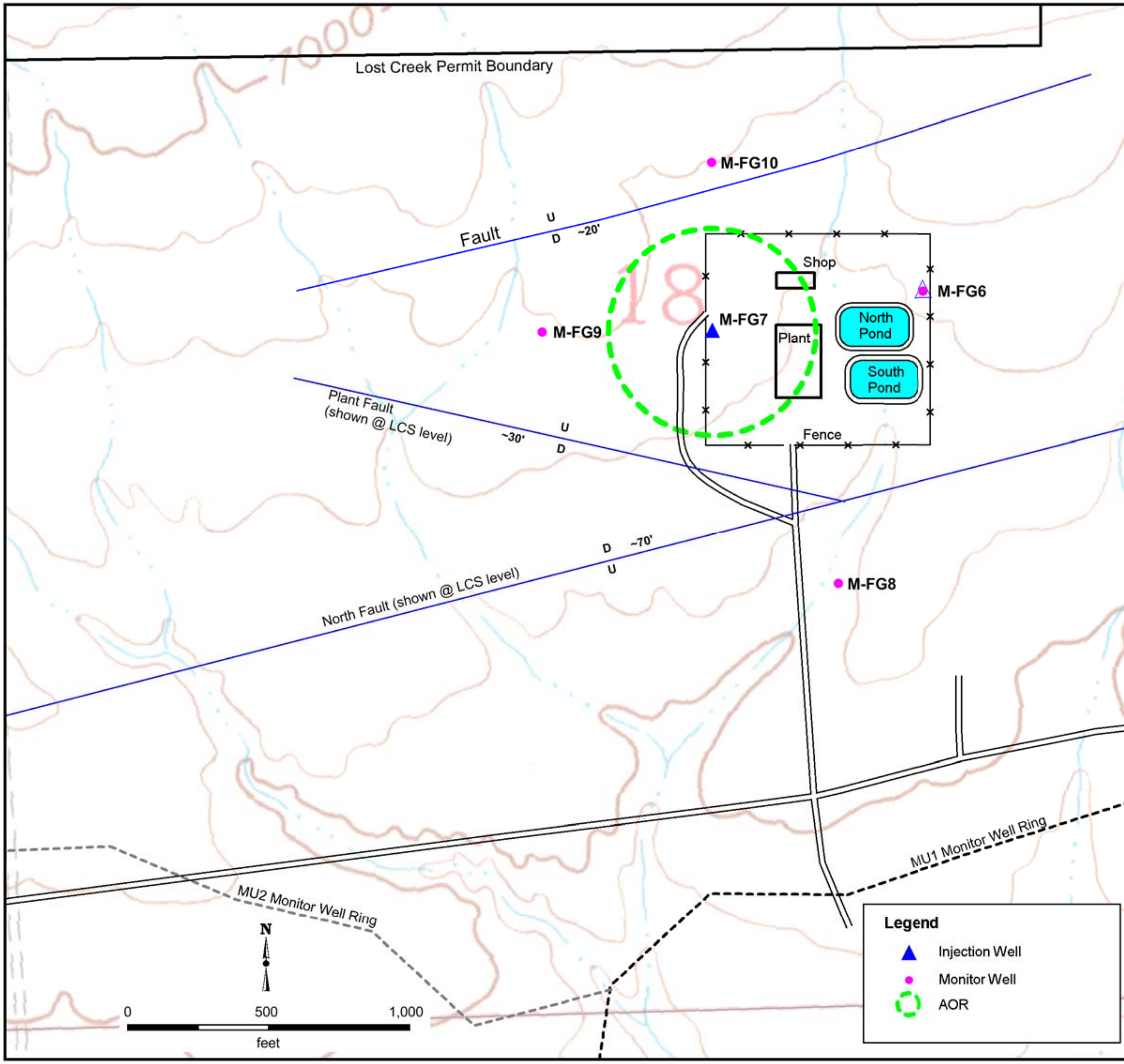


Figure 4-1
Class V
Permit Application
Area of Review
After 14 Years

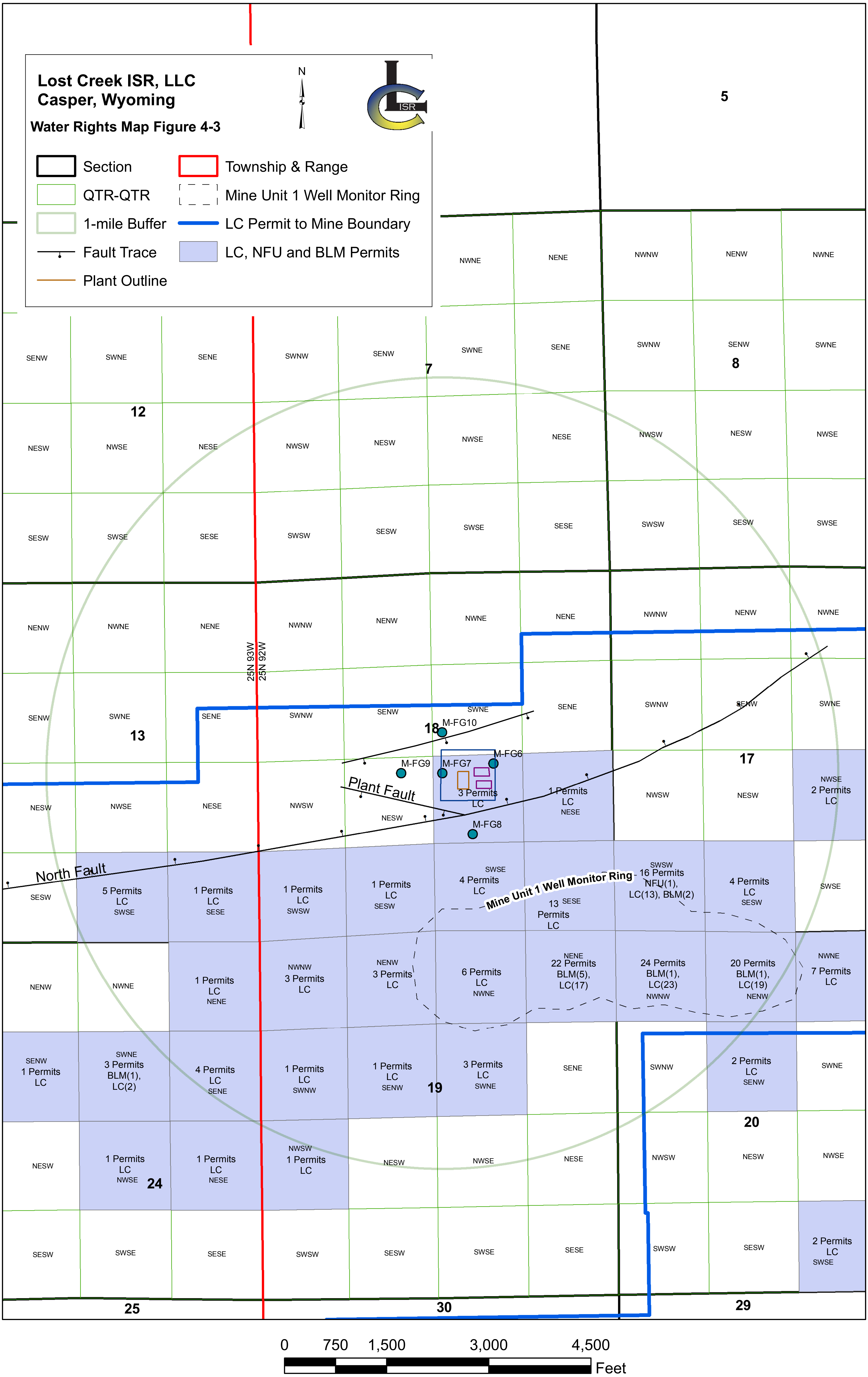
April 13, 2015



Lost Creek ISR, LLC
Casper, Wyoming

Figure 4-2
Class V
Permit Application
Area of Review
After Five Years

April 13, 2015


Lost Creek ISR, LLC
Casper, Wyoming
Water Rights Map Figure 4-3
N
ISR
Section
Township & Range
QTR-QTR
Mine Unit 1 Well Monitor Ring
1-mile Buffer
LC Permit to Mine Boundary
Fault Trace
LC, NFU and BLM Permits
Plant Outline
5
7
8
12
13
17
18
19
20
24
25
29
30
25N 93W
25N 92W
North Fault
Plant Fault
Mine Unit 1 Well Monitor Ring
M-FG10
M-FG9
M-FG7
M-FG6
M-FG8
3 Permits
LC
1 Permits
LC
NESE
2 Permits
LC
5 Permits
LC
SWSE
1 Permits
LC
SESE
1 Permits
LC
SWSW
1 Permits
LC
SESW
SWSE
4 Permits
LC
13 SESE
Permits
LC
SWSW
16 Permits
NFU(1),
LC(13), BLM(2)
4 Permits
LC
SESW
1 Permits
LC
NENE
NWNW
3 Permits
LC
NENW
3 Permits
LC
6 Permits
LC
NWNE
NENE
22 Permits
BLM(5),
LC(17)
24 Permits
BLM(1),
LC(23)
NWNW
20 Permits
BLM(1),
LC(19)
NENW
NWNE
7 Permits
LC
SENW
1 Permits
LC
SWNE
3 Permits
BLM(1),
LC(2)
4 Permits
LC
SENE
1 Permits
LC
SWNW
1 Permits
LC
SENW
3 Permits
LC
SWNE
2 Permits
LC
SENW
1 Permits
LC
NWSE
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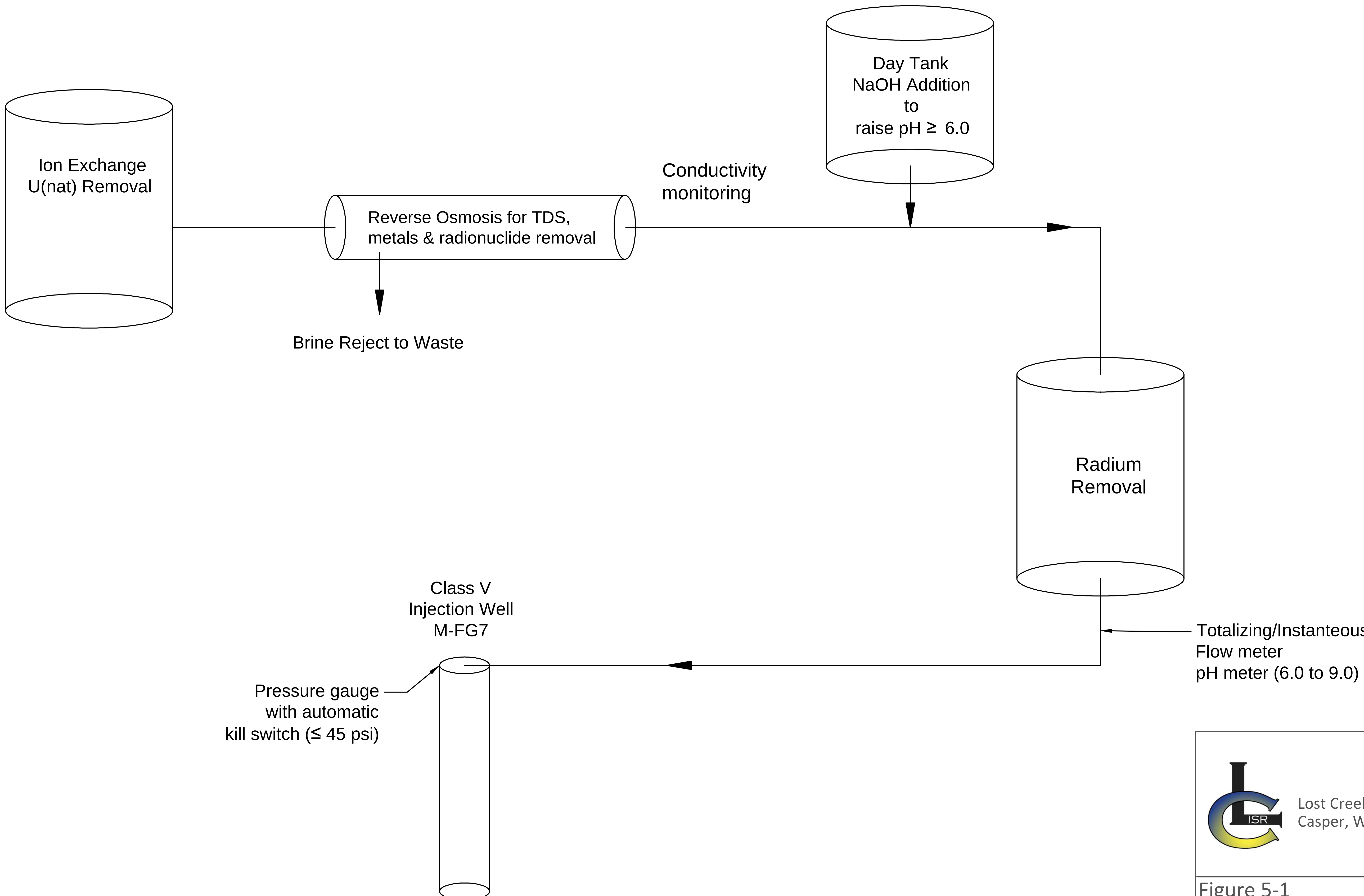
3,000
4,500
Feet



Lost Creek ISR, LLC
Casper, Wyoming

Figure 5-1

Class V Water Treatment Schematic

Scale: Not To Scale	Drawn By: JHC
Issued / Revised: 04.14.2015	
Drawing Name: Water Treatment Flow Diagram.dwg	
File Path: S:\GIS\LostCreek\Plant	