LOST CREEK ISR, LLC

Lost Creek Project

NRC Technical Report

VOLUME 1

KM Amendment

PREAMBLE

With this application, Lost Creek ISR, LLC proposes to add mine units and associated infrastructure and disturbance within the existing area. Specifically, this application adds HJ Horizon mine units as well as KM Horizon mine units which are slightly deeper. This application also seeks to increase the production rate to 2.2 million pounds of U_3O_8 per year (measured as dried U_3O_8 excluding water and other contaminants). Up to 1.2 million pounds of U_3O_8 could come from wellfields. In no case would the total production (wellfield plus toll processing) exceed 2.2 million pounds of U_3O_8 per year. Yellowcake slurry and/or loaded ion exchange resins could be shipped to Lost Creek for processing or sent from Lost Creek to another facility for processing.

Since each of the proposed mine units are within the existing Lost Creek boundary, the majority of environmental baseline work has already been completed and reviewed and approved by appropriate regulatory agencies. The following Sections of the existing Technical Report do not require amendment to incorporate the proposed mine units and the reader should refer back to the approved Technical Report for information:

- Site Characterization, Section 2.1 of approved Lost Creek Technical Report
- Land Use, Section 2.2 of approved Lost Creek Technical Report
- Population Distribution, Section 2.3 of approved Lost Creek Technical Report
- Archeology, Section 2.4 of approved Lost Creek Technical Report
- Meteorology, Section 2.5 of approved Lost Creek Technical Report
- Soil, Section 2.6 of approved Lost Creek Technical Report.
- Vegetation, Section 2.8 of approved Lost Creek Technical Report
- Wildlife, Section 2.8 of approved Lost Creek Technical Report
- Wetlands, Section 2.8 of approved Lost Creek Technical Report
- Background Radiation, Section 2.9 of approved Lost Creek Technical Report. A new MILDOS run which considers production from both the Lost Creek and LC East wellfields is included in the LC East Amendment.
- Other Environmental Impacts, Section 2.10 of the approved Lost Creek Technical Report
- Effluent Control, Section 4 of the approved Lost Creek Technical Report

Several portions of the approved Technical Report had to be updated in consideration of the KM Amendment, as follows:

- Proposed Activities, Section 1.0 of the approved Lost Creek Technical Report. The changes being proposed by this amendment are described above and in the LC East Technical Report.

- Geology, Section 2.6 of the approved Lost Creek Technical Report is updated in the KM Amendment Technical Report (see Section D5)

- Hydrology, Section 2.7 of the approved Lost Creek Technical Report is updated in the KM Amendment Technical Report (see Section D6).

- Mine Plan, Section 3 of the approved Lost Creek Technical Report is updated in the Operations Plan of the Technical Report of the LC East Amendment as appropriate.

- Operational Management and Organization, Section 5 of the approved Lost Creek Technical Report is updated in the Operations Plan of the Technical Report of the LC East Amendment as appropriate.

- Restoration, Reclamation and Decommissioning, Section 6 of the approved Lost Creek Technical Report is updated in the Operations Plan of the Technical Report of the LC East Amendment as appropriate.

- Environmental Affects, Section 7 of the approved Lost Creek Technical Report is updated in the LC East Amendment Environmental Report which considers all impacts from both the KM and LC East Amendments.

- Alternatives, Section 8 of the approved Lost Creek Technical Report is updated in the LC East Amendment Environmental Report which considers all impacts from both the KM and LC East Amendments.

- Cost Benefit Analysis, Section 9 of the approved Lost Creek Technical Report is updated in the LC East Amendment Environmental Report which considers all impacts from both the KM and LC East Amendments.

Section 2.6

Geology

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2.6 GEOLOGY

2.6.1 Regional Geology

The Lost Creek Property (Property) is currently comprised of six individual and contiguous Projects: the Lost Creek, LC East, LC North, LC South, LC West and EN Projects. The Lost Creek Project is effectively contained within the Lost Creek Permit Area (Permit Area), and is situated in the northeastern part of the Great Divide Basin (GDB) which is underlain by up to 25,000 feet of Paleozoic to Quaternary sediments. The GDB is an oval-shaped structural depression, encompassing some 3,500 square miles in south-central Wyoming. It represents the northeastern portions of the greater Green River Basin, which occupies much of southwestern Wyoming. The GDB lies within a unique divergence of the Continental Divide, and is bounded by structural uplifts or fault displaced Precambrian rocks, resulting in internal drainage and an independent hydrogeologic system. It is bounded on the north by the Wind River Range and Granite Mountains, on the east by the Rawlins Uplift, on the south by the Wamsutter Arch and on the west by the Rock Springs Uplift. Geologic development of the GDB began in the Late Cretaceous and continued through much of the Early Eocene.

Rock outcrops in the GDB are dominated by the Battle Spring Formation of Eocene age. Due to the soft nature of the formation, this occurs largely as sub-crop beneath the soil. Regional and local surficial geology is shown on **Figure 2.6-1**. Maximum thickness of the Battle Spring Formation sediments within the GDB is 6,200 feet. Uranium deposits in the GDB, including the Permit Area, are found principally in the Battle Spring Formation.

2.6.1.1 Regional Stratigraphy

The earliest sedimentation in the GDB was the Paleocene (Early Tertiary) Fort Union Formation, which was unconformably deposited upon the Lance Formation of Late Cretaceous age. The Fort Union Formation consists mostly of lacustrine shales, siltstones, and thin sandstones, which locally contain lignite and coal beds. The thickness of the Fort Union Formation varies from place to place in the GDB, and it is approximately 4,650 feet thick in the Permit Area.

The Fort Union Formation is unconformably overlain by sediments of Eocene age, making up about 6,200 feet of basin fill. The northern and northeastern portions of the GDB are dominated by thick, medium to coarse-grained arkosic sandstones and conglomerates, separated by intermittent mudstone, claystone and siltstone of the Battle Spring Formation. The Battle Spring Formation represents a large alluvial fan complex relatively close to the sediment source in the ancestral Granite Mountains, approximately 20 to 30 miles to the north. In the southern and southwestern portions of the GDB the Battle Spring Formation undergoes a facies transition into intertonguing units of the Wasatch and Green River

Formations which represent distal fluvial and lacustrine depositional environments, respectively. Lithology of these units is predominately sandstone, claystone, siltstone, limestone, conglomerate and include thin lignite beds. Pliocene pediment deposits and recent alluvium cover large areas of the surface in the GDB.

The Lost Creek Permit Area is located near the north-central part of the Basin. Here the GDB fill consists of the Eocene Battle Spring and Wasatch Formations plus the Paleocene Fort Union Formation. The upper portions of the stratigraphic section consist of Battle Spring Formation underlain by a tongue of the Wasatch Formation. The combined thickness of the Battle Spring and Wasatch Formations is approximately 6,200 feet. The Battle Spring/Wasatch Formations are unconformably underlain by the Fort Union Formation which is approximately 4,650 feet thick. The Fort Union Formation, in turn, is unconformably underlain by numerous Cretaceous, Jurassic, Triassic, Paleozoic, and Precambrian basement lithologic units.

Approximately six miles southwest of the Permit Area, the Battle Spring Formation interfingers with the Wasatch and Green River Formations of equivalent age (Eocene) within a belt roughly 15 miles wide (as illustrated on **Figure 2.6-1**). The Wasatch and Green River collectively represent low-energy fluvial, lacustrine and paludal depositional environments which are time-equivalents of the alluvial fan deposits of the Battle Spring Formation. **Figure 2.6-1** schematically illustrates the stratigraphic relationships of Tertiary sediments within the GDB, and the specific Permit Area stratigraphy.

2.6.1.2 Regional Structure

The present geomorphological features of the GDB were generated by the Laramide Orogeny. During the Late Cretaceous and Early Tertiary, the structures surrounding the GDB were either rejuvenated or were formed, transforming the area into a bowl-shaped geological structure, the Basin. During this upheaval, the Wind River Mountains and Granite Mountains were thrusted upward on the north side of the GDB. The Rawlins Uplift formed to the east; the Wamsutter Arch formed to the south; and the Rock Spring Uplift formed to the west.

The GDB is asymmetrical, with its major axis trending west-northwest. Several anticlines and synclines have been mapped within the GDB, and some of these features are oil-bearing (at much deeper levels than the uranium-bearing formations). Noteworthy among these structures is the Lost Soldier anticline in the northeastern part of the GDB, approximately 15 miles northeast of the Permit Area. The Battle Spring and Fort Union Formations, as well as older rocks crop out in the anticline; and the formations on the southwestern flank of the anticline dip 20 to 25 degrees to the southwest. The dip gradually becomes gentler and, at the Permit Area, it is merely three degrees westerly.

Deep-seated regional thrust faulting associated with the Wind River uplift occurred at depth in the north-central portions of the GDB. The horizontal component of displacement is possibly greater than nine miles. However, displacement along these faults did not extend to the surface, such that the upper portions of the Battle Spring Formation are largely undisturbed.

Shallow normal faulting is also common throughout the central GDB, having a preferential orientation that is generally east-west. These are relatively local and appear to be the result of late stage events in the structural history of the GDB. They are believed to be the result of a regional extension event and possibly also isostatic unloading within the GDB due to regional erosion. They are not considered to be currently active. Displacements are generally less than 100 feet and most commonly less than 50 feet. For example, the maximum displacement within the Lost Creek Fault System, which traverses the mineralized area from west-southwest to east-northeast, is about 80 feet. More details about the Lost Creek Fault are discussed in Section 2.6.2.2.

Strata within the GDB generally exhibit gentle dips of one to three degrees, increasing to as much as 20 degrees in some locations along the GDB margin. Gentle folding during late Eocene accompanied late-stage regional thrusting; therefore broad anticlinal and synclinal folds are present within the Battle Spring Formation. Similar to the shallow normal faulting discussed above, the fold axes generally are oriented east-west.

2.6.2 Site Geology

Outcrop within the entire Permit Area is represented solely by the upper portions of the Battle Spring Formation, which is the host to uranium mineralization. The Battle Spring Formation in the vicinity of the Lost Creek Property is part of a major alluvial fan system, consisting of 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 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. Various stratigraphic intervals, some dominated by sandstone and others by mudstone, have been correlated and named across the Property and Permit Area. These named "Horizons" are described in more depth in the following Section (Section 2.6.2.1).

Lithology of the Battle Spring Formation within the Permit Area consists of approximately 60% to 80% weakly consolidated, medium to coarse, commonly conglomeratic, clean arkosic sands 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 **(Figure 2.6-1)**. This lithological assemblage remains relatively consistent throughout the entire vertical section of interest within the Battle Spring Formation, 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 Property occur as roll front type deposits. The most significant mineral resources in the Lost Creek Property and the Permit Area occur within two major stratigraphic Horizons within the Battle Spring Formation: the HJ and the KM Horizons (**Figure 2.6-1**). The HJ Horizon carries the majority of the currently defined mineral resource, and is currently permitted and being developed. The KM Horizon, the subject of this application, underlies the HJ Horizon and contains additional economic mineralization, which is the focus of this document.

Depth to the top of any given unit can vary from one end of the mineral trend to the other by up to 220 feet due to the regional dip of one to three degrees, and to displacement by normal faulting. Within the Permit Area the depth to KM Horizon mineralization ranges from 425 to 685 feet, averaging 515 feet.

Mineralization also occurs above the HJ within the DE and FG Horizons. The DE hosts only minor occurrences which are virtually always above the water table. Consequently, it is of little economic interest. Mineralization within the FG is secondary to that of the HJ and KM, but is none the less significant, and remains to be investigated for economic viability. Mineral discoveries have also been made in the L, M, and N sands which are collectively referred to as the Deep Horizons and underlie the KM. Economic assessment of these Horizons will require additional exploration activity.

The combined HJ and KM mineral trend within the Permit Area is referred to as the Main Mineral Trend (MMT) and extends in an east-northeast to west-southwest orientation for nearly three miles (**Plates 2.6-1a** and **1b**). The composite width of the MMT varies from 500 to 2,000 feet. Individual roll fronts within the deposit are typically 25 to 75 feet wide and are very sinuous. Mineralization in both the HJ and KM Horizons are stacked vertically and commonly overlie each other in a complex, erratic, anastomosing pattern in plan-view. Both the HJ and KM mineralization are considered to be the product of the same regional mineralizing event and therefore virtually contemporaneous and similar in most respects. The location of currently identified KM mineralization is illustrated in **Plate 2.6-1a.**

The geometry of the uranium mineralization is dominated by the classic roll front "C" shape or crescent configuration at the alteration interface. Thickness of mineralization within each roll front may vary from 5 to 25 feet thick. Typical thickness is from 10 to 15 feet. Mineral intercepts of over 25 feet in total thickness are common where multiple roll fronts occur stacked on top of each other. To date, a total of nine individual roll fronts have been identified in the KM Horizon within a stratigraphic interval of approximately 100 feet. Average grade within the Lost Creek MMT is approximately 0.057% eU_3O_8. East-west oriented normal faulting is common in the Lost Creek Property. As discussed above, these appear to be the product of relatively late-stage structural adjustments. They appear to be genetically associated with the Chicken Springs Fault system identified on published geological maps approximately five to ten miles to the east. The latest displacement of these faults was post-mineralization and therefore has offset mineralization. They are no longer considered active. The fault planes are close to vertical, being less than 3 degrees from vertical in locations where dip of the fault plane can be determined. Faulting is discussed in greater detail in Section 2.6.2.2.

2.6.2.1 Site Stratigraphy

The upper portion of the Battle Spring Formation is host to the uranium mineralization in the Permit Area. 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 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. This is well illustrated in the thickness isopach maps of the SBS and K Shales (**Plates 2.6-3a** and **2.6-3b**) where discernible patterns of deposition are virtually absent; and also in the Geologic Cross-Sections (**Plates 2.6-2a** to **2.6-2h** and the **Well Completion Reports** in **Attachment 2.6-1**).

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. Distinctive characteristics of given stratigraphic intervals are subtle and generally are not consistent regionally, consequently partitioning into meaningful stratigraphic units remains largely arbitrary. Vertical boundaries have been defined at shale units showing the greatest regional continuity, or lacking that, at pre-established thickness intervals.

In the Permit Area, the top 1,200 feet of the Battle Spring Formation represents the interval of interest. Within this interval the stratigraphy has been sub-divided into several thick stratigraphic "Horizons" (e.g. HJ or KM). Horizons are dominated by sands and separated from each other by **"Named Shales"** of regional extent. Each horizon, however, is in actuality the composite of numerous "sands" which are in turn separated by numerous **"Unnamed Shales"** within the horizon. Unnamed shales may be quite extensive, or may be only of local extent. Note also that the term "shale" is used herein rather loosely, as it commonly may include considerable amounts of siltstone or fine grained sand as well as mudstone and claystone.

Horizons of primary interest are further subdivided into "Sub-Horizons" (e.g., LFG, UHJ, UKM). Criteria for establishing sub-horizons are based largely on a combination of continuity of sand packages and continuity of associated mineral horizons. Vertical boundaries between sub-horizons are established somewhat arbitrarily and may or may not coincide with the presence of an intervening shale.

The resulting system of stratigraphic nomenclature is illustrated in the Stratigraphic Column within **Figure 2.6-1**. This nomenclature is internal to Ur-Energy and is not recognized officially by the geological community. The foundation for this system has been carried over, with some modification, from that established by Conoco Minerals during its early exploration activities in the region and subsequently adopted by Texasgulf during its tenure with the property. Nomenclature terms from surface downward to the KM Horizon were inherited from previous operators; below that the terms were derived by Ur-Energy.

Note that in the last few years Ur-Energy has abandoned the use of the term "Sand" in favor of the term "Horizon" to describe the major stratigraphic units. It is believed that the term "Sand" can be misleading in recognition of the fact that any substantial stratigraphic interval consists not only of sand facies but also contains a considerable number of interbedded shales which yields hydrogeological characteristics significantly different than an interval consisting only of sand.

Also note that the boundaries between horizons (i.e. Named Shales) have been established on a relatively arbitrary basis and don't necessarily reflect patterns or breaks in sedimentary or depositional characteristics. As a result, the system of nomenclature as illustrated on **Figure 2.6-1** should be viewed essentially and simply as a cataloguing tool for stratigraphic organization.

Named Shales represent the shaly interval nearest the stratigraphic level established as the break between Horizons. Strictly defined, they represent the shaly interval between the lowest sand assigned to the overlying Horizon and the uppermost sand assigned to the underlying Horizon. The Battle Spring interval of interest contains many more shales (unnamed) than just the Named Shales (see Type Log #2, **Figure 2.6-2** and Geological Cross-Sections **Plates 2.6-2a** to **2.6-2h**). As such, Named Shales may not be the dominant shale in any given area nor represent the only shale occurring between production sands. Named Shales may not be regionally continuous; or they may represent a series of shales which can be overlapping, en-echelon, or complexly interwoven with vertically adjacent sands. Because of this complexity, thickness values selected for shale isopach mapping (**Plates 2.6-3a** and **2.6-3b**) may not represent all shales in such a series, but rather only the one that best correlates to the stratigraphic nomenclature boundary. An example of shale complexity is well illustrated in the central portions of Cross-Section I-I' (**Plate 2.6-2h**).

The most notable exceptions to the above statements are the LCS and SBS Shales which locally may display considerable complexity but do exhibit a high degree of regional continuity and confinement.

Provided below is a brief description of each named stratigraphic unit within the Permit Area. The general lithologic character of the units remains relatively consistent throughout the entire Property, however depths below ground surface (bgs) may vary significantly locally due to regional stratigraphic dip and displacement due to normal faulting.

A Horizon –The A Horizon is poorly characterized largely because it is commonly not present, having been removed by erosion; except in the western down-dip portions of the property and where it has been down-thrown by faulting. When present, lithologic data is often missing in drill logs because it is dry and occurs above the fluid level in the drill hole while logging. Fluid in the hole is required to generate the single point resistance and spontaneous potential (SP) curves used for lithological characterization. The lower boundary of the A Horizon is arbitrary and poorly defined. Significant mineralization is rare.

BC Horizon – The BC Horizon is the horizon occurring at the surface within the majority of the Permit Area. Like the A Horizon, it is often completely or partially above the drilling fluid level while logging, consequently detailed characterization of the BC Horizon is sporadic. In general it appears to be similar in character to the adjacent underlying DE Horizon. The upper and lower boundaries are arbitrary and poorly defined. Thickness is approximately 80 to 100 feet. The BC Horizon is dry, except possibly for some local perched water tables. Significant mineralization is rare.

DE Horizon – This Horizon occurs at the surface in the eastern portions of the Project. It commonly consists of a sequence of relatively thick sands with thick intervening shaly units. In portions of the Permit Area, the lower shale boundary is absent such that the sands of the DE Horizon coalesce vertically with sands of the underlying FG Horizon. In the Lost Creek Project, the top of the unit ranges in depth from surface to 200 feet and is approximately 80 feet thick where the entire section is present. The DE Horizon is the shallowest horizon which carries groundwater (i.e., the shallowest aquifer). When present, standing water levels occur at the very basal portions of the DE Horizon. Significant mineralization is uncommon.

EF Shale (formerly the Upper No Name Shale) – The EF Shale represents the boundary between the overlying DE Horizon and the underlying FG Horizon. Hydrogeological confinement by the EF Shale is not complete. It is not everywhere present and commonly does not consist of one regionally continuous shale but rather multiple shales which overlap in en-echelon manner (for example, see the east half of Cross-Section D-E, **Plate 2.6-2c**). Thickness varies considerably from two to 45 feet. Depths to the EF Shale vary from 125 feet in the eastern portions of the Project to 300 feet in the western portions.

FG Horizon – In the Permit Area the top of the FG Horizon occurs at depths of approximately 125 feet in the east to 300 feet in the western regions of the Project. The total thickness of the FG Horizon is typically about 160 feet, ranging between 140 to 175 feet. Stratigraphically, the FG Horizon is subdivided into three sub-horizons: the Upper FG (UFG), Middle FG (MFG) and the Lower FG (LFG), all roughly of equal thickness. The breaks between these are not rigidly defined. Generally they are selected based on significant shales (if present) which separate channel-fill sequences. The character of individual FG sand units tends to be thinner, more erratic and shaly than what is characteristic of lower horizons; and as a whole the FG has a lower Sandstone to Shale (SS/Sh) ratio. The FG contains significant mineralization in the Permit Area.

Lost Creek Shale (LCS) – The Lost Creek Shale separates the FG and HJ Horizons. It is a dominant shaly horizon which has been found to be continuous throughout the Lost Creek Permit area. For this reason it has been used as the datum for stratigraphic correlation. Thickness ranges from 5 to 45 feet, typically being from 10 to 25 feet. Depth ranges from approximately 280 feet in the east portions of the project to 475 feet in the west. Its lithology is dominated by silty mudstone and dense claystone. It commonly includes siltstone, and may locally be sandy or contain thin lenticular sands. Segments of the LCS commonly interfinger with and undergo rapid facies exchanges with lower sands of the FG Horizon and upper sands of the HJ Horizon. This can complicate correlation and often results in dramatic changes in the thickness of the LCS within short horizontal distances.

HJ Horizon – The HJ Horizon is the dominant host for mineralization in the MMT and is the host to current production development. The HJ Horizon has been subdivided into four sub-horizons: Upper HJ (UHJ), Middle HJ1 (MHJ1), Middle HJ2 (MHJ2) and the Lower HJ (LHJ). The boundaries between the sub-horizons are somewhat arbitrary but selection is guided by sand channel and roll front mineral horizon continuity. Boundaries may be accompanied by a shale break. The bulk of the uranium mineralization is present in the two MHJ sub-horizons. The HJ Horizon characteristically includes noticeably thicker sands and a high SS/Sh ratio compared to most of the other horizons. The total thickness of the HJ Horizon ranges from 120 to 160 feet, averaging approximately 130 feet. Depth to the top of the HJ Horizon within the Permit Area ranges from approximately 280 feet in the east to 475 feet in the west.

Sagebrush Shale (SBS) – The Sagebrush Shale forms the boundary between the HJ Horizon and the underlying KM Horizon. As such it represents the aquitard between the HJ production horizon and the proposed KM production horizon. The SBS is laterally extensive and virtually continuous throughout the Permit Area. Within the Permit Area depth to this shale ranges from 425 feet in the eastern portions of the Project to approximately 625 feet in the west. Thickness varies from 2 to 50 feet. Similar to the LCS, segments of the SBS commonly interfinger with and undergo rapid facies exchanges with lower sands of the HJ Horizon and upper sands of the KM Horizon. This can complicate correlation and often results in dramatic changes in the thickness of the SBS within short horizontal distances, as is evident in the thickness isopach map for the SBS (**Plate 2.6-3a**)

KM Horizon – The KM Horizon is the secondary host to the mineralization in the MMT. Proposed production from the KM is the focus of this document. Nomenclature for the KM was modified in recent years. Initially, and at the time of the original Mine Permit, the KM Horizon was assigned three sub-horizons: the Upper KM (UKM), the Middle KM (MKM) and the Lower KM (LKM). As additional drilling results became available over time it became apparent that the KM is better described as having only two sub-horizons, underlain by the K Shale. Consequently the MKM designation was abandoned and replaced by the LKM such that the current nomenclature employs only the UKM and LKM.

In general the character and lithology of the KM is similar to that of the HJ Horizon. Both the UKM and the LKM sub-horizons host mineralization. A shale unit referred to as the No Name Shale (NNS) commonly divides the two sub-horizons of the KM, but it is not present everywhere within the Project. Depth to the top of the KM Horizon ranges from 430 feet in the eastern portions of the Project to 650 feet in the far western portions. Thickness ranges from 80 feet to 110 feet.

K Shale – The K-Shale represents the lower boundary of the proposed KM production horizon. It occurs throughout the Lost Creek area, but may be sporadically absent locally. Where present, continuity and confinement is not seamless as it may locally be represented by multiple overlapping shales. Average thickness is 10 feet, ranging from 2 feet to 40 feet. A thickness isopach map for the K Shale is presented as **Plate 2.6-3b**. Depth to the K Shale varies from 525 feet in the eastern margins of the Project to 750 feet in the west.

L, M, and N Horizons – These horizons are collectively referred to as the "Deep Horizons" and occur within a 300 to 350 feet interval below the K Shale. Currently they are the targets of exploration activities. Available drill data for these horizons is much sparser than for the shallower horizons. Individually, each horizon is approximately 100 feet thick. They consist of lithologies identical to that of shallower horizons. In general, like the remainder of the Battle Spring Formation, they are composed of multiple, stacked, coarse sands separated by numerous shale intervals. Stratigraphically, shales within these horizons are often relatively thick and more continuous than seen in the shallower horizons, contributing to an overall lower SS/Sh ratio. At the same time, individual sands tend to be thicker and show more regional continuity. This character becomes more dominant with depth.

> *L Horizon*: Depth to the L Horizon varies from 525 feet in the east to approximately 750 feet in the west. Thickness of the L Horizon is locally diminished significantly due to substantial thickening of the underlying LM Shale.

M Horizon: Locally the M Horizon exhibits a much more shaly character with more shale interbeds, thinner sands and a much lower SS/Sh ratio than the vertically adjacent horizons. Depth to the top of the M Horizon ranges from 610 feet in the east to 825 feet in the western portions of the Project.

N Horizon: The character of the N Horizon is similar to that of the L and M, commonly exhibiting thick shales with well-developed sands. Depth to the top of the N Horizon ranges from 725 feet in the east to approximately 940 feet in the west.

LM, MN, and NP Shales – These shales represent the lower boundaries of the L, M and N Horizons respectively. Designation of these shales as horizon boundaries were arbitrarily established on roughly 100 foot intervals below the K Shale. As such they do not present unique characteristics compared to any other shales within this stratigraphic interval. Thickness of the shales varies considerably, reaching up to 50 feet with an average of approximately 13 feet. Although these shales have regional extent, continuity is unconfirmed. In many areas drill data spacing is insufficient to confirm correlation. Breaks in these shales have locally been identified.

2.6.2.2 Site Structure

The dominant geologic structural features in the Permit Area are a series of normal faults. The locations of these faults are illustrated in the General Location Map (**Plates 2.6-1a** and **1b**); in the Geological Cross-Sections (**Plates 2.6-2a** to **2.6-2h**) and in the Isopach Maps; (**Plates 2.6-3a** and **2.6-3b**). Bedding within the Battle Spring Formation in the Permit Area is nearly flat-lying, dipping gently to the northwest at roughly three degrees. This regional pattern of strike and dip is modified locally due to horst and graben features resulting from normal faulting in the Lost Creek area.

The MMT within the Permit Area is bisected by a normal fault system, which is 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 (**Plate 2.6-1a**).

The 'main' Lost Creek Fault trends east to west and dissects the eastern two-thirds of the Permit Area. Downward displacement occurs on the south block. Throw is approximately 70 to 80 feet in the eastern portion of the Permit Area, decreasing to the west, and eventually losing identity in the western one-third of the Permit Area. Easterly, displacement on the 'main' fault disappears near the eastern boundary of Section 17. In addition, a minor 'splay' fault has been identified close to the 'main' fault in the west-central portion of the Main Mineral Trend. Maximum throw on this fault is roughly 20 feet in the opposite direction than the 'main' fault, creating a localized graben structure between.

A second or ‘subsidiary’ fault to the ‘main’ fault is positioned sub-parallel and approximately 800 to 1,000 feet south. Throw is opposite that of the ‘main’ fault with a maximum down to the north displacement of approximately 50 feet. The ‘subsidiary’ fault also has a minor splay fault associated with it which splits off to the north between the ‘subsidiary’ and ‘main’ faults. Drilling conducted in recent years shows that the primary branch of the ‘subsidiary’ fault continues easterly out of the Permit Area. Portions of it were previously referred to as the South fault. Westerly, the ‘subsidiary’ fault appears to diminish before reaching the western Permit boundary.

Drilling has identified additional faults elsewhere within the Permit Area. The ‘north’ Fault is located roughly 3,800 feet north of the MMT and has displacement ranging from approximately 20 feet to 80 feet. Also a significant fault has been discovered in Section 25 in the southernmost portions of the Permit Area. Displacement on this fault is approximately 120 to 160 feet. Both of these faults are distant from the MMT and are well outside of anticipated production areas. Several other minor faults have also been identified **(Plate 2.6-1a)**. Most of these are of limited extent and exhibit throws no more than 10 to 20 feet.

Finally, drilling has revealed three faults within Section 16 in the eastern portions of the Permit Area. Orientation of these faults closely parallels that of the Main Fault. Displacement varies from 15 to 50 feet. They are east of the anticipated areas of KM production, and therefore will have minimal, if any, effect on that production.

Pump-testing and monitoring on both sides of the ‘main’ fault in the Mine Unit 1 area have demonstrated that the fault plane acts as a substantial barrier to flow within the HJ and KM Horizons (see Section 2.7).

2.6.2.3 Ore Mineralogy and Geochemistry

The age of mineralization in the Battle Spring Formation is considered to be between 35 and 26 million years before present. Uranium mineralization in the Basin generally occurs either as tabular or C-shaped roll-front deposits. Oxygen-rich surface water, carrying dissolved uranium, entered various sandstones in the Basin. The water percolated down dip, oxidizing the sandstones on its way down dip. Upon reaching sites rich in organic matter, the water lost its oxidizing potential and deposited the uranium, forming the two types of mineralization mentioned above.

Tabular deposits may form at the interface between oxidizing and reducing conditions (the redox front), where oxidation, for all practical purposes, stops. Localized tabular deposits may also form up-dip from the redox front in an entirely oxidized zone, where carbonaceous materials have gathered and formed locally reducing conditions.

The C-shaped roll-front deposits normally form just at the redox front, where the water loses its oxidizing potential. The uranium precipitates and accumulates in a "C"-shaped deposit, with the concave side facing up-dip toward the oxidized sand. Uranium usually accumulates in finer-grained sandstones that carry various amounts of organic matter, which provides a reducing condition.

The alteration process not only changes the color, but also alters the mineralogy of the host sandstones. The color of unaltered, reduced sandstone is light to dark grey, with carbon trash, dark accessories, and traces of pyrite. Altered, oxidized, sandstone contains iron oxide staining (where former carbonaceous matter and pyrite were present), kaolinized feldspar, and has a pink to tan-buff, greenish-grey to bleached appearance. The presence of pyrite and carbonaceous material appear to be the major controlling factors for the precipitation of uranium mineralization. Thinning of sandstones and diminishing grain size probably slowed the advance of the uranium-bearing solutions and further enhanced the chances of precipitation.

The main uranium minerals are uraninite, a uranium oxide, and coffinite, a uranium silicate. Russell Honea (1979) and John V. Heyse (1979) studied several core samples by scanning electron microprobe (SEM), polished section and thin section. Their conclusions were that the host sands are fine- to coarse-grained, poorly sorted arkose. The uranium mineralization is of sub-microscopic size and can be seen only in SEM magnification. They are associated and at times intergrown with round pyrite particles. The uranium minerals identified are mostly uraninite and, possibly, coffinite. The uranium, besides occurring with pyrite, also occurs as a coating around sand grains and as filling of voids between grains. It also occurs as minute particles within larger clay particles.

The most recent study of the lithology and mineralogy was conducted by Hazen Research under the guidance of Dr. Nick Ferris, Ur-E geologist (Ferris, 2007, company report). He concluded that the rocks, represented by a core sample from a depth of 506 to 507 feet of Hole Number LC-64C, are composed of medium- to coarse-grained sand with interstitial clay and silt. Uranium occurrences are very fine-grained and micron-sized, and are mainly dispersed throughout some of the interstitial clays, and occur similarly in some of the interstitial pyrite as well. Because of the size of uranium mineral particles, it was not certain whether the uranium mineral was coffinite or uraninite. The sample tested, comes from the Upper KM Sand unit and may or may not be representative of the majority of the mineralization in the overlying HJ Horizon within the Permit Area.

Known mineralized intervals are found at depths ranging from near surface down to 1,150 feet below the surface in the Permit Area. It is possible that deeper mineralization may exist as well. The main mineralization horizons trend in an east-northeast direction for at least three miles, and are up to 2,000 feet wide. The thickness of individual mineralized beds at the Permit Area ranges from five to 28 feet and averages about 16 feet. The mineralization grade ranges from 0.03 percent to more than 0.20 percent equivalent uranium oxide (eU_3O_8). Four main mineralized horizons, from depths of 300 to 700 feet, have been identified. The richest mineralized zone occurs in the middle part of the HJ Horizon (MHJ Sand) and it is about 30 feet thick, 400 to 450 feet deep, and is believed to contain more than 50 percent of the total resource under the Permit Area.

Leach amenability studies, using the bottle roll method, were performed on core samples collected from the Permit Area in 2007. The analytical results of the bottle roll tests indicate leach efficiencies of 84 percent to 93 percent where bicarbonate was added to the leach solution (a standard in situ recovery practice). The testing demonstrated leach amenability to varying levels of bicarbonate and oxidant addition and accomplished the goal of defining the chemical factors for leaching the ore body and determining the maximum economic leach efficiencies.

The bottle roll tests were conducted using standard industry practice and rigorous modern laboratory controls. The tests were performed on seven uniform splits of a composite core recovered from hole LC66C. Oxidation of uranium in core that has been exposed to the atmosphere can increase the leachability of the uranium, yielding results which are not representative of the in situ deposit. Therefore, the drill core was vacuum sealed in airtight plastic sleeves immediately after recovery to protect the uranium bearing minerals from exposure to the air.

Upon completion of the coring program, the sealed core was characterized by geologists and transferred to the laboratory. A single core composite of eight feet of core was selected for leach amenability, bicarbonate and oxidant studies. The selected core composite was chosen to represent a typical production zone for the Project. The composite splits were then subjected to "bottle roll" amenability testing in which each individual sample was placed in a plastic container with a hydrogen peroxide lixiviant in a measured volume estimated to be five pore volumes of the tested interval, and then rolled mechanically for 16 hours. The lixiviant was extracted and tested for uranium content in the solution and new lixiviant was added and the process was repeated. Each sample was subjected to five additional periods of leaching, to represent the total volume of fluid that would leach uranium from the host over the life of an in situ recovery operation. These six roll sets, each being leached with five pore volumes of lixiviant, replicates a total of 30 pore volumes of lixiviant passing through the deposit, thus closely simulating an actual in situ leach operation. Once the six sets of rotation were completed, the core was analyzed to determine the amount of uranium remaining, in order to establish the efficiency of the leaching system. This allows a determination of the potential in situ leachability of the uranium-bearing sandstone and the potential rate of recovery.

A total of seven tests were conducted. The first test, LC-2001-01, showed low recovery without a bicarbonate addition, which demonstrated the requirement for bicarbonate addition to the lixiviant and the effectiveness of the sample preparation for the test. The other six samples (LC-2001-02 through -07) successfully demonstrated the ore's wide range of amenability to varying chemical conditions. The results of these tests demonstrate that uranium is easily mobilized for production and that the chemical conditions utilized in the tests will be equally effective under both low and high oxidant injection rates. The results of this testing are summarized in **Table 2.6-1**.

Mineralogy has been studied in thin section and by x-ray diffraction analysis. These analyses were conducted in 2007 by Hazen Research which included samples from the KM Horizon derived from core (core-hole LC64C). Results indicate that the uranium in the KM is virtually identical to that in the HJ Horizon, occurring primarily as the mineral coffinite (uranium silicate) in the form of micron- to submicron-size inclusions disseminated in and on interstitial clay, possibly absorbed by cation exchange; also intimately interspersed through some of the pyrite and as partial coatings on quartz and biotite. Minor amounts of uraninite (uranium oxide) and brannerite (uranium-titanium oxide) have also been identified. Clay rich fractions are predominantly smectite (montmorillonite), with minor kaolinite.

The Hazen Research analysis concluded that uranium should be recoverable by an ISR operation because of the unconsolidated nature of the sandstone and expected diffusion of the lixiviant through the smectite minerals. Leach amenability tests as discussed in the original Permit Application included one set of core samples collected from the UKM Horizon (core-hole LC46C). Recoverability has been confirmed by these leach testing results, which revealed that the character of KM mineralization is virtually identical to that in the HJ Horizon.

The nature of the uranium mineralization in the HJ and KM Horizons at the LC East Project is identical to that observed at the Lost Creek Project and therefore can be reasonably presumed to be identical in ore mineralogy and leaching amenability. No site-specific petrographic or leaching tests have been conducted for the LC East Project.

2.6.2.4 Exploration and Production Activities

The earliest drilling was started in 1967 by Wolf Land and Exploration who was later joined in a joint venture by Conoco in 1969. Also, in 1967 Hecla Mining drilled one exploration hole on what is currently the LC East Project. Conoco took full control of the Red Desert venture in 1970 and continued to drill the property through 1977 as part of its Project A. By that time approximately 916 exploration holes had been drilled, including 13 core holes. Abundant significant mineralization had been found and a well-defined mineral trend identified, which is currently referred to as the EMT. Much of the drilling was on 200-foot spacing and in several localities has a spacing of 100 feet or less.

In 1978, Texasgulf joint-ventured with Conoco as the operator on Project A. They continued defining the trend by drilling an additional 126 exploration holes through 1981, including three core holes of very shallow targets (less than 150 feet). Texasgulf discontinued their operations in the Great Divide Basin in 1983. Portions of the current LC East Project were later acquired by PNC Exploration in 1987. In 1990 they drilled 21 holes within the current LC East Project in conjunction with their activities on the MMT in the Lost Creek Project. PNC released their property in 2000. Since then, no additional exploration drilling activity had been conducted in LC East until activities by URE in 2012. Prior to acquisition by URE, a total of 1,064 historical exploration holes for a total of 474,582 feet of drilling had been drilled within the currently defined LC East Project, including one water well which has since been abandoned. Drilled depths average 446 feet, ranging from 40 feet to 2,257 feet. Exploration by URE has been limited to 16 widely spaced stratigraphic test holes.

Since acquisition, URE has conducted pre-development drilling activities consisting of 179 delineation holes for a total of 114,600 feet of drilling, plus the installation of 28 baseline monitors and pump test wells totalling 11,945 feet. Baseline environmental studies have also been conducted and concluded.

2.6.3 Seismology

The discussion of the seismology of the Permit Area and surrounding areas includes: an analysis of historic seismicity (**Figure 2.6-3**); an analysis of the Uniform Building Code (UBC); a deterministic analysis of nearby faults; an analysis of the maximum credible "floating earthquake;" and a discussion of the existing short- and long-term probabilistic seismic hazard analysis. The materials presented here are mainly based on the seismologic characterization of Sweetwater, Carbon, Fremont, and Natrona Counties by James C. Case and others from the Wyoming State Geological Survey (Case et al., 2002a, 2002b, 2002c and 2003).

Town of Bairoil Area

Bairoil is located about 15 miles northeast of the Permit Area. Historically, there have been only a few earthquakes that have occurred within 20 miles of Bairoil. On August 11, 1916, a non-damaging intensity III earthquake occurred approximately 17 miles northwest of Bairoil. On June 1, 1993, a non-damaging magnitude 3.8, intensity III earthquake occurred four miles north of Bairoil, and was felt by some residents. On December 10, 1996, a non-damaging magnitude 2.6 earthquake occurred approximately ten miles northwest of Bairoil. A few residents also felt that event.

Two recent earthquakes were recorded near Bairoil in 2000. On May 26, 2000, a magnitude 4.0 earthquake occurred, followed by another (magnitude 2.8) four days later, on May 30, 2000. Both earthquakes were located about 3.5 miles southwest of Bairoil.

Most residents in Bairoil felt the first earthquake. No significant damage was associated with either seismic event (Cook, 2000).

Town of Rawlins Area

Rawlins is approximately 38 miles southeast of the Permit Area. The first recorded earthquake that was felt and reported immediately southwest of Rawlins occurred on March 28, 1896. The intensity IV earthquake shook for about two seconds. On March 10, 1917, an earthquake (intensity IV) was recorded approximately one-mile northeast of Rawlins. The earthquake was felt as a distinct shock that caused wooden buildings to noticeably vibrate. Stone buildings were not affected by the event (*Rawlins Republican*, 1917).

On September 10, 1964, a magnitude 4.1 earthquake occurred approximately 30 miles west of Rawlins. One Rawlins resident reported that the earthquake caused a crack in the basement of his home in Happy Hollow. No other damage was reported (*Daily Times*, 1964).

Small earthquakes were detected, on April 13, 1973, May 30, 1973, and June 1, 1973, approximately six miles west of Hanna. No one reported feeling these events. On July 11, 1975, Rawlins residents felt an earthquake (intensity II) event. On January 27, 1976, an earthquake (magnitude 2.3, intensity V) occurred approximately 12 miles north of Rawlins. Several people reported that they were thrown out of bed (*Daily Times*, 1976). On March 3, 1977, an earthquake (intensity V) was reported approximately 18.5 miles west-northwest of Encampment. Doors and dishes were rattled in southern Carbon County homes; but no significant damage was reported (*Laramie Daily Boomerang*, 1977).

On April 13, 1991 and April 19, 1991, magnitude 3.2 and magnitude 2.9 earthquakes, respectively, occurred near the center of the Seminoe Reservoir. A magnitude 3.1 earthquake occurred on December 18, 1991, southwest of the Seminoe Reservoir, approximately 15 miles northeast of Sinclair. No one reported feeling these Seminoe-Reservoir-area earthquakes. On August 6, 1998, a magnitude 3.6 earthquake occurred approximately 13 miles north of Rawlins. Residents in Rawlins reported hearing a sound and then feeling a jolt. On April, 1999, a magnitude 4.3 earthquake occurred approximately 29 miles north-northwest of Baggs. It was felt in Rawlins; and residents reported that pictures fell off the walls.

Town of Rock Springs Area

Rock Springs is located approximately 80 miles southwest of the Permit Area. The first recorded earthquake that was felt in Sweetwater County occurred on April 28, 1888. This intensity IV earthquake, which originated near Rock Springs, did not cause any appreciable damage. On July 25, 1910, an intensity V earthquake occurred at the same time that the

Union Pacific Number One Mine in Rock Springs partially collapsed. On July 28, 1930, an intensity IV earthquake, with an epicenter near Rock Springs, was felt in Rock Springs and Reliance (*Casper Daily Tribune*, 1930). The earthquake awakened many residents; and some merchandise fell off of store shelves.

On March 21, 1942, a non-damaging, intensity III earthquake was felt in the Rock Springs area. This event was followed, on September 14, 1946, by an intensity IV earthquake. On October 25, 1947, a small earthquake with no assigned intensity or magnitude occurred southeast of Rock Springs. Two intensity IV earthquakes occurred in the Rock Springs area on September 24, 1948. The events rattled dishes in parts of Rock Springs.

A magnitude 3.9 event was recorded on January 5, 1964, approximately 23 miles south of Rock Springs. The University of Utah Seismograph Stations detected a non-damaging, magnitude 2.4 earthquake on March 19, 1968. This event was centered approximately 17 miles southeast of Rock Springs. A magnitude 3.2 event occurred on May 29, 1975, approximately 13 miles northeast of Superior. A week later, on June 6, 1975, a magnitude 3.7 earthquake was recorded in the same area. No damage was associated with any of the 1975 events.

The University of Utah Seismograph Stations recorded a non-damaging magnitude 2.7 earthquake on June 5, 1986. This event was located approximately 14 miles southwest of Green River, Wyoming.

On February 1, 1992, the University of Utah Seismograph Stations recorded a non-damaging magnitude 2.3 earthquake, approximately seven miles north of Rock Springs.

City of Lander Area

Lander is about 70 miles northwest of the Permit Area. A number of earthquakes have occurred in the Lander area. The first reported earthquake occurred on January 22, 1889, and had an intensity of III to IV. This was followed by an intensity IV event on November 21, 1895, during which houses were jarred and dishes rattled. On November 23, 1934, an intensity V earthquake was centered approximately 20 miles northwest of Lander. For a radius of ten miles around Lander, residents reported that dishes were thrown from cupboards, and that pictures fell down from the walls. Cracks were found in buildings along two business blocks; and the brick chimney of the Fremont County Courthouse was separated by two inches from the building. The earthquake was felt at Rock Springs and Green River, Wyoming (*Casper Tribune-Herald*, 1934).

There were a series of earthquakes in the Lander area in the 1950s that caused little damage. On August 17, 1950, there was an intensity IV earthquake that caused loose objects to rattle and buildings to creak. On January 12, 1954, there was an intensity II event; and on December 13, 1955, there was an intensity IV event near Lander, with no damage reported.

On June 14, 1973, a small earthquake was reported about eight miles east-northeast of Lander. The earthquake has been recently interpreted as a probable explosion. On January 31, 1992, a non-damaging magnitude 2.8 earthquake occurred approximately 20 miles northwest of Lander. This event was followed, on October 10, 1992, by a magnitude 4.0, intensity III earthquake centered approximately 22 miles east of Lander.

City of Casper Area

Casper is located about 90 miles northeast of the Permit Area. Two of the earliest recorded earthquakes in Wyoming occurred near Casper. The first was on June 25, 1894, and had an estimated intensity of V. In residences on Casper Mountain, dishes rattled and fell on the floor and people were thrown from their beds. Water in the Platte River changed from fairly clear to reddish, and became thick with mud, due to the river banks slumping into the river during the earthquake. On November 14, 1897, an even larger event was felt. An intensity VI to VII earthquake, one of the largest recorded in central and eastern Wyoming, caused considerable damage to a few buildings. As a result of the earthquake, a portion of the Grand Central Hotel was cracked from the first to the third story. Some of the ceilings in the Grand Central Hotel were also severely damaged.

On October 25, 1922, an intensity IV earthquake was reported in the Casper area. The event was felt in Casper; at Salt Creek, 50 miles north of Casper; and at Bucknum, 22 miles west of Casper. Dishes were rattled and hanging pictures were tilted near Salt Creek. No significant damage was reported in Casper (Casper Daily Tribune, 1922). On December 11, 1942, an intensity IV earthquake was recorded north of Casper. Although no damage was reported, the event was felt in Casper, Salt Creek, and Glenrock (Casper Tribune-Herald, 1941). On August 2, 1948, another intensity IV earthquake was reported in the Casper area. No damage was reported (Casper Tribune-Herald, 1948). In the 1950s, two earthquakes caused some concern among Casper residents. On January 24, 1954, an intensity IV earthquake near Alcova did not result in any reported damage (Casper Tribune-Herald, 1954). On August 19, 1959, an intensity IV earthquake was felt in Casper. Most recently, on October 19, 1996, a magnitude 4.2 earthquake was recorded approximately 15 miles north-northeast of Casper. No damage was reported.

2.6.3.1 Uniform Building Code

With safety in mind, the UBC provides Seismic Zone Maps to help identify which building design factors are critical to specific areas of the country. Five UBC seismic zones are recognized, ranging from Zone 0 to Zone 4. These seismic zones are, in part, defined by the probability of having a certain level of ground shaking (horizontal acceleration) in 50 years. The criteria used for defining boundaries on the Seismic Zone Map were established by the Seismology Committee of the Structural Engineers Association of California (SEAOC, 1986). The criteria they developed are as follows:

- Zone 4: ≥ 30 percent gravity (g) effective peak acceleration;
- Zone 3: 20 to ≤ 30 percent g effective peak acceleration;
- Zone 2: 10 to ≤ 20 percent g effective peak acceleration;
- Zone 1: 5 to ≤ 10 percent g effective peak acceleration; and
- Zone 0: ≤ 5 percent g effective peak acceleration.

The Seismology Committee of the Structural Engineers Association of California assumed that there was a 90 percent probability that the above values would not be exceeded in 50 years, or a 100 percent probability that the values would be exceeded in 475 years.

Figure 2.6-4 shows the delineation of UBC seismic zones in Wyoming. The Permit Area is located in Seismic Zone 1. Since effective peak accelerations (90 percent chance of non-exceedance in 50 years) can range from five to ten percent g in Zone 1, it may be reasonable to assume that an average peak acceleration of 7.5 percent g could be applied to the design of a non-critical facility located near the center of Zone 1.

2.6.3.2 Deterministic Analysis of Active Fault Systems

There are two active fault systems in the vicinity of the Permit Area, the Chicken Springs Fault System and the South Granite Mountain Fault System (**Figure 2.6-5**).

The Chicken Springs Fault System, located six miles east of the Permit Area, is composed of a series of east-west trending segments. In 1996, the Wyoming State Geological Survey investigated this fault system, and determined that the most recent activity on the system appears to be Holocene in age. Reconnaissance-level studies indicated that the fault system is capable of generating a magnitude 6.5 earthquake (Case et al., 2002a). A magnitude 6.5 earthquake on the Chicken Springs Fault System would generate peak horizontal accelerations of approximately 4.8 percent g at Rawlins (Case et al., 2002a). These accelerations would be roughly equivalent to an intensity V earthquake, which may cause some light damage. Bairoil, however, would be subjected to a peak horizontal acceleration of approximately 23 percent g, or an intensity VII earthquake (Case et al., 2002a). Intensity VII events have the potential to cause moderate damage.

The South Granite Mountain Fault System is located about 14 miles northeast of the Permit Area. This fault system is composed of several northwest-southeast trending normal and thrust faults in southeastern Fremont County and northwestern Carbon County. The active segments of the system have been assigned a maximum magnitude of 6.75, which could generate peak horizontal accelerations of approximately 20 percent g at Bairoil and 6.1 percent g at the Rawlins (Case et al., 2002a). These accelerations would be roughly equivalent to an intensity VII earthquake at the Bairoil and an intensity V earthquake at Rawlins. Bairoil could sustain moderate damage; whereas minor or no damage could occur at Rawlins.

2.6.3.3 Maximum Tectonic Province Earthquake "Floating Earthquake" Seismogenic Source

Tectonic provinces are regions with a uniform potential for the occurrence of earthquakes that are tied to buried faults with no surface expression. Within a tectonic province, earthquakes associated with buried faults are assumed to occur randomly, and, as a result, can theoretically occur anywhere within that area of uniform earthquake potential. In reality, that random distribution may not be the case, as most earthquakes are associated with specific faults. If all buried faults have not been identified, however, the distribution has to be considered random. "Floating earthquakes" are earthquakes that are considered to occur randomly in a tectonic province.

The US Geological Survey (USGS) identified tectonic provinces in a report titled "Probabilistic Estimates of Maximum Acceleration and Velocity in Rock in the Contiguous United States" (Algermissen et al., 1982). In that report, Sweetwater County was classified as being in a tectonic province with a "floating earthquake" maximum magnitude of 6.1. Geomatrix (1988) suggested using a more extensive regional tectonic province, called the "Wyoming Foreland Structural Province," which is approximately defined by the Idaho-Wyoming Thrust Belt on the west, 104 degrees West longitude on the east, 40 degrees North latitude on the south, and 45 degrees North latitude on the north. Geomatrix (1988) estimated that the largest "floating earthquake" in the "Wyoming Foreland Structural Province" would have a magnitude in the 6.0 to 6.5 range, with an average value of magnitude 6.25.

2.6.3.4 Short-Term Probabilistic Seismic Hazard Analysis

The USGS publishes probabilistic acceleration maps for 500-; 1,000-; and 2,500-year time frames. The maps show what accelerations may be met or exceeded in those time frames by expressing the probability that the accelerations will be met or exceeded in a shorter time frame. For example, a ten percent probability that acceleration may be met or exceeded in 50 years is roughly equivalent to a 100 percent probability of exceedance in 500 years.

The 500-year map provides accelerations that are comparable to those derived from the UBC and from the deterministic analysis on the Green Mountain Segment of the South Granite Mountain Fault System. It was often used for planning purposes for average structures. Based on the 500-year map (ten percent probability of exceedance in 50 years), the estimated peak horizontal acceleration in the Permit Area is approximately 6.5 percent g, which is comparable to the acceleration expected in Seismic Zone 1 of the UBC (**Figure 2.6-6**). These accelerations (3.9 – 9.2 percent g) are roughly comparable to intensity V earthquakes which can result in cracked plaster and broken dishes, but minor or no construction damages (Case, 2002). All facilities, including the processing plant, pipelines and well structures, at Lost Creek will be designed and constructed to sustain an intensity V earthquake. In addition, the observations of injection, production, and pipeline pressures and associated monitor well measurements, necessary for the in situ operation, will provide short-term information about any unanticipated seismic impacts. The estimated acceleration in the Permit Area is 20 percent g on the 2,500-year map.

2.6.4 References

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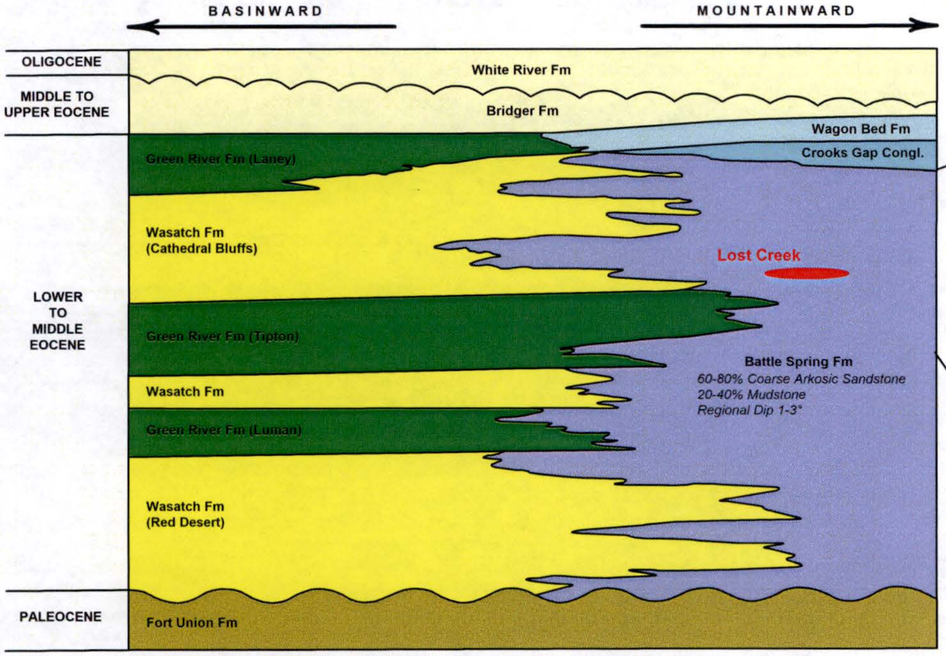
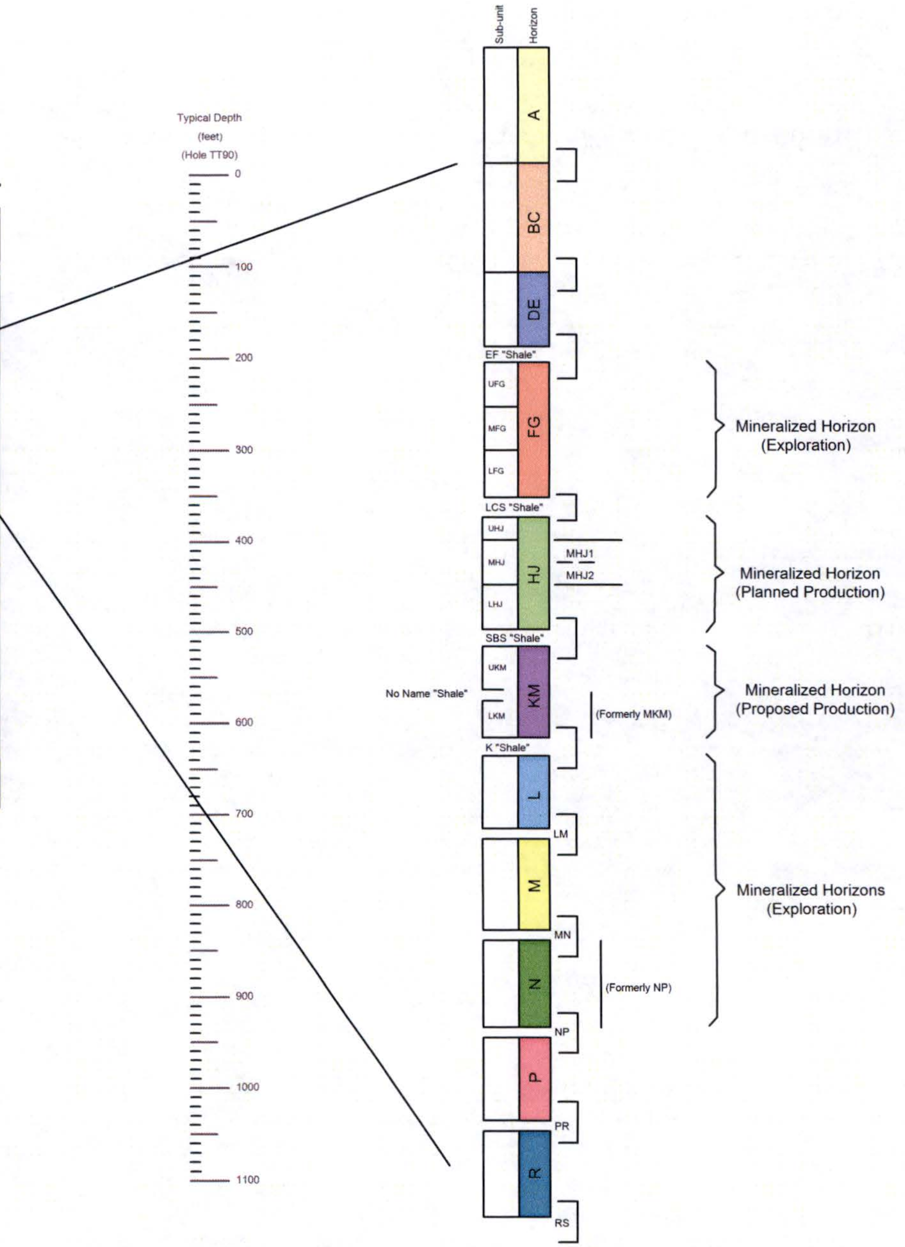
Stratigraphic Relationships - Schematic



Diagrammatic relationships of Tertiary sedimentary units in the Great Divide Basin, Wyoming (Modified from Pippiringos & Denson, 1970)

Lost Creek Project Stratigraphic Column



Lost Creek ISR, LLC
Casper, Wyoming, USA

Figure 2.6-1
Stratigraphic Relationships
Lost Creek Project

July 15, 2014

Drawn by: MML

Lost Creek ISR, LLC

S:\GIS\LC_East\Figure2.6-1_StratRelationships\Fig2.6-1_StratRelationships.WOR

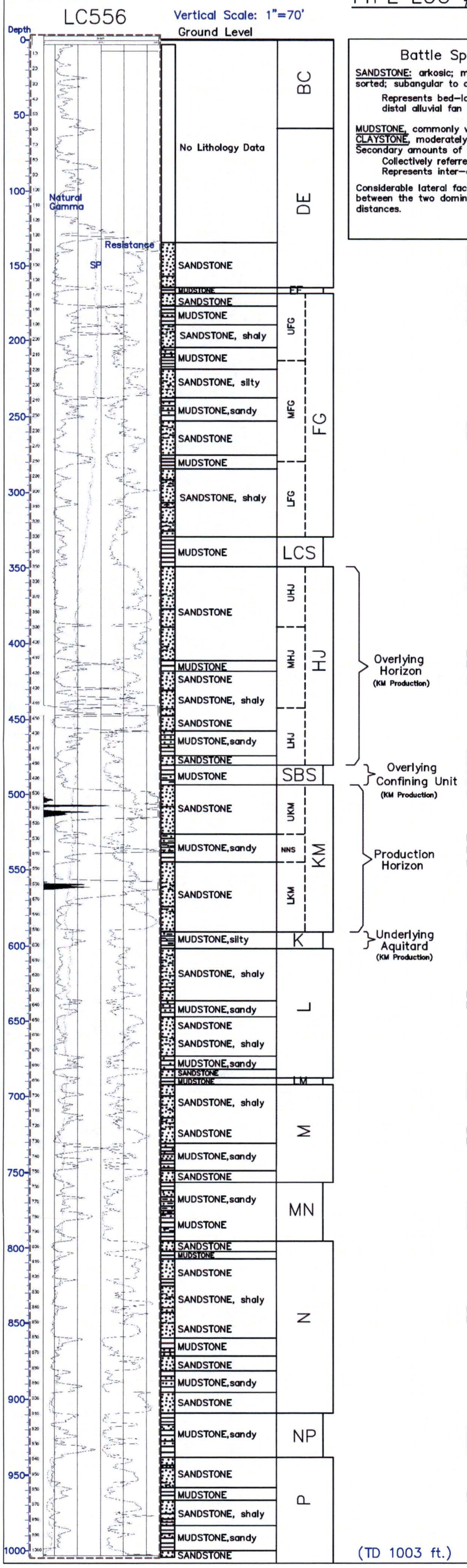
Figure 2.6–2

Lost Creek ISR, LLC

TYPE LOG #2 – LOST CREEK PROJECT

HOLE # LC556

E 2,213,333/N 596,190 (NAD 83)
Elev. 6954'



Battle Spring Formation –Typical Lithology

SANDSTONE: arkosic; medium to very coarse–grained, locally fine–grain; poorly–sorted; subangular to angular; weakly to moderately consolidated, moderately firm.

Represents bed–load to mixed–load, channel–fill fluvial environments within a distal alluvial fan system.

MUDSTONE, commonly very silty and/or sandy; soft to very firm; and CLAYSTONE, moderately firm to very firm, dense, blocky.
Secondary amounts of SILTSTONE, commonly very sandy, firm to very firm.
Collectively referred to as 'Shale'
Represents inter–channel and overbank fluvial environments.

Considerable lateral facies changes, inter–tonguing, and overlapping occurs between between the two dominant lithologies. This can be very dramatic within short distances.

DE Horizon: Multiple sandstone units interbedded with mudstones Host to minor amounts of uranium mineralization.

EF Shale: (upper No–Name Shale): Mudstone and claystone commonly silty and/or sandy; locally with interbedded very fine–granied sands. Does not exhibit lateral continuity throughout project area. Represents a series of overlapping shaley units.

FG Horizon: Multiple sandstone units interbedded with mudstones Host to significant uranium mineralization.

LCS (Lost Creek Shale): Mudstone and claystone, commonly silty and/or sandy; locally with interbedded very fine–grained sands. Exhibits lateral continuity throughout project area. Commonly intertongues with upper portions of the HJ and lower portions of the FG.

HJ Horizon: Multiple sandstone units interbedded with mudstones Host to economic uranium mineralization.

Current PRODUCTION HORIZON

SBS (Sagebrush Shale): Mudstone and claystone, commonly silty and/or sandy; locally with interbedded very fine–grained sands. Exhibits lateral continuity throughout project area. Commonly intertongues with upper portions of the KM and lower portions of the HJ.

KM Horizon: Multiple sandstone units interbedded with mudstones Host to economic uranium mineralization.

Proposed PRODUCTION HORIZON

Includes NNS (No Name Shale) separating UKM from LKM. Does not exhibit regional continuity.

(Note: LKM was previously named MKM).

K Shale: Mudstone and claystone, commonly silty and/or sandy. Regional continuity is unconfirmed. Locally may consist of multiple, intertonguing shales..

L Horizon: Multiple sandstone units interbedded with mudstones Host to uranium mineralization discoveries.

LM Shale: Mudstone and claystone, commonly silty and/or sandy. Regional continuity is unconfirmed. Locally may consist of multiple, intertonguing shales..

M Horizon: Multiple sandstone units interbedded with mudstones Host to uranium mineralization discoveries.

MN Shale: Mudstone and claystone, commonly silty and/or sandy. Regional continuity is unconfirmed. Locally may consist of multiple, intertonguing shales..

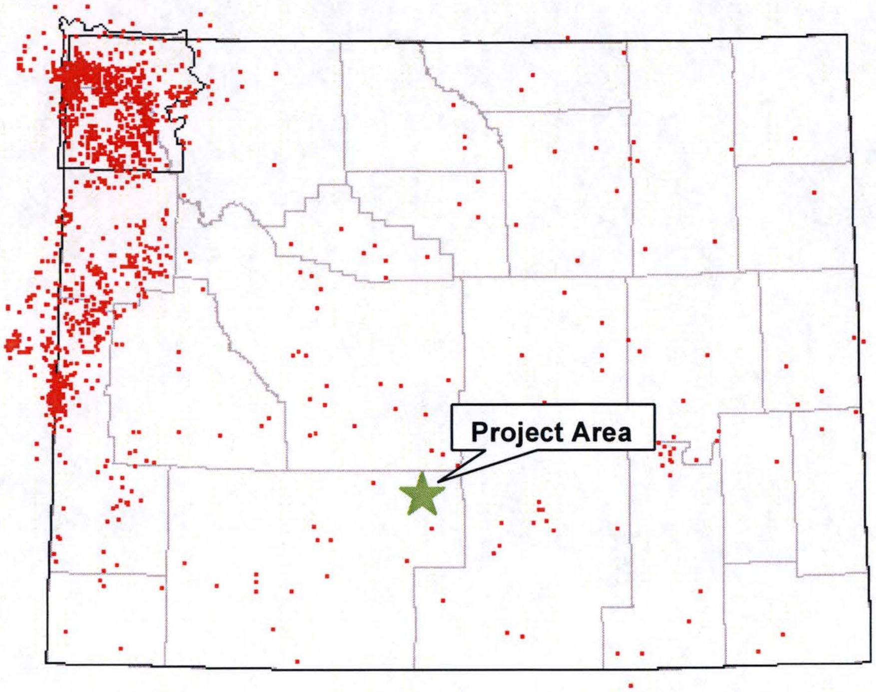
N Horizon: Multiple sandstone units interbedded with mudstones Host to uranium mineralization discoveries.

NP Shale: Mudstone and claystone, commonly silty and/or sandy. Regional continuity is unconfirmed. Locally may consist of multiple, intertonguing shales..

P Horizon: Multiple sandstone units interbedded with mudstones

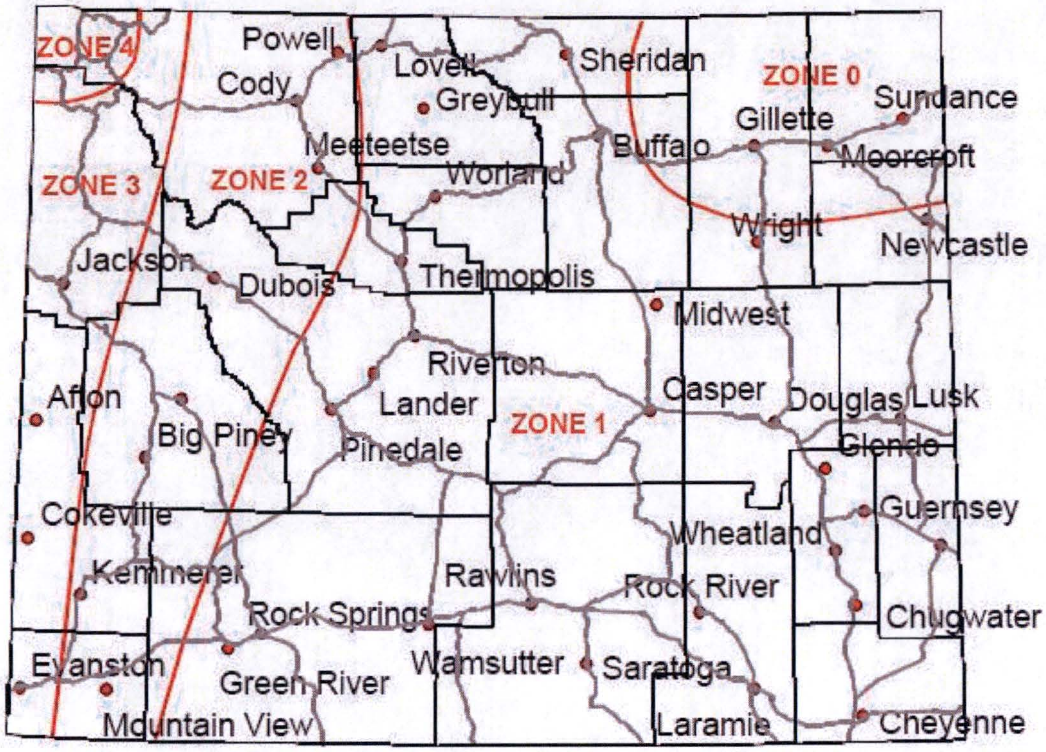
Figure 2.6–2

Figure 2.6-3 Historical seismic activities in Wyoming*



* Red dots are locations of epicenters for those magnitude = 2.5 or intensity = III earthquakes recorded from 1871 to present. (Bergantion et al., 2007)

Figure 2.6-4 UBC Seismic Zones in Wyoming (Case et. al., 2002)



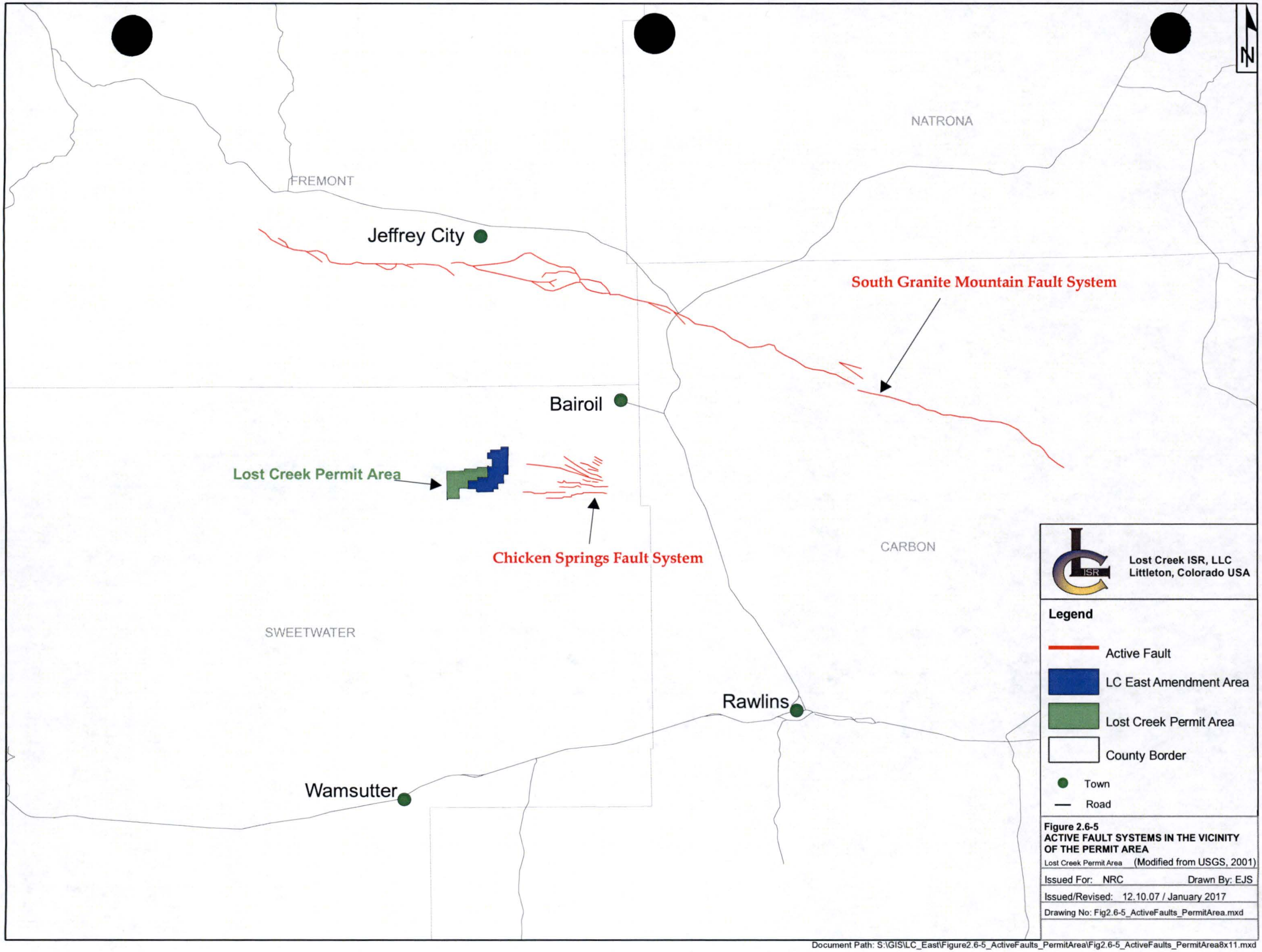


Figure 2.6-5
ACTIVE FAULT SYSTEMS IN THE VICINITY OF THE PERMIT AREA

Lost Creek Permit Area (Modified from USGS, 2001)

Issued For: NRC Drawn By: EJS

Issued/Revised: 12.10.07 / January 2017

Drawing No: Fig2.6-5_ActiveFaults_PermitArea.mxd

Document Path: S:\GIS\LC_East\Figure2.6-5_ActiveFaults_PermitArea\Fig2.6-5_ActiveFaults_PermitArea8x11.mxd

Figure 2.6-6: 500-YEAR PROBABLISTIC ACCELERATION MAP OF WYOMING (Case et. al., 2002)

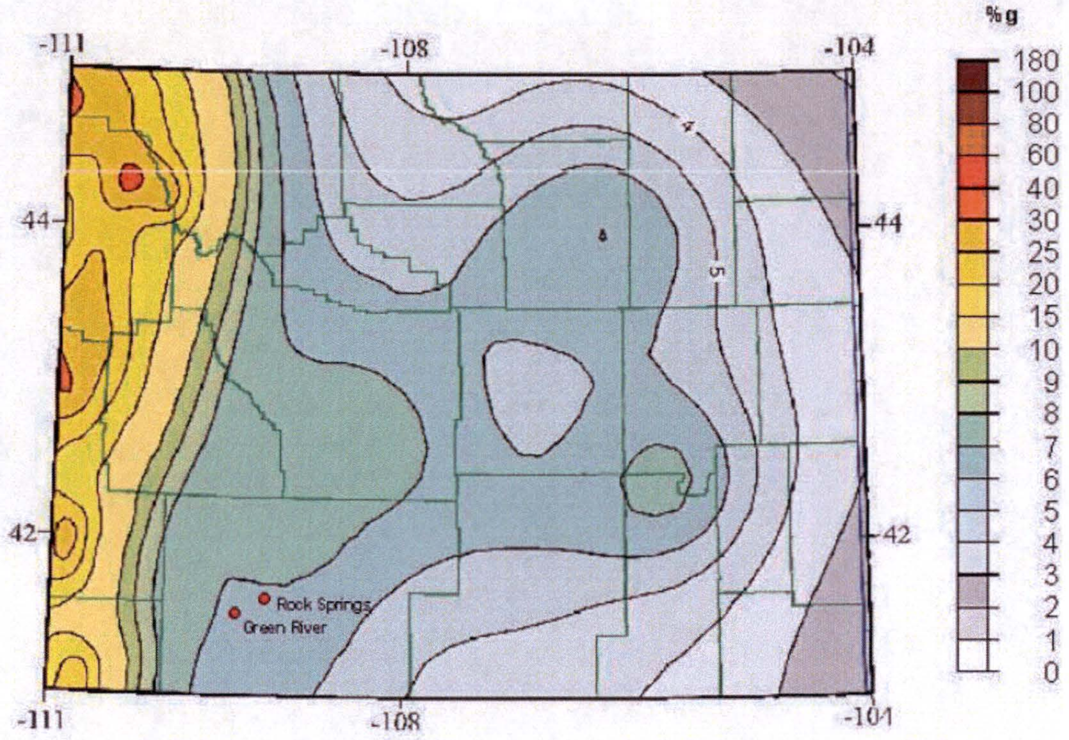
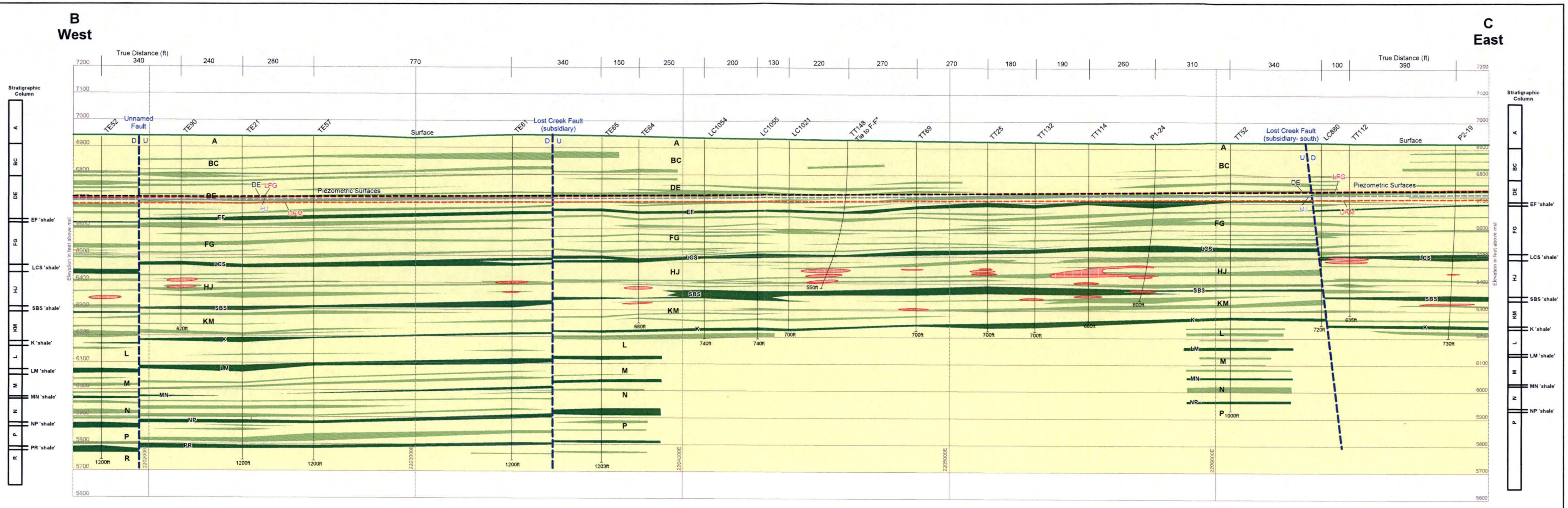
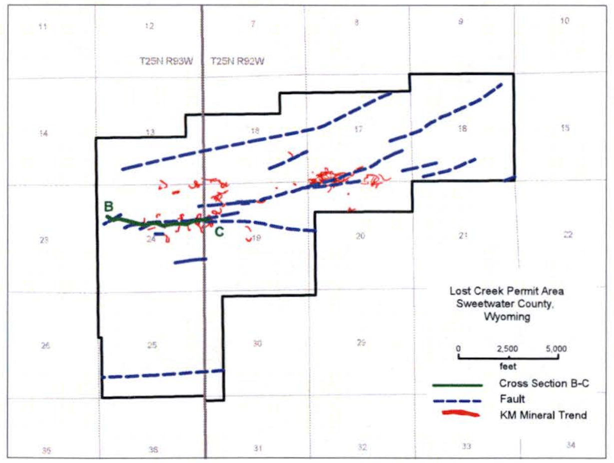


Table 2.6-1 Leach Amenability

Sample ID	**Solution Base**	**Bicarbonate (g/L)**	**H_2O_2 (g/L)**	**Uranium Recovery (percent)**
LC-2001-01	Ground Water	Natural Bicarb	0.25	20.0
LC-2001-02	Ground Water	1.0	0.25	84.1
LC-2001-03	Ground Water	1.5	0.25	86.4
LC-2001-04	Ground Water	2.0	0.25	93.3
LC-2001-05	Ground Water	2.0	0.50	87.1
LC-2001-06	Synthetic	2.0	0.25	92.6
LC-2001-07	Synthetic	2.0	0.50	88.1

Hole ID:	LC-66C
Core Composition Depth Interval:	412 to 420.4 feet
Pre-Test Feed Grade:	0.0513% $_c$U





Lost Creek ISR, LLC
Casper, Wyoming, USA

Legend

Mineralization

🟥

Aquitard

Unnamed 🟩 Named 🟩

Sand

🟨

Cross Section projected onto E-W vertical plane

PLATE 2.6-2a
Cross Section B-C
Lost Creek Permit Area

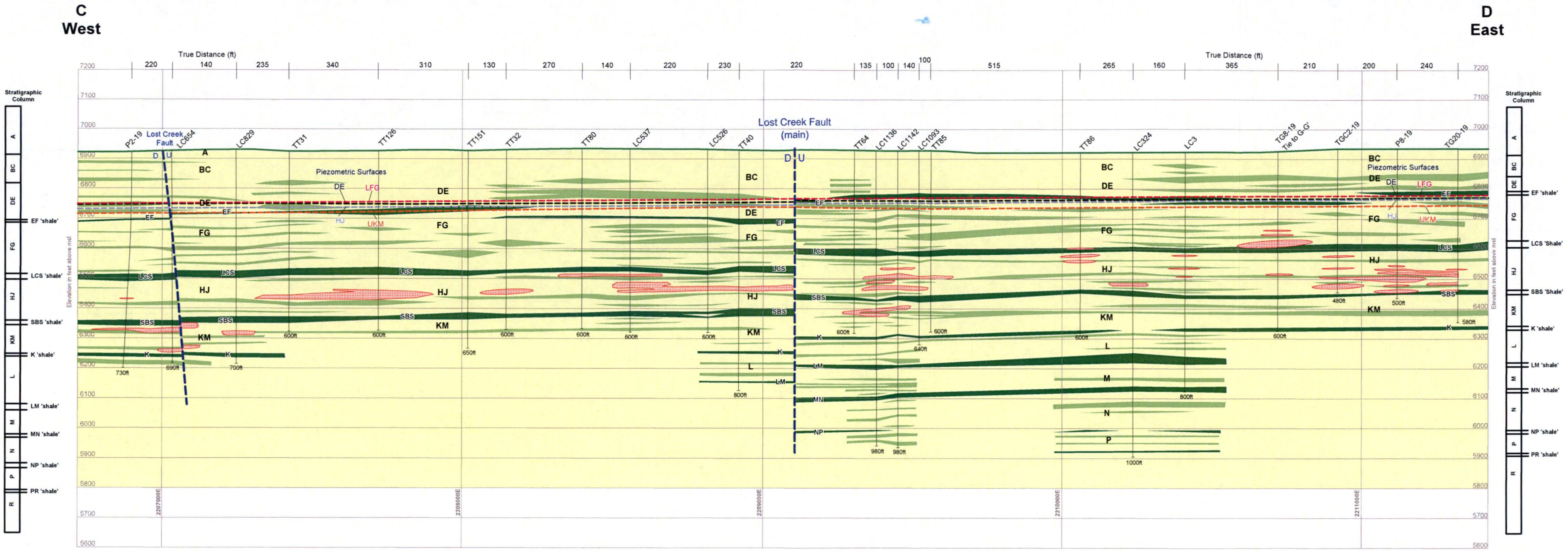
Issued For: NRC Drawn By: CVH/MML/JHC

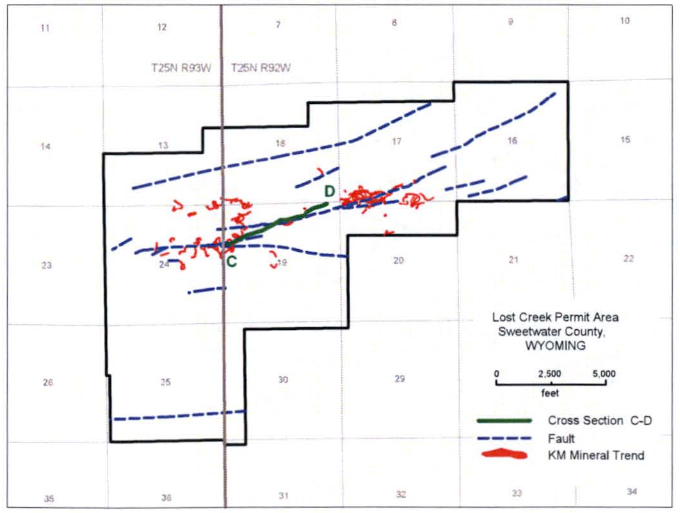
Issued/Revised: 10.11.07 / January 2017

0 200
feet
(no vertical exaggeration)

Piezometric surfaces as illustrated are interpolated from corresponding regional piezometric surface contour maps

P:\GIS\LostCreek\Permitting\Permitting2013\KMamendment\CrossSections\B-C\Plate2.6-2a_XsectB-C.wor





Piezometric surfaces as illustrated are interpolated from corresponding regional piezometric surface contour maps

Lost Creek ISR, LLC
Casper, Wyoming, USA

Legend

Mineralization 🟥

Aquitard

Unnamed 🟩 Named 🟩

Sand 🟨

Cross Section projected onto N-S vertical plane

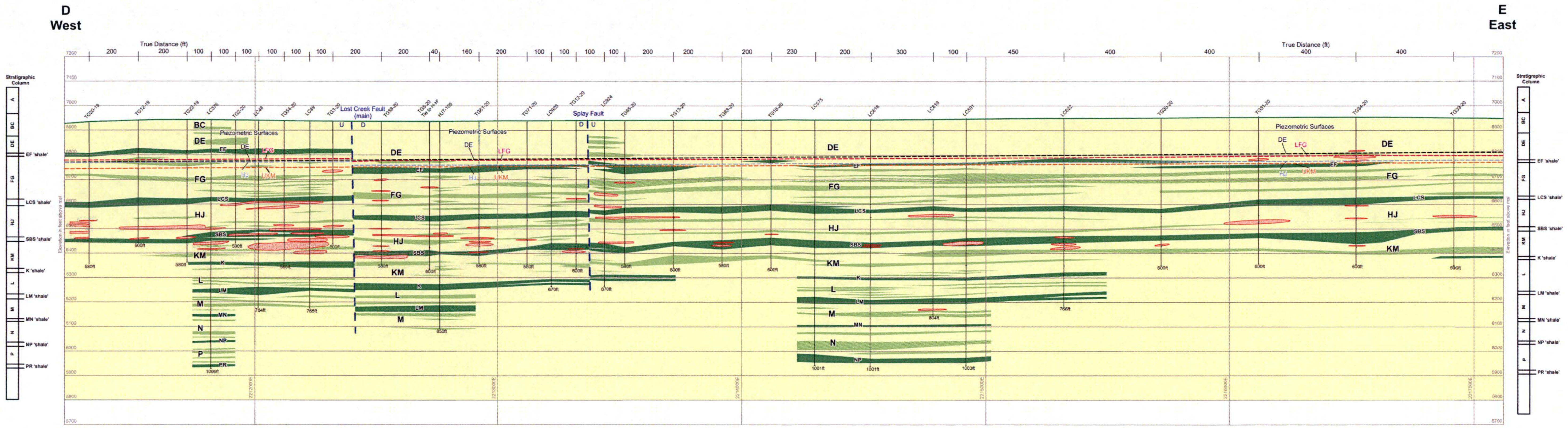
PLATE 2.6-2b
Cross Section C-D
Lost Creek Permit Area

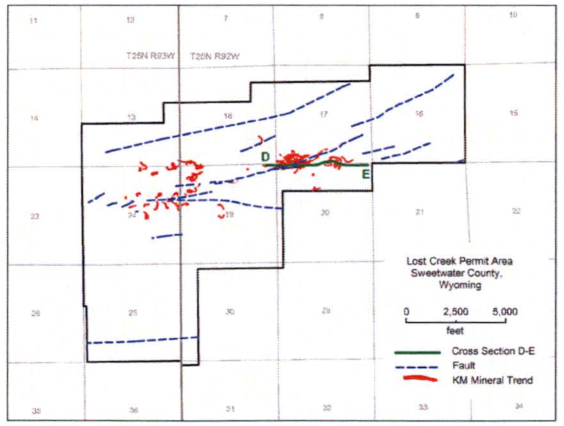
Issued For: NRC Drawn By: CVH/MML/JHC

Issued/Revised: 10.11.07 / January 2017

0 200 feet (no vertical exaggeration)

P:\GIS\LostCreek\Permitting\Permitting2013\KMamendment\CrossSections\C-D\Plate2.6-2b_XsectC-D.wor





Piezometric surfaces as illustrated are interpolated from corresponding regional piezometric surface contour maps.

Lost Creek ISR, LLC
Casper, Wyoming, USA

Legend

Mineralization

Aquitard

Unnamed 🟩 Named 🟩

Sand

Cross Section projected onto E-W vertical plan

PLATE 2.6-2c

Cross Section D-E
Lost Creek Permit Area

Issued For: NRC By: CVH/JKC/GIS/JHC

Issued/Revised: 10.25.07/January 2017

0 200 feet (no vertical exaggeration)

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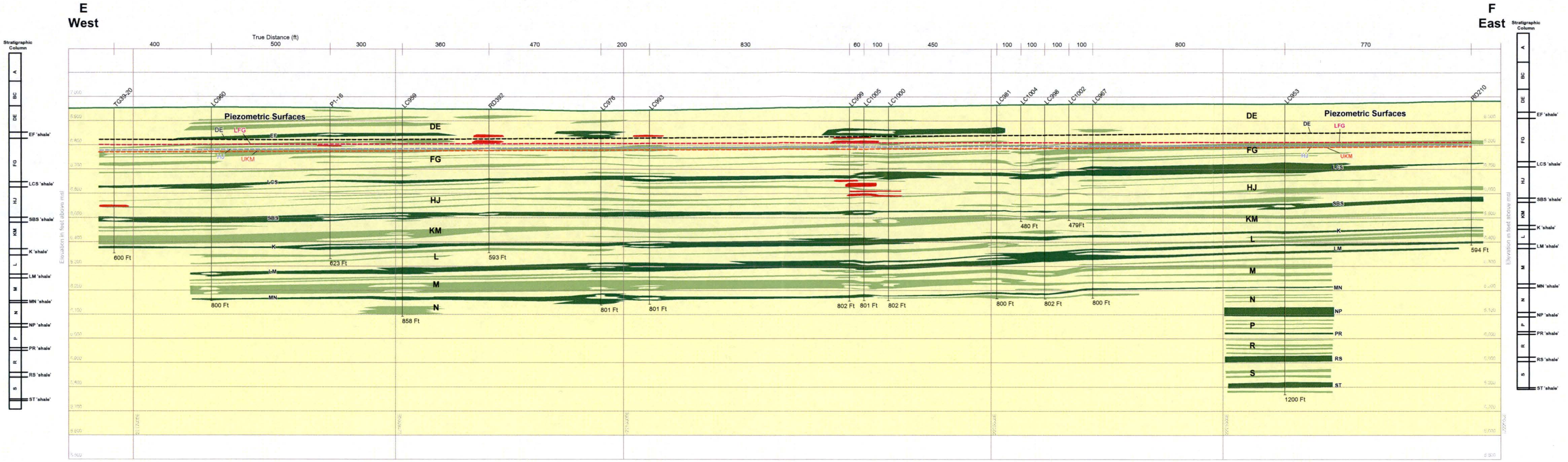

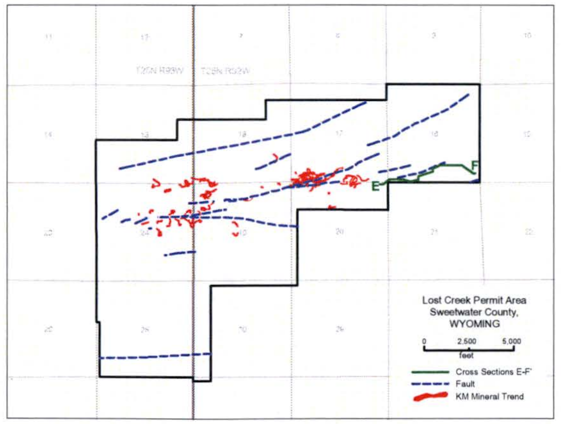

Lost Creek ISR, LLC
Casper, Wyoming, USA

Legend

Mineralization 🟥

Aquitard

Unnamed 🟩 Named 🟩

Sand 🟨

PLATE 2.6-2d

Cross Section E-F (East-West)
Lost Creek Permit Area

Issued For: NRC By: CVH / MF/ JHC

Issued/Revised: 05.29.13/January 2017

0 200 feet (no vertical exaggeration)

Piezometric surfaces as illustrated are interpolated from corresponding regional piezometric surface contour map.

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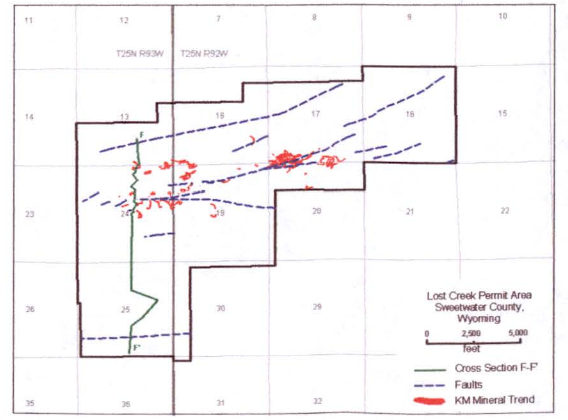

Lost Creek ISR, LLC
Casper, Wyoming, USA

Legend

Mineralization

🟥

Aquitard

Unnamed	Named
🟩	🟩

Sand

🟨

Cross Section projected onto N-S vertical plane

PLATE 2.6-2e

Cross Section F - F' (North-South)
Lost Creek Permit Area

Issued For: NRC By: CVH/JKC/MF/JHC

Issued/Revised: 10.25.07 / January 2017

0 200 feet (no vertical exaggeration)

Piezometric surfaces as illustrated are interpolated from corresponding regional piezometric surface contour maps.

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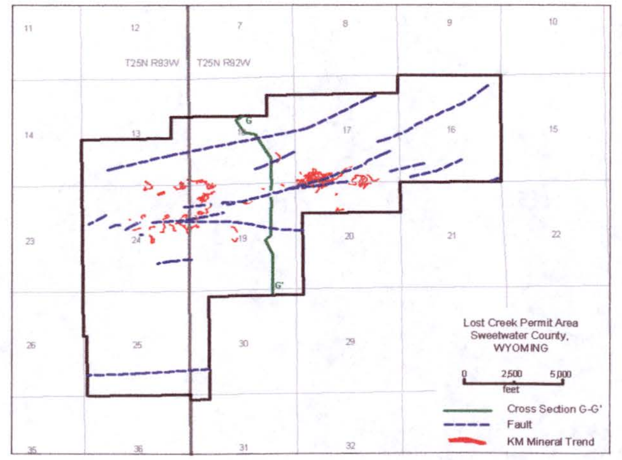

Lost Creek Permit Area
Sweetwater County,
WYOMING

Lost Creek ISR, LLC
Casper,Wyoming, USA

Legend

Mineralization

Aquitard

Unnamed Named

Sand

Cross Section projected onto N-S vertical plane

PLATE 2.6-2f

Cross Section G-G' (North-South)
Lost Creek Permit Area

Issued For: NRC By: CVH / MF/ JHC

Issued/Revised: 10.11.07/ January 2017

0 200 feet (no vertical exaggeration)

Piezometric surfaces as illustrated are interpolated from corresponding regional piezometric surface contour maps.

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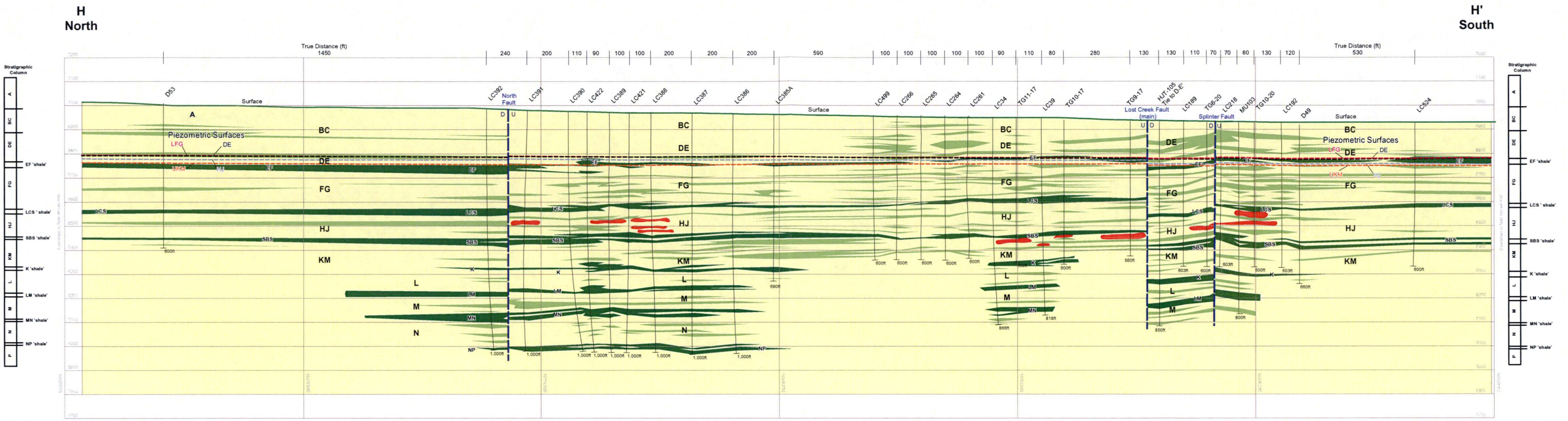
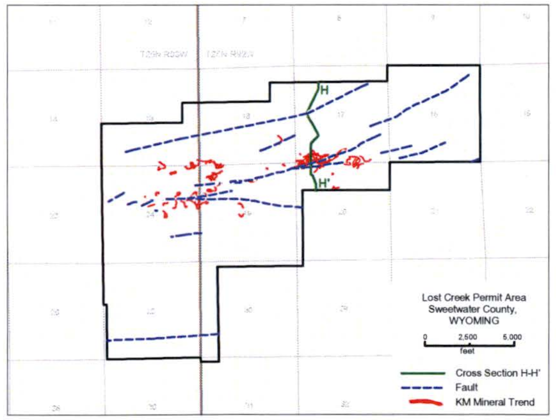




Piezometric surfaces as illustrated are interpolated from corresponding regional piezometric surface contour maps.

Lost Creek ISR, LLC
Casper, Wyoming, USA

Legend

Mineralization 🟥

Aquitard
Unnamed Named

Sand

Cross Section projected onto N-S vertical plane

PLATE 2.6-2g

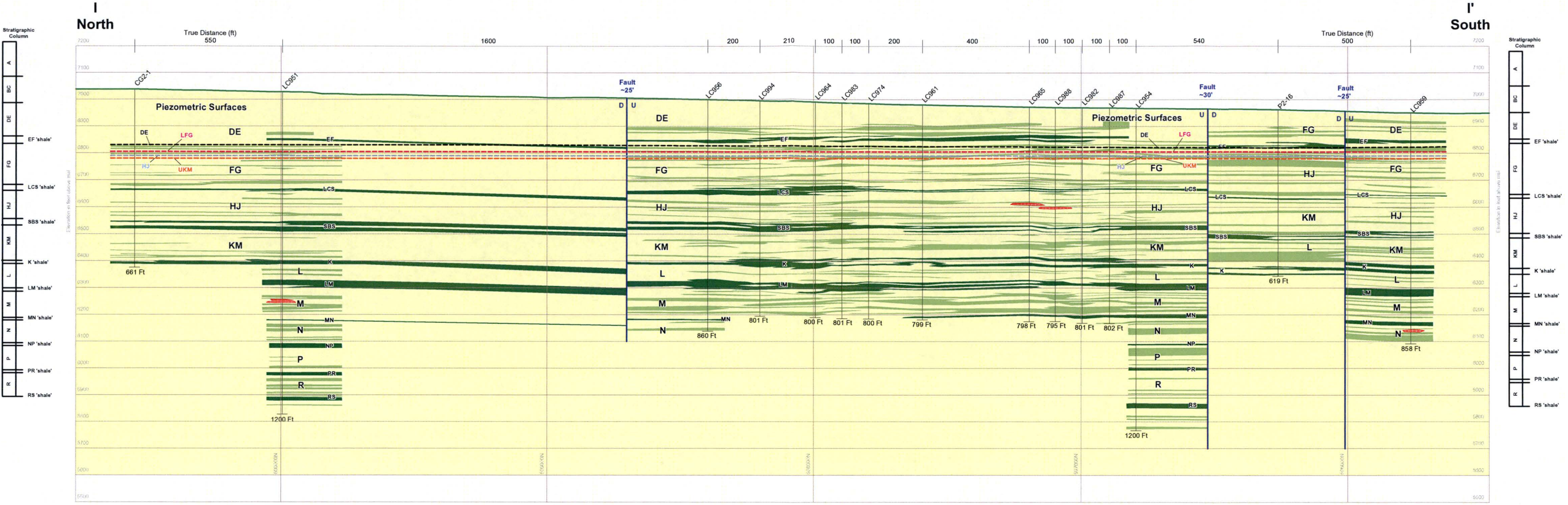
Cross Section H-H' (North-South)
Lost Creek Permit Area

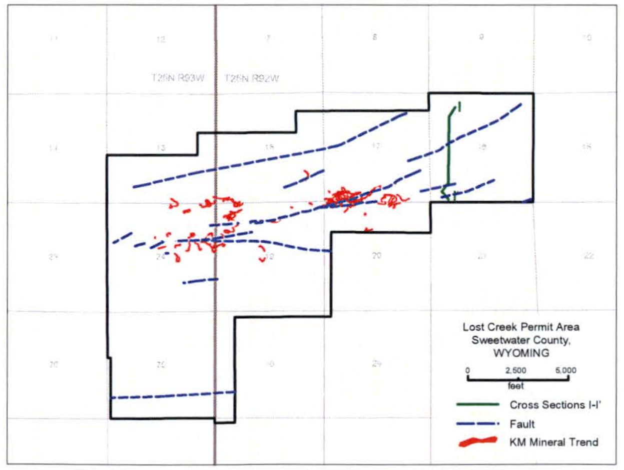
Issued For: NRC By:CVH / MF/ JHC

Issued/Revised: 10.11.07 / January 2017

0 200
feet
(no vertical exaggeration)

P:\GIS\LostCreek\Permitting\Permitting2013\KMamendment\CrossSections\H-H\Plate2.6-2g_XsectH-H'.wor





Piezometric surfaces as illustrated are interpolated from corresponding regional piezometric surface contour map.

Lost Creek ISR, LLC
Casper, Wyoming, USA

Legend

Mineralization 🟥

Aquitard

Unamed 🟩 Named 🟩

Sand 🟨

PLATE 2.6-2h

Cross Section I-I' (North-South)
Lost Creek Permit Area

Issued For: NRC By: CVH / MF/ JHC

Issued/Revised: 05.30.13/ January 2017

0 200 feet (no vertical exaggeration)

P:\GIS\LostCreek\Permitting\Permitting2013\KMamendment\CrossSections\I-I\Plate2.6-2h_XsectI-I'.wor

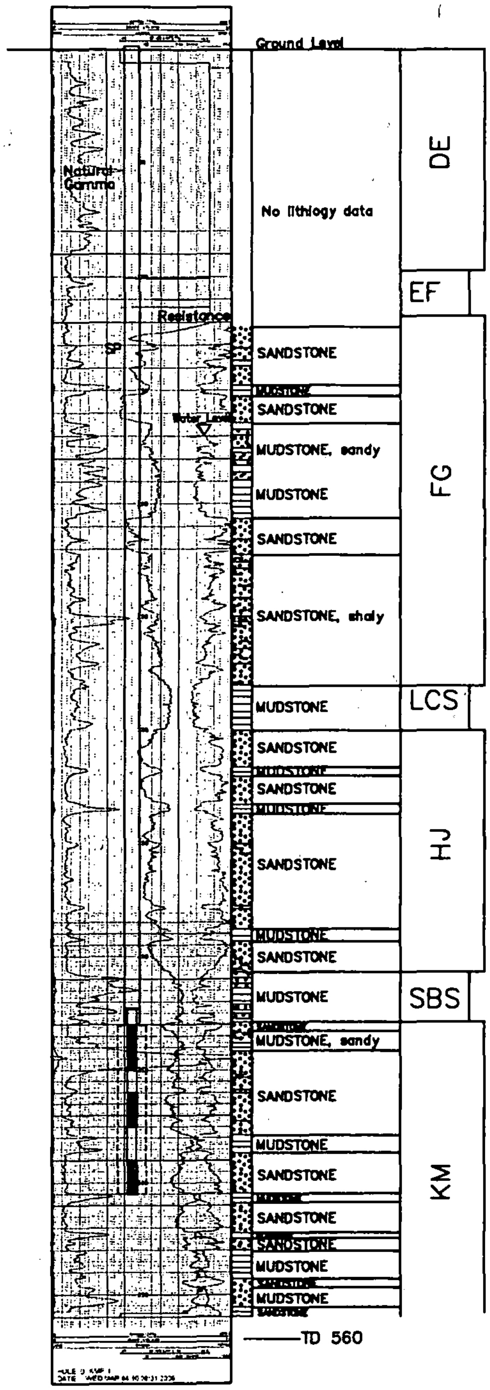
Attachment 2.6-1 - Well Completion Reports

KMP-1 Well Completion Report
KMP-2 Well Completion Report
KMP-3A Well Completion Report
KMP-4 Well Completion Report
KMP-5 Well Completion Report
KMU-1 Well Completion Report
KMU-2 Well Completion Report
KMU-3 Well Completion Report
KMU-4 Well Completion Report
KPW-1A Well Completion Report
KPW-3 Well Completion Report
LC33W Well Completion Report
LC229W Well Completion Report
LC606W Well Completion Report
MB-11 Well Completion Report
MB-12A Well Completion Report
MB-13 Well Completion Report
MB-14 Well Completion Report
M-KM1 Well Completion Report
M-KM2 Well Completion Report
M-KM3A Well Completion Report
M-L1 Well Completion Report
M-L2 Well Completion Report
M-L3 Well Completion Report
M-L4 Well Completion Report
M-L5 Well Completion Report
M-M1 Well Completion Report
M-M2 Well Completion Report
M-M3 Well Completion Report
M-M4 Well Completion Report
M-M5 Well Completion Report
M-M6A Well Completion Report
M-M7 Well Completion Report
M-M8 Well Completion Report
M-N1 Well Completion Report
5S-HJ1 Well Completion Report
5S-KM1 Well Completion Report
5S-KM2 Well Completion Report
5S-KM3 Well Completion Report
5S-KM4 Well Completion Report
5S-N1 Well Completion Report

KMP-1

Vertical Scale: 1"=50'

KMP-1



Lost Creek ISR, LLC

WELL COMPLETION REPORT

WELL # KMP-1 SEO # 189583 Date Drilled: 3/4/09

Location: E 2,216,968 / N 594,503 (NAD 83)

Ground Elev: 6935 Measure Point Elev: 6936.3

TD: 560' Hole Dia.: 7-7/8"

CASED to: 430' Casing: PVC SDR17 ID: 4.5" OD: 5"

GROUT: Portland Cement – Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: KM Horizon

Static Water Level: Depth 170.4' Elev: 6764.3
(11/8/10.)

UNDERREAM: Blade Dia: 11"
Intervals: from 430' to 505' /length 75"
from ____ to ____ /length ____

SCREEN LINER ASSEMBLY

Description	Depth From	Depth To	Elev. From	Elev. To	Length
K-packer string	423'	430'	6512'	6505'	7'
Screen	430'	450'	6505'	6485'	20'
Screen	460'	475'	6475'	6460'	15'
Screen	490'	505'	6445'	6430'	15'

SCREEN SPECIFICATIONS:
Slot: 0.020" Composition 3" PVC screen (wrapped)

FILTER PACKING: N/A
Volume: ____ (bags)(ft³) Sand Specs. ____
Method: ____

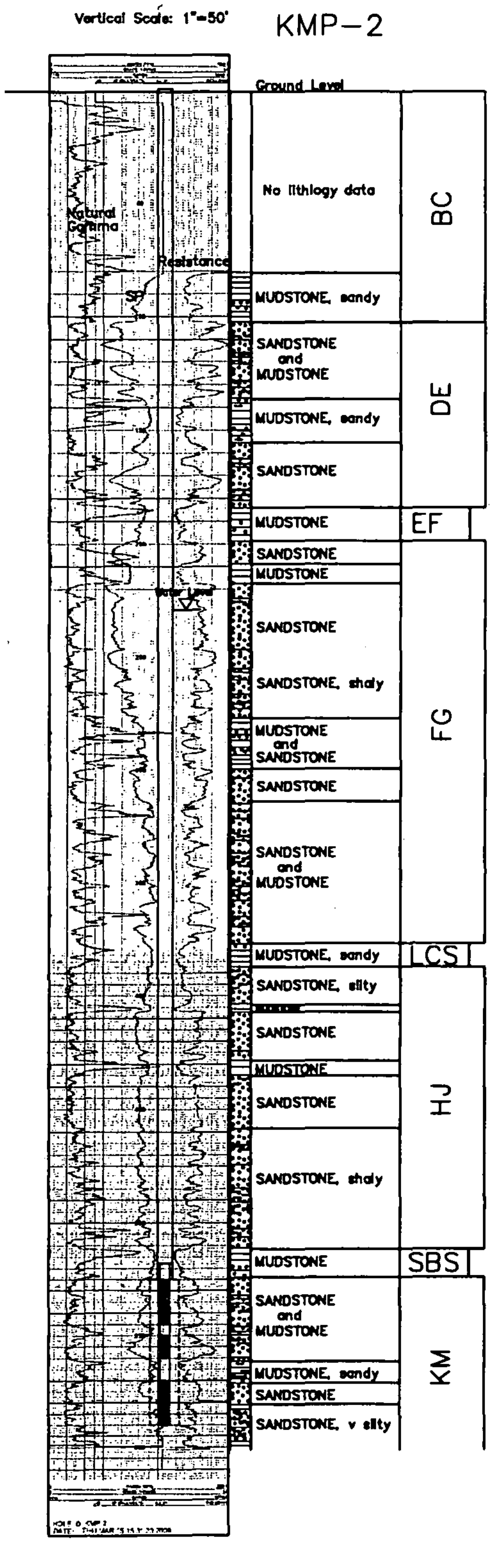
WELL STIMULATION: Method Airlift
Yield: [✓ Good] / Moderate / Poor
50 gpm

KMP-1

KMP-2

Lost Creek ISR, LLC

WELL COMPLETION REPORT



WELL # KMP-2 SEO # 189584 Date Drilled: 3/5/09

Location: E 2,216,654 / N 599,180 (NAD 83)

Ground Elev: 7015' Measure Point Elev: 7016.5'

TD: 600' Hole Dia.: 7-7/8"

CASED to: 525' Casing: PVC SDR17 ID: 4.5" OD: 5"

GROUT: Portland Cement – Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: KM Horizon

Static Water Level: Depth 229.0' Elev: 6786.7'
(11/8/10)

UNDERREAM: Blade Dia: 10.5"

Intervals: from 525' to 590' /length 65'
from ____ to ____ /length ____

SCREEN LINER ASSEMBLY

Description	Depth From	– To	Elev. / From	– To	Length
K-packer string	518'	525'	6496'	6489'	7'
Screen	525'	545'	6489'	6469'	20'
Screen	550'	560'	6464'	6454'	10'
Screen	570'	590'	6444'	6424'	20'

SCREEN SPECIFICATIONS:

Slot: 0.020" Composition 3" PVC screen (wrapped)

FILTER PACKING: N/A

Volume: ____ (bags)(ft³) Sand Specs. ____

Method: ____

WELL STIMULATION: Method Airlift

Yield [✓ Good] / Moderate / Poor
50 gpm

KMP-2

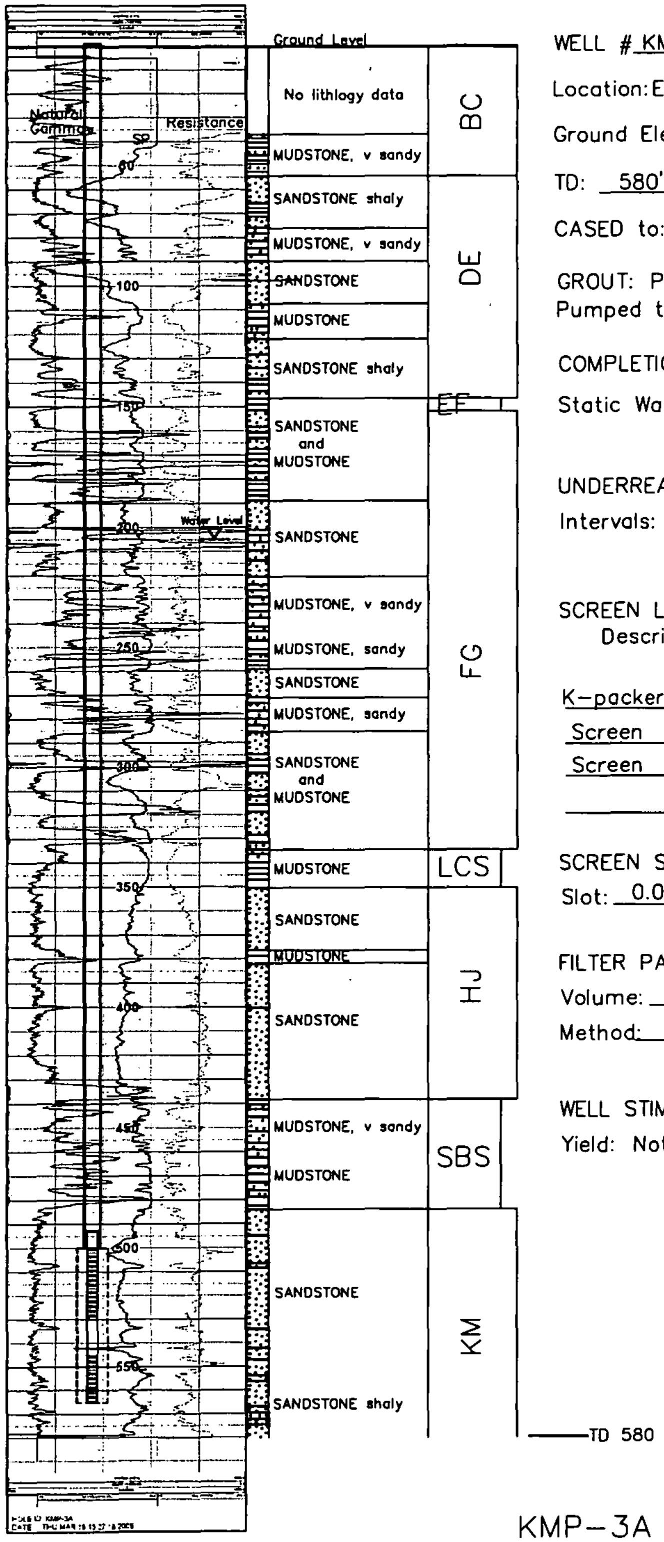
KMP-3A

Lost Creek ISR, LLC

WELL COMPLETION REPORT

Vertical Scale: 1"=50'

KMP-3A



WELL # KMP-3A SEO # 189585 Date Drilled: 3/19/09

Location: E 2,214,149 / N 596,542 (NAD 83)

Ground Elev: 6965 Measure Point Elev: 6966.2

TD: 580'. Hole Dia.: 7-7/8"

CASED to: 500' Casing: PVC SDR17 ID: 4.5" OD: 5"

GROUT: Portland Cement – Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: KM Horizon

Static Water Level: Depth 205.3' Elev: 6759.7' (avg.)

UNDERREAM: Blade Dia: 10.5"

Intervals: from 500' to 565' /length 65'
from ____ to ____ /length ____

SCREEN LINER ASSEMBLY

Description	Depth From	Depth To	Elev. From	Elev. To	Length
K-packer string	494'	500'	6472'	6465'	7'
Screen	500'	530'	6465'	6435'	30'
Screen	545'	565'	6420'	6400'	20'

SCREEN SPECIFICATIONS:
Slot: 0.020" Composition 3" PVC Screen (wrapped)

FILTER PACKING: N/A
Volume: ____ (bags)(ft^3) Sand Specs. ____
Method: ____

WELL STIMULATION: Method Airlift
Yield: Not recorded

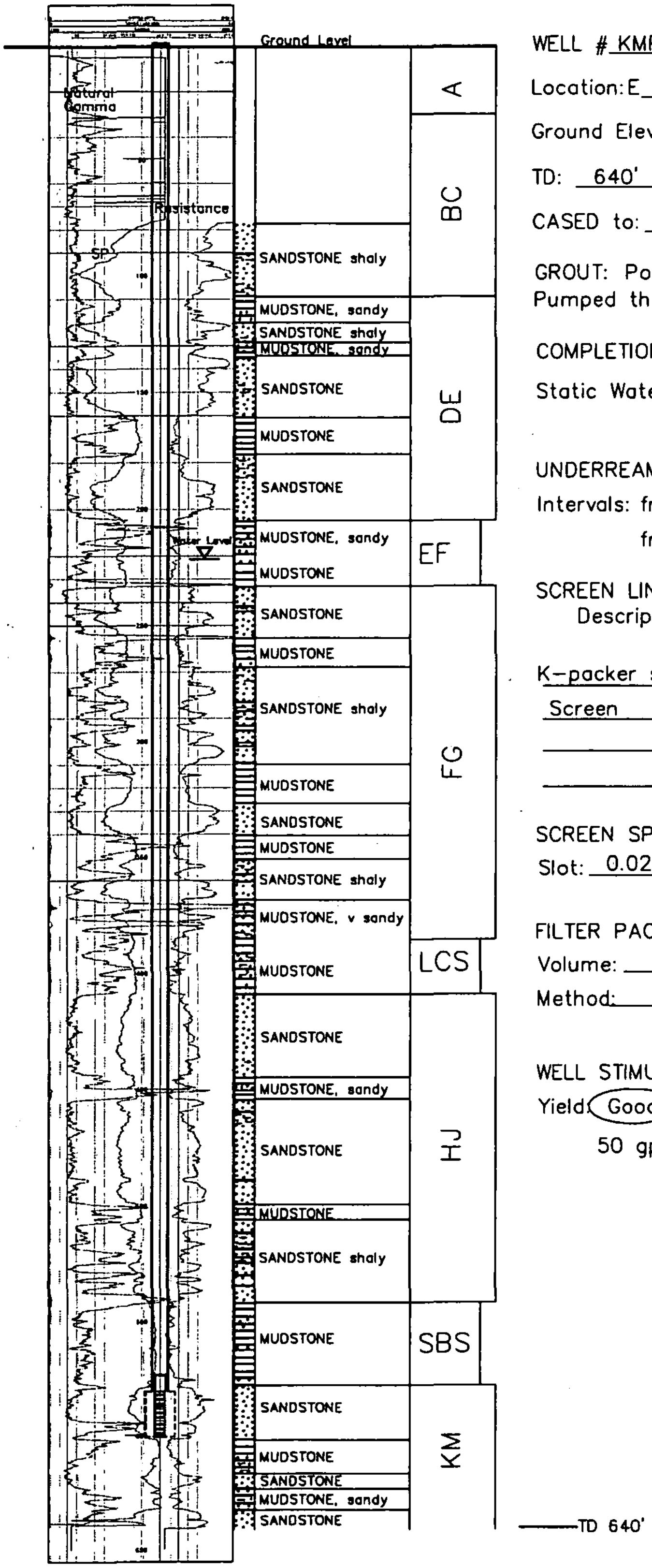
KMP-3A

KMP-4

Lost Creek ISR, LLC

WELL COMPLETION REPORT

Vertical Scale: 1"=50' KMP-4



WELL # KMP-4 SEO # 189586 Date Drilled: 3/6/09

Location: E 2,211,256 / N 597,607 (NAD 83)

Ground Elev: 6969' Measure Point Elev: 6971.2'

TD: 640' Hole Dia.: 7-7/8"

CASED to: 580' Casing: PVC SDR17 ID: 4.5" OD: 5"

GROUT: Portland Cement – Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: UKM Sub-Horizon

Static Water Level: Depth 221.1' Elev: 6748.4 (11/8/10)

UNDERREAM: Blade Dia: 10.5"
Intervals: from 580' to 600' /length 20'
from _____ to _____ /length _____

SCREEN LINER ASSEMBLY

Description	Depth From	Depth To	Elev. From	Elev. To	Length
K-packer string	573'	580'	6396'	6389'	7'
Screen	580'	600'	6389'	6369'	20'

SCREEN SPECIFICATIONS:
Slot: 0.020" Composition 3" PVC Screen (wrapped)

FILTER PACKING: N/A
Volume: _____ (bags)(ft^3) Sand Specs. _____
Method: _____

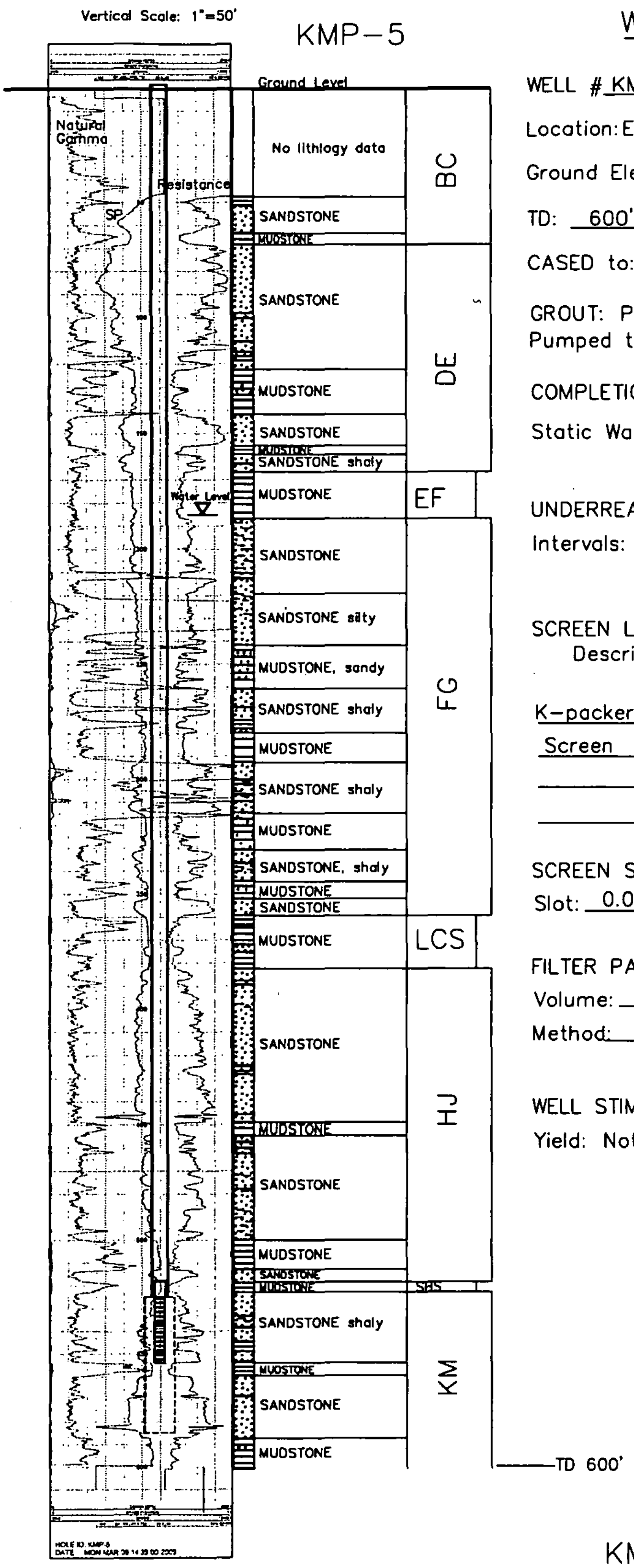
WELL STIMULATION: Method Airlift
Yield: [✓ Good] / Moderate / Poor
50 gpm

KMP-4

KMP-5

Lost Creek ISR, LLC

WELL COMPLETION REPORT



WELL # KMP-5 SEO # 189587 Date Drilled: 3/9/09

Location: E 2,210,070 / N 594,057 (NAD 83)

Ground Elev: 6915 Measure Point Elev: 6916.2

TD: 600' Hole Dia.: 7-7/8"

CASED to: 525' Casing: PVC SDR17 ID: 4.5" OD: 5"

GROUT: Portland Cement – Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: UKM Sub-Horizon

Static Water Level: Depth 185.2' Elev: 6730.5'
(11/8/10)

UNDERREAM: Blade Dia: 10.5"

Intervals: from 525' to 585' /length 60'

from ____ to ____ /length ____

SCREEN LINER ASSEMBLY

Description	Depth From	– To	Elev. / From	– To	Length
K-packer string	518'	525'	6398'	6391'	7'
Screen	525'	554'	6391'	6362'	29'

SCREEN SPECIFICATIONS:

Slot: 0.020" Composition 3" PVC Screen (wrapped)

FILTER PACKING: N/A

Volume: ____ (bags)(ft³) Sand Specs. ____

Method: ____

WELL STIMULATION: Method Airlift

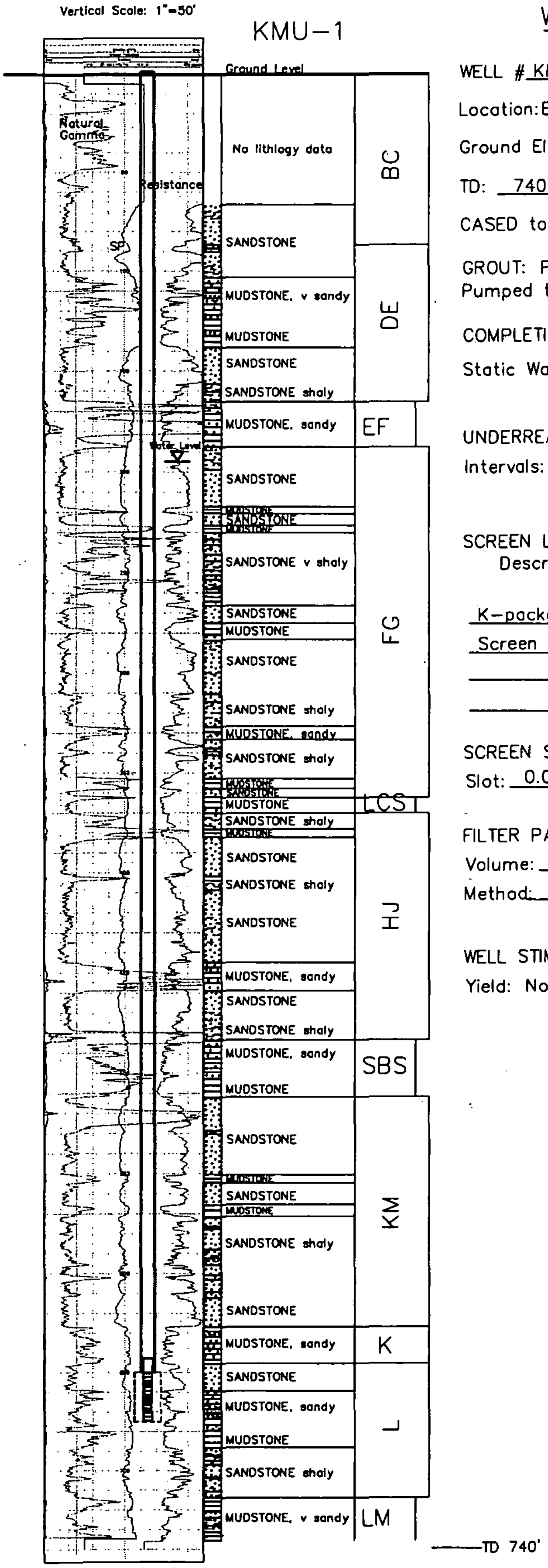
Yield: Not recorded

KMP-5

KMU-1

Lost Creek ISR, LLC

WELL COMPLETION REPORT



WELL # KMU-1 SEO # 189588 Date Drilled: 3/6/09

Location: E 2,214,011 / N 595,543 (NAD 83)

Ground Elev: 6945 Measure Point Elev: 6947.4

TD: 740' Hole Dia.: 7-7/8"

CASED to: 650' Casing: PVC SDR17 ID: 4.5" OD: 5"

GROUT: Portland Cement – Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: L Horizon

Static Water Level: Depth 194.8' Elev: 6749.8'
(3/15/13)

UNDERREAM: Blade Dia: 10.5"

Intervals: from 650' to 675' /length 25'

from ____ to ____ /length ____

SCREEN LINER ASSEMBLY

Description	Depth From	Depth To	Elev. From	Elev. To	Length
K-packer unit	643'	650'	6302'	6295'	7'
Screen	650'	675'	6295'	6270'	25'

SCREEN SPECIFICATIONS:

Slot: 0.020" Composition 3" PVC Screen (wrapped)

FILTER PACKING: N/A

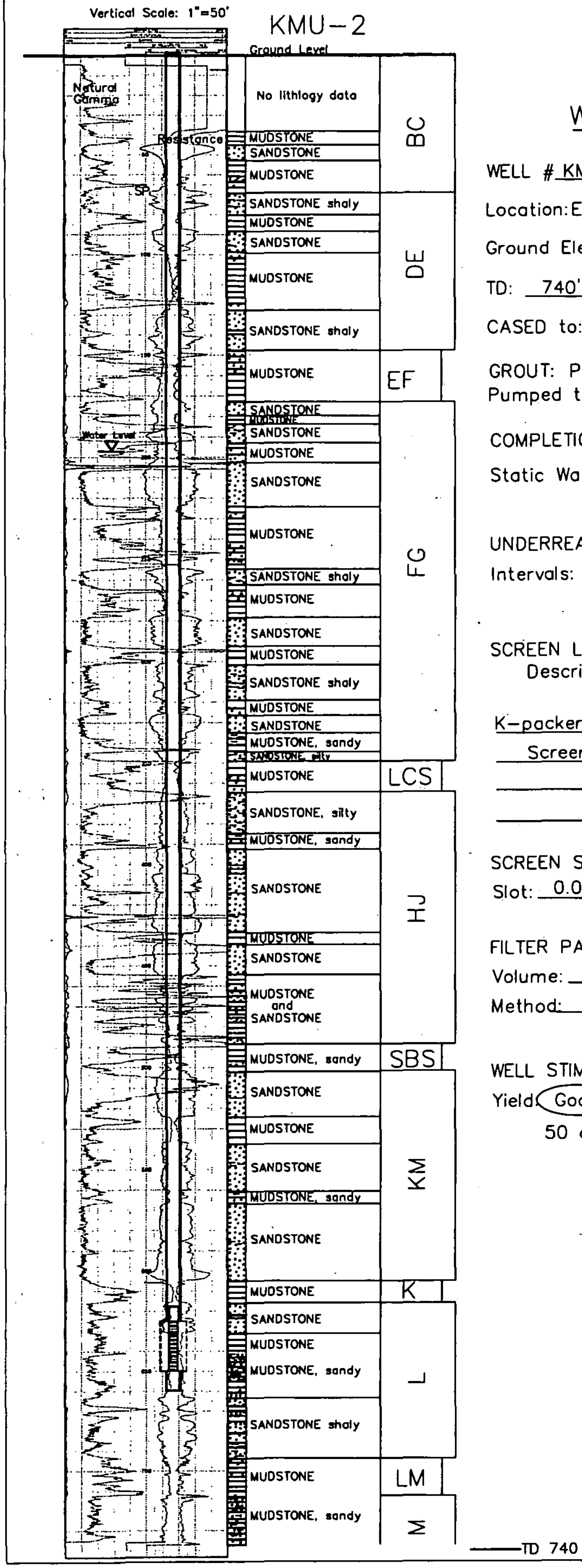
Volume: ____ (bags)(ft^3) Sand Specs. ____

Method: ____

WELL STIMULATION: Method Airlift

Yield: Not recorded

KMU-1



KMU-2

Lost Creek ISR, LLC

WELL COMPLETION REPORT

WELL # KMU-2 SEO # 189,589 Date Drilled: 3/4/09

Location: E 2,215,179 / N 595,572 (NAD 83)

Ground Elev: 6952' Measure Point Elev: 6953.0

TD: 740' Hole Dia.: 7-7/8"

CASED to: 660' Casing: PVC SDR17 ID: 4.5" OD: 5"

GROUT: Portland Cement – Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: L Horizon

Static Water Level: Depth 197.0 Elev: 6755.3
(3/15/13)

UNDERREAM: Blade Dia: 10.5"
Intervals: from 625' to 650' /length 25'
from _____ to _____ /length _____

SCREEN LINER ASSEMBLY

Description	Depth From	Depth To	Elev. From	Elev. To	Length
K-packer string	618'	625'	6334'	6327'	7'
Screen	625'	650'	6327'	6302'	25'

SCREEN SPECIFICATIONS:
Slot: 0.020" Composition 3" PVC Screen (wrapped)

FILTER PACKING: N/A
Volume: _____ (bags)(ft³) Sand Specs. _____
Method: _____

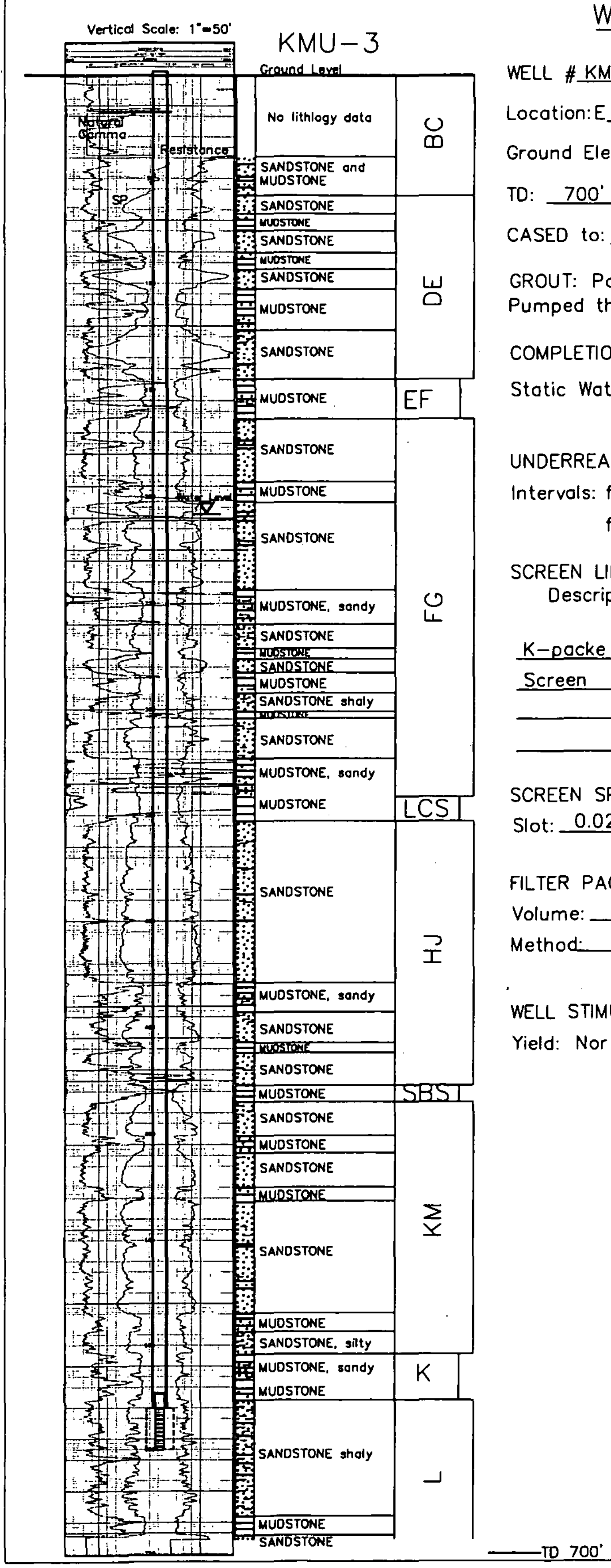
WELL STIMULATION: Method Airlift
Yield [✓ Good] / Moderate / Poor
50 gpm

KMU-2

KMU-3

Lost Creek ISR, LLC

WELL COMPLETION REPORT



WELL # KMU-3 SEO # 189590 Date Drilled: 3/6/09

Location: E 2,214,220 / N 596,505 (NAD 83)

Ground Elev: 6964' Measure Point Elev: 6965.4'

TD: 700' Hole Dia.: 7-7/8"

CASED to: 630' Casing: PVC SDR17 ID: 4.5" OD: 5"

GROUT: Portland Cement – Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: L Horizon

Static Water Level: Depth 207.5' Elev: 6756.6'
(3/15/13)

UNDERREAM: Blade Dia: 10.5"

Intervals: from 630' to 650' /length 20'

from ____ to ____ /length ____

SCREEN LINER ASSEMBLY

Description	Depth		Elev.		Length
	From	– To	/ From	– To	
K-packe unit	623'	630'	6342'	6335'	7'
Screen	630'	650'	6335'	6315'	20'

SCREEN SPECIFICATIONS:

Slot: 0.020" Composition 3" PVC Screen (wrapped)

FILTER PACKING: N/A

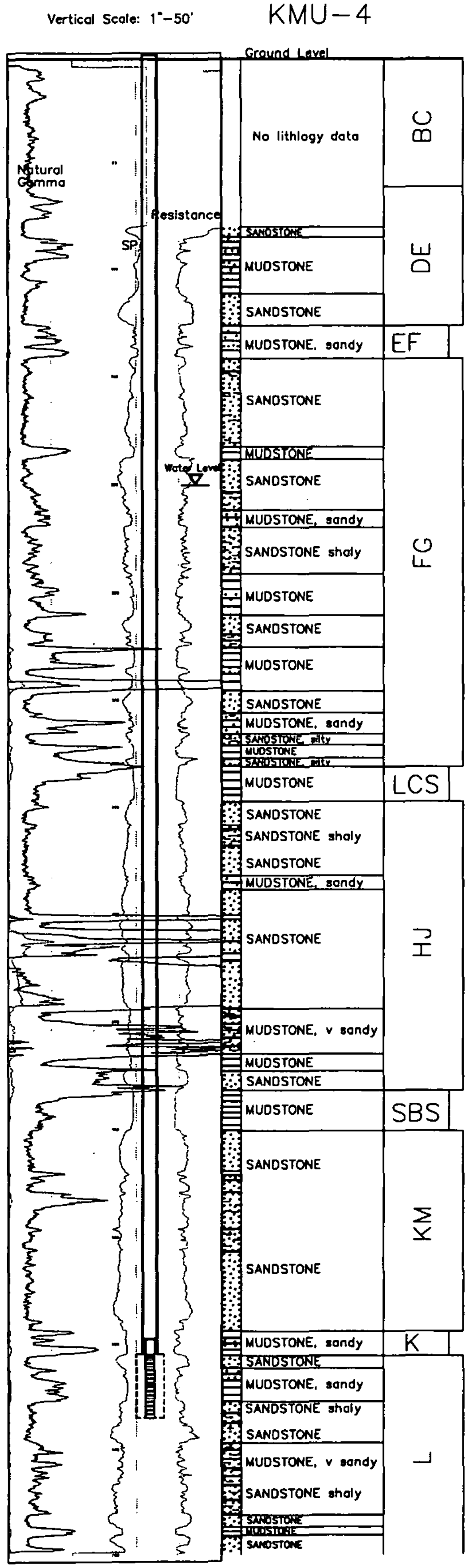
Volume: ____ (bags)(ft^3) Sand Specs. ____

Method: ____

WELL STIMULATION: Method Airlift

Yield: Nor recorded

KMU-3



TD 700

KMU-4

Lost Creek ISR, LLC

WELL COMPLETION REPORT

WELL # KMU-4 SEO # 189591 Date Drilled: 3/7/09

Location: E 2,211,051 / N 595,488 (NAD 83)

Ground Elev: 6943' Measure Point Elev: 6943.2'

TD: 700' Hole Dia.: 7-7/8"

CASED to: 605' Casing: PVC SDR17 ID: 4.5" OD: 5"

GROUT: Portland Cement – Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: L Horizon

Static Water Level: Depth 199.7' Elev: 6743.2'
(3/15/13)

UNDERREAM: Blade Dia: 10.5"
Intervals: from 605' to 635' /length 30'
from _____ to _____ /length _____

SCREEN LINER ASSEMBLY

Description	Depth From	Depth To	Elev. From	Elev. To	Length
K-packer unit	598'	605'	6345'	6338'	7'
Screen	605'	635'	6338'	6308'	30'

SCREEN SPECIFICATIONS:
Slot: 0.020" Composition 3" PVC Screen (wrapped)

FILTER PACKING: N/A
Volume: _____ (bags)(ft^3) Sand Specs. _____
Method: _____

WELL STIMULATION: Method Airlift
Yield: Not recorded

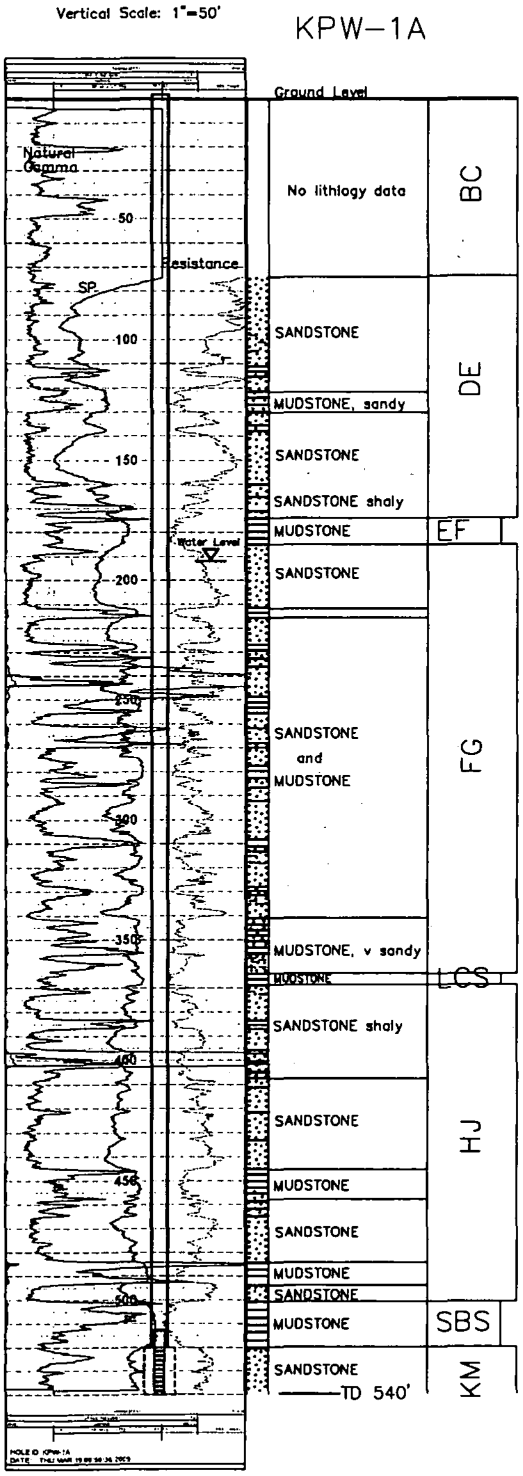
KMU-4

KPW-1A

Lost Creek ISR, LLC

WELL COMPLETION REPORT

KPW-1A



WELL # KPW-1A SEO # 189592 Date Drilled: 3/19/09

Location: E 2,213,927 / N 595,550 (NAD 83)

Ground Elev: 6945 Measure Point Elev: 6947.6

TD: 540' Hole Dia.: 7-7/8"

CASED to: 520' Casing: PVC SDR17 ID: 4.5" OD: 5"

GROUT: Portland Cement – Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: UKM Sub-Horizon

Static Water Level: Depth 191.8' Elev: 6755.8' (11/15/10)

UNDERREAM: Blade Dia: 10.5"

Intervals: from 520' to 540' /length 20'

from ____ to ____ /length ____

SCREEN LINER ASSEMBLY

Description	Depth From	Depth To	Elev. From	Elev. To	Length
K-packer string	513'	520'	6432'	6425'	7'
Screen	520'	540'	6425'	6405'	20'

SCREEN SPECIFICATIONS:

Slot: 0.020" Composition 3" PVC Screen (wrapped)

FILTER PACKING: N/A

Volume: ____ (bags)(ft³) Sand Specs. ____

Method: ____

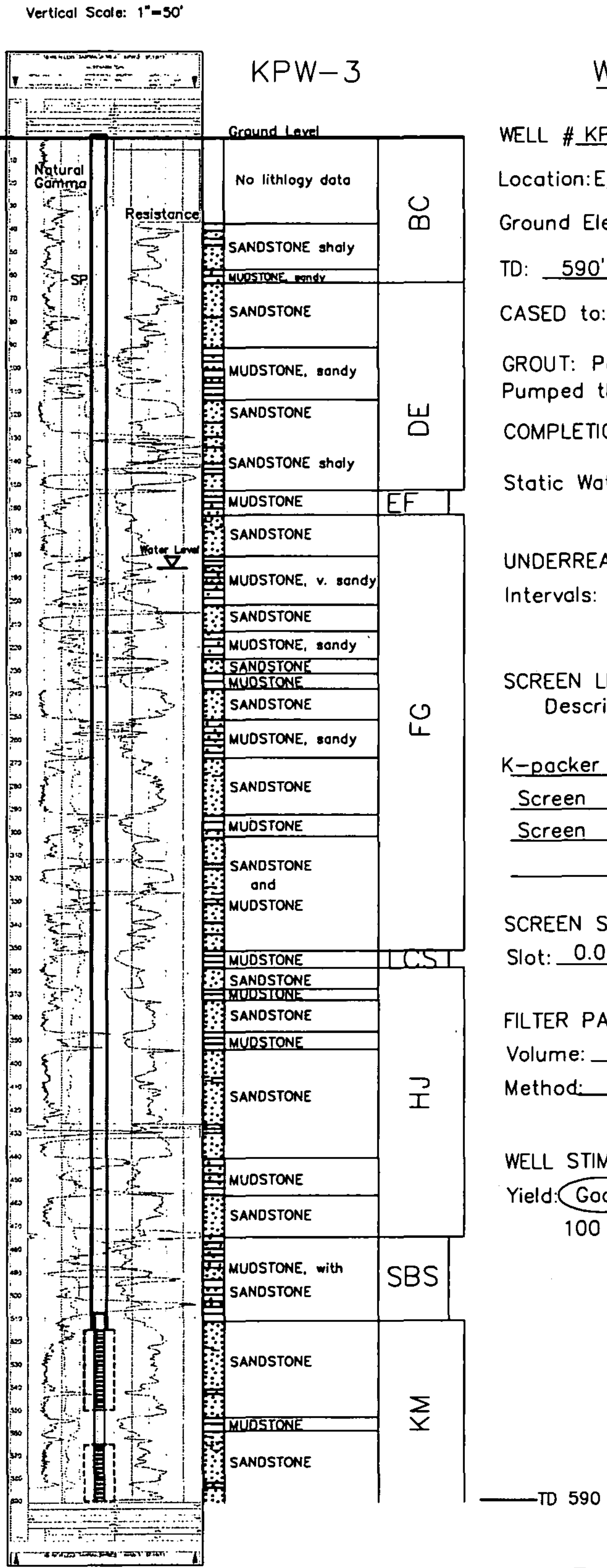
WELL STIMULATION: Method Airlift

Yield: [✓ Good] / Moderate / Poor

100 gpm

KPW-1A

KPW-3



Lost Creek ISR, LLC

WELL COMPLETION REPORT

WELL # KPW-3 SEO # 194696 Date Drilled: 7/19/11

Location: E 2,213,891 / N 595,227 (NAD 83)

Ground Elev: 6939 Measure Point Elev: 6940.2

TD: 590' Hole Dia.: 7-7/8"

CASED to: 515' Casing: PVC SDR17 ID: 4.5" OD: 5"

GROUT: Portland Cement – Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: UKM and LKM Sub-Horizons

Static Water Level: Depth 185.5' Elev: 6754.7'
(8/16/11)

UNDERREAM: Blade Dia: 10.5"
Intervals: from 515' to 550' /length 35'
from 565' to 590' /length 25'

SCREEN LINER ASSEMBLY

Description	Depth From	Depth To	Elev. From	Elev. To	Length
K-packer string	508'	515'	6431'	6424'	7'
Screen	515'	550'	6424'	6389'	35'
Screen	565'	590'	6374'	6349'	25'

SCREEN SPECIFICATIONS:
Slot: 0.030" Composition 3" PVC Screen (wrapped)

FILTER PACKING: N/A
Volume: _____ (bags)(ft^3) Sand Specs. _______
Method: ____________________

WELL STIMULATION: Method Airlift
Yield: [✓ Good] / Moderate / Poor
100 gpm

KPW-3

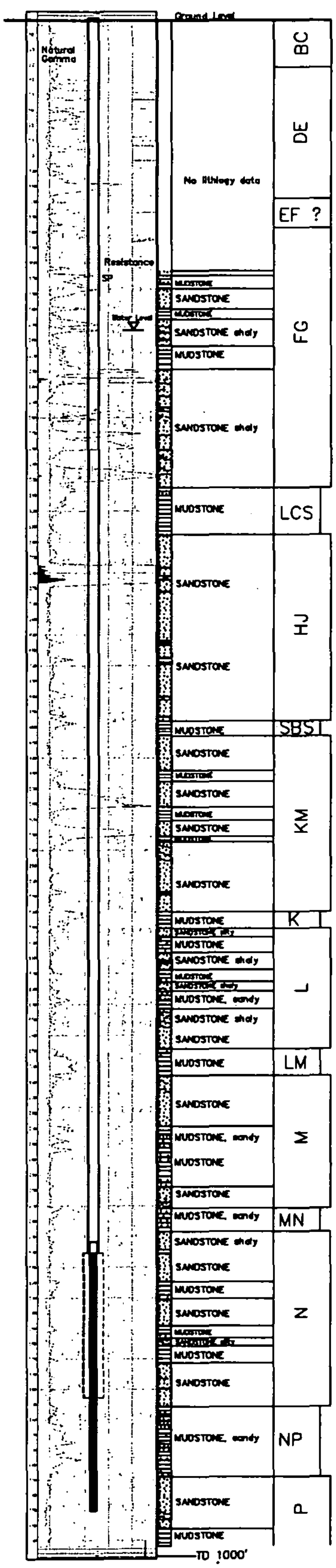
LC33W

Lost Creek ISR, LLC

WELL COMPLETION REPORT

WATER WELL

LC33W



WELL # LC33W SEO # 179827 Date Drilled: 4/17/07

Location: E 2,216,308 / N 595,008 (NAD 83)

Ground Elev: 6941 Measure Point Elev: 6941.5

TD: 1000' Hole Dia.: 7-7/8"

CASED to: 800' Casing: PVC SDR17 ID: 4.5" OD: 5"

GROUT: Portland Cement – Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: N and P Horizons

Static Water Level: Depth 203.2' Elev: 6738.3
(2/9/12)

UNDERREAM: Blade Dia: 10.0"

Intervals: from 800' to 895' /length 95'
from ____ to ____ /length ____
(Underreamer broke at 895')

SCREEN LINER ASSEMBLY

Description	Depth		Elev.		Length
	From	– To	/ From	– To	
K-packer string	775'	800'	6166'	6141'	25'
Screen	800'	970'	6141'	5971'	170'

SCREEN SPECIFICATIONS:

Slot: 0.030" Composition 3" PVC

FILTER PACKING: N/A

Volume: ____ (bags)(ft^3) Sand Specs. ____

Method: ____

WELL STIMULATION: Method Airlift

Yield: No record

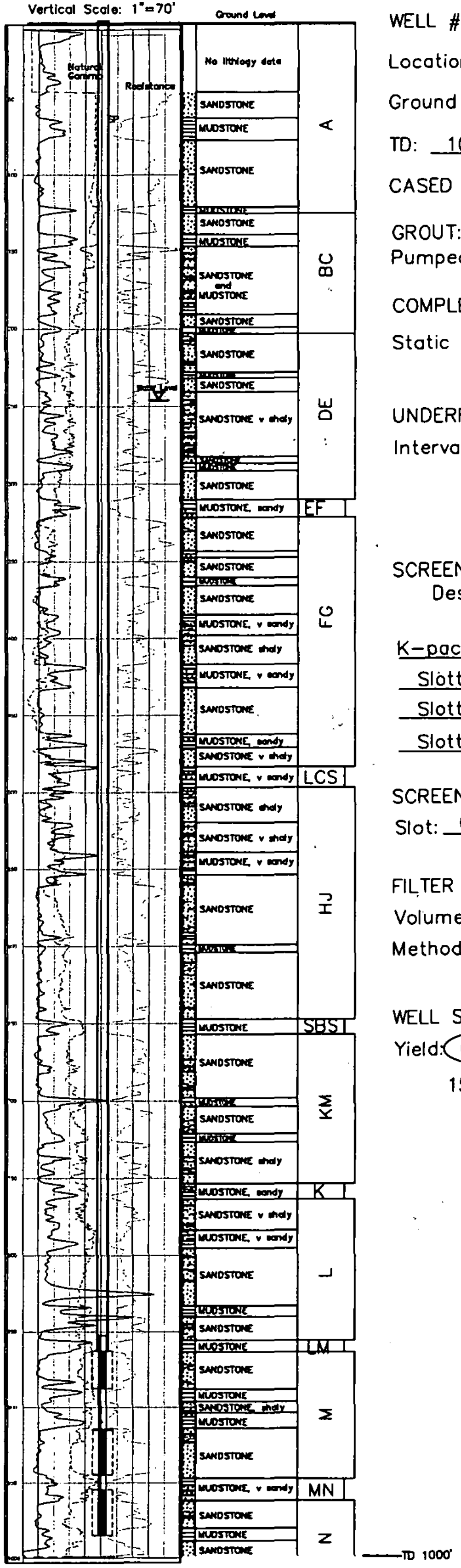
LC229W

Lost Creek ISR, LLC

WELL COMPLETION REPORT

WATER WELL

LC229W



WELL # LC229W SEO # 186494 Date Drilled: 6/3/08

Location: E 2,209,390 / N 598,285 (NAD 83)

Ground Elev: 6980' Measure Point Elev: 6977.82'

TD: 1000' Hole Dia.: 7-7/8"

CASED to: 863' Casing: PVC SDR17 ID: 4.5" OD: 5"

GROUT: Portland Cement – Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: M and N Horizons

Static Water Level: Depth 247.0" Elev: 6730.8'
(3/15/13)

UNDERREAM: Blade Dia: 10.5"
Intervals: from 863' to 888' /length 25'
from 915' to 945' /length 30'
from 955' to 985' /length 30'

SCREEN LINER ASSEMBLY

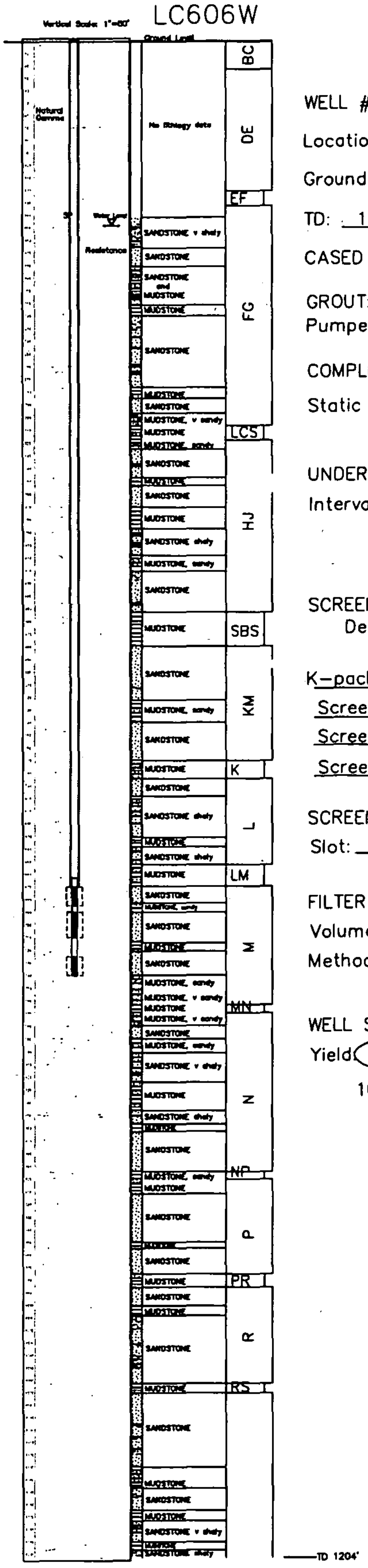
Description	Depth From	Depth To	Elev. From	Elev. To	Length
K-packer string	853'	863'	6127'	6117'	10'
Slotted PVC	863'	888'	6117'	6092'	25'
Slotted PVC	915'	945'	6065'	6035'	30'
Slotted PVC	955'	985'	6025'	5995'	30'

SCREEN SPECIFICATIONS:
Slot: 0.030" Composition 3" Slotted PVC

FILTER PACKING: N/A
Volume: ____ (bags)(ft³) Sand Specs. ____
Method: ____

WELL STIMULATION: Method Airlift
Yield: [✓ Good] / Moderate / Poor
150 gpm

LC229W



LC606W

Lost Creek ISR, LLC

WELL COMPLETION REPORT

WATER WELL

WELL # LC606W SEO # 190300 Date Drilled: 10/9/08

Location: E 2,202,741 / N 586,360 (NAD 83)

Ground Elev: 6808.6' Measure Point Elev: 6808.6'

TD: 1204' Hole Dia.: 7-7/8"

CASED to: 670' Casing: PVC SDR17 ID: 4.5" OD: 5"

GROUT: Portland Cement – Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: M Horizon

Static Water Level: Depth 148.4' Elev: 6660.2'
(3/15/13)

UNDERREAM: Blade Dia: 10.0"

Intervals: from 670' to 685' /length 15'
from 690' to 710' /length 20'
from 725' to 740' /length 15'

SCREEN LINER ASSEMBLY

Description	Depth From	Depth To	Elev. From	Elev. To	Length
K-packer string	663'	670'	6146'	6139'	7'
Screen	670'	685'	6139'	6124'	15'
Screen	690'	710'	6119'	6099'	20'
Screen	725'	740'	6084'	6069'	15'

SCREEN SPECIFICATIONS:
Slot: 0.020" Composition 3" PVC Screen (wrapped)

FILTER PACKING: N/A
Volume: ____ (bags)(ft^3) Sand Specs. ____
Method: ____

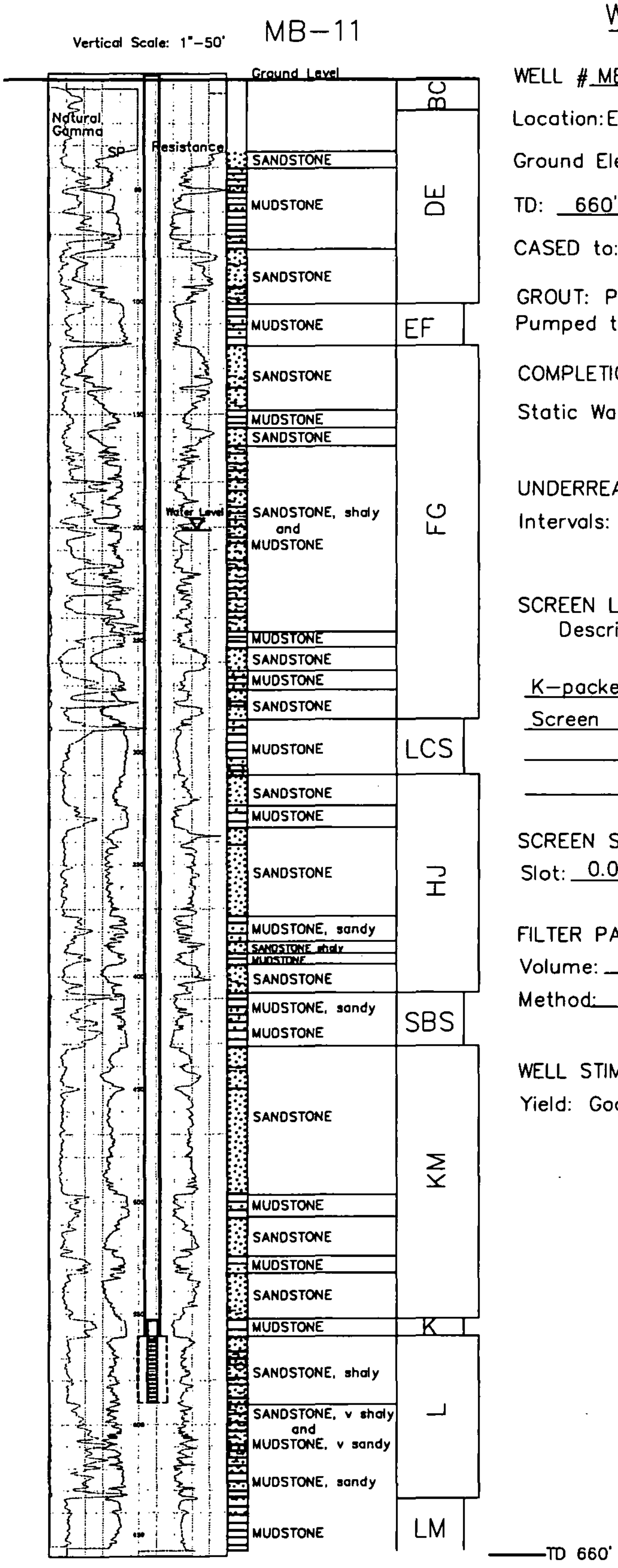
WELL STIMULATION: Method Airlift
Yield [✓ Good] / Moderate / Poor
100 gpm

LC606W

MB-11

Lost Creek ISR, LLC

WELL COMPLETION REPORT



WELL # MB-11 SEO # 189582 Date Drilled: 3/3/09

Location: E 2,221,627 / N 599,739 (NAD 83)

Ground Elev: 7011' Measure Point Elev: 7012.1'

TD: 660' Hole Dia.: 7-7/8"

CASED to: 560' Casing: PVC SDR17 ID: 4.5" OD: 5"

GROUT: Portland Cement – Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: L Horizon

Static Water Level: Depth 200.7' Elev: 6810.5
(3/15/13)

UNDERREAM: Blade Dia: 10.0"
Intervals: from 560' to 590' /length 30'
from ______ to ______ /length ______

SCREEN LINER ASSEMBLY

Description	Depth From	Depth To	Elev. From	Elev. To	Length
K-packer unit	553'	560'	6458'	6451'	7'
Screen	560'	590'	6451'	6421'	30'

SCREEN SPECIFICATIONS:
Slot: 0.020" Composition 3" PVC Screen (wrapped)

FILTER PACKING: N/A
Volume: ______ (bags)(ft^3) Sand Specs. ______
Method: ______

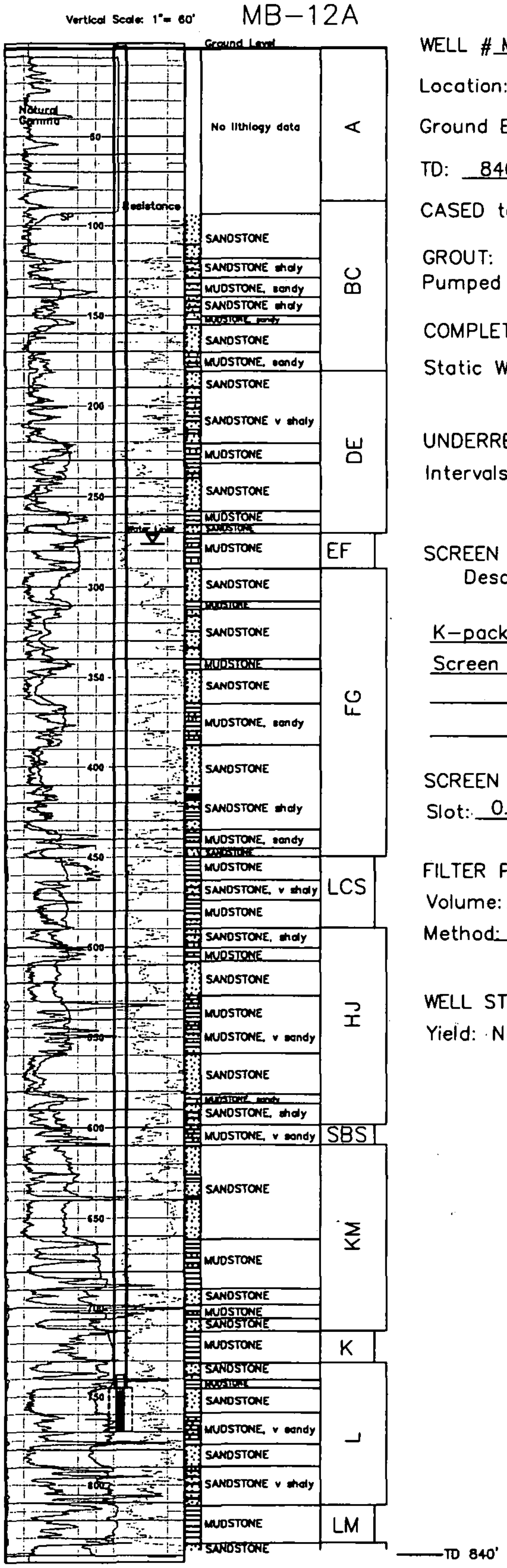
WELL STIMULATION: Method Airlift
Yield: Good / Moderate / [✓ Poor]
10 gpm

MB-11

MB-12A

Lost Creek ISR, LLC

WELL COMPLETION REPORT



MB-12A

WELL # MB-12A SEO # 189581 Date Drilled: 2/27/09

Location: E 2,204,569 / N 596,488 (NAD 83)

Ground Elev: 6987' Measure Point Elev: 6987.2'

TD: 840' Hole Dia.: 7-7/8"

CASED to: 745' Casing: PVC SDR17 ID: 4.5" OD: 5"

GROUT: Portland Cement – Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: L Horizon

Static Water Level: Depth 276.4' Elev: 6710.8'
(3/15/13)

UNDERREAM: Blade Dia: 10.0"
Intervals: from 745' to 770' /length 25'
from ____ to ____ /length ____

SCREEN LINER ASSEMBLY

Description	Depth		Elev.		Length
	From – To		/ From – To		
K-packer unit	738'	745'	6249'	6242'	7'
Screen	745'	770'	6242'	6217'	25'

SCREEN SPECIFICATIONS:
Slot: 0.020" Composition 3" PVC Screen (wrapped)

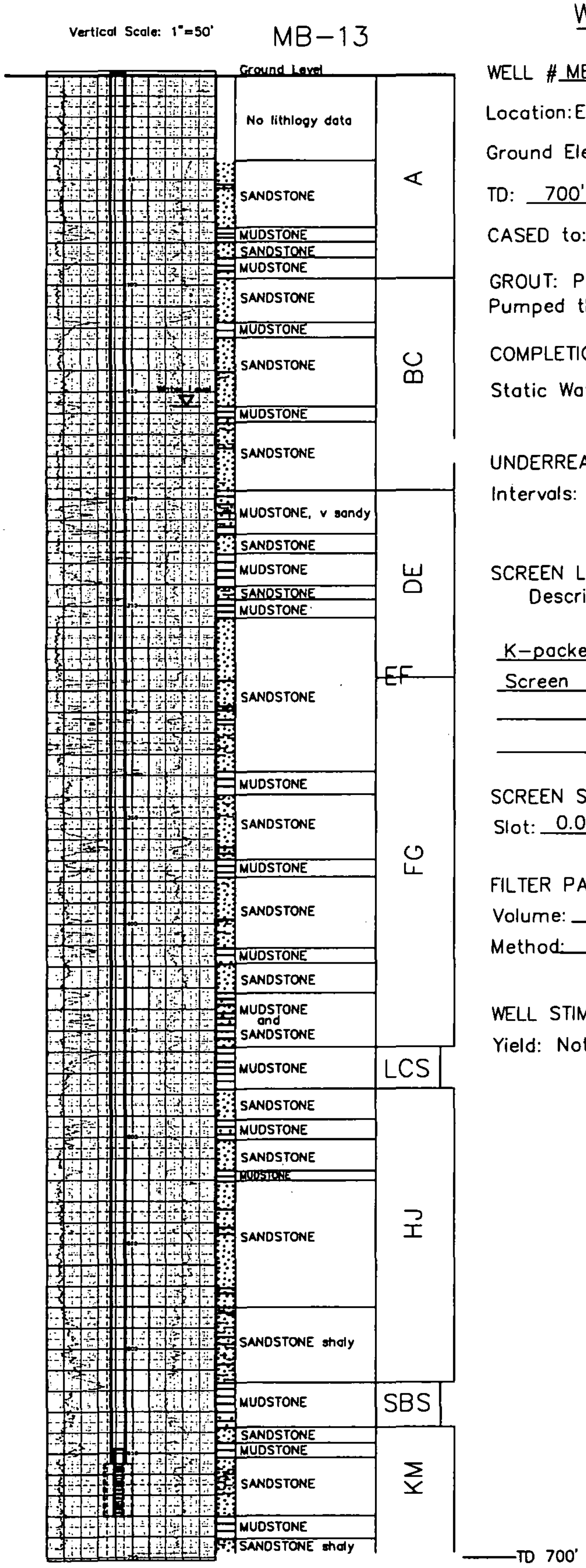
FILTER PACKING: N/A
Volume: ____ (bags)(ft^3) Sand Specs. ____
Method: ____

WELL STIMULATION: Method Airlift
Yield: Not Recorded

MB-13

Lost Creek ISR, LLC

WELL COMPLETION REPORT



WELL # MB-13 SEO # 189580 Date Drilled: 2/25/09

Location: E 2,201,670 / N 585,189 (NAD 83)

Ground Elev: 6806 Measure Point Elev: 6805.7'

TD: 700' Hole Dia.: 7-7/8"

CASED to: 655' Casing: PVC SDR17 ID: 4.5" OD: 5"

GROUT: Portland Cement – Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: UKM Horizon

Static Water Level: Depth 157.8' Elev: 6647.9'
(3/15/13)

UNDERREAM: Blade Dia: 10.5"
Intervals: from 655 to 680' /length 25'
from ______ to ______ /length ______

SCREEN LINER ASSEMBLY

Description	Depth From	Depth To	Elev. From	Elev. To	Length
K-packer unit	648'	655'	6158'	6151'	7'
Screen	655'	680'	6151'	6126'	25'

SCREEN SPECIFICATIONS:
Slot: 0.030" Composition 3" PVC Screen (wrapped)

FILTER PACKING: N/A
Volume: _____ (bags)(ft^3) Sand Specs. ______
Method: ______

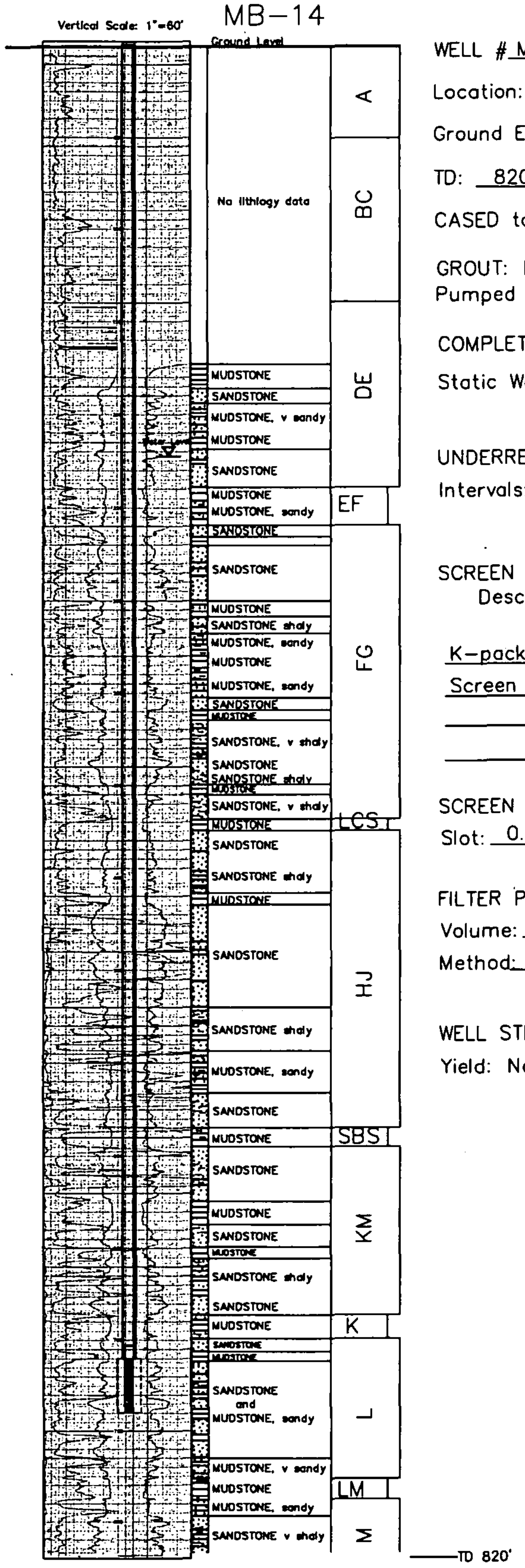
WELL STIMULATION: Method Airlift
Yield: Not recorded

MB-13

MB-14

Lost Creek ISR, LLC

WELL COMPLETION REPORT



WELL # MB-14 SEO # 189618 Date Drilled: 3/3/09

Location: E 2,204,577 / N 593,511 (NAD 83)

Ground Elev: 6924' Measure Point Elev: 6924.1'

TD: 820' ft. Hole Dia.: 7-7/8"

CASED to: 710' Casing: PVC SDR17 ID: 4.5" OD: 5"

GROUT: Portland Cement – Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: L Horizon

Static Water Level: Depth 221.9' Elev: 6702.3'
(3/15/13)

UNDERREAM: Blade Dia: 10.5"

Intervals: from 710' to 740' /length 30'

from ____ to ____ /length ____

SCREEN LINER ASSEMBLY

Description	Depth		Elev.		Length
	From	To	From	To	
K-packer unit	703'	710'	6221'	6214'	7'
Screen	710'	740'	6214'	6184'	30'

SCREEN SPECIFICATIONS:

Slot: 0.020" Composition 3" PVC Screen (wrapped)

FILTER PACKING: N/A

Volume: ____ (bags)(ft^3) Sand Specs. ____

Method: ____

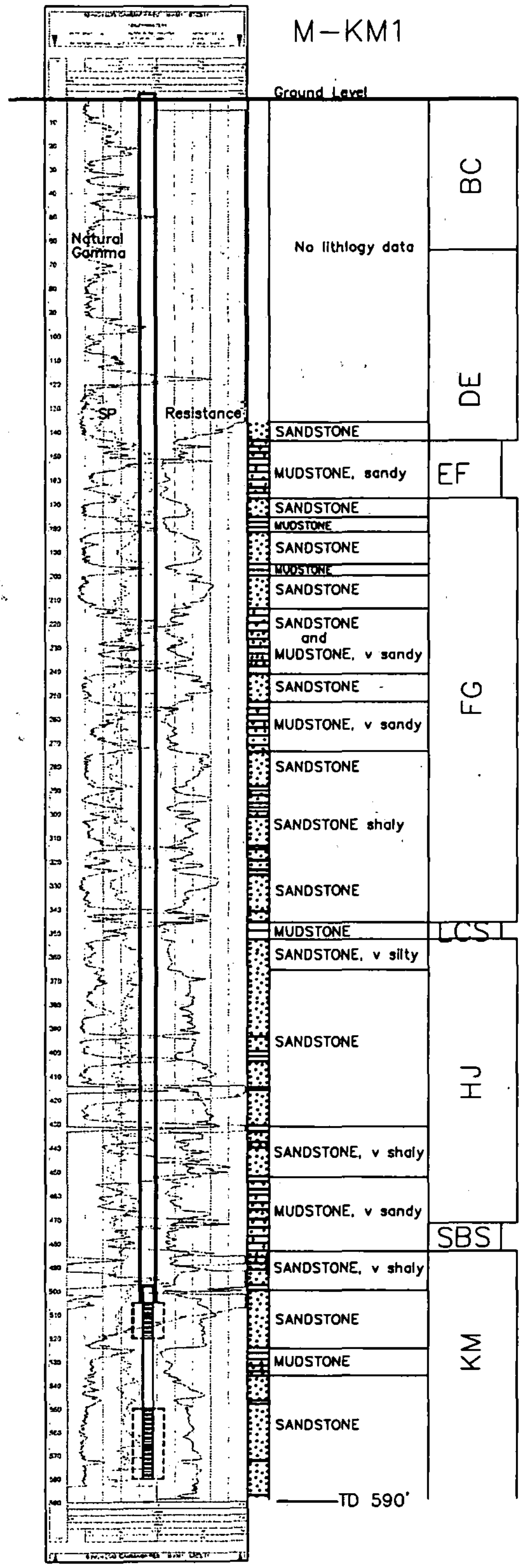
WELL STIMULATION: Method Airlift

Yield: Not recorded

MB-14

M–KM1

Vertical Scale: 1"–50'



Lost Creek ISR, LLC

WELL COMPLETION REPORT

WELL # M-KM1 SEO # 194695 Date Drilled: 7/22/11

Location: E 2,215,130 / N 595,555 (NAD 83)

Ground Elev: 6951' Measure Point Elev: 6951.6'

TD: 590' Hole Dia.: 7-7/8"

CASED to: 505' Casing: PVC SDR17 ID: 4.5" OD: 5"

GROUT: Portland Cement – Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: UKM and LKM Sub-Horizons

Static Water Level: Depth 194.3' Elev: 6756.4'
(10/23/11)

UNDERREAM: Blade Dia: 10.5"
Intervals: from 505' to 520' /length 15'
from 550' to 580' /length 30'

SCREEN LINER ASSEMBLY

Description	Depth From	Depth To	Elev. From	Elev. To	Length
K-packer unit	498'	505'	6453'	6446'	7'
Screen	505'	520'	6446'	6431'	15'
Screen	550'	580'	6401'	6371'	30'

SCREEN SPECIFICATIONS:
Slot: 0.030" Composition 3" PVC Screen (wrapped)

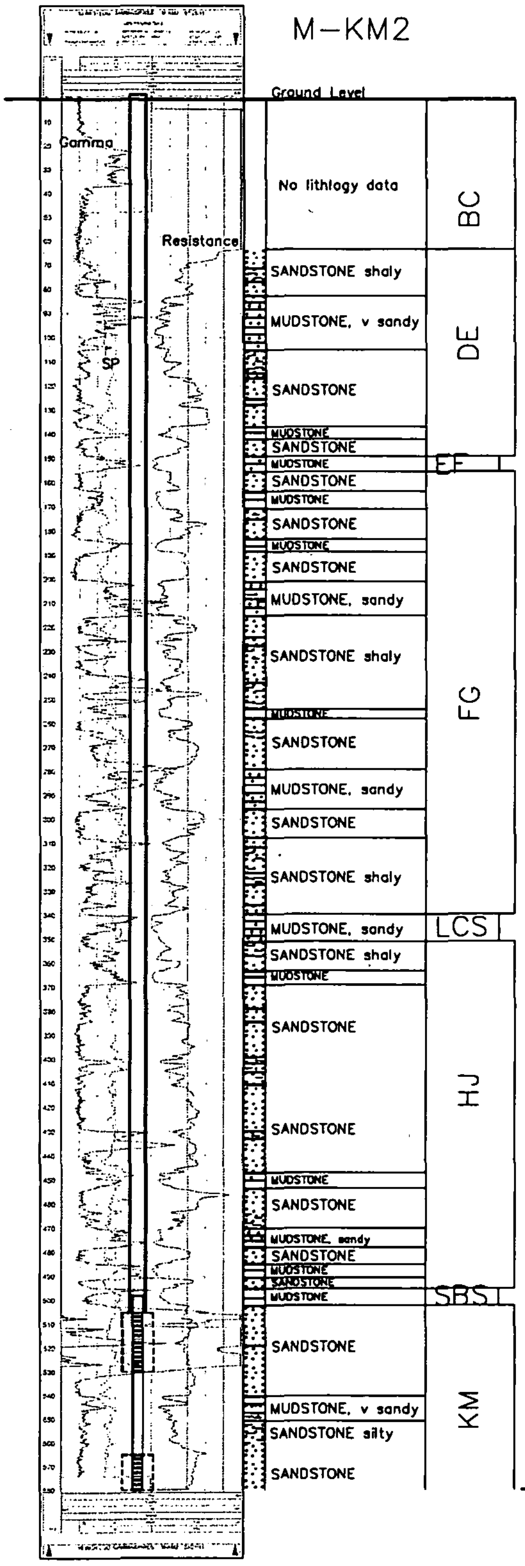
FILTER PACKING: N/A
Volume: ____(bags)(ft^3) Sand Specs. ______
Method: ____________

WELL STIMULATION: Method Airlift
Yield: [✓ Good] / Moderate / Poor
35 gpm

M–KM1

M–KM2

Vertical Scale: 1"=50'



Lost Creek ISR, LLC

WELL COMPLETION REPORT

WELL # M-KM2 SEO # 194694 Date Drilled: 7/21/11

Location: E 2,213,993 / N 594,513 (NAD 83)

Ground Elev: 6945 Measure Point Elev: 6946.9

TD: 580' Hole Dia.: 7-7/8"

CASED to: 505' Casing: PVC SDR17 ID: 4.5" OD: 5"

GROUT: Portland Cement – Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: UKM and LKM Sub-Horizons

Static Water Level: Depth 193.4' Elev: 6751.3'
(10/23/11)

UNDERREAM: Blade Dia: 10.5"
Intervals: from 505' to 530' /length 25'
from 565' to 580' /length 15'

SCREEN LINER ASSEMBLY

Description	Depth From	– To	Elev. / From	– To	Length
K-packer unit	498'	505'	6447'	6440'	7'
Screen	505'	530	6440'	6415'	25'
Screen	565'	580'	6380'	6365'	15'

SCREEN SPECIFICATIONS:
Slot: 0.030" Composition 3" PVC Screen (wrapped)

FILTER PACKING: N/A
Volume: ____ (bags)(ft^3) Sand Specs. ______
Method: ____________

WELL STIMULATION: Method Airlift
Yield [✓ Good] / Moderate / Poor
50 gpm

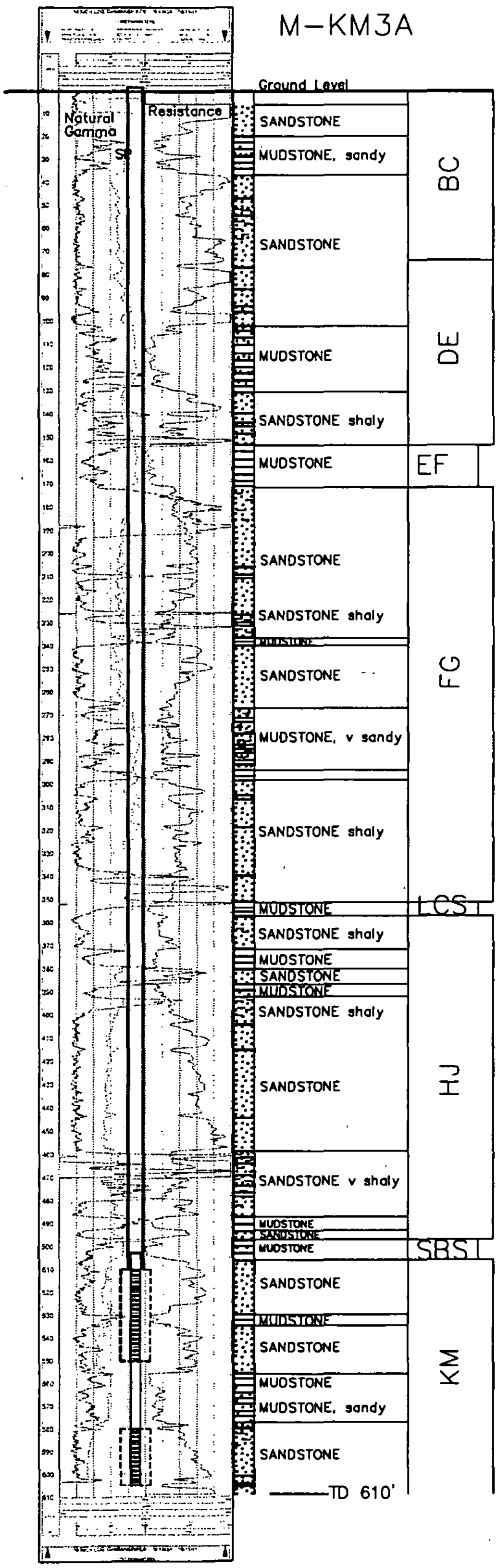
M–KM2

M-KM3A

Lost Creek ISR, LLC

WELL COMPLETION REPORT

Vertical Scale: 1"=50'



WELL # M-KM3A SEO # 194708 Date Drilled: 10/11/11

Location: E 2,214,543 / N 595,505 (NAD 83)

Ground Elev: 6945' Measure Point Elev: 6945.7'

TD: 610' Hole Dia.: 7-7/8"

CASED to: 510' Casing: PVC SDR17 ID: 4.5" OD: 5"

GROUT: Portland Cement – Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: UKM and LKM Sub-Horizons

Static Water Level: Depth 189.8' Elev: 6755.3'
(10/23/11)

UNDERREAM: Blade Dia: 10.5"
Intervals: from 510' to 550' /length 40'
from 580' to 605' /length 25'

SCREEN LINER ASSEMBLY

Description	Depth From	– To	Elev. / From	– To	Length
K-packer string	503'	510'	6442'	6435'	7'
Slotted PVC	510'	550'	6435'	6395'	40'
Slotted PVC	580'	605'	6365'	6340'	25'

SCREEN SPECIFICATIONS:
Slot: 0.030" Composition 3" Slotted PVC

FILTER PACKING: N/A
Volume: ____ (bags)(ft^3) Sand Specs. ____
Method: ____

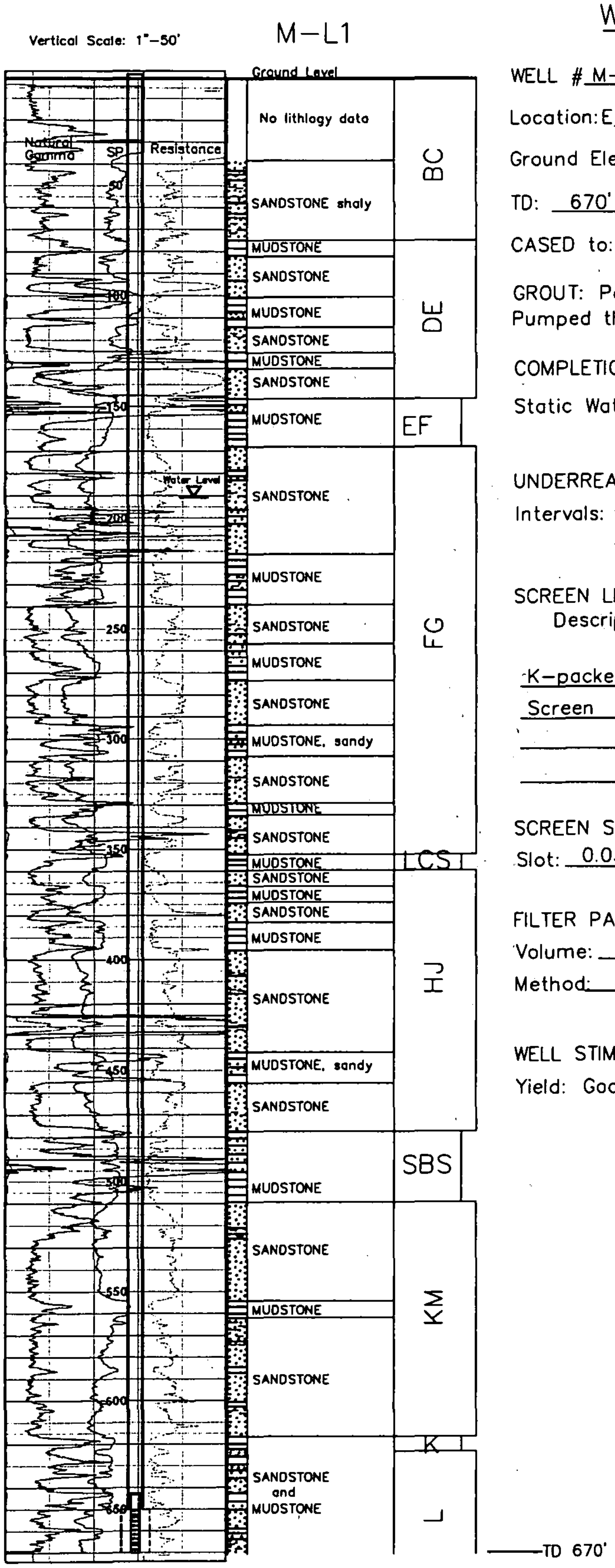
WELL STIMULATION: Method Airlift
Yield: [✓ Good] / Moderate / Poor
40 gpm

M-KM3A

M–L1

Lost Creek ISR, LLC

WELL COMPLETION REPORT



WELL # M–L1 SEO # 192104 Date Drilled: 2/16/10

Location: E 2,213,856 / N 595,210 (NAD 83)

Ground Elev: 6939' Measure Point Elev: 6941.5'

TD: 670' Hole Dia.: 7-7/8"

CASED to: 650" Casing: PVC SDR17 ID: 4.5" OD: 5"

GROUT: Portland Cement – Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: L Horizon

Static Water Level: Depth 190.8' Elev: 6750.7'
(3/15/13)

UNDERREAM: Blade Dia: 10.5"

Intervals: from 650' to 670' /length 20'

from ______ to ______ /length ______

SCREEN LINER ASSEMBLY

Description	Depth From	Depth To	Elev. From	Elev. To	Length
K-packer unit	643'	650'	6296'	6289'	7'
Screen	650'	670'	6289'	6269'	20'

SCREEN SPECIFICATIONS:

Slot: 0.030" Composition 3" PVC Screen (wrapped)

FILTER PACKING: N/A

Volume: ____ (bags)(ft^3) Sand Specs. ______

Method: ______________________

WELL STIMULATION: Method Airlift

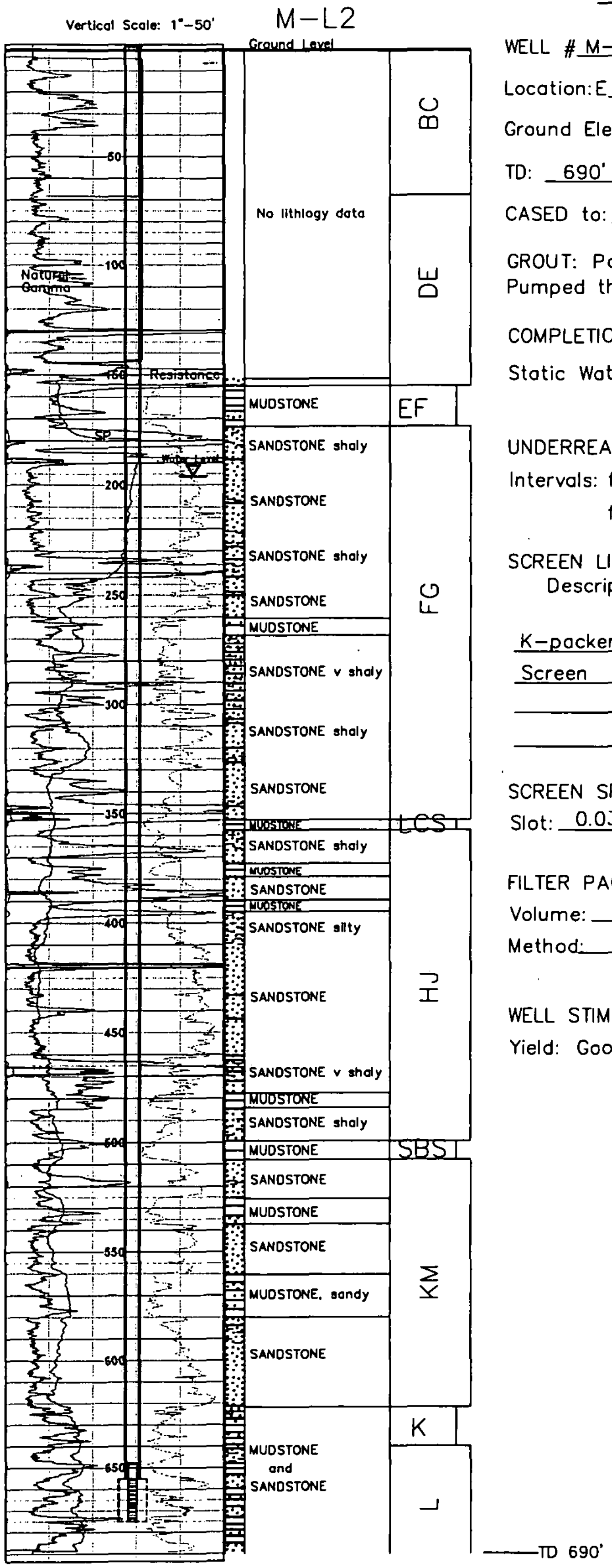
Yield: Good / [✓ Moderate] / Poor
10 gpm

M–L1

M-L2

Lost Creek ISR, LLC

WELL COMPLETION REPORT



WELL # M-L2 SEO # 192105 Date Drilled: 2/10/10

Location: E 2,214,551 / N 595,530 (NAD 83)

Ground Elev: 6945' Measure Point Elev: 6946.6'

TD: 690' Hole Dia.: 7-7/8"

CASED to: 655' Casing: PVC SDR17 ID: 4.5" OD: 5"

GROUT: Portland Cement – Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: L Horizon

Static Water Level: Depth 196.5' Elev: 6750.1'
(3/15/13)

UNDERREAM: Blade Dia: 10.5"

Intervals: from 655' to 675' /length 20'

from ____ to ____ /length ____

SCREEN LINER ASSEMBLY

Description	Depth		Elev.		Length
	From	To	From	To	
K-packer unit	648'	655'	6297'	6290'	7'
Screen	655'	675'	6290'	6270'	20'

SCREEN SPECIFICATIONS:

Slot: 0.030" Composition 3" PVC Screen (wrapped)

FILTER PACKING:

Volume: ____ (bags)(ft^3) Sand Specs. ____

Method: ____

WELL STIMULATION: Method Airlift

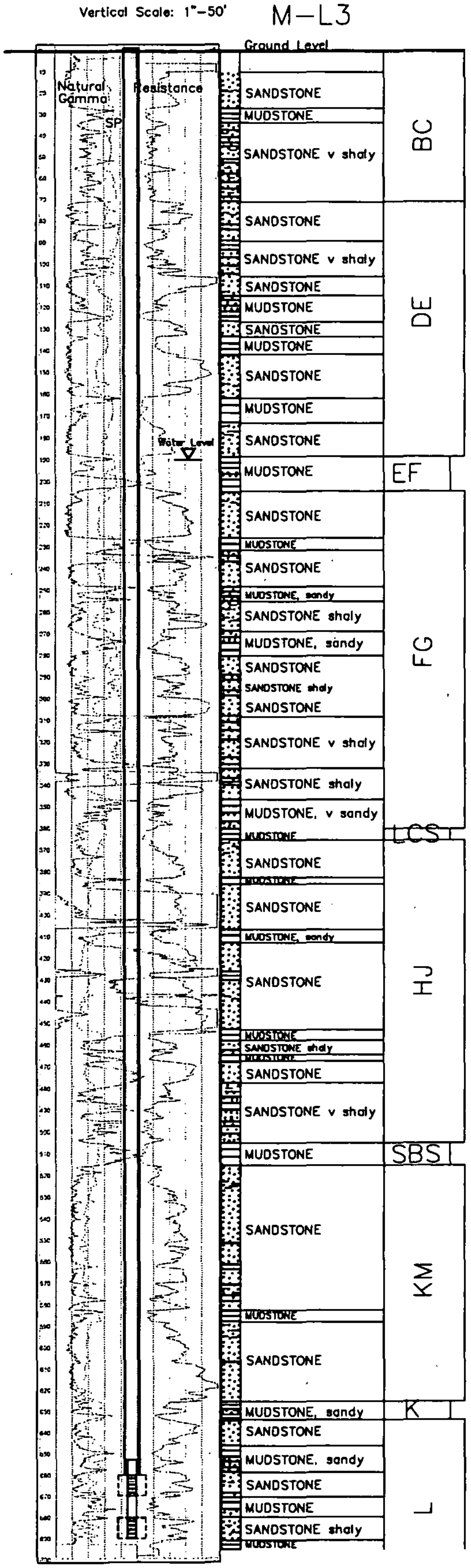
Yield: Good / Moderate / [✓ Poor]
10 gpm

M-L2

M–L3

Lost Creek ISR, LLC

WELL COMPLETION REPORT



WELL # M–L3 SEO # 194693 Date Drilled: 8/2/11

Location: E 2,212,651 / N 595,362 (NAD 83)

Ground Elev: 6934 Measure Point Elev: 6934.9

TD: 700' Hole Dia.: 7–7/8"

CASED to: 660' Casing: PVC SDR17 ID: 4.5" OD: 5"

GROUT: Portland Cement – Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: L Horizon

Static Water Level: Depth 189.6' Elev: 6745.3'
(3/15/13)

UNDERREAM: Blade Dia: 10.5"

Intervals: from 660' to 670' /length 10'
from 680' to 690' /length 10'

SCREEN LINER ASSEMBLY

Description	Depth From	Depth To	Elev. From	Elev. To	Length
K–packer unit	653'	660'	6281'	6274'	7'
Screen	660'	670'	6274'	6264'	10'
Screen	680'	690'	6254'	6244'	10'

SCREEN SPECIFICATIONS:
Slot: 0.030" Composition 3" PVC Screen (wrapped)

FILTER PACKING: N/A
Volume: ____ (bags)(ft³) Sand Specs. ____
Method: ____

WELL STIMULATION: Method Airlift
Yield: [✓ Good] / Moderate / Poor
25 gpm

M–L3

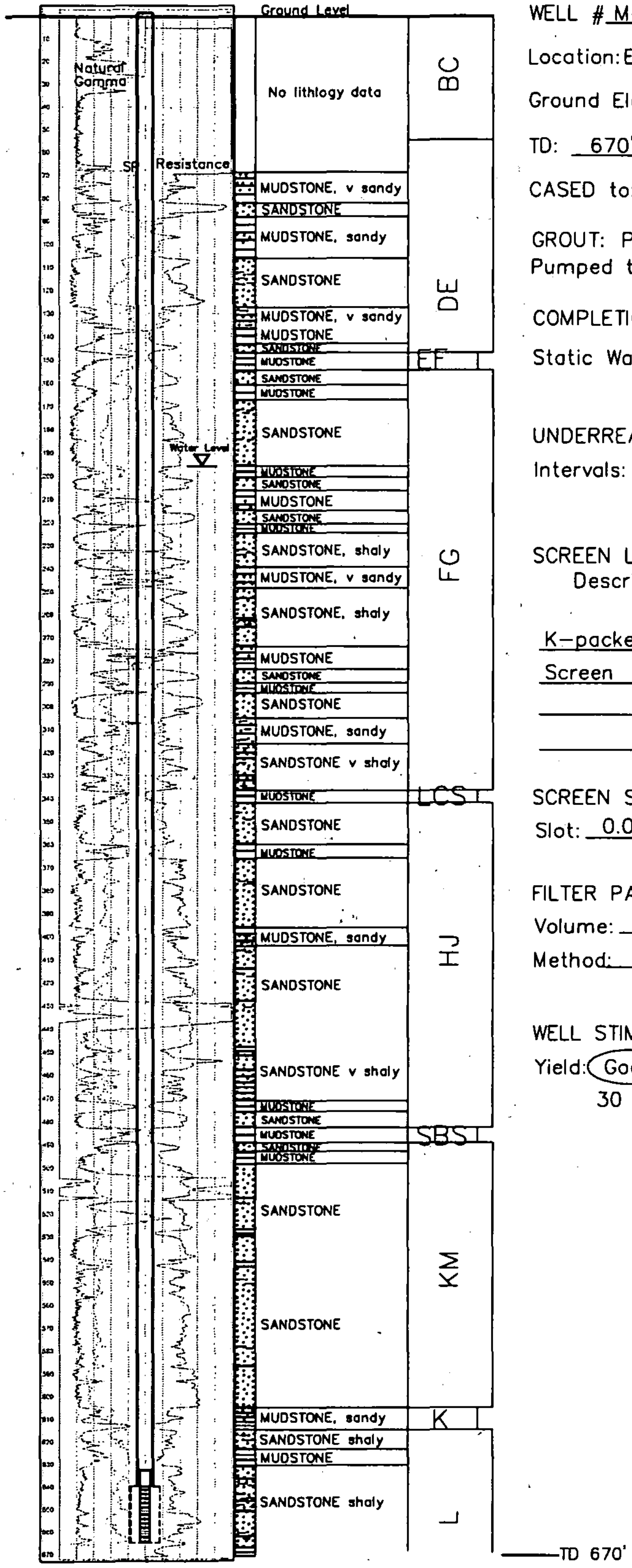
M–L4

Lost Creek ISR, LLC

WELL COMPLETION REPORT

Vertical Scale: 1"–50'

M–L4



WELL # M–L4 SEO # 194692 Date Drilled: 7/27/11

Location: E 2,213,937 / N 594,454 (NAD 83)

Ground Elev: 6943 Measure Point Elev: 6944.9

TD: 670' Hole Dia.: 7-7/8"

CASED to: 640' Casing: PVC SDR17 ID: 4.5" OD: 5"

GROUT: Portland Cement – Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: L Horizon

Static Water Level: Depth 195.8' Elev: 6749.1'
(3/15/13)

UNDERREAM: Blade Dia: 10.5"
Intervals: from 640' to 665' /length 25'
from ____ to ____ /length ____

SCREEN LINER ASSEMBLY

Description	Depth From	Depth To	Elev. From	Elev. To	Length
K–packer unit	633'	640'	6310'	6303'	7'
Screen	640'	665'	6303'	6278'	25'

SCREEN SPECIFICATIONS:
Slot: 0.030" Composition 3" PVC Screen (wrapped)

FILTER PACKING: N/A
Volume: ____ (bags)(ft^3) Sand Specs. ____
Method: ____

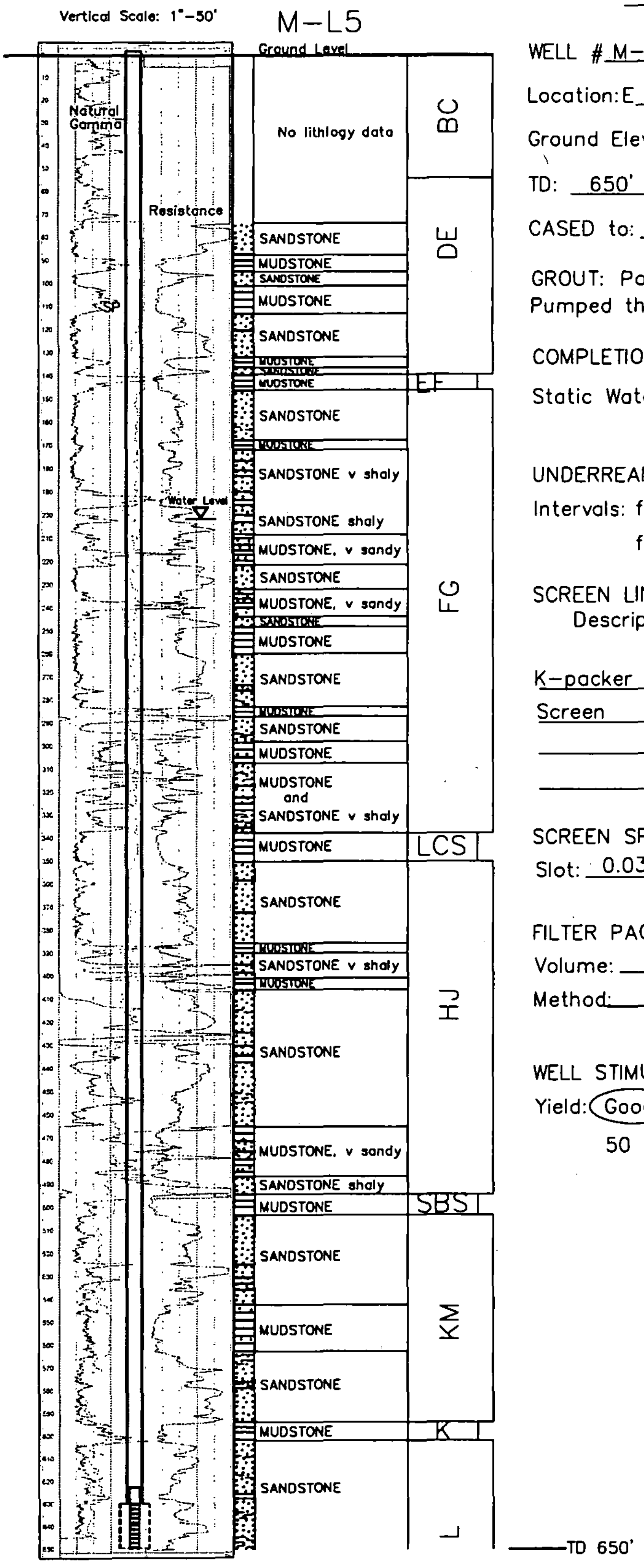
WELL STIMULATION: Method Airlift
Yield: [✓ Good] / Moderate / Poor
30 gpm

M–L4

M–L5

Lost Creek ISR, LLC

WELL COMPLETION REPORT



WELL # M–L5 SEO # 194699 Date Drilled: 8/2/11

Location: E 2,211,589 / N 595,995 (NAD 83)

Ground Elev: 6945 Measure Point Elev: 6945.3

TD: 650' Hole Dia.: 7–7/8"

CASED to: 630' Casing: PVC SDR17 ID: 4.5" OD: 5"

GROUT: Portland Cement – Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: L Horizon

Static Water Level: Depth 201.6' Elev: 6743.7
(3/15/13)

UNDERREAM: Blade Dia: 10.5"

Intervals: from 630' to 650' /length 20'

from ______ to ______ /length ______

SCREEN LINER ASSEMBLY

Description	Depth		Elev.		Length
	From	To	From	To	
K–packer string	623'	630'	6322'	6315'	7
Screen	630'	650'	6315'	6295'	20'

SCREEN SPECIFICATIONS:

Slot: 0.030" Composition 3" PVC Screen (wrapped)

FILTER PACKING: N/A

Volume: ______ (bags)(ft^3) Sand Specs. ______

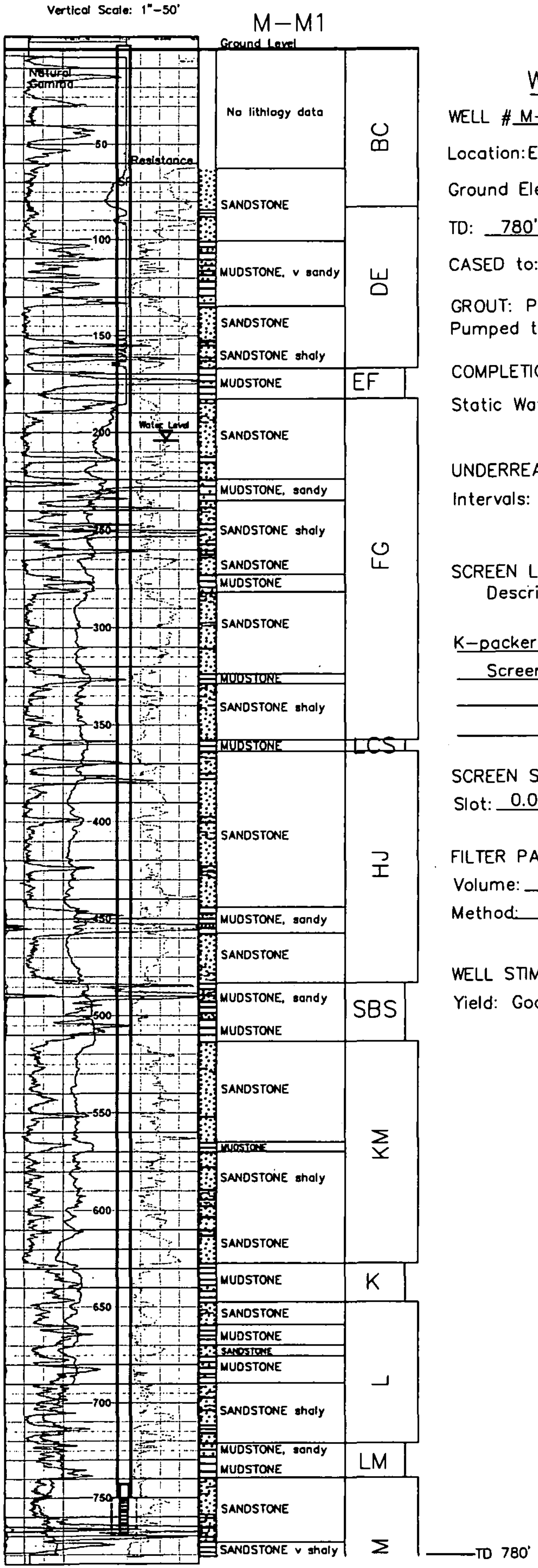
Method: ______

WELL STIMULATION: Method Airlift

Yield: [✓ Good] / Moderate / Poor

50 gpm

M–L5



M-M1

Lost Creek ISR, LLC

WELL COMPLETION REPORT

WELL # M-M1 SEO # 192106 Date Drilled: 2/10/10

Location: E 2,213,989 / N 595,525 (NAD 83)

Ground Elev: 6944 Measure Point Elev: 6947.3

TD: 780' Hole Dia.: 7-7/8"

CASED to: 750' Casing: PVC SDR17 ID: 4.5" OD: 5"

GROUT: Portland Cement – Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: M Horizon

Static Water Level: Depth 203.7' Elev: 6743.7
(3/15/13)

UNDERREAM: Blade Dia: 10.0"
Intervals: from 750' to 770' /length 20'
from _____ to _____ /length _____

SCREEN LINER ASSEMBLY

Description	Depth From	Depth To	Elev. From	Elev. To	Length
K-packer string	743'	750'	6201'	6194'	7'
Screen	750'	770'	6194'	6174'	20'

SCREEN SPECIFICATIONS:
Slot: 0.030" Composition 3" PVC Screen (wrapped)

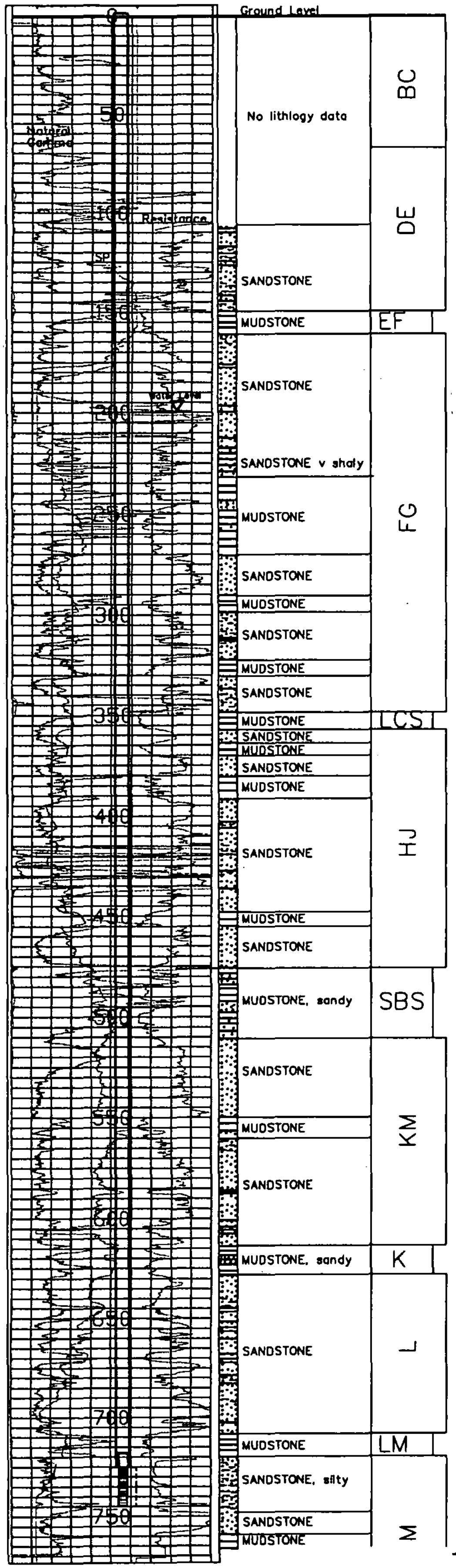
FILTER PACKING: N/A
Volume: _____ (bags)(ft^3) Sand Specs. _____
Method: _____

WELL STIMULATION: Method Airlift
Yield: Good / [✓ Moderate] / Poor
35 gpm

M-M1

Vertical Scale: 1"-50'

M-M2



M-M2

Lost Creek ISR, LLC

WELL COMPLETION REPORT

WELL # M-M2 SEO # 192102 Date Drilled: 2/11/10

Location: E 2,213,830 / N 595,194 (NAD 83)

Ground Elev: 6940 Measure Point Elev: 6942.0

TD: 770' Hole Dia.: 7-7/8"

CASED to: 725' Casing: PVC SDR17 ID: 4.5" OD: 5"

GROUT: Portland Cement – Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: M Horizon

Static Water Level: Depth 199.4 Elev: 6742.6
(3/15/13)

UNDERREAM: Blade Dia: 10.0"
Intervals: from 725' to 745' /length 20'
from ____ to ____ /length ____

SCREEN LINER ASSEMBLY

Description	Depth From	Depth To	Elev. From	Elev. To	Length
K-packer string	718'	725'	6222'	6215'	7'
Screen	725'	745'	6215'	6195'	20'

SCREEN SPECIFICATIONS:
Slot: 0.030" Composition 3" PVC Screen (wrapped)

FILTER PACKING: N/A
Volume: ____ (bags)(ft^3) Sand Specs. ____
Method: ____

WELL STIMULATION: Method Airlift
Yield: Good / [✓ Moderate] / Poor
20 gpm

M-M2

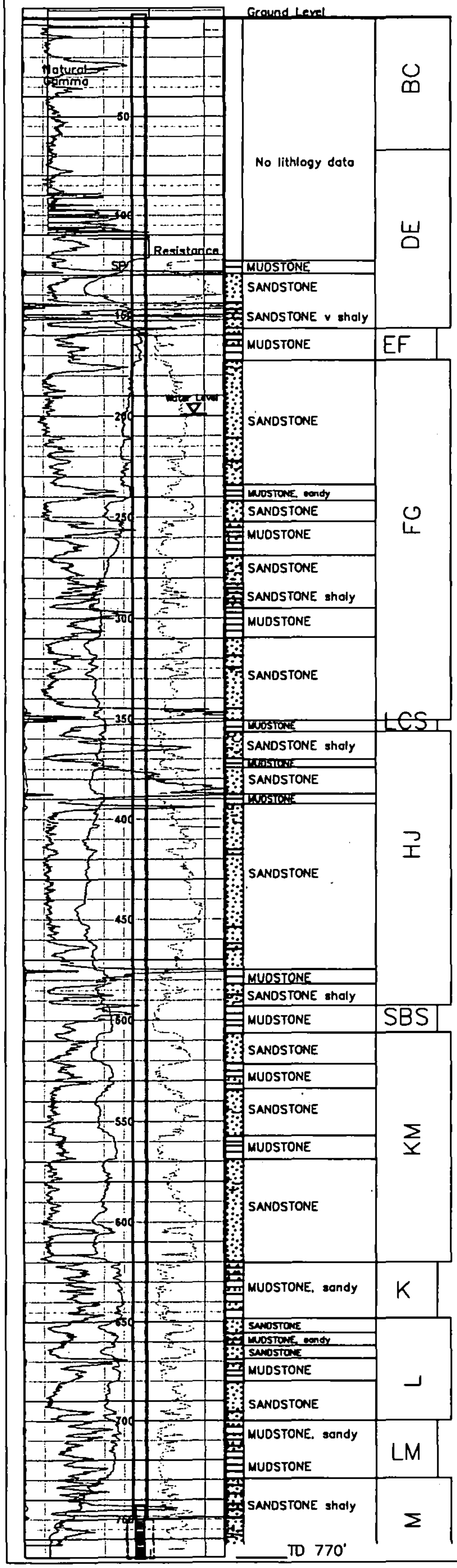
M-M3

Lost Creek ISR, LLC

WELL COMPLETION REPORT

Vertical Scale: 1"-50'

M-M3



WELL # M-M3 SEO # 192101 Date Drilled: 2/10/10

Location: E 2,214,552 / N 595,550 (NAD 83)

Ground Elev: 6945' Measure Point Elev: 6947.8'

TD: 770' Hole Dia.: 7-7/8"

CASED to: 750' Casing: PVC SDR17 ID: 4.5" OD: 5"

GROUT: Portland Cement – Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: M Horizon

Static Water Level: Depth 198.7' Elev: 6749.1'
(3/15/13)

UNDERREAM: Blade Dia: 10.0"
Intervals: from 750' to 770' /length 20'
from ____ to ____ /length ____

SCREEN LINER ASSEMBLY

Description	Depth		Elev.		Length
	From	– To	/ From	– To	
K-packer string	743'	750'	6202'	6195'	7'
Screen	750'	770'	6195'	6175'	20'

SCREEN SPECIFICATIONS:
Slot: 0.030" Composition 3" PVC Screen (wrapped)

FILTER PACKING:
Volume: ____ (bags)(ft³) Sand Specs. ____
Method: ____

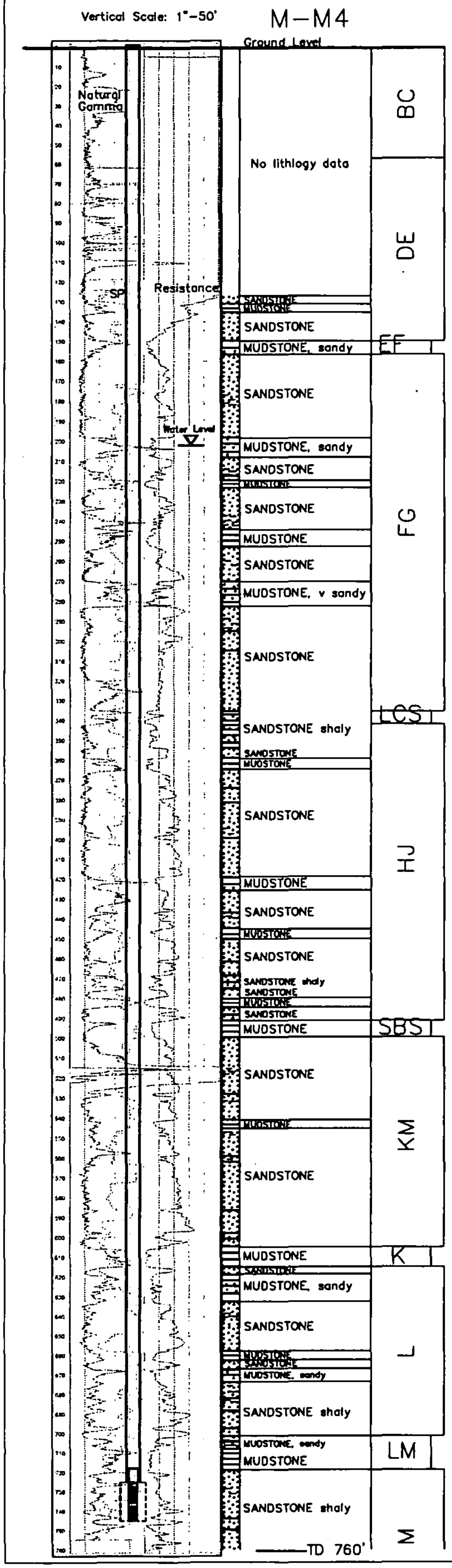
WELL STIMULATION: Method Airlift
Yield: Good / Moderate / [✓ Poor]
10 gpm

M-M3

M-M4

Lost Creek ISR, LLC

WELL COMPLETION REPORT



WELL # M-M4 SEO # 194688 Date Drilled: 7/25/11

Location: E 2,214,044 / N 594,453 (NAD 83)

Ground Elev: 6944' Measure Point Elev: 6945.8'

TD: 760' Hole Dia.: 7-7/8"

CASED to: 725' Casing: PVC SDR17 ID: 4.5" OD: 5"

GROUT: Portland Cement – Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: M Horizon

Static Water Level: Depth 202.0' Elev: 6743.8'
(3/15/13)

UNDERREAM: Blade Dia: 10.5"

Intervals: from 725' to 745' /length 20'

from ____ to ____ /length ____

SCREEN LINER ASSEMBLY

Description	Depth From	Depth To	Elev. From	Elev. To	Length
K-packer string	718'	725'	6226'	6219'	7'
Screen	725'	745'	6219'	6199'	20'

SCREEN SPECIFICATIONS:

Slot: 0.030" Composition 3" PVC Screen (wrapped)

FILTER PACKING: N/A

Volume: ____ (bags)(ft^3) Sand Specs. ____

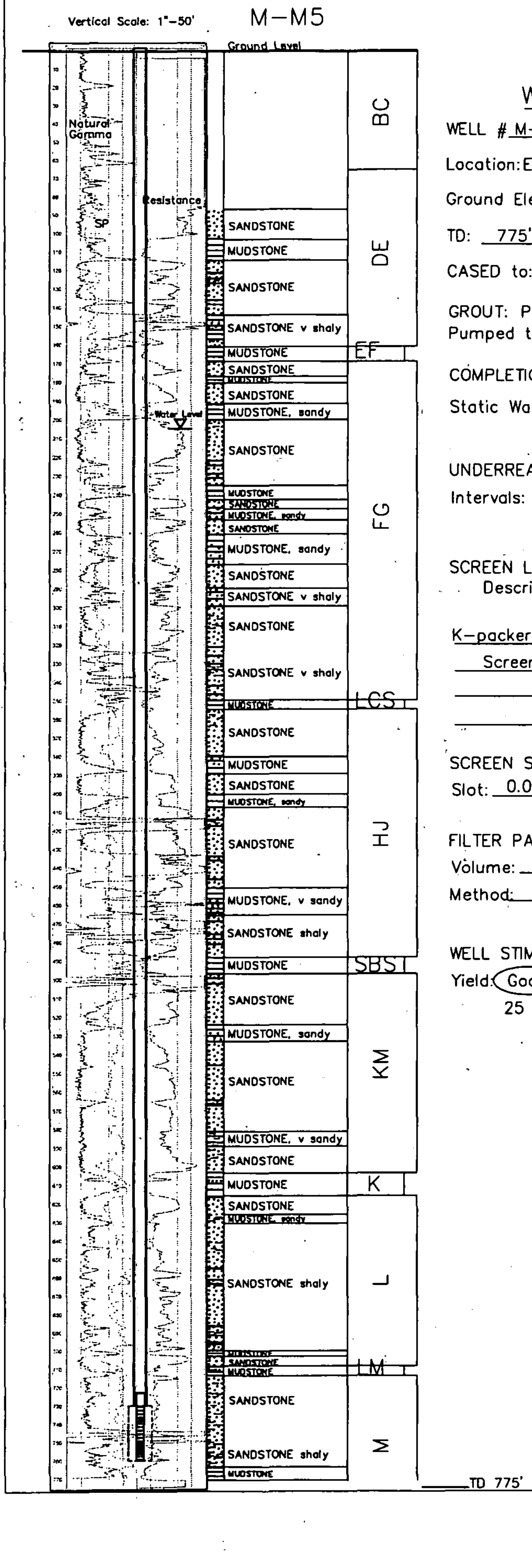
Method: ____

WELL STIMULATION: Method Airlift

Yield: Good / [✓ Moderate] / Poor

15 gpm

M-M4



M-M5

Lost Creek ISR, LLC

WELL COMPLETION REPORT

WELL # M-M5 SEO # 194689 Date Drilled: 7/20/11

Location: E 2,215,196 / N 595,340 (NAD 83)

Ground Elev: 775' Measure Point Elev: 6953.0'

TD: 775' Hole Dia.: 7-7/8"

CASED to: 730' Casing: PVC SDR17 ID: 4.5" OD: 5"

GROUT: Portland Cement – Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: M Horizon

Static Water Level: Depth 204.9' Elev: 6748.1'
(3/15/13)

UNDERREAM: Blade Dia: 10.5"
Intervals: from 730' to 760' /length 30'
from ______ to ______ /length ______

SCREEN LINER ASSEMBLY

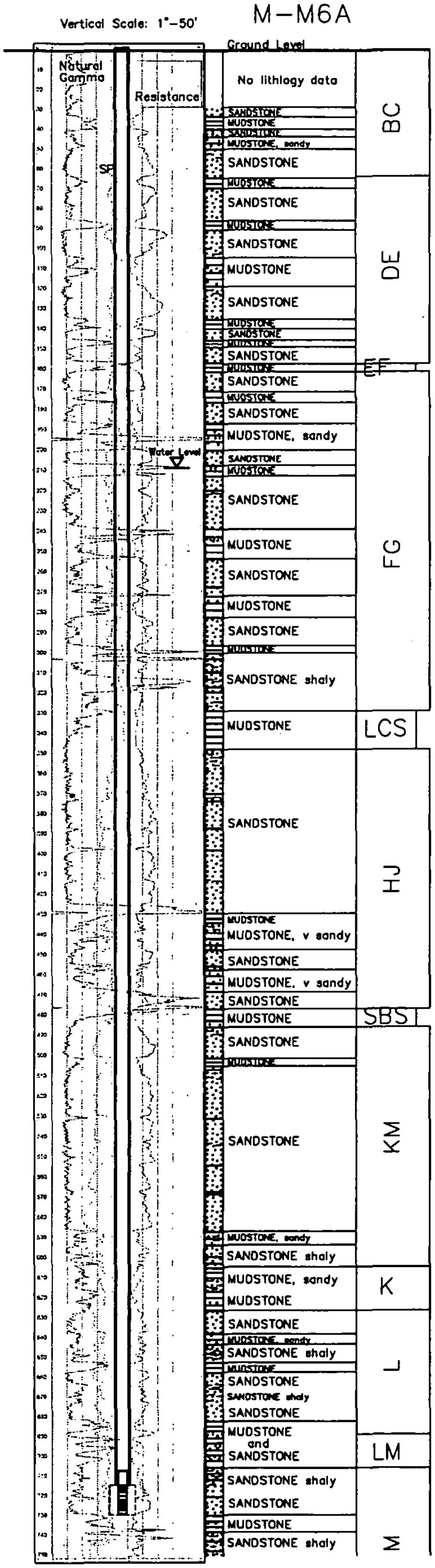
Description	Depth From	Depth To	Elev. From	Elev. To	Length
K-packer string	723'	730'	6229'	6222'	7'
Screen	730'	760'	6222'	6192'	30'

SCREEN SPECIFICATIONS:
Slot: 0.030" Composition 3" PVC Screen (wrapped)

FILTER PACKING: N/A
Volume: ______ (bags)(ft^3) Sand Specs. ______
Method: ______

WELL STIMULATION: Method Airlift
Yield: [✓ Good] / Moderate / Poor
25 gpm

M-M5



M-M6A

Lost Creek ISR, LLC

WELL COMPLETION REPORT

WELL # M-M6A SEO # 194690 Date Drilled: 7/27/11

Location: E 2,214,200 / N 596,525 (NAD 83)

Ground Elev: 6964' Measure Point Elev: 6964.5'

TD: 750' Hole Dia.: 7-7/8"

CASED to: 715' Casing: PVC SDR17 ID: 4.5" OD: 5"

GROUT: Portland Cement – Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: M Horizon

Static Water Level: Depth 209.4' Elev: 6755.1'
(3/15/13)

UNDERREAM: Blade Dia: 10.5"
Intervals: from 715' to 730' /length 15'
from ____ to ____ /length ____

SCREEN LINER ASSEMBLY

Description	Depth From	Depth To	Elev. From	Elev. To	Length
K-packer string	708'	715'	6256'	6249'	7'
Screen	715'	730'	6249'	6234'	15'

SCREEN SPECIFICATIONS:
Slot: 0.030" Composition 3" PVC Screen (wrapped)

FILTER PACKING: N/A
Volume: ____ (bags)(ft^3) Sand Specs. ____
Method: ____

WELL STIMULATION: Method Airlift
Yield [✓ Good] / Moderate / Poor
25 gpm

TD 750'

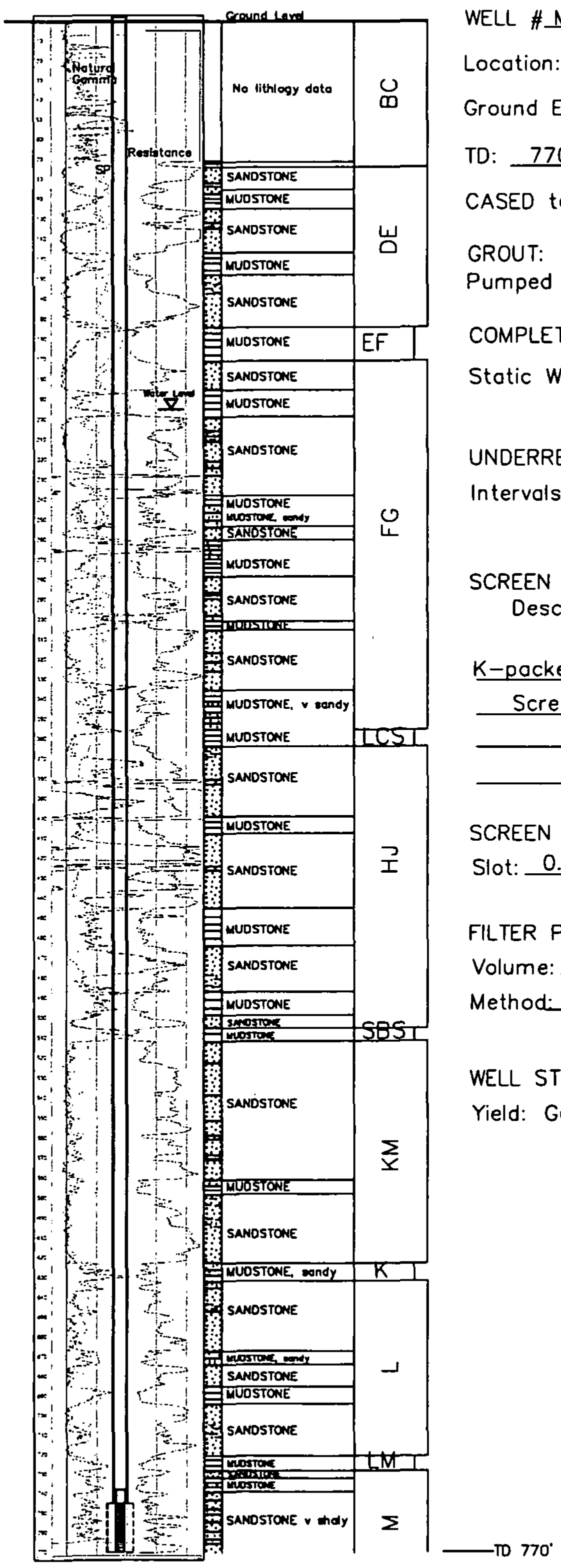
M-M6A

M-M7

Lost Creek ISR, LLC

WELL COMPLETION REPORT

M-M7



WELL # M-M7 SEO # 194691 Date Drilled: 7/28/11

Location: E 2,212,691 / N 595,346 (NAD 83)

Ground Elev: 6933' Measure Point Elev: 6933.5'

TD: 770' Hole Dia.: 7-7/8"

CASED to: 745' Casing: PVC SDR17 ID: 4.5" OD: 5"

GROUT: Portland Cement – Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: M Horizon

Static Water Level: Depth 195.4' Elev: 6738.0'
(3/15/13)

UNDERREAM: Blade Dia: 10.5"

Intervals: from 745' to 770' /length 25'
from ______ to ______ /length ______

SCREEN LINER ASSEMBLY

Description	Depth From	Depth To	Elev. From	Elev. To	Length
K-packer string	738'	745'	6195'	6188'	7'
Screen	745'	770'	6188'	6163'	25'

SCREEN SPECIFICATIONS:

Slot: 0.030" Composition 3" PVC Screen (wropped)

FILTER PACKING: N/A

Volume: ______ (bags)(ft^3) Sand Specs. ______

Method: ______

WELL STIMULATION: Method Airlift

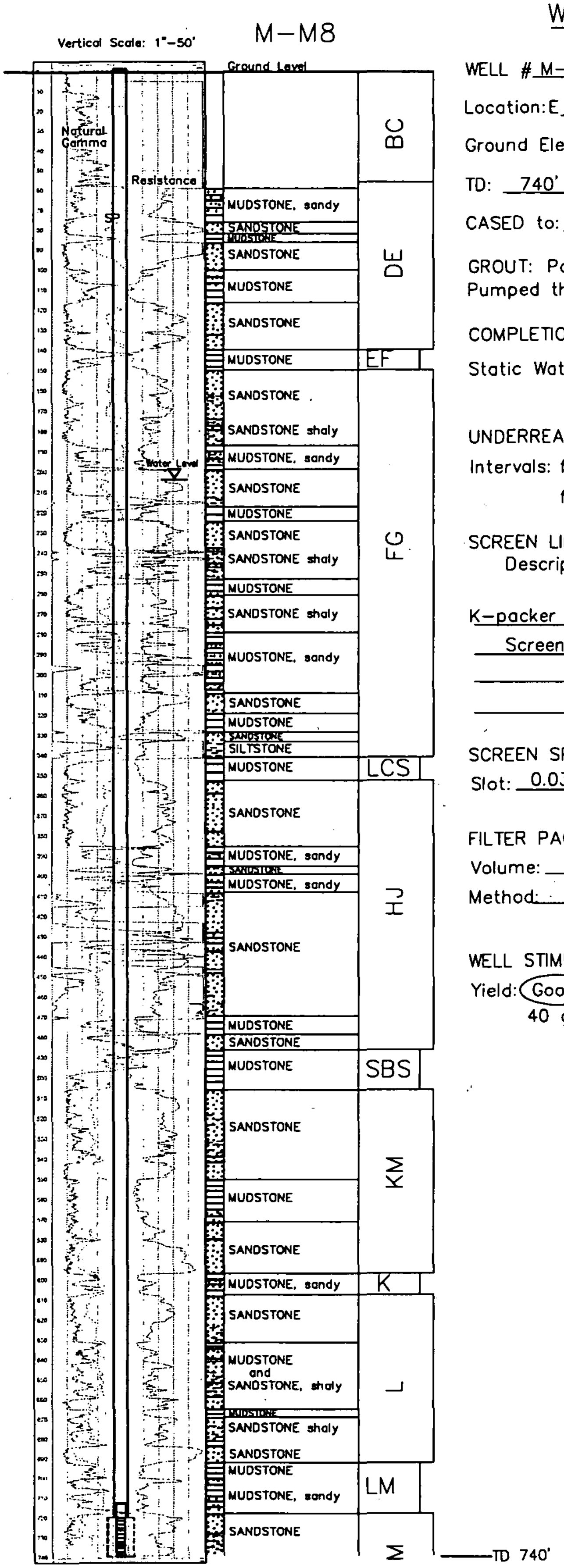
Yield: Good / [✓ Moderate] / Poor
20 gpm

M-M7

M−M8

Lost Creek ISR, LLC

WELL COMPLETION REPORT



WELL # M−M8 SEO # 194698 Date Drilled: 7/29/11

Location: E 2,211,634 / N 596,001 (NAD 83)

Ground Elev: 6947' Measure Point Elev: 6947.7'

TD: 740' Hole Dia.: 7−7/8"

CASED to: 720' Casing: PVC SDR17 ID: 4.5" OD: 5"

GROUT: Portland Cement − Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: M Horizon

Static Water Level: Depth 203.8' Elev: 6743.9'
(3/15/13)

UNDERREAM: Blade Dia: 10.5"
Intervals: from 720' to 740' /length 20'
from ____ to ____ /length ____

SCREEN LINER ASSEMBLY

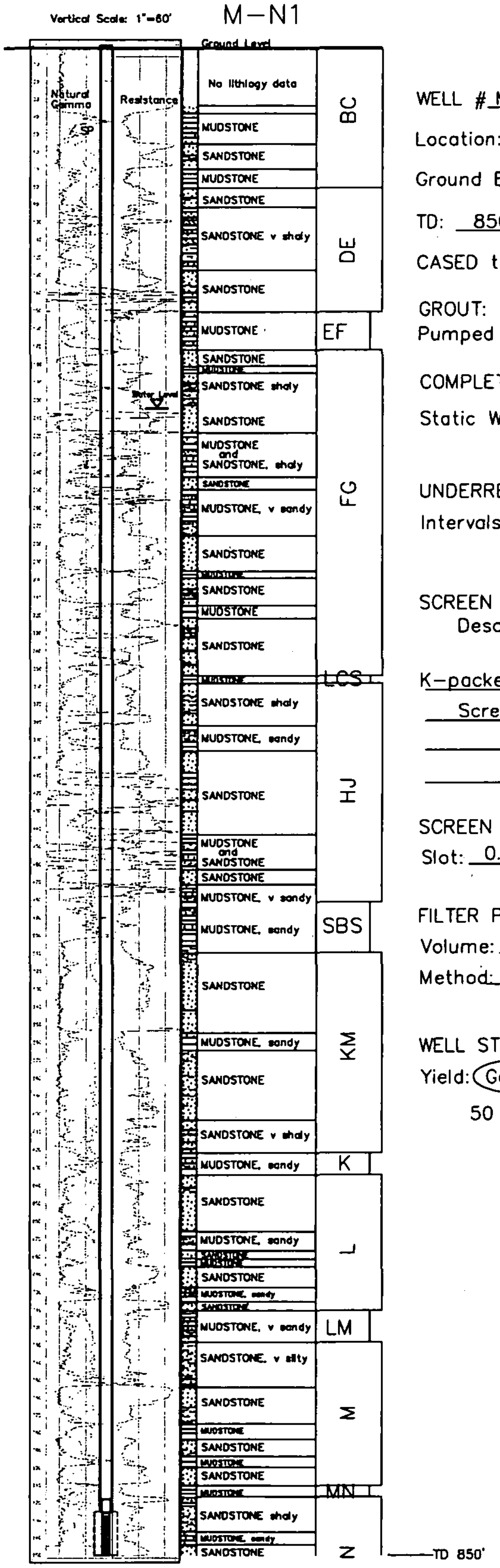
Description	Depth From	Depth To	Elev. From	Elev. To	Length
K−packer string	713'	720'	6234'	6227'	7'
Screen	720'	740'	6227'	6207'	20'

SCREEN SPECIFICATIONS:
Slot: 0.030" Composition 3" PVC Screen (wrapped)

FILTER PACKING: N/A
Volume: ____ (bags)(ft³) Sand Specs. ____
Method: ____

WELL STIMULATION: Method Airlift
Yield: [✓ Good] / Moderate / Poor
40 gpm

M−M8



M-N1

Lost Creek ISR, LLC

WELL COMPLETION REPORT

WELL # M-N1 SEO # 194697 Date Drilled: 7/20/11

Location: E 2,213,777 / N 595,217 (NAD 83)

Ground Elev: 6940' Measure Point Elev: 6942.4'

TD: 850' Hole Dia.: 7-7/8"

CASED to: 825' Casing: PVC SDR17 ID: 4.5" OD: 5"

GROUT: Portland Cement – Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: N Horizon

Static Water Level: Depth 204.2' Elev: 6738.2'
(3/15/13)

UNDERREAM: Blade Dia: 10.5"
Intervals: from 825' to 850' /length 25'
from ____ to ____ /length ____

SCREEN LINER ASSEMBLY

Description	Depth From	Depth To	Elev. From	Elev. To	Length
K-packer string	818'	825'	6122'	6115'	7'
Screen	825'	850'	6115'	6090'	25'

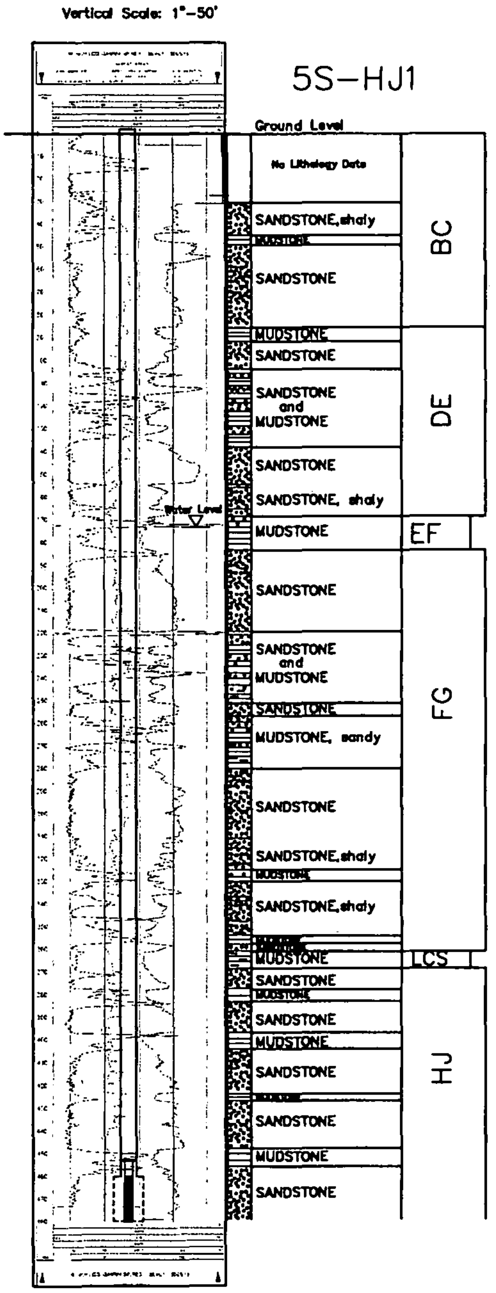
SCREEN SPECIFICATIONS:
Slot: 0.030" Composition 3" PVC Screen (wrapped)

FILTER PACKING: N/A
Volume: ____ (bags)(ft^3) Sand Specs. ____
Method: ____

WELL STIMULATION: Method Airlift
Yield: [✓ Good] / Moderate / Poor
50 gpm

M-N1

5S-HJ1



Lost Creek ISR, LLC

WELL COMPLETION REPORT

WELL # 5S-HJ1 SEO # 194709 Date Drilled: 7/25/11

Location: E 2,214,014 / N 595,593 (NAD 83)

Ground Elev: 6945' Measure Point Elev: 6947.2'

TD: 480' Hole Dia.: 7-7/8"

CASED to: 460' Casing: PVC SDR17 ID: 4.5" OD: 5"

GROUT: Portland Cement - Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: LHJ Sub-Horizon

Static Water Level: Depth 173.3' Elev: 6773.9'
(10/4/12)

UNDERREAM: Blade Dia: 10.5"
Intervals: from 460' to 480' /length 20'
from ____ to ____ /length ____

SCREEN LINER ASSEMBLY

Description	Depth		Elev.		Length
	From	To	From	To	
K-packer string	453'	453'	6492'	6485'	7'
Slotted PVC	460'	480'	6485'	6465'	20'

SCREEN SPECIFICATIONS:
Slot: 0.030" Composition 3" PVC-Slotted Casing

FILTER PACKING: N/A
Volume: ____ (bags)(ft^3) Sand Specs. ____
Method: ____

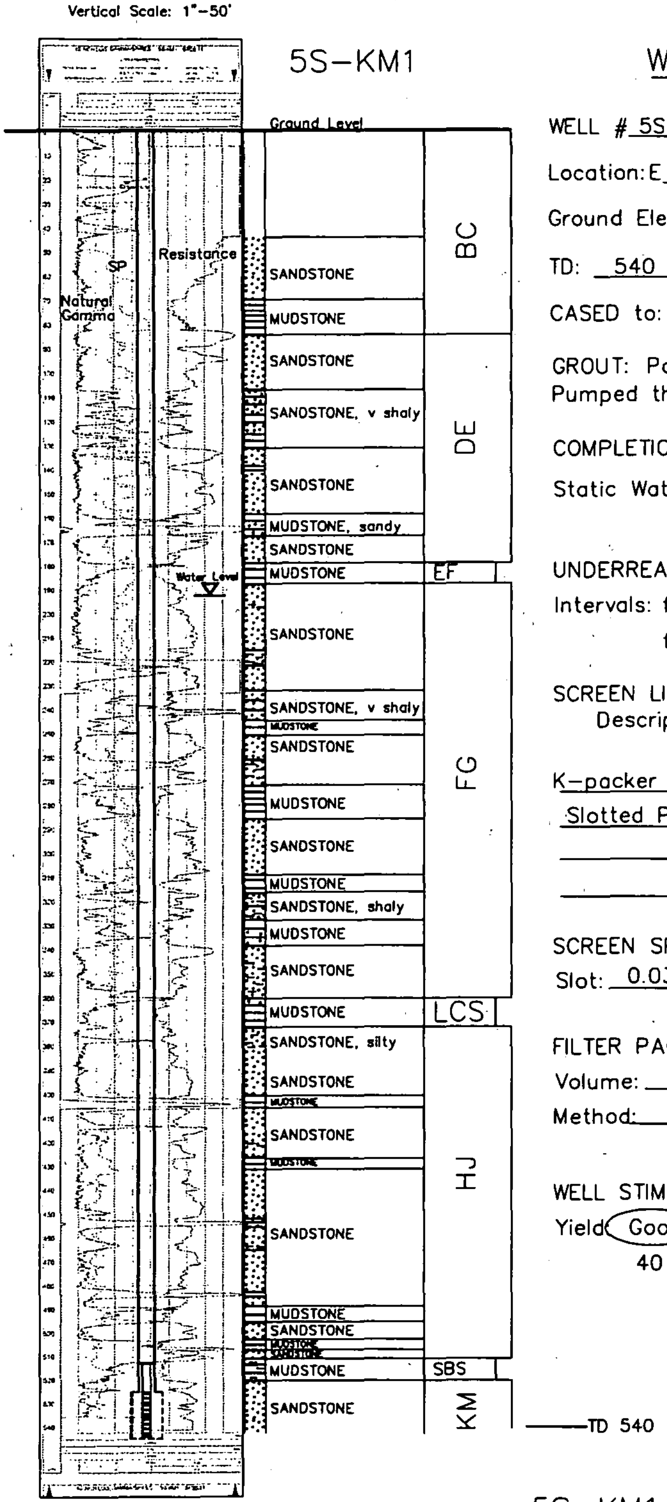
WELL STIMULATION: Method Airlift
Yield: [✓ Good] / Moderate / Poor
35 gpm

5S-HJ1

5S-KM1

Lost Creek ISR, LLC

WELL COMPLETION REPORT



WELL # 5S-KM1 SEO # 194711 Date Drilled: 7/26/11

Location: E 2,213,950 / N 595,640 (NAD 83)

Ground Elev: 6946 Measure Point Elev: 6946.2'

TD: 540 ft. Hole Dia.: 7-7/8"

CASED to: 525 Casing: PVC SDR17 ID: 4.5" OD: 5"

GROUT: Portland Cement - Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: UKM Sub-Horizon

Static Water Level: Depth 192.3'' Elev: 6753.9'
(10/4/12)

UNDERREAM: Blade Dia: 10.5"

Intervals: from 525' to 545' /length 20'

from ____ to ____ /length ____

SCREEN LINER ASSEMBLY

Description	Depth From	To	Elev. / From	To	Length
K-packer string	518'	525'	7414'	7421'	7'
Slotted PVC	525'	545'	6421'	6401'	20'

SCREEN SPECIFICATIONS:

Slot: 0.030" Composition 3" Slotted PVC

FILTER PACKING: N/A

Volume: ____(bags)(ft^3) Sand Specs. ____

Method: ____

WELL STIMULATION: Method Airlift

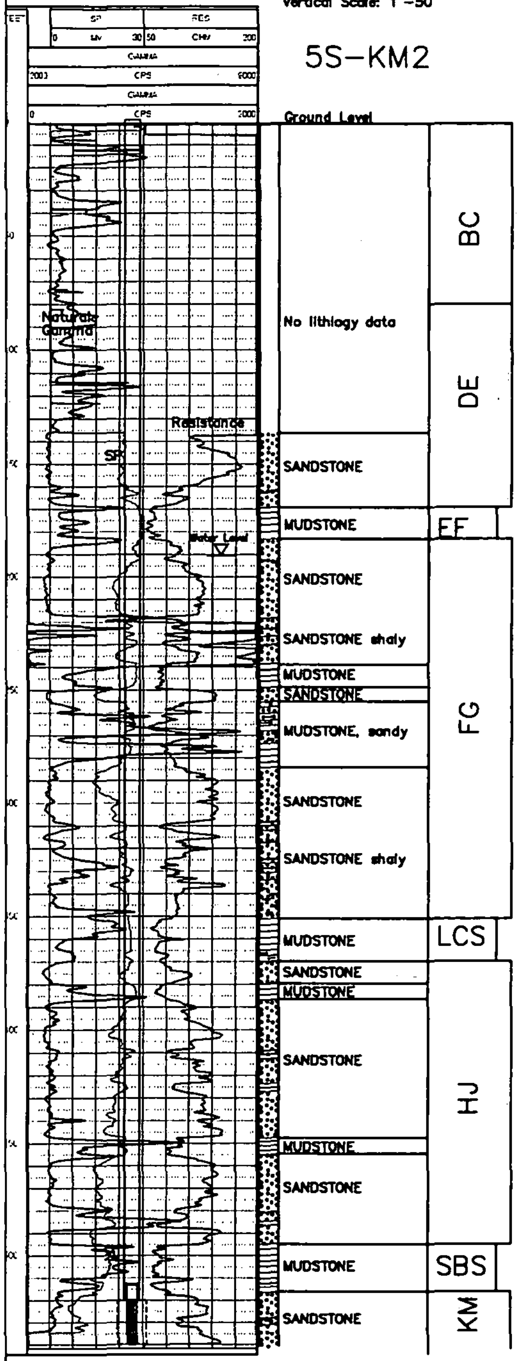
Yield [✓ Good] / Moderate / Poor
40 gpm

5S-KM1

5S-KM2

Vertical Scale: 1"-50'

5S-KM2



Lost Creek ISR, LLC

WELL COMPLETION REPORT

WELL # 5S-KM2 SEO # 194712 Date Drilled: 7/19/11

Location: E 2,214,046 / N 595,610 (NAD 83)

Ground Elev: 6946' Measure Point Elev: 6946.0'

TD: 540' Hole Dia.: 7-7/8"

CASED to: 520' Casing: PVC SDR17 ID: 4.5" OD: 5"

GROUT: Portland Cement – Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: UKM Sub-Horizon

Static Water Level: Depth 190.1' Elev: 6756.9'
(3/15/13)

UNDERREAM: Blade Dia: 10.5"
Intervals: from 520' to 540' /length 20'
from ____ to ____ /length ____

SCREEN LINER ASSEMBLY

Description	Depth From	Depth To	Elev. From	Elev. To	Length
K-packer string	523'	520'	6433'	6426'	7'
Slotted PVC	520'	540'	6426'	6406'	20'

SCREEN SPECIFICATIONS:
Slot: 0.030" Composition 3" Slotted PVC

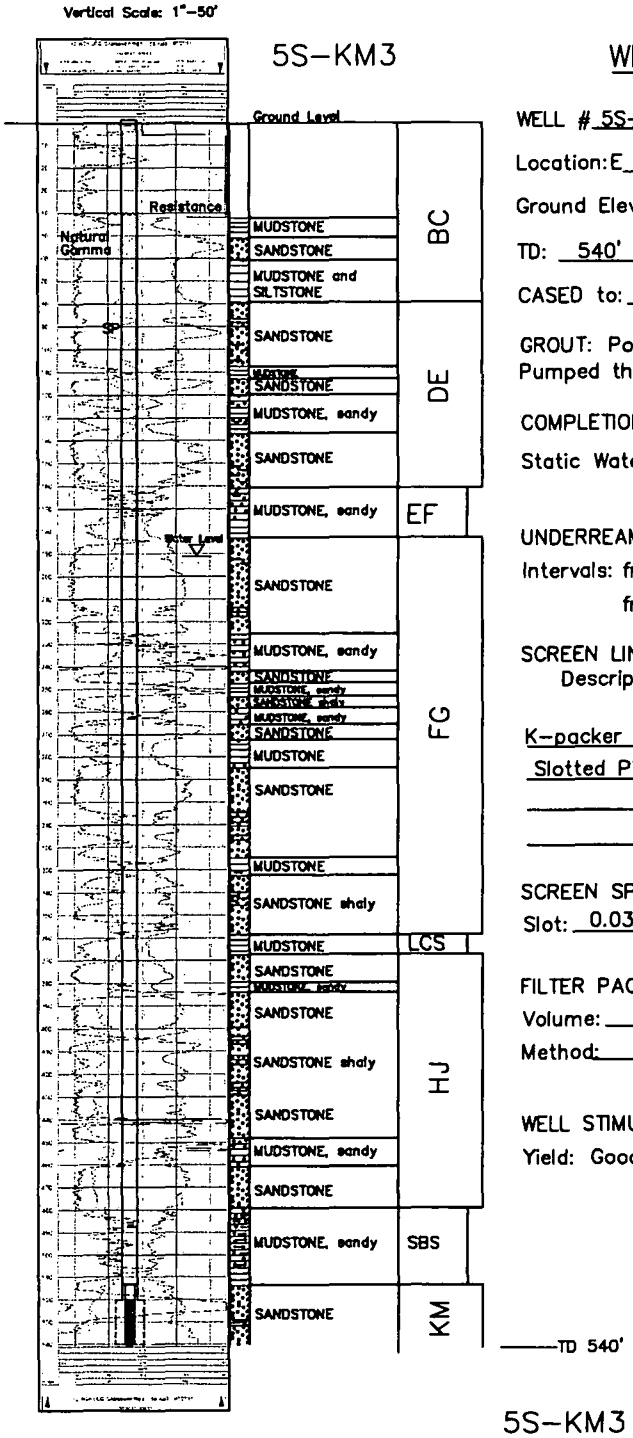
FILTER PACKING: N/A
Volume: ____ (bags)(ft^3) Sand Specs. ____
Method: ____

WELL STIMULATION: Method Airlift
Yield: [✓ Good] / Moderate / Poor
35 gpm

TD 540'

5S-KM2

5S-KM3



Lost Creek ISR, LLC

WELL COMPLETION REPORT

WELL # 5S-KM3 SEO # 194713 Date Drilled: 7/27/11

Location: E 2,213,985 / N 595,579 (NAD 83)

Ground Elev: 6945' Measure Point Elev: 6945.5'

TD: 540' Hole Dia.: 7-7/8"

CASED to: 520' Casing: PVC SDR17 ID: 4.5" OD: 5"

GROUT: Portland Cement – Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: UKM Sub-Horizon

Static Water Level: Depth 191' Elev: 6754'
(10/6/11)

UNDERREAM: Blade Dia: 10.5"

Intervals: from 520' to 540' /length 20'
from _____ to _____ /length _____

SCREEN LINER ASSEMBLY

Description	Depth From	– To	Elev. / From	– To	Length
K-packer string	513'	520'	6432'	6425"	7'
Slotted PVC	520'	540'	6425'	6405'	20'

SCREEN SPECIFICATIONS:
Slot: 0.030" Composition 3" Slotted PVC

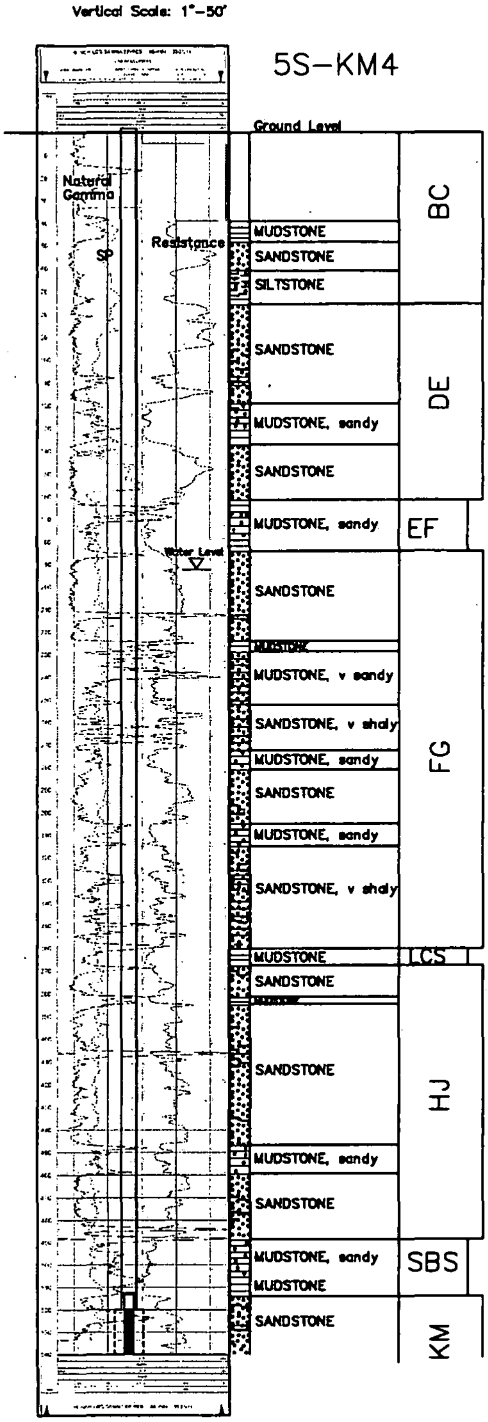
FILTER PACKING: N/A
Volume: _____ (bags)(ft^3) Sand Specs. _____
Method: _____

WELL STIMULATION: Method Airlift
Yield: Good / [✓ Moderate] / Poor
25 gpm

5S-KM3

5S–KM4

Vertical Scale: 1"–50'



Lost Creek ISR, LLC

WELL COMPLETION REPORT

WELL # 5S-KM4 SEO # 194714 Date Drilled: 7/21/11

Location: E 2,213,955 / N 595,563 (NAD 83)

Ground Elev: 6946' Measure Point Elev: 6945.6'

TD: 540' ft. Hole Dia.: 7-7/8"

CASED to: 520' Casing: PVC SDR17 ID: 4.5" OD: 5"

GROUT: Portland Cement – Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: UKM Sub-Horizon

Static Water Level: Depth 192.2' Elev: 6753.4'
(3/15/13)

UNDERREAM: Blade Dia: 10.5"
Intervals: from 520' to 540"/length 20'
from ____ to ____/length ____

SCREEN LINER ASSEMBLY

Description	Depth From	Depth To	Elev. From	Elev. To	Length
K-packer string	513'	520'	6432'	6425'	7'
Slotted PVC	520'	540'	6425'	6405'	20'

SCREEN SPECIFICATIONS:
Slot: 0.030" Composition 3" Slotted PVC

FILTER PACKING: N/A
Volume: ____ (bags)(ft^3) Sand Specs. ____
Method: ____

WELL STIMULATION: Method Airlift
Yield: [✓ Good] / Moderate / Poor
35 gpm

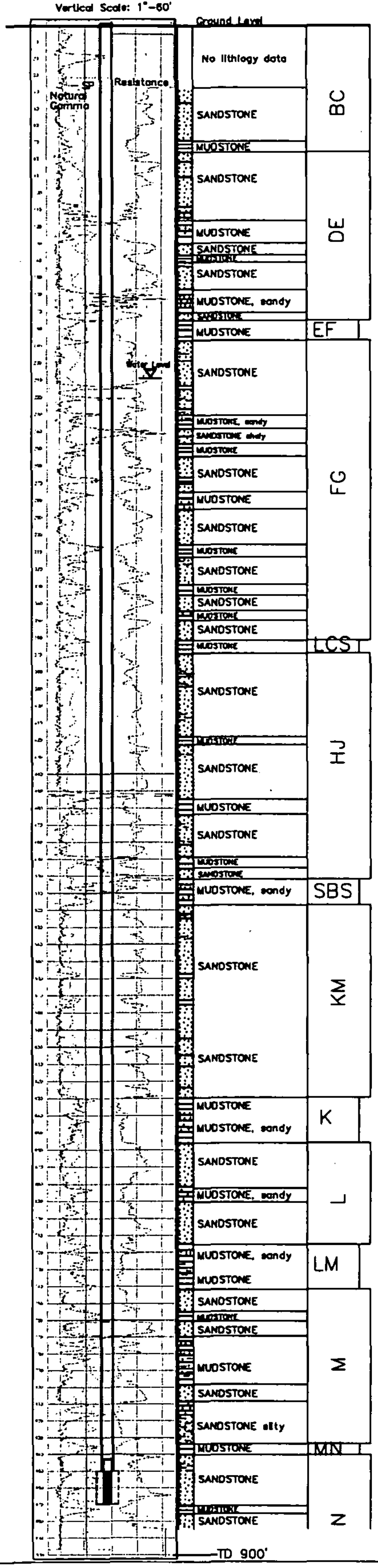
5S–KM4

5S-N1

Lost Creek ISR, LLC

WELL COMPLETION REPORT

5S-N1



WELL # 5S-N1 SEO # 194710 Date Drilled: 7/20/11

Location: E 2,213,940 / N 595,615 (NAD 83)

Ground Elev: 6946' Measure Point Elev: 6947.7'

TD: 900' Hole Dia.: 7-7/8"

CASED to: 850' Casing: PVC SDR17 ID: 4.5" OD: 5"

GROUT: Portland Cement – Type I/II
Pumped thru casing, displaced to surface with water

COMPLETION Aquifer: N Horizon

Static Water Level: Depth 209.1' Elev: 6738.5'
(3/15/13)

UNDERREAM: Blade Dia: 10.5"

Intervals: from 850' to 870' /length 20'

from ____ to ____ /length ____

SCREEN LINER ASSEMBLY

Description	Depth From	– To	Elev. / From	– To	Length
K-packer string	843'	850'	6103'	6096'	7'
Screen	850'	870'	6096'	6076'	20'

SCREEN SPECIFICATIONS:

Slot: 0.030" Composition 3" PVC Screen (wrapped)

FILTER PACKING: N/A

Volume: ____ (bags)(ft^3) Sand Specs. ____

Method: ____

WELL STIMULATION: Method Airlift

Yield: [✓ Good] / Moderate / Poor
60 gpm

5S-N1

Section 2.7

Hydrology

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FIGURES

TABLES

ATTACHMENT

2.7 HYDROLOGY

This appendix addresses surface water drainage characteristics and use (**Sections 2.7.1.1** and **2.7.1.2**), surface water quality (**Section 2.7.1.3**), regional and site hydrogeology (**Sections 2.7.2.1** and **2.7.2.2**), groundwater use (**Section 2.7.3**), regional and site groundwater quality (**Sections 2.7.4.1** and **2.7.4.2**), and the regional and site hydrologic conceptual models (**Sections 2.7.5.1** and **2.7.5.2**). Potential hydrologic impacts, mitigation, and monitoring are presented in the revised **Operations Plan (contained in this application)**.

2.7.1 Surface Water

2.7.1.1 Drainage Characteristics

The Permit Area is located in the Great Divide Basin, a topographically closed system which drains internally, due to a divergence in the Continental Divide. Most of the surface water is runoff from precipitation or snowmelt, and it quickly infiltrates, recharging shallow groundwater, evaporates, or is consumed by plants through evapotranspiration. Alluvial deposits, if any, along drainages are not extensive, and the shallow aquifer, Battle Spring, underlying the Permit Area is unconfined, unconsolidated, and poorly stratified. The shallow water table is typically 80 to 150 feet below ground surface (ft. bgs).

There are no perennial or intermittent streams within the Permit Area or on adjacent lands. The only officially named drainage within the Permit Area is Battle Spring Draw, which is dry for the majority of the year (**Figure 2.7-1**). A 1:24,000 USGS topographic map was imported into GIS, and used to conduct the drainage network analyses described in this section. Three primary watersheds drain ninety-nine percent of the Permit Area. These watersheds have been named Western Draw, West Battle Spring Draw, and East Battle Spring Draw for the purposes of this application. The Western Draw watershed covers 2.9 mi^2, of which 2.4 mi^2 are within the Permit Area; the West Battle Spring Draw watershed cover 7.0 mi^2, of which 3.1 mi^2 are within the Permit Area; the East Battle Spring Draw watershed covers 5.1 mi^2, of which 1.0 mi^2 is within the Permit Area. The entire Permit Area drains into the Battle Spring Flat, approximately nine miles southwest of the Permit Area. Much of the water conveyed through the ephemeral channels does not reach Battle Spring Flat. Instead, it infiltrates into the alluvium and recharges the Battle Spring aquifer.

The average slope of the Battle Spring Draw (northeastern) drainage in the Permit Area is 1.2 percent, the central drainage has an average slope of 1.5 percent, and the southwestern drainage has an average slope of 1.7 percent. The sinuosity (length of the channel divided by the length of valley) was calculated for the major channel in each basin. The sinuosity values for the northeastern Battle Spring Draw, central, and southwestern basins are 1.02, 1.15, and 1.16, respectively. The drainage densities range from 3.3 miles per square mile in the southwestern basin to 4.6 miles per square mile and 4.5 miles per square mile in the central and northeastern basins, respectively. A longitudinal profile of the northeastern Battle Spring Draw within the Permit Area is shown in **Figure 2.7-2**.

The existing drainages are incised, wide u-shaped and trapezoidal cross-sectional morphologies. Vertical and slumping banks exist where active erosion is occurring. The channels near the downstream boundary of the Permit Area are incised three to six feet and are ten to 15 feet wide. The channel side-slopes range in slope from 1:1 to approximately 2.5:1. The bed material in the larger draws is sandy textured and non-cohesive. Draws around the Permit Area are typically vegetated with sagebrush.

Annual runoff in the Permit Area is very low due to the high infiltration capacity and low annual precipitation. The channels are dry for the majority of the year. Drainages in the Permit Area are naturally ephemeral and primarily flow during spring snowmelt as saturated overland flow when soil moisture is at a maximum. The quantity of spring runoff is variable, depending on the amount of winter snowfall accumulation. Peak runoff from high intensity rain events can be significant; but surface flow is generally short-lived. Storm-water runoff after high intensity rain events is very rare because surface water infiltrates very rapidly or evaporates. Some intermittent and localized flow can occur near a small number of springs; but no surface runoff has been observed from springs within the Permit Area.

Runoff data are limited for the ephemeral and intermittent streams in the Great Divide Basin. There are two USGS streamflow gaging stations within 40 miles of the Permit Area; but they are on perennial streams and are not representative of drainages in the Permit Area. On April 6, 1976, the USGS measured the instantaneous discharge of Lost Soldier Creek, approximately 14.5 miles northeast of the Permit Area. The measurement of 0.2 cubic feet per second was taken during spring runoff so the source of water was predominantly snowmelt (USGS, 2006).

A method for estimating peak stream discharge in un-gaged watersheds in response to storms with recurrence intervals from two to 100 years has been developed by Miller (2003). Miller analyzed streamflow data for hundreds of gaged watersheds in Wyoming ranging from one to 1,200 square miles, and developed regional regression relationships based upon basin characteristics (drainage area, geographic factors, elevation, etc.). The most significant independent variables in Sweetwater County were drainage area and latitude. The equations used for each calculation as well as the associated percent errors are summarized in **Table 2.7-1**. **Table 2.7-2** shows the calculated peak discharges for Battle Spring Draw (the major drainage in the project area) at the exit boundary of the

Project area. Due to the incised nature and the width of the channels, flows from the 100-year flood would likely remain mostly within the channels.

One small (less than one-quarter acre) detention pond exists in the Permit Area, which acts as an off-channel storage area for stock watering. This is Crooked Well Reservoir which is shown in **Figure 2.7-3**. This pond is dry for the majority of the year and typically fills from spring snowmelt during the months of March and April. Wetland vegetation has not been observed around this impoundment. This detention pond is not included in the active surface water rights in the area.

2.7.1.2 Surface Water Use

Under the WDEQ Water Quality Division (WQD) Classification, Battle Spring Draw is listed as a Class 3B water body. Beneficial uses for Class 3B waters can include recreation, wildlife, "other aquatic life," agriculture, industry, and scenic value, but do not include drinking water, game fish, non-game fish, and fish consumption.

Water-use permits with legal descriptions inside and within two miles of the Permit Area were queried using the WSEO Water Rights Database (WSEO, 2006). The query results indicate that surface-water-use permits do not exist inside or within two miles of the Permit Area. As noted in **Section 2.7.3**, there are four BLM stock ponds within two miles of the Permit Area, but the water-use permits for these ponds are associated with the wells that supply the ponds. i.e., they are not associated with any surface-water-use permits. Also, as noted in the previous section, the Crooked Well Reservoir is located in the Permit Area. However, it is a small off-channel detention pond, less than one-quarter acre in size, and there is no water-use permit associated with it.

2.7.1.3 Surface Water Quality

Background historic surface water quality within the study area was characterized using water quality data from 1974 and 1975 that were collected as part of the environmental report for the Sweetwater Uranium permit application (Shephard Miller Inc., 1994). Samples were collected at Battle Spring, which is seven miles southwest of the Permit Area. The historic dataset is small, and more representative of groundwater quality than surface water quality so they are not directly comparable to expected surface water conditions within the Permit Area. The water-quality data for the historic sampling at Battle Spring are summarized in **Table 2.7-3**. Historic sampling of Battle Spring in July 1974 showed that pH was highly alkaline at 9.5. Uranium concentrations ranged from 0.006 to 0.95 milligrams per liter (mg/L).

In 2006 and 2007, storm-water samplers (**Figure 2.7-4**) were installed at 13 locations in the Permit Area (**Figure 2.7-5**). Three samplers were installed to capture runoff as it enters the Permit Area from the upstream side, and the others capture runoff within the Permit Area or at the downstream boundary. The water samples were collected to characterize the quality of ephemeral surface runoff. The sampling locations were selected based on their topographic potential to concentrate ephemeral surface flow.

Seven samplers collected full, one-liter samples from snowmelt runoff in March and April 2007. These samples were collected on April 17, 2007. The water quality data for these seven samples are summarized in **Table 2.7-4**.

Ionic strength was low in all samples, probably due to the majority of the sample being snowmelt water that did not come into contact with the underlying soil. For all samples, the dissolved and total concentrations of trace metals were near or less than the detection limit. Radiometric parameters, including uranium, lead-210, polonium-210, and thorium-230, were generally less than detection with the exception of dissolved uranium, which was detected at very low concentrations (0.0003 to 0.0004 mg/L) in two samples, suspended uranium (0.0003 to 0.0009 mg/L) in two samples, and total uranium (0.0003 to 0.0009 mg/L) in four samples. Total radium-226 was detected at a low concentration (0.5 picoCuries per liter [pCi/L]) in one sample. This was the LC2 location in the center of the Permit Area in one of the larger channels. Gross alpha was also detected in small amounts (1.1 to 3.6 pCi/L) in six samples. The highest concentration of 3.6 pCi/L was again from the LC2 location. The pH of the sites was slightly acidic to neutral ranging from 6.39 to 7.12. Conductivity was low with less than 100 microSiemens per centimeter for all samples.

In general, the quality of water was very good for all samples. The radiometric parameters detected in the LC2 correlate well with the radiological scans of the Permit Area. This central area has the highest radioactivity, as indicated by the results from the radiological surveys. Still, the levels are well below all Wyoming agricultural and drinking water standards.

Currently, the surface water samplers, some of which are no longer extant, are not used for collection of routine surface water samples as stated in TR Section 5.7.8.2. Additional samplers will be installed as necessary for ad hoc monitoring of surface water runoff in drainage following an unplanned release that impacts the drainage.

2.7.2 Groundwater Occurrence

This section describes the regional and local groundwater hydrology including hydrostratigraphy, groundwater flow patterns, hydraulic gradient and aquifer parameters. The discussion is based on information from investigations performed within the Great Divide Basin, data presented in previous applications/reports for the Permit Area, and the geologic information presented in **Section 2.6** of the approved Technical Report. Regional and site hydrogeology are discussed in **Sections 2.7.2.1** and **2.7.2.2**; groundwater use in **Section 2.7.3**; regional and site groundwater quality in **Sections 2.7.4.1** and **2.7.4.2**; and the regional and site hydrologic conceptual models in **Sections 2.7.5.1** and **2.7.5.2**.

2.7.2.1 Regional Hydrogeology

The Project is located within the northeastern portion of the Great Divide Basin. The basin is topographically closed with all surface water drainage being to the interior of the basin. Available data suggest that groundwater flow within the basin is predominately toward the interior of the basin (Collentine, 1981; Welder, 1966; and Mason, 2005). A generalized potentiometric surface map of the Battle Spring/Wasatch Formations, prepared by Welder and McGreevey (1966), indicates groundwater movement toward the center of the basin (**Figure 2.7-6**). Fisk (1967) suggests that aquifers within the Great Divide Basin may be in communication with aquifers in the Washakie Basin to the south and that groundwater may potentially move across the Wamsutter Arch between the basins.

The topographically elevated area known as the Green Mountains (Townships 26 and 27 North, between Ranges 90 to 94 West) was identified by Fisk as a major recharge area to aquifers within the northeastern portion of the Great Divide Basin (1967). The Rawlins Uplift, Rock Springs Uplift, and Creston Junction, located east, southwest, and southeast, respectively, from the Permit Area, were also identified as major recharge areas for aquifers within the Great Divide Basin (Fisk, 1967). The main discharge area for the Battle Spring/Wasatch aquifer system is to a series of lakes, springs and playa lakes beds near the center of the basin. Groundwater potentiometric elevations within the Tertiary aquifer system in the central portion of the basin are generally close to the land surface.

The Battle Spring Formation crops out over most of the northeastern portion of the Great Divide Basin, including much of the Permit Area. The Battle Spring Formation is considered part of the Tertiary aquifer system by Collentine et al. (1981). The Tertiary aquifer system is identified as "the most important and most extensively distributed and accessible groundwater source in the study area" (Collentine, 1981). This aquifer system includes the laterally equivalent Wasatch Formation (to the west and south) and the underlying Fort Union and Lance Formations. The base of the Tertiary aquifer system is marked by the occurrence of the Lewis Shale. The Lewis Shale is generally considered a regional aquitard, although this unit does produce limited amounts of water from sandstone lenses at various locations within the Great Divide Basin and to the south in the Washakie Basin.

Shallower aquifer systems that can be significant water supply aquifers within the Great Divide Basin include the Quaternary and Upper Tertiary aquifer systems. However, as previously stated, the Battle Spring Formation of the Tertiary aquifer system crops out over most of the northeast part of the basin; and the Quaternary and Upper Tertiary aquifer systems are absent or minimal in extent. The shallower aquifer systems are only important sources of groundwater in localized areas, typically along the margin of the basin where the Battle Spring Formation is absent. Aquifer systems beneath the Tertiary include the Mesaverde, Frontier, Cloverly, Sundance-Nugget and Paleozoic aquifer systems (Collentine, 1981). In the northeast Great Divide Basin, these aquifer systems are only important sources of water in the vicinity of outcrops near structural highs such as the Rawlins Uplift.

For purposes of this application, only hydrogeologic units younger than and including the Lewis Shale (Upper Cretaceous age) are described, with respect to general hydrologic properties and potential for groundwater supply. The Lewis Shale is an aquitard and is considered the base of the hydrogeologic sequence of interest within the Great Divide Basin. Units deeper than the Lewis Shale are generally too deep to economically develop for water supply or have elevated total dissolved solid (TDS) concentration that renders them unusable for human consumption. Exceptions to this can be found along the very eastern edge of the basin, tens of miles from the Permit Area, where some Lower Cretaceous and older units provide relatively good quality water from shallow depths. Hydrologic units of interest within the northeast Great Divide Basin are shown on the stratigraphic column on **Figure 2.7-7** and further described below, from deepest to shallowest:

- Lewis Shale (aquitard between Tertiary and Mesaverde aquifer systems);
- Fox Hills Formation
- Lance Formation (Tertiary aquifer system);
- Fort Union Formation (Tertiary aquifer system);
- Battle Spring Formation-Wasatch Formation (Tertiary aquifer system);
- Undifferentiated Tertiary Formations (Upper Tertiary aquifer system, including Bridger, Uinta, Bishop Conglomerate, Browns Park, and South Pass); and
- Undifferentiated Quaternary Deposits (Quaternary aquifer system).

Discussion of the regional characteristics for each of these hydrostratigraphic units is provided below.

Lewis Shale

The Lewis Shale underlies the Fox Hills Formation and is generally considered an aquitard in the Great Divide Basin. This unit is described by Welder and McGreevey (1966) as light to dark gray, carbonaceous shale with beds of siltstone and very fine-grained sandstone. The Lewis Shale is up to 2,700 feet thick, generally increasing in thickness toward the east side of the basin. In the Permit Area, the Lewis Shale is 1,200 feet thick. Small quantities of water may be available from the thin sandstone beds within this unit near the margins of the basin. The Lewis Shale acts as the confining unit between the Tertiary and Mesaverde aquifer systems.

Fox Hills Formation

Fox Hills Formation overlies the Lewis Shale and consists of very fine-grained sandstone, siltstone and coal beds. It is not considered to be an important aquifer in the Permit Area.

Lance Formation

Overlying the Fox Hills Formation is the Lance Formation, consisting, predominately, of very fine-to fine-grained lenticular, clayey, calcareous sandstone. Shale, coal, and lignite beds are present within the formation, which reaches a maximum thickness of approximately 4,500 feet (Welder, 1966). In the Permit Area, the Lance Formation is 2,950 feet thick.

Collentine and others (1981) include the Lance Formation (Aquifer) as the lower-most aquifer within the Tertiary aquifer system. However, the Lance Aquifer is included as part of the Mesaverde aquifer system by Freethey and Cordy (1991). Several stock wells, located along the eastern outcrop area of the basin, are completed in the Lance Aquifer. The stock wells have estimated yields of five to 30 gpm. Hydraulic conductivity for the Mesaverde aquifer system reported by Freethey and Cordy (1991) (which, by the authors' designation, includes the Fox Hills Sandstone, Lewis Shale, and Mesaverde Group, in addition to the Lance Aquifer) is reported to range from 0.0003 to 2.2 feet per day (ft/d). Because of the limited number of wells completed within the Lance Aquifer in the Great Divide Basin, there are insufficient data to develop representative potentiometric surface maps for this hydrologic unit. However, the potentiometric surface is most likely similar in orientation to that seen in the overlying Fort Union and Battle Spring/Wasatch aquifers, with inferred groundwater movement generally toward the center of the basin. No regionally extensive aquitards between the Fort Union and Lance Formation were identified or reported in the hydrologic studies, investigations, and reports reviewed for this permit application.

Fort Union Formation

The Paleocene-age Fort Union Formation is between the Lance Formation and the overlying Wasatch and Battle Spring Formations, reaching a maximum thickness of approximately 6,000 feet within the Great Divide/Washakie Basin area. In the Permit Area, it is 4,650 feet thick. The Fort Union Formation is present at or near land surface in a band around the Rock Springs Uplift and in the northeastern corner of the Great Divide Basin (Mason, 2005). The Fort Union Formation is described as a fine- to coarse-grained sandstone with coal and carbonaceous shale. Siltstone and claystone are present in the upper part of the formation (Welder, 1966).

A potentiometric surface map prepared by Naftz (1996) that groups the Fort Union aquifer with the Battle Spring/Wasatch aquifers, shows inferred movement of groundwater toward the basin center **(Figure 2.7-8)**.

The Fort Union aquifer is largely undeveloped and unknown as a source of groundwater supply except in areas where it occurs at shallow depths along the margins of the basin. Well yields from the Fort Union aquifer within the Great Divide and Washakie Basins range from three to 300 gpm. Estimates of transmissivity for the Fort Union aquifer are highly variable. Ahern (1981) estimated transmissivity of less than three square feet per day (ft^2/d) for ten Fort Union Formation oil fields in the Green River Basin. Collentine and others (1981) reported transmissivity of the Fort Union aquifer as characteristically less than 325 ft^2/d from oil well data.

Water quality for the Fort Union aquifer is described in Section 2.7.4.

Battle Spring Formation- Wasatch Formation

The most important water-bearing aquifers within the Great Divide Basin are in the Wasatch Formation and the Battle Spring Formation. The Wasatch and Green River Formations grade into the Battle Spring Formation in the northeastern portion of the basin. The Battle Spring Formation is absent along the eastern margin of the Great Divide Basin near the county line between Sweetwater and Carbon Counties. The termination of the Battle Spring Formation to the east is controlled, largely, by structural features, including the Rawlins Uplift to the east and the Green Mountains to the north. A dry oil test in Section 14, Township 24 North, Range 90 West, located within a few miles of the eastern limit of the Battle Spring Formation, had a reported thickness of over 6,000 feet of fine- to coarse-grained sandstone that was interpreted by the American Stratigraphic Company as the Battle Spring Formation. Within the Permit Area, the Battle Spring/Wasatch Formations are 6,200 feet thick.

The Battle Spring Formation is described as an arkosic, fine- to coarse-grained sandstone with claystone and minor conglomerates. There are typically several water-bearing sands within the Battle Spring Formation. The Battle Spring aquifers are included in the Tertiary aquifer system, as defined by Collentine (1981).

Groundwater within the Battle Spring aquifers is typically under confined conditions, although locally unconfined conditions exist. The potentiometric surface within the Battle Spring aquifers is usually within 200 feet of the ground surface (Welder, 1966). Most wells drilled for water supply in this unit are less than 1,000 feet deep. The potentiometric surface map of Wasatch and Battle Spring aquifers (**Figure 2.7-6**) indicates groundwater movement toward the center of the basin (Welder, 1966). From the Permit Area, the potentiometric surface dips to the southwest at approximately 50 feet per mile (ft/mi) (a hydraulic gradient of 0.01 foot per foot [ft/ft]). The hydraulic gradient becomes steeper near the margins of the basin, where recharge to the aquifer is occurring.

Collentine and others (1981) report that wells completed in the Battle Spring aquifers typically yield 30 to 40 gpm; but that yields as high as 150 gpm are possible. Collentine and others (1981) also reported that pump tests conducted on 26 wells completed within the Battle Spring aquifers resulted in transmissivity values ranging from 3.9 to 423 ft^2/d, although most wells were less than 67 ft^2/d. Specific capacity was less than one gallon per minute per foot for 23 of 26 wells tested.

Water quality for the Wasatch/Battle Spring aquifers is described in Section 2.7.4.

Undifferentiated Tertiary and Quaternary Sediments

Undifferentiated Tertiary and Quaternary units above the Battle Spring/Wasatch Formations can be sources of water supply; but wells in the northeastern part of the Great Divide Basin are rare and generally limited to the margins of the basin where the Battle Spring Formation is not present. Commonly, along the margins of the basin, hydrostratigraphic units younger than the Battle Spring/Wasatch have been deposited on rocks of Cretaceous age or older. Water supply wells along the margins of the basin are often completed in both the older hydrostratigraphic units and Tertiary and Quaternary sediments. Water quality within these units tends to be variable and of limited quantity.

The undifferentiated Tertiary units consist of interbedded claystone, sandstone and conglomerate with the coarser grained facies providing suitable groundwater resources where present. The undifferentiated Tertiary units are absent within the Permit Area and are not discussed further.

The undifferentiated Quaternary units consist of clay, silt, sand, gravel and conglomerates that are poorly consolidated to unconsolidated (Welder, 1966). These units represent windblown, alluvial and lake deposits. Where present, these deposits can provide acceptable yields of groundwater of relatively good quality. Thin deposits of Quaternary sediments are present within surface drainages in the Permit Area but are usually above the water table and unsaturated. Therefore, Quaternary sediments are not an important groundwater source in the vicinity of the Project and are not described further.

2.7.2.2 Site Hydrogeology

LC ISR, LLC has been collecting lithologic, water level, water quality, and pump test data as part of its ongoing evaluation of hydrologic conditions at the Project. Water level measurements, both historic and recent, provide data to assess potentiometric surface, hydraulic gradients and inferred groundwater flow directions for the aquifers of interest at the Project. Three long-term pump tests (**Attachment 2.7-1**) were used to: 1) evaluate hydrologic properties of the aquifers of interest, 2) to assess hydraulic characteristics of the confining units, 3) to evaluate impacts to the hydrologic system of the Lost Creek Fault (Fault) through the Permit Area, and 4) to evaluate aquifer injectivity characteristics. Results of Permit Area water quality sampling and analysis are presented in **Section 2.7.4.2**.

Figure 2.7-9 shows the locations of all existing KM Horizon monitor wells in the Permit Area. **Table 2.7-5** provides completion data for all KM, L, M and N Horizon monitor wells currently in use.

2.7.2.2.1 Hydrostratigraphic Units

Aquifers in the Battle Spring Formation are comprised of the sand facies components of the formation. Mapable sand units consist of clean, medium to coarse-grained, fluvial channel fill sands which may range from five to 50 feet in composite thickness. Aquifers, as applied herein, typically consist of multiple stacked sand units separated by numerous unnamed aquitards and aquicludes which can be local or laterally extensive. For ease of geologic mapping, the Battle Spring Formation is segregated into vertical intervals called Horizons. The total composite thickness of each Horizon (for example: the HJ Horizon) is commonly in excess of 100 feet. (**Figure 2.7-10**). The vertical extent of Horizons may or may not be identified based on aquitards or aquicludes.

Aquicludes and aquitards consist of the intervening shaly units separating sand units. They represent quiescent floodplain and overbank sedimentary environments between channel-fill sequences. Generally referred to as 'shales', they are in essence, sedimentary sequences dominated by mudstone and claystone lithology, but also may include substantial amounts of siltstone and fine-grained sands. Hydrogeologically, they represent substantially lower permeabilities compared to the clean coarse sands of the aquifers. Shale lithologies are often transitional to the Horizons above or below or can exhibit rapid lateral facies changes and interfingering with adjacent lithology. As a result, dramatic thickening and thinning of the aquicludes can occur locally (see **Plates D5-3a** and **D5-3b** in the KM Amendment Geology, Technical Report). Thicknesses of aquicludes and sand packages are commonly in excess of 25 feet, and may be as thin as one to five feet thick.

In a global sense, the entire Battle Spring Formation essentially represents a single aquifer. On the scale of the Lost Creek Project more definition and distinctions can be made. Vertical boundaries of aquifers are herein defined arbitrarily at the named shales, although in many cases the named shales show little distinction from unnamed shales. The notable exception to this is the HJ aquifer bounded by the Lost Creek Shale (LCS) and Sagebrush Shale (SBS) aquicludes, resulting in a clearly confined aquifer. Elsewhere within the Battle Spring stratigraphy, differentiation between aquifers is less distinct. Due to this lack of clearly defined boundaries, the term Horizon is commonly used instead of aquifer.

Nomenclature for the hydrostratigraphic units of interest within the Project follows the nomenclature for stratigraphic units (Refer to Section 2.6.2.1 for a discussion of the stratigraphic units). A brief description of each hydrostratigraphic unit follows, from shallowest to deepest.

DE Horizon

The DE Horizon is the shallowest occurrence of groundwater within the Permit Area; however, the Horizon does not carry water in all portions of the Permit Area. Where it does the unit is not saturated, water levels being restricted to the basal portions of the Horizon. Locally, the lower bounding EF Shale is not present so that the sands of the DE Horizon coalesce with sands of the FG Horizon.

FG Horizon

The upper boundary of the FG Horizon, separating it from DE, is the EF Shale. The EF Shale is not everywhere present or may locally be represented by a composite of en-echelon overlapping shales. Overlying hydrogeological confinement is poor. The lower boundary is the Lost Creek Shale, which has been shown to be an affective aquiclude. The Lower FG (LFG) is the basal sub-horizon in the FG Horizon. It ranges from 20 to 50 feet thick within the Permit Area, and has been designated as the overlying aquifer for the HJ production orebody.

Lost Creek Shale

The Lost Creek Shale acts as the overlying confining aquiclude to the currently permitted HJ production zone. The LCS has shown continuity throughout the Lost Creek Permit area. The confining characteristics have been demonstrated by multiple pump tests, as discussed later in this application.

HJ Horizon

The primary production aquifer at Lost Creek is the HJ Horizon, which is currently permitted and in development for production. The HJ Horizon represents a confined aquifer, bounded above and below by the Lost Creek Shale and the Sagebrush Shale confining units, respectively. The dominant lithology of the HJ Horizon is clean, medium to coarse-grained arkosic sand, which occurs in multiple stacked units. The sand facies are commonly separated by multiple 'unnamed' shales of variable thickness which represent localized aquitards and aquicludes to vertical groundwater migration within the larger aquifer (see **Plates D5-2a** to **D5-2h** in the KM Amendment Geology, Technical Report). The deepest sub-horizon, the Lower HJ (LHJ), is designated as the overlying aquifer to the proposed KM production orebody.

Sagebrush Shale

The Sagebrush Shale represents the confining aquiclude between the HJ production zone and the underlying proposed KM production zone. Its presence is regionally pervasive (see **Plate D5-3a** in the KM Amendment Geology, Technical Report), and its confining characteristics have been demonstrated through pumping tests as described in later sections of this application.

KM Horizon

The secondary production zone in the Lost Creek Project, and the focus of this application, is the KM Horizon. The Upper KM (UKM) sub-horizon is commonly separated from the Lower KM (LKM) by a shale named the "No Name Shale". At the time of the original Technical Report, and prior to an adequate drill data base, LC ISR, LLC believed that the No Name Shale represented a confining aquiclude. Substantial drilling since that time has demonstrated that this is not the case. Rather it is one of several internal aquicludes which may be extensive, but do not show regional continuity.

Hydrogeologically, the KM Horizon can be considered confined with overlying confinement provided by the Sagebrush Shale. Underlying confinement is less apparent. Nominally, the K Shale represents the lower boundary of the KM Horizon. However, there are breaks in the continuity of the K Shale and pump tests have shown it to be a leaky aquitard. At this time, lower confinement of the KM aquifer remains under investigation.

K Shale

The K Shale represents the lower boundary to the KM Horizon and serves as an aquitard. However, as stated above, it has been demonstrated to be leaky. Stratigraphic evaluations have shown it to be absent in small localities (see **Plate D5-3b** in the KM Amendment Geology, Technical Report) and at times represented by multiple overlapping but not continuous shales.

L, M and N Horizons

Nominally, the L Horizon represents the underlying aquifer to the KM production orebody. The hydrogeological relationship between these two Horizons has been investigated at various locations in Lost Creek and LC East. The findings indicated that where the K Shale is present, the hydraulic communication between the KM and L Horizons is highly limited. Elsewhere, when the K Shale is less well defined or contains more fine sand, there is measurable hydraulic connectivity. Based on previous "Regional" and "Permit Area" scale pump test results, there is demonstrated hydrogeologic communication between the KM Horizon and the underlying horizons in some areas. However, the degree of communication diminishes with depth.

2.7.2.2.2 Potentiometric Surface, Groundwater Flow Direction and Hydraulic Gradient

The LC ISR, LLC hydrologic evaluation of the Project included measurement of water levels in monitor wells completed in the KM Horizon and the underlying composite L, M, and N Horizons to assess the potentiometric surface, groundwater flow direction and hydraulic gradient of those units. **Table 2.7-6** lists static water level data recorded between 2010 and 2015.

The water level data were used to construct potentiometric surface maps for the UKM, L, M, and N Horizons **Figures 2.7-10.5** through **2.7-13**, respectively. Depiction of these surfaces on the cross sections were generated by tracking the intersection of the plane of the cross section profile with the potentiometric contours for the given horizons. The Figures and Plates show that the hydraulic gradient and groundwater flow direction across the permit area are similar to that seen in the overlying KM and HJ Horizons.

The horizontal hydraulic gradient for the KM aquifer in the vicinity of the Lost Creek Fault, determined from 2007 to 2012 water level data, ranged from 0.0032 to 0.0139 ft/ft (16.9 to 73.4 ft/mi). **Table 2.7-7a** summarizes the horizontal hydraulic gradients determined from the most recent water level data. The horizontal hydraulic gradient across the permit area averages 0.0063 ft/ft north of the Lost Creek Fault and 0.0035 ft/ft on the south side.

Vertical hydraulic gradients were determined for the UKM Horizon by measuring water levels in closely grouped wells completed in different hydrostratigraphic units. **Figure 2.7-14** shows the location of the UKM well groups used for the assessment of vertical hydraulic gradients. **Table 2.7-7b** is an updated table that presents the calculated vertical gradients between the HJ and UKM aquifers. Vertical hydraulic gradients range from 0.05 to 0.36 ft/ft between the HJ and UKM aquifers and typically indicate decreasing hydraulic head with depth. A downward gradient is consistent with the structural and stratigraphic location of the Project within the Great Divide Basin.

2.7.2.2.3 Aquifer Properties

As part of the hydrologic characterization activities for the NRC License and LQD Permit to Mine applications, LC ISR and Petrotek previously performed several in-house pump tests that provided progressively more information related to the composite KLM Horizon hydraulics. The KM Horizon of the composite KLM Horizon is further subdivided into two sandy sub-horizons designated the UKM (upper KM) and the LKM (lower KM).

In 2007, a pump test was conducted in sub-horizon UKM. Based on the degree of drawdown response observed in the underlying sub-horizon LKM wells, it was determined that additional zones below the KM Horizon would need to be investigated and monitored during subsequent pump tests. In 2009, LC ISR and Petrotek conducted two additional in-house pump tests in the KM Horizon, at pumping wells KPW-2 (north side of the fault) and KPW-1A (south side). The drawdown results in the L Horizon indicated that the KM and L Horizons were in hydraulic communication. A re-test at pumping well KPW-1A was conducted in 2010 with additional deeper monitoring in the M Horizon to evaluate deeper responses. Based on the previous test results, the most recent composite KLM Horizon Permit Area Pump Test was conducted in October 2011. This test represents the most complete characterization of the composite KLM Horizon, with monitoring conducted in the KM, L, M and N Horizons.

A brief summary of KM and KLM Horizon investigations is provided below with aquifer characteristics summarized in **Table 2.7-12**. **Figure 2.7-15** shows the locations of all pump tests performed between 2007 and 2012 as compiled in the following table.

Summary of KM Horizon Hydrologic Investigations

Test	Pump Well	Location relative to fault	Rate (gpm)	Duration (days)
November 2007	UKMP-103	North	29 gpm	6 days
June 2009	KPW-2	North	68 gpm	0.33 days
June-July 2009	KPW-1A	South	63 gpm	7 days
April 2010	MU-101	South	50 gpm	1 day
November 2010	KPW-1A (re-test)	South	62 gpm	4 days
October 2011 Mine Unit Pump Test	KPW-3	South	70 gpm	4.9 days
October 2012 5-Spot Pump Test	5S-KM3	South	Various	Various

November 2007 – Internal Testing

The 2007 test was a long-term, multi-well test conducted on the north side of the Lost Creek Fault and designed to provide general hydrologic characterization of the Upper KM Horizon (sub-horizon UKM, UKMP-103). **Table 2.7-8** lists the wells monitored during the test. At that time, it was believed that the No Name Shale represented a regionally contiguous aquitard between the UKM and LKM sub-horizons. However, responses observed during this test indicated that the two KM sub-horizons had a strong hydrologic connection. Subsequent drilling and logging performed in the summer of 2008 substantiated the lack of continuity of the No Name Shale.

The test was run for a period of approximately six days at an average rate of 29 gpm. Test results (**Table 2.7-9**) indicated an average aquifer transmissivity of 138 ft^2/d and average storativity of 1.07×10^{-4}. Water level responses observed during the test indicated that the Lost Creek Fault acts as a partial hydrologic barrier to groundwater flow, or zone of lower permeability, within the upper UKM sub-horizon when pumped on the north side of the fault. A single KM Horizon well located between the main fault and the splay fault showed a similar scale of drawdown across the main fault compared to wells on the north side.

Several KM Horizon wells south of the main fault and splay fault showed lower drawdowns compared to similarly spaced wells north of the fault. Distance versus drawdown observations across the fault and splay for these wells were reduced by approximately five times. Therefore, based on the responses observed during this test, the secondary fault splay, mentioned above, also appears to behave as a zone of lower permeability.

Although the pump test on the north side of the fault did not recognize the upper and lower KM sub-horizons as a single hydrostratigraphic unit, the data acquired from that test were valuable in determining aquifer properties for the KM Horizon on the north side of the fault.

Following the initial 2007 KM Horizon pump test and analysis by Petrotek, additional drilling and logging was conducted which allowed for better definition of deeper stratigraphic units underlying the KM Horizon. In 2009 and 2010, additional monitor wells were installed in the deeper L and M Horizons. Subsequent in-house pump tests (summarized below) were conducted by LC ISR to evaluate possible lower aquitards to the composite KLM Horizon and to characterize KM Horizon aquifer properties on both sides of the fault.

June 2009 – Internal Testing

In June 2009, a short-term multi-well pump test was conducted at KPW-2, which is completed in the KM Horizon and located north of the Lost Creek Fault. **Table 2.7-10** lists the wells monitored during the test. KPW-2 was pumped for eight hours at an average rate of 68.3 gpm. Test results (**Table 2.7-11**) indicated an average aquifer transmissivity of 139 ft^2/d and average storativity of 1.2×10^{-4}. No drawdown responses were observed in the overlying HJ Horizon during this relatively short test. However, hydrologic communication between the KM Horizon and underlying L Horizon was observed. An L Horizon well (KMU-4) approximately 170 feet away from KPW-2 exhibited greater than 11 feet of drawdown.

June-July 2009 – Internal Testing

During June and July 2009, a long-term multi-well pump test was conducted on the south side of the Lost Creek Fault at well KPW-1A by pumping at an average rate of 63 gpm for seven days. **Table 2.7-10** lists the wells monitored during the test. Drawdown data from HJ Horizon wells indicated adequate overlying confinement (Sagebrush Shale) separating the composite KLM Horizon from the HJ Horizon. Observed drawdown in HJ Horizon wells, located on the south side of the fault, ranged between 0.5 to 1.8 feet, while no responses were observed in wells located north of the fault. Test results (**Table 2.7-11**) indicated an average aquifer transmissivity of 156 ft^2/d and average storativity of 1.1 x 10^{-4}.

As seen in the KPW-2 test, hydrologic communication between the KM Horizon and the underlying L Horizon was observed. Drawdowns observed in two L Horizon wells located on the south side of the Lost Creek Fault were approximately 21 feet, compared to approximately 40 feet in the KM Horizon wells on the same side of the fault. Observed drawdowns in two L Horizon wells located north of the fault were between 2.7 to 5.1 feet and comparable with drawdown observed in nearby KM Horizon wells north of the fault.

Based on the drawdown responses observed across the fault during this test, the Lost Creek Fault appeared to act as a partial barrier to flow or zone of lower permeability when a well on the south side of the fault is pumped, and wells are monitored on the north side of the fault.

Following the pump testing in the summer of 2009, four historic exploration holes that penetrated the K Shale (mudstone interval at the base of the KM Horizon) were located, re-entered and re-abandoned. Also, additional monitor wells were installed in the deeper L and M Horizons during the first quarter of 2010. Following the activities mentioned above, LC ISR conducted a short-term pump test using MU-101 (UKM sub-horizon completion) as the pumping well on the south side of the fault to assess whether the re-abandonment activities decreased the observed response in the L Horizon and to assess response in the deeper M Horizon. MU-101 was pumped for 24 hours at approximately 50 gpm. Data suggested limited hydrologic separation between the KM Horizon and L Horizon with a maximum drawdown of 2.6 feet observed in the L Horizon versus 12 to 17 feet observed in KM Horizon wells. No drawdown response was observed in the deeper M Horizon. The lack of response in the M Horizon wells was likely due to: 1) the pumping well (MU-101) being completed in only the upper portion of the KM Horizon, 2) the vertical separation between the two horizons, and 3) the presence of numerous discontinuous siltstone, mudstone and shale beds that exist between the two horizons.

November 2010 – Internal Testing

In November 2010, LC ISR conducted a re-test of KPW-1A (located south of fault) in order to replicate the test performed in June 2009, while also monitoring newer wells installed in the lower L and M Horizons. KPW-1A was pumped for four days at an average rate of 62.2 gpm. Test results indicated that hydrologic isolation between the KM and L Horizons appeared to be limited based on a maximum drawdown of 16.0 feet observed in the L Horizon wells in contrast to a nearby KM Horizon well that showed 43 feet of drawdown. Hydrologic isolation between the L Horizon and the deeper M Horizon also appeared to be limited as evidenced by the 6.8 feet of drawdown response seen in M Horizon wells as compared to the 16.0 feet observed in overlying L Horizon wells. Based on the drawdown responses observed north and south of the fault during the test at KPW-1A, the Lost Creek Fault appears to act as a partial hydrologic barrier (low permeability zone). The observed drawdown on the north side of the fault was lower by approximately 10 times relative to wells on the south side of the fault. Based on the results of testing, the responses observed in the KM, L and M Horizons indicate that the three layers comprising the composite KLM Horizon are in varying degrees of hydraulic communication.

October 2011 – Internal Testing

The 2011 Composite KLM Horizon Regional Pump Test was designed to evaluate the hydrologic characteristics as required for an amendment to include Resource Area 3 in current State and Federal permits at Lost Creek. Based on the results of internal testing conducted at four pumping well locations in the KM Horizon both north and south of the Lost Creek Fault, the regional pump test was conducted at pumping well KPW-3 on the south side of the Lost Creek Fault. Drawdown monitoring was conducted within the HJ, KM, L, M, and the lowermost N Horizon. The results support previous data that indicate the KLM Horizon acts as one hydrostratigraphic unit, albeit with locally occurring interfingered mudstone and siltstone beds and decreasing drawdown with depth. Based on drilling and logging data, the MN Shale is not considered a truly regional confining unit, but does restrict vertical flow between the M Horizon and the deeper N Horizon. The scale of hydraulic communication observed relative to the pumped KM Horizon and the overlying HJ Horizon is similar in scale to the communication observed relative to the KM and N Horizons.

For reference, the following table summarizes the in-house testing programs conducted between 2007 and 2012.

Summary of Pump Testing, 2007-2010

Date	Pump Well and Completion	Side of LC Fault	Obs. Wells by Horizon	Pump Rate (gpm)	Time (days)	Notes on Responses
Nov 2007	UKMP-103 (Upper KM)	North	33 total 3 FG 7 HJ 20 U. KM 3 L. KM	28.8	5.96	- Significant response observed in Lower KM Horizon, which was the monitored underlying zone. - Minimal (<1') response observed in overlying HJ.
June 2009	KPW-2 (Upper and Lower KM)	North	24 total 6 HJ 14 KM 4 L	68.3	0.33	- Demonstrated successful abandonment of MU-108; communication due to completion issues were indicated during 2008 MU1 testing. - Drawdown propagation dampened across the fault. - No response observed in overlying HJ Horizon. - L Horizon well on north side showed 11.6' of drawdown.
June July 2009	KPW-1A (Upper and Lower KM)	South	24 total 6 HJ 14 KM 4 L	63.0	6.91	- Minimal responses observed in overlying HJ Horizon. - Level of drawdown observed in L Horizon similar in scale to pumped KM Horizon.
April 2010	MU-101 (Upper KM)	South	27 total 6 HJ 13 KM 5 L 3 M	50.0	1.0	- Conducted to confirm whether abandonment of nearby historic drill holes affected drawdown in deeper L and M Horizons; results indicated communication between these horizons.
Nov 2010	KPW-1A (Upper and Lower KM)	South	48 total 6 HJ 33 KM 6 L 3 M	62.2	4.0	- Minimal response observed in overlying HJ Horizon. - Limited hydrologic separation between the KM Horizon and deeper L and M Horizons. - Drawdown propagation dampened across fault.
Oct 2011	KPW-3	South	79 total 30 HJ 30 KM 9 L 8 M 2 N	70	4.92	- Varying degrees of hydraulic communication between the two underlying L and M Horizons of the composite KLM Horizon, thus confirming that the entire KLM is hydraulically connected.
Oct 2012	5S-KM3	South	10 total 1 HJ 6 KM 1 L 1 M 1 N	28.5	3.1	5-Spot injection/extraction test - Drawdown response in HJ and N Horizons was minor.

October 2012 - Internal Testing

LC ISR plans to develop and extract uranium from mine units within the KM Horizon of the Battle Spring Formation via ISR. Initial production from the KM Horizon will occur within an area of the Lost Creek Project currently designated as Resource Area 3. This resource area lies to the east of Mine Unit 1, the first planned production well field, and partially underlies Mine Unit 1, which will produce from the HJ Horizon.

With reference to Resource Area 3, significant mineralization has been identified in the KM Horizon, occurring between depths of approximately 430 to 590 feet below ground surface (ft bgs). Average thickness of the KM Horizon is approximately 115 feet thick and total thickness of the composite KLM ranges from approximately 260 to 330 feet.

The purpose of the 5-Spot Hydrologic Testing was to assess the level of hydraulic communication between the KM Horizon (Production Zone), and the overlying HJ Horizon, the underlying L and M Horizons of the composite KLM Horizon, in addition to the deeper N Horizon in a typical commercial scale 5-Spot production pattern.

Prior to testing activities, LC ISR re-developed all wells utilized in the 5-Spot Hydrologic Testing. During development activities, bentonite grout was produced from well KPW-1A. LC ISR initiated remedial activities on KPW-1A. In addition, a completion assessment of all other KM Horizon wells in the 5-Spot area was performed prior to beginning testing activities.

Extraction testing conducted in the KM Horizon indicated varying degrees of hydraulic communication between the two underlying L and M Horizons of the composite KLM Horizon, confirming that the entire composite KLM Horizon is hydraulically connected.

Drawdown responses in the overlying HJ Horizon and deeper N Horizon during the extraction test were minor (an order of magnitude lower than responses observed in the composite KLM Horizon). LC ISR has aggressively pursued the re-plugging and abandonment of historic wells, and therefore cross-horizon communication through improperly abandoned wells is considered to be relatively unlikely.

Based on hydrologic testing results to date, it is anticipated that the minor communication between the composite KLM Horizon and the overlying and underlying horizons can be managed through operational practices, detailed monitoring, and engineering operations.

Based on the minimal responses observed in the underlying L and M Horizons and overlying HJ Horizon and deeper N Horizon during the Injection/Extraction portion of testing conducted with no bleed, it is anticipated that commercial scale production operations in Resource Area 3 *with typical bleed* will have little if any impact on the overlying and underlying horizons.

2.7.3 Groundwater Use

Table 2.7-13 is an updated list (April 2014) of the permits issued by the WSEO to LC ISR, LLC or its affiliates (Ur-E and NFU Wyoming, LLC). At this time, there are 207 groundwater permits of which 10 are water supply wells, 156 are monitor wells, two are disposal wells, 15 are test wells and 22 are industrial wells associated with ISR mining activities (four permits are for well rework thus duplicates). Currently, the ISR milling operation consumes approximately 10 gallons per minute (gpm), and the well fields generate another 10 to 12 gpm.

A negligible amount of groundwater is used for seasonal drilling, well construction and development, monitoring, testing, and miscellaneous purposes related to uranium exploration.

Water-use permits with legal descriptions inside and within two miles of the Permit Area were queried using the WSEO Water Rights Database (**Table 2.7-13**). The majority of the groundwater-use permits filed in the vicinity of the Permit Area are for monitoring or miscellaneous mining-related purposes, and do not represent consumptive use of groundwater. Many of those permits are associated with the Kennecott Sweetwater Mine, which is in reclamation. Because this mine was an open-pit operation, the dewatering and monitoring associated with it were at much shallower depths than those proposed for ISR at Lost Creek. Dewatering in advance of mining was completed in 1983.

All non-mining and mining groundwater-use permits inside and within two miles of the Permit Area are presented in **Table 2.7-13**. Descriptions of the groundwater-use permits include, but are not limited to, location, uses, priority dates, status, yield, total depth, and static water depth.

The water-use permits unrelated to mining are those of the BLM. In 1968 and 1980, the BLM Rawlins District was granted three permits (13834, 55112, and 55113). Each of these permits is associated with a well that supplies a stock pond (or tank). These wells and associated stock ponds are located outside of the Permit Area, but within the study area (**Figure 2.7-15.5**). In addition, there is a fourth BLM well, supplying a stock pond, for which no water-use permit was found.

Permit 13834 is for Battle Spring Draw Well No. 4451, which pumps water into a stock tank east of the Permit Area (Township 25 North, Range 92 West, Section 21, Northwest Quarter, Northeast Quarter, Northeast Quarter). In 1968, a uranium exploration hole was drilled at this location; when water was encountered, plastic casing was installed and the well was developed. The well depth is 900 feet, with a static water level of 104 feet. A yield of 19 gallons per minute is permitted. The screened interval is unknown, but given the well depth, it may be significantly deeper than the sands targeted by LC ISR, LLC under this permit.

Boundary Well No. 4775 (Permit 55112) and Battle Spring Well No. 4777 (Permit 55113) were drilled as stock wells in 1981 to a depth of approximately 280 feet and 220 feet, respectively. These wells are shallower than the sands targeted by LC ISR, LLC under this permit. A water use of 25 gallons per minute is permitted at each of these wells. According to aerial photographs, Boundary Well No. 4775 is located northeast of the Permit Area, in Township 25 North, Range 92 West, Section 10, Southeast Quarter, Northeast Quarter, Southwest Quarter. Battle Spring Well No. 4777 is situated southeast of the Permit Area, in Township 25 North, Range 92 West, Section 30, Southeast Quarter, Northwest Quarter. The condition of the windmill on Boundary Well No. 4775 is not known, and the windmill on the Battle Spring Well No. 4777 was not in working order in June 2007 (**Figure 2.7-15.5**).

In June and July of 2007, LC ISR, LLC contacted BLM to identify the status of these groundwater-use permits. These groundwater-use permits are still considered active (BLM, 2007a). In addition to these wells, BLM identified another active stock well, the East Eagle Nest Draw Well.

The East Eagle Nest Draw Well is located north of the Permit Area, in the Northwest Quarter of the Northwest Quarter of the Northwest Quarter of Section 13, Township 25 North and Range 93 West. From mid-May through mid-September, an electric submersible pump in the well is used to pump water into a livestock watering pond at an average rate of five gallons per minute for six to eight hours each day (**Figure 2.7-15.5**). The total depth of this well is 370 feet, with a static water level of 269 feet.

Throughout the phases of the Project, LC ISR, LLC will correspond with BLM to ensure that the stock reservoirs and wells are not impacted in a manner that restricts the intended use.

2.7.4 Groundwater Quality

This section describes the regional and local groundwater quality based on information from investigations performed within the Great Divide Basin, data presented in previous applications/reports for the Permit Area, and recent data collected in the Permit Area.

2.7.4.1 Regional Groundwater Quality

Water quality within the Great Divide Basin ranges from very poor to excellent. Groundwater in the near surface, more permeable aquifers is generally of better quality than groundwater in deeper and less permeable aquifers. Groundwater with TDS less than 3,000 mg/L can generally be found at depths less than 1,500 feet within the Tertiary aquifer system, which includes the Battle Spring/Wasatch, Fort Union and Lance aquifers (Collentine, 1981).

Water quality for the Great Divide Basin is available from a large number of sources including the USGS National Water Information System (NWIS) database, the University of Wyoming Water Resources Data System (WRDS) and the USGS Produced Waters Database. Much of these data are tabulated in "Water Resources of Sweetwater County, Wyoming", a USGS Scientific Investigation Report by Mason and Miller (2005). However, the quality and accuracy of much of the data are difficult to assess. This section of the permit application describes general water quality of the Great Divide Basin, primarily by reference to these sources.

Mason and Miller (2005) noted that water quality in Sweetwater County is highly variable within even a single hydrogeologic unit; and that water quality tends to be better near outcrop areas, where recharge occurs. They also noted that groundwater quality samples from the Quaternary and Tertiary aquifers are most likely biased toward better water quality and do not necessarily represent a random sampling, for the following reasons. Wells and springs that do not produce useable water usually are abandoned or not developed. Deeper portions of the aquifers typically are not exploited as a groundwater resource because a shallower water supply may be available. As a result, these water sources do not become part of the sampled network of wells and springs that ultimately make up the available groundwater database. Groundwater quality samples from deeper Mesozoic and Paleozoic hydrostratigraphic units are often available where oil and gas production or exploration has occurred. Therefore, groundwater samples from older geologic units may have less bias in representing ambient groundwater quality than samples collected from Quaternary and Tertiary aquifers.

Water quality within the shallow Tertiary aquifers generally represents sodium-bicarbonate to sodium-sulfate water types. TDS levels within the Wasatch aquifer in the west and south parts of the Great Divide Basin tend to be high relative to the US EPA's Secondary

Drinking Water Standard (SDWS) of 500 mg/L, even within the shallow aquifers. TDS levels within the Battle Spring/ Wasatch aquifers are generally below 500 mg/L along the northern flank of the Great Divide Basin (which includes the Permit Area). Elevated TDS levels (greater than 3,000 mg/L) are present within the Wasatch aquifer along the eastern edge of the Washakie Basin and within the Fort Union and Lance aquifers along the east side of the Rock Springs uplift. Elsewhere within the Great Divide and Washakie Basins, TDS levels in the Tertiary aquifer system are typically between 1,000 and 3,000 mg/L (Collentine, 1981).

Low-TDS waters within the Battle Spring aquifer are predominately sodium-bicarbonate type waters. With increasing salinity, the water type tends to become more calcium- sulfate dominated. However, this trend is not exhibited in the Wasatch, Fort Union and Lance aquifers within the Great Divide and Washakie Basins. The Wasatch and Lance aquifers are characterized by predominately sodium-sulfate type waters, particularly near outcrop areas. The Fort Union is more variable in composition.

Water quality data for Tertiary aquifers away from the outcrop areas are sparse, but available data indicate that TDS levels increase rapidly away from the basin margins. A Lance pump test in Section 14, Township 23 North, Range 99 West has TDS levels in excess of 35,000 mg/L. A Fort Union test in Section 25, Township 13 North, Range 95 West had TDS levels in excess of 60,000 mg/L, based on resistivity logs (Collentine, 1981). Water quality samples from produced water in the Wasatch and Fort Union Formations from an average depth of 3,500 feet had TDS values ranging from 1,050 to 153,000 mg/L with a median value of 13,900 mg/L (Mason, 2005). TDS from four wells completed in the Fort Union Formation located along the margins of the basin ranged from 800 to 3,400 mg/L (Welder and McGreevy, 1966).

A graph of TDS versus sampling depth for produced water samples from the Wasatch Formation in Sweetwater County prepared by Mason and Miller (2005) shows that, at depths greater than 3,000 feet, TDS values are typically above 10,000 mg/L. It is noted that the Mason and Miller data set is small for a large area and may be biased by data from the southern part of the Great Divide Basin; few site-specific data directly applicable to the Project are available.

Water quality within the Battle Spring aquifer is generally good in the northeast portion of the basin with TDS levels usually less than 1,000 mg/L and frequently less than 200 mg/L. Water type within the Battle Spring aquifer is typically sodium bicarbonate to sodium sulfate. Mason and Miller (2005) reviewed eighteen groundwater samples, collected from the Battle Spring aquifer, and observed that those samples represented some of the best overall quality of those studied in Sweetwater County. Sulfate levels can be elevated in Tertiary aquifers, but are generally low in the shallow aquifers of the Battle Spring Formation. Out of eighteen samples included in the Mason study, only one sample exceeded the WDEQ Class I Drinking Water Standard for sulfate of 250 mg/L. Most of the samples were also less than the WDEQ TDS Class I Drinking Water Standard of 500 mg/L. Nitrate, fluoride and arsenic levels were less than WDEQ and EPA standards for all of the samples.

Notable exceptions to the relatively good water quality included waters with elevated radionuclides. Uranium and radium-226 (Ra-226) concentrations exceeded their respective EPA Maximum Contaminant Levels (MCLs) of 0.03 mg/l and 5 pCi/l in some of the samples; radon-222 (Rn-222) concentrations were also relatively high in some samples (Mason, 2005); and the presence of high levels of uranium in Tertiary sediments and groundwater of the Great Divide Basin has been well documented. The Lost Creek Shroeckingerite deposit, located northwest of the Permit Area, is noted for high uranium levels in groundwater. Uranium-bearing coals are also present in Great Divide Basin. Sediments of the Battle Spring Formation were derived from the Granite Mountains and contain from 0.0005 to 0.001 percent uranium (Masursky, 1962). Based on historical exploration results, certain areas of the Battle Spring Formation (e.g., Lost Creek) contain much higher uranium concentrations.

Water quality for aquifer systems deeper than the Tertiary (such as the Mesaverde aquifer system) are not described in this report; because they are several thousands of feet deep in the vicinity of the Project and are separated from the Tertiary aquifer system by the Lewis Shale, a regional aquitard. The deeper aquifer systems of the Great Divide Basin will not impact nor be impacted by ISR activities at the Project.

2.7.4.2 Site Groundwater Quality

Water quality information for the KM and underlying horizons has been obtained from baseline and background monitoring well sampling, that commenced in 2006.

2.7.4.2.1 Groundwater Monitoring Network and Parameters

LC ISR, LLC began baseline sampling in September 2006. Quarterly water level measurements and water quality samples were initially collected from the following six KM Horizon monitor wells:

- UKM Monitor Wells: LC17M, LC20M, LC23M, LC24M, LC27M, and LC28M.

At the time that pump tests were conducted (and when the original LC ISR NRC TR was submitted), wells LC27M and LC28M were believed to have been completed in the HJ Horizon. However, since the aquifer test analyses report was completed in March 2007, a revised interpretation of the stratigraphy surrounding wells LC27M and LC28M has been conducted based on more recent drill data. The new interpretation of the stratigraphic sequence for wells LC27M and LC28M concludes that the wells are completed in the UKM Sand as opposed to the HJ Horizon.

In October 2008, one additional KM Horizon well (MB-4) was installed. Quarterly sampling began in August 2009. **Figure 2.7-16** shows the monitor well locations, and the analytical results are presented in **Table 2.7-14**.

Within the Permit boundary, LC ISR, LLC also installed:

- 12 background monitoring wells in the L Horizon and sampled nine of the 12 wells for Guideline 8 parameters.
- nine background monitoring wells in the M Horizon and sampled five of the nine wells for Guideline 8 parameters.
- two background monitoring wells in the N Horizon and sampled one well for Guideline 8 parameters.

All KM Horizon monitor well locations are shown on **Figure 2.7-16** and L, M and N Horizon monitor wells on **Figure 2.7-17**. The Guideline 8 parameter analytical results presented in **Tables 2.7-14** and **2.7-15**. **Table 2.7-16** presents the State (DWQD Class-of-Use) and Federal (EPA Drinking Water) groundwater quality criteria for specific parameters, to which the analytical results on **Tables 2.7-14** and **2.7-15** are compared; discussion follows.

2.7.4.2.2 Groundwater Quality Sampling Results

KM Horizon Background Sampling

Sampling dates and baseline water quality results for the KM Horizon monitor wells are displayed in **Table 2.7-14**. **Table 2.7-14** shows that the WDEQ TDS Class I standard is exceeded in only one of the 28 UKM aquifer samples. However, six of the seven wells have TDS levels less than the Class I Standard of 500 mg/L. The distribution of average TDS is shown on **Figure 2.7-18**.

The trace constituents, barium, boron, cadmium, chromium, copper, lead, manganese, mercury, nickel, vanadium, and zinc had concentrations that were all less than detection limits for all samples. Ammonia exceeded the WDEQ Class I Standard in two samples from the same monitor well. Dissolved Iron exceeded: 1) the WDEQ Class I Standard (0.3 mg/L) in one sample, and 2) the EPA Secondary Standard (0.03 mg/L) in five of the seven UKM monitor wells.

Three of the seven UKM Horizon monitor wells had one or more sample that exceeded the EPA Uranium MCL of 0.03 mg/L. The average uranium concentration from all baseline monitor well samples was 0.028 mg/L. The average distribution of uranium at individual wells from September 2006 to May 2007 is shown on **Figure 2.7-19**.

The average distribution of radium-226+228 is shown on **Figure 2.7-20**. The WDEQ Class I Standard and EPA MCL for radium-226+228 is 5.0 pCi/L. **Table 2.7-14** shows that eight of the 28 water samples did not exceeded the EPA MCL criteria.

In summary, general water quality in the KM Horizon, within the Permit Area, tends to be relatively good, with the exception of the presence of radionuclides. TDS and sulfate values are relatively low, with only one TDS exceedances of the WDEQ Class I standards. Radium-226+228 exceeded the EPA MCL in 64 percent of the samples collected, and the average uranium concentration is slightly greater than the EPA MCL for that constituent. Elevated concentration of these constituents is consistent with the presence of uranium orebodies.

L, M, and N Horizon Background Sampling

LC ISR, LLC began baseline sampling of the L, M and N Horizons in 2009. The background sampling included the following monitor wells:

- L Horizon Wells: KMU-1, KMU-2, KMU-3, KMU-4, MB-11, MB-12A, MB-13, MB-14, M-L2;
- M Horizon Wells: M-M1, M-M2, M-M3, LC229W, LC606W; and
- N Horizon Well: LC33W.

Results of the LC ISR, LLC background monitoring program for Horizons L, M and N are compiled in **Table 2.7-15**. In **Table 2.7-15**, those analytical results which exceed specific WDEQ WQD or EPA criteria are bolded/highlighted, and the WQD and EPA criteria used for the comparison are presented in **Table 2.7-16**. The following bullets summarize the salient points gleaned from **Table 2.7-15** analysis:

- ➢ The trace constituents: barium, boron, cadmium, chromium, copper, mercury, molybdenum, nickel, selenium, vanadium, and zinc were at or less than the detection limits for all samples tested.
- ➢ Aluminum exceeded the EPA MCL Secondary Standard of 0.05 mg/L in five of the 33 samples.
- ➢ As with all prior monitoring results, chloride values are low; less than 10 mg/L and typically 5 mg/L or less.
- ➢ The pH laboratory measures exceeded the WDEQ Class I Standard and EPA MCL Secondary Standard (6.5 – 8.5) in eight of the nine L Horizon monitoring wells, and in two of the five M Horizon monitoring wells. Where the pH standard was exceeded, the values ranged from 8.5 to 9.5.

- The distribution of average Total Dissolved Solids (TDS) (averaged from the four sampling events) is shown on **Figure 2.7-21**. None of the individual TDS analytical results exceeded the WDEQ Class I Standard or EPA MCL.
- The distribution of sulfate, averaged from June 2009 to December 2012, is shown on **Figure 2.7-22**. None of the individual sulfate analytical results exceeded the WDEQ Class I Standard or EPA MCL.
- With the exception of one L Horizon monitor well (MB-12A), none of the monitoring wells exceeded the EPA uranium MCL of 0.03 mg/L in any quarter. The average distribution of uranium at individual wells from June 2009 to December 2012 is shown on **Figure 2.7-23**.
- The average distribution of radium-226+228 is shown on **Figure 2.7-24**. The WDEQ Class I Standard and EPA MCL for radium-226+228 is 5.0 pCi/L. **Table 2.7-15** indicates that seven of the nine L Horizon wells exceeded the standard, three M Horizon wells and one N Horizon well also exceeded the criteria.

Piper diagrams were developed to compare groundwater quality between individual wells (**Figure 2.7-25**) and between different Horizons (**Figure 2.7-26**). The individual well comparison plots the average value for each of the wells for all of the samples analyzed. The piper diagram comparing different aquifers represents the average water quality for all wells sampled within individual Horizons (L, M and N). Groundwater within the shallow Battle Springs aquifers/Horizons beneath the Permit Area is a calcium-sulfate to calcium-bicarbonate type water. There is some variability in water chemistry when the wells are compared individually, but not much (LC606W being the exception).

In summary, the general water quality in the L, M, and N Horizon monitor wells, located within the Permit Area, tends to be relatively good, with the exception of the presence of radionuclides. TDS and sulfate values are all less than the WDEQ Class I standards. Laboratory pH measurements exceeded the WDEQ Class I Standard and EPA MCL Secondary Standard in 49 percent of the monitor wells sampled. Radium-226+228 exceeds the EPA MCL in approximately 60 percent of the samples collected from the L, M and N Horizons. An elevated concentration of these constituents is consistent with the presence of uranium orebodies.

2.7.5 Hydrologic Conceptual Model

A hydrologic conceptual model of the Project and surrounding area has been developed to provide a framework that allows LC ISR, LLC to make decisions regarding optimal methods for extracting uranium from mineralized zones, and to minimize environmental and safety concerns caused by ISR operations.

LC ISR, LLC will use ISR technology at the Project to extract uranium from permeable uranium-bearing sandstones within the upper portion of the Battle Spring Formation, at depths ranging from 350 to 900 feet. A conceptual hydrologic model of the Project is summarized below.

2.7.5.1 Regional Groundwater Conceptual Model

The Project is located within the northeastern portion of the Great Divide Basin. The Eocene Battle Spring Formation crops out over most of the northeastern portion of the Great Divide Basin, including the Permit Area. The total thickness of the Battle Spring Formation in the vicinity of the Permit Area is approximately 6,200 feet. The Battle Spring Formation contains multiple aquifers that are a part of the Tertiary aquifer system. Groundwater flow within the Battle Spring aquifers is primarily toward the interior of the basin, southwest of the Project. Recharge to the Battle Spring aquifers within the Project area is mostly the result of infiltration of precipitation to the north and northeast in the Green Mountains and Ferris Mountains. Based on available information, discharge from the Battle Spring aquifers is predominately to a series of lakes, springs, and playa lake beds near the center of the basin. Some groundwater from the Battle Spring aquifers is discharged through pumping for stock watering, irrigation, industrial, and domestic use.

The Battle Spring Formation is described as an arkosic fine- to coarse-grained sandstone with claystone and conglomerates. Groundwater within the Battle Spring aquifers is typically under confined conditions, although locally unconfined conditions exist. The potentiometric surface within the Battle Spring aquifers is usually within 200 feet of the ground surface. Most wells drilled for water supply in this unit are less than 1,000 feet deep. Wells completed in the Battle Spring aquifers typically yield 30 to 40 gpm but yields as high as 150 gpm are possible.

Water quality within the shallow Tertiary aquifers generally represents sodium-bicarbonate to sodium-sulfate water types. TDS levels within the Battle Spring aquifers are generally below 500 mg/L along the northern flank of the Great Divide Basin near areas of outcrop. Low TDS waters within the Battle Spring aquifer are predominately sodium-bicarbonate type waters. With increasing salinity, the water type tends to become more calcium-sulfate dominated. Notable exceptions to the relatively good water quality included waters with elevated radionuclides (uranium, radium-226 and radon-228). High levels of uranium are common in Tertiary sediments and groundwater of the Great Divide Basin. The Lost Creek Shroeckingerite deposit located northwest of the Project is noted for high uranium levels in groundwater. Uranium-bearing coals are present in the Wasatch Formation in the central part of the Great Divide Basin.

As described previously, the Battle Spring Formation outcrops over most of the Permit Area. The Battle Spring is the shallowest occurrence of groundwater within the Permit Area. Water-bearing Quaternary and Tertiary units younger than the Battle Spring Formation are present several miles to the north and east and are hydraulically up-gradient of the Permit Area. Therefore, ISR operations conducted at the Project will have no impact on those shallower hydrostratigraphic units.

2.7.5.2 Site Groundwater Conceptual Model

2.7.5.2.1 Hydrostratigraphic Units

The hydrostratigraphic units of interest within the Battle Spring Formation, with respect to the Project include, from shallowest to deepest:

- DE Horizon (shallowest occurrence of groundwater):
    - sands and discontinuous clay/shale units, top of unit 100 to 200 ft bgs;
    - coalesces with underlying FG Horizon to the south; and
    - water levels in the DE Sand are typically 140 to 200 ft bgs;
- Upper No Name Shale (upper confining unit to the FG Horizon):
    - 0 to 50 feet thick;
- FG Horizon (includes overlying aquifer to HJ Horizon):
    - subdivided into UFG, MFG and LFG Sands;
    - total thickness of Horizon is 100 feet;
    - top of unit is 200 to 350 ft bgs;
    - LFG Sand the overlying aquifer to HJ Horizon;
    - LFG Sand is 20 to 50 feet thick; and
    - water levels in the LFG Sand are typically 160 to 200 ft bgs;
- Lost Creek Shale (upper confining unit to the HJ Horizon):
    - laterally continuous across Permit Area;
    - five to 45 feet thick; and
    - confining properties demonstrated from water levels and pump test;
- HJ Horizon (contains the primary production zone):
    - subdivided into UHJ, MHJ, and LHJ Sands, although sands are hydraulically connected;
    - coarse-grained arkosic sands with thin lenticular intervals of fine sand, mudstone and siltstone;

    - averages 120 feet thick;
    - top of unit is 300 to 450 feet bgs; and
    - water levels in the HJ Horizon range from 150 to 200 ft bgs;
- Sagebrush Shale (lower confining unit to the HJ Horizon and upper confining unit to the KM Horizon):
    - laterally continuous across Permit Area;
    - five to 75 feet thick;
    - top of unit 450 to 550 ft bgs; and
    - confining properties demonstrated from water levels and pump test;
- KM Horizon (includes secondary production zone, lower confining units, and underlying aquifers):
    - subdivided into UKM and LKM Sands;
    - massive coarse sandstones with thin lenticular fine sandstone intervals;
    - top of unit is 450 to 600 ft bgs;
    - UKM Sand is a secondary production zone and first underlying aquifer;
    - UKM Sand is 30 to 60 feet thick;
    - water levels in the UKM Sand are generally 185 to 220 ft bgs;
    - No Name Shale is the lower confining unit to the UKM Sand;
    - No Name Shale is ten to 30 feet thick and laterally extensive but will require additional characterization; and
- L Horizon (underlying aquifer to the KM production zone)
    - L Horizon is continuous throughout the LC East Project;
    - the horizon commonly exhibits a much more shaley character;
    - top of unit is approximately 640 feet deep in Section 20 and only 200 feet in the far north;
    - total thickness is typically 100, but ranges from 60 to 120 feet;
    - L Horizon is usually confined above by the K Shale throughout the project area, which averages 12 feet in thickness; and
    - K Shale is regionally extensive but not fully contiguous, therefore it is not considered a confining unit.

2.7.5.2.2 Potentiometric Surface and Hydraulic Gradients

Potentiometric surfaces for the L and M Horizons are illustrated as contour maps on **Figures 2.7-11** and **2.7-12**. Depiction of these surfaces on the cross sections were generated by tracking the intersection of the plane of the cross section profile with the potentiometric contours for the given horizons. The Figures show that the groundwater flow direction across the permit area are similar to that seen in the overlying KM and HJ Horizons.

A downward gradient to successively deeper Horizons (KM to L, L to M, and M to N) is consistent with the structural and stratigraphic location of the Project within the Great Divide Basin.

2.7.5.2.3 Aquifer Properties

Transmissivity values for the HJ Horizon range from 35 to 400 ft^2/d (260 to 3,000 gpd/ft). Based on long-term pump test results, the estimated "effective" transmissivity (because of the impacts of the Lost Creek Fault) is 60 to 80 ft^2/d (450 to 600 gpd/ft) on both sides of the Fault. Because of the boundary effect of the Fault (e.g., the system is not an infinite-acting aquifer), the actual transmissivity of the aquifer, without impacts from the Fault, would be higher. Using the effective transmissivity and an average thickness of 120 feet, the "effective" hydraulic conductivity of the HJ Horizon is in the range of 0.5 to 0.67 ft/d. The actual hydraulic conductivity of the aquifer is probably between one and 1.5 ft/d. Storativity of the HJ Horizon ranges from 5.0×10^{-5} to 5.0×10^{-4}.

Based on more limited testing, the transmissivity of the LFG aquifer is lower than for the HJ Horizon ranging from 4.4 to 40 ft^2/d (30 to 300 gpd/ft). The range of transmissivity of the UKM aquifer is similar to but slightly lower than the HJ aquifer, ranging from 26 to 115 ft^2/d (195 to 860 gpd/ft). Transmissivity of the DE Horizon is variable, ranging from 1.3 to 130 ft^2/d (10 to 1,000 gpd/ft). Storativity values have not been determined for the overlying aquifer at this time because no multi-well pump tests have been conducted within that Horizon. However, it is expected that storativity values in the FG Horizon will be similar to the range observed in the HJ Horizon. The DE Horizon is at least partially under *unconfined* conditions and therefore will have a specific yield instead of a storage coefficient. As discussed in the previous section, the long-term, multi-well pump tests performed in the fall of 2007 provided data on the degree of connectivity between the overlying and underlying aquifers relative to the HJ Horizon.

Between 2007 and 2012, six additional pump tests were performed in the KM Horizon as discussed in **Section 2.7.2.2.3**. The pump test locations are shown on **Figure 2.7-15**, the aquifer properties summarized in **Table 2.7-12**, and the spatial distribution of individual transmissivity values presented on **Figure 2.7-27**.

Transmissivity values for the KM Horizon range from 26 to 224 ft^2/d (195 to 1,675 gpd/ft). As shown in **Table 2.7-12**, transmissivity is slightly variable north and south of the Lost Creek Fault, but the storativity is rather consistent at about 1.2×10^{-4}.

2.7.5.2.4 Water Quality

Water quality within the hydrostratigraphic units of interest (the production zones and overlying and underlying aquifers) is generally good with respect to major chemistry. TDS and sulfate levels are typically less than their respective WDEQ Class I Standards and EPA SDWS, although occasionally, regulatory standards are exceeded. Chloride levels are low, (typically less than 10 mg/L) making this parameter a good indicator for excursion monitoring.

Trace metal concentrations are generally less than their WDEQ Class I Standards and EPA MCLs in the production zone and underlying aquifers. Exceptions include aluminum and iron. Aluminum concentrations exceeded EPA Secondary Drinking Water criteria (0.05 to 0.2 mg/L) in four L Horizon wells. Total iron concentrations exceeded the WDEQ Class I Standard (0.3 mg/L) in two L Horizon wells. Iron concentrations also exceeded the EPA's Secondary Drinking Water Standard (0.03 mg/L) in five L Horizon wells and three M/N Horizon wells. Lab pH measurements exceeded the WDEQ Class I/II Standards and the EPA Secondary Standard in 10 different monitor wells.

Table 2.7-14 shows that uranium is present in all wells, but only three KM Horizon monitor well contained concentrations that exceed the EPA MCL of 0.03 mg/L. Radium-226+228 levels exceed the EPA MCL and WDEQ Class I Standard (5.0 pCi/L) in six KM Horizon wells, seven L Horizon wells, three M Horizon wells, and one N Horizon well. Dissolved radionuclide levels are commonly elevated in groundwater associated with uranium-bearing sandstones.

2.7.5.2.5 Summary

The uranium bearing sandstones within the upper Battle Spring Formation are suitable targets for ISR operations. The proposed production zone aquifer (KM Horizon) is bounded by a laterally extensive upper confining unit (SBS), as demonstrated by static water level differences and responses to pump tests. The K Shale underlies the KM Horizon, but it is not considered a true, regionally extensive confining unit. However, based on testing results to date, it has been demonstrated that the minor communication, between the production zones and the underlying L Horizons, can be managed through operational practices, detailed monitoring, and engineering operations.

Future "Mine Unit" scale pump tests results combined with site specific geologic and hydrologic data, will be utilized to determine the appropriate operations monitoring scheme for each planned Mine Unit.

Aquifer properties (transmissivity, hydraulic conductivity and storativity) of the KM Horizon are within the ranges observed in the HJ Horizon, which is currently being successfully mined at Lost Creek. Water quality is generally consistent throughout the hydrostratigraphic units of interest. Elevated radionuclides are present in the groundwater, but this is consistent with the presence of uranium ore deposits within the sandstones. The Lost Creek Fault acts as a hydraulic barrier to groundwater flow and will need to be accounted for in mine unit design and operation.

2.7.6 References

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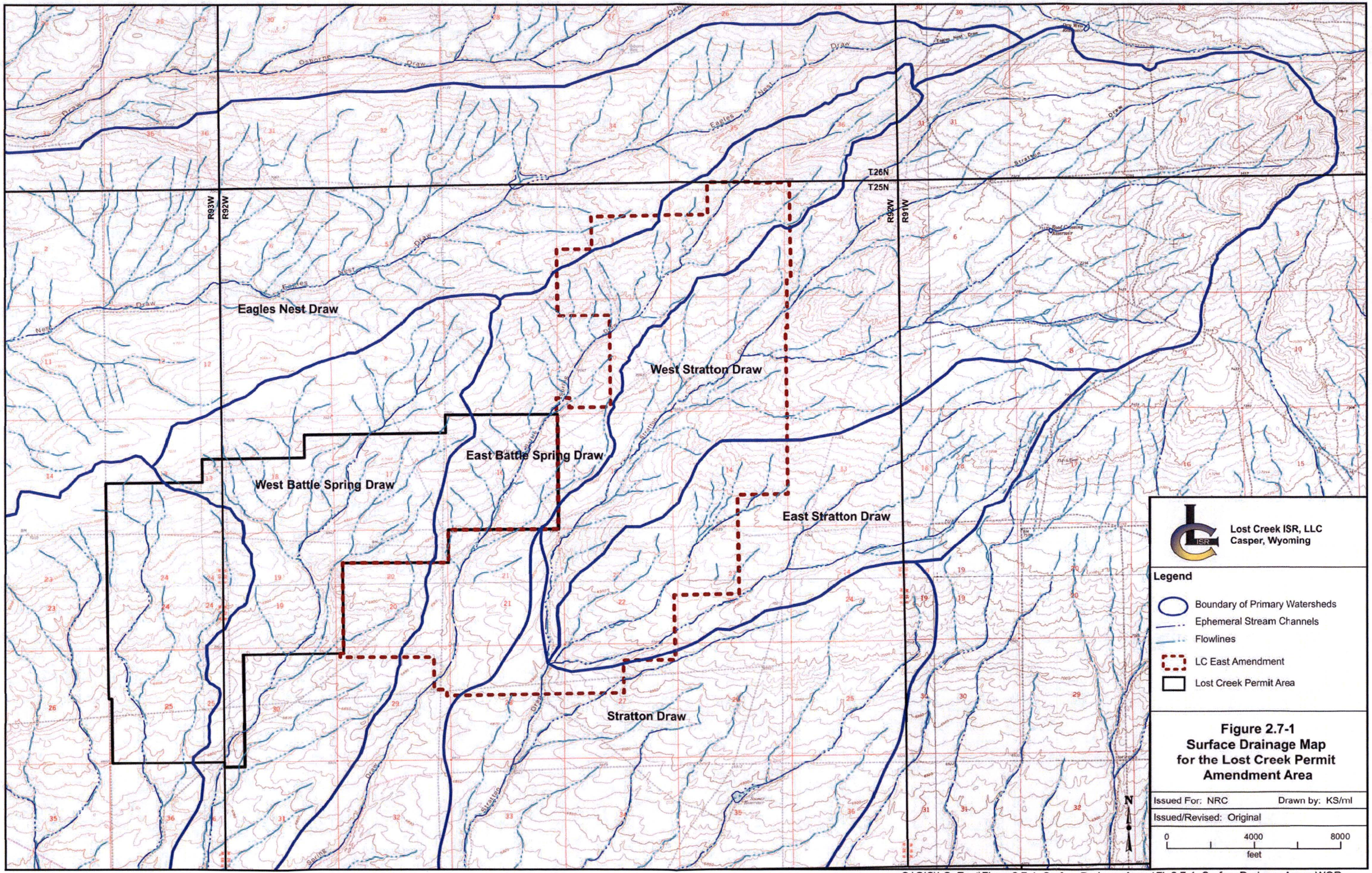

Figure 2.7-1
Surface Drainage Map
for the Lost Creek Permit
Amendment Area

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Figure 2.7-2. Longitudinal Profiles for Three Principle Drainages

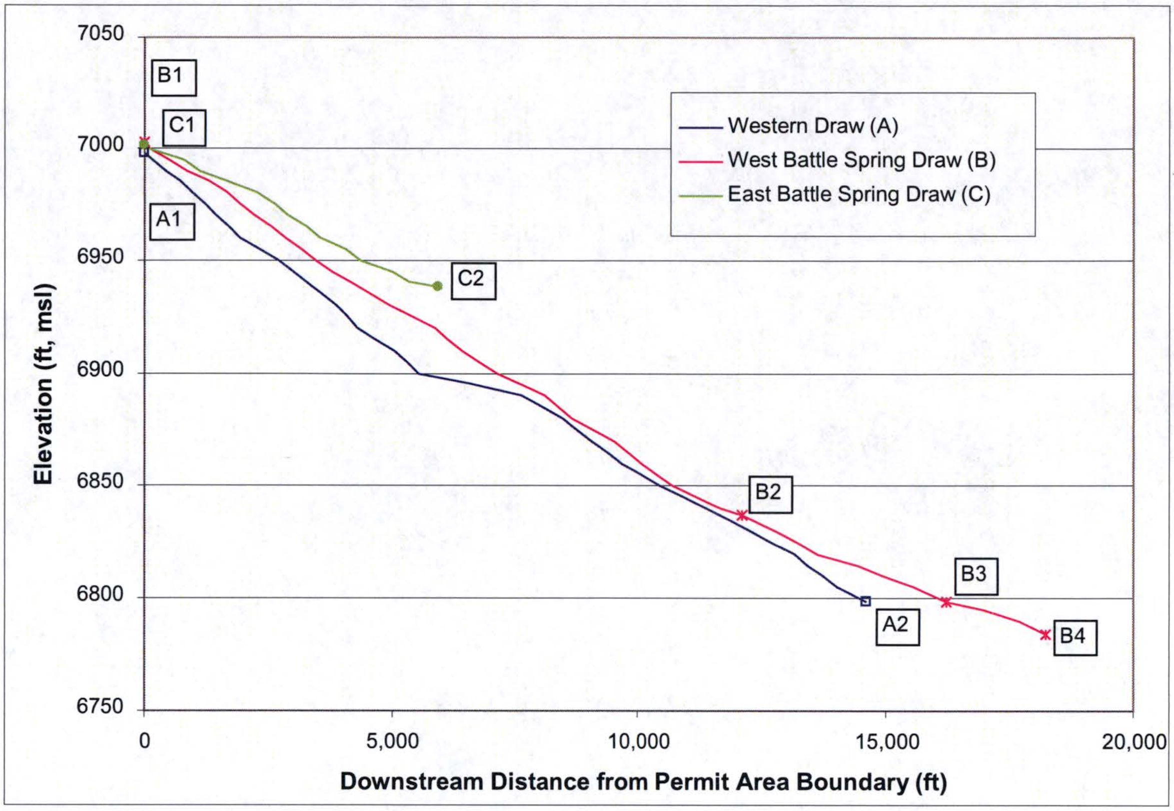

Figure 2.7-3. Photo of Crooked Well Reservoir taken during spring snowmelt runoff looking west.

(April 2007)

Figure 2.7-4. Stormwater sampler installed to collect a 1-L sample of snowmelt or storm surface runoff.

(April, 2007)

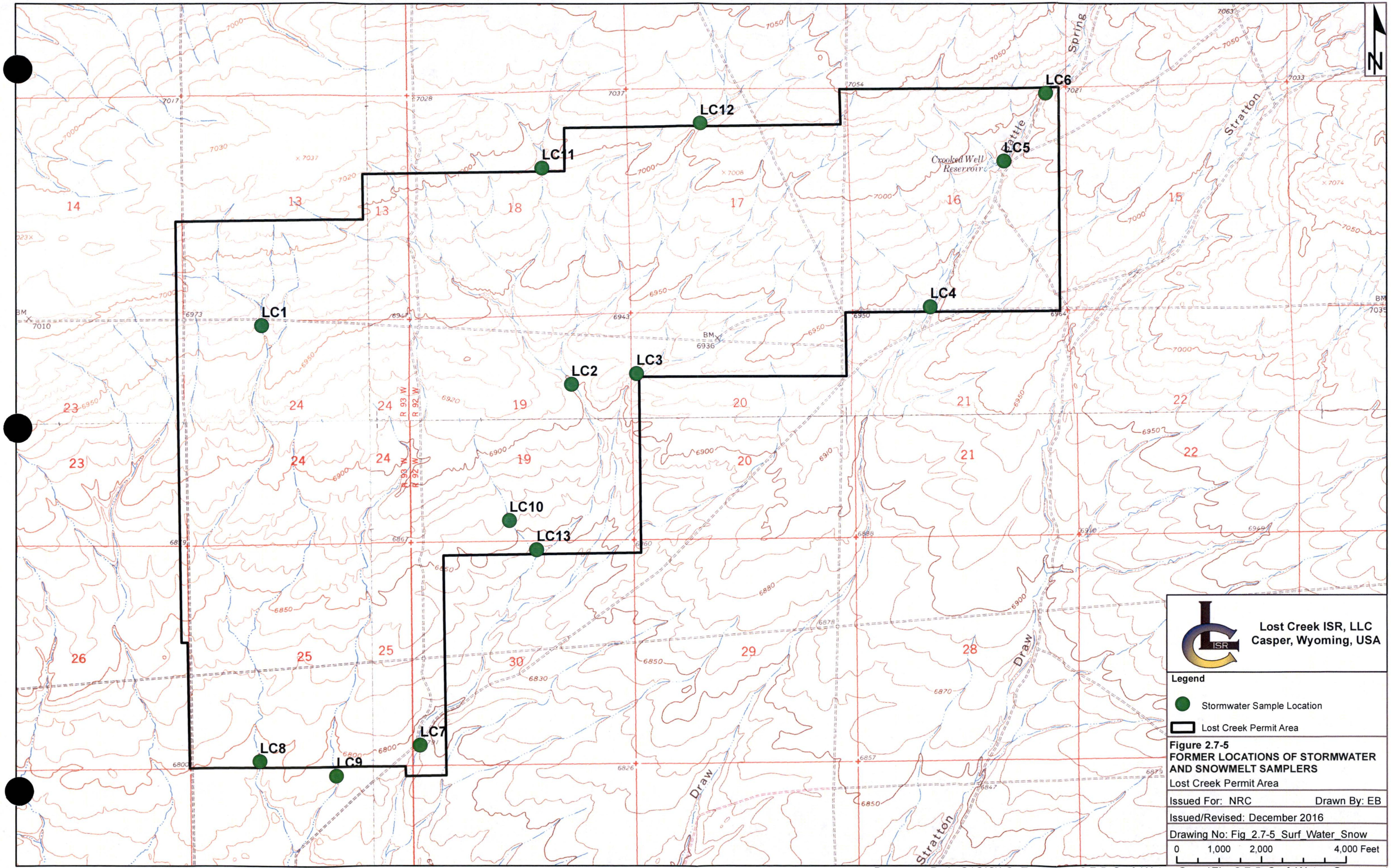

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Figure 2.7-5
FORMER LOCATIONS OF STORMWATER AND SNOWMELT SAMPLERS
Lost Creek Permit Area

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Drawn By: EB
Issued/Revised: December 2016
Drawing No: Fig_2.7-5_Surf_Water_Snow

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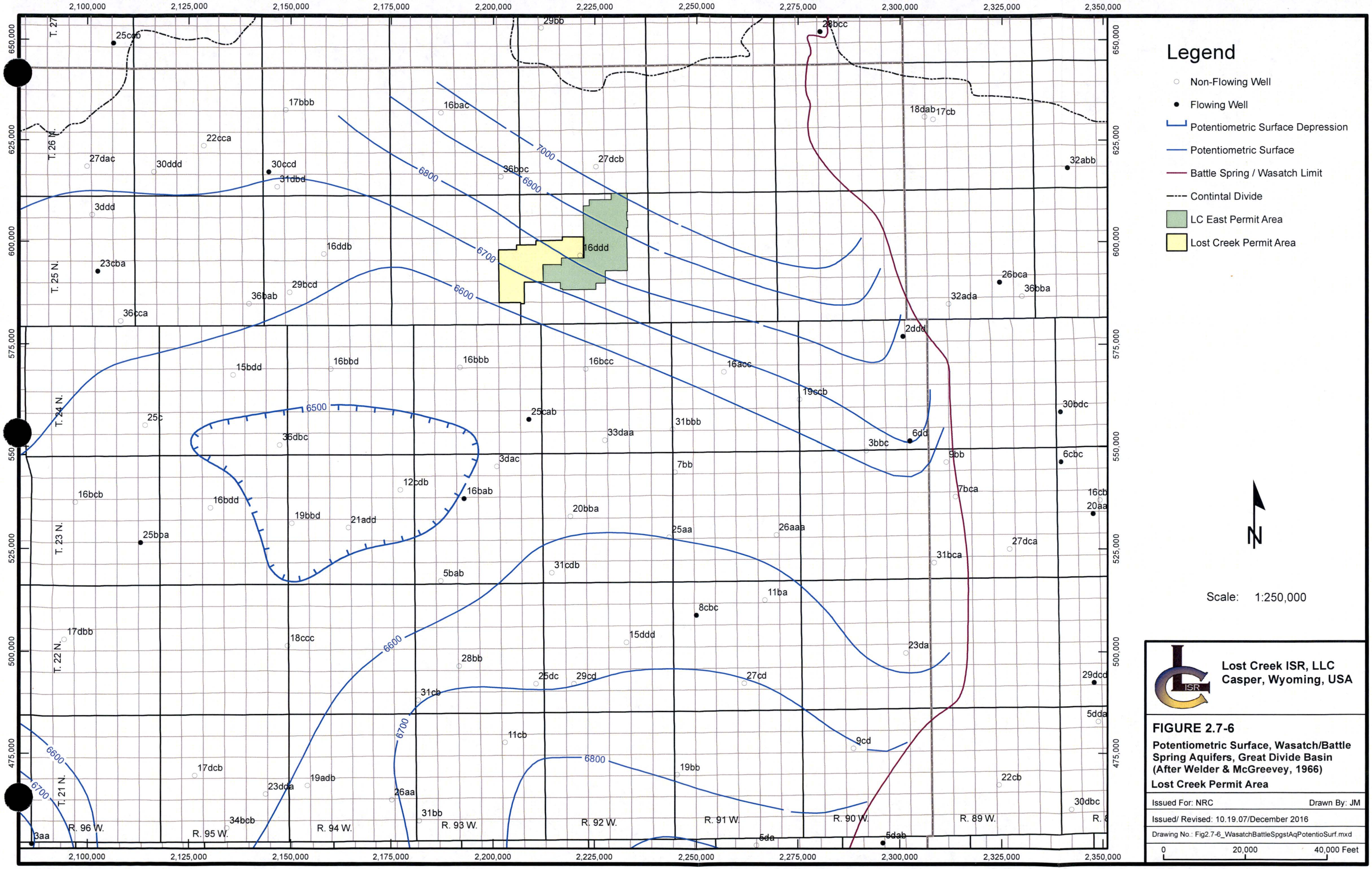

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FIGURE 2.7-6

Potentiometric Surface, Wasatch/Battle Spring Aquifers, Great Divide Basin (After Welder & McGreevey, 1966)

Lost Creek Permit Area

Issued For: NRC

Drawn By: JM

Issued/ Revised: 10.19.07/December 2016

Drawing No.: Fig2.7-6_WasatchBattleSpgstAqPotentioSurf.mxd

Projection: NAD 27 StatePlane Wyoming West Central (feet)

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ERA	SYSTEM, SERIES AND OTHER SUBDIVISIONS			STRATIGRAPHIC UNIT	HYDROGEOLOGIC UNIT
Cenozoic	Quaternary			Unnamed Alluvium	Alluvial Aquifers
	Tertiary	Miocene	Upper	Brown Park, North Park, and South Pass Formations, Bishop Conglomerate	Upper Tertiary Aquifers (Not present near Lost Creek)
		Oligocene			
		Eocene	Lower	Bridger Formation Green River Formation	
		Paleocene		Wasatch Formation-Battle Spring Formation Fort Union Formation	Tertiary Aquifers
Mesozoic	Cretaceous		Upper	Lance Formation	
				Fox Hills Sandstone	
				Lewis Shale	Confining Unit
				Mesaverde Formation	Mesaverde Aquifer
				Steele Shale	Confining Unit
				Cody Shale	
				Niobrara Formation	
				Frontier Formation	Frontier Aquifer
			Lower	Mowry Shale	Confining Unit
				Muddy Sandstone	
				Thermopolis Shale	
				Cloverly Formation	Cloverly (Dakota) Aquifer
	Jurassic			Morrison Formation	Confining Unit
				Sundance Formation	Sundance/Nugget Aquifer
	Triassic			Nugget Sandstone	
				Chugwater Formation	Confining Unit
				Dinwoody Formation	
Paleozoic	Permian			Phosphoria Formation	
	Pennsylvanian			Tensleep Formation	Paleozoic Aquifer
				Amsden Formation	
	Mississippian			Madison Formation	
	Cambrian			Flathead Sandstone	

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Casper, Wyoming, USA

FIGURE 2.7-7

Regional Hydrostratigraphic Units of Interest, Great Divide Basin

Lost Creek Permit Area

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Drawn By: JM
Issued/Revised: 10.22.07/December 2016
Drawing No.: Fig3.5-7_RegHydrostaticUnits.pdf

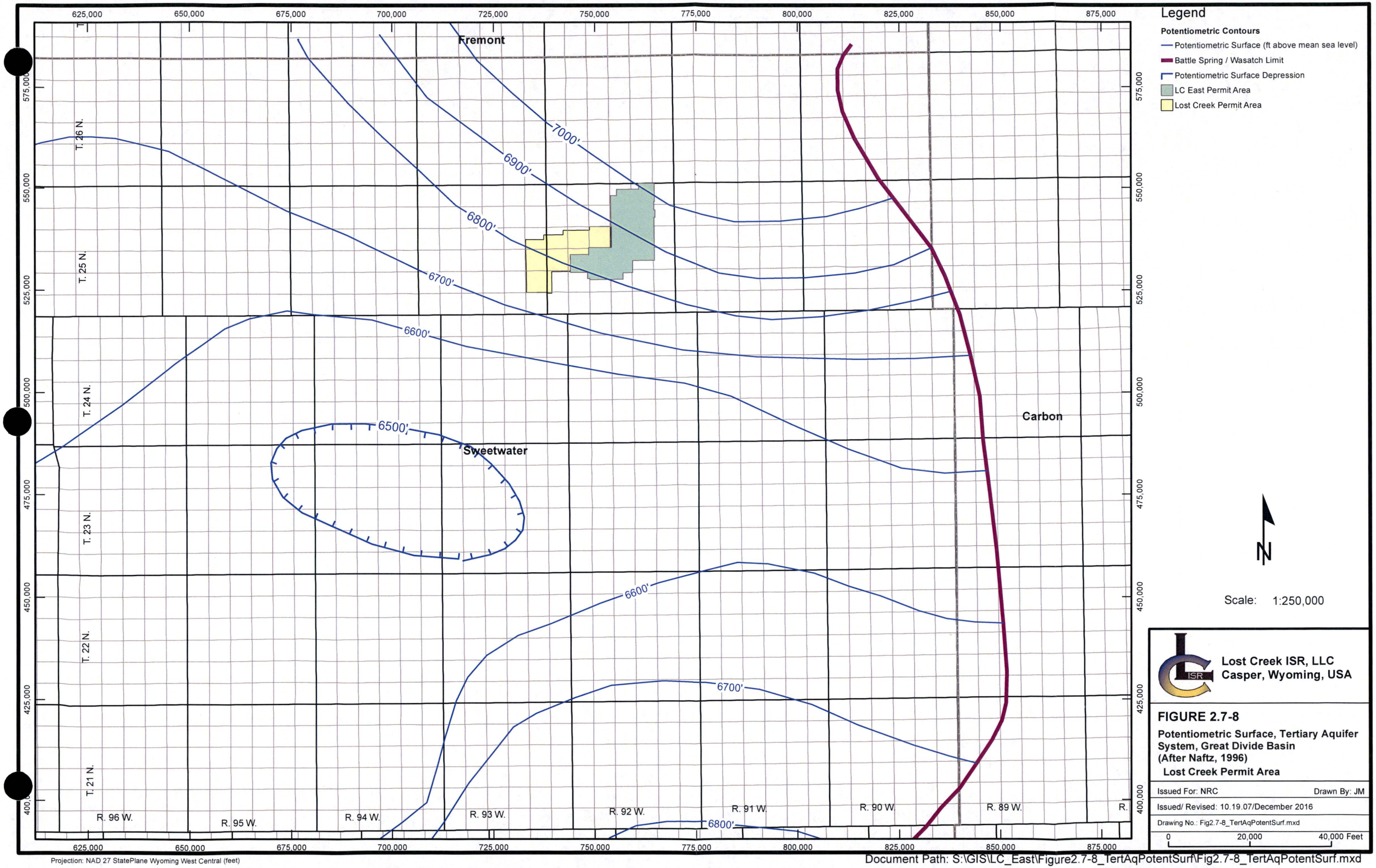

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FIGURE 2.7-8

Potentiometric Surface, Tertiary Aquifer System, Great Divide Basin (After Naftz, 1996)
Lost Creek Permit Area

Issued For: NRC Drawn By: JM

Issued/ Revised: 10.19.07/December 2016

Drawing No.: Fig2.7-8_TertAqPotentSurf.mxd

Projection: NAD 27 StatePlane Wyoming West Central (feet)

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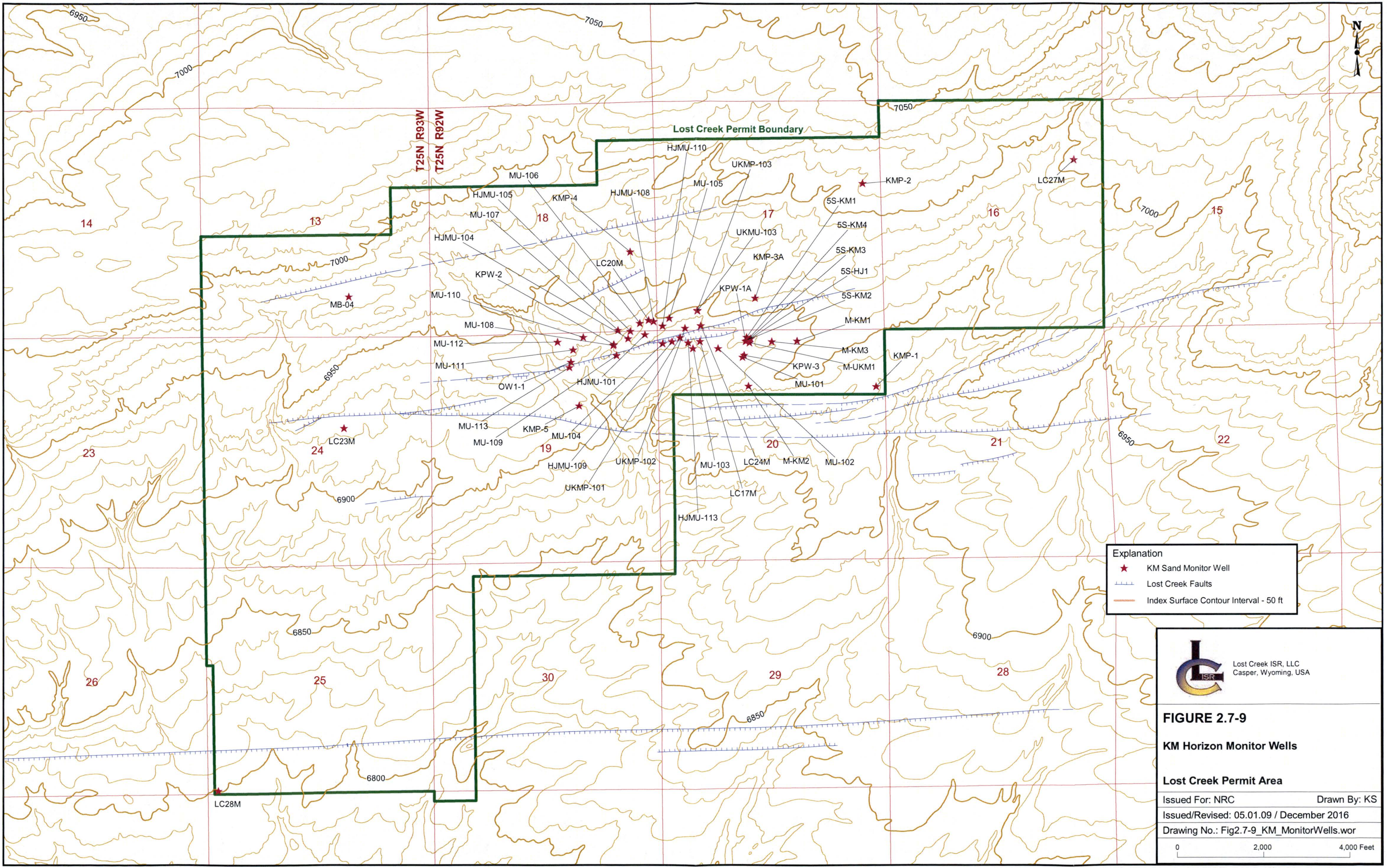

FIGURE 2.7-9

KM Horizon Monitor Wells

Lost Creek Permit Area

Issued For: NRC Drawn By: KS

Issued/Revised: 05.01.09 / December 2016

Drawing No.: Fig2.7-9_KM_MonitorWells.wor

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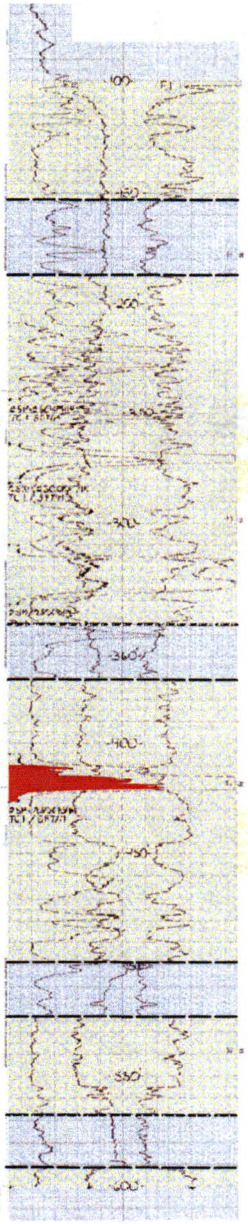

DE Horizon	DE - Alternating very fine, course-grained sandstone, mudstone and siltstone. Minor host for uranium mineralization.
	Shale Horizon
FG Horizon (Overlying Aquifer)	FG - Lenticular arkosic sandstones with intervals of mudstone and siltstone. Categorized as suspended load facies. Cut and fill channels not as prominent as in HJ horizon. Minor host for uranium mineralization.
LC Shale (Overlying Confining Unit)	LCS - Shale horizon separating FG from HJ; a virtually continuous aquiclude in Lost Creek area.
	Mineralization
HJ Horizon (Production Zone Aquifer)	HJ - Course-grained arkoses with minor matrix. Very thin lenticular intervals of fine sands. Cut and fill channels are prominent. Mixed load facies. Major host to uranium mineralization, especially in middle parts.
SB Shale (Underlying Confining Unit)	SB Shale - Shale/mudstone separating HJ from UKM Sand. Continuous throughout Permit Area.
UKM Sand (Underlying Aquifer)	UKM - Generally massive, coarse-grained sandstone with lenticular fine sand intervals. Mixed load facies. Host to significant uranium mineralization.
NN Shale	NN Shale - No Name Shale, separating UKM Sand from MKM Sand.
MKM Sand	MKM Sand - Similar to the UKM Sand.

Lost Creek ISR, LLC
Littleton, Colorado, USA

FIGURE 2.7-10

Site Hydrostratigraphic Units

Lost Creek Permit Area

Issued For: NRC Drawn By: JM

Issued/ Revised: 10.22.07/December 2016

Drawing No.: Fig2.7-10_Site_Hydrostrat_Units.pdf

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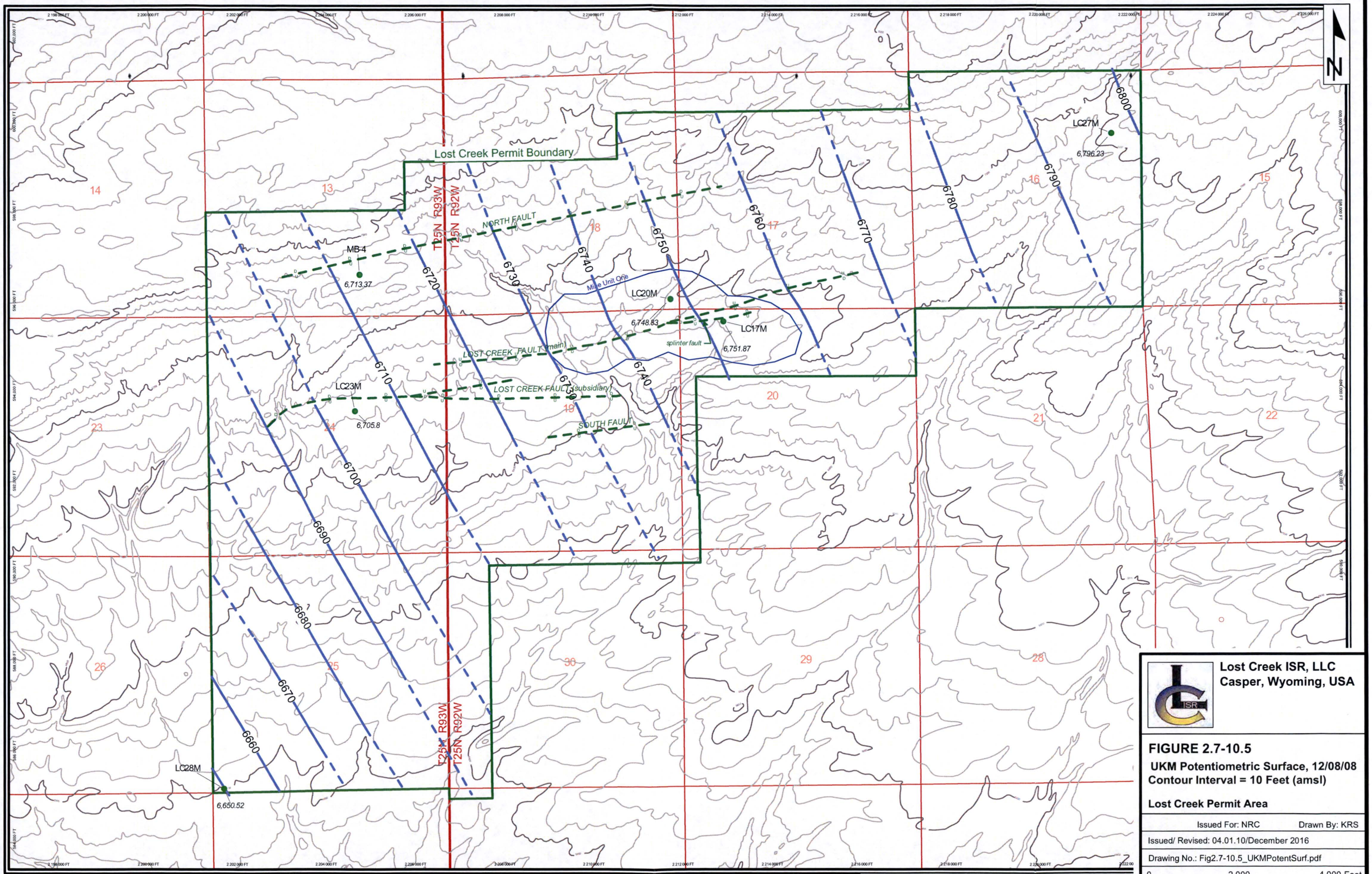

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Lost Creek ISR, LLC
Casper, Wyoming, USA

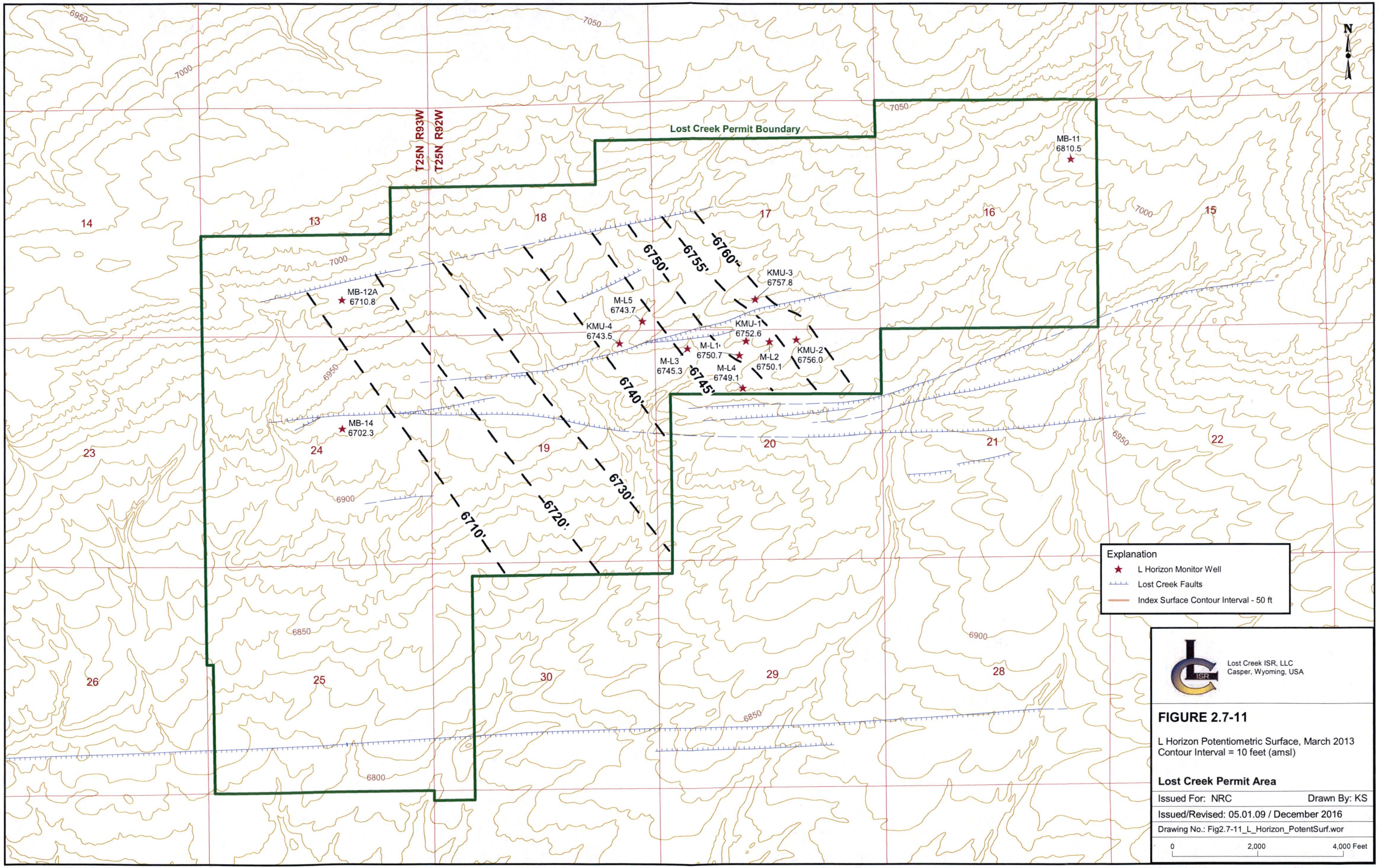
FIGURE 2.7-10.5

UKM Potentiometric Surface, 12/08/08
Contour Interval = 10 Feet (amsl)

Lost Creek Permit Area

Issued For: NRC
Drawn By: KRS
Issued/ Revised: 04.01.10/December 2016
Drawing No.: Fig2.7-10.5_UKMPotentSurf.pdf

0 2,000 4,000 Feet



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Casper, Wyoming, USA

FIGURE 2.7-11

L Horizon Potentiometric Surface, March 2013
Contour Interval = 10 feet (amsl)

Lost Creek Permit Area

Issued For: NRC Drawn By: KS
Issued/Revised: 05.01.09 / December 2016
Drawing No.: Fig2.7-11_L_Horizon_PotentSurf.wor

0 2,000 4,000 Feet

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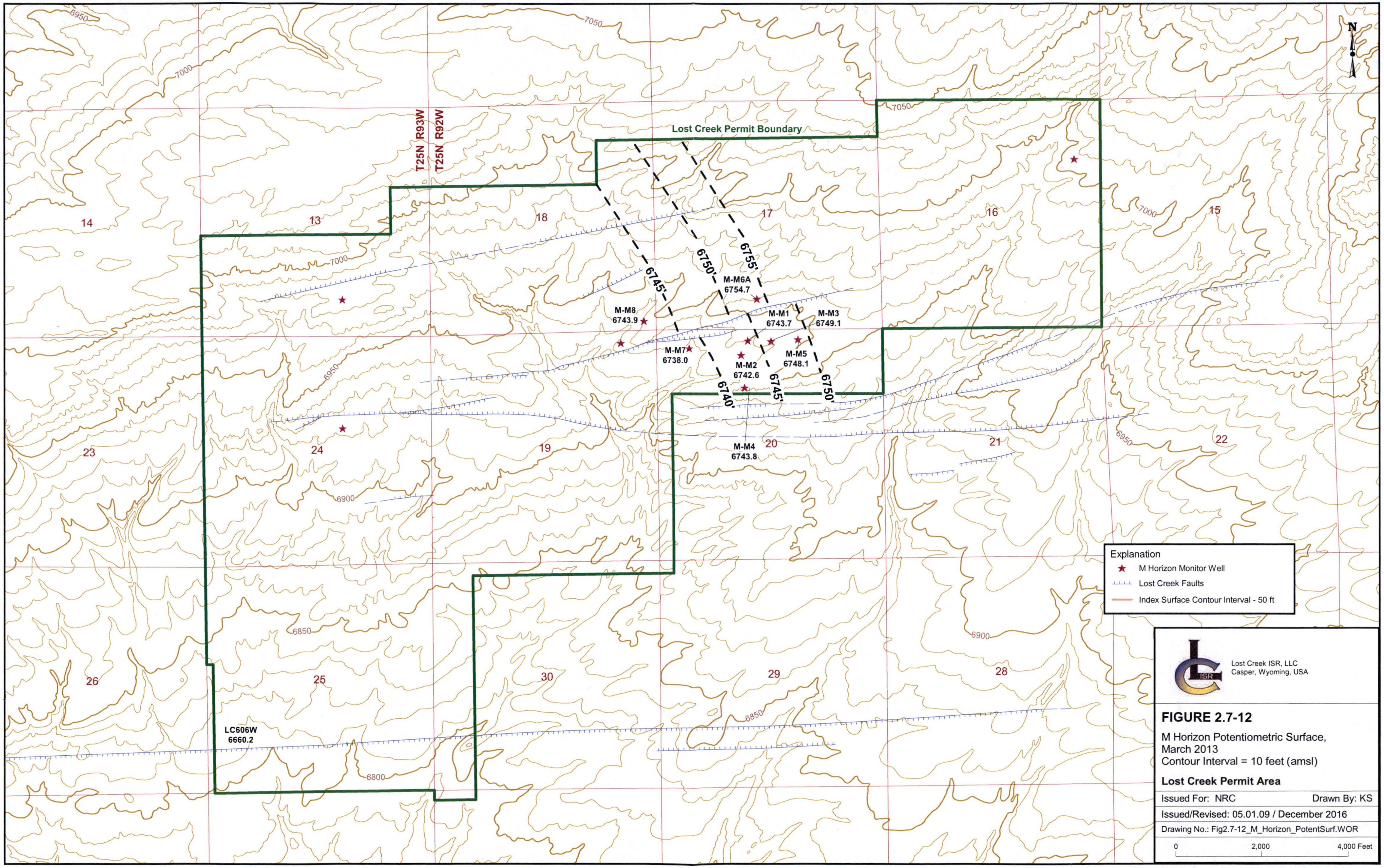

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Casper, Wyoming, USA

FIGURE 2.7-12

M Horizon Potentiometric Surface,
March 2013
Contour Interval = 10 feet (amsl)

Lost Creek Permit Area

Issued For: NRC Drawn By: KS

Issued/Revised: 05.01.09 / December 2016

Drawing No.: Fig2.7-12_M_Horizon_PotentSurf.WOR

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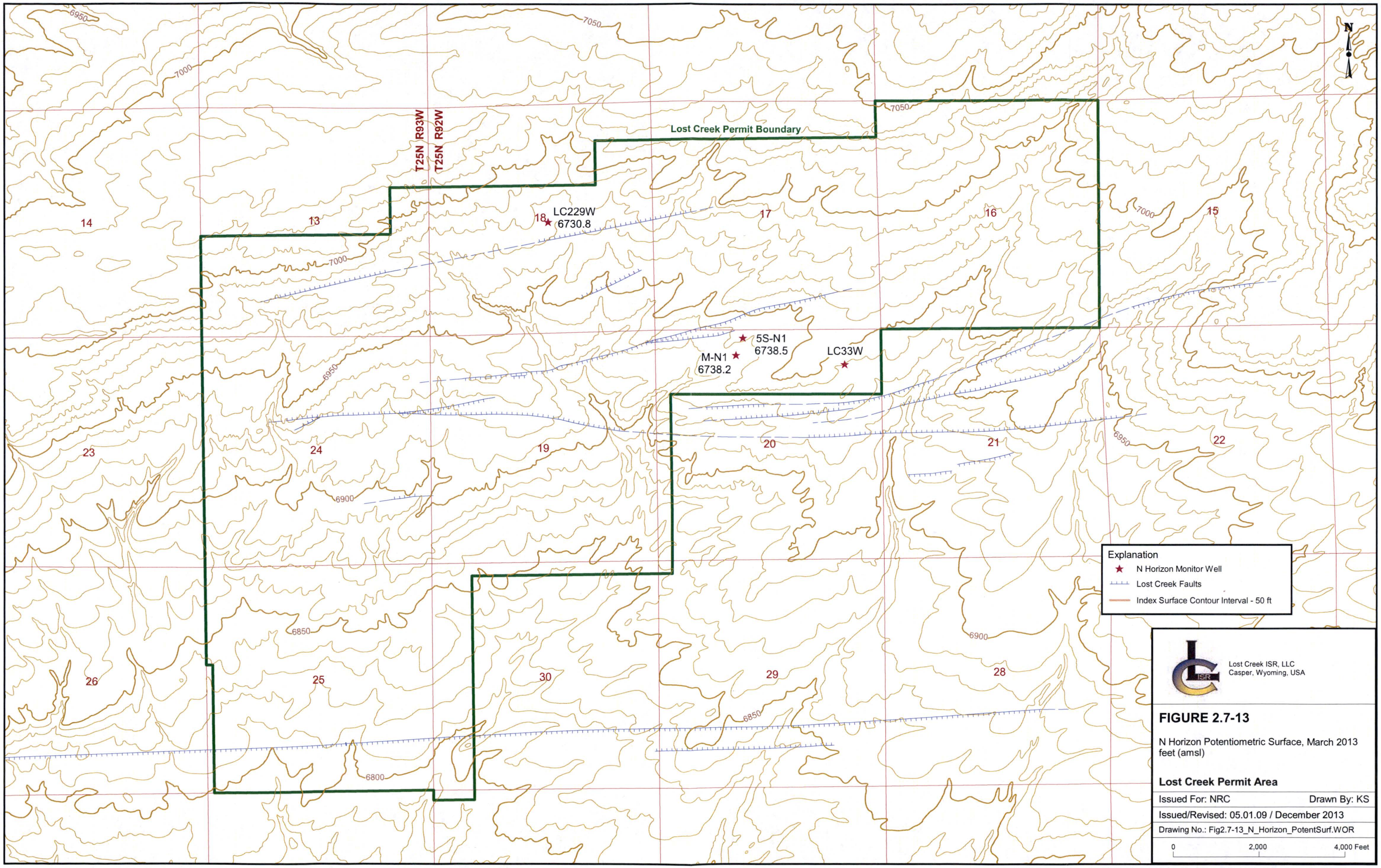

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Casper, Wyoming, USA

FIGURE 2.7-13

N Horizon Potentiometric Surface, March 2013
feet (amsl)

Lost Creek Permit Area

Issued For: NRC Drawn By: KS

Issued/Revised: 05.01.09 / December 2013

Drawing No.: Fig2.7-13_N_Horizon_PotentSurf.WOR

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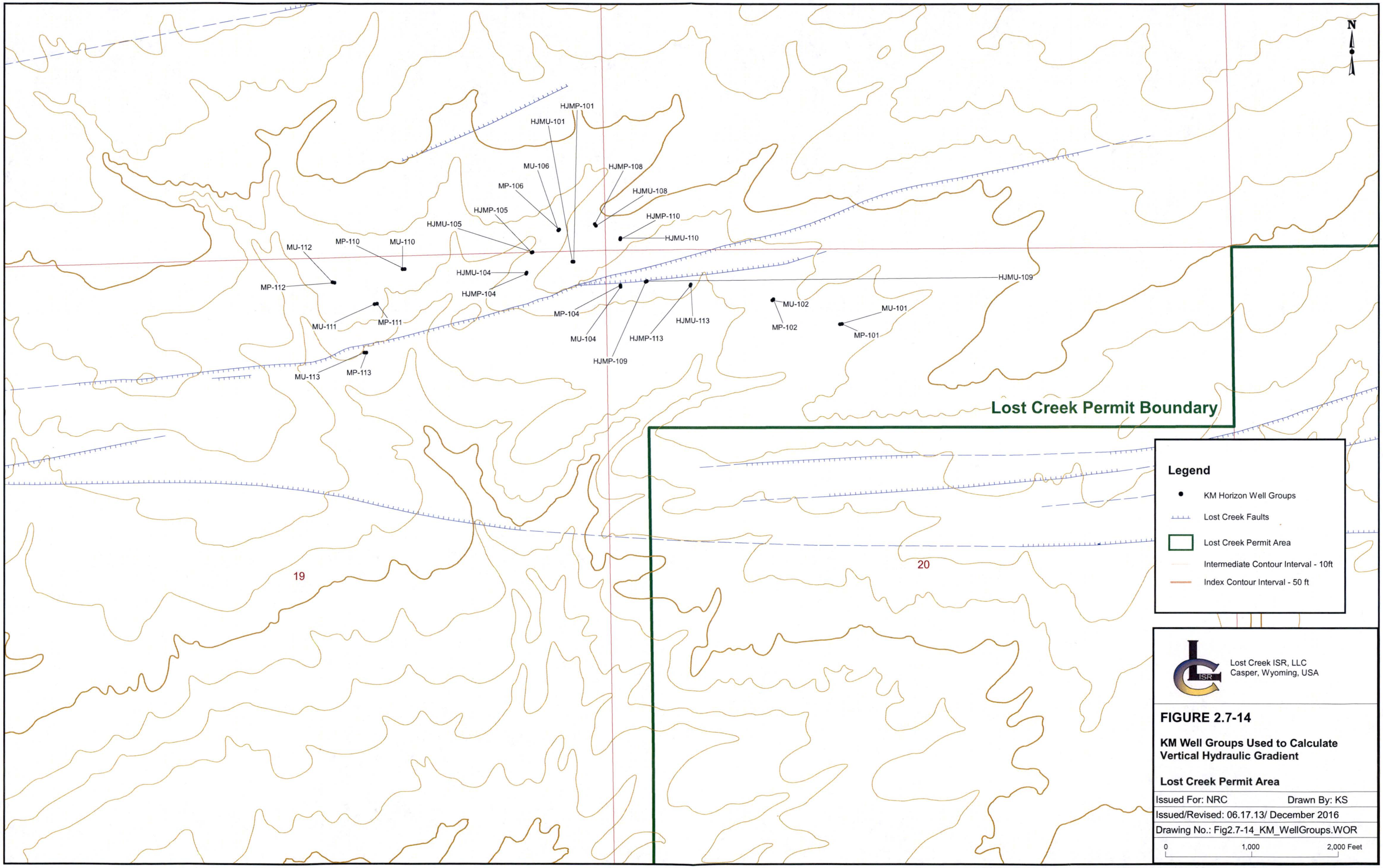

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Casper, Wyoming, USA

FIGURE 2.7-14

KM Well Groups Used to Calculate Vertical Hydraulic Gradient

Lost Creek Permit Area

Issued For: NRC Drawn By: KS

Issued/Revised: 06.17.13/ December 2016

Drawing No.: Fig2.7-14_KM_WellGroups.WOR

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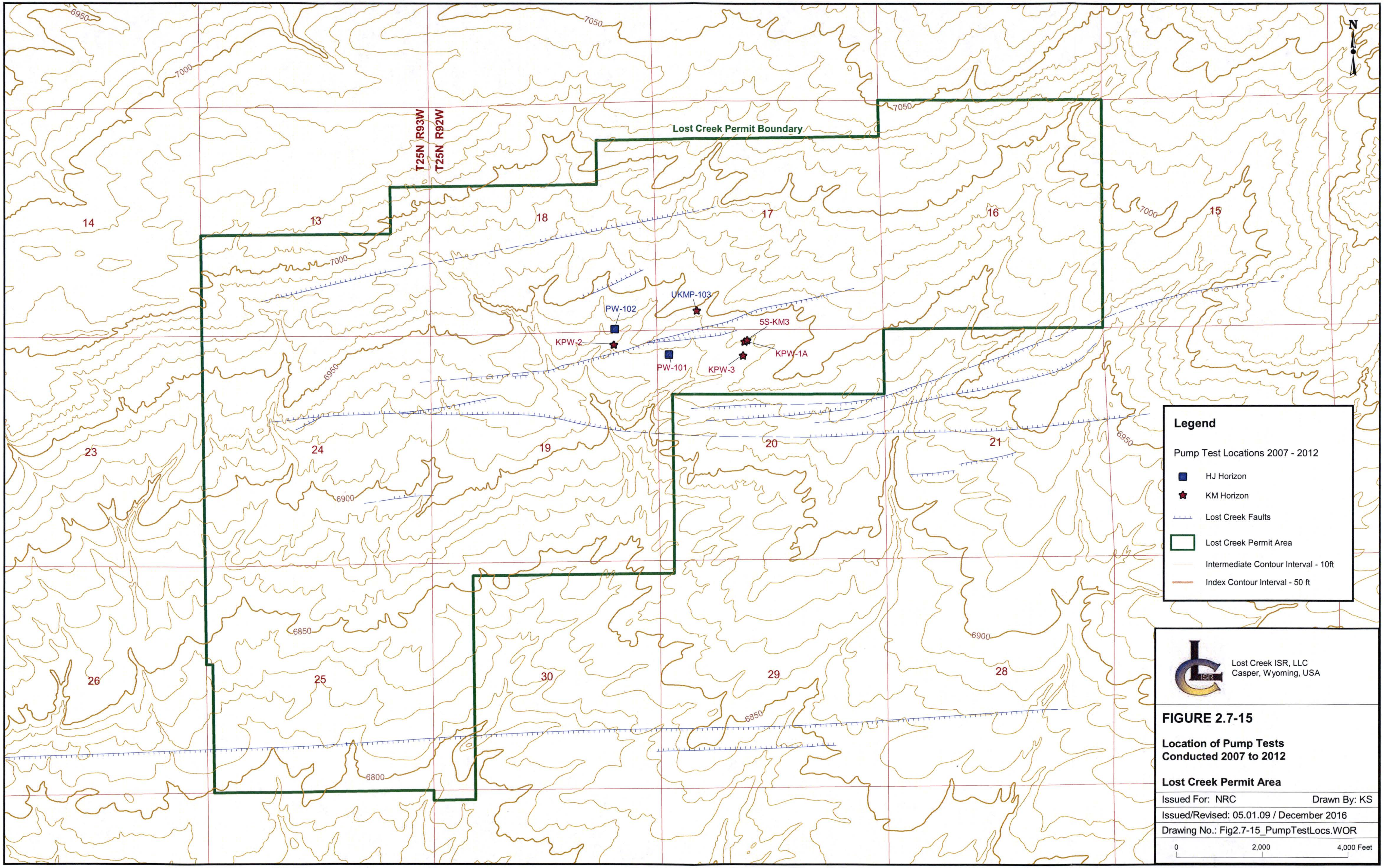

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FIGURE 2.7-15

Location of Pump Tests Conducted 2007 to 2012

Lost Creek Permit Area

Issued For: NRC
Drawn By: KS
Issued/Revised: 05.01.09 / December 2016
Drawing No.: Fig2.7-15_PumpTestLocs.WOR

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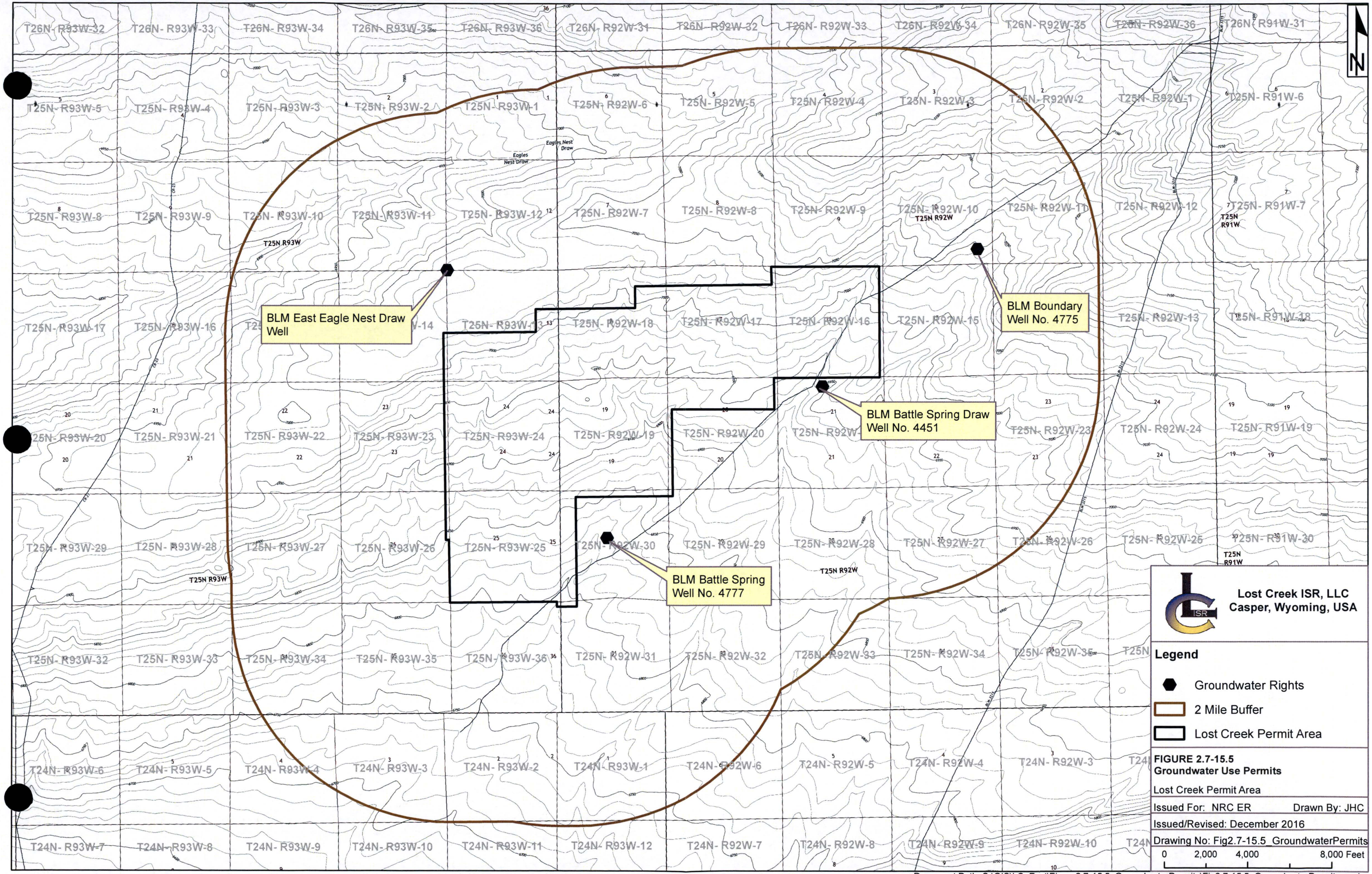

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Casper, Wyoming, USA

FIGURE 2.7-15.5
Groundwater Use Permits

Lost Creek Permit Area

Issued For: NRC ER

Drawn By: JHC

Issued/Revised: December 2016

Drawing No: Fig2.7-15.5_GroundwaterPermits

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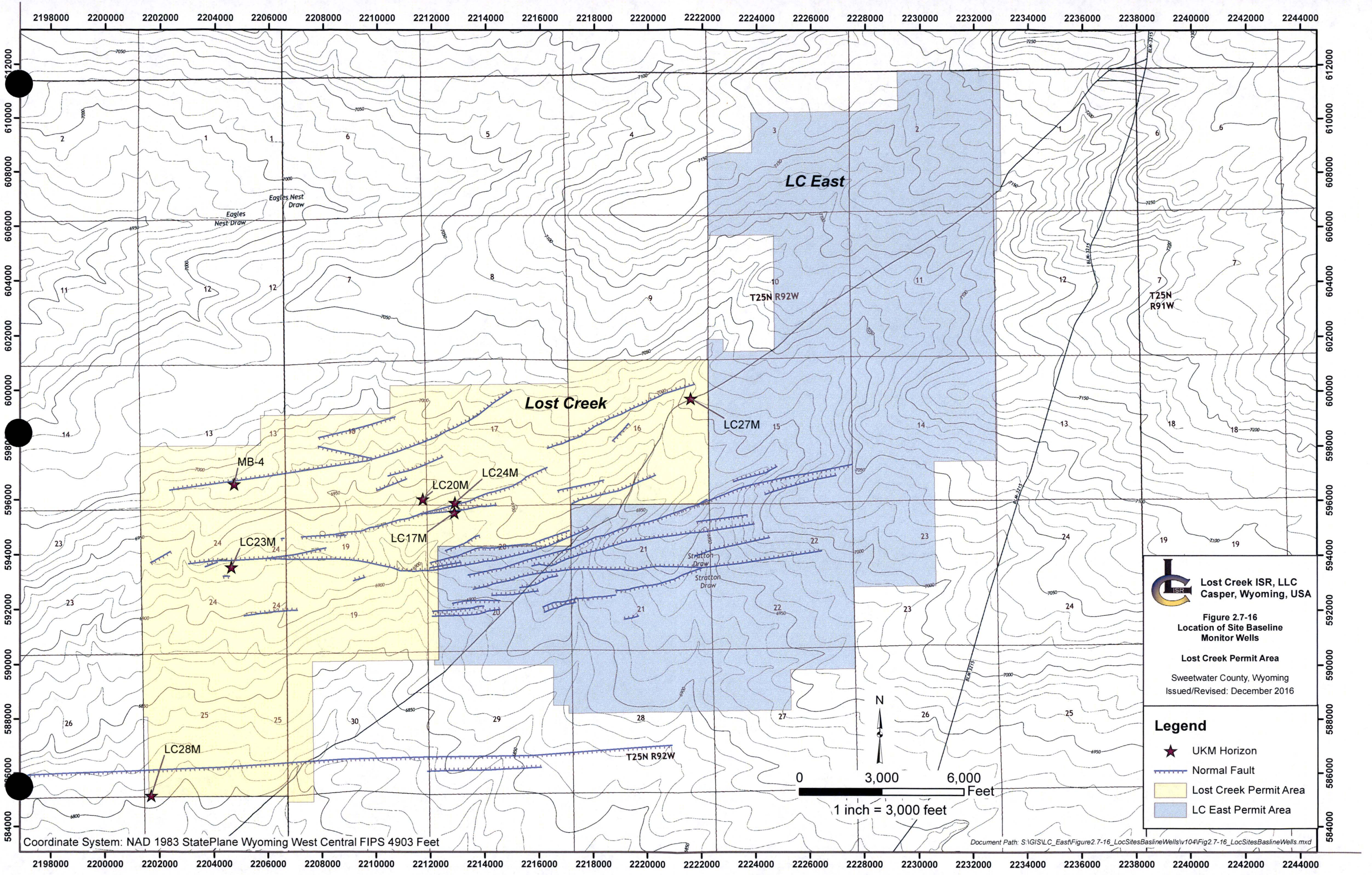
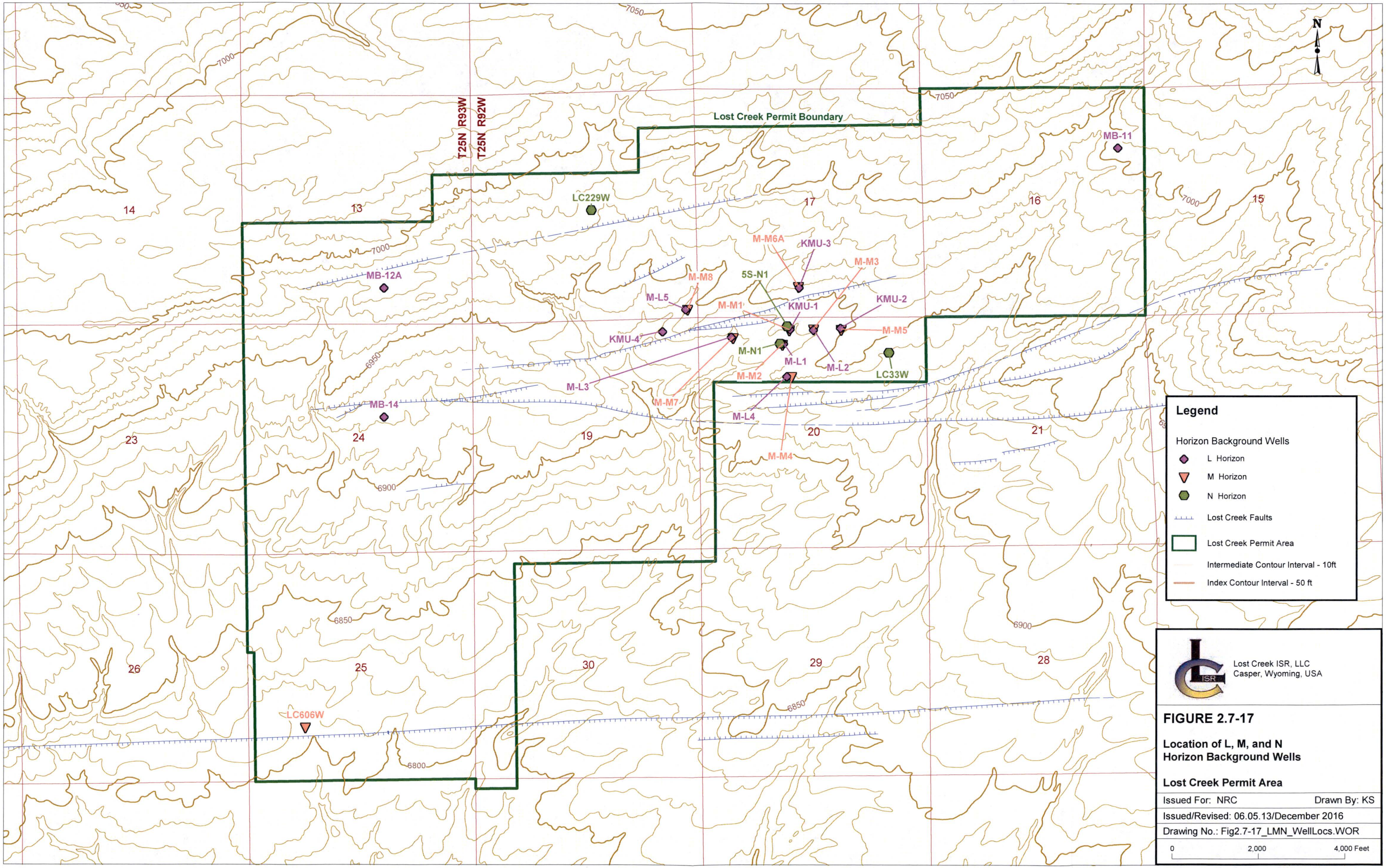


Lost Creek ISR, LLC
Casper, Wyoming, USA

Figure 2.7-16
Location of Site Baseline Monitor Wells

Lost Creek Permit Area

Sweetwater County, Wyoming
Issued/Revised: December 2016



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Casper, Wyoming, USA

FIGURE 2.7-17

Location of L, M, and N
Horizon Background Wells

Lost Creek Permit Area

Issued For: NRC Drawn By: KS
Issued/Revised: 06.05.13/December 2016
Drawing No.: Fig2.7-17_LMN_WellLocs.WOR

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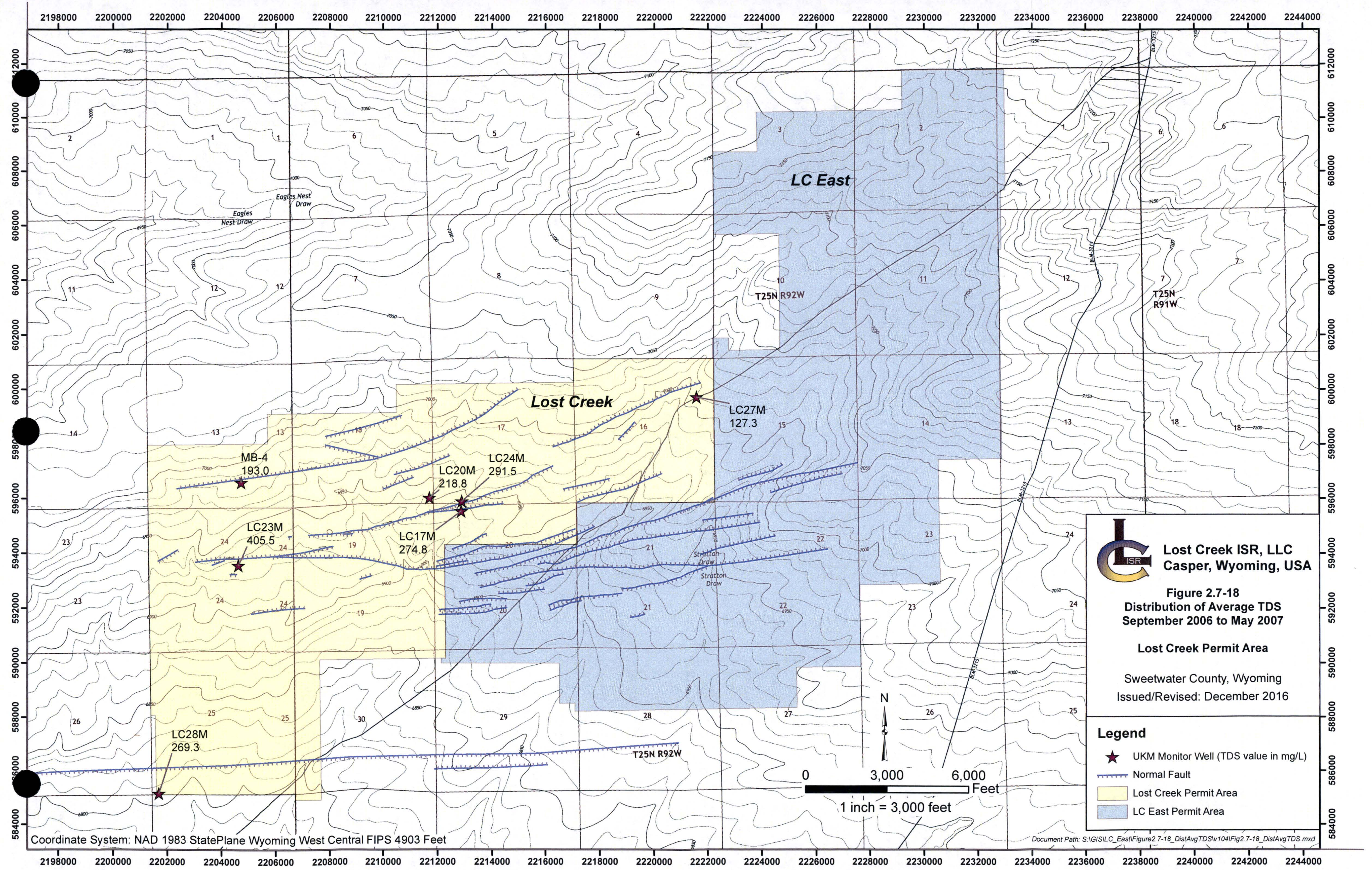


Lost Creek ISR, LLC
Casper, Wyoming, USA

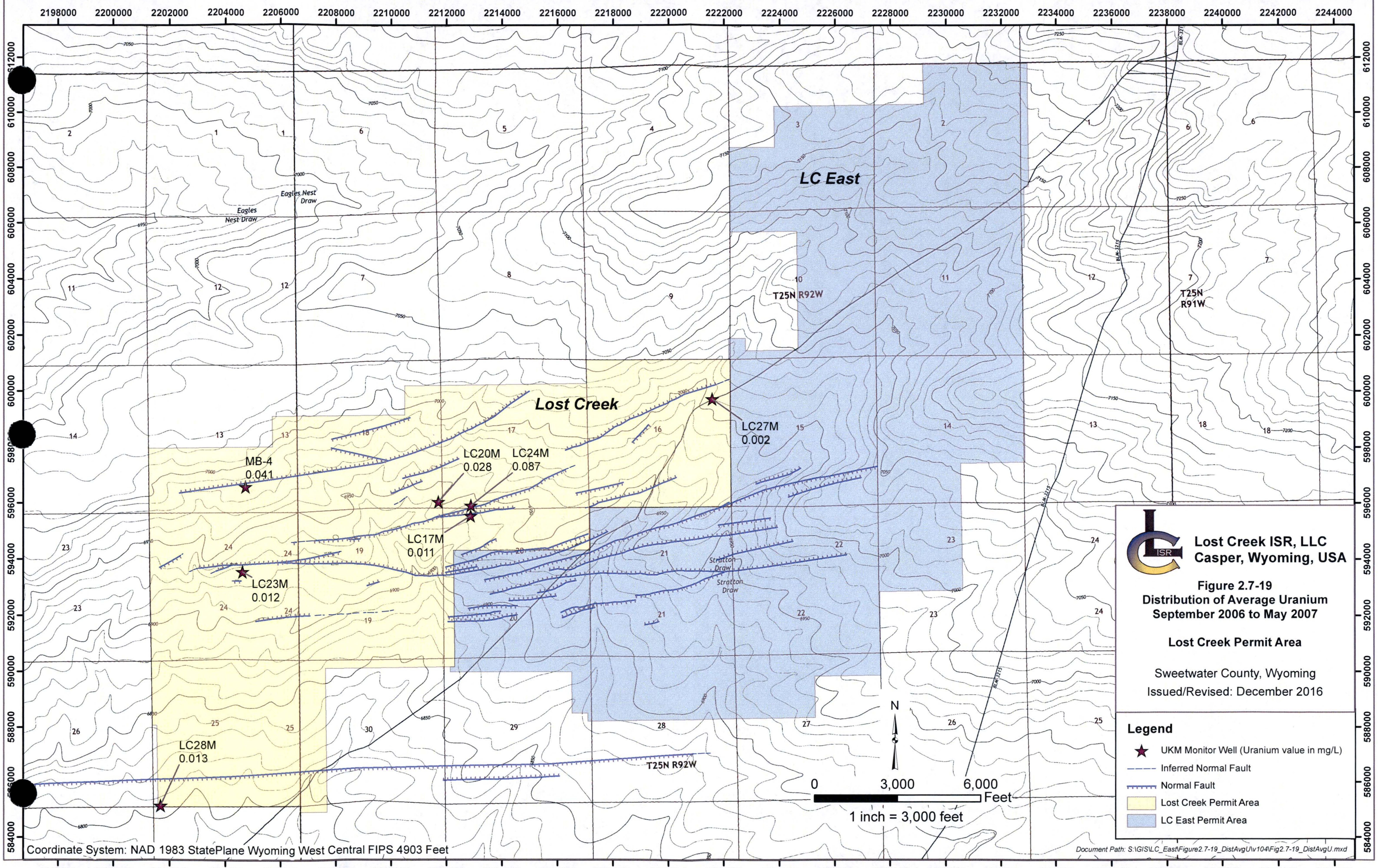
Figure 2.7-18
Distribution of Average TDS
September 2006 to May 2007

Lost Creek Permit Area

Sweetwater County, Wyoming
Issued/Revised: December 2016

Legend

★	UKM Monitor Well (TDS value in mg/L)
⊥⊥⊥	Normal Fault
🟨	Lost Creek Permit Area
🟦	LC East Permit Area



Lost Creek ISR, LLC
Casper, Wyoming, USA

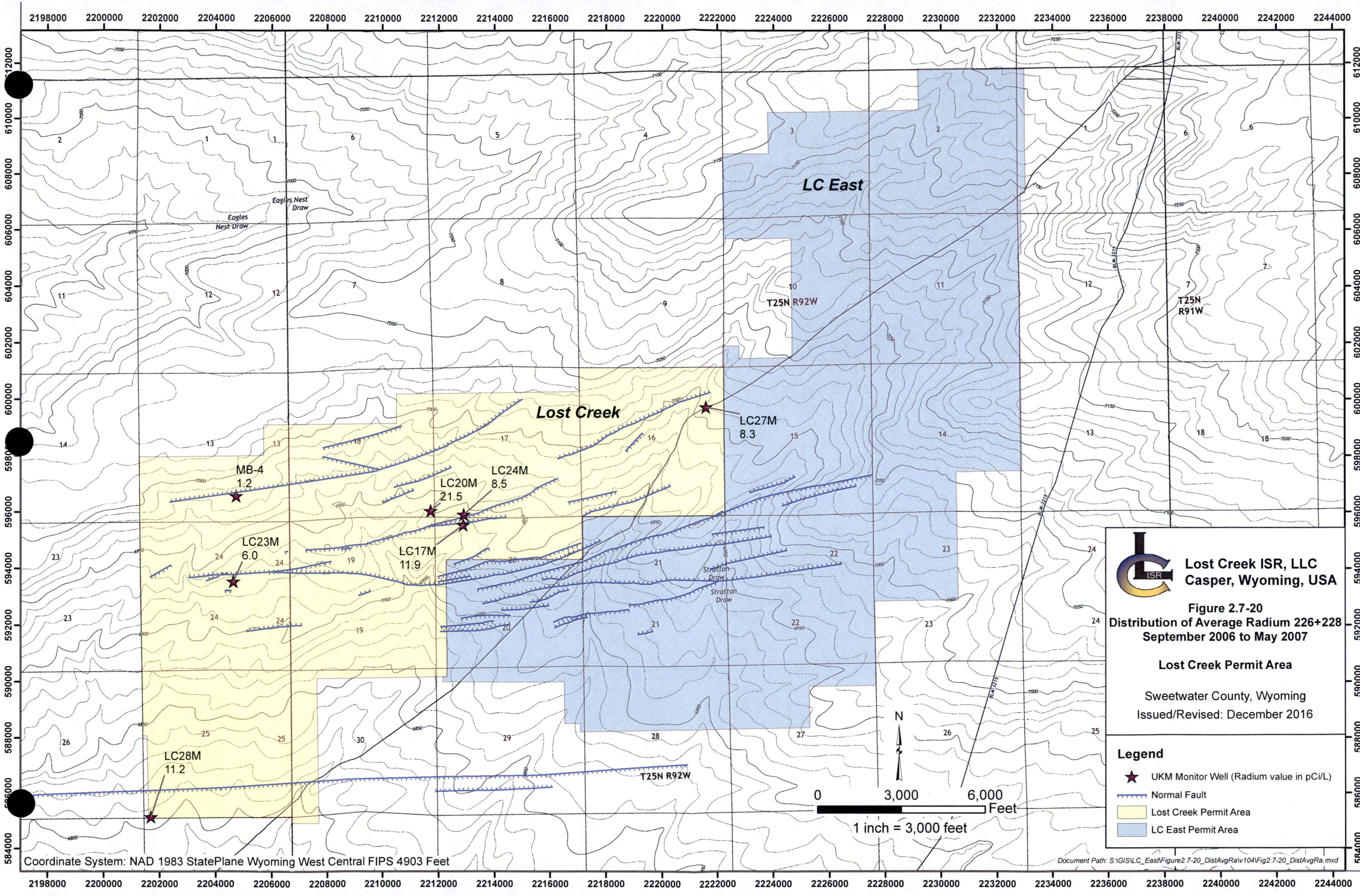
Figure 2.7-19
Distribution of Average Uranium
September 2006 to May 2007

Lost Creek Permit Area

Sweetwater County, Wyoming
Issued/Revised: December 2016

Legend

★ UKM Monitor Well (Uranium value in mg/L)
Inferred Normal Fault
Normal Fault
🟨 Lost Creek Permit Area
🟦 LC East Permit Area



Lost Creek ISR, LLC
Casper, Wyoming, USA

Figure 2.7-20
Distribution of Average Radium 226+228
September 2006 to May 2007

Lost Creek Permit Area

Sweetwater County, Wyoming
Issued/Revised: December 2016

Legend

- ★ UKM Monitor Well (Radium value in pCi/L)
- ┴┴┴ Normal Fault
- 🟨 Lost Creek Permit Area
- 🟦 LC East Permit Area

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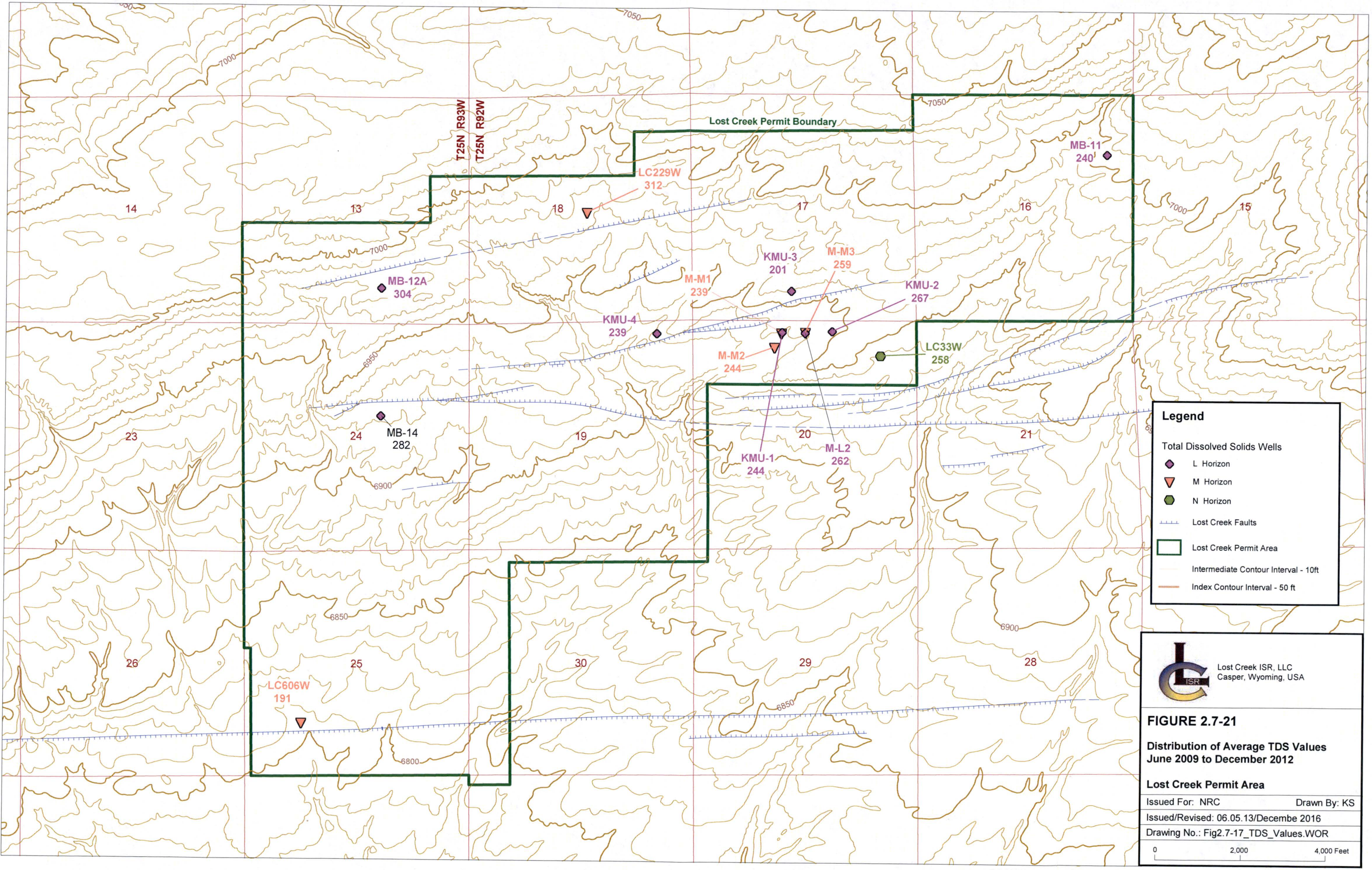

FIGURE 2.7-21

Distribution of Average TDS Values
June 2009 to December 2012

Lost Creek Permit Area

Issued For: NRC Drawn By: KS

Issued/Revised: 06.05.13/Decembe 2016

Drawing No.: Fig2.7-17_TDS_Values.WOR

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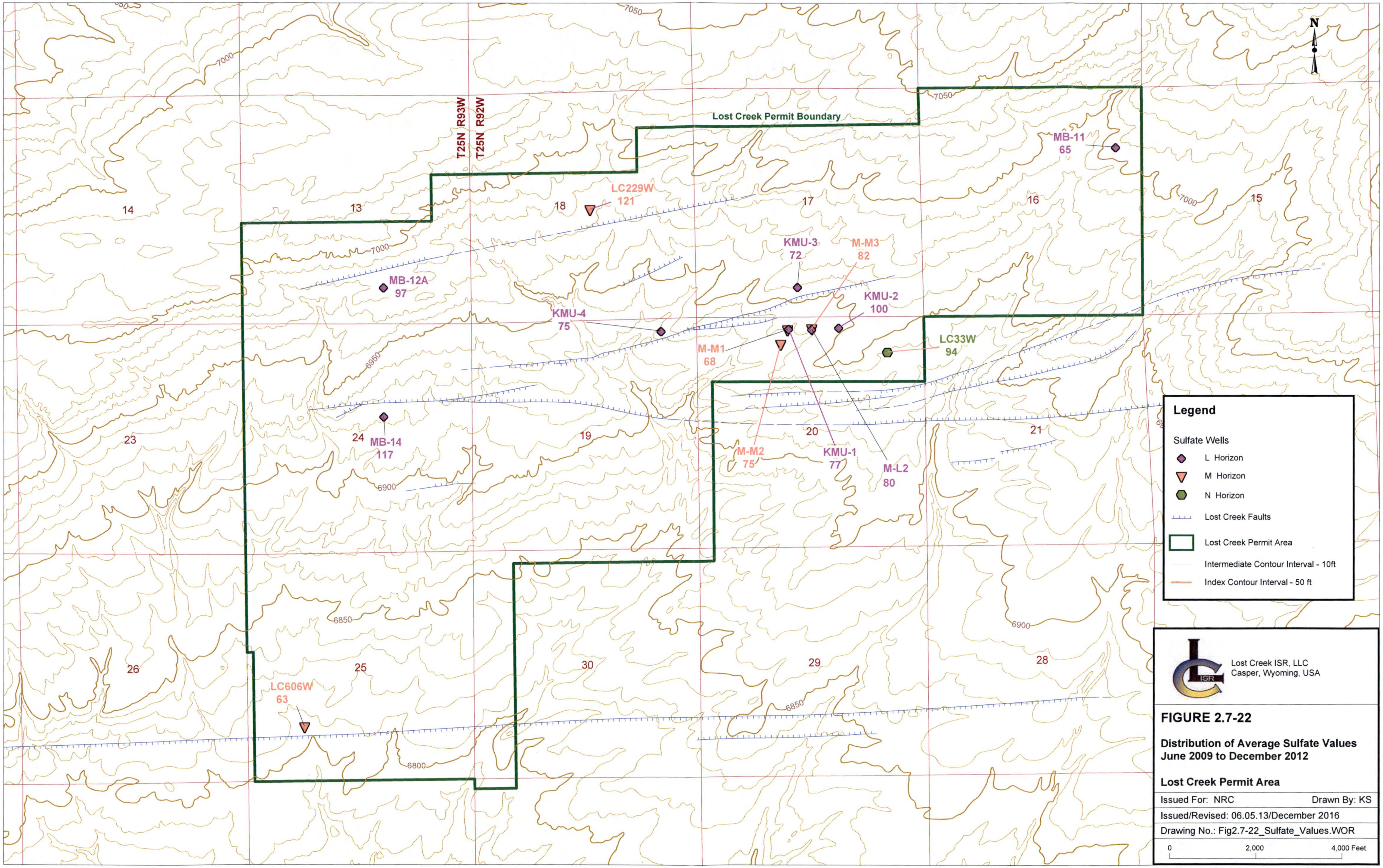

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Casper, Wyoming, USA

FIGURE 2.7-22

Distribution of Average Sulfate Values June 2009 to December 2012

Lost Creek Permit Area

Issued For: NRC Drawn By: KS

Issued/Revised: 06.05.13/December 2016

Drawing No.: Fig2.7-22_Sulfate_Values.WOR

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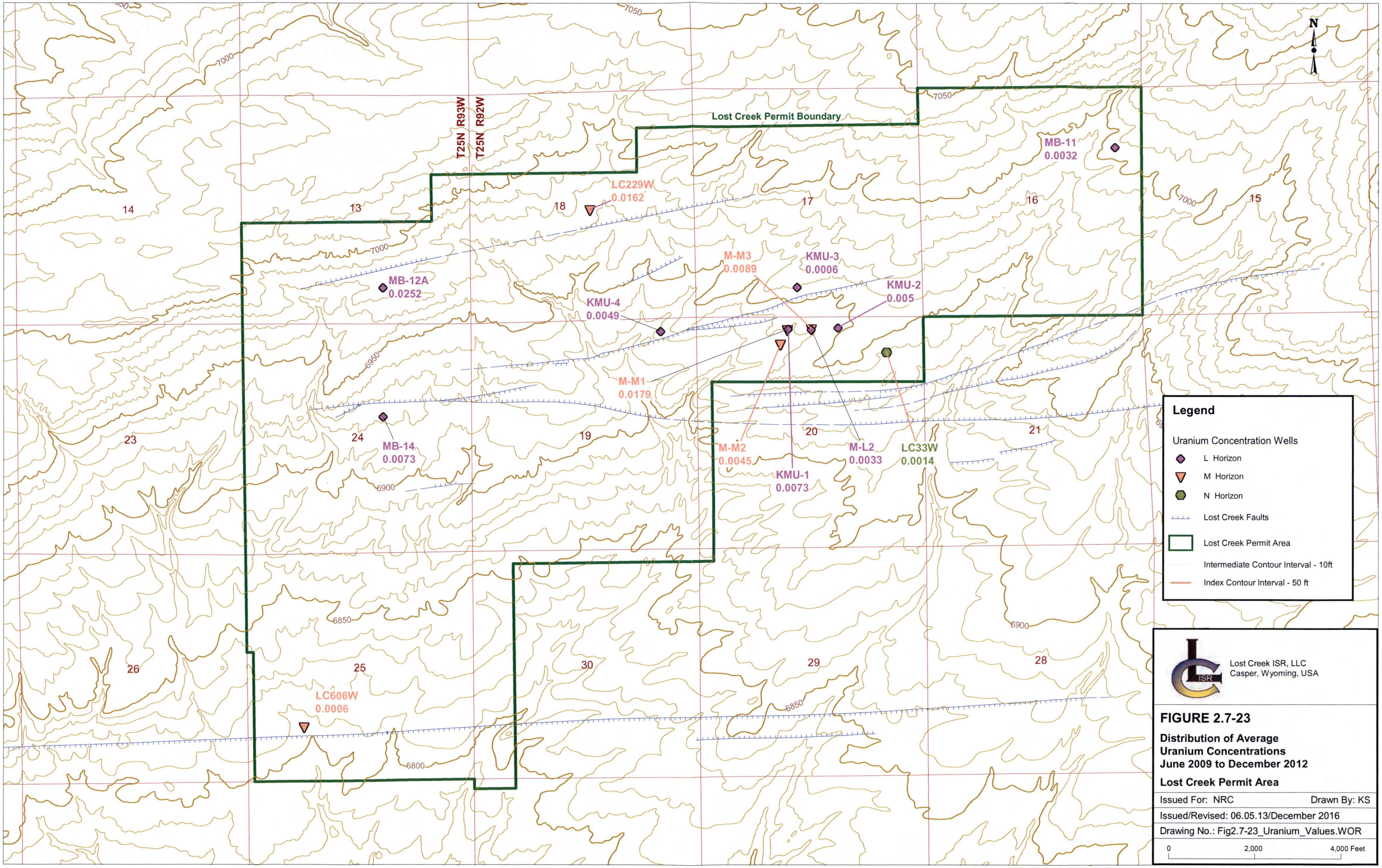

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Casper, Wyoming, USA

FIGURE 2.7-23

Distribution of Average Uranium Concentrations June 2009 to December 2012

Lost Creek Permit Area

Issued For: NRC Drawn By: KS

Issued/Revised: 06.05.13/December 2016

Drawing No.: Fig2.7-23_Uranium_Values.WOR

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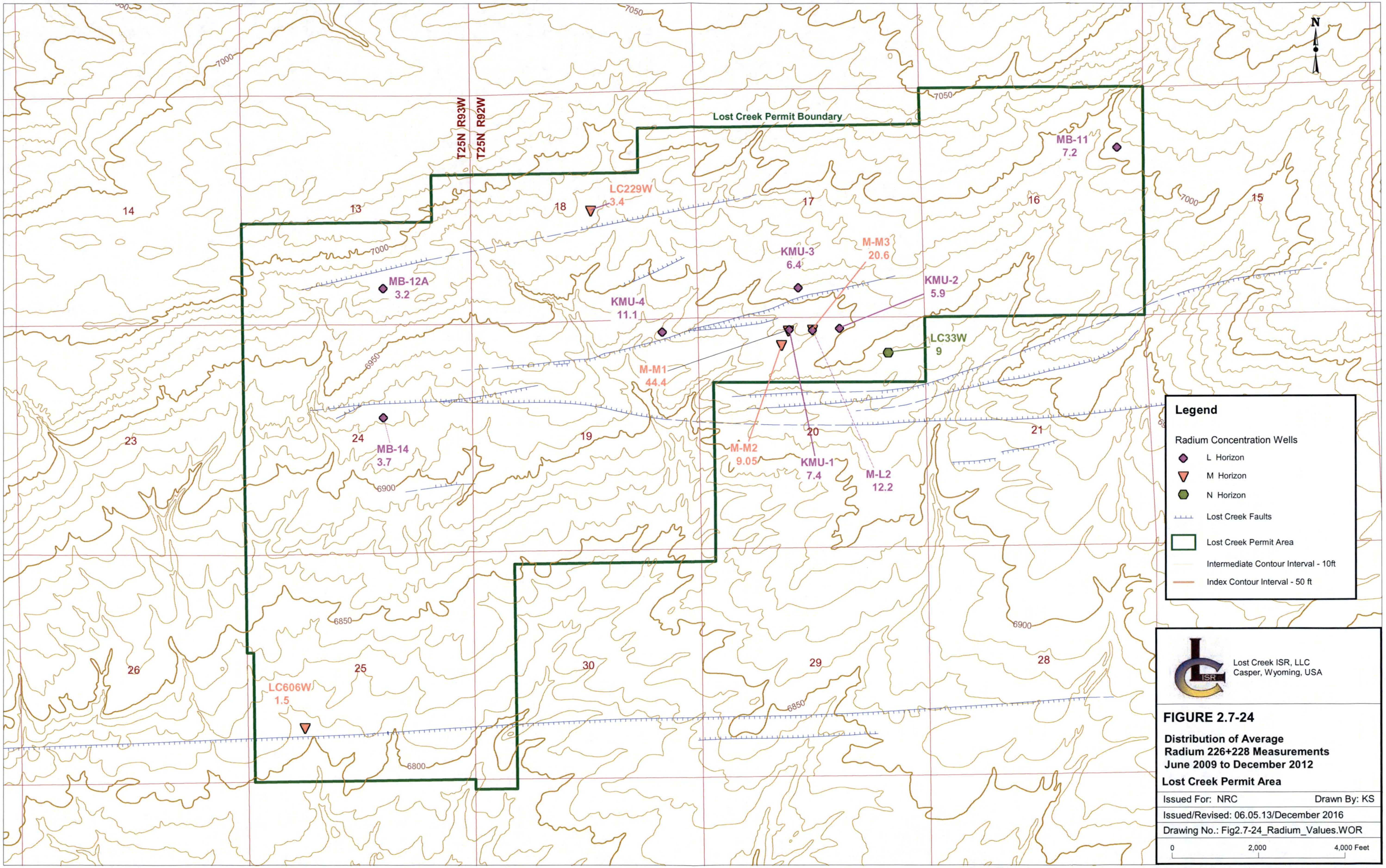

FIGURE 2.7-24

Distribution of Average Radium 226+228 Measurements June 2009 to December 2012

Lost Creek Permit Area

Issued For: NRC Drawn By: KS

Issued/Revised: 06.05.13/December 2016

Drawing No.: Fig2.7-24_Radium_Values.WOR

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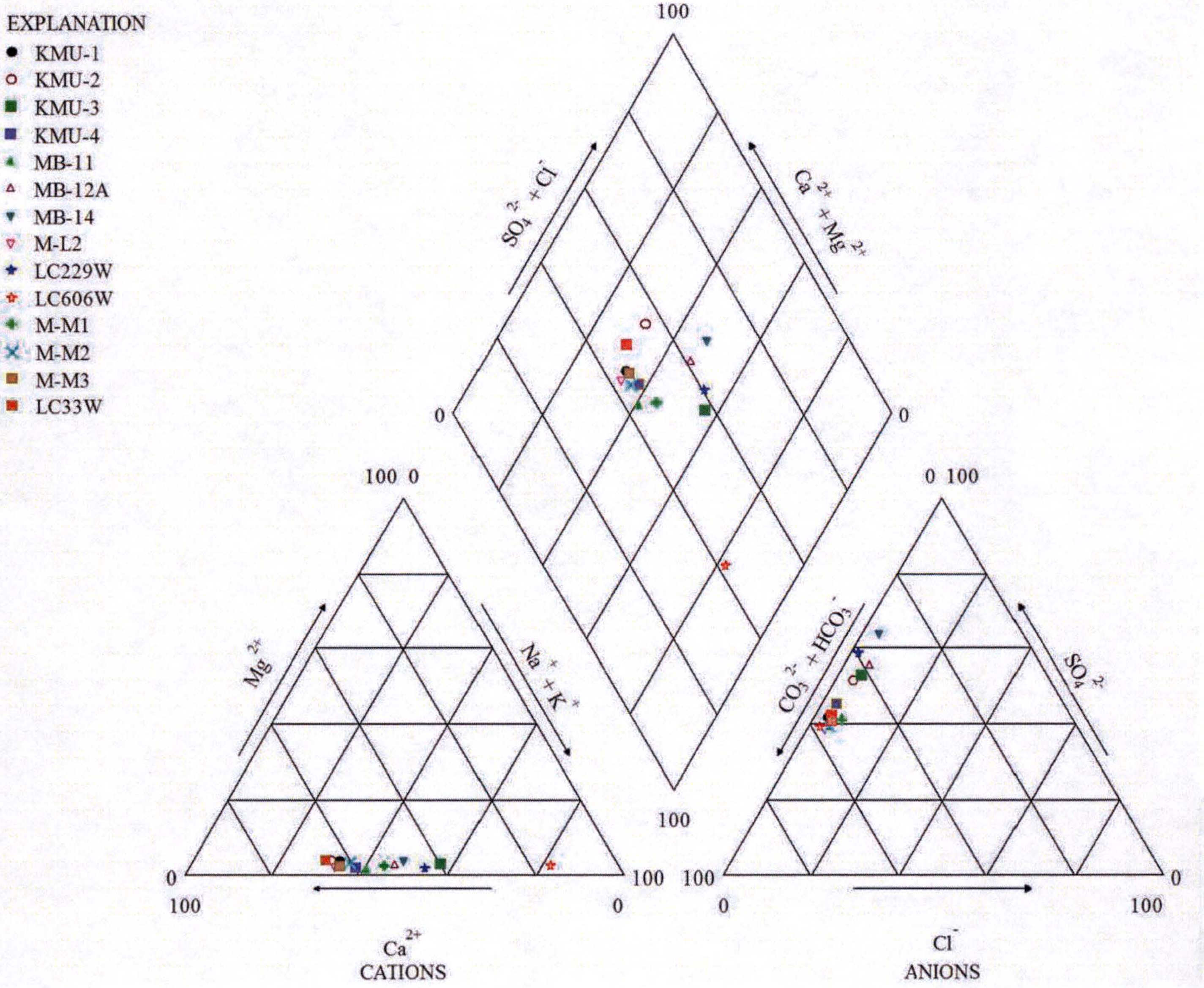

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Casper, Wyoming, USA

Figure 2.7-25

Piper Diagram - Average Water Quality for Individual L, M, & N Horizon Wells

Lost Creek Permit Area

Issued For: NRC Drawn By: KS

Issued/Revised: 06.17.13/December 2016

Drawing No.: Fig2.7-25_Indv_LMN_PiperDiagram.WOR

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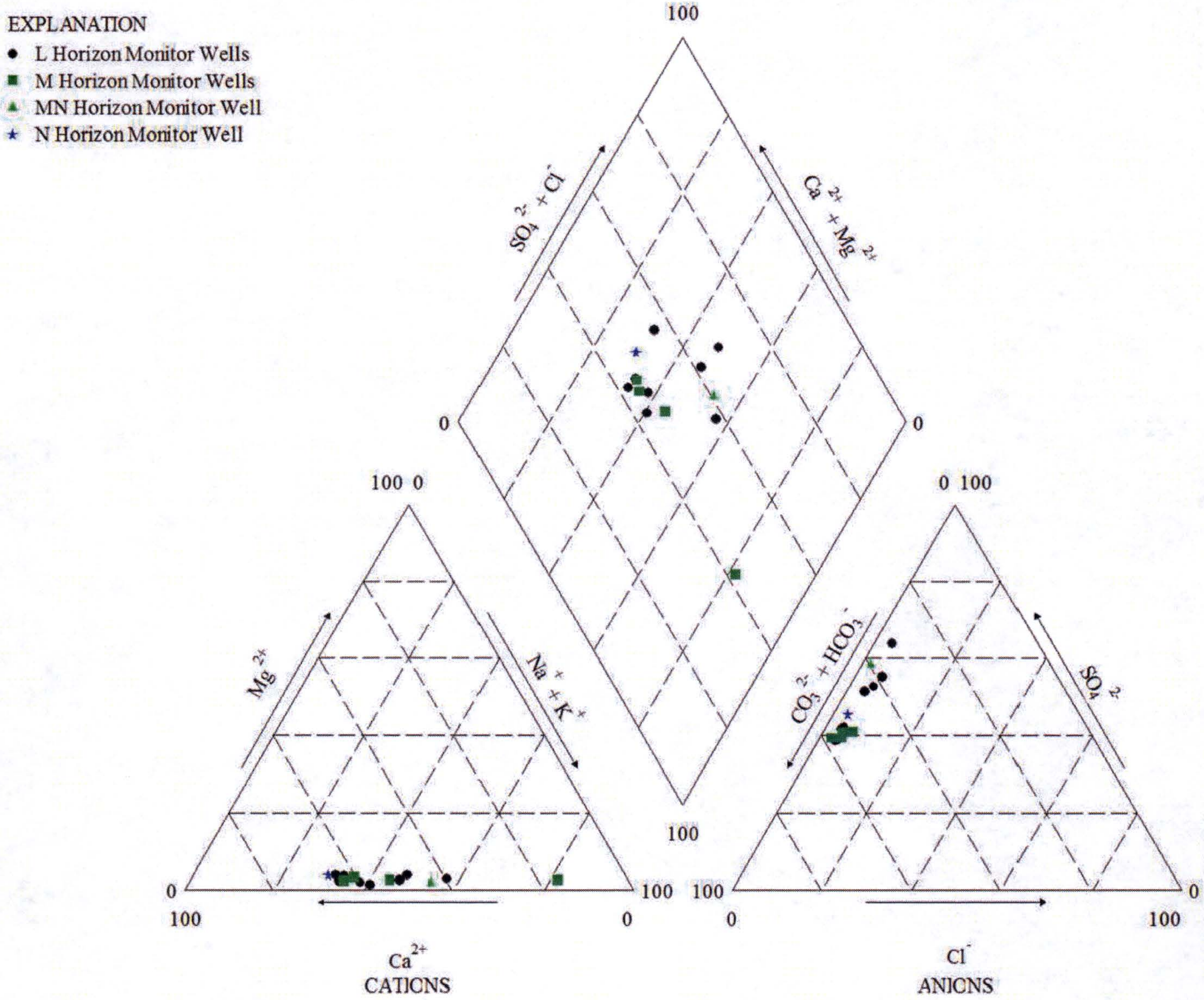

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Casper, Wyoming, USA

Figure 2.7-26

Piper Diagram - Average Water Quality for L, M, & N Horizon Wells

Lost Creek Permit Area

Issued For: NRC Drawn By: KS

Issued/Revised: 06.17.13/December 2016

Drawing No.: Fig2.7-26_ALL_LMN_PiperDiagram.WOR

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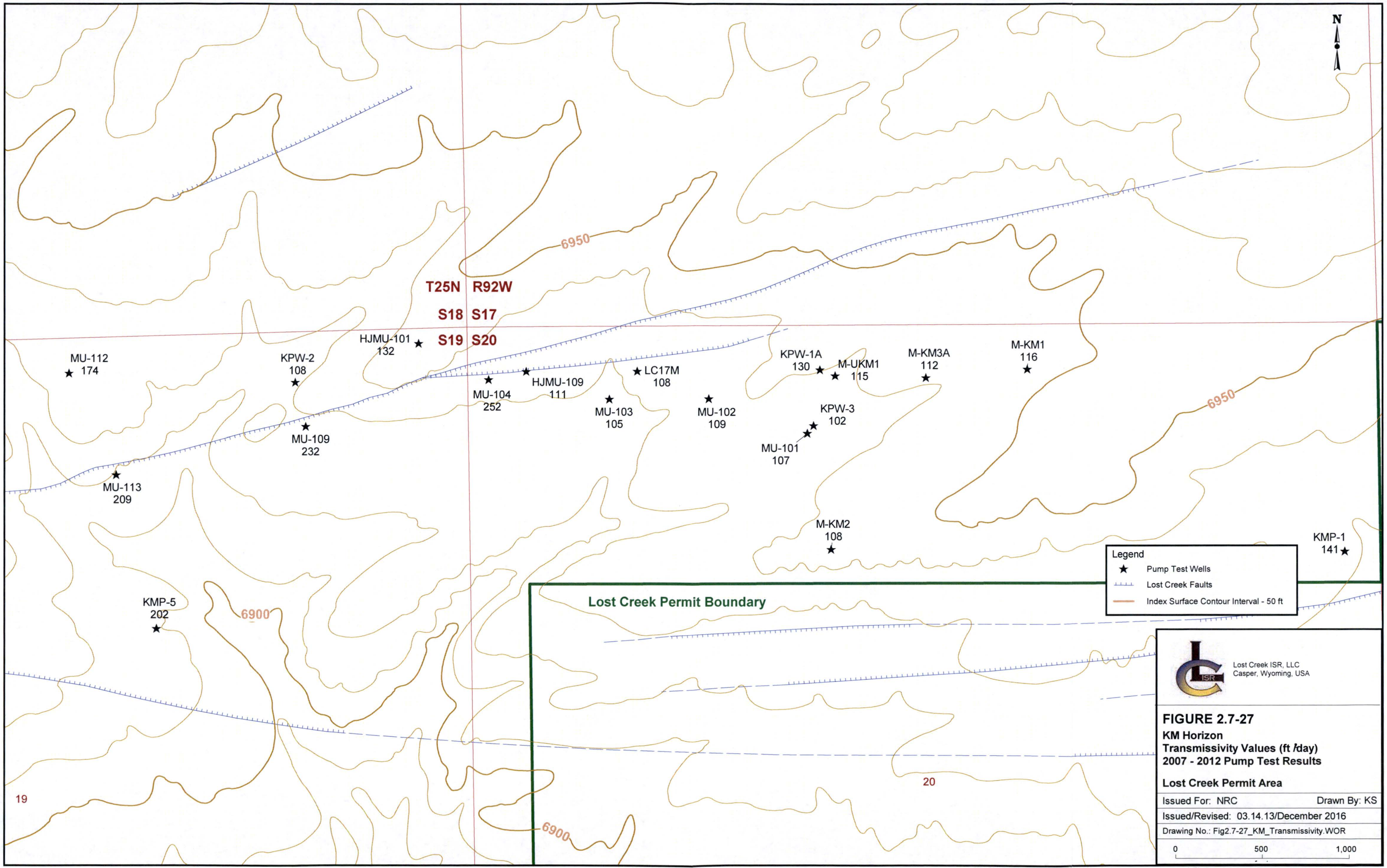

Lost Creek ISR, LLC
Casper, Wyoming, USA

FIGURE 2.7-27

KM Horizon
Transmissivity Values (ft /day)
2007 - 2012 Pump Test Results

Lost Creek Permit Area

Issued For: NRC Drawn By: KS

Issued/Revised: 03.14.13/December 2016

Drawing No.: Fig2.7-27_KM_Transmissivity.WOR

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Table 2.7-1 Peak Flow Regression Equations

Equation	SE_E (percent)	SE_P (percent)	Average equivalent years of record	95-percent prediction interval factor	
				Lower limit	Upper limit
$Q_{1.5} = 12.7(AREA^{0.626})((LAT-40)^{-1.18})$	66	72	3.2	0.266	3.76
$Q_2 = 22.2(AREA^{0.608})((LAT-40)^{-1.24})$	60	66	3.2	.292	3.43
$Q_{2.33} = 28.1(AREA^{0.600})((LAT-40)^{-1.26})$	59	64	3.3	.301	3.32
$Q_5 = 66.4(AREA^{0.567})((LAT-40)^{-1.35})$	53	59	4.7	.328	3.05
$Q_{10} = 116(AREA^{0.544})((LAT-40)^{-1.40})$	52	57	6.4	.336	2.98
$Q_{25} = 204(AREA^{0.520})((LAT-40)^{-1.44})$	52	58	8.5	.331	3.02
$Q_{50} = 290(AREA^{0.504})((LAT-40)^{-1.46})$	53	60	9.7	.320	3.13
$Q_{100} = 394(AREA^{0.489})((LAT-40)^{-1.47})$	56	63	10.4	.304	3.29
$Q_{200} = 519(AREA^{0.476})((LAT-40)^{-1.48})$	59	67	10.9	.286	3.49
$Q_{500} = 719(AREA^{0.459})((LAT-40)^{-1.49})$	64	73	11.1	.261	3.83

SE_E=average standard error of estimate;
SE_P=average standard error of prediction;
Q_T=estimated peak flow (cfs) for the recurrence interval of T years;
AREA=total drainage area (mi^2);
LAT=latitude of basic outlet location in decimal degrees.

Table 2.7-2 Calculated Peak Flows for Three Principal Drainages

Watershed	Drainage Area (mi2)	Latitude (dec. deg)	2-Year (cfs)	5-Year (cfs)	10-Year (cfs)	25-Year (cfs)	50-Year (cfs)	100-Year (cfs)
Western Draw	2.9	42.1	16.9	45.0	73.9	123.0	169.3	224.6
West Battle Spring Draw	7.0	42.1	28.7	73.7	118.6	193.2	262.3	343.6
East Battle Spring Draw	5.1	42.1	23.6	61.3	99.5	163.3	222.8	293.3

Table 2.7-3 Historic Water Quality Results for Battle Spring from the Sweetwater Mill Permit Application *

Battle Spring						
Sample Date	July 18-20, 1974	April 29, 1975	June 20-23, 1975	August 21-28, 1975	October 3-6, 1975	July 30, 1976
Sodium (mg/L)	116					
Potassium (mg/L)	8					
Calcium (mg/L)	23					
Magnesium (mg/L)	5					
Sulfate (mg/L)	130					
Chloride (mg/L)	18					
Carbonate (mg/L)	0					
Bicarbonate (mg/L)	220					
TDS (mg/L)	276					
pH (SU)	9.5					
Gross Alpha (pCi/L)				156 ± 34		
Gross Beta (pCi/L)				90.3 ± 8.8		
Th-230 (pCi/L)				3.34 ± 0.43		
Ra-226 (pCi/L)				33.5 ± 1.1		
Sr-90 (pCi/L)				1.5 ± 0.6		
Uranium (mg/L)	0.006	0.153	0.153	0.289	0.95	0.5

* (Shepherd and Miller, 1994)

Table 2.7-4 Water Quality Results for Seven Storm Water/Spring Snowmelt Samples Collected on 17 April 2007 (Page 1 of 3)

			Sample ID:	**LC1**	**LC2**	**LC4**	**LC5**	**LC10**	**LC11**	**LC12**
			Lab ID:	C07040912-001	C07040912-002	C07040912-003	C07040912-004	C07040912-005	C07040912-006	C07040912-007
Laboratory Analysis Report - UR Energy Project			Sample Matrix:	Stormwater	Stormwater	Stormwater	Stormwater	Stormwater	Stormwater	Stormwater
			Sample Date:	4/17/2007	4/17/2007	4/17/2007	4/17/2007	4/17/2007	4/17/2007	4/17/2007
			Report Date:	6/5/2007	6/5/2007	6/5/2007	6/5/2007	6/5/2007	6/5/2007	6/5/2007
Major Ions-Dissolved		Units	Detection Limit	Results	Results	Results	Results	Results	Results	Results
Calcium	Ca	mg/L	1.0	2.8	5.6	3.3	5.5	3.3	5.2	7.4
Magnesium	Mg	mg/L	1.0	0.9	1.5	0.9	1.6	0.6	1.3	1
Sodium	Na	mg/L	1.0	1.1	1.1	0.8	1.2	1.4	1	1
Patassium	K	mg/L	1.0	4.1	6.2	5	7.8	8.4	9.4	3.4
Carbonate	CO_3	mg/L	1.0	<1	<1	<1	<1	<1	<1	<1
Bicarbonate	HCO_3	mg/L	1.0	12	27	17	30	29	15	24
Sulfate	SO_4	mg/L	1.0	3	3	3	5	13	6	6
Chloride	CL	mg/L	1.0	2	1	1	2	1	2	<1
Ammonia as N	NH_3	mg/L	0.05	0.46	0.6	0.55	1.11	8.7	0.86	0.41
Nitrite as N	NO_2	mg/L	0.10	<0.1	<0.1	<0.1	<0.1	0.3	0.2	<0.1
Nitrite + Nitrate as N	NO_2+NO_3	mg/L	0.10	0.3	0.3	0.3	<0.1	0.7	0.6	0.9
Fluoride	F	mg/L	0.10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Silica	SiO_2	mg/L	1.0	6.9	9.9	7.1	14.5	0.9	1.1	3.9
Trace Metals-Dissolved										
Aluminum	Al	mg/L	0.10	0.3	0.7	0.6	0.6	<0.1	0.2	0.7
Arsenic	As	mg/L	0.001	0.002	0.003	0.002	0.006	0.002	0.002	0.001
Barium	Ba	mg/L	0.10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Boron	B	mg/L	0.10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium	Cd	mg/L	0.005	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium	Cr	mg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Copper	Cu	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Iron	Fe	mg/L	0.05	0.66	0.76	0.66	1.26	0.04	0.17	0.35
Lead	Pb	mg/L	0.001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Manganese	Mn	mg/L	0.01	0.03	0.01	0.07	0.4	0.07	0.13	0.04
Mercury	Hg	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Molybdenum	Mo	mg/L	0.10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	Ni	mg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Selenium	Se	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.004	<0.001
Silver	Ag	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	V	mg/L	0.10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	Zn	mg/L	0.01	0.07	0.04	0.05	0.03	0.22	0.13	0.08

Table 2.7-4 Water Quality Results for Seven Storm Water/Spring Snowmelt Samples Collected on 17 April 2007 (Page 2 of 3)

			Sample ID:	LC1	LC2	LC4	LC5	LC10	LC11	LC12
			Lab ID:	C07040912-001	C07040912-002	C07040912-003	C07040912-004	C07040912-005	C07040912-006	C07040912-007
Laboratory Analysis Report - UR Energy Project			Sample Matrix:	Stormwater	Stormwater	Stormwater	Stormwater	Stormwater	Stormwater	Stormwater
			Sample Date:	4/17/2007	4/17/2007	4/17/2007	4/17/2007	4/17/2007	4/17/2007	4/17/2007
			Report Date:	6/5/2007	6/5/2007	6/5/2007	6/5/2007	6/5/2007	6/5/2007	6/5/2007
Major Ions-Dissolved		Units	Detection Limit	Results	Results	Results	Results	Results	Results	Results
Trace Metals-Total										
Aluminum	Al	mg/L	0.10	0.5	1.4	1.6	2.7	0.1	0.3	0.8
Arsenic	As	mg/L	0.001	0.001	0.002	<0.001	0.004	<0.001	<0.001	<0.001
Barium	Ba	mg/L	0.10	<0.1	<0.1	<0.1	0.2	<0.1	<0.1	<0.1
Boron	B	mg/L	0.10	0.6	1	0.8	0.4	0.7	0.8	1.2
Cadmium	Cd	mg/L	0.005	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chromium	Cr	mg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Copper	Cu	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Iron	Fe	mg/L	0.05	0.24	0.54	0.29	1.83	0.06	0.21	0.17
Lead	Pb	mg/L	0.001	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Manganese	Mn	mg/L	0.01	0.04	0.13	0.08	1.45	0.06	0.13	0.03
Mercury	Hg	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Molybdenum	Mo	mg/L	0.10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	Ni	mg/L	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Selenium	Se	mg/L	0.001	0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001
Silver	Ag	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	V	mg/L	0.10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc	Zn	mg/L	0.01	0.06	0.03	0.05	0.08	0.22	0.13	0.09

Table 2.7-4 Water Quality Results for Seven Storm Water/Spring Snowmelt Samples Collected on 17 April 2007 (Page 3 of 3)

			Sample ID:	LC1	LC2	LC4	LC5	LC10	LC11	LC12
			Lab ID:	C07040912-001	C07040912-002	C07040912-003	C07040912-004	C07040912-005	C07040912-006	C07040912-007
Laboratory Analysis Report - UR Energy Project			Sample Matrix:	Stormwater	Stormwater	Stormwater	Stormwater	Stormwater	Stormwater	Stormwater
			Sample Date:	4/17/2007	4/17/2007	4/17/2007	4/17/2007	4/17/2007	4/17/2007	4/17/2007
			Report Date:	6/5/2007	6/5/2007	6/5/2007	6/5/2007	6/5/2007	6/5/2007	6/5/2007
Radiometric-Dissolved										
Uranium	NatU	mg/L	0.0003	<0.0003	0.0004	<0.0003	0.0003	<0.0003	<0.0004	<0.0003
Lead 210	Pb	pCi/L	2.2	<2.4	<2.2	<2.2	<2.5	<2.2	<2.3	<2.2
Polonium 210	Po	pCi/L	2.2	<2.4	<2.2	<2.2	<2.5	<2.2	<2.3	<2.2
Thorium230	Th	pCi/L	0.4	<0.5	<0.4	<0.4	<0.5	<0.4	<0.5	<0.4
Radiometric-Suspended										
Uranium	NatU	mg/L	0.0003	<0.0003	0.0005	<0.0003	0.0006	<0.0003	<0.0003	<0.0003
Lead 210	Pb	pCi/L	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Polonium 210	Po	pCi/L	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Thorium230	Th	pCi/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
226Radium	226Ra	pCi/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Radiometric-Total										
Uranium	NatU	mg/L	0.0003	0.0003	0.0008	0.0003	0.0009	<0.0003	<0.0003	<0.0003
226Radium	NatU	pCi/L	0.2	<0.2	0.5	<0.2	<0.2	<0.2	<0.2	<0.2
228Radium	NatU	pCi/L	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Gross Alpha minus Rn & U	226Ra	pCi/L	1	1.3	3.6	1.4	2.6	1.2	<1.0	1.1
Gross Beta	a	pCi/L	2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Quality Assurance Data			Target Range							
Anion	-	meq/L		0.355	0.571	0.377	0.655	0.823	0.486	0.609
Cation	-	meq/L		0.462	0.766	0.537	0.881	1.12	0.748	0.698
WYDEQ A/C Balance	-	%	-5 to +5	13	14.6	17.4	14.7	15.2	21.3	6.82
Calc TDS	-	mg/L		29	43	30	52	46	37	40
Non-Metals										
pH	S.U.	std. units	0.01	7.1	6.86	6.66	6.83	7.12	6.41	6.39
Conductivity	Cond.	µmho/cm	1.0	36.4	57.3	40.5	64.5	100	66.4	62.6
Total Suspended Solids @ 105°C	TSS	mg/L	1.0	36	422	24	5280	4	14	9
Alkalinity as CaCO3	Alk.	mg/L	1.0	10	22	14	25	24	12	20

Table 2.7-5 Monitor Well Completion Data (Page 1 of 3)

Well Name	Completion Zone	Easting (feet)	Northing (feet)	Ground Surface Elevation (ft amsl)	Measure Point Elevation (ft amsl)	Total Depth (feet)	Top Underreamed Zone (ft bgs)	Bottom Underreamed Zone (ft bgs)	Total Underreamed thickness (feet)
5S-HJ1	UKM	2,214,013.36	595,593.04	6,945.80	6,947.20	488	460	480	20
5S-KM1	UKM	2,213,950.03	595,640.32	6,945.65	6,946.20	563	525	545	20
5S-KM2	UKM	2,214,046.09	595,609.82	6,945.68	6,946.00	541	520	540	20
5S-KM3	UKM	2,213,985.84	595,579.11	6,945.34	6,945.50	541	520	540	20
5S-KM4	UKM	2,213,954.65	595,562.81	6,944.89	6,945.60	540	520	540	20
HJMU-101	UKM	2,211,596.99	595,701.71	6,947.82	6,949.00	535	499	535	36
HJMU-104	UKM	2,211,211.01	595,611.33	6,939.01	6,940.50	550	512	550	38
HJMU-105	UKM	2,211,261.61	595,781.08	6,936.37	6,937.58	548	502	542	40
HJMU-108	UKM	2,211,796.55	596,002.63	6,949.97	6,951.51	850	510	540	30
HJMU-109	UKM	2,212,224.96	595,540.25	6,933.92	6,939.60	850	524	574	50
HJMU-110	UKM	2,212,005.02	595,899.82	6,945.97	6,948.00	850	492	532	40
HJMU-113	UKM	2,212,597.08	595,512.32	6,935.16	6,937.00	800	524	555	31
KMP-1	KM	2,216,967.87	594,502.96	6,934.69	6,936.30	560	430	505	75
KMP-2	KM	2,216,654.24	599,179.75	7,014.74	7,016.50	600	525	590	65
KMP-3A	KM	2,214,149.00	596,542.81	6,965.00	6,966.20	580	500	565	65
KMP-4	KM	2,211,256.36	597,607.07	6,969.41	6,971.20	640	580	600	20
KMP-5	KM	2,210,070.25	594,057.31	6,915.68	6,916.20	620	525	585	60
KPW-1A	KM	2,213,927.10	595,549.83	6,945.49	6,947.60	610	520	540	20
KPW-2	KM	2,210,879.01	595,476.52	6,937.64	6,936.50	600	500	590	90
KPW-3	UKM	2,213,890.84	595,227.24	6,939.37	6,940.20	590	515	550	35
	LKM						565	590	25
LC17M	UKM	2,212,869.00	595,542.00	6,935.32	6,937.20	565	529	565	36
LC20M	UKM	2,211,684.00	596,034.00	6,949.22	6,950.80	543	511	543	32
LC23M	UKM	2,204,599.00	593,538.00	6,924.00	--	634	595	630	35
LC24M	UKM	2,212,886.00	595,906.00	6,942.33	6,944.60	542	478	531	53
LC27M	UKM	2,221,564.50	599,728.88	6,987.38	--	477	433	456	23
LC28M	UKM	2,201,670.50	585,142.00	6,805.56	--	563	502	557	55
MB-04	UKM	2,204,715.68	596,572.42	6,987.27	--	680	610	640	30
M-KM1	UKM	2,215,129.70	595,554.51	6,950.66	6,951.60	590	505	520	15
	LKM						550	580	30
M-KM2	UKM	2,213,992.91	594,513.61	6,944.70	6,946.90	580	505	530	25
	LKM						565	580	15
M-KM3	UKM	2,214,539.41	595,541.58	6,945.22	6,946.50	610	510	550	40
	LKM						580	605	25
M-UKM1	UKM	2,214,016.65	595,516.07	6,944.03	6,946.50	550	520	540	20

Table 2.7-5 Monitor Well Completion Data (Page 2 of 3)

Well Name	Completion Zone	Easting (feet)	Northing (feet)	Ground Surface Elevation (ft amsl)	Measure Point Elevation (ft amsl)	Total Depth (feet)	Top Underreamed Zone (ft bgs)	Bottom Underreamed Zone (ft bgs)	Total Underreamed thickness (feet)
MU-101	UKM	2,213,854.75	595,183.07	6,938.55	6,941.10	560	520	540	20
MU-102	UKM	2,213,285.87	595,382.48	6,939.10	6,941.90	557	525	553	28
MU-103	UKM	2,212,706.04	595,380.11	6,934.18	6,935.80	802	525	560	35
MU-104	UKM	2,212,006.07	595,492.63	6,936.64	6,939.80	855	550	580	30
MU-105	UKM	2,212,160.46	596,078.62	6,948.93	6,950.10	853	507	545	38
MU-106	UKM	2,211,478.82	595,963.61	6,940.59	6,941.75	547	500	546	46
MU-107	UKM	2,210,977.02	595,802.44	6,935.06	6,937.50	850	500	540	40
MU-108	UKM	2,210,866.38	595,452.28	6,934.72	6,935.40	600	495	525	30
MU-109	UKM	2,210,940.72	595,221.39	6,931.92	6,934.30	570	525	545	20
MU-110	UKM	2,210,162.06	595,638.55	6,937.11	6,941.00	560	520	540	20
MU-111	UKM	2,209,926.79	595,348.72	6,936.09	6,937.00	550	512	532	20
MU-112	UKM	2,209,564.16	595,529.14	6,935.42	6,938.30	550	515	535	20
MU-113	UKM	2,209,839.22	594,942.10	6,921.83	6,925.40	580	530	550	20
OW1-1	UKM	2,209,876.52	595,067.67	6,926.96	6,927.00	540	500	525	25
UKMP-101	UKM	2,212,410.08	595,633.12	6,940.18	6,942.00	575	547	575	28
UKMP-102	UKM	2,212,522.96	595,849.52	6,940.51	6,942.10	498	475	498	23
UKMP-103	UKM	2,212,807.57	596,262.95	6,950.84	6,954.30	537	496	537	41
UKMU-103	MKM	744,487.50	535,545.98	6,948.75	6,950.92	850	558	590	32
KMU-1	L	2,214,011.07	595,543.24	6,944.61	6,947.35	740	650	675	25
KMU-2	L	2,215,178.86	595,571.68	6,952.31	6,952.99	740	625	650	25
KMU-3	L	2,214,219.74	596,505.62	6,964.17	6,965.36	700	630	650	20
KMU-4	L	2,211,051.36	595,488.29	6,942.94	6,943.22	700	605	635	30
MB-11	L	2,221,627.01	599,739.25	7,011.14	--	660	560	590	30
MB-12A	L	2,204,569.15	596,488.52	6,987.19	--	840	745	770	25
MB-13	L	2,201,670.12	585,188.95	6,805.66	--	700	655	680	25
MB-14	L	2,204,576.75	593,510.90	6,924.13	--	820	710	740	30
M-L1	L	2,213,855.50	595,210.27	6,938.90	6,941.45	670	650	670	20
M-L2	L	2,214,550.83	595,530.20	6,944.81	6,946.59	690	655	675	20
M-L3	L	2,212,651.32	595,361.83	6,934.28	6,934.90	700	660	670	10
							680	690	10
M-L4	L	2,213,937.16	594,453.56	6,942.55	6,944.86	670	640	665	25
M-L5	L	2,211,588.61	595,995.07	6,944.68	6,945.26	650	630	650	20
LC229W	M	2,209,389.28	598,287.04	6,977.82	--	1,000	863	888	25
LC606W	M	2,202,741.32	586,360.63	6,808.59	--	1,200	670	685	15
							690	710	20
							725	740	15
M-M1	M	2,213,988.52	595,525.89	6,943.94	6,947.34	780	750	770	20
M-M2	M	2,213,829.67	595,193.89	6,939.50	6,941.97	770	725	745	20
M-M3	M	2,214,552.35	595,550.06	6,944.87	6,947.75	770	750	770	20

Table 2.7-5 **Monitor Well Completion Data** (Page 3 of 3)

Well Name	Completion Zone	Easting (feet)	Northing (feet)	Ground Surface Elevation (ft amsl)	Measure Point Elevation (ft amsl)	Total Depth (feet)	Top Underreamed Zone (ft bgs)	Bottom Underreamed Zone (ft bgs)	Total Underreamed thickness (feet)
M-M4	M	2,214,043.96	594,452.69	6,943.50	6,945.79	760	725	745	20
M-M5	M	2,215,195.85	595,539.94	6,952.03	6,952.97	775	730	760	30
M-M6A	M	2,214,200.27	596,525.14	6,963.79	6,964.46	750	715	730	15
M-M7	M	2,212,690.92	595,345.53	6,932.98	6,933.45	770	745	770	25
M-M8	M	2,211,634.33	596,000.50	6,947.06	6,947.71	740	720	740	20
LC33W	N	2,216,308.23	595,008.13	6,941.49	--	1,000	800	895	95
LC229W	N	2,209,389.28	598,287.04	6,977.82	--	1,000	915	945	30
							955	985	30
M-N1	N	2,213,777.27	595,217.25	6,940.22	6,942.42	850	825	850	25
5S-N1	N	2,213,940.21	595,615.33	6,945.55	6,947.66	900	850	870	20

(- -) Data not available.

Table 2.7-6 Water Level Data (Page 1 of 2)

WELL NAME	COMPLETION HORIZON	MEASURE POINT ELEV. (ft amsl)	DEPTH TO WATER (ft bgs)	WATER ELEV. (ft amsl)	DEPTH TO WATER (ft bgs)	WATER ELEV. (ft amsl)	DEPTH TO WATER (ft bgs)	WATER ELEV. (ft amsl)	DEPTH TO WATER (ft bgs)	WATER ELEV. (ft amsl)	DEPTH TO WATER (ft bgs)	WATER ELEV. (ft amsl)	DEPTH TO WATER (ft bgs)	WATER ELEV. (ft amsl)
Date			7/6/2010		10/21/2011		7/25/2012		3/15/2013		3/10/2014		11/5/2015	
LC17M	KM	6,936.90					187.78	6,749.12					193.88	6,743.02
LC20M	KM	6,950.52					204.50	6,746.02					208.30	6,742.22
LC23M	KM	6,926.80					221.25	6,705.55					221.56	6,705.24
LC27M	KM	7,012.32					190.66	6,821.66					191.38	6,820.94
LC28M	KM	6,805.56					155.10	6,650.46					155.80	6,649.76
KMU-1	KM	6,947.35	198.20	6,749.15	195.99	6,751.35			194.77	6,752.58				
KMU-2	KM	6,952.99	197.00	6,755.99	198.04	6,754.95			197.04	6,755.95				
KMU-3	KM	6,965.36	209.50	6,755.86	207.79	6,757.56			207.53	6,757.83				
KMU-4	KM	6,943.22	202.20	6,741.02	200.26	6,742.96			199.72	6,743.50				
MB-4	KM	6,987.27					277.34	6,709.93					277.36	6,709.91
M-KM4A	KM	6,897.94									161.20	6,736.74	161.20	6,736.74
M-KM5A	KM	6,906.91									170.37	6,736.54	170.37	6,736.54
M-KM6	KM	6,894.09									163.58	6,730.51	163.58	6,730.51
M-KM7	KM	6,999.20									152.60	6,846.60	152.60	6,846.60
M-KM8	KM	7,047.95									159.36	6,888.59	159.36	6,888.59
M-KM9	KM	7,094.98									144.32	6,950.66	144.32	6,950.66
M-KM10	KM	7,150.80									164.14	6,986.66	164.14	6,986.66
M-KM11A	KM	6,930.39									175.17	6,755.22	175.17	6,755.22
MU-101	KM	6,941.10					190.26	6,750.84					196.97	6,744.13
MU-102	KM	6,941.90					190.10	6,751.80					198.70	6,743.20
MU-103	KM	6,935.80					185.85	6,749.95					194.83	6,740.97
MU-104	KM	6,939.80					193.67	6,746.13					198.69	6,741.11
MU-105	KM	6,950.10					203.60	6,746.50					204.53	6,745.57
MU-106	KM	6,941.75					166.30	6,775.45					198.00	6,743.75
MU-107	KM	6,937.50					194.05	6,743.45					197.42	6,740.08
MU-109	KM	6,934.30					193.15	6,741.15					216.41	6,717.89
MU-110	KM	6,941.00					202.10	6,738.90					203.89	6,737.11
MU-111	KM	6,937.00					200.34	6,736.66					201.32	6,735.68
MU-112	KM	6,938.30					200.45	6,737.85					202.89	6,735.41
MU-113	KM	6,925.40					188.34	6,737.06					191.99	6,733.41

Table 2.7-6 Water Level Data (Page 2 of 2)

WELL NAME	COMPLETION HORIZON	MEASURE POINT ELEV. (ft amsl)	DEPTH TO WATER (ft bgs)	WATER ELEV. (ft amsl)	DEPTH TO WATER (ft bgs)	WATER ELEV. (ft amsl)	DEPTH TO WATER (ft bgs)	WATER ELEV. (ft amsl)	DEPTH TO WATER (ft bgs)	WATER ELEV. (ft amsl)	DEPTH TO WATER (ft bgs)	WATER ELEV. (ft amsl)
Date			7/6/2010		10/21/2011		2/8/2012		3/15/2013		3/10/2014	
MB-11	L	7,011.14	203.40	6,807.74					200.68	6,810.46		
MB-12A	L	6,987.19	277.55	6,709.64					276.37	6,710.82		
MB-13	L	6,805.66					159.20	6,646.46	157.75	6,647.91		
MB-14	L	6,924.13	226.10	6,698.03					221.87	6,702.26		
M-L1	L	6,941.45	191.50	6,749.95	191.51	6,749.94			190.79	6,750.66		
M-L2	L	6,946.59	198.00	6,748.59	194.29	6,752.31			196.49	6,750.10		
M-L3	L	6,934.90			189.20	6,745.71			189.61	6,745.29		
M-L4	L	6,944.86			196.67	6,748.19			195.78	6,749.08		
M-L5	L	6,945.26			200.50	6,744.77			201.59	6,743.67		
LC606W	M	6,808.59					149.65	6,658.94				
M-M1	M	6,947.34			204.46	6,742.87			203.65	6,743.69		
M-M2	M	6,941.97			199.33	6,742.64	198.32	6,743.65	199.36	6,742.61		
M-M3	M	6,947.75			199.50	6,748.25			198.68	6,749.07		
M-M4	M	6,945.79			203.17	6,742.63			201.97	6,743.82		
M-M5	M	6,952.97			204.33	6,748.64			204.87	6,748.10		
M-M6A	M	6,964.46			209.08	6,755.38			209.41	6,755.05		
M-M7	M	6,933.45			194.86	6,738.60			195.43	6,738.02		
M-M8	M	6,947.71			202.92	6,744.79			203.78	6,743.93		
5S-N1	N	6,947.66			209.98	6,737.69			209.14	6,738.52		
LC33W	N	6,941.49					203.21	6,738.28				
LC229W	N	6,977.82					246.56	6,731.26				
M-N1	N	6,942.42			204.92	6,737.50			204.22	6,738.20		
M-N2	N	6,904.27					171.20	6,733.07			173.94	6,730.33
M-N3	N	7,003.33					237.50	6,765.83			292.00	6,711.33
M-N4	N	7,098.83					257.89	6,840.94			259.62	6,839.21
M-N5A	N	7,153.29					252.50	6,900.79			253.42	6,899.87
M-N6	N	6,928.58									190.27	6,738.31

Table 2.7-7a Horizontal Hydraulic Gradient, Lost Creek Project

Well Pair	NAD 83 Easting (feet)	NAD 83 Northing (feet)	Water Level Elevation (feet amsl)	Distance Between Wells (feet)	Head Difference (feet)	Hydraulic Gradient (foot/foot)	Description (Aquifer, Location and Date)
UKMP-103	2,212,808	596,263	6750.50	1,733	6.70	0.0039	UKM Aquifer-North Side of Fault 2007
HJMP-104	2,211,205	595,602	6743.80				
MU-101	2,213,855	595,183	6751.86	1,165	2.91	0.0025	UKM Aquifer-South Side of Fault 2009
MU-103	2,212,706	595,380	6748.95				
MU-103	2,212,706	595,380	6748.95	709	1.45	0.0020	UKM Aquifer-South Side of Fault 2009
MU-104	2,212,006	595,493	6747.50				
HJMU-105	2,211,262	595,781	6743.82	345	4.79	0.0139	UKM Aquifer-North Side of Fault 2012
HJMU-101	2,211,597	595,702	6748.61				
HJMU-104	2,211,211	595,611	6766.56	845	2.67	0.0032	UKM Aquifer-North Side of Fault 2012
HJMU-110	2,212,005	595,900	6769.23				
MU-111	2,209,927	595,349	6736.66	405	1.71	0.0042	UKM Aquifer-North Side of Fault 2012
MU-112	2,209,564	595,529	6734.95				
MU-102	2,213,286	595,382	6751.80	3,475	14.74	0.0042	UKM Aquifer-South Side of Fault 2012
MU-113	2,209,839	594,942	6737.06				
MU-101	2,213,855	595,183	6750.84	4,023	13.78	0.0034	UKM Aquifer-South Side of Fault 2012
MU-113	2,209,839	594,942	6737.06				

Table 2.7-7b Vertical Hydraulic Gradients, Lost Creek Project (Page 1 of 2)

Well ID	NAD 83 Easting (feet)	NAD 83 Northing (feet)	Completion Zone	Measure Point Elevation (ft amsl)[1]	Top Underreamed Interval (ft bgs)[2]	Bottom Underreamed Interval (ft bgs)[2]	Midpoint Underreamed Interval (ft bgs)[3]	Date of Measurement	Depth to Water (ft bgs)[2]	Water Level Elevation (ft amsl)[1]	Vertical Hydraulic Gradient (foot/foot)
Mine Unit 1 (South Side of Fault)											
MP-101	2,213,872.18	595,184.91	MHJ2	6,942.02	420	438	429	7/24/2012	171.60	6,770.42	
MU-101	2,213,854.75	595,183.07	UKM	6,941.10	520	540	530	8/29/2012	190.26	6,750.84	0.19
MP-102	2,213,295.93	595,390.97	HJ	6,941.01	408	423	415.5	7/24/2012	180.40	6,760.61	
MU-102	2,213,285.87	595,382.48	UKM	6,941.90	525	553	539	7/24/2012	190.10	6,751.80	0.07
MP-104	2,212,004.37	534,801.58	HJ	6,938.45	423	460	441.5	7/20/2012	185.58	6,752.87	
MU-104	2,212,006.07	595,492.63	UKM	6,939.80	550	580	565	7/20/2012	193.67	6,746.13	0.05
MP-113	2,209,858.46	594,941.17	MHJ2	6,923.19	447	466	456.5	7/23/2012	186.96	6,736.23	
MU-113	2,209,839.22	594,942.10	UKM	6,925.40	530	550	540	7/24/2012	188.34	6,737.06	-0.01
HJMP-109	2,212,215.30	595,534.57	HJ	6,939.10	478	512	495	8/2/2012	178.00	6,761.10	
HJMU-109	2,212,224.96	595,540.25	UKM	6,939.38	524	574	549	8/2/2012	190.80	6,748.58	0.23
HJMP-113	2,212,592.91	595,501.22	HJ	6,937.26	416	462	439	7/31/2012	180.95	6,756.32	
HJMU-113	2,212,597.08	595,512.32	UKM	6,937.00	524	555	539.5	7/31/2012	186.91	6,750.08	0.06
Mine Unit 1 (North Side of Fault)											
MP-106	2,211,485.45	595,971.22	LHJ	6,941.29	430	480	455	7/23/2012	197.40	6,743.89	
MU-106	2,211,478.82	595,963.61	UKM	6,941.75	500	546	523	7/20/2012	175.80	6,765.95	-0.32
MP-110	2,210,181.86	595,639.59	MHJ2	6,938.69	419	438	428.5	7/23/2012	172.30	6,766.39	
MU-110	2,210,162.06	595,638.55	UKM	6,941.00	520	540	530	7/23/2012	202.10	6,738.90	0.27
MP-111	2,209,947.87	595,351.90	MHJ1	6,936.28	391	410	400.5	7/23/2012	178.32	6,757.96	
MU-111	2,209,926.79	595,348.72	UKM	6,937.00	512	532	522	7/24/2012	200.34	6,736.66	0.18
MP-112	2,209,582.53	595,525.71	MHJ2	6,936.64	422	441	431.5	7/24/2012	170.60	6,766.04	
MU-112	2,209,564.16	595,529.14	UKM	6,938.30	515	535	525	7/24/2012	203.35	6,734.95	0.33
HJMP-101	2,211,607.05	595,702.15	HJ	6,950.09	438	465	451.5	7/31/2012	180.92	6,769.17	
HJMU-101	2,211,596.99	595,701.71	UKM	6,951.20	499	535	517	7/31/2012	202.59	6,748.61	0.31

Table 2.7-7b Vertical Hydraulic Gradients, Lost Creek Project (Page 2 of 2)

Well ID	NAD 83 Easting (feet)	NAD 83 Northing (feet)	Completion Zone	Measure Point Elevation (ft amsl)[1]	Top Underreamed Interval (ft bgs)[2]	Bottom Underreamed Interval (ft bgs)[2]	Midpoint Underreamed Interval (ft bgs)[3]	Date of Measurement	Depth to Water (ft bgs)[2]	Water Level Elevation (ft amsl)[1]	Vertical Hydraulic Gradient (foot/foot)
HJMP-104	2,211,205.35	595,601.60	HJ	6,941.04	402	430	416	8/2/2012	174.48	6,766.56	
HJMU-104	2,211,211.01	595,611.33	UKM	6,940.50	512	550	531	8/2/2012	197.10	6,743.42	0.20
HJMP-105	2,211,252.35	595,778.02	HJ	6,937.38	425	463	444	7/31/2012	170.51	6,766.87	
HJMU-105	2,211,261.61	595,781.08	UKM	6,937.58	502	542	522	7/31/2012	193.76	6,743.82	0.30
HJMP-108	2,211,786.07	596,015.23	HJ	6,952.20	400	434	417	7/31/2012	182.88	6,769.32	
HJMU-108	2,211,796.55	596,002.63	UKM	6,951.51	510	540	525	7/31/2012	203.93	6,747.59	0.20
HJMP-110	2,212,001.62	595,888.08	HJ	6,947.01	431	476	453.5	7/31/2012	177.79	6,769.23	
HJMU-110	2,212,005.02	595,899.82	UKM	6,947.86	492	532	512	7/31/2012	199.81	6,748.05	0.36

[1] ft amsl - feet above mean sea level

[2] ft bgs - feet below ground surface

[3] Vertical hydraulic gradient is calculated from middle of underreamed interval in overlying aquifer to middle of underreamed interval in underlying aquifer. A positive number indicates

[4] Dash (-) indicates no overlying aquifer.

[5] Asterisk (*) indicates values were not reported by HydroSearch, Inc. (1982).

Table 2.7-8 UKMP-103 Long-Term Pump Test Monitoring Wells (Page 1 of 4)

Well Name	Well Type	Monitored Horizon	Location Relative to Fault	Top of Casing Elevation [ft amsl]	NAD 83 Easting [ft]	NAD 83 Northing [ft]	Distance from Pumping Well (feet)	Casing Inside Diameter [in]	Screen Inside Diameter [in]	Screened Interval [ft bgs]	Total Screen Length [ft]	Static Depth to Water (11/21/07) (ft bgs)	Static Water Level Elevation (11/21/07) (ft amsl)
UKMP-103	Prod. Zone Pumping Well	UKM	North	6,936.15	2,212,807.6	596,263.0	0.0	4.5	3.0	496-537	41	178.78	6,757.37
HJMU-101	Prod. Zone Monitoring Well	UKM	North	6949.03	2,211,597.0	595,702.0	1,334.2	4.5	3.0	499-535	36	200.33	6748.70
HJMU-102	Prod. Zone Monitoring Well	UKM	North	6935.35	743,476.4	535,298.9	1,043.3	4.5	3.0	500-525	25	181.91	6753.44
HJMU-103	Prod. Zone Monitoring Well	UKM	North	6936.06	742,656.5	535,098.2	1,887.3	4.5	3.0	500-530	30	192.34	6743.72
HJMU-104	Prod. Zone Monitoring Well	UKM	North	6940.51	2,211,211.01	595,611.33	1,724.4	4.5	3.0	512-550	38	196.73	6,743.78
HJMU-105	Prod. Zone Monitoring Well	UKM	North	6937.58	2,211,261.61	595,781.08	1,619.3	4.5	3.0	503-523	20	193.56	6,744.02
HJMU-106	Prod. Zone Monitoring Well	UKM	North	6941.75	743,158.8	535,258.4	1,361.5	4.5	3.0	502-535	33	196.05	6,745.70
HJMU-107	Prod. Zone Monitoring Well	UKM	North	6937.88	743,686.1	534,787.8	1,111.1	4.5	3.0	545-580	35	190.60	6,747.28
HJMU-108	Prod. Zone Monitoring Well	UKM	North	6951.51	2,211,796.55	596,002.63	1,044.0	4.5	3.0	500-530	30	204.92	6,746.59
HJMU-109	Prod. Zone Monitoring Well	UKM	North	6939.38	2,212,224.96	595,540.25	928.3	4.5	3.0	529-565	36	191.45	6,747.93

Table 2.7-8 UKMP-103 Long-Term Pump Test Monitoring Wells (Page 2 of 4)

Well Name	Well Type	Monitored Horizon	Location Relative to Fault	Top of Casing Elevation [ft amsl]	NAD 83 Easting [ft]	NAD 83 Northing [ft]	Distance from Pumping Well (feet)	Casing Inside Diameter [in]	Screen Inside Diameter [in]	Screened Interval [ft bgs]	Total Screen Length [ft]	Static Depth to Water (11/21/07) (ft bgs)	Static Water Level Elevation (11/21/07) (ft amsl)
HJMU-110	Prod. Zone Monitoring Well	UKM	North	6947.56	2,212,005.02	595,899.82	880.9	4.5	3.0	500-535	35	200.73	6,746.83
HJMU-111	Prod. Zone Monitoring Well	UKM	North	6950.08	743,841.3	535,374.2	671.3	4.5	3.0	507-540	33	202.51	6,747.57
HJMU-112	Prod. Zone Monitoring Well	UKM	North	6935.35	744,385.8	534,675.6	888.3	4.5	3.0	520-547	27	184.81	6750.54
HJMU-113	Prod. Zone Monitoring Well	UKM	North	6936.99	2,212,597.08	595,512.32	779.6	4.5	3.0	526-560	34	187.48	6,749.51
HJMU-114	Prod. Zone Monitoring Well	UKM	North	6940.43	744,966.5	534,678.2	1,002.1	4.5	3.0	530-560	30	189.47	6,750.96
LC17M	Prod. Zone Monitoring Well	UKM	North	6936.90	744,548.3	534,837.7	723.0	4.5	3.0	529-565	36	186.96	6,749.94
LC20M	Prod. Zone Monitoring Well	UKM	North	6950.51	743,364.2	535,329.0	1,145.8	4.5	3.0	511-540	29	204.20	6,746.31
LC24M	Prod. Zone Monitoring Well	UKM	North	6944.33	744,565.9	535,200.5	366.2	4.5	3.0	478-531	53	193.68	6,750.65
UKMP-101	Prod. Zone Monitoring Well	UKM	North	6941.74	744,090.3	534,928.6	744.0	4.5	3.0	540-572	32	194.09	6,747.65
UKMP-102	Prod. Zone Monitoring Well	UKM	North	6942.10	744,203.9	535,145.2	500.6	4.5	3.0	485-505	20	192.81	6,749.29

Table 2.7-8 UKMP-103 Long-Term Pump Test Monitoring Wells (Page 3 of 4)

Well Name	Well Type	Monitored Horizon	Location Relative to Fault	Top of Casing Elevation [ft amsl]	NAD 83 Easting [ft]	NAD 83 Northing [ft]	Distance from Pumping Well (feet)	Casing Inside Diameter [in]	Screen Inside Diameter [in]	Screened Interval [ft bgs]	Total Screen Length [ft]	Static Depth to Water (11/21/07) (ft bgs)	Static Water Level Elevation (11/21/07) (ft amsl)
HJMP-111	Overlying Monitoring Well	HJ	North	6949.49	743,835.5	535,365.5	679.3	4.5	3.0	393-440	47	178.55	6,770.94
HJMP-113	Overlying Monitoring Well	HJ	North	6937.26	744,273.4	534,796.8	790.7	4.5	3.0	416-462	46	180.84	6,756.42
HJT-105	Overlying Monitoring Well	HJ	North	6938.87	744,423.4	535,024.4	537.5	4.5	3.0	405-436	31	171.68	6,767.19
LC16M	Overlying Monitoring Well	HJ	North	6936.15	744,548.7	534,817.5	743.1	4.5	3.0	410-467	57	178.78	6,757.37
UKMO-101	Overlying Monitoring Well	HJ	North	6942.28	744,085.6	534,942.7	734.6	4.5	3.0	465-485	20	179.00	6,763.28
UKMO-102	Overlying Monitoring Well	HJ	North	6940.79	744,205.2	535,133.9	509.2	4.5	3.0	377-408	31	167.52	6,773.27
UKMO-103	Overlying Monitoring Well	HJ	North	6950.53	744,500.7	535,556.1	13.9	4.5	3.0	417-445	28	176.02	6,774.51
HJMO-111	Overlying Monitoring Well	LFG	North	6950.46	743,825.4	535,371.2	687.5	4.5	3.0	310-333	23	166.49	6,783.97
HJMO-113	Overlying Monitoring Well	LFG	North	6936.97	744,264.7	534,805.2	785.0	4.5	3.0	325-360	35	159.63	6,777.34
LC15M	Overlying Monitoring Well	LFG	North	6936.55	744,532.5	534,820.3	739.2	4.5	3.0	286-340	54	157.94	6778.61

Table 2.7-8 UKMP-103 Long-Term Pump Test Monitoring Wells (Page 4 of 4)

Well Name	Well Type	Monitored Horizon	Location Relative to Fault	Top of Casing Elevation [ft amsl]	NAD 83 Easting [ft]	NAD 83 Northing [ft]	Distance from Pumping Well (feet)	Casing Inside Diameter [in]	Screen Inside Diameter [in]	Screened Interval [ft bgs]	Total Screen Length [ft]	Static Depth to Water (11/21/07) (ft bgs)	Static Water Level Elevation (11/21/07) (ft amsl)
UKMU-101	Underlying Monitoring Well	MKM	North	6941.87	744,101.1	534,930.9	736.4	4.5	3.0	600-625	25	194.69	6747.18
UKMU-102	Underlying Monitoring Well	MKM	North	6942.62	744,191.1	535,143.1	509.6	4.5	3.0	545-570	25	193.60	6749.02
UKMU-103	Underlying Monitoring Well	MKM	North	6950.92	744,487.5	535,546.0	12.1	4.5	3.0	582-610	28	200.39	6750.53

Notes:

ft amsl - feet above mean sea level

ft bgs - feet below ground surface

ft btoc - feet below top of casing

in = inches

WL = Water Level

Table 2.7-9 2007 UKMP-103 Long Term Pump Test Summary (Page 1 of 1)

Well Name	Distance From Pumping Well (feet)	Analytical Results	Theis Drawdown Method	Theis Recovery Method	Cooper & Jacob 'u' Assumption Satisfied at (<0.05)	Averages Values
UKMP-103	Pumping Well	Transmissivity (ft²/day)	NA	1.28	NA	128
		Hyd. Cond. (ft/day)	NA	2.56	NA	2.56
		Storativity	NA	---	NA	---
HJMU-102	2,102	Transmissivity (ft²/day)	219	258	NA**	239
		Hyd. Cond. (ft/day)	4.38	5.16	NA	4.77
		Storativity	5.61E-04	---	NA	---
HJMU-110	880	Transmissivity (ft²/day)	138	142	152	144
		Hyd. Cond. (ft/day)	2.77	2.83	3.04	2.88
		Storativity	9.10E-05	---	---	---
HJMU-111	680	Transmissivity (ft²/day)	146	139	151	145
		Hyd. Cond. (ft/day)	2.93	2.78	3.02	2.91
		Storativity	9.86E-05	---	---	---
LC20M	1,146	Transmissivity (ft²/day)	160	143	161	155
		Hyd. Cond. (ft/day)	3.20	2.87	3.22	3.10
		Storativity	6.27E-05	---	---	---
LC24M	366	Transmissivity (ft²/day)	130	127	142*	133
		Hyd. Cond. (ft/day)	2.60	2.54	2.84	2.66
		Storativity	1.02E-04	---	---	---
UKMP-101	744	Transmissivity (ft²/day)	133	142	150	142
		Hyd. Cond. (ft/day)	2.66	2.85	3.00	2.84
		Storativity	1.51E-04	---	---	---
UKMP-102	501	Transmissivity (ft²/day)	85.9	131	143	120
		Hyd. Cond. (ft/day)	1.72	2.61	2.85	2.39
		Storativity	1.40E-04	---	---	---
					Average Transmissivity (ft²/day)	138
					AverageHyd. Cond. (ft/day)	2.76
					Average Storativity	1.07E-04

* = the 'u' assumption (<0.01) inherent to the Cooper & Jacob method was satisfied for well LC24M only; data presented satisfies the 'u' assumption (<0.05).

** = due to anomalous drawdown curve, data from HJMU-102 analyses were not used for calculating averages.

Table 2.7-10 2009 KPW-1A and KPW-2 Long-Term Pump Test Monitoring Wells (Page 1 of 2)

Well Name	Well Type	Monitored Horizon	Location Relative to Fault	Top of Casing Elevation [ft amsl]	NAD 83 Easting [ft]	NAD 83 Northing [ft]	Distance from KPW-1A Pumping Well (feet)	Distance from KPW-2 Pumping Well (feet)	Casing Inside Diameter [in]	Screen Inside Diameter [in]	Screened Interval [ft bgs]	Total Screen Length [ft]	06/16/09 Depth to Water [ft btoc]	06/16/09 WL Elevation [ft amsl]
KPW-2	Production Zone Pumping Well	KM	North	6,934.35	2,210,881.9	595,485.4	3,043.7	0.0	4.5	3.0	500-507 526-545 555-590	61	193.57	6,740.78
KPW-1A	Production Zone Pumping Well	KM	South	6,944.19	2,213,924.9	595,553.0	0.0	3,043.7	4.5	3.0	520-565 575-610	80	189.64	6,754.54
HJMP-108	Overlying Monitor Well	HJ	North	6,952.20	2,211,786.0	596,016.0	2,188.4	1,048.4	4.5	3.0	400-434	34	180.67	6,771.53
M-101	Overlying Monitor Well	HJ	South	6,949.24	2,214,620.0	595,288.5	743.7	3,743.3	4.5	3.0	423-438	15	177.18	6,773.26
M-103	Overlying Monitor Well	HJ	South	6,946.20	2,214,022.0	594,644.2	913.9	3,250.8	4.5	3.0	364-378 414-434	34	175.77	6,771.63
M-127	Overlying Monitor Well	HJ	South	6,947.66	2,213,935.0	595,955.7	402.9	3,089.2	4.5	3.0	408-418 450-471	31	174.39	6,774.47
MP-102	Overlying Monitor Well	HJ	South	6,941.02	2,213,296.3	595,391.8	648.9	2,416.3	4.5	3.0	408-423	15	179.19	6,763.03
MP-108	Overlying Monitor Well	HJ	North	6,936.15	2,210,878.9	595,460.3	3,047.4	25.2	4.5	3.0	424-438	14	169.96	6,767.39
KMP-1	Production Zone Monitor Well	KM	South	6,934.49	2,216,970.7	594,511.8	3,218.9	6,166.2	4.5	3.0	430-450 460-475 490-505	50	168.62	6,765.87
KMP-2	Production Zone Monitor Well	KM	North	7,013.44	2,216,657.1	599,188.6	4,547.9	6,860.5	4.5	3.0	525-545 550-560 570-590	50	227.61	6,785.84
KMP-3	Production Zone Monitor Well	KM	North	6,963.31	2,214,148.5	596,532.7	1,005.0	3,430.4	4.5	3.0	500-530 545-565	50	205.46	6,757.85
KMP-4	Production Zone Monitor Well	KM	North	6,968.10	2,211,259.2	597,615.9	3,370.7	2,163.7	4.5	3.0	580-600	20	220.17	6,747.93
KMP-5	Production Zone Monitor Well	KM	South	6,913.32	2,210,070.3	594,057.3	4,134.5	1,642.5	4.5	3.0	525-554 560-585	54	183.55	6,729.77
HJMU-101	Production Zone Monitor Well	KM	North	6,949.03	2,211,597.0	595,702.0	2,332.6	747.2	4.5	3.0	499-535	36	200.33	6,748.70
MU-101	Production Zone Monitor Well	KM	South	6,940.37	2,213,859.9	595,192.1	366.7	2,992.4	4.5	3.0	520-540	20	188.08	6,753.49
MU-102	Production Zone Monitor Well	KM	South	6,940.43	2,213,287.3	595,383.3	659.8	2,407.6	4.5	3.0	525-553	28	189.26	6,752.37
MU-109	Production Zone Monitor Well	KM	South	6,932.78	2,210,944.1	595,229.5	2,998.2	263.3	4.5	3.0	525-545	20	192.59	6,741.39
MU-112	Production Zone Monitor Well	KM	North	6,936.75	2,209,569.4	595,537.7	4,355.5	4,685.9	4.5	3.0	515-535	20	199.54	6,738.41
UKMP-101	Production Zone Monitor Well	KM	South	6,941.74	2,212,410.0	595,634.0	1,517.0	1,535.3	4.5	3.0	547-575	28	191.86	6,749.88

Table 2.7-10 2009 KPW-1A and KPW-2 Long-Term Pump Test Monitoring Wells (Page 2 of 2)

Well Name	Well Type	Monitored Horizon	Location Relative to Fault	Top of Casing Elevation [ft amsl]	NAD 83 Easting [ft]	NAD 83 Northing [ft]	Distance from KPW-1A Pumping Well (feet)	Distance from KPW-2 Pumping Well (feet)	Casing Inside Diameter [in]	Screen Inside Diameter [in]	Screened Interval [ft bgs]	Total Screen Length [ft]	06/16/09 Depth to Water [ft btoc]	06/16/09 WL Elevation [ft amsl]
UKMP-103	Production Zone Monitor Well	KM	North	6,950.84	2,212,807.0	596,263.0	1,324.3	2,076.3	4.5	3.0	496-537	41	199.58	6,751.26
KMU-1	Underlying Monitor Well	L	South	6,943.69	2,214,013.9	595,552.1	89.1	3,132.8	4.5	3.0	650-675	25	193.05	6,750.64
KMU-2	Underlying Monitor Well	L	South	6,951.00	2,215,181.7	595,580.5	1,257.2	4,300.9	4.5	3.0	625-650	25	195.19	6,755.81
KMU-3	Underlying Monitor Well	L	North	6,962.31	2,214,222.6	596,514.5	1,006.6	3,495.6	4.5	3.0	630-650	20	206.98	6,755.33
KMU-4	Underlying Monitor Well	L	North	6,939.42	2,211,054.2	595,497.1	2,871.2	172.7	4.5	3.0	605-635	30	198.43	6,740.99

Notes:
ft amsl - feet above mean sea level
ft bgs - feet below ground surface
ft btoc - feet below top of casing
in = inches
WL = Water Level

Table 2.7-11 2009 KPW-2 Long-Term Pump Test Summary (Page 1 of 2)

Mine Unit 1 North Test - Lost Creek ISR, LLC

Well Name	Distance from Pumping Well (ft)	Side of Fault	Theis Drawdown			Theis Recovery		
			T (ft²/d)	K (ft/d)	S	T (ft²/d)	K (ft/d)	S
KPW-2	0	North	111.0	0.97	--	104.0	0.91	--
HJMU-101	747	North	132.0	1.15	1.3E-04	30.3	0.26	--
MU-112	1,314	North	174.0	1.51	1.1E-04	--	--	--
		Maximum	**174.0**	**1.51**	**1.3E-04**	**104.0**	**0.91**	**--**
		Minimum	**111.0**	**0.97**	**1.1E-04**	**30.3**	**0.26**	**--**
		Average	**139.0**	**1.21**	**1.2E-04**	**67.2**	**0.58**	**--**
		Std. Deviation	**32.1**	**0.28**	**1.7E-05**	**--**	**--**	**--**

Groundwater Linear Velocity			
	Average	**Maximum**	**Minimum**
Hydraulic Conductivity (K, ft/d)	1.21	1.51	0.97
Average Hydraulic Gradient (dh/dl, ft/ft)	0.006	0.006	0.006
Effective Porosity (*n* e, dimensionless)	0.28	0.28	0.28
Calculated Velocity (ft/day)	0.026	0.032	0.021
Calculated Velocity (ft/year)	9.5	11.8	7.6

Notes:

T - Transmissivity

K - Hydraulic conductivity; calculated based on 120 ft aquifer thickness. S - Storativity

Linear velocity = (K * dh/dl) / n_e

Table 2.7-11 2009 KPW-1A Long Term Pump Test Summary (Page 2 of 2)

Mine Unit 1 South Test - Lost Creek ISR, LLC

Well Name	Distance from Pumping	Side of Fault	Theis Drawdown			Theis Recovery		
			T (ft²/d)	K (ft/d)	S	T (ft²/d)	K (ft/d)	S
KPW-1A	0	South	142.0	1.58	--	169.0	1.47	--
MU-101*	367	South	124.0	1.08	1.2E-04	--	--	--
MU-102	660	South	120.0	1.04	4.1E-05	107.0	0.93	--
MU-109	2,998	South	224.0	1.95	2.1E-04	--	--	--
KMP-1	3,219	South	128.0	1.11	6.4E-05	--	--	--
KMP-5	4,135	South	199.0	1.73	1.1E-04	--	--	--
Maximum			**224.0**	**1.95**	**2.1E-04**	**169.0**	**1.47**	**--**
Minimum			**120.0**	**1.04**	**4.1E-05**	**107.0**	**0.93**	**--**
Average			**156.2**	**1.42**	**1.1E-04**	**138.0**	**1.20**	**--**
Std. Deviation			**44.2**	**0.39**	**6.3E-05**	**43.8**	**0.38**	**--**

Groundwater Linear Velocity			
	Average	**Maximum**	**Minimum**
Hydraulic Conductivity (K, ft/d)	1.42	1.95	1.04
Average Hydraulic Gradient (dh/dl, ft/ft)	0.006	0.006	0.006
Effective Porosity (n_e, dimensionless)	0.28	0.28	0.28
Calculated Velocity (ft/day)	0.030	0.042	0.022
Calculated Velocity (ft/year)	11.1	15.3	8.1

Notes:

T - Transmissivity

K - Hydraulic conductivity; calculated based on 120 ft aquifer thickness. S - Storativity

Linear velocity = (K * dh/dl) / n_e

* - Analysis of MU-101 utilizes time-drawdown data prior to transducer being exposed. Recovery analysis not possible.

Table 2.7-12 Summary of Aquifer Characteristics (Page 1 of 1)

Hydrostratigraphic Unit	Thickness (feet) [typical]	Porosity[1]	Transmissivity[2]				Storativity		Horizontal Hydraulic Conductivity[3] (feet/day)	
			(gpd/ft)		(ft^2/day)					
			N of Fault[4]	**S of Fault[4]**	**N of Fault**	**S of Fault**	**N of Fault**	**S of Fault**	**N of Fault**	**S of Fault**
KM Horizon	20 to 75 [50]	0.28	224 to 1302	195 to 1675	30 to 174	26 to 224	1.20E-04	1.10E-04	0.26 to 2.76	0.5 to 1.95

[1] Specific yield not determined because all aquifers except DE are confined systems.

[2] Transmissivity is "effective" - influenced by fault, actual transmissivity may be up to 2X greater.

[3] Hydraulic conductivity is "effective" - influenced by fault, actual hydraulic conductivity may be up to 2X greater.

[4] Fault is minor and may not extend across entire permit area.

Table 2.7-13 LC ISR, LLC Affiliates Groundwater Use Permits - Wyoming State Engineer Records March 2013 (Page 1 of 7)

Well or Use Point[1]	Permit Number	Applicant[2]	Township	Range	Section	¼ of the ¼	Uses	Priority	Status	Permit Facility Name	Yield[3]	Well Depth (ft)	Static Well Depth (ft)
Lost Creek Project Monitoring Wells													
DE Horizon													
Well	P179861W	NFU Wyoming LLC	25 N	92 W	20	NWNW	Monitoring	3/1/2007	Complete	HJT 106	LCS	160	154.55
Well	P179862W	NFU Wyoming LLC	25 N	92 W	20	NENE	Monitoring	3/1/2007	Complete	HJT 107	LCS	160	160.25
Well	P175260W	NFU Wyoming LLC and BLM	25 N	92 W	20	NWNW	Monitoring, Test Well	6/9/2006	Complete	LC29M	LCS	171	153.95
Well	P175262W	NFU Wyoming LLC and BLM	25 N	93 W	24	SWNE	Monitoring, Test Well	6/9/2006	Complete	LC30M	LCS	236	198.91
Well	P175268W	NFU Wyoming LLC and BLM	25 N	93 W	25	SWSW	Monitoring	6/9/2006	Complete	LC31M	LCS	191	144.01
Well	P188852.0W	Lost Creek ISR LLC	25 N	93 W	13	NWSE	Monitoring	9/26/2008	Complete	MB-01	LCS	280	277.85
Well	P188858.0W	Lost Creek ISR LLC	25 N	92 W	16	SENE	Monitoring	9/26/2008	Complete	MB-07	0	125	Dry
Well	P188861.0W	Lost Creek ISR LLC	25 N	92 W	18	SESE	Monitoring	9/26/2008	Complete	MB-10	0	160	Dry
Well	P198439.0W	Lost Creek ISR LLC	25 N	92 W	21	SESW	Monitoring	06/05/2012	Incomplete	M-DE1	0	Not Drilled	--
Well	P198448.0W	Lost Creek ISR LLC	25 N	92 W	15	NWSE	Monitoring	06/05/2012	Incomplete	M-DE2	0	Not Drilled	--
FG Horizon													
Well	P179865W	NFU Wyoming LLC	25 N	92 W	19	NENE	Monitoring	3/1/2007	Complete	HJMO-101	LCS	326	169.02
Well	P179868W	NFU Wyoming LLC	25 N	92 W	19	NENE	Monitoring	3/1/2007	Complete (MO-108)	HJMO-102	LCS	330	160.8
Well	P179871W	NFU Wyoming LLC	25 N	92 W	18	SESE	Monitoring	3/1/2007	Complete (MO-107)	HJMO-103	LCS	327	161.75
Well	P179874W	NFU Wyoming LLC	25 N	92 W	19	NENE	Monitoring	3/1/2007	Complete	HJMO-104	LCS	326	163.53
Well	P179877W	NFU Wyoming LLC	25 N	92 W	19	NENE	Monitoring	3/1/2007	Complete	HJMO-105	LCS	323	161.10
Well	P179880W	NFU Wyoming LLC	25 N	92 W	18	SESE	Monitoring	3/1/2007	Complete (MO-106)	HJMO-106	LCS	326	166.01
Well	P179883W	NFU Wyoming LLC	25 N	92 W	19	NENE	Monitoring	3/1/2007	Complete (MO-104)	HJMO-107	LCS	369	169.73
Well	P179886W	NFU Wyoming LLC	25 N	92 W	18	SESE	Monitoring	3/1/2007	Complete	HJMO-108	LCS	333	171.20
Well	P179889W	NFU Wyoming LLC	25 N	92 W	20	NWNW	Monitoring	3/1/2007	Complete	HJMO-109	LCS	370	164.88
Well	P179892W	NFU Wyoming LLC	25 N	92 W	20	NWNW	Monitoring	3/1/2007	Complete	HJMO-110	LCS	330	166.15
Well	P179895W	NFU Wyoming LLC	25 N	92 W	17	SWSW	Monitoring	3/1/2007	Complete (MO-105)	HJMO-111	LCS	330	169.20
Well	P179898W	NFU Wyoming LLC	25 N	92 W	20	NWNW	Monitoring	3/1/2007	Complete (MO-113)	HJMO-112	LCS	386	164.04
Well	P179901W	NFU Wyoming LLC	25 N	92 W	20	NWNW	Monitoring	3/1/2007	Complete	HJMO-113	LCS	356	162.18
Well	P179904W	NFU Wyoming LLC	25 N	92 W	20	NENW	Monitoring	3/1/2007	Complete (MO-102)	HJMO-114	LCS	360	164.93
Well	P175260W	NFU Wyoming LLC and BLM	25 N	92 W	20	NWNW	Monitoring, Test Well	6/9/2006	Complete	LC15M	LCS	350	160.80
Well	P175261W	NFU Wyoming LLC and BLM	25 N	92 W	18	SESE	Monitoring, Test Well	6/9/2006	Complete	LC18M	LCS	350	168.04
Well	P175262W	NFU Wyoming LLC and BLM	25 N	93 W	24	SWNE	Monitoring, Test Well	6/9/2006	Complete	LC21M	LCS	410	198.20
Well	P175264W	NFU Wyoming LLC and BLM	25 N	92 W	19	NENE	Monitoring	6/9/2006	Complete	LC25M	LCS	380	167.05
Well	P192649.0W	NFU Wyoming LLC	25 N	92 W	29	NESE	Miscellaneous	03/15/2010	Incomplete	LCS1W	30	LCS	LCS

Table 2.7-13 LC ISR, LLC Affiliates Groundwater Use Permits - Wyoming State Engineer Records March 2013 (Page 2 of 7)

Well or Use Point[1]	Permit Number	Applicant[2]	Township	Range	Section	¼ of the ¼	Uses	Priority	Status	Permit Facility Name	Yield[3]	Well Depth (ft)	Static Well Depth (ft)
Well	P188853.0W	Lost Creek ISR LLC	25 N	93 W	13	NWSE	Monitoring	9/26/2008	Complete	MB-02	LCS	450	243.40
Well	P188856.0W	Lost Creek ISR LLC	25 N	93 W	25	SWSW	Monitoring	9/26/2008	Complete	MB-05	LCS	325	144.60
Well	P188859.0W	Lost Creek ISR LLC	25 N	92 W	16	SENE	Monitoring	9/26/2008	Complete	MB-08	LCS	260	171.16
Well	P198440.0W	Lost Creek ISR LLC	25 N	92 W	21	SESW	Monitoring	06/05/2012	Incomplete	M-FG1	0	190	117.19
Well	P198449.0W	Lost Creek ISR LLC	25 N	92 W	15	NWSE	Monitoring	06/05/2012	Incomplete	M-FG2	0	210	110.00
HJ Horizon													
Well	P179864W	NFU Wyoming LLC	25 N	92 W	19	NENE	Monitoring	3/1/2007	Complete	HJMP-101	LCS	465	180.92
Well	P179867W	NFU Wyoming LLC	25 N	92 W	19	NENE	Monitoring	3/1/2007	Complete (MP-108)	HJMP-102	LCS	435	172.50
Well	P179870W	NFU Wyoming LLC	25 N	92 W	18	SESE	Monitoring	3/1/2007	Complete (MP-107)	HJMP-103	LCS	432	171.50
Well	P179873W	NFU Wyoming LLC	25 N	92 W	19	NENE	Monitoring	3/1/2007	Complete	HJMP-104	LCS	430	174.48
Well	P179876W	NFU Wyoming LLC	25 N	92 W	19	NENE	Monitoring	3/1/2007	Complete	HJMP-105	LCS	463	170.51
Well	P179879W	NFU Wyoming LLC	25 N	92 W	18	SESE	Monitoring	3/1/2007	Complete (MP-106)	HJMP-106	LCS	480	175.75
Well	P179882W	NFU Wyoming LLC	25 N	92 W	19	NENE	Monitoring	3/1/2007	Complete	HJMP-107	LCS	464	183.61
Well	P179885W	NFU Wyoming LLC	25 N	92 W	18	SESE	Monitoring	3/1/2007	Complete	HJMP-108	LCS	434	182.88
Well	P179888W	NFU Wyoming LLC	25 N	92 W	20	NWNW	Monitoring	3/1/2007	Complete	HJMP-109	LCS	512	178.00
Well	P179891W	NFU Wyoming LLC	25 N	92 W	20	NWNW	Monitoring	3/1/2007	Complete	HJMP-110	LCS	476	177.79
Well	P179894W	NFU Wyoming LLC	25 N	92 W	17	SWSW	Monitoring	3/1/2007	Complete (MP-105)	HJMP-111	LCS	440	176.94
Well	P179897W	NFU Wyoming LLC	25 N	92 W	20	NWNW	Monitoring	3/1/2007	Complete (MP-103)	HJMP-112	LCS	400	179.96
Well	P179900W	NFU Wyoming LLC	25 N	92 W	20	NWNW	Monitoring	3/1/2007	Complete	HJMP-113	LCS	462	180.95
Well	P179903W	NFU Wyoming LLC	25 N	92 W	20	NENE	Monitoring	3/1/2007	Complete (MP-102)	HJMP-114	LCS	460	180.53
Well	P179856W	NFU Wyoming LLC	25 N	92 W	19	NENE	Monitoring	3/1/2007	Complete	HJT 101	LCS	477	174.86
Well	P179857W	NFU Wyoming LLC	25 N	92 W	19	NENE	Monitoring	3/1/2007	Complete	HJT 102	LCS	417	172.90
Well	P179858W	NFU Wyoming LLC	25 N	92 W	19	NENE	Monitoring	3/1/2007	Complete	HJT 103	LCS	450	190.40
Well	P179859W	NFU Wyoming LLC	25 N	92 W	20	NWNW	Monitoring	3/1/2007	Complete	HJT 104	LCS	460	172.15
Well	P179860W	NFU Wyoming LLC	25 N	92 W	20	NWNW	Monitoring	3/1/2007	Complete	HJT 105	LCS	438	172.97
Well	P175260W	NFU Wyoming LLC and BLM	25 N	92 W	20	NWNW	Monitoring, Test Well	6/9/2006	Complete	LC16M	LCS	472	178.14
Well	P175261W	NFU Wyoming LLC and BLM	25 N	92 W	18	SESE	Monitoring, Test Well	6/9/2006	Complete	LC19M	LCS	463	180.08
Well	P175262W	NFU Wyoming LLC and BLM	25 N	93 W	24	SWNE	Monitoring, Test Well	6/9/2006	Complete	LC22M	LCS	592	206.73
Well	P175265W	NFU Wyoming LLC and BLM	25 N	92 W	20	NENE	Monitoring	6/9/2006	Complete	LC26M	LCS	436	171.10
Well	P179907W	NFU Wyoming LLC	25 N	92 W	20	NWNW	Monitoring	3/1/2007	Complete	UKMO-101	LCS	487	178.40
Well	P179910W	NFU Wyoming LLC	25 N	92 W	17	SWSW	Monitoring	3/1/2007	Complete	UKMO-102	LCS	420	168.60
Well	P179913W	NFU Wyoming LLC	25 N	92 W	17	SWSW	Monitoring	3/1/2007	Complete	*UKMP-103	LCS	438	177.64
Well	P188854.0W	Lost Creek ISR LLC	25 N	93 W	13	NWSE	Monitoring	9/26/2008	Complete	MB-03B	LCS	587	259.00

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Well or Use Point[1]	Permit Number	Applicant[2]	Township	Range	Section	¼ of the ¼	Uses	Priority	Status	Permit Facility Name	Yield[3]	Well Depth (ft)	Static Well Depth (ft)
Well	P188857.0W	Lost Creek ISR LLC	25 N	93 W	25	SWSW	Monitoring	9/26/2008	Complete	MB-06	LCS	405	141.00
Well	P188860.0W	Lost Creek ISR LLC	25 N	92 W	16	SENE	Monitoring	9/26/2008	Complete	MB-09	LCS	370	183.00
Well	P189593.0W	Lost Creek ISR LLC	25 N	92 W	19	NENE	Monitoring	02/04/2009	Complete	KPW-2	70	590	193.00
Well	P198441.0W	Lost Creek ISR LLC	25 N	92 W	21	SWSW	TST	06/05/2012	Incomplete	M-HJ1	LCS	340	140.29
Well	P198444.0W	Lost Creek ISR LLC	25 N	92 W	21	SESW	Monitoring	06/05/2012	Incomplete	M-HJ2	LCS	340	152.25
Well	P198446.0W	Lost Creek ISR LLC	25 N	92 W	20	SWSE	Monitoring	06/05/2012	Incomplete	M-HJ3	LCS	370	156.22
Well	P198450.0W	Lost Creek ISR LLC	25 N	92 W	15	SWNE	TST	06/05/2012	Incomplete	M-HJ4	LCS	340	121.85
Well	P193897.0W	Lost Creek ISR LLC	25 N	92 W	18	SWSE	Monitoring	09/02/2010	Complete	TW1-1	LCS	483	167
KM Horizon													
Well	P194711.0W	Lost Creek ISR LLC	25 N	92 W	20	NENW	TST	12/20/2010	Complete	5S-KM1	LCS	540	192.8
Well	P194712.0W	Lost Creek ISR LLC	25 N	92 W	20	NENW	TST	12/20/2010	Complete	5S-KM2	LCS	540	190.1
Well	P194713.0W	Lost Creek ISR LLC	25 N	92 W	20	NENW	TST	12/20/2010	Complete	5S-KM3	LCS	540	192.2
Well	P194714.0W	Lost Creek ISR LLC	25 N	92 W	20	NENW	TST	12/20/2010	Complete	5S-KM4	LCS	540	192.2
Well	P194708.0W	Lost Creek ISR LLC	25 N	92 W	20	NWNE	Monitoring	12/20/2010	Complete	5S-KM5	LCS	610	190
Well	P179863W	NFU Wyoming LLC	25 N	92 W	19	NENE	Monitoring	3/1/2007	Complete	HJMU-101	LCS	535	199
Well	P179866W	NFU Wyoming LLC	25 N	92 W	19	NENE	Monitoring	3/1/2007	Complete	*HJMV-102	LCS	525	179
Well	P179869W	NFU Wyoming LLC	25 N	92 W	18	SESE	Monitoring	3/1/2007	Complete	HJMU-103	LCS	540	190
Well	P179872W	NFU Wyoming LLC	25 N	92 W	19	NENE	Monitoring	3/1/2007	Complete	HJMU-104	LCS	550	193
Well	P179875W	NFU Wyoming LLC	25 N	92 W	19	NENE	Monitoring	3/1/2007	Complete	HJMU-105	LCS	542	191
Well	P179878W	NFU Wyoming LLC	25 N	92 W	18	SESE	Monitoring	3/1/2007	Complete	HJMU-106	LCS	546	192
Well	P179881W	NFU Wyoming LLC	25 N	92 W	19	NENE	Monitoring	3/1/2007	Complete	HJMU-107	LCS	580	188
Well	P179884W	NFU Wyoming LLC	25 N	92 W	18	SESE	Monitoring	3/1/2007	Complete	HJMU-108	LCS	540	201
Well	P179887W	NFU Wyoming LLC	25 N	92 W	20	NWNW	Monitoring	3/1/2007	Complete	HJMU-109	LCS	574	189
Well	P179890W	NFU Wyoming LLC	25 N	92 W	20	NWNW	Monitoring	3/1/2007	Complete	HJMU-110	LCS	532	197
Well	P179893W	NFU Wyoming LLC	25 N	92 W	17	SWSW	Monitoring	3/1/2007	Complete	HJMU-111	LCS	545	199
Well	P179896W	NFU Wyoming LLC	25 N	92 W	20	NWNW	Monitoring	3/1/2007	Complete	HJMU-112	LCS	560	182
Well	P179899W	NFU Wyoming LLC	25 N	92 W	20	NWNW	Monitoring	3/1/2007	Complete	HJMU-113	LCS	555	185
Well	P179902W	NFU Wyoming LLC	25 N	92 W	20	NENW	Monitoring	3/1/2007	Complete	HJMU-114	LCS	553	187
Well	P189583.0W	Lost Creek ISR LLC	25 N	92 W	20	NENE	Monitoring	02/04/2009	Complete	KMP-1	22	505	167
Well	P189584.0W	Lost Creek ISR LLC	25 N	92 W	17	SENE	Monitoring	02/04/2009	Complete	KMP-2	LCS	590	226
Well	P189585.0W	Lost Creek ISR LLC	25 N	92 W	17	SESW	Monitoring	02/04/2009	Complete	KMP-3	LCS	565	204
Well	P189586.0W	Lost Creek ISR LLC	25 N	92 W	18	NESE	Monitoring	02/04/2009	Complete	KMP-4	LCS	600	217
Well	P189587.0W	Lost Creek ISR LLC	25 N	92 W	19	SWNE	Monitoring	02/04/2009	Complete	KMP-5	LCS	585	184
Well	P189588.0W	Lost Creek ISR LLC	25 N	92 W	20	NENW	Monitoring	02/04/2009	Complete	KMU-1	LCS	675	192
Well	P189589.0W	Lost Creek ISR LLC	25 N	92 W	20	NWNE	Monitoring	02/04/2009	Complete	KMU-2	LCS	650	194
Well	P189590.0W	Lost Creek ISR LLC	25 N	92 W	17	SESW	Monitoring	02/04/2009	Complete	KMU-3	LCS	650	205

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Well or Use Point[1]	Permit Number	Applicant[2]	Township	Range	Section	¼ of the ¼	Uses	Priority	Status	Permit Facility Name	Yield[3]	Well Depth (ft)	Static Well Depth (ft)
Well	P189591.0W	Lost Creek ISR LLC	25 N	92 W	19	NENE	Monitoring	02/04/2009	Complete	KMU-4	LCS	635	197
Well	P189592.0W	Lost Creek ISR LLC	25 N	92 W	20	NENW	Monitoring	02/04/2009	Complete	KPW-1	LCS	610	188
Well	P194696.0W	Lost Creek ISR LLC	25 N	92 W	20	NENW	Monitoring	12/17/2010	Complete	KPW-3	LCS	590	97
Well	P175260W	NFU Wyoming LLC and BLM	25 N	92 W	20	NWNW	Monitoring, Test Well	6/9/2006	Complete	LC17M	LCS	575	185.26
Well	P175261W	NFU Wyoming LLC and BLM	25 N	92 W	18	SESE	Monitoring, Test Well	6/9/2006	Complete	LC20M	LCS	543	202.36
Well	P175262W	NFU Wyoming LLC and BLM	25 N	93 W	24	SWNE	Monitoring, Test Well	6/9/2006	Complete	LC23M	LCS	634	220.75
Well	P175263W	NFU Wyoming LLC and BLM	25 N	92 W	17	SWSW	Monitoring	6/9/2006	Complete	LC24M	LCS	542	192.11
Well	P175266W	NFU Wyoming LLC and BLM	25 N	92 W	16	SENE	Monitoring	6/9/2006	Complete	LC27M	LCS	477	189.8
Well	P175267W	NFU Wyoming LLC and BLM	25 N	93 W	25	SWSW	Monitoring	6/9/2006	Cancelled	LC28M	LCS	557	--
Well	P188083.0W	Lost Creek ISR LLC	25 N	93 W	25	SWSW	Miscellaneous	07/29/2008	Complete	LC28M	25	557	155.1
Well	P188855.0W	Lost Creek ISR LLC	25 N	93 W	13	NWSE	Monitoring	9/26/2008	Complete	MB-04	LCS	640	274
Well	P194695.0W	Lost Creek ISR LLC	25 N	92 W	20	NWNE	Monitoring	12/17/2010	Complete	M-KM1	0	580	194.31
Well	P194694.0W	Lost Creek ISR LLC	25 N	92 W	20	NENW	Monitoring	12/17/2010	Complete	M-KM2	0	580	193.31
Well	P198442.0W	Lost Creek ISR LLC	25 N	92 W	21	SWSW	TST	06/05/2012	Incomplete	M-KM4	0	460	161.6
Well	P198445.0W	Lost Creek ISR LLC	25 N	92 W	21	SESW	Monitoring	06/05/2012	Incomplete	M-KM5	0	480	168.64
Well	P198447.0W	Lost Creek ISR LLC	25 N	92 W	20	SWSE	Monitoring	06/05/2012	Incomplete	M-KM6	0	500	161.68
Well	P198451.0W	Lost Creek ISR LLC	25 N	92 W	15	SENW	TST	06/05/2012	Incomplete	M-KM7	0	470	155.74
Well	P192103.0W	Lost Creek ISR LLC	25 N	92 W	20	NENW	Monitoring	01/22/2010	Incomplete	M-UKM1	0	550	191.64
Well	P193899.0W	Lost Creek ISR LLC	25 N	92 W	19	NWNE	Monitoring	09/01/2010	Complete	OW1-1	0	525	188
Well	P193898.0W	Lost Creek ISR LLC	25 N	92 W	19	NENW	Monitoring	09/02/2010	Incomplete	TW1-2	25	--	--
Well	P179906W	NFU Wyoming LLC	25 N	92 W	20	NWNW	Monitoring	3/1/2007	Complete	UKMP-101	LCS	575	192.13
Well	P179909W	NFU Wyoming LLC	25 N	92 W	17	SWSW	Monitoring	3/1/2007	Complete	UKMP-102	LCS	498	190.68
Well	P179912W	NFU Wyoming LLC	25 N	92 W	17	SWSW	Monitoring	3/1/2007	Complete	UKMP-103	LCS	537	196
Well	P179905W	NFU Wyoming LLC	25 N	92 W	20	NWNW	Monitoring	3/1/2007	Complete (MO-114)	UKMU-101	LCS	630	191
Well	P179908W	NFU Wyoming LLC	25 N	92 W	17	SWSW	Monitoring	3/1/2007	Complete (MO-115)	UKMU-102	LCS	580	190
Well	P179911W	NFU Wyoming LLC	25 N	92 W	17	SWSW	Monitoring	3/1/2007	Complete	UKMU-103	LCS	590	196
L Horizon													
Well	P194709.0W	Lost Creek ISR LLC	25 N	92 W	20	NENW	Monitoring	12/20/2010	Incomplete	5S-L1	LCS	LCS	LCS
Well	P189582.0W	Lost Creek ISR LLC	25 N	92 W	16	SENE	Monitoring	02/04/2009	Complete	MB-11	LCS	590	198
Well	P189581.0W	Lost Creek ISR LLC	25 N	93 W	13	SWSE	Monitoring	02/04/2009	Complete	MB-12	17	770	277
Well	P189580.0W	Lost Creek ISR LLC	25 N	93 W	25	SWSW	Monitoring	02/04/2009	Complete	MB-13	LCS	680	158
Well	P189618.0W	Lost Creek ISR LLC	25 N	93 W	24	SWNE	Monitoring	02/06/2009	Complete	MB-14	LCS	740	222
Well	P189619.0W	Lost Creek ISR LLC	25 N	92 W	18	SESE	Monitoring	02/06/2009	Cancelled	MB-15	LCS	--	--

Table 2.7-13 LC ISR, LLC Affiliates Groundwater Use Permits - Wyoming State Engineer Records March 2013 (Page 5 of 7)

Well or Use Point[1]	Permit Number	Applicant[2]	Township	Range	Section	¼ of the ¼	Uses	Priority	Status	Permit Facility Name	Yield[3]	Well Depth (ft)	Static Well Depth (ft)
Well	P192104.0W	Lost Creek ISR LLC	25 N	92 W	20	NENW	Monitoring	01/22/2010	Incomplete	M-L1	LCS	670	191.51
Well	P192105.0W	Lost Creek ISR LLC	25 N	92 W	20	NWNE	Monitoring	01/22/2010	Incomplete	M-L2	LCS	675	194.29
Well	P194693.0W	Lost Creek ISR LLC	25 N	92 W	20	NWNW	Monitoring	12/17/2010	Complete	M-L3	LCS	690	189.2
Well	P194692.0W	Lost Creek ISR LLC	25 N	92 W	20	SENW	Monitoring	12/17/2010	Complete	M-L4	LCS	665	196.67
Well	P194699.0W	Lost Creek ISR LLC	25 N	92 W	18	SESE	Monitoring	12/17/2010	Incomplete	M-L5	LCS	650	200.5
M Horizon													
Well	P194710.0W	Lost Creek ISR LLC	25 N	92 W	20	NENW	Monitoring	12/20/2010	Complete	5S-M1	LCS	900	210
Well	P186494.0W	Lost Creek ISR LLC	25 N	92 W	18	SWNE	Miscellaneous	3/19/2008	Cancelled	LC229W	LCS	985	246.56
Well	P190300.0W	Lost Creek ISR LLC	25 N	93 W	25	SESW	Miscellaneous	03/30/2009	Complete	LC606W	45	740	147
Well	P192106.0W	Lost Creek ISR LLC	25 N	92 W	20	NENW	Monitoring	01/22/2010	Incomplete	M-M1	LCS	770	204.46
Well	P192102.0W	Lost Creek ISR LLC	25 N	92 W	20	NENW	Monitoring	01/22/2010	Incomplete	M-M2	LCS	745	199.33
Well	P192101.0W	Lost Creek ISR LLC	25 N	92 W	20	NWNE	Monitoring	01/22/2010	Incomplete	M-M3	LCS	770	199.5
Well	P194688.0W	Lost Creek ISR LLC	25 N	92 W	20	NENW	Monitoring	12/17/2010	Incomplete	M-M4	LCS	745	203.17
Well	P194689.0W	Lost Creek ISR LLC	25 N	92 W	20	NWNE	Monitoring	12/17/2010	Complete	M-M5	LCS	760	204.33
Well	P194690.0W	Lost Creek ISR LLC	25 N	92 W	17	SESW	Monitoring	12/17/2010	Complete	M-M6	LCS	730	209.08
Well	P194691.0W	Lost Creek ISR LLC	25 N	92 W	20	NWNW	Monitoring	12/17/2010	Complete	M-M7	LCS	770	194.86
Well	P194698.0W	Lost Creek ISR LLC	25 N	92 W	18	SESE	Monitoring	12/17/2010	Complete	M-M8	LCS	740	202.92
N Horizon													
Well	P198794.0W	Lost Creek ISR LLC	25 N	92 W	18	NWSE	Miscellaneous	05/17/2012	Incomplete	LC229W	150	1000	300
Well	P179827W	Lost Creek ISR LLC	25 N	92 W	20	NENE	Miscellaneous	2/28/2007	Unadjudicated	LC33W	20	945	400
Well	P194697.0W	Lost Creek ISR LLC	25 N	92 W	20	NENW	Monitoring	12/17/2010	Complete	M-N1	LCS	850	204.92
Well	P198443.0W	Lost Creek ISR LLC	25 N	92 W	21	SESW	Monitoring	06/05/2012	Incomplete	M-N2	LCS	740	171.2
Well	P198452.0W	Lost Creek ISR LLC	25 N	92 W	15	NESW	Monitoring	06/05/2012	Incomplete	M-N3	LCS	720	237.5
Well	P179826W	Lost Creek ISR LLC	25 N	92 W	17	NWSE	Miscellaneous	2/28/2007	Unadjudicated	LC32W	20	878	450
Other Wells *(listed in order by location)*													
Well	P169906W	Ur-Energy USA Inc. -- WSBLC	25 N	93 W	24	NENW	Miscellaneous	9/12/2005	Cancelled	LCIW	25		
Well	P187655.0W	Ur-Energy USA Inc.	25 N	92 W	19	SWNE	Monitoring	7/3/2008	Complete	SWNE19M	LCS	488	180
Well	P187654.0W	Ur-Energy USA Inc.	25 N	92 W	19	NWNE	Monitoring	7/3/2008	Complete	NWNE19M	LCS	460	170
Well	P187664.0W	Ur-Energy USA Inc.	25 N	92 W	20	NWNW	Monitoring	7/3/2008	Complete	NWNW20PW	LCS	495	185
Well	P187646.0W	Ur-Energy USA Inc.	25 N	92 W	18	SESW	Monitoring	7/3/2008	Complete	SESW18M	LCS	459	183
Well	P187656.0W	Ur-Energy USA Inc.	25 N	92 W	19	NENW	Monitoring	7/3/2008	Complete	NENW19M	LCS	472	188
Well	P187647.0W	Ur-Energy USA Inc.	25 N	92 W	18	SWSE	Monitoring	7/3/2008	Complete	SWSE18M	LCS	459	185
Well	P187657.0W	Ur-Energy USA Inc.	25 N	92 W	19	NWNE	Monitoring	7/3/2008	Complete	NWNE19MU	LCS	539	195
Well	P187648.0W	Ur-Energy USA Inc.	25 N	92 W	18	SESE	Monitoring	7/3/2008	Complete	SESE18M	LCS	451	183
Well	P187658.0W	Ur-Energy USA Inc.	25 N	92 W	19	NWNE	Monitoring	7/3/2008	Complete	NWNE19MO	LCS	342	165
Well	P187649.0W	Ur-Energy USA Inc.	25 N	92 W	17	SWSW	Monitoring	7/3/2008	Complete	SWSW17M	LCS	428	177

Table 2.7-13 LC ISR, LLC Affiliates Groundwater Use Permits - Wyoming State Engineer Records March 2013 (Page 6 of 7)

Well or Use Point[1]	Permit Number	Applicant[2]	Township	Range	Section	¼ of the ¼	Uses	Priority	Status	Permit Facility Name	Yield[3]	Well Depth (ft)	Static Well Depth (ft)
Well	P187659.0W	Ur-Energy USA Inc.	25 N	92 W	19	NWNE	Monitoring	7/3/2008	Complete	NWNE19MP	LCS	438	180
Well	P189072.0W	Lost Creek ISR LLC	25 N	93 W	25	SWSW	Monitoring	10/9/2008	Complete	Deep Well No. 1	LCS	9933	5270
Well	P186531.0W	Lost Creek ISR LLC	25 N	92 W	17	NWSE	Miscellaneous	4/8/2008	Complete	ENL. LC 32W	LCS	LCS	LCS
Well	P187650.0W	Ur-Energy USA Inc.	25 N	92 W	17	SESW	Monitoring	7/3/2008	Complete	SESW17M	LCS	436	173
Well	P187660.0W	Ur-Energy USA Inc.	25 N	92 W	20	NENW	Monitoring	7/3/2008	Complete	NENW20MU	LCS	541	188
Well	P186532.0W	Lost Creek ISR LLC	25 N	92 W	20	NENE	Miscellaneous	4/8/2008	Complete	ENL. LC 33W	LCS	LCS	LCS
Well	P187651.0W	Ur-Energy USA Inc.	25 N	92 W	20	NENW	Monitoring	7/3/2008	Complete	NENW20M	LCS	442	177
Well	P187661.0W	Ur-Energy USA Inc.	25 N	92 W	20	NENW	Monitoring	7/3/2008	Complete	NENW20MO	LCS	340	159
Well	P186493.0W	Lost Creek ISR LLC	25 N	93 W	24	NENW	Miscellaneous	3/19/2008	Cancelled	ENL. LCIW	LCS	LCS	LCS
Well	P187652.0W	Ur-Energy USA Inc.	25 N	92 W	20	NWNW	Monitoring	7/3/2008	Complete	NWNW20M	LCS	436	174
Well	P187662.0W	Ur-Energy USA Inc.	25 N	92 W	20	NENW	Monitoring	7/3/2008	Complete	NENW20MP	LCS	439	172
Well	P186653.0W	Ur-Energy USA Inc.	25 N	92 W	19	NENE	Monitoring	7/3/2008	Complete	NENE19M	LCS	424	177
Well	P187663.0W	Ur-Energy USA Inc.	25 N	92 W	18	SESE	Monitoring	7/3/2008	Complete	SESE18PW	LCS	467	171
Well	P187662.0W	Lost Creek ISR LLC	25 N	92 W	20	NENW	Monitoring	07/03/2008	Complete	NENW20MP	0	439	172
Well	P187661.0W	Lost Creek ISR LLC	25 N	92 W	20	NENW	Monitoring	07/03/2008	Complete	NENW20MO	0	340	159
Well	P187660.0W	Lost Creek ISR LLC	25 N	92 W	20	NENW	Monitoring	07/03/2008	Complete	NENW20MU	0	541	188
Well	P187659.0W	Lost Creek ISR LLC	25 N	92 W	19	NWNE	Monitoring	07/03/2008	Complete	NWNE19MP	0	438	180
Well	P187658.0W	Lost Creek ISR LLC	25 N	92 W	19	NWNE	Monitoring	07/03/2008	Complete	NWNE19MO	0	342	165
Well	P187657.0W	Lost Creek ISR LLC	25 N	92 W	19	NWNE	Monitoring	07/03/2008	Complete	NWNE19MU	0	539	195
Well	P187656.0W	Lost Creek ISR LLC	25 N	92 W	19	NENW	Monitoring	07/03/2008	Complete	NENW19M	0	472	188
Well	P187655.0W	Lost Creek ISR LLC	25 N	92 W	19	SWNE	Monitoring	07/03/2008	Complete	SWNE19M	0	488	180
Well	P187654.0W	Lost Creek ISR LLC	25 N	92 W	19	NWNE	Monitoring	07/03/2008	Complete	NWNE19M	0	460	170
Well	P187653.0W	Lost Creek ISR LLC	25 N	92 W	19	NENE	Monitoring	07/03/2008	Complete	NENE19M	0	424	177
Well	P187652.0W	Lost Creek ISR LLC	25 N	92 W	20	NWNW	Monitoring	07/03/2008	Complete	NWNW20M	0	436	174
Well	P187651.0W	Lost Creek ISR LLC	25 N	92 W	20	NENW	Monitoring	07/03/2008	Complete	NENW20M	0	442	177
Well	P187650.0W	Lost Creek ISR LLC	25 N	92 W	17	SESW	Monitoring	07/03/2008	Complete	SESW17M	0	436	173
Well	P187649.0W	Lost Creek ISR LLC	25 N	92 W	17	SWSW	Monitoring	07/03/2008	Complete	SWSW17M	0	428	177
Well	P187648.0W	Lost Creek ISR LLC	25 N	92 W	18	SESE	Monitoring	07/03/2008	Complete	SESE18M	0	451	183
Well	P187647.0W	Lost Creek ISR LLC	25 N	92 W	18	SWSE	Monitoring	07/03/2008	Complete	SWSE18M	0	459	185
Well	P187646.0W	Lost Creek ISR LLC	25 N	92 W	18	SESW	Monitoring	07/03/2008	Complete	SESW18M	0	459	183
Well	P190176.0W	Lost Creek ISR LLC	25 N	92 W	20	NWNE	Monitoring	04/20/2009	Complete	NWNE20	0	438	174.7
Reservoir	P13595.0R	Lost Creek ISR LLC	25 N	92 W	18	NWSE	IND_SW	02/17/2010	Incomplete	PONDS 1 AND 2	LCS	LCS	LCS
Well	P198897.0W	Lost Creek ISR LLC	25 N	92 W	19	NWNE	IND_GW; MIS	07/06/2012	Incomplete	NWNE19P (UP TO 280 WELLS)	14000	LCS	LCS
Well	P198898.0W	Lost Creek ISR LLC	25 N	92 W	19	NENE	IND_GW; MIS	07/06/2012	Incomplete	NENE19P (UP TO 190 WELLS)	9500	LCS	LCS

Table 2.7-13 LC ISR, LLC Affiliates Groundwater Use Permits - Wyoming State Engineer Records March 2013 (Page 7 of 7)

Well or Use Point[1]	Permit Number	Applicant[2]	Township	Range	Section	¼ of the ¼	Uses	Priority	Status	Permit Facility Name	Yield[3]	Well Depth (ft)	Static Well Depth (ft)
Well	P198899.0W	Lost Creek ISR LLC	25 N	92 W	18	SWSE	IND_GW; MIS	07/06/2012	Incomplete	SWSE18P (UP TO 10 WELLS)	500	LCS	LCS
Well	P198900.0W	Lost Creek ISR LLC	25 N	92 W	18	SESE	IND_GW; MIS	07/06/2012	Incomplete	SESE18P (UP TO 100 WELLS)	5000	LCS	LCS
Well	P198901.0W	Lost Creek ISR LLC	25 N	92 W	20	NWNW	IND_GW; MIS	07/06/2012	Incomplete	NWNW20P (UP TO 170 WELLS)	8500	LCS	LCS
Well	P198902.0W	Lost Creek ISR LLC	25 N	92 W	20	NENW	IND_GW; MIS	07/06/2012	Incomplete	NENW20P (UP TO 140 WELLS)	7000	LCS	LCS
Well	P198903.0W	Lost Creek ISR LLC	25 N	92 W	17	SWSW	IND_GW; MIS	07/06/2012	Incomplete	SWSW17P (UP TO 50 WELLS)	2500	LCS	LCS
Well	P198926.0W	Lost Creek ISR LLC	25 N	92 W	18	SWSE	Miscellaneous	08/22/2012	Incomplete	LC1007W	50	LCS	LCS
Well	P198928.0W	Lost Creek ISR LLC	25 N	93 W	13	SWSW	Miscellaneous	09/06/2012	Incomplete	LC1008W	50	LCS	LCS

[1] Each number represents a well. A number followed by a letter(s) is a point of use related to the well.

[2] WSBLC = Wyoming State Board of Land Commissioners.

[3] LCS = Part of the on-going Lost Creek Project study. Information will be provided when it becomes available.

*HJMV-102 is incorrect well name; should be HJMU-102

*UKMP-103 is incorrect well name; should be UKMO-103

Table 2.7-14 Analytical Results of Baseline Monitoring (Page 1 of 4)

Major Cations and Anions												
Well ID	Completion Zone	Sample Date	Na (mg/L)	K (mg/L)	Ca (mg/L)	Mg (mg/L)	Cl (mg/L)	HCO_3 (mg/L)	CO_3 (mg/L)	SO_4 (mg/L)	SiO_2 (mg/L)	NO_3+NO_2 (mg/L)
LC17M	UKM	9/12/06	27.0	4.0	55.0	2.0	4.0	107.0	4.0	107.0	15.2	ND
LC17M	UKM	11/26/06	27.0	2.0	55.0	2.0	5.0	120.0	ND	94.0	15.1	ND
LC17M	UKM	3/1/07	29.0	2.0	62.0	3.0	5.0	124.0	ND	105.0	16.8	ND
LC17M	UKM	5/4/07	27.0	2.0	61.0	3.0	4.0	142.0	ND	108.0	15.9	ND
LC20M	UKM	9/21/06	32.0	3.0	56.0	2.0	6.0	113.0	2.0	102.0	17.2	ND
LC20M	UKM	11/22/06	32.0	5.0	38.0	ND	6.0	63.0	3.0	80.0	12.7	ND
LC20M	UKM	3/1/07	36.0	11.0	15.0	ND	5.0	39.0	ND	95.0	14.6	ND
LC20M	UKM	5/4/07	35.0	11.0	12.0	ND	6.0	34.0	2.0	91.0	14.1	ND
LC23M	UKM	9/21/06	44.0	8.0	58.0	ND	5.0	83.0	6.0	165.0	13.9	ND
LC23M	UKM	11/26/06	41.0	7.0	50.0	2.0	3.0	85.0	ND	150.0	14.1	ND
LC23M	UKM	3/1/07	64.0	48.0	52.0	ND	15.0	7.0	137.0	146.0	10.7	ND
LC23M	UKM	5/3/07	63.0	52.0	86.0	ND	5.0	4.0	66.0	126.0	9.4	ND
LC24M	UKM	9/21/06	32.0	3.0	68.0	4.0	5.0	109.0	ND	138.0	16.1	ND
LC24M	UKM	11/26/06	29.0	2.0	66.0	3.0	4.0	126.0	2.0	121.0	14.7	ND
LC24M	UKM	3/1/07	31.0	7.0	43.0	3.0	5.0	73.0	ND	126.0	14.8	ND
LC24M	UKM	5/4/07	31.0	7.0	48.0	3.0	5.0	85.0	ND	126.0	14.6	ND
LC27M	UKM	9/26/06	19.5	4.1	29.5	0.6	4.0	93.0	1.0	29.0	15.3	ND
LC27M	UKM	11/16/06	21.0	4.0	27.0	ND	6.0	82.0	2.0	29.0	15.5	ND
LC27M	UKM	3/1/07	21.0	5.0	11.0	ND	4.0	38.0	ND	39.0	16.4	ND
LC27M	UKM	5/3/07	22.0	5.0	7.0	ND	4.0	33.0	5.0	32.0	17.8	ND
LC28M	UKM	9/21/06	27.0	3.0	60.0	3.0	6.0	125.0	ND	101.0	16.1	ND
LC28M	UKM	11/26/06	24.0	2.0	58.0	3.0	4.0	127.0	ND	88.0	15.7	ND
LC28M	UKM	2/28/07	25.0	2.0	59.0	3.0	6.0	127.0	ND	95.0	16.9	ND
LC28M	UKM	5/3/07	25.0	2.0	62.0	3.0	6.0	130.0	ND	96.0	15.0	ND
MB-4	UKM	8/31/09	32.0	8.0	32.0	ND	10.0	ND	23.0	61.0	19.5	0.5
MB-4	UKM	12/14/09	33.0	8.0	19.0	ND	32.0	15.0	10.0	66.0	14.0	0.7
MB-4	UKM	3/30/10	32.0	5.0	21.0	ND	7.0	23.0	16.0	73.0	17.4	0.9
MB-4	UKM	7/7/10	29.0	3.0	19.0	ND	6.0	35.0	10.0	72.0	16.0	ND

ND - Concentration was below the laboratory detection limit.

Blank - Sample not analyzed for this parameter.

Blank and duplicate samples were ommitted from this table.

WQD and EPA criteria listed in Table 2.7-16.

Highlight for concentration exceeding WQD criteria is based on the lowest criteria exceeded. If EPA concentration also exceeded, both highlight and pattern are shown. Pattern for concentration exceeding EPA criteria is based on lowest criteria exceeded. For pH, narrowest range is used.

Bold	Concentration exceeds WQD Domestic Class-of-Use (Class I).
Bold	Concentration exceeds WQD Agricuture Class-of-Use (Class II).
Bold	Concentration exceeds WQD Livestock Class-of-Use (Class III).
Bold	Concentration exceeds EPA criteria.

Table 2.7-14 Analytical Results of Baseline Monitoring (Page 2 of 4)

			General Water Quality				Radionuclides					
Well ID	Completion Zone	Sample Date	TDS (mg/L)	Specific Conductivity	Lab pH (SU)	Alkalinity (mg/L)	Gross Alpha (pCi/L)	Gross Beta (pCi/L)	Ra-226 (pCi/L)	Ra-228 (pCi/L)	Ra-226 + Ra-228 (pCi/L)	Uranium (mg/L)
LC17M	UKM	9/12/06	262.0				**28.4**	13.7	10.6	1.1	**11.7**	0.0135
LC17M	UKM	11/26/06	262.0	436.0	8.02	98.0	**29.0**	15.5	8.8	12.9	**21.7**	0.010
LC17M	UKM	3/1/07	284.0	433.0	7.88		**26.8**	11.5	5.5	ND	**5.5**	0.011
LC17M	UKM	5/4/07	291.0	467.0	8.11		**17.3**	9.1	7.2	1.5	**8.7**	0.009
LC20M	UKM	9/21/06	274.0	388.0	**8.56**	96.0	**44.4**	24.0	9.6	3.9	**13.5**	**0.036**
LC20M	UKM	11/22/06	216.0	362.0	**8.91**	56.0	**38.7**	19.5	9.3	3.4	**12.7**	0.025
LC20M	UKM	3/1/07	197.0	305.0	7.66		**65.3**	23.9	47.8	ND	**47.8**	0.024
LC20M	UKM	5/4/07	188.0	322.0	**9.04**		**31.9**	23.6	9.2	2.6	**11.8**	0.025
LC23M	UKM	9/21/06	341.0	451.0	**8.87**	76.0	**32.8**	17.5	3.3	ND	3.3	0.023
LC23M	UKM	11/26/06	303.0	498.0	7.97	70.0	**35.0**	14.9	4.7	6.7	**11.4**	0.019
LC23M	UKM	3/1/07	452.0	1180.0	**11.60**		5.3	34.8	1.9	1.0	2.9	0.002
LC23M	UKM	5/3/07	**526.0**	1720.0	**11.60**		**15.1**	44.7	4.7	1.5	**6.2**	0.002
LC24M	UKM	9/21/06	321.0	455.0	8.30	91.0	**107.0**	43.2	6.5	1.5	**8.0**	**0.134**
LC24M	UKM	11/26/06	302.0	500.0	8.33	105.0	**86.8**	27.6	5.9	5.8	**11.7**	**0.100**
LC24M	UKM	3/1/07	266.0	410.0	7.99		**48.6**	22.6	1.8	2.0	3.8	**0.062**
LC24M	UKM	5/4/07	277.0	452.0	8.08		**49.1**	23.8	8.9	1.5	**10.4**	**0.052**
LC27M	UKM	9/26/06	136.0				10.7	9.7	1.1	0.4	1.5	0.0026
LC27M	UKM	11/16/06	145.0	243.0	**8.66**		6.8	9.4	1.1	3.6	4.7	0.002
LC27M	UKM	3/1/07	117.0	171.0	**8.74**		**77.7**	4.1	26.6	ND	**26.6**	0.001
LC27M	UKM	5/3/07	111.0	178.0	**9.51**		2.9	3.9	0.4	ND	0.4	0.002
LC28M	UKM	9/21/06	276.0	394.0	8.14	103.0	**30.7**	19.4	8.1	3.4	**11.5**	0.017
LC28M	UKM	11/26/06	259.0	435.0	8.00	104.0	**18.1**	14.4	8.4	4.2	**12.6**	0.006
LC28M	UKM	2/28/07	269.0	400.0	8.15		**27.0**	13.0	7.7	2.1	**9.8**	0.007
LC28M	UKM	5/3/07	273.0	440.0	8.01		**19.4**	11.2	7.1	3.7	**10.8**	0.023
MB-4	UKM	8/31/09	209.0	474.0	**11.10**		**49.8**	22.4	0.5	1.7	2.2	0.017
MB-4	UKM	12/14/09	183.0	329.0	**9.65**		**59.2**	23.0	0.9	1.2	2.1	**0.065**
MB-4	UKM	3/30/10	198.0	285.0	**9.91**	45.0	**58.6**	13.2	ND	ND	ND	**0.037**
MB-4	UKM	7/7/10	182.0	259.0	**9.36**	45.0	**70.5**	20.5	0.2	0.3	0.5	**0.044**

Table 2.7-14 Analytical Results of Baseline Monitoring (Page 3 of 4)

Trace Parameters (Dissolved unless otherwise noted.)											
Well ID	Completion Zone	Sample Date	Al (mg/L)	NH_3-N (mg/L)	As (mg/L)	Ba (mg/L)	B (mg/L)	Cd (mg/L)	Cr (mg/L)	Cu (mg/L)	F (mg/L)
LC17M	UKM	9/12/06	ND	ND	0.006	ND	ND	ND	ND	ND	0.20
LC17M	UKM	11/26/06	ND	ND	0.003	ND	ND	ND	ND	ND	0.20
LC17M	UKM	3/1/07	ND	0.06	0.002	ND	ND	ND	ND	ND	0.20
LC17M	UKM	5/4/07	ND	ND	0.002	ND	ND	ND	ND	ND	0.20
LC20M	UKM	9/21/06	ND	ND	**0.012**	ND	ND	ND	ND	ND	ND
LC20M	UKM	11/22/06	ND	ND	**0.012**	ND	ND	ND	ND	ND	0.20
LC20M	UKM	3/1/07	ND	ND	**0.012**	ND	ND	ND	ND	ND	0.20
LC20M	UKM	5/4/07	ND	ND	**0.011**	ND	ND	ND	ND	ND	0.20
LC23M	UKM	9/21/06	ND	ND	0.009	ND	ND	ND	ND	ND	ND
LC23M	UKM	11/26/06	ND	ND	0.004	ND	ND	ND	ND	ND	0.20
LC23M	UKM	3/1/07	ND	**0.86**	0.003	0.30	ND	ND	ND	ND	0.40
LC23M	UKM	5/3/07	**0.20**	**0.75**	0.002	0.30	ND	ND	ND	ND	0.20
LC24M	UKM	9/21/06	ND	0.13	0.003	ND	ND	ND	ND	ND	ND
LC24M	UKM	11/26/06	ND	0.08	ND	ND	ND	ND	ND	ND	0.20
LC24M	UKM	3/1/07	ND	0.08	ND	ND	ND	ND	ND	ND	ND
LC24M	UKM	5/4/07	ND	ND	ND	ND	ND	ND	ND	ND	0.20
LC27M	UKM	9/26/06	ND	ND	0.009	ND	ND	ND	ND	ND	0.20
LC27M	UKM	11/16/06	ND	ND	0.006	ND	ND	ND	ND	ND	0.30
LC27M	UKM	3/1/07	ND	ND	0.007	ND	ND	ND	ND	ND	0.30
LC27M	UKM	5/3/07	ND	ND	0.005	ND	ND	ND	ND	ND	0.30
LC28M	UKM	9/21/06	ND	ND	0.005	ND	ND	ND	ND	ND	ND
LC28M	UKM	11/26/06	ND	ND	ND	ND	ND	ND	ND	ND	0.20
LC28M	UKM	2/28/07	ND	ND	ND	ND	ND	ND	ND	ND	0.20
LC28M	UKM	5/3/07	ND	ND	ND	ND	ND	ND	ND	ND	0.20
MB-4	UKM	8/31/09	**0.30**	0.07	0.00	ND	ND	ND	ND	ND	ND
MB-4	UKM	12/14/09	ND	ND	0.01	ND	ND	ND	ND	ND	0.30
MB-4	UKM	3/30/10	ND	ND	0.01	ND	ND	ND	ND	ND	ND
MB-4	UKM	7/7/10	ND	ND	0.01	ND	ND	ND	ND	ND	ND

Table 2.7-14 Analytical Results of Baseline Monitoring (Page 4 of 4)

Trace Parameters (Dissolved unless otherwise noted.)													
Well ID	Completion Zone	Sample Date	Fe (mg/L)		Hg (mg/L)	Mn (mg/L)		Mo (mg/L)	Ni (mg/L)	Pb (mg/L)	Se (mg/L)	V (mg/L)	Zn (mg/L)
			Dissolved	Total		Dissolved	Total						
LC17M	UKM	9/12/06	0.03	0.03	ND	ND	ND	ND	ND	ND	ND	ND	ND
LC17M	UKM	11/26/06	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
LC17M	UKM	3/1/07	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
LC17M	UKM	5/4/07	0.05	0.05	ND	ND	0.01	ND	ND	ND	ND	ND	ND
LC20M	UKM	9/21/06	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
LC20M	UKM	11/22/06	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
LC20M	UKM	3/1/07	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
LC20M	UKM	5/4/07	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
LC23M	UKM	9/21/06	ND	ND	ND	ND	ND	ND	ND	ND	0.002	ND	ND
LC23M	UKM	11/26/06	ND	ND	ND	ND	ND	ND	ND	ND	0.002	ND	ND
LC23M	UKM	3/1/07	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
LC23M	UKM	5/3/07	ND	ND	ND	ND	ND	ND	ND	0.002	0.005	ND	ND
LC24M	UKM	9/21/06	**0.32**	**0.32**	ND	ND	ND	ND	ND	ND	0.002	ND	ND
LC24M	UKM	11/26/06	0.16	0.16	ND	ND	ND	ND	ND	ND	0.002	ND	ND
LC24M	UKM	3/1/07	0.06	0.06	ND	ND	ND	ND	ND	ND	ND	ND	ND
LC24M	UKM	5/4/07	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
LC27M	UKM	9/26/06	0.15	0.15	ND	ND	ND	ND	ND	ND	ND	ND	ND
LC27M	UKM	11/16/06	0.08	0.08	ND	ND	ND	ND	ND	ND	ND	ND	ND
LC27M	UKM	3/1/07	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
LC27M	UKM	5/3/07	0.04	0.04	ND	ND	ND	ND	ND	ND	ND	ND	ND
LC28M	UKM	9/21/06	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
LC28M	UKM	11/26/06	0.04	0.04	ND	ND	ND	ND	ND	ND	ND	ND	ND
LC28M	UKM	2/28/07	ND	ND	ND	ND	0.01	ND	ND	ND	ND	ND	ND
LC28M	UKM	5/3/07	0.05	0.05	ND	ND	0.01	ND	ND	ND	0.002	ND	ND
MB-4	UKM	8/31/09	0.30	ND	ND	ND	ND	ND	ND	ND	0.016	ND	ND
MB-4	UKM	12/14/09	ND	ND	ND	ND	ND	ND	ND	ND	0.014	ND	ND
MB-4	UKM	3/30/10	ND	0.12	ND	ND	ND	ND	ND	ND	0.015	ND	ND
MB-4	UKM	7/7/10	ND	ND	ND	ND	ND	ND	ND	ND	0.02	ND	ND

Table 2.7-15 L, M, and N Horizon Background Water Quality Results (Page 1 of 8)

Major Cations and Anions												
Well ID	Completion Zone	Sample Date	Na (mg/L)	K (mg/L)	Ca (mg/L)	Mg (mg/L)	Cl (mg/L)	HCO_3 (mg/L)	CO_3 (mg/L)	SO_4 (mg/L)	SiO_2 (mg/L)	NO_3+NO_2 (mg/L)
KMU-1	L	8/26/2009	25	6	38	1	5	95	<5	75		
KMU-1	L	1/4/2010	25	5	41	1	5	117	<5	74	18.2	
KMU-1	L	3/29/2010	26	3	48	2	5	132	<5	74	18	
KMU-1	L	7/7/2010	25	3	51	2	5	134	<5	84	18.6	
KMU-2	L	8/26/2009	25	6	30	<1	8	32	<5	96		
KMU-2	L	1/4/2010	24	3	48	2	5	93	<5	99	17.1	
KMU-2	L	3/29/2010	26	2	56	2	5	132	<5	95	19	
KMU-2	L	7/7/2010	27	2	60	2	5	141	<5	108	19	
KMU-3	L	8/27/2009	35	4	17	<1	6	35	7	69	15.8	<0.01
KMU-3	L	12/15/2009	35	4	18	<1	6	42	12	74	15.3	
KMU-3	L	3/29/2010	37	3	23	<1	5	67	8	68	15.9	
KMU-3	L	7/7/2010	36	3	32	<1	5	83	<5	77	16.4	
KMU-4	L	8/27/2009	28	5	38	<1	6	95	8	72	17.4	
KMU-4	L	1/4/2010	27	4	38	1	5	95	7	73	17.1	
KMU-4	L	3/29/2010	29	3	42	1	5	122	<5	77	17.2	
KMU-4	L	7/7/2010	28	3	45	1	5	128	<5	79	18.5	
MB-11	L	8/27/2009	30	5	34	<1	6	81	<5	62	15.9	<0.1
MB-11	L	12/15/2009	28	4	35	<1	6	97	8	66	<0.1	
MB-11	L	3/30/2010	28	2	41	1	5	135	<5	66	18.6	<0.1
MB-11	L	7/6/2010	28	2	39	1	5	126	<5	67	18	<0.1
MB-12A	L	8/27/2009	45	7	35	<1	9	67	<5	101	13.8	<0.1
MB-12A	L	12/14/2009	43	5	33	<1	6	80	9	109	<0.1	
MB-12A	L	3/30/2010	25	5	49	2	6	89	9	107	18.7	<0.1
MB-12A	L	7/7/2010	45	7	44	<1	9	<5	29	69	11.9	<0.1
MB-13	L	8/27/2009	21	2	52	2	5	157	<5	66	<0.01	
MB-13	L	12/14/2009	39	2	38	1	4	88	<5	111	<0.1	
MB-13	L	7/7/2010	40	2	37	1	4	97	<5	111	17	<0.1
MB-13	L	2/8/2012	43	2	38	2	4	91	<5	109	15.7	<0.1
MB-14	L	8/31/2009	36	3	22	1	6	23	5	105	<0.01	
MB-14	L	12/15/2009	38	3	34	2	5	61	5	121	<0.1	
MB-14	L	3/31/2010	42	3	42	2	5	87	<5	120		<0.1
MB-14	L	7/6/2010	41	2	44	2	5	92	<5	123	15.6	<0.1
M-L2	L	3/31/2010	27	3	48	1	6	142	<5	80	--	<0.1

Table 2.7-15 L, M, and N Horizon Background Water Quality Results (Page 2 of 8)

			General Water Quality				Radionuclides					
Well ID	Completion Zone	Sample Date	TDS (mg/L)	Specific Conductivity	Lab pH (SU)	Alkalinity (mg/L)	Gross Alpha (pCi/L)	Gross Beta (pCi/L)	Ra-226 (pCi/L)	Ra-228 (pCi/L)	Ra-226 + Ra-228 (pCi/L)	Uranium (mg/L)
KMU-1	L	8/26/09	217	340	**8.7**	--	**18.8**	13.9	3.7	3.7	**7.4**	0.0063
KMU-1	L	1/4/2010	216	352	8.25	96	**21.2**	15.1		6.7	**6.7**	0.0093
KMU-1	L	3/29/10	273	376	8.27	111	**18.8**	12.4		4.4	4.4	0.0071
KMU-1	L	7/7/10	272	381	7.80	110	**19**	12.5		4.6	4.6	0.0064
KMU-2	L	8/26/09	205	310	**9.1**		**18.3**	12.1	3.2	2.7	**5.9**	0.0042
KMU-2	L	1/4/2010	258	375	8.31	81	**30.2**	18.3		5.8	**5.8**	0.0050
KMU-2	L	3/29/10	310	428	8.01	108	**21.3**	11.5		5.7	**5.7**	0.0064
KMU-2	L	7/7/10	293	435	7.50	115	**30.2**	19.1		8.6	**8.6**	0.0043
KMU-3	L	8/27/09	191	268	**9.34**	--	8.0	6.5	3.3	3.6	**6.9**	0.0006
KMU-3	L	12/15/09	183	280	**9.5**		9.0	8.0	2.6	3.4	**6.0**	0.0006
KMU-3	L	3/29/10	220	309	**9.24**	69	9.3	8.9		3.8	3.8	0.0006
KMU-3	L	7/7/10	210	333	**8.95**	73	8.9	11		4.9	4.9	0.0007
KMU-4	L	8/27/09	245	347	**8.91**		**48.0**	31.1	6.3	4.8	**11.1**	0.0045
KMU-4	L	1/4/2010	222	343	**8.81**	89	**51.5**	31.2		4.9	4.9	0.0049
KMU-4	L	3/29/10	249	357	8.42	100	**20.7**	11.4		4.7	4.7	0.0048
KMU-4	L	7/7/10	241	365	8.09	105	**35.1**	24.9		5.8	**5.8**	0.0056
MB-11	L	8/27/2009	194	303	**8.95**		**18.6**	10.7	4.6	4.3	**8.9**	0.0037
MB-11	L	12/15/2009	315	326	**8.86**		**33.7**	25.4	3.4	3.3	**6.7**	0.0038
MB-11	L	3/30/2010	221	338	8.04	110	**24.5**	9.7	3.3	4.7	**8.0**	0.0027
MB-11	L	7/6/2010	232	340	7.67	103	9.2	5.2	2.7	2.5	**5.2**	0.0024
MB-12A	L	8/27/2009	243	382	**8.97**		**77.8**	24.2	1.7	2.5	4.2	**0.0436**
MB-12A	L	12/14/2009	239	398	**9.07**		**79.5**	25.4	1.2	1.8	3.0	**0.0508**
MB-12A	L	3/30/2010	291	400	**9.12**	87	**78.7**	11.5	0.94	1.8	2.7	0.0032
MB-12A	L	7/7/2010	443	796	**11**	101	14.6	11.5	1.3	1.4	2.7	0.0033
MB-13	L	8/27/2009	239	363	8.00		**22.2**	11.7	5.6	3.3	**8.9**	0.0067
MB-13	L	12/14/2009	255	395	**8.61**		13.5	12.0	3.3	4.2	**7.5**	0.0007
MB-13	L	7/7/2010	290	389	7.98	81	11.2	10.5	3.0	2.8	**5.8**	0.0008
MB-13	L	2/8/2012	245	377	7.83	75	14.2	10.3	2.8	4.1	**6.9**	0.0005
MB-14	L	8/31/2009	246	332	**9.38**		**20.9**	12.6	1.6	2.0	3.6	0.0043
MB-14	L	12/15/2009	292	380	**8.85**		**19.9**	8.9	1.4	2.7	4.1	0.0062
MB-14	L	3/31/2010	292	410	**8.9**	79	**20.4**	7.5	1.5	1.7	3.2	0.0091
MB-14	L	7/6/2010	298	419	**8.53**	75	**34.6**	9.8	2.0	1.8	3.8	0.0097
M-L2	L	3/31/2010	262	380	8.40	119	**19.8**	12.2	6.2	6.0	**12.2**	0.0033

Table 2.7-15 L, M, and N Horizon Background Water Quality Results (Page 3 of 8)

Trace Parameters (Dissolved unless otherwise noted.)											
Well ID	Completion Zone	Sample Date	Al (mg/L)	NH_3-N (mg/L)	As (mg/L)	Ba (mg/L)	B (mg/L)	Cd (mg/L)	Cr (mg/L)	Cu (mg/L)	F (mg/L)
KMU-1	L	8/26/09	<0.1	0.18	<0.001	<0.1	<0.1	<0.005	<0.05	<0.01	0.2
KMU-1	L	1/4/2010	<0.1	<0.05	<0.001			<0.005		<0.01	0.1
KMU-1	L	3/29/10	<0.1	<0.05	<0.001	<0.1		<0.005	<0.05	<0.01	0.2
KMU-1	L	7/7/10	<0.1	<0.05	<0.001	<0.1		<0.005	<0.05	<0.01	0.2
KMU-2	L	8/26/09	<0.1	0.05	0.002	<0.1	<0.1	<0.005	<0.05	<0.01	0.2
KMU-2	L	1/4/2010	<0.1	<0.05	<0.001	<0.1		<0.005	<0.05	<0.01	0.1
KMU-2	L	3/29/10	<0.1	<0.05	<0.001	<0.1		<0.005	<0.05	<0.01	0.1
KMU-2	L	7/7/10	<0.1	<0.05	<0.001	<0.1		<0.005	<0.05	<0.01	0.2
KMU-3	L	8/27/09	<0.1	0.36	0.002	<0.1	<0.1	<0.005	<0.05	<0.01	0.1
KMU-3	L	12/15/09	**0.2**	<0.05	0.002	<0.1	<0.1	<0.005	<0.05	<0.01	0.1
KMU-3	L	3/29/10	**0.1**	<0.05	0.002	<0.1		<0.005	<0.05	<0.01	0.1
KMU-3	L	7/7/10	<0.1	<0.05	0.002	<0.1		<0.005	<0.05	<0.01	0.1
KMU-4	L	8/27/09	<0.1	0.17	0.001	<0.1	<0.1	<0.005	<0.05	<0.01	0.2
KMU-4	L	1/4/2010	<0.1	<0.05	<0.001	<0.1		<0.005	<0.05	<0.01	0.1
KMU-4	L	3/29/10	<0.1	<0.05	<0.001	<0.1		<0.005	<0.05	<0.01	0.2
KMU-4	L	7/7/10	<0.1	0.05	<0.001						0.2
MB-11	L	8/27/2009	<0.1	0.11	0.002	<0.1	<0.1	<0.005	<0.05	<0.01	<0.1
MB-11	L	12/15/2009	**0.1**	<0.05	0.002	<0.1	<0.1	<0.005	<0.05	<0.01	0.1
MB-11	L	3/30/2010	<0.1	<0.05	0.002	<0.1	<0.1	<0.005	<0.05	<0.01	0.1
MB-11	L	7/6/2010	<0.1	<0.05	0.001	<0.1	<0.1	<0.005	<0.05	<0.01	0.1
MB-12A	L	8/27/2009	<0.1	0.25	0.002	<0.1	<0.1	<0.005	<0.05	<0.01	<0.1
MB-12A	L	12/14/2009		<0.05	0.002		<0.1	<0.005		<0.01	0.2
MB-12A	L	3/30/2010	<0.1	<0.05	0.004	<0.1	<0.1	<0.005	<0.05	<0.01	0.1
MB-12A	L	7/7/2010	**0.3**	<0.05	0.002		<0.1				0.2
MB-13	L	8/27/2009	<0.1	0.32	0.001	<0.1		<0.005	<0.05	<0.01	0.1
MB-13	L	12/14/2009	<0.1	<0.05	0.002		<0.1	<0.005		<0.01	0.1
MB-13	L	7/7/2010	<0.1	<0.05	0.001		<0.1				0.1
MB-13	L	2/8/2012	<0.1	<0.05	0.002	<0.1	<0.1	<0.005	<0.05	<0.01	0.1
MB-14	L	8/31/2009		0.06	0.008	<0.1		<0.005	<0.05	<0.01	0.1
MB-14	L	12/15/2009	**0.1**	<0.05	0.007	<0.1	<0.1	<0.005	<0.05	<0.01	0.1
MB-14	L	3/31/2010	<0.1	<0.05	0.007	<0.1		<0.005	<0.05	<0.01	0.1
MB-14	L	7/6/2010	<0.1	<0.05	0.006	<0.1	<0.1	<0.005	<0.05	<0.01	0.1
M-L2	L	3/31/2010	<0.1	<0.05	0.002	<0.1	<0.1	<0.005	<0.05	<0.01	0.2

Table 2.7-15 L, M, and N Horizon Background Water Quality Results (Page 4 of 8)

Trace Parameters (Dissolved unless otherwise noted.)													
Well ID	Completion Zone	Sample Date	Fe (mg/L)		Hg (mg/L)	Mn (mg/L)		Mo (mg/L)	Ni (mg/L)	Pb (mg/L)	Se (mg/L)	V (mg/L)	Zn (mg/L)
			Dissolved	Total		Dissolved	Total						
KMU-1	L	8/26/09	<0.03	0.04	<0.001	<0.01	<0.01	<0.1	<0.05	<0.001	<0.001	<0.1	0.01
KMU-1	L	1/4/2010	<0.03		<0.001					<0.001	<0.001	<0.1	<0.01
KMU-1	L	3/29/10	<0.03	0.07	<0.001	<0.01	<0.01	<0.1	<0.05	<0.001	<0.001	<0.1	<0.01
KMU-1	L	7/7/10	<0.03		<0.001	<0.01		<0.1	<0.05	<0.001	<0.001	<0.1	<0.01
KMU-2	L	8/26/09	<0.03	0.16	<0.001	<0.01	<0.01	<0.1	<0.05	<0.001	<0.001	<0.1	<0.01
KMU-2	L	1/4/2010	<0.03	0.07	<0.001	<0.01	<0.01	<0.1	<0.05	<0.001	<0.001	<0.1	0.01
KMU-2	L	3/29/10	<0.03	0.16	<0.001	0.01	0.01	<0.1	<0.05	<0.001	<0.001	<0.1	<0.01
KMU-2	L	7/7/10	<0.03		<0.001	0.01		<0.1	<0.05	<0.001	<0.001	<0.1	<0.01
KMU-3	L	8/27/09	<0.03	<0.03	<0.001	<0.01	<0.01	<0.1	<0.05	<0.001	<0.001	<0.1	<0.01
KMU-3	L	12/15/09	<0.03		<0.001	<0.01	<0.01	<0.1	<0.05	<0.001	<0.001	<0.1	<0.01
KMU-3	L	3/29/10	<0.03	<0.03	<0.001	<0.01	<0.01	<0.1	<0.05	<0.001	<0.001	<0.1	<0.01
KMU-3	L	7/7/10	<0.03		<0.001	<0.01		<0.1	<0.05	<0.001	<0.001	<0.1	<0.01
KMU-4	L	8/27/09	<0.03	0.12	<0.001	<0.01	<0.01	<0.1	<0.05	<0.001	<0.001	<0.1	<0.01
KMU-4	L	1/4/2010	<0.03	0.33	<0.001	<0.01	<0.01	<0.1	<0.05	<0.001	<0.001	<0.1	0.01
KMU-4	L	3/29/10	<0.03	0.44	<0.001	<0.01	<0.01	<0.1	<0.05	<0.001	<0.001	<0.1	<0.01
KMU-4	L	7/7/10	<0.03		<0.001					<0.001	<0.001		
MB-11	L	8/27/2009	0.2	<0.03	<0.001	<0.01	<0.01	<0.1	<0.05	<0.001	<0.001	<0.1	<0.01
MB-11	L	12/15/2009	<0.03	0.44	<0.001	<0.01	<0.01	<0.1	<0.05	0.002	<0.001	<0.1	<0.01
MB-11	L	3/30/2010	<0.03	0.03	<0.001	<0.01	<0.01	<0.1	<0.05	<0.001	<0.001	<0.1	<0.01
MB-11	L	7/6/2010	<0.03	0.34	<0.001	<0.01	<0.01	<0.1	<0.05	<0.001	<0.001	<0.1	<0.01
MB-12A	L	8/27/2009	0.1	<0.03	<0.001	<0.01	<0.01	<0.1	<0.05	<0.001	<0.001	<0.1	<0.01
MB-12A	L	12/14/2009			<0.001	<0.01				<0.001	<0.001	<0.1	
MB-12A	L	3/30/2010	<0.03	<0.03	<0.001	<0.01	<0.01	<0.1	<0.05	<0.001	<0.001	<0.1	<0.01
MB-12A	L	7/7/2010	<0.03	0.04	<0.001		<0.01			0.002	<0.001		
MB-13	L	8/27/2009	<0.03	0.03	<0.001	<0.01	<0.01	<0.1	<0.05	<0.001	<0.001	<0.1	0.01
MB-13	L	12/14/2009			<0.001	<0.01				<0.001	<0.001	<0.1	<0.01
MB-13	L	7/7/2010	<0.03	<0.03	<0.001		0.01			<0.001	<0.001		
MB-13	L	2/8/2012	<0.03	<0.03	<0.001	0.01	0.01	<0.1	<0.05	<0.001	<0.001	<0.1	<0.01
MB-14	L	8/31/2009	<0.03	<0.03	<0.001	<0.01	<0.01	<0.1	<0.05	<0.001	<0.001	<0.1	<0.01
MB-14	L	12/15/2009	<0.03		<0.001	<0.01	<0.01	<0.1	<0.05	<0.001	<0.001	<0.1	<0.01
MB-14	L	3/31/2010			<0.001	<0.01		<0.1	<0.05	<0.001	<0.001	<0.1	<0.01
MB-14	L	7/6/2010	<0.03	<0.03	<0.001	<0.01	<0.01	<0.1	<0.05	<0.001	<0.001	<0.1	<0.01
M-L2	L	3/31/2010	<0.03	<0.03	<0.001	<0.01	<0.01	<0.1	<0.05	<0.001	<0.001	<0.1	<0.01

Table 2.7-15 L, M, and N Horizon Background Water Quality Results (Page 5 of 8)

Major Cations and Anions												
Well ID	Completion Zone	Sample Date	Na (mg/L)	K (mg/L)	Ca (mg/L)	Mg (mg/L)	Cl (mg/L)	HCO_3 (mg/L)	CO_3 (mg/L)	SO_4 (mg/L)	SiO_2 (mg/L)	NO_3+NO_2 (mg/L)
LC229W	MN	6/10/2009	48	2	33	1	3	98	<1	119	13.1	<0.05
LC229W	MN	2/9/2012	51	2	39	1	3	99	<5	123	13.2	<0.1
LC606W	M	2/8/2012	60	<1	10	<1	3	109	<5	63	11.7	<0.1
M-M1	M	4/1/2010	31	7	36	<1	8	101	<5	68	16.0	<0.1
M-M2	M	4/1/2010	30	3	41	<1	5	134	<5	66	18.0	<0.1
M-M2	M	2/9/2012	31	3	46	2	7	120	<5	77	16.4	<0.1
M-M2	M	7/26/2012	28	3	45	1	8	122	<5	78	16.7	<0.1
M-M2	M	12/27/2012	30	2	49	2	7	123	<5	78	18.2	<0.1
M-M3	M	3/31/2010	29	3	49	1	7	131	<5	82	13.5	<0.1
BLM (4451)	N	8/27/2009	30	3	167	8	7	206	<5	**340**	--	<0.05
BLM (4451)	N	6/29/2010	31	3	170	8	7	200	<5	**353**	16.5	<0.1
BLM (4451)	N	7/25/2012	33	3	172	8	7	201	<5	**336**	16.5	<0.1
BLM (4451)	N	7/26/2012					5					
LC33W	N	2/9/2012	28	2	55	2	5	126	<5	94	16.3	<0.1
LC33W	N	7/26/2012					7					

Table 2.7-15 L, M, and N Horizon Background Water Quality Results (Page 6 of 8)

			General Water Quality				Radionuclides					
Well ID	Completion Zone	Sample Date	TDS (mg/L)	Specific Conductivity	Lab pH (SU)	Alkalinity (mg/L)	Gross Alpha (pCi/L)	Gross Beta (pCi/L)	Ra-226 (pCi/L)	Ra-228 (pCi/L)	Ra-226 + Ra-228 (pCi/L)	Uranium (mg/L)
LC229W	MN	6/10/2009	322	432	8.32	80	**37.0**	9.1	1.8	2.0	3.8	0.0138
LC229W	MN	2/9/2012	302	443	7.83	81	**34.5**	10.8	1.7	1.2	2.9	0.0186
LC606W	M	2/8/2012	191	269	8.40	89	5.1	3.3	0.7	0.8	1.5	0.0006
M-M1	M	4/1/2010	239	340	**9.02**	90	**108.0**	47.0	39.0	5.6	**44.4**	0.0179
M-M2	M	4/1/2010	200	342	**8.55**	110	**40.9**	20.9	4.2	5.3	**9.5**	0.0124
M-M2	M	2/9/2012	259	382	8.09	98	14.2	10.0	4.5	4.2	**8.9**	0.0019
M-M2	M	7/26/2012	245	369	8.11	<5	13.3	7.0	4.6	4.1	**8.7**	0.0017
M-M2	M	12/27/2012	271	380	8.13	101	**16.2**	10.9	5.1	4.0	**9.1**	0.0022
M-M3	M	3/31/2010	259	390	8.40	111	**47.2**	19.1	16.0	4.6	**20.6**	0.0089
BLM (4451)	N	8/27/2009	**698**	929	7.94	--	**1230**	313.0	11.0	8.0	**19.0**	**0.911**
BLM (4451)	N	6/29/2010	**694**	948	7.67	164	**1190**	249.0	7.9	5.4	**13.3**	**1.100**
BLM (4451)	N	7/25/2012	**709**	995	7.61	165	**816**	291.0	6.1	6.6	**12.7**	**1.030**
BLM (4451)	N	7/26/2012				133						
LC33W	N	2/9/2012	258	418	7.97	103	10.5	9.8	4.0	5.0	**9.0**	0.0014
LC33W	N	7/26/2012				113						

Table 2.7-15 L, M, and N Horizon Background Water Quality Results (Page 7 of 8)

Trace Parameters (Dissolved unless otherwise noted.)											
Well ID	Completion Zone	Sample Date	Al (mg/L)	NH_3-N (mg/L)	As (mg/L)	Ba (mg/L)	B (mg/L)	Cd (mg/L)	Cr (mg/L)	Cu (mg/L)	F (mg/L)
LC229W	MN	6/10/2009	<0.1	<0.05	<0.001	<0.1	<0.1	<0.005	<0.05	<0.01	0.1
LC229W	MN	2/9/2012	<0.1	<0.05	0.002	<0.1	<0.1	<0.005	<0.05	<0.01	0.2
LC606W	M	2/8/2012	<0.1	<0.05	0.002	<0.1	<0.1	<0.005	<0.05	<0.01	0.1
M-M1	M	4/1/2010	<0.1	<0.05	0.004	<0.1	<0.1	<0.005	<0.05	<0.01	0.2
M-M2	M	4/1/2010	<0.1	<0.05	0.002	<0.1	<0.1	<0.005	<0.05	<0.01	0.1
M-M2	M	2/9/2012	<0.1	<0.05	0.002	0.1	<0.1	<0.005	<0.05	<0.01	0.2
M-M2	M	7/26/2012	<0.1	<0.05	0.002	<0.1	<0.1	<0.005	<0.05	<0.01	0.1
M-M2	M	12/27/2012	<0.1	<0.05	0.001	<0.1	<0.1	<0.005	<0.05	<0.01	0.2
M-M3	M	3/31/2010	<0.1	0.07	0.002	<0.1	<0.1	<0.005	<0.05	<0.01	0.2
BLM (4451)	N	8/27/2009	<0.1	<0.05	<0.001	<0.1	<0.1	<0.005	<0.05	<0.01	0.1
BLM (4451)	N	6/29/2010	<0.1	<0.05	<0.001	<0.1	<0.1	<0.005	<0.05	<0.01	<0.1
BLM (4451)	N	7/25/2012	<0.1	<0.05	<0.001	<0.1	<0.1	<0.005	<0.05	<0.01	<0.1
BLM (4451)	N	7/26/2012				<0.1	<0.1				
LC33W	N	2/9/2012	<0.1	<0.05	0.001	<0.1	<0.1	<0.005	<0.05	<0.01	0.2
LC33W	N	7/26/2012									

Table 2.7-15 L, M, and N Horizon Background Water Quality Results (Page 8 of 8)

Trace Parameters (Dissolved unless otherwise noted.)														
Well ID	Completion Zone	Sample Date	Fe (mg/L)		Hg (mg/L)	Mn (mg/L)		Mo (mg/L)	Ni (mg/L)	Pb (mg/L)	Se (mg/L)	V (mg/L)	Zn (mg/L)
			Dissolved	Total		Dissolved	Total						
LC229W	MN	6/10/2009	<0.03	<0.03	<0.001	<0.01	<0.01	<0.1	<0.05	<0.001	<0.001	<0.1	<0.01
LC229W	MN	2/9/2012	<0.03	<0.03	<0.001	0.01	<0.01	<0.1	<0.05	<0.001	<0.001	<0.1	<0.01
LC606W	M	2/8/2012	<0.03	0.25	<0.001	<0.01	<0.01	<0.1	<0.05	<0.001	<0.001	<0.1	<0.01
M-M1	M	4/1/2010	<0.03	<0.03	<0.001	<0.01	<0.01	<0.1	<0.05	<0.001	<0.001	<0.1	<0.01
M-M2	M	4/1/2010	<0.03	0.10	<0.001	<0.01	<0.01	<0.1	<0.05	<0.001	<0.001	<0.1	<0.01
M-M2	M	2/9/2012	<0.03	0.28	<0.001	0.02	0.02	<0.1	<0.05	<0.001	<0.001	<0.1	<0.01
M-M2	M	7/26/2012	<0.03	0.23	<0.001	0.01	0.02	<0.1	<0.05	<0.001	<0.001	<0.1	<0.01
M-M2	M	12/27/2012	<0.03	0.26	<0.001	<0.01	0.02	<0.1	<0.05	<0.001	<0.001	<0.1	<0.01
M-M3	M	3/31/2010	<0.03	<0.03	<0.001	<0.01	<0.01	<0.1	<0.05	0.003	0.001	<0.1	<0.01
BLM (4451)	N	8/27/2009	<0.03	0.11	<0.001	0.02	0.02	<0.1	<0.05	<0.001	0.015	<0.1	0.02
BLM (4451)	N	6/29/2010	<0.03	0.11	<0.001	0.01	0.01	<0.1	<0.05	<0.001	0.025	<0.1	0.03
BLM (4451)	N	7/25/2012	<0.03	0.11	<0.001	0.01	0.01	<0.1	<0.05	<0.001	0.025	<0.1	0.01
BLM (4451)	N	7/26/2012	<0.03	0.08	<0.001	0.01	0.01	<0.1	<0.05	<0.001	0.038	<0.1	0.03
LC33W	N	2/9/2012	<0.03	0.19	<0.001	0.02	0.02	<0.1	<0.05	<0.001	<0.001	<0.1	0.25
LC33W	N	7/26/2012											

ND - Concentration was below the laboratory detection limit.
Blank - Sample not analyzed for this parameter.
WQD and EPA criteria listed in Table D6-15c.

Bold	Concentration exceeds WQD Domestic Class-of-Use (Class I).
Bold	Concentration exceeds WQD Agricuture Class-of-Use (Class II).
Bold	Concentration exceeds WQD Livestock Class-of-Use (Class III).
Bold	Concentration exceeds EPA criteria.

Highlight for concentration exceeding WQD criteria is based on the lowest criteria exceeded. If EPA concentration also exceeded, both highlight and pattern are shown. Pattern for concentration exceeding EPA criteria is based on lowest criteria exceeded. For pH, narrowest range is used.
Blank and duplicate samples were ommitted from this table and are presented in Attachment D6-4

Table 2.7-16 State and Federal Groundwater Quality Criteria for Specified Parameters (Page 1 of 1)

Parameter	WQD Class-of-Use Criteria			EPA Drinking Water Criteria		
	Domestic (Class I)	Agriculture (Class II)	Livestock (Class III)	MCL	Treatment Action Level	Secondary Standard
Aluminum	--	5.0	5.0	--	--	0.05 to 0.2
Ammonia	0.5	--	--	--	--	--
Arsenic	0.05	0.1	0.2	0.010	--	--
Barium	2.0	--	--	2.0	--	--
Boron	0.75	0.75	5.0	--	--	--
Cadmium	0.005	0.01	0.05	0.005	--	--
Chloride	250.0	100.0	2000.0	--	--	250.0
Chromium	0.1	0.1	0.05	0.005	--	--
Copper	1.0	0.2	0.5	--	1.0	--
Fluoride	4.0	--	--	4.0	--	2.0
Gross Alpha (pCi/L, including Radium-226, excluding Radon & Uranium)	15.0	15.0	15.0	15.0	--	--
Iron	0.3	5.0	--	--	--	0.03
Lead	0.015	5.0	0.1	--	0.015	--
Manganese	0.05	0.2	--	0.05	--	--
Mercury	0.002	--	0.00005	0.002	--	--
Nickel	--	0.2	--	--	--	--
Nitrate	10.0	--	--	10.0	--	--
pH (standard units)	6.5 - 8.5	4.5 - 9.0	6.5 - 8.5	--	--	6.5 - 8.5
Radium-226+Radium-228 (pCi/L)	5.0	5.0	5.0	5.0	--	--
Selenium	0.05	0.02	0.05	0.05	--	--
Sulfate	250.0	200.0	3000.0	--	--	250.0
Total Dissolved Solids	500.0	2000.0	5000.0	--	--	500.0
Uranium	--	--	--	0.03	--	--
Vanadium	--	0.1	0.1	--	--	--
Zinc	5.0	2.0	25.0	--	--	5.0

All concentrations are in mg/L unless otherwise noted. Dashes indicate no criteria have been established.

WQD Class-of-Use criteria are from Table I in Chapter 8 (Quality Standards for Wyoming Groundwater) of the WQD Rules & Regulations, available at http://deq.state.wy.us/wqd/WQDrules/Chapter_08.pdf, accessed on April 3, 2014.

EPA Drinking Water Criteria are from http://www.epa.gov/safewater/consumer/pdf/mcl.pdf, accessed on April 3, 2014.