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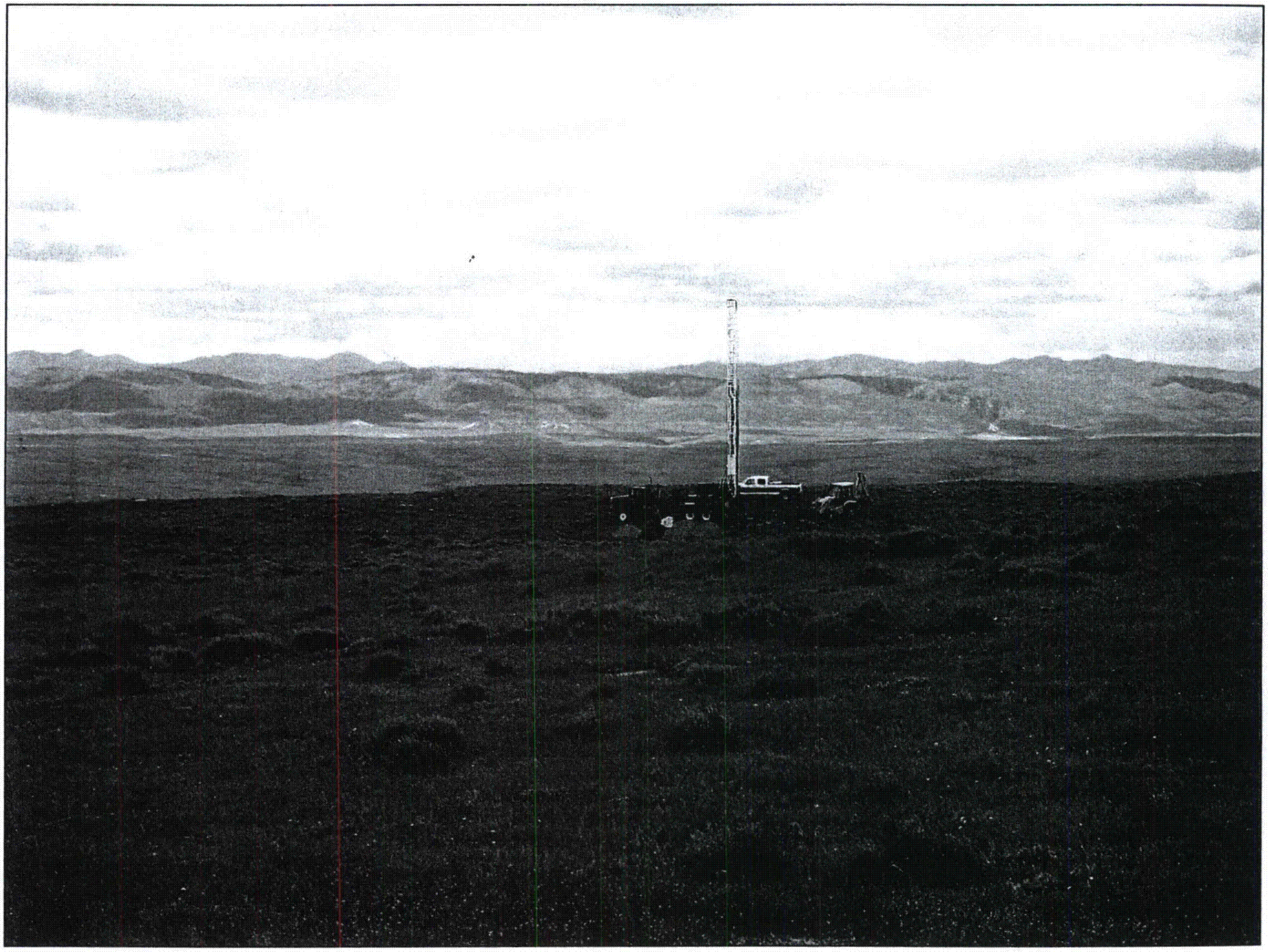
SUA-1341 License Amendment
Ludeman Project
Converse County, Wyoming

Technical Report
Volume I Section 1 Through Section 2.5

December 2011



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1 PROPOSED ACTIVITIES

Uranium One USA Inc. (Uranium One) is submitting this Technical Report (TR) to the United States Nuclear Regulatory Commission (NRC) as part of a combined source and 11e.(2) byproduct material license application to construct and operate an in situ leach uranium recovery (ISR) facility at the proposed Ludeman Project site in Converse County in the State of Wyoming. An NRC combined source and 11e.(2) byproduct material license is required to recover uranium by ISR extraction techniques, under the provisions of the Atomic Energy Act of 1954 (AEA), as amended by the Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA) as well as Title 10 U.S. Code of Federal Regulations (CFR), Part 40, "Domestic Licensing of Source Materials." This section summarizes the proposed activities including the nature of the facilities, equipment, and procedures to be used in the proposed project.

1.1 LICENSING ACTION REQUESTED

This TR has been prepared in support of an application to the United States Nuclear Regulatory Commission (NRC) for an amendment to Materials License SUA-1341 to develop and operate the proposed Ludeman Project in Converse County, Wyoming. The proposed project will consist of three Satellite facilities with associated injection/production wellfields, lixiviant make-up circuit, ion exchange circuit, up to six deep injection disposal wells and up to six surge ponds. Uranium from ion exchange resins at the proposed Ludeman Satellite facilities will be transported and subsequently processed at the Willow Creek Central Processing Plant (CPP) located in Johnson County, Wyoming.

This application and TR have been prepared using guidelines and standard formats from both Wyoming state and federal agencies. The TR is presented primarily in the NRC format found in Regulatory Guide 3.46, *"Standard Format and Content of License Applications, Including Environmental Reports, For In Situ Uranium Solution Mining"* (June 1982) and NUREG-1569, *Standard Review Plan for In Situ Leach Uranium Extraction License Applications* (June 2003). The guidance in NUREG-1569 was used to ensure that all necessary information is provided to allow NRC staff to complete their review and approval of this license application in a timely manner.

1.2 PROJECT HISTORY

The proposed project area was initially identified as a significant uranium prospect in the late 1970s. Multiple parties investigated and evaluated prospects in the vicinity of the proposed project. Teton Exploration Drilling Company, Inc. (TETON) and Nuclear

Exploration and Development Company (NEDCO) conducted extensive exploratory drilling and prepared a Mine License Application that was dated September 1, 1981 for start of ISR operations at the Leuenberger Project. The Leuenberger Project was located in the northwest portion of the proposed project site. An extensive exploration and aquifer testing program was conducted by TETON and NEDCO. A pilot production plant was built at the Leuenberger site and production began in January of 1980. The plant operated for approximately one year and was technically successful. However, the economic conditions of the uranium market forced commercial mining plans to be postponed. The pilot plant was decommissioned and groundwater was restored under NRC and Wyoming Department of Environmental Quality (DEQ) guidance.

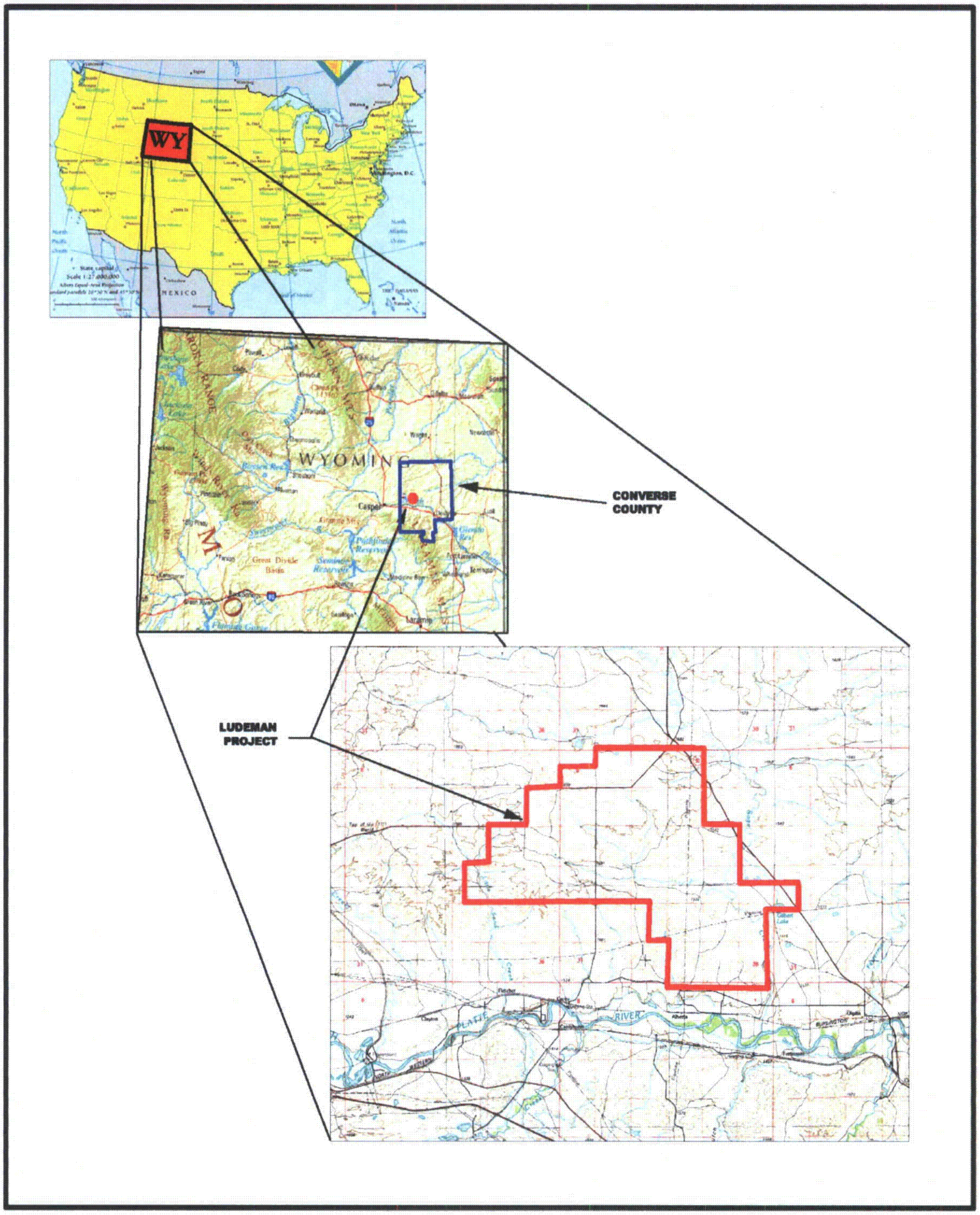
Uranium Resources, Inc. (URI) completed exploratory drilling and conducted an extensive pumping test of the Production Zone aquifer systems in the northeast portion of the proposed Ludeman Project site during November 1980. URI subsequently prepared a Mine License Application for the proposed site. The URI project was permitted but was never operated as a result of the declining economics for uranium production.

Additionally, Envirosphere was retained by Nuclear Assurance Corporation (NAC) to conduct hydrologic testing and analyses of an ore zone at the Peterson property area located in the southeast portion of the proposed Ludeman Project site. Hydrologic testing at this area occurred September 19 through December 5, 1979. No uranium extraction or processing was completed at the Peterson property.

1.3 CORPORATE ENTITIES INVOLVED

This License Application which includes the TR and ER have been prepared and submitted by Uranium One Americas, Inc., a Nevada corporation. The immediate parent company of Uranium One Americas, Inc. is Uranium One Investments Inc., a Canadian corporation. The ultimate parent company of Uranium One Americas, Inc. is Uranium One Inc., located in Toronto, Ontario, Canada, with a primary listing on the Toronto Stock Exchange (TSX) and a secondary listing on the Johannesburg Stock Exchange (JSE Limited).

Figure 1-1: Proposed Project General Location



1.4 SITE LOCATION AND DESCRIPTION

The proposed Ludeman Project is located in the southern portion of the Powder River Uranium District of Wyoming, within Converse County, Wyoming (Figure 1-1). The proposed Ludeman Project covers approximately 31 Sections (19,888 acres) and its location is described as follows:

- T34N R74W – All of Sections 12, 13, 14, 23, 24 and the east half of Section 22;
- T34N R73W – All of sections 3, 4, 5, 7, 8, 9, 10, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 26, 27, 34, 35, the west half of the west half of Section 2, the south half of Section 6, the west half of the west half of Section 11, the south half of Section 24, the west half of Section 25, the west half of the east half of Section 25, the northeast quarter of the northeast quarter of Section 25, the east half of Section 28, the west half of Section 36, and the west half of the east half of Section 36;
- T34N R72W – The southwest quarter of Section 19 and the north half of the northwest quarter of Section 30; and
- T33N R73W – The northwest quarter of the northeast quarter of Section 1, the north half of the northwest quarter of Section 1, the north half of the north half of Section 2, and the north half of the north half of Section 3.

The proposed project is located approximately ten miles northeast of Glenrock, Wyoming. State Highway 95 provides access to the proposed project area from the towns of Glenrock and Rolling Hills to the west, and State Highway 93 provides access from Douglas, Wyoming to the southeast. Interstate 25 provides access to both of these state highways from the south of the proposed project site. The project will consist of three Satellite facilities, several in-situ uranium extraction wellfields, and related infrastructures. Detailed information related to the site location is presented in Section 2.1.

1.5 SURFACE AND MINERAL OWNERSHIP

Surface ownership within the proposed project area includes private land, with some areas located in federal and state owned lands. Figure 1-2 illustrates surface land ownership and Figure 1-3 delineates mineral ownership for the proposed project site. Uranium One has executed surface use agreements with all land owners who hold surface ownership in the proposed project area.

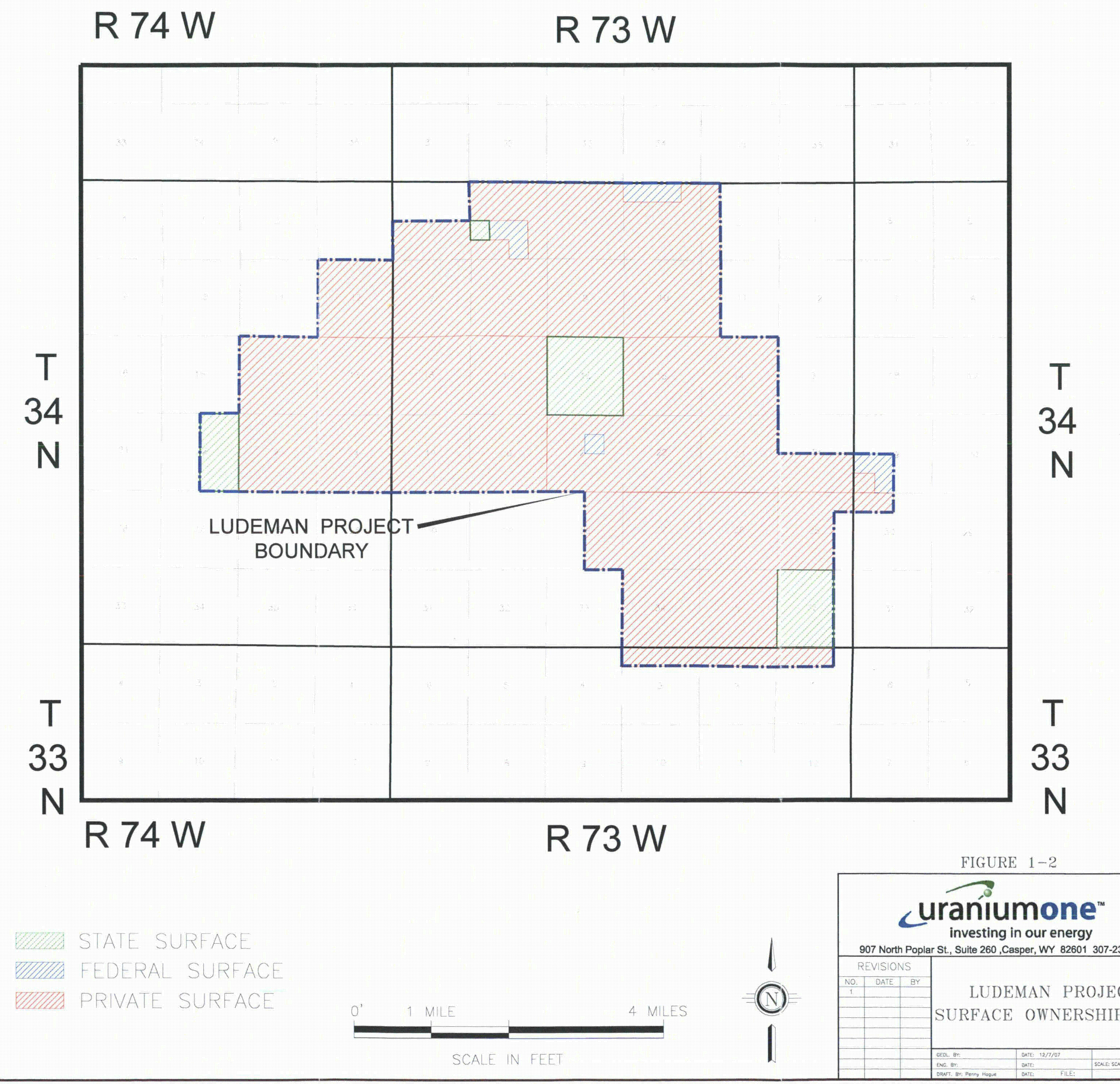


FIGURE 1-2

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LUDEMAN PROJECT SURFACE OWNERSHIP MAP

REVISIONS		
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ENG. BY:	DATE:	SCALE: SCALE:	
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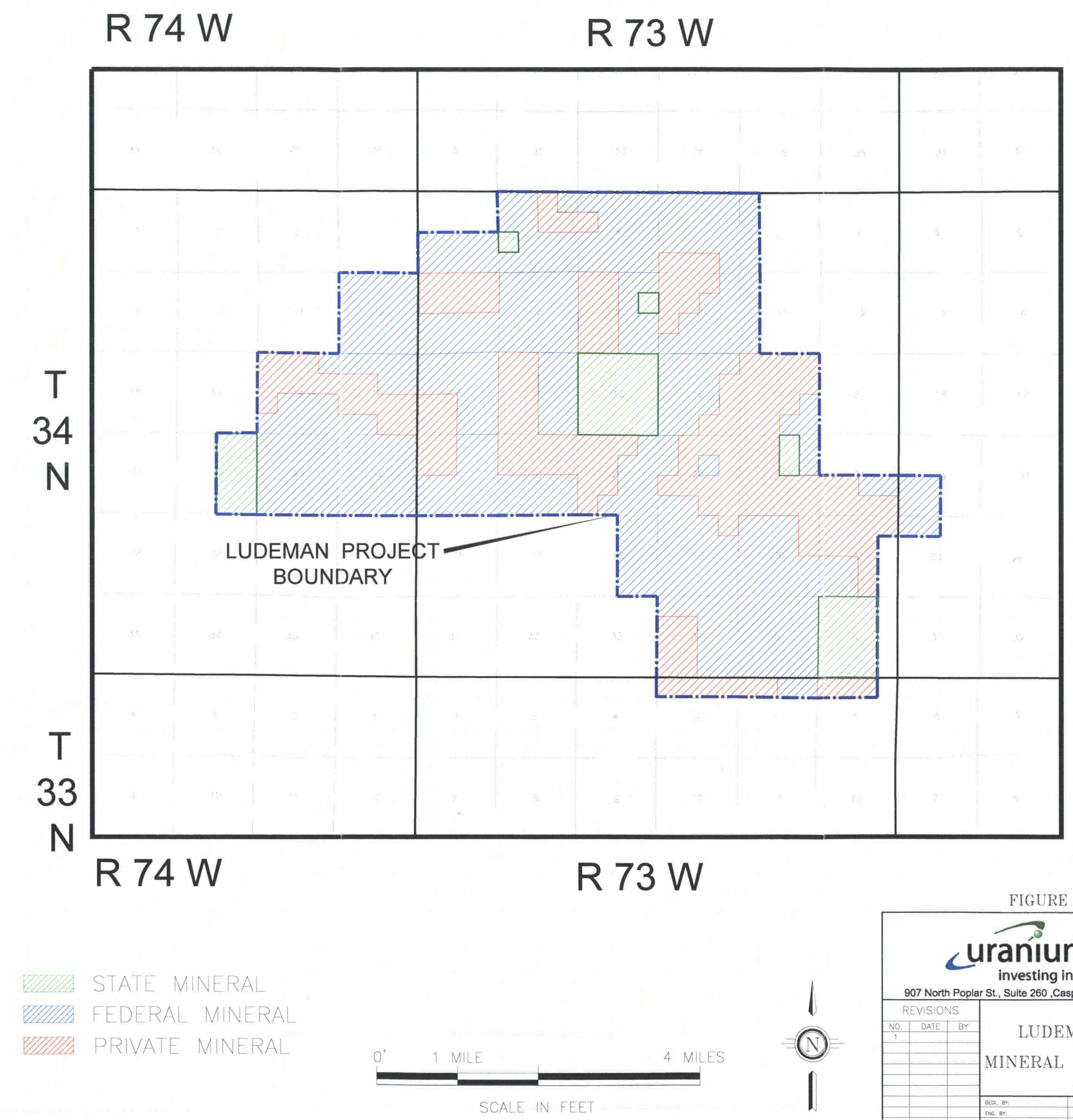

FIGURE 1-3

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LUDEMAN PROJECT
MINERAL OWNERSHIP MAP

REVISIONS		
NO.	DATE	BY
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DATE: 12/7/07
DRAFT. BY: Penny Hogue

1.6 ORE BODY DESCRIPTION

Uranium ore within the proposed project area occurs in typical roll-front deposits. Uranium One exploration nomenclature designates the sands in the project area by decreasing numbers with increasing depth. The Production Zone aquifers in the proposed project area are the 70, 80 and 90 Sands of the Lebo member of the Paleocene Fort Union formation. The sand thickness is variable and ranges in thickness from 13 to 164 feet in the 70 sand, zero to 161 feet in the 80 sand and 19 to 299 feet in the 90 sand. The 70 Sand is continuous across the planned wellfields as is the 90 Sand. The 80 Sand is not continuous across the area as it pinches out in the south-east and east-central portions of the proposed project area.

Confinement exists between the 70, 80 and 90 Sand Production Zones and the overlying and underlying sands throughout the proposed Ludeman Project area.

The mineralization in the 90 Sand in the western portion of the project area varies from 189 to 292 feet deep from surface level and averages 219 feet in depth. The mineralization in the 80 Sand varies from 303 to 441 feet deep from surface level and averages 352 feet in depth. Mineralization in this area is primarily contained within the 60, 80, 90 and 100 Sands; only the 80 and 90 Sands are planned to be mined. The thickness of the mineralization in the 90 Sand averages 8.3 feet with an average grade of 0.090 percent U_3O_8. The thickness of the mineralization in the 80 Sand averages 9.5 feet with an average grade of 0.130 percent U_3O_8.

The mineralization in the central part of the proposed project area varies from 465 to 690 feet deep averaging 557 feet in depth from surface. Mineralization is primarily contained within the 50, 60 and 70 Sands; only the 70 Sand is planned to be mined. Mineralization thickness in this portion of the project area averages 10.6 feet with an average grade of 0.074 percent U_3O_8.

The south-eastern portion of the proposed project area has depths to mineralization ranging from 19 to 366 feet, averaging 191 feet. The 70, 80 and 90 Sands contain the primary mineralization in the area, averaging 4.6 feet in thickness with an average grade of 0.093 percent U_3O_8.

Typical stratigraphic intervals to be mined are shown in the geologic cross sections and generalized stratigraphic column in Section 2.6 of this application. For ISR wellfields, the Production Zone is the geological sandstone unit where the recovery solutions are injected and produced. However, the ore thickness and corresponding Production Zone at any location is a fraction of the total thickness of the host sand and rarely exceeds 20 feet.

1.7 ESTIMATED ANNUAL PRODUCTION

Uranium One is currently projecting a uranium resource estimate for the proposed Ludeman Project site that is on the order of 6.3 million pounds of minable uranium in place, at an average grade of approximately 0.097 percent. Total mineable resources for the proposed project are not fully developed at this time and further delineation of uranium resources will be ongoing. With NRC approval of this amendment request for SUA-1341, Uranium One will begin construction and operation of the proposed Ludeman Project. Shipments of loaded IX resin from the proposed project will be transported to the Willow Creek project for elution, yellowcake drying and packaging.

SUA-1341 allows yellowcake production up to 2.5 million pounds of throughput per year. The License Renewal Application (LRA) for SUA-1341 (Cogema Mining, 2007) estimated that during peak periods of production, the Willow Creek Satellite could produce up to 1 million pounds per year of uranium yellowcake which will be dried at Willow Creek and stated that Uranium One may wish to dry up to an additional 1.5 million pounds per year of yellowcake product from other uranium licensees. The LRA also noted that MILDOS modeling has been performed at the 2.5 million pound throughput and no significant increases in exposures to the public were indicated as a result of this level of drying.

Estimated injection of solutions for recovery at the proposed project will be at a rate of approximately 3,000 gpm for each Satellite facility. Water balance for the Satellite facilities is shown on Figure 3-6. The liquid waste generated at the Satellite facilities will be primarily the production bleed, which is estimated to range from 0.5 percent to 1.5 percent of the total flow or 15 to 45 gpm, and may average one percent (30 gpm) of the production flow. Uranium One proposes to dispose of the liquid waste through deep disposal well injection. Each Satellite will be designed with two surge ponds that can temporarily store liquid waste if the deep disposal well becomes inoperable or is down for maintenance as discussed in Section 4.

1.8 SOLUTION RECOVERY METHOD

The ISR process for uranium recovery consists of an oxidation step and a dissolution step. Gaseous oxygen or hydrogen peroxide is used to oxidize the uranium, and carbon dioxide or bicarbonate is used for dissolution. The carbonate/bicarbonate production solution and oxidant are combined into a leaching solution or lixiviant, which is injected into the ore-bearing sandstone formation through a series of injection wells that have been drilled, cased, cemented, and tested for mechanical integrity. Recovery wells pump the uranium-bearing solution from the ore-bearing sandstone formation to the surface and into the pressurized downflow ion exchange columns circuit in the processing plant. As the lixiviant and oxidant move through the formation from injection wells to recovery

wells it contacts the ore. Here the uranium is first oxidized and then complexed by the bicarbonate to form a soluble uranium salt which remains in solution until recovered in the pressurized downflow ion exchange column circuit. The uranium-bearing lixiviant is drawn to a recovery well where it is pumped to the surface and transferred to the processing plant. Within the plant, the process uses the following steps to process uranium from the recovered solutions:

- Loading of uranium complexes onto ion exchange resin;
- Elution (removal) of the uranium complexes from the ion exchange resin; (Willow Creek CPP);
- Precipitation of uranium complexes from the eluate (Willow Creek CPP);
- Drying and packaging of the uranium(Willow Creek CPP); and
- Reconstitution of the barren lixiviant by the addition of carbon dioxide and/or carbonate/bicarbonate and oxidant (gaseous oxygen or hydrogen peroxide), which is recycled back to the wellfields for continuing operations.

During the extraction process, slightly more water is produced from the ore-bearing formation than is injected. This net withdrawal, or "bleed", creates a cone of depression in the wellfield area, controlling fluid flow and confining it to the Production Zone. Uranium One will ensure that the operation will maintain an inward gradient at all times. The production aquifer is surrounded laterally, above and below, as necessary, by monitor wells that are frequently sampled to ensure that all extraction fluids are hydraulically balanced to be retained within the Production Zone. The "bleed" also provides a chemical purge on the aquifer to limit the buildup of species such as sulfate and chloride that are affected by the recovery process.

The ISR process selectively removes uranium from the ore body. No tailings are generated by the process, thus eliminating a major concern associated with conventional uranium mining and milling. When installing an ISR wellfield, only limited surface disturbance occurs. During the operating life of the wellfield, vegetation is re-established over the wellfields and pipeline corridors to prevent erosion and buildup of undesirable weeds.

1.8.1 Advantages of ISR Uranium Recovery

ISR of uranium is a proven technology which has been successfully demonstrated commercially in Wyoming, Texas, and Nebraska. Uranium ISR is environmentally superior to conventional open pit and underground uranium mining as evidenced by the following:

1. ISR results in significantly less surface disturbance because mine pits, waste dumps, haul roads, and tailings ponds are not needed;
2. ISR requires much less net water demand than conventional mining and milling by avoiding the water consumption associated with pit dewatering, conventional milling, and tailings transport;
3. The lack of heavy equipment, haul roads, waste dumps, etc. results in very little air quality degradation at ISR sites;
4. Fewer employees are needed at ISR operations, thereby reducing transportation and socioeconomic concerns;
5. Aquifers are not excavated, but remain intact during and after ISR;
6. Tailings ponds are not used, thereby eliminating a major ground water pollution concern. State of the art lined surge ponds may be used to manage liquid waste streams; and
7. Uranium ISR results with the majority of other contaminants (e.g., heavy metals) remaining where they naturally occur instead of moving to waste dumps and tailings ponds where their presence present environmental concern.

1.8.2 Ore Amenability

Economic recovery of the uranium deposits at the proposed project with respect to ISR recovery methods have been previously demonstrated by both the Leuenberger and North Platte Pilot Projects that were performed on the proposed project site. Other ISR projects include Smith Ranch/Highland Project and Willow Creek projects, which are similar in geology setting and groundwater chemistry with respect to the conditions found at the proposed site. These projects demonstrate that *in-situ* recovery methods can efficiently mine roll front uranium deposits in a cost effective manner with minimal environmental impacts and with no significant risk to the public health or safety.

1.9 OPERATING PLANS, DESIGN THROUGHPUT, AND PRODUCTION

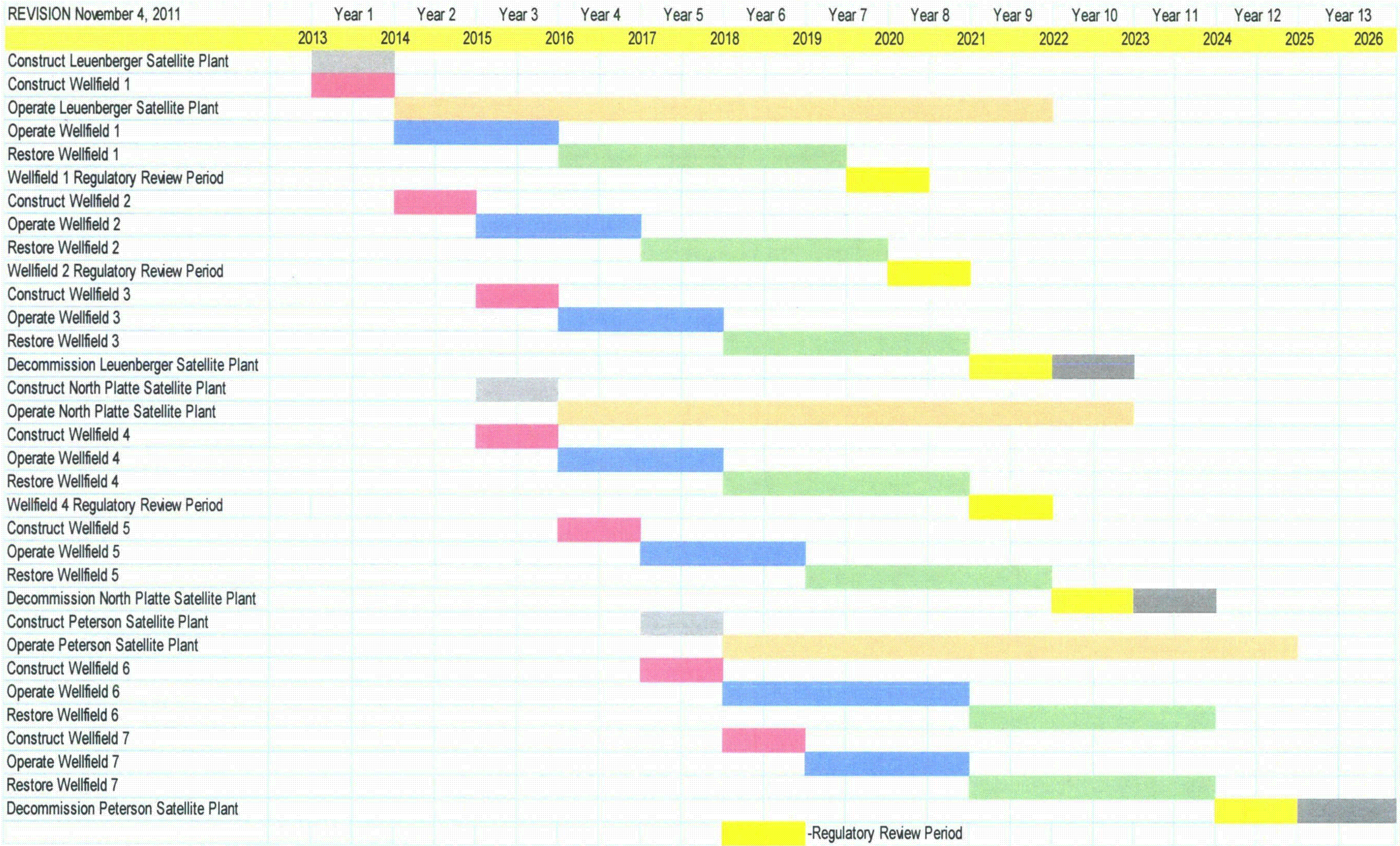
The uranium extracted from the proposed Ludeman Project will be loaded onto ion exchange resin at the three Satellite facilities. Loaded ion exchange resin from the Satellite facilities will then be transported to the Willow Creek CPP for elution, precipitation, drying and packaging of uranium. Barren resin will be returned back to the IX columns at the proposed Satellite facilities.

1.10 PROJECT CONSTRUCTION, OPERATION, AND RESTORATION SCHEDULE

Following NRC approval of the amendment of Materials License SUA-1341, construction of the first wellfield and ancillary Satellite facility are planned to begin in the second quarter of 2013. Completion of the first Satellite facility, wellfield and deep disposal well is expected to be completed in the second quarter of 2014 and startup of operations will commence. Construction of subsequent wellfields will follow, approximately one every year. It is anticipated that there will be a seamless transition from production to restoration of wellfields. It is anticipated that depleted wellfields will be inactive for less than 30 days, unless immediately adjacent to another active wellfield, in which case restoration could pull recovery solutions into the area of restoration. Development of the three Satellite facilities and associated wellfields will begin in sequential order.

Additional wellfield plans will be developed approximately one year prior to the planned commencement of new recovery operations in that wellfield. The layout of the planned wellfields and Satellite facilities are shown in Figure 2.1-1 in Section 2.1. It is currently anticipated that ISR operations and wellfield restoration will continue for approximately twelve years. At that time, decommissioning of wellfields including well abandonment, removal of related piping and equipment, wellfield building removal, surface soil radiological surveys and reclamation will commence. Projected production and restoration schedules for the proposed Ludeman Project are shown in Figure 1-4.

Figure 1-4: Proposed Project Production, Restoration and Decommissioning Schedule



1.11 WASTE MANAGEMENT AND DISPOSAL

This section describes the proposed waste management system. Liquid and solid wastes are divided into two general categories: 11e.(2) waste and non-11e.(2) waste. The proposed waste management system is summarized below for each category of waste. Additional details about Waste Management are found in Section 4 of this document.

1.11.1 11e.(2) Liquid Waste

1.11.1.1 Brine

Brine will be generated from RO treatment of the production bleed and from RO treatment of the groundwater restoration water. Brine will be routed from the production and restoration RO units in the Satellite facilities to a wastewater collection system.

1.11.1.2 Excess Permeate

Permeate will also be generated from the treatment of both the process bleed and groundwater from groundwater restoration. Excess permeate which is not recycled back to operation or restoration activities will be used as plant makeup water. Permeate will be high quality water and will generally be put to beneficial use.

1.11.1.3 Other 11e.(2) Liquid Waste

Other 11e.(2) liquid wastes include spent eluate, resin transfer wash water, plant wash-down water, and fluids generated from wellfield release. Liquid wastes generated in the Satellite facility will be discharged to the wastewater disposal system or to the feed of the s RO Unit while water collected from wellfields will be collected in dedicated portable tanks or tanker trucks and transported to the wastewater disposal system. Any water captured from leaking pipelines or equipment will also be transported to the wastewater disposal system in dedicated portable tanks or tanker trucks.

These liquid wastes will be combined with brine and disposed of through the deep disposal well.

1.11.2 Non 11e.(2) Liquid Waste

1.11.2.1 Stormwater Runoff

Stormwater management is controlled under National Pollutant Discharge Elimination System (NPDES) permits issued by the WDEQ-WQD. As part of the permit, a storm water pollution plan (SWPPP) will be prepared describing best management practices (BMPs) used to keep pollutants out of surface waters and storm drains. Facility drainage will be designed to route storm runoff water away from or around the plant, ancillary buildings and parking areas, and chemical storage. The design and controls of the proposed project facility will be implemented such that runoff is not considered to be a potential source of pollution.

1.11.2.2 Domestic Liquid Waste

Domestic liquid wastes from the restrooms and lunchrooms will be disposed of in a septic system that meets the requirements of the WYDEQ-WQD and will likely include one or more septic tanks for primary treatment. Septic tank effluent will be disposed of in a gravity or pressure-dosed drain field. The septic system will be separate from other liquid waste lines to prevent 11e.(2) byproduct material discharge into the septic fluid. These systems are in common use throughout the United States and the effect of the system on the environment is known to be minimal.

1.11.2.3 Waste Petroleum Products and Chemicals

At the proposed project, small quantities of used oil will be generated from equipment and vehicles used on-site. The waste petroleum products will be temporarily stored on-site before being transported to a nearby recycling or disposal facility. These wastes will not have been affiliated with the processing or generation of 11e.(2) byproduct material.

Waste petroleum product fluids will be stored in an aboveground storage tank located in the maintenance shop. The storage tank will be cylindrical and constructed of steel with a locking cap and venting system. Secondary containment will be designed to contain 110 percent of the tank volume. Spills of waste petroleum will be contained, mitigated, cleaned up, and reported in accordance with WDEQ requirements.

The proposed project is anticipated to be classified as a conditionally exempt small quantity generator (CESQG) by WDEQ/SHWD. As such, the project will be required to generate less than 220 pounds (100 kg) of hazardous waste in any calendar month, generate less than 2.2 pounds (1 kg) of acutely hazardous waste, and store less than 2,200 pounds (1,000 kg) of hazardous waste at any one time.

1.11.3 Solid 11e.(2) Byproduct Material

All contaminated items that cannot be decontaminated to meet release criteria will be properly packaged, transported, and disposed of off-site at a licensed to 11e.(2) byproduct material disposal facility. Solid wastes generated by the proposed project that may become contaminated with radioactive isotopes consist of items such as rags, trash, packing material, worn or replaced parts from equipment, piping, filters, protective clothing, and solids removed from process pumps and vessels. Radioactive solid waste which has a contamination level precluding decontamination will be isolated in drums or equivalent DOT approved containers. These materials will be stored on site inside the security controlled area until such time that a full shipment can be shipped to a waste disposal site or mill tailings facility licensed to accept 11e.(2) byproduct materials.

This 11e.(2) byproduct material will be collected and stored within the proposed project Satellite facilities in appropriate containers (e.g., 55 gallon drums with drum liners) approved by DOT, and will be appropriately labeled and placarded for the class of material being shipped. When these containers are full, they will be closed, sealed and stored within the byproduct storage area and stored in a strong, tight container as defined by DOT regulations. The strong, tight containers will be capable of preventing the spread of contamination and contact with precipitation. The proposed project plans to use covered roll-off containers with an approximate capacity of 15-30 cubic yards. Once full, these containers will be shipped for disposal to a byproduct licensed disposal facility. During storage, the containers will be located within a designated security controlled area. Access to the byproduct storage facility will be controlled through the use of security fencing, locked gates, and proper posting as a security controlled area.

Larger items such as contaminated equipment that cannot be stored in a roll-off container will be stored in the proposed project Satellite facilites or covered/sealed in manner that will prevent the spread of contamination in the byproduct storage area.

1.11.4 Non-11e.(2) Solid Waste

1.11.4.1 Uncontaminated Solid Waste

Uncontaminated solid waste will be collected on the site on a regular basis and disposed of in the nearest approved sanitary landfill, compliant with the rules and regulations of WDEQ-SHWD.

1.11.4.2 Septic System Solid Waste

Domestic liquid wastes from the restrooms and lunchrooms will be disposed of in an approved septic system that meets the requirements of the WDEQ for Class V UIC wells.

Occasionally, it will be necessary to dispose of sludge material collected in septic systems holding tanks. The disposal of these sludge materials must be performed in accordance with WDEQ-SHWD rules and regulations.

1.11.4.3 Hazardous Waste

Hazardous wastes are defined by WDEQ-SHWD's Hazardous Waste Management Chapter 2 or by USEPA in 40CFR Part 261. Generated materials defined by these regulations as hazardous waste will be consolidated in appropriate containers upon generation and shipped off-site for disposal at a facility licensed for the acceptance of hazardous wastes. Wastes that may be generated at the proposed project that may be classified as hazardous wastes include solvent rags, expired laboratory reagents, solvents, cleaners, or degreasers. It is also expected that the proposed project facility will generate Universal Wastes such as batteries, fluorescent light bulbs and used oil.

It is anticipated that the proposed project facilities will be classified by WDEQ-SHWD as a Conditionally Exempt Small Quantity Generator (CESQG). As such, the project will be required to generate less than 220 pounds (100 kg) of hazardous waste in any calendar month, generate less than 2.2 pounds (1 kg) of acutely hazardous waste, and store less than 2,200 pounds (1,000 kg) of hazardous waste at any one time. This classification as a CESQG does not relieve Uranium One from complying with CESQG regulations and those requirements to dispose of classified hazardous wastes at a properly licensed hazardous waste facility. Uranium One will comply with the EPA and WDEQ-SHWD CESQG requirements and monitor the generation of hazardous waste to ensure compliance with the weight generation rules of those regulations.

1.12 GROUNDWATER RESTORATION

Groundwater restoration activities will be carried out at the proposed project upon completion of recovery activities in a given wellfield and concurrent with recovery activities in other wellfields. The restoration process may consist of the following activities:

- <u>Groundwater Sweep</u> - groundwater is pumped from the wellfields with no reinjection, which results in an influx of native groundwater from outside the wellfields.
- <u>Groundwater Treatment</u> - groundwater from the wellfield is pumped to the restoration plant where ion exchange, reverse osmosis, filtration or other treatment methods take place.
- <u>Reductant</u> - Chemical or biological agents may be added to the restoration injection stream to increase microbial activity or to promote reduced groundwater

chemistry conditions to arrest the mobility of uranium within the geologic formation.

As described in more detail in Section 6, it may not be necessary to use all of the phases described above to meet restoration goals. Following restoration, a groundwater stabilization monitoring program will be initiated. Once the Restoration Target Values (TRV's) are reached and maintained, restoration will be deemed complete. Results will be documented in a restoration report and submitted to the WDEQ and the NRC for approval.

1.13 DECOMMISSIONING AND RECLAMATION

Surface and subsurface facilities in individual wellfields will be decommissioned following the completion and agency acceptance of groundwater restoration. Individual wellfield decommissioning will include the plugging and abandonment of all injection and recovery wells plus the removal of those wellfield piping and structures which are no longer required for operation of the wellfield.

At the completion of project life and after groundwater restoration has been completed and approved, the entire site will be fully decommissioned. Decommissioning will include the removal of remaining wellfield piping and equipment, demolition and disposal of contaminated buildings and structures, and reclamation of all disturbed areas. Appropriate NRC and WDEQ guidance will be followed during decommissioning as required. Decommissioning and reclamation are discussed in more detail in Section 6 of this TR.

1.14 SURETY ARRANGEMENTS

Pursuant to 10 CFR Part 40 and Appendix A, Criterion 9, Uranium One will provide adequate financial assurance for the proposed project. Uranium One will provide NRC Staff with financial assurance cost estimates for all aspects of the proposed project, including groundwater restoration, surface reclamation, and D&D of proposed facilities.

Pursuant to Criterion 9, licensees are required to submit annual financial assurance updates reflecting potential changes in costs for specific licensed activities resulting from inflation, changes in equipment or personnel costs, or new activities proposed to be started or completed prior to the proceeding annual update. In order to be granted a license, an applicant must propose and receive NRC approval of financial assurance cost estimates for the phase of the project that will exist prior to the next annual update; but the applicant is not required to provide the actual financial assurance mechanism supporting that NRC-approved cost estimate until licensed operations commence. Pursuant to these requirements, Uranium One will comply with Criterion 9 requirements

for these annual financial assurance updates and will have in place an NRC-approved financial assurance mechanism after receiving the NRC license and prirot to beginning active ISR operations.

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2.1 SITE LOCATION AND LAYOUT

The proposed Ludeman Project (proposed project) is located in the southern portion of the Powder River Basin (PRB), in the Sothern Powder River Uranium District in Campbell County, Wyoming in the Wyoming East Milling Region as defined by NUREG-1910 (GEIS Sec. 3.3). Figure 1-1 of this TR shows the general site location of the proposed project site and surrounding area in the PRB area in relation to surrounding population centers, interstates and highways.

The proposed project covers approximately 31 Sections (19,888 acres) and its location is described as follows:

- T34N R74W – All of Sections 12, 13, 14, 23, 24 and the east half of Section 22.
- T34N R73W – All of sections 3, 4, 5, 7, 8, 9, 10, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 26, 27, 34, 35, the west half of the west half of Section 2, the south half of Section 6, the west half of the west half of Section 11, the south half of Section 24, the west half of Section 25, the west half of the east half of Section 25, the northeast quarter of the northeast quarter of Section 25, the east half of Section 28, the west half of Section 36, and the west half of the east half of Section 36.
- T34N R72W – The southwest quarter of Section 19 and the north half of the northwest quarter of Section 30.
- T33N R73W – The northwest quarter of the northeast quarter of Section 1, the north half of the northwest quarter of Section 1, the north half of the north half of Section 2, and the north half of the north half of Section 3.

Population centers around the proposed project include Rolling Hills (2010 population est. 449), Glenrock (2010 population est. 2,231), Douglas (2010 population est. 5,288), Edgerton (2010 population est. 195), Midwest (2010 population est. 404), Gillette (2010 population est. 29,087), and Casper (2010 population est. 55,316). Section 2.3 of this TR provides more information on surrounding population, and Figure 2.3-1 in the same section shows population and distances to population centers within a 50-mile (80 km) radius.

The proposed project area, including the two-mile buffer area, is located in the north-eastern portion of the Middle North Platte-Casper Basin, Hydrologic Unit Code (HUC) 10180007. The proposed project area, including the two-mile buffer area, drains into the North Platte River, which lies directly south of the proposed project area and transects the southern portion of the two-mile buffer area (Figure 2.7-1 of this TR).

The climate of the proposed project area is classified as semi-arid with a range of elevations from approximately 5,000 feet to 5,300 feet above mean sea level. The two-mile buffer has elevations up to 5,600 feet and as low as 4,800 feet above mean sea level.

State Highway 95 provides access to the proposed project from the Towns of Glenrock and Rolling Hills to the west and State Highway 93 provides access from Douglas to the southeast. Interstate 25 provides access to both of these state highways from the south of the proposed project area. The main access to the proposed North Platte and Peterson facilities and wellfields will be from State Highways 93, via a paved road running east through section 9, and 95, via a paved road running through sections 14 and 15. A paved road will be used to access the Peterson site which will head from section 15. The proposed Leuenberger facilities will be accessed from Highway 95 by a paved road heading south in sections 13 and 14.

The proposed project will be developed by constructing three Satellite facilities, wellfields, and ISR recovery support facilities. The North Platte, Leuenberger and Peterson Satellite facilities will each be located within an approximate 5-acre fenced area in the SW¼ NW¼, Section 10, T34N, R73W, SE¼ NE¼ of Section 14, T34N, R74W, and SW¼ SW¼, Section 26, T34N, R73W, respectively.

Figure 2.1-1 shows the general topography, proposed project site layout, and restricted areas for the proposed project including the Satellite facilities and wellfields. Other site right-of-ways such as roads, electrical transmission lines and pipelines are also shown on Figure 2.1-1. Drainage, surface water features, and waterways are shown on Figure 2.7-1 in Section 2.7 of this TR. Further development within the project may be possible according to sand trends, see Figure 3-1 in Section 3 of this TR.

ESRI® ArcMap™ 9.3 software was used with Wyoming DRG-E (Enhanced Digital Raster Graphic) image data from the Wyoming GIS Coordination Structure (WGCS) to create a base map. The base map was then used for each of the figures prepared for this document with the addition of pertinent geospatial data from the Wyoming Geographic Information Science Center (WyGISC) for that figure.

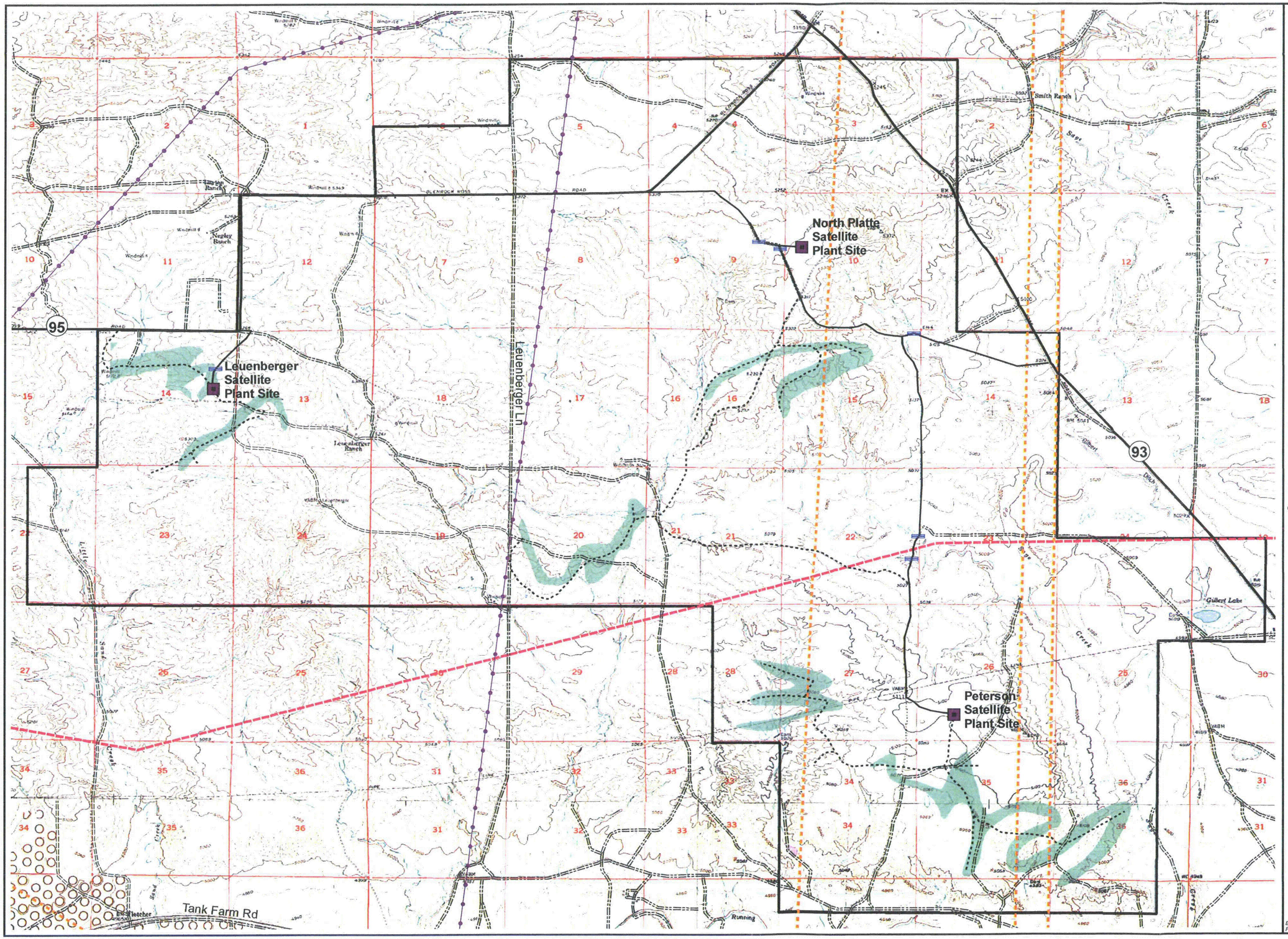

FIGURE 2.1-1
PROPOSED INFRASTRUCTURE
LUDEMAN PROJECT
CONVERSE COUNTY, WY

PREPARED FOR:
URANIUM ONE
CASPER, WY

TREC, Inc.
Engineering & Environmental Management
951 Werner Court
Suite 395
Casper, WY 82601
Phone (307) 265-0696
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E:/Wyoming/Project_8204_Ludeman/MapDocuments/Fig2 Proposed Infrastructure 120909.mxd

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2.2 USES OF ADJACENT LANDS AND WATERS

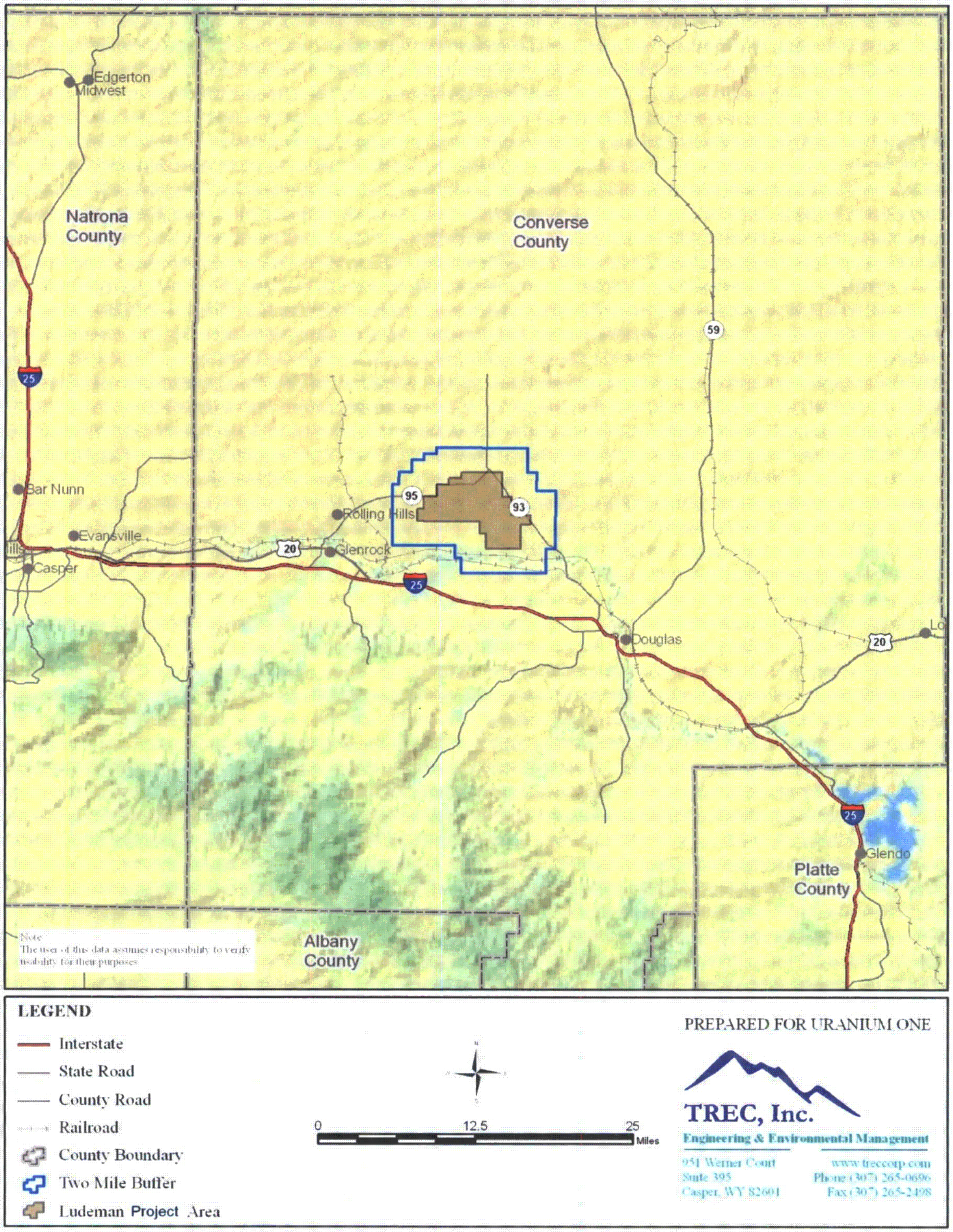
NRC guidance in NUREG-1569 requires discussion of land use in, and within a two-mile radius surrounding the proposed Ludeman Project (proposed project). This section describes the nature and extent of present and projected land use and trends in population or industrial patterns. Preliminary data were obtained from several sources followed by field studies to collect on-site data to check land uses.

2.2.1 General Setting

The proposed project is located in central Wyoming in Converse County. State Highway 95 provides access to the proposed project from the towns of Glenrock and Rolling Hills to the west and State Highway 93 provides access from Douglas to the southeast. Interstate 25 provides access to both of these state highways from the south of the proposed project. (Figure 2.2-1)

The proposed project is located within the Pathfinder to Guernsey sub-basin of the greater Platte River Basin. The greater Platte River Basin is located within the Rocky Mountain, Wyoming Basin, and Great Plains Physiographic Provinces. The topography of the basin includes valleys, high plains, hills and mountains. Elevations in the Platte River Basin range from 4,025 to 12,013 feet above mean sea level. As described in Section 2.5, average annual precipitation for the region of the proposed project ranges from nine to 12 inches per year.

Figure 2.2-1: Proposed Project Location with Major Roads and Rail



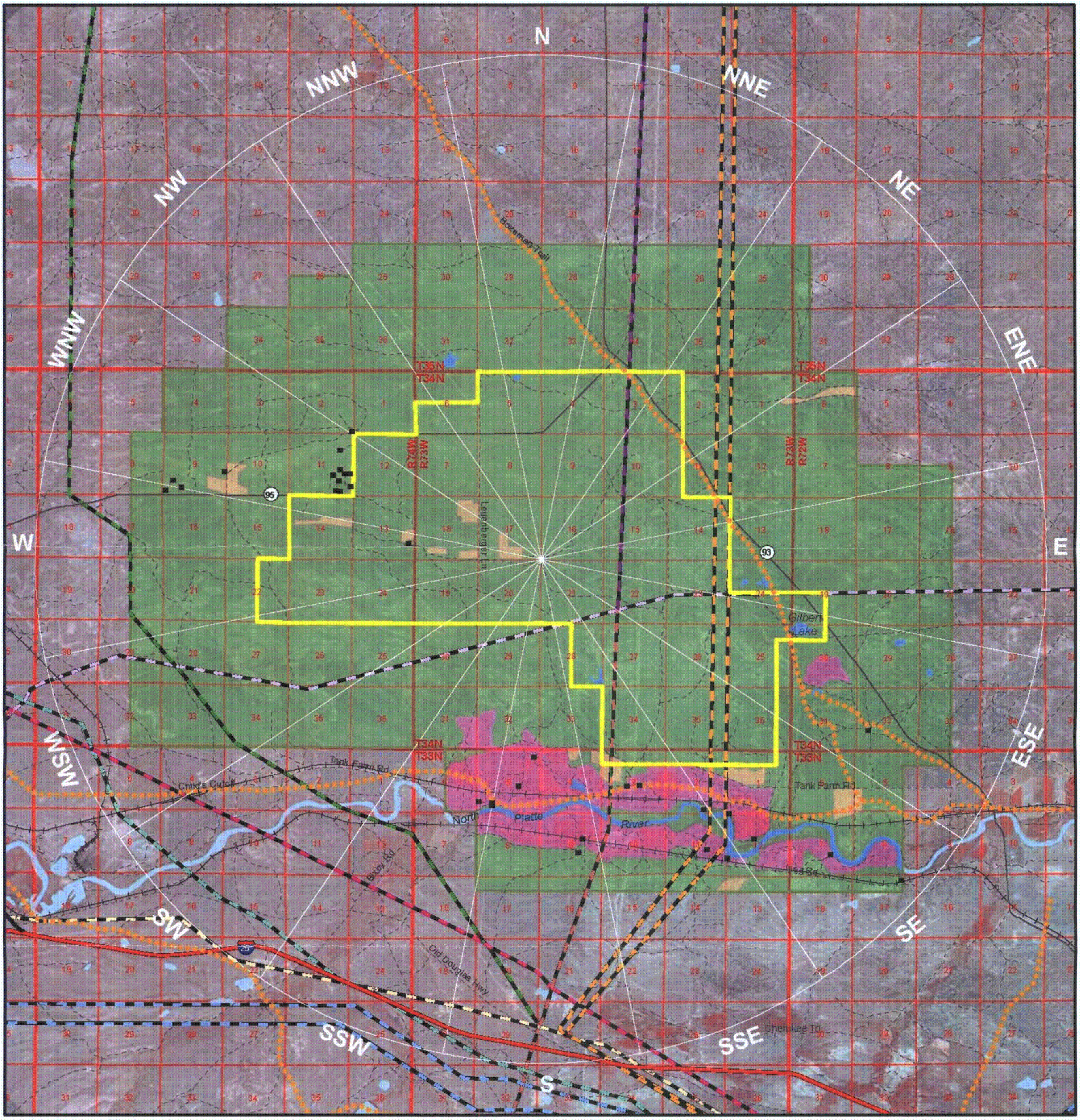
2.2.2 Land Use

Land use and land cover within the proposed project and a two-mile Ludeman Buffer Area around the proposed project is illustrated on Figure 2.2-2. Table 2.2-1 defines the land use and land cover types depicted on Figure 2.2-2.

Table 2.2-2 presents current land uses and land cover in 22-1/2 degree sectors centered on each of the 16 compass points. These sectors radiate from the geographic center of the proposed project. The total areas of the sectors vary because of the irregular site boundary. Rangeland is the primary land use within the proposed project area and within the surrounding two-mile buffer area. Also within the two-mile buffer area, but outside the proposed project boundary, areas of irrigated cropland exist (primarily along the North Platte River). Non-irrigated cropland is scattered within the two-mile buffer area. Within the proposed project, there is one residence. There are 31 residential sites in the two-mile buffer area outside the proposed project. Oil and gas pipelines cross the proposed project and lands within the two-mile buffer area. The Bozeman Trail crosses the proposed project and other lands within the two-mile buffer area. The Child's Cutoff Trail generally parallels the North Platte River south of the Project. Portions of the Trail are within the two-mile buffer area.

Table 2.2-1: Land Use and Land Cover Definitions

Land Use/Land Cover	Definition
Ir	Irrigated Cropland
NI	Non-Irrigated Cropland
R-Other	Rangeland and other Non-Agricultural Land
W	Water



Legend

- Residence Site
- Historic Trails
- Railroad
- Irrigated Cropland
- Non-irrigated Cropland
- Rangeland/Other
- North Platte River, Lakes/Ponds
- Ludeman Project Area

Pipelines

OWNER, Product

- COLORADO INTERSTATE GAS, Natural Gas
- FORT UNION GAS GATHERING, Natural Gas
- INTERLINE RESOURCES, Crude Oil
- KANEB PIPELINE CO., Product
- KANSAS-NEBRASKA INTERSTATE (PONY EXPRESS), Natural Gas
- KANSAS-NEBRASKA INTERSTATE, Natural Gas
- McCULLOCH INTERSTATE GAS COMPANY, Natural Gas
- PLATTE (EXPRESS SPONSORS), Crude Oil
- THUNDER CREEK GAS SERVICES, L.L.C., Natural Gas

N

0 0.55 1.1 1.65 2.2 Miles

PREPARED FOR:
URANIUM ONE

Figure 2.2-2

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Table 2.2-2: Land Use and Land Cover of the Proposed Project and within Two Miles (3.3-km) of the Project Boundary

Compass Sector[1]	Land Use and Land Cover within Project (in acres)				Land Use and Land Cover within Two-Mile Buffer Surrounding Project (in acres)				Total
	Ir	NI	R-Other	Water	Ir	NI	R-Other	Water	
North	0.0	0.0	1,130.6	7.4	0.0	0.0	2,040.6	0.0	3,178.5
North-Northeast	0.0	0.0	1,344.3	0.0	0.0	0.0	2,392.2	0.0	3,736.5
Northeast	0.0	0.0	1,307.3	0.0	0.0	0.9	3,084.4	0.0	4,392.6
East-Northeast	0.0	0.0	978.6	0.0	0.0	80.1	2,946.3	0.0	4,004.9
East	0.0	0.0	1,346.2	0.0	0.0	0.0	4,005.8	12.0	5,363.9
East-Southeast	0.0	0.0	2,272.3	28.2	155.1	0.0	3,442.1	21.5	5,919.2
Southeast	1.9	0.3	2,533.3	0.0	960.6	217.8	2,478.8	162.3	6,354.9
South-Southeast	5.2	26.7	1,095.8	12.4	1,219.1	135.9	1,569.6	102.1	4,166.9
South	0.0	0.0	131.3	0.0	1,388.6	23.6	1,911.5	71.4	3,526.4
South-Southwest	0.0	0.0	155.1	0.0	664.0	0.0	1,140.0	8.6	1,967.8
Southwest	0.0	0.0	274.2	0.0	0.0	0.0	2,098.1	0.0	2,372.3
West-Southwest	0.0	0.0	1,124.4	0.0	0.0	0.0	4,324.7	0.0	5,449.1
West	0.0	142.2	2,150.7	0.0	0.0	0.2	3,061.7	0.0	5,354.7
West-Northwest	0.0	98.2	1,428.3	0.0	0.0	123.6	3,556.2	0.0	5,206.4
Northwest	0.0	37.8	1,172.3	0.0	0.0	0.0	3,177.1	0.0	4,387.2
North-Northwest	0.0	0.0	1,083.4	0.0	0.0	0.0	2,592.6	21.2	3,697.3
Total	7.1	305.2	19,528.2	48.1	4,387.4	582.0	43,821.5	399.1	69,078.6

[1]22 ½ degree sectors centered on each of 16 compass points

Ir = Irrigated Cropland, NI = Non-Irrigated Cropland, R = Rangeland and Other Non-Agricultural Land

Predominant current land use within the two-mile buffer area is rangeland. In 2006, Converse County ranked first in Wyoming for sheep production and tenth for cattle production. According to the 2002 agricultural census, Converse County had 339 farms and ranches with a total of 2,517,920 acres. The average size of a farm or ranch was 7,427 acres. A total of 71,452 acres was cropland, and of this 30,584 were irrigated for forage crops. In 2006, cash receipts for livestock sales totaled $37.7 million in Converse County. Table 2.2-3 shows the 2006 livestock inventory for Converse County (NASS, 2008).

Table 2.2-3: 2007 Livestock Inventory for Converse County

Type of Livestock	Number
Beef Cows	39,950
Cows	35,000
Breeding Sheep & Lambs	65,000
Total animals	139,950

Recreational lands are present in Albany, Campbell, Converse, Johnson, Natrona, Niobrara, and Platte Counties within 50 miles of the proposed project (Table 2.2-4). Recreational opportunities provided by federal and state lands in the county have become an increasingly important component of the local economy. The regional setting (Converse, Natrona, Platte, Campbell, Niobrara and Albany counties) of the proposed project provides broad, panoramic prairie landscapes, which provide a setting for a variety of outdoor recreational activities. Major attractions include Medicine Bow National Forest, Thunder Basin National Grassland, Hogadon Ski Area, North Platte River, Glendo Reservoir, several state historic sites, and the historic Bozeman Trail and Overland Emigrant Route.

Table 2.2-4: Recreational Areas within 50-miles of the Proposed Ludeman Project

Name of Recreational Facility	Managing Agency	Distance From Ludeman Project (miles)
Thunder Basin National Grasslands	USFS	18
Bessemer Bend	BLM	42
Fort Fetterman	Wyoming State Parks	4.4
Edness K. Wilkins State Park	Wyoming State Parks	23
Glendo State Park	Wyoming State Parks	36
Wyoming Pioneer Museum	Wyoming State Parks	12
Ayres Park and Natural Bridge	Wyoming State Parks	9
North Platte River Access:		
PP&L	Wyoming Game and Fish	6.5
Bixby	Wyoming Game and Fish	2.5
South Douglas	Wyoming Game and Fish	13
Orin Junction Bridge	Wyoming Game and Fish	25
Glendo	Wyoming Game and Fish	42
Mills Bridge	Wyoming Game and Fish	31
Paradise Valley/Robertson Road	Wyoming Game and Fish	35
Speck/Bessemer/Hartnett	Wyoming Game and Fish	42
Schmitt	Wyoming Game and Fish	43
Sechrist	Wyoming Game and Fish	44
Casper Mountain	Natrona County	32
Hogadon Ski Area	Casper City	33
Bozeman Trail	Various Agencies	in Project and beyond (Monument is 32 miles)
Child's Cutoff Trail	Various Agencies	in two-mile Buffer Area and beyond

As shown on Figures 2.2-2 and 1-2 in Section 1, there are public lands scattered within the proposed project area and surrounding two-mile buffer area. Some of the public land parcels outside of the proposed project are accessible via public roads and provide potential dispersed recreational opportunities, such as hunting. Within the proposed project, there are four parcels of state land and four parcels of BLM-managed federal land. Of these, only three parcels (all of which are BLM-managed lands) are adjacent to public roadways.

In addition to the recreational sites on public lands shown in Table 2.2-4, larger communities in the 50-mile area provide a variety of recreational opportunities. These include municipal and private campgrounds, golf courses, rodeo grounds, parks, ball parks, recreation centers, and swimming pools.

There is one residence within the proposed project. Table 2.2-5 shows the distance to the nearest residence from the center of the proposed project for each 22-1/2 degree sector centered on each of 16 compass points. It also shows distance to the nearest site boundary for residences outside the Project. Outside of the proposed project, the nearest residence sites are less than 500 feet from the proposed project boundary as displayed in Table 2.2-5 and shown on Figure 2.2-2.

Table 2.2-5: Distance to Nearest Residence and Site Boundary from Center of the Proposed Project for Each Compass Sector

Compass Sector[1]	Nearest Residence (miles)	Nearest Site Boundary (feet/mile)
North	11.0	42,240/8.0
North-Northeast	23.7	107,302/20.3
Northeast	3.8	2,485/0.5
East-Northeast	20.6	93,936/17.6
East	18.8	75,946/14.4
East-Southeast	5.8	7,944/1.5
Southeast	5.0	3,992/0.8
South-Southeast	3.9	1,697/0.3
South	3.2	11,207/2.1
South-Southwest	3.9	5,734/1.1
Southwest	4.5	18,322/3.5
West-Southwest	10.4	31,649/6.0
West	Within Proposed Project Area	Within Proposed Project Area
West-Northwest	3.2	251/.05
Northwest	3.6	261/.05
North-Northwest	7.7	24,211/4.6

[1] 22 1/2 degree sectors centered on each of the 16 compass points

2.2.2.1 Oil and Gas Development

The proposed project is located within the Powder River Basin Uranium District, which extends across portions of southern Montana and Sheridan, Campbell, Johnson, and Converse counties in Wyoming. In addition to uranium, the Powder River Basin contains major deposits of coal, coal bed methane (CBM) and other petroleum resources. These resources are more prevalent in the northern portion of the Powder River Basin. In the southern Powder River Basin (the portion that includes the proposed project), coal and CBM resources are less prevalent (Office of Federal and State Materials, 2008). There have not been any coal mines or CBM wells in the two-mile buffer area. The Dave Johnson Power Plant, located six miles east of Glenrock (but outside of the two-mile buffer area), produces electricity with coal produced in the Powder River Basin.

Wells in the two-mile buffer area have since been plugged and abandoned or permits have expired. Wyoming Oil and Gas Conservation Commission data accessed in December 2008 (WOGCC, 2008) indicated only one active oil and gas well site within the two-mile radius buffer area. The other nearest active location is a permit to drill approximately three miles north of the proposed project area.

The administering agency for split estate minerals (private surface and federal subsurface minerals) is the Casper Field Office of the Bureau of Land Management.

2.2.2.2 Aesthetics

The proposed project is located on flat to rolling grasslands that are typical landscapes in the Powder River Basin. The proposed project landscape is rural in character, with some rural residential development along the northwest portion of the proposed project.

The BLM has assigned Visual Resource Management (VRM) classifications to all lands within each BLM Region, including private lands and lands managed by other agencies. There are no Class I areas within 50 miles of the proposed project. Class I is the most visually sensitive classification. VRM Class II areas within 50 miles of the proposed project are generally south of Interstate 25 along the Laramie Mountains and along the North Platte River. Areas of extensive urban modification and several areas of oil, natural gas, and coal production (such as Natrona and Converse Counties near Casper and Douglas) have been classified as VRM Class IV or V/Rehabilitation. The majority of the proposed project area falls within a VRM Class IV area with portions classified as Class III areas (Office of Federal and State Materials, 2008). Detailed discussion of VRM classifications and evaluations is presented in Section 2.4.2.

2.2.2.3 Transportation and Utilities

The primary transportation routes from the nearest communities are on State Highway 95 from Glenrock and State Highway 93 to Douglas. Both Glenrock and Douglas are connected to the nearest largest city (Casper) by Interstate 25. Average Annual Daily Traffic counts on Highway 95 near Rolling Hills were 1,810 vehicles in 2006. On Highway 93 near Orpha, Average Annual Daily Traffic count was 340 vehicles in 2006. (Office of Federal and State Materials, 2008). One county road, Leuenberger Lane, crosses the project area. Several other county and private roads cross lands within the two-mile buffer area.

Railroad lines parallel both sides of the North Platte River south of the project area within the two-mile buffer area.

There are several oil and gas pipelines and overhead utilities across both the proposed project and the two-mile buffer area.

2.2.2.4 Fuel Cycle Facilities

The NRC website (US NRC, 2007) provides maps and information on nuclear fuel cycle facilities in the United States. The nearest uranium fuel fabrication facility is located in Richland, Washington. The only conversion facility in the U.S. is in Illinois, and the only gaseous diffusion enrichment facility is in Kentucky.

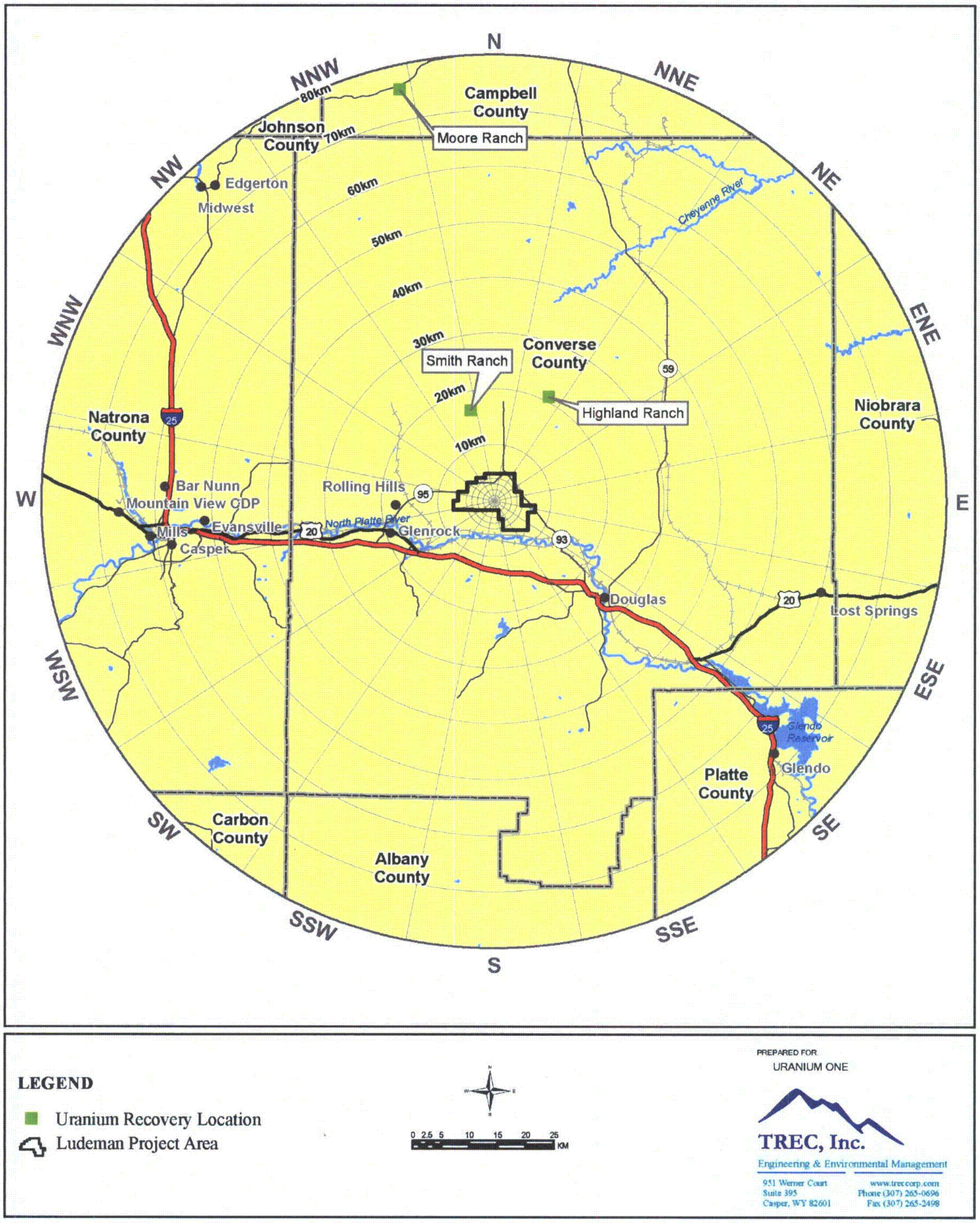
Several uranium projects occur or are proposed within a fifty-mile radius of the proposed project as shown on Figure 2.2-3. These sites are listed in Table 2.2-6. The nearest operational *in situ* uranium recovery facility is the Smith Ranch ISR facility. Smith Ranch is the only currently producing uranium facility in Wyoming.

Table 2.2-6: Uranium Recovery Facilities Located or Proposed within 50-Mile Radius of the Proposed Ludeman Project

Facility	Owner	Status	Description
Smith Ranch	Power Resources, Inc., dba Cameco Resources	Operating	The Smith Ranch-Highland Uranium Project is the primary processing facility for Cameco operations. Intend to expand.
Highland Ranch	Power Resources, Inc dba Cameco Resources	Operating	ISR Satellite facility to Smith Ranch – Highland Uranium Project
Moore Ranch	Uranium One	Licensed	ISR project
Reynolds Ranch	Power Resources, Inc dba Cameco Resources	Proposed	ISR Project
Allemand-Ross	Uranium One	Proposed	ISR Project

Note: ISR = *In situ* Recovery

Figure 2.2-3: Uranium Recovery Facilities Within 80 Kilometers (50 miles) of Proposed Project



2.2.3 Uses of Adjacent Waters

This section examines the nature and extent of present and projected water use in the Project. Preliminary data were obtained from several sources followed by field studies to collect on-site data. NUREG 1569 requires review and discussion of water use in the Project and within a two-mile radius surrounding the proposed project.

2.2.3.1 Surface Water

The proposed project and two-mile buffer area are located in the northeastern portion of the Middle North Platte-Casper Basin, Hydrologic Unit Code (HUC) 10180007. The Middle North Platte-Casper Basin is a part of the Pathfinder to Guernsey Subbasin in the Platte River Basin. The proposed project and two-mile buffer area drain into the North Platte River, directly south of the proposed project and within the southern portion of the two-mile buffer area (Figure 2.2-4).

There are three watersheds within the two-mile Buffer Area, including the proposed project: Box Elder Creek, North Platte River-Sand Creek and Sage Creek (Figure 2.2-5). The Sage Creek watershed flows through the eastern portion of the proposed project. Little Sand Creek and Running Dutchman Ditch sub-watersheds drain the remainder of the project, which are both part of the North Platte River-Sand Creek Watershed.

The Platte River Basin is a part of the Missouri-Mississippi River Basin. The North Platte River originates in the mountains of North Central Colorado. From the mountains the North Platte flows east through Casper, WY, Douglas, WY and then through Orin, WY. After Orin, WY it enters the Glendo Reservoir and then the Guernsey Reservoir in Wyoming before flowing southeast to Nebraska. In Nebraska, the confluence of the North Platte and South Platte create the Platte River, which flows east into the Missouri River.

The Platte River Basin receives between eight and 12 inches of precipitation annually (Trihydro 2006). The mean annual precipitation for the project from 1948 through 2006 is 12.48 inches (WRCC). The majority of the stream flow occurs from snow melt runoff. Large summer storms have the potential to create high runoff volumes.

Figure 2.2-4: Surface Water Drainage Basins and Gauging Locations in Vicinity of the Proposed Project

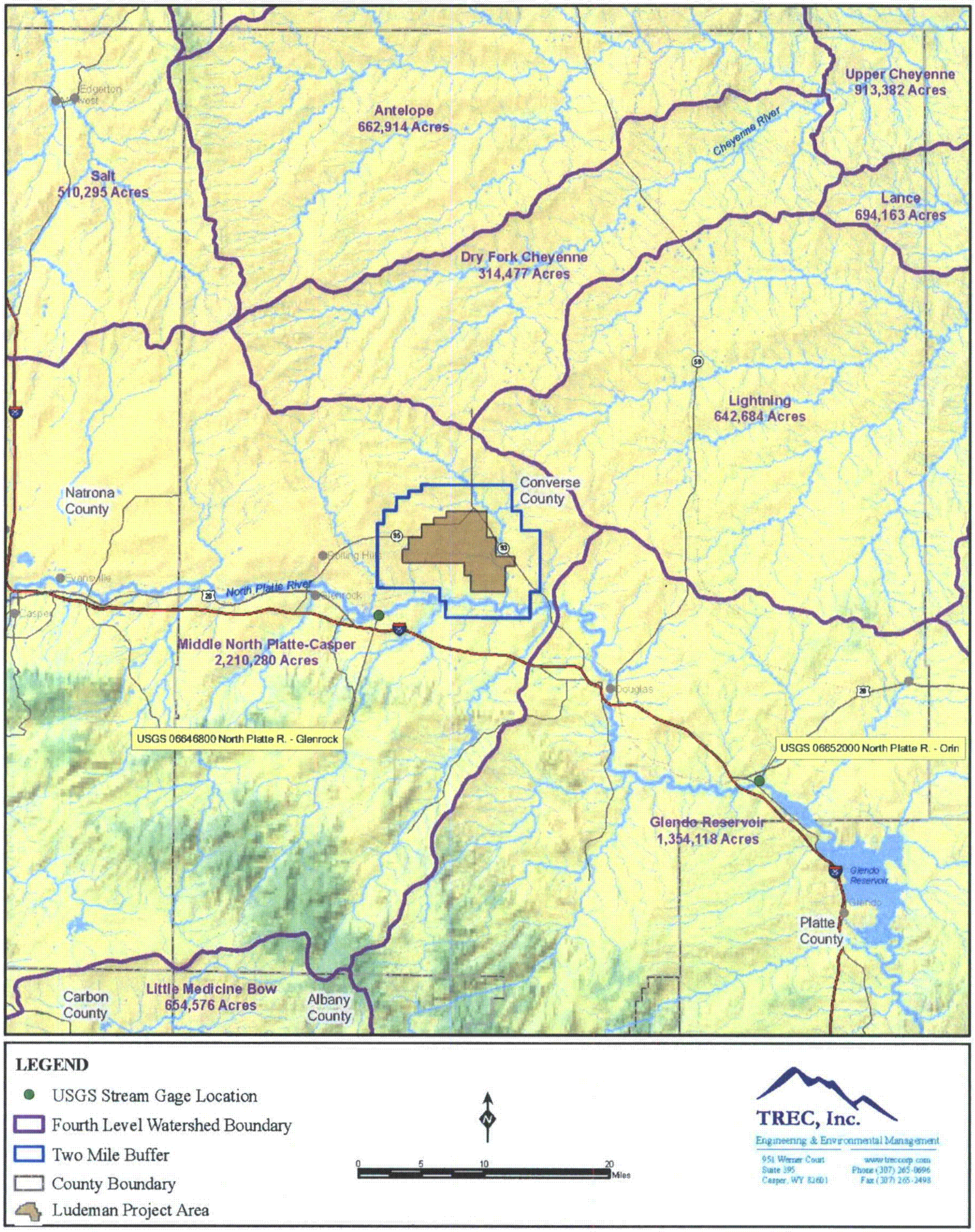
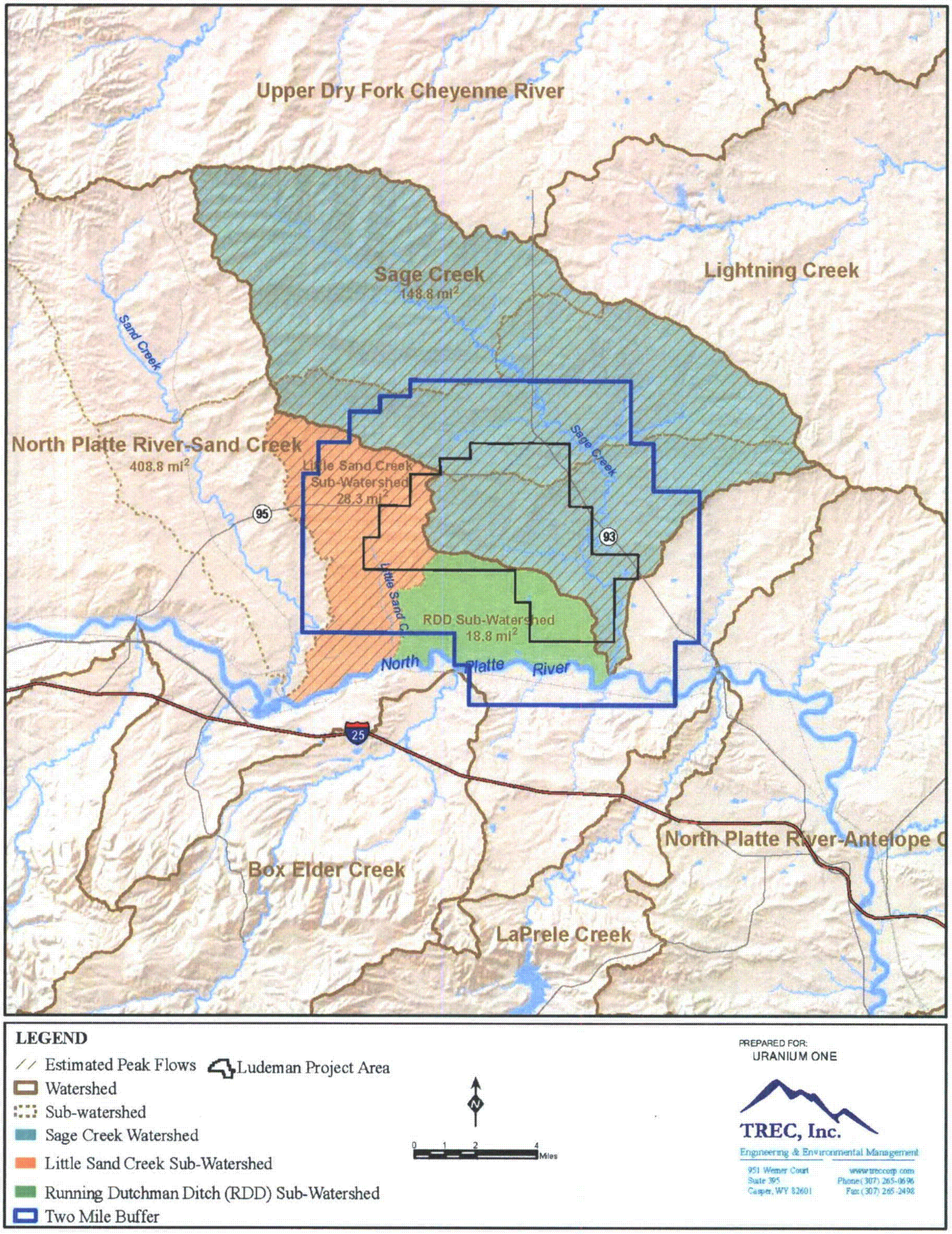


Figure 2.2-5: Watersheds, Proposed Ludeman Project



2.2.3.1.1 Surface Water Quantity

There are no United States Geological Buffer (USGS) automated data collection sites within the boundaries of the proposed project or the two-mile buffer area. The nearest automated, real-time stream gauge is Orin, WY gauge (USGS 06652000) which is approximately 40 miles downstream on the North Platte. Historical data is available for three pertinent sites: 'Running Dutchman Canal' (USGS 06647000), 'Sand Creek' (USGS 06646780) and 'North Platte River - Douglas' (USGS 06650000). The nearest upstream historical gauge on the North Platte is the Glenrock gauge USGS (06646800). The Running Dutchman Canal gauge is within the two-mile buffer area and is located south of the proposed project boundary, just east of the diversion of the Running Dutchman Ditch from the North Platte. The Sand Creek gauge, near Glenrock, receives runoff from the west edge of the two-mile Buffer Area. Sand Creek, Running Dutchman Canal and Glenrock gauges are located within the Middle North Platte-Casper Basin (HUC 10180007). The 'North Platte River - Douglas' gauge is on the North Platte River downstream of the proposed project area.

Flood frequency analysis was performed for the North Platte upstream at Glenrock historical gauge (Figure 2.2-6) and downstream at Orin (Figure 2.2-7) automated real-time gauge records using the USGS standard method, in which a log-Pearson Type III frequency distribution is fit to the logarithms of the annual peak flow cumulative distribution. Parameters of the log-Pearson Type III were estimated from the logarithmic peak flows (mean, standard deviation, and coefficient of skewness) with adjustments for low and high outliers, historic peaks and generalized skew (USGS 1982). Log-Pearson III flood frequency analysis results in a ten-year flood magnitude (i.e., a flood that has the probability of occurring once every ten years) of about 8,500 cubic feet per second (cfs) for the Glenrock gauge and 12,800 cfs for the Orin gauge and a 100-year flood of about 13,700 cfs for the Glenrock Gauge and 24,000 cfs for the Orin gauge. Additional detail regarding surface water hydrology is presented in Section 2.7.1.

Figure 2.2-6: Glenrock Gauge Flow Probability Distribution, North Platte River

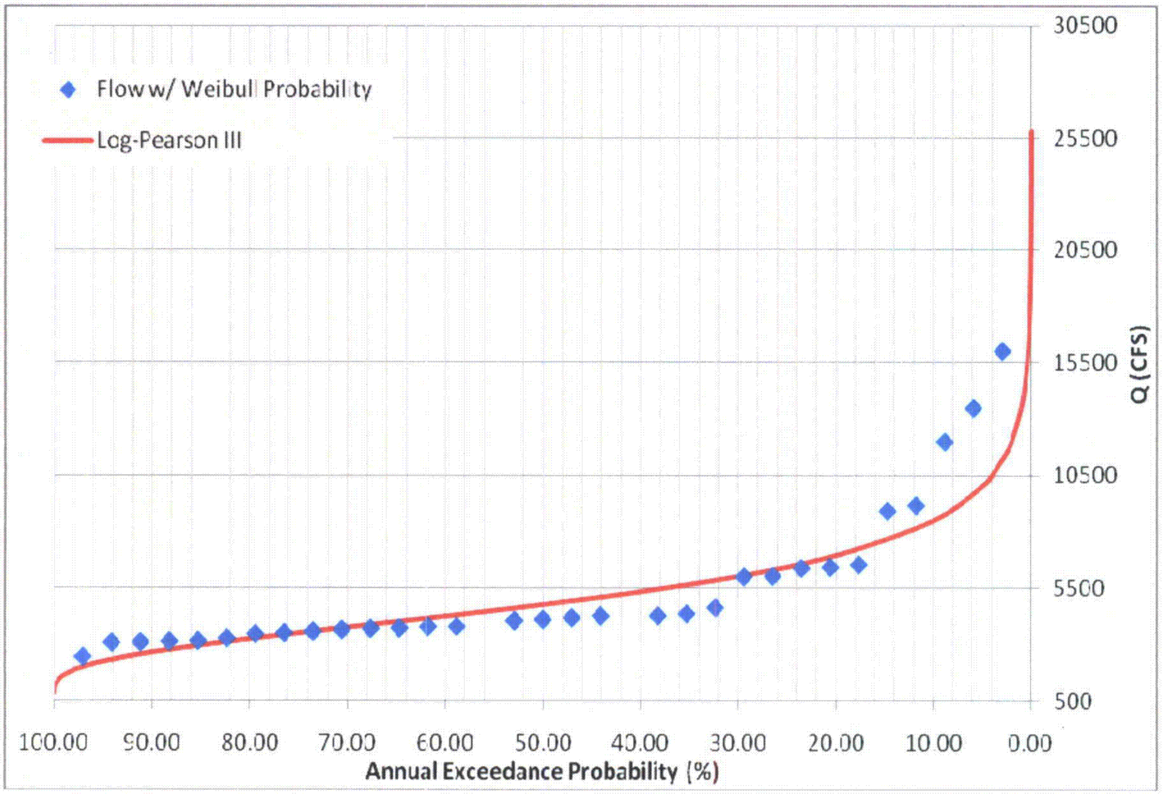
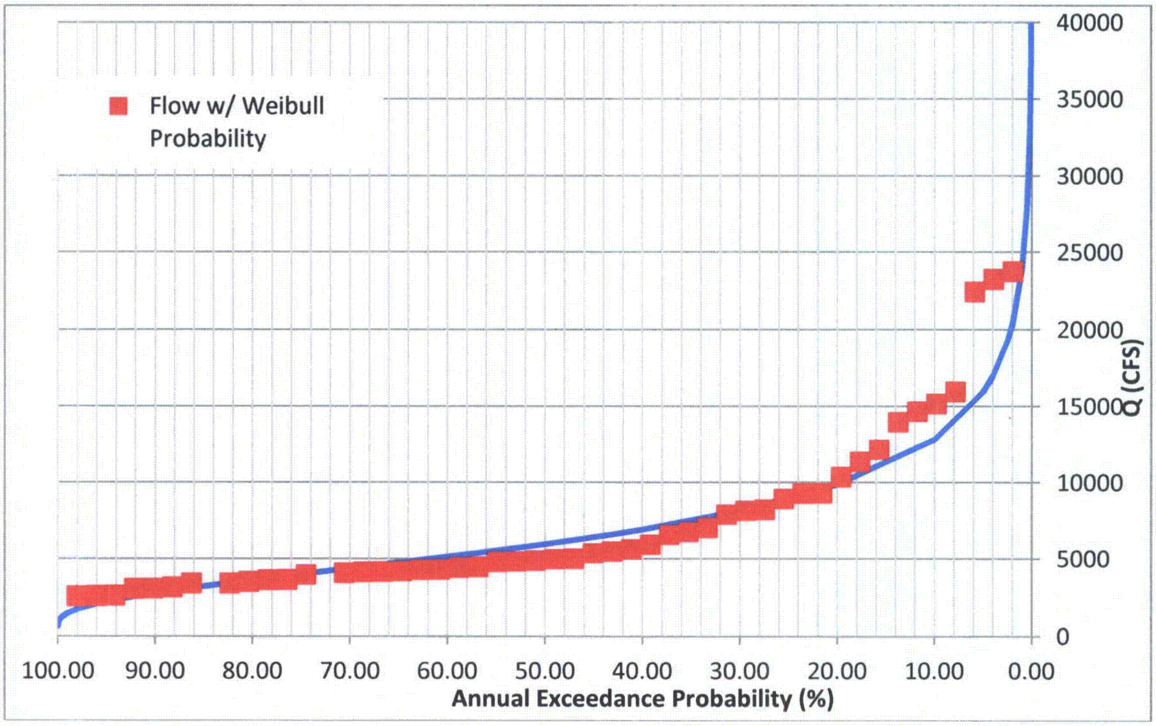


Figure 2.2-7: Orin Gauge Flow Probability Distribution, North Platte River



Surface water permit types within both a two-mile and 0.5-mile radius of the proposed project boundary are presented in Table 2.2-7 (WYSEO 2008). The majority of the surface water permits are held for irrigation.

Table 2.2-7: Two-mile and 0.5-mile Surface Water Rights

Summary of Surface Water Rights		
	Two-mile Radius	0.5-mile Radius
Stock, Wetlands	1	0
Stock, Irrigation, Miscellaneous, Domestic	4	0
Stock, Irrigation, Domestic	54	0
Stock, Irrigation	159	27
Stock, Domestic	20	0
Stock	65	4
Reservoir Supply, Stock, Irrigation	5	0
Reservoir Supply, Irrigation, Domestic	11	11
Reservoir Supply, Irrigation	25	1
Reservoir Supply	9	9
Railroad, Stock, Domestic	1	0
Power, Irrigation, Domestic	33	0
Irrigation, Manufacturing, Milling	1	0
Irrigation, Domestic	94	43
Irrigation	1425	300
Industrial	15	5
Domestic, Irrigation	11	4

2.2.3.1.2 Surface Water Quality

Surface water quality data were available from one current USGS stream gage (06652000) located on North Platte River near Orin, WY, 40 miles downstream of the proposed project, from July 14, 1966 through October 30, 2008. Water quality data analyses identify a mean temperature of 11.3 degrees Celsius (°C) and a range from 0 to 26 °C. Mean dissolved oxygen was 9.7 milligrams/liter (mg/L) and ranged from 6.1 to 15.8 mg/L. Total nitrogen averaged 1.4 mg/L and ranged from 0.27 to 8.1 mg/L. Mean ammonia (as nitrogen) concentrations were 0.08 mg/L and ranged from 0.01 to 0.53 mg/L. Nitrite plus nitrate (as nitrogen) averaged 0.34 mg/L, with a range from 0.01 to 0.8 mg/L. Average phosphate was 0.21 mg/L (single sample from 1979) and average selenium (water filtered) was 4.4 μg/L (USGS 2008).

According to the Wyoming Department of Environmental Quality (WY DEQ), Sage Creek and Sand Creek are classified as 3B surface waters, meaning their designated use are for recreation, other aquatic life, wildlife, agriculture, industry, and scenic value. Boxelder Creek is classified as a 2AB surface water. Its designated use is for drinking water, game and non-game fisheries, fish consumption, other aquatic life, recreation, wildlife, agriculture, industry, and scenic value. The North Platte River is classified as a Type 2AB surface water body in the vicinity of the proposed project (WY DEQ 2001).

The North Platte River is also an EPA 303(d)-classified stream – one which does not pass Wyoming DEQ surface water quality standards. The main reason for the 303(d) listing is high selenium levels (WY DEQ 2008).

In addition to the USGS data for the Middle North Platte-Casper and the Orin gauges, water quality monitoring has been performed at the proposed project by Uranium One in the spring of 2008 though spring 2009. There are 24 surface water sampling sites within the proposed project which sample the major drainages in the proposed project. Water quality discussions are presented in detail in Sections 2.7 & 2.9.

2.2.3.2 Ground Water

The proposed project area is located in the southern portion of the Powder River Basin uranium district, approximately two miles north of the east-flowing North Platte River and approximately 34 miles east of Casper, Wyoming. The proposed project area lies within the Northern Great Plains Aquifer System. The Northern Great Plains Aquifer System contains overlapping aquifers in the Lower Tertiary, Upper and Lower Cretaceous, and Upper and Lower Paleozoic rocks. Figure 2.2-8 provides a generalized stratigraphic column of the hydrostratigraphic units of the Northern Great Plains Aquifer System. The Paleocene Lebo Member of the Fort Union Formation, the stratigraphic unit that hosts the uranium mineralization of the proposed project is overlain by the eroded

remnants of the Eocene Wasatch Formation which crops out over most of the proposed project. The Oligocene White River Formation has completely eroded away in the vicinity of the proposed project. Occasional surficial deposits of the Wasatch Formation are encountered in the vicinity of the proposed project (Whitehead 1996).

Regional movement of water in the Northern Great Plains aquifer system comes from recharge areas at high altitudes, down the dip of the aquifers and then upward to discharge into shallower aquifers or to the land surface. The regional direction of flow in the deep, confined aquifers follows long flow paths and trends from southwest to northeast. Most of the recharge to the aquifer system is either from precipitation or snowmelt. Much of the discharge from the aquifer system is by upward leakage of water into shallower aquifers where the hydraulic head in the shallower aquifer is less than that of a deeper aquifer (Whitehead 1996).

The water-bearing units in the Northern Great Plains aquifer system can be divided into six major aquifer systems. From shallowest to deepest, these include:

- Quaternary Aquifers
- Middle Tertiary Aquifers
- Lower Tertiary Aquifers
- Upper Cretaceous Aquifers
- Lower Cretaceous Aquifers
- Paleozoic Aquifers

Figure 2.2-8 presents these units along with the corresponding stratigraphic formations. The general characteristics for the various Northern Great Plains aquifer systems, including transmissivity and water yields are seen in Table 2.2-8. Section 2.7 details the aquifer systems and geologic formations applicable to the proposed project.

Figure 2.2-8: Generalized Stratigraphic Column

<table>
<tr><th>ERA</th><th colspan="3">SYSTEM, SERIES AND OTHER SUBDIVISIONS</th><th colspan="2">STATIGRAPHIC UNIT</th><th>HYDROGEOLOGIC UNIT</th></tr>
<tr><td rowspan="6">Cenozoic</td><td colspan="3">Quaternary</td><td colspan="2">Alluvium</td><td rowspan="4">Not Included As An Aquifer System</td></tr>
<tr><td rowspan="5">Tertiary</td><td>Pliocene</td><td rowspan="2">Upper</td><td colspan="2" rowspan="2">(Absent in Powder River Basin)</td></tr>
<tr><td>Miocene</td></tr>
<tr><td>Oligocene</td><td rowspan="3">Lower</td><td colspan="2">White River Formation</td></tr>
<tr><td>Eocene</td><td colspan="2">Wasatch Formation</td><td rowspan="2">Lower Tertiary Aquifers</td></tr>
<tr><td>Paleocene</td><td colspan="2">Fort Union Formation</td></tr>
<tr><td rowspan="16">Mesozoic</td><td colspan="2" rowspan="12">Cretaceous</td><td rowspan="4">Upper</td><td colspan="2">Lance Formation</td><td rowspan="2">Upper Cretaceous Aquifers</td></tr>
<tr><td colspan="2">Fox Hills Sandstone</td></tr>
<tr><td colspan="2">Lewis Shale</td><td rowspan="8">Confining Unit</td></tr>
<tr><td colspan="2">Mesaverde Formation</td></tr>
<tr><td rowspan="8">Lower</td><td colspan="2">Steele Shale</td></tr>
<tr><td colspan="2">Cody Shale</td></tr>
<tr><td colspan="2">Frontier Formation*</td></tr>
<tr><td colspan="2">Mowry Shale</td></tr>
<tr><td colspan="2">Muddy Sandstone*</td></tr>
<tr><td colspan="2">Thermopolis Shale</td></tr>
<tr><td rowspan="2">Inyan Kara Group</td><td>Fall River Formation</td><td rowspan="2">Lower Cretaceous Aquifers</td></tr>
<tr><td>Lakota Formation</td></tr>
<tr><td colspan="3" rowspan="3">Jurassic</td><td colspan="2">Morrison Formation</td><td rowspan="5">Confining Unit</td></tr>
<tr><td colspan="2">Sundance Formation*</td></tr>
<tr><td colspan="2">Gypsum Spring Formation</td></tr>
<tr><td colspan="3">Triassic</td><td colspan="2">Chugwater Formation</td></tr>
<tr><td rowspan="4">Paleozoic</td><td colspan="3">Permian</td><td colspan="2">Goose Egg Formation</td></tr>
<tr><td colspan="3" rowspan="2">Pennsylvania</td><td>Tensleep Sandstone</td><td>Minnelusa Formation</td><td rowspan="3">Upper Paleozoic Aquifers</td></tr>
<tr><td colspan="2">Amsden Formation</td></tr>
<tr><td colspan="3">Mississipian</td><td colspan="2">Madison Formation</td></tr>
</table>

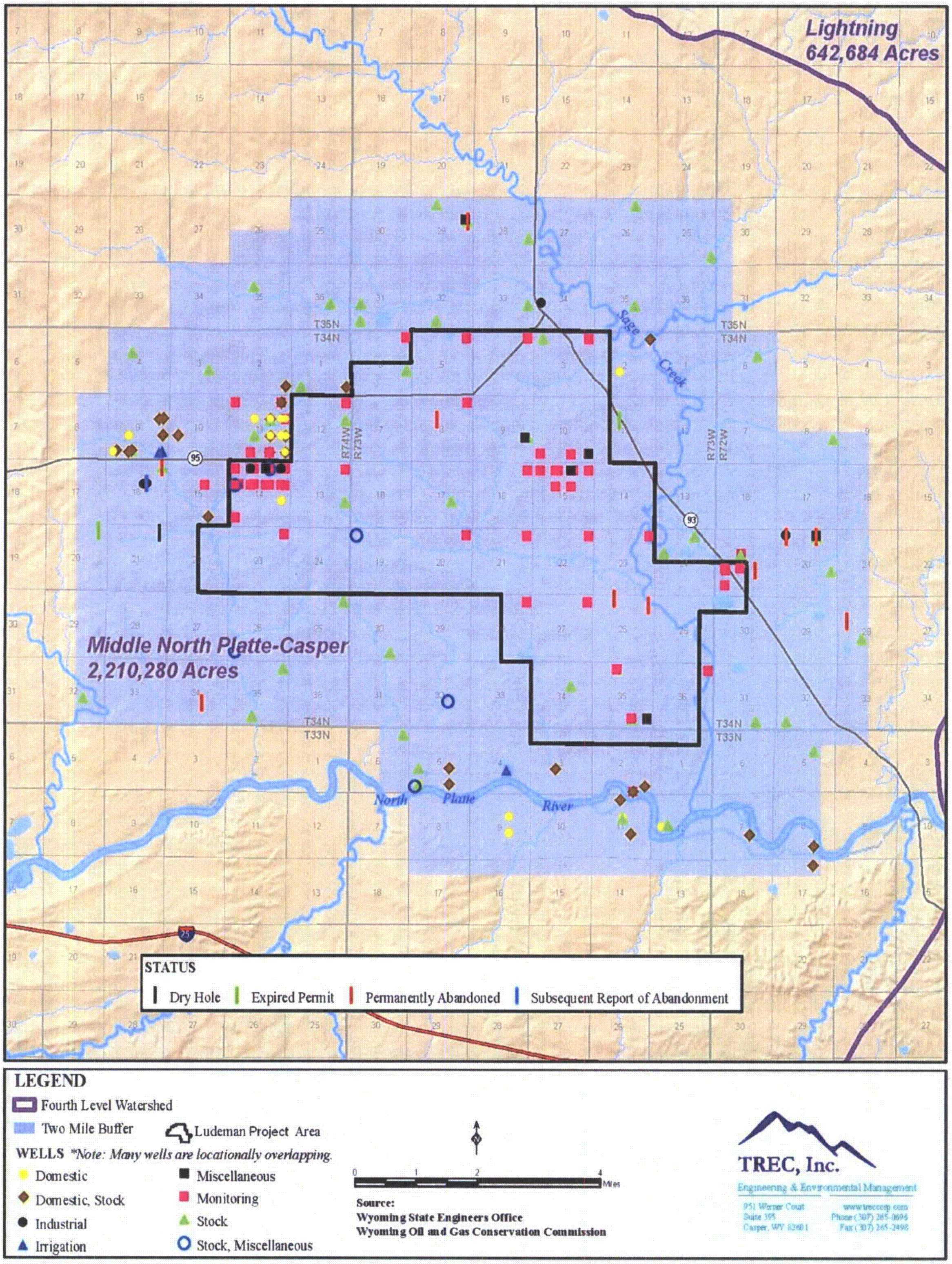
* Can be a local source of groundwater where permeable

2.2.3.2.1 Ground Water Quantity

According to the Wyoming State Engineers Office, there are 415 well permits located within two miles of the proposed project boundary as of November, 2008. Most of the groundwater pumped from active wells buffered within two miles of the proposed project boundary is used either for stock or monitoring. Groundwater rights within the proposed project are presented in Addendum 2.7A.

Figure 2.2-9 shows the locations of the water wells in the proposed project and within two miles of proposed project boundary. The WSEO has record of more wells than are shown on the map, as the well data is provided on a quarter-quarter basis and several wells may occur within a given quarter-quarter of a section. The list of wells on the map are identified in Addendum 2.7A. Within two miles of the proposed project, 67 domestic and 52 domestic/stock water wells exist, ranging from five to 360 feet in depth. Although the one residence within the proposed project is known to have a domestic well, and that well was sampled as part of baseline environmental evaluations for this License Amendment Application, no information was found regarding the well, from the WSEO or other sources.

Figure 2.2-9: Well Locations



Within two miles of the proposed project, there are 13 industrial wells. There are eight irrigation wells. There are 15 miscellaneous wells. There are 165 monitoring wells and one test well ranging from 100 to 619 feet in depth. The 49 stock wells within the two-mile area range from 14 to 72 feet in depth. In addition, nine other stock water wells are located within the proposed project. These nine wells have depths ranging between 90 and 340 feet below ground surface (bgs). Seven additional monitoring/industrial wells and one reservoir supply/industrial well exist within the two-mile radius of the proposed project. (WSEO 2008)

The Wyoming State Engineers Office lists 43 of these wells as abandoned and 109 cancelled. There are another 43 which are unadjudicated. The remaining are in good standing or in good standing but have incomplete notices.

The Wyoming Oil and Gas Conservation Commission lists 15 wells within the two-mile radius. There are 11 permanently abandoned wells, two expired permits, one dry hole and one subsequent report of abandonment.

Table 2.2-8 identifies the general water-producing characteristics of the Northern Great Plains aquifers systems. Water use estimates for Converse County for different water use types are presented in Table 2.2-9.

Table 2.2-8: General Characteristics of the Northern Great Plains Aquifer Systems and Hydrogeological Formations

Aquifer System	Formations	General Transmissivity (gpd/ft).	General Water Yields (gpm)
Quaternary Aquifers	Alluvium, Terrace, and Eolian Deposits	15 to 64,000	Up to 1,000
Middle Tertiary Aquifers	Arikaree Formation	Up to 77,000	Up to 1,000
Lower Tertiary Aquifers	Wasatch and Fort Union Formations	1 to 5,000	1 to 60
Upper Cretaceous Aquifers	Lance and Fox Hills Formations	76 to 2,100	Up to 350 (Lance) and 700 (Fox Hills)
Lower Cretaceous Aquifers	Dakota Sandstone Formation	0-900	Up to 150
Paleozoic Aquifers	Madison Limestone Formation	1,000 to 300,000	Up to 1,000

(HKM et al. 2002).

Table 2.2-9: Estimated Water Use in Converse County, Wyoming

Water Use	Units	1995	2000
Public supply, total population served	thousands	8.93	8.6
Public supply, GW , fresh	Mgal/d	1.86	2.29
Public supply, SW , fresh	Mgal/d	0.01	0.08
Public supply, total , fresh	Mgal/d	1.87	2.37
Domestic, self-supplied population	thousands	3.03	3.45
Domestic, GW self-supplied , fresh	Mgal/d	0.22	0.26
Domestic, SW self-supplied , fresh	Mgal/d	0.01	0
Domestic, total self-supplied , fresh	Mgal/d	0.23	0.26
Industrial, GW self-supplied , total	Mgal/d	0.02	0.01
Industrial, SW self-supplied , total	Mgal/d	0.02	0.01
Industrial, total self-supplied , total	Mgal/d	0.04	0.02
Irrigation, acres irrigated, sprinker	thousands	5.00	3.98
Irrigation, acres irrigated, microirrigation	thousands	0.01	0.01
Irrigation, acres irrigated, surface (flood)	thousands	39.90	31.8
Irrigation, acres irrigated, total	thousands	44.91	35.79
Irrigation, GW , fresh	Mgal/d	0.89	4.09
Irrigation, SW , fresh	Mgal/d	40.18	184.35
Irrigation, total , fresh	Mgal/d	41.07	188.44
Aquaculture, total , fresh	Mgal/d	0.02	
Livestock, total , fresh	Mgal/d	0.72	
Mining GW , total	Mgal/d	6.36	16.49
Mining SW , total	Mgal/d	1.79	4.46
Mining, total	Mgal/d	8.15	20.95
Thermoelectric once-through, SW , total	Mgal/d		178.7
Thermoelectric closed-loop, total	Mgal/d		7.47
Thermoelectric, total	Mgal/d	173.71	186.17
Total GW , fresh	Mgal/d	8.29	19.3
Total GW , saline	Mgal/d	1.30	3.84
Total GW , total	Mgal/d	9.59	23.14
Total SW , fresh	Mgal/d	216.24	375.07
Total SW , saline	Mgal/d	0.00	0
Total SW , total	Mgal/d	216.24	375.07

Source: Hutson et al. 2000 and Solley et al. 1995
Notes: GW = Groundwater
SW = Surface water
Estimated Water Use in Converse County for five year periods ending in 1995 and 2000

Agricultural, industrial and municipal uses comprise the majority of the ground water use in the Pathfinder to Guernsey sub-basin. Agricultural wells primarily draw from Quaternary and/or Late Tertiary aquifers. Industrial wells for power, mining and petroleum primarily use the Quaternary aquifer. Of the total permitted ground water rights in the Pathfinder to Guernsey sub-basin, agricultural uses accounts for 53 percent, industrial uses account for 25 percent, municipal uses account for 20 percent and domestic uses accounts for approximately three percent of the permitted groundwater consumption (Trihydro 2006).

Predicted groundwater use is contained to the Quaternary, Late Tertiary and Late Paleozoic Aquifers. The Quaternary aquifer can supply large quantities of water, but since it is potentially connected to the North Platte River the aquifer can quickly become contaminated. The Late Tertiary has potential for future industrial, stock and domestic use. Late Paleozoic does not have the same hydrogeological data as the Quaternary and Late Tertiary. For the Late Paleozoic to be developed, more research must be done to make this aquifer only cost effective for large establishments such as municipal water systems (Trihydro 2006).

2.2.3.2.2 Ground Water Quality

Ground water quality is naturally dependent on aquifer rock type, aquifer depth and aquifer flow. Ground water wells within the proposed project yield water from the Fort Union Formation.

Uranium One has conducted groundwater quality sampling at 34 monitoring wells within the project area. These samples were analyzed for the water quality constituents listed in Table 2.2-10. The objective of this sampling was to characterize the water quality in the target formation and surrounding aquifers. Sample collection and preservation were performed using standard EPA methods. A summary of the results for the 2008-2009 groundwater quality monitoring data is presented in Section 2.7.

Table 2.2-13: Ground Water Sampling Parameters

Ground Water Sampling Parameters						
Parameter	State	TestNo.		Parameter	State	TestNo.
A/C Balance (± 5) (%)	DIS	Calculation		Potassium (mg/L)	DIS	E200.7
Anions (meq/L)	DIS	Calculation		Selenium (mg/L)	DIS	E200.8
Bicarbonate as HCO3 (mq/L)	DIS	A2320 B		Silica (mg/L)	DIS	E200.7
Carbonate as CO3 (mg/L)	DIS	A2320 B		Sodium (mg/L)	DIS	E200.7
Cations (meq/L)	DIS	Calculation		Uranium (mg/L)	DIS	E200.8
Chloride (mg/L)	DIS	A4500-Cl B		Vanadium (mg/L)	DIS	E200.8
Conductivity (umhos/cm)	DIS	A2510 B		Zinc (mg/L)	DIS	E200.8
Fluoride (mg/L)	DIS	A4500-F C		Iron (mg/L)	TOT	E200.7
pH (s.u.)	DIS	A4500-H B		Manganese (mg/L)	TOT	E200.7
Solids, Total Dissolved Calculated (mg/L)	DIS	Calculation		Gross Alpha (pCi/L)	DIS	E900.0
Solids, Total Dissolved TDS @ 180 C (mg/L)	DIS	A2540 C		Gross Alpha MDC (pCi/L)	DIS	E900.0
TDS Balance (0.80 - 1.20) (dec. %)	DIS	Calculation		Gross Beta (pCi/L)	DIS	E900.0
Sulfate (mg/L)	DIS	A4500-SO4 E		Gross Beta MDC (pCi/L)	DIS	E900.0
Nitrogen, Ammonia as N (mg/L)	DIS	E350.1		Lead 210 (pCi/L)	DIS	E909.0M
Nitrogen, Nitrate+Nitrite as N (mg/L)	DIS	E353.2		Lead 210 MDC (pCi/L)		E909.0M
Aluminum (mg/L)	DIS	E200.8		Polonium 210 (pCi/L)	DIS	RMO-3008
Arsenic (mg/L)	DIS	E200.8		Radium 226 (pCi/L)	DIS	E903.0
Barium (mg/L)	DIS	E200.8		Radium 226 MDC (pCi/L)	DIS	E903.0
Boron (mg/L)	DIS	E200.7		Radium 228 (pCi/L)	DIS	RA-05
Cadmium (mg/L)	DIS	E200.8		Radium 228 MDC (pCi/L)	DIS	RA-05
Calcium (mg/L)	DIS	E200.7		Thorium 230 (pCi/L)	DIS	E907.0
Chromium (mg/L)	DIS	E200.8		Lead 210 (pCi/L)	SUS	E909.0M
Copper (mg/L)	DIS	E200.8		Lead 210 MDC (pCi/L)		E909.0M
Iron (mg/L)	DIS	E200.7		Polonium 210 (pCi/L)	SUS	RMO-3008
Lead (mg/L)	DIS	E200.8		Radium 226 (pCi/L)	SUS	E903.0
Magnesium (mg/L)	DIS	E200.7		Radium 226 MDC (pCi/L)	SUS	E903.0
Manganese (mg/L)	DIS	E200.8		Radium 228 (pCi/L)		RA-05
Mercury (mg/L)	DIS	E200.8		Radium 228 MDC (pCi/L)		RA-05
Molybdenum (mg/L)	DIS	E200.8		Thorium 230 (pCi/L)	SUS	E907.0
Nickel (mg/L)	DIS	E200.8		Uranium (mg/L)	SUS	E200.8

2.2.4 Precautions and Impacts

2.2.4.1 Potential Impacts to Local Surface/Groundwater Quantity, Quality and Use

Potential impacts to water resources from mining and restoration activities may include:

- Impacts to surface water from construction and decommissioning activities;
- Groundwater consumption;
- Impacts to groundwater quality from direct mining activities; and
- Impacts to groundwater and surface water quality from accidental spills.

These potential impacts are described in the following sub-sections.

2.2.4.1.1 Impacts to Surface Water from Construction and Decommissioning Activities

Normal construction activities within the well fields, process plants, and along the pipeline and road alignments have the potential to increase the sediment yield of the disturbed areas. However, the relative size of these disturbances is small when compared to the size of the overall areas and to the size of the watersheds. Additionally, best management practices will be designed and used to minimize or prevent sediment mobilization and transport. Additionally, because field decommissioning and reclamation activities will be on-going throughout the life of the project, as described in Sections 1.8, the area to be reclaimed at the conclusion of operations will be significantly minimized.

2.2.4.1.2 Groundwater Consumption

Minimal effects to the existing aquifer as a result of drawdown are anticipated. Based on a bleed of 0.5 percent to 1.5 percent which has been successfully applied at other ISR operations, the potential impact from consumptive use of groundwater is expected to be minimal. In this regard, as described in Section 3.1.5, the vast majority (e.g., on the order of 99 percent) of groundwater used in the mining process will be treated and re-injected. No significant impacts are anticipated to private wells in the project areas due to the confining layers between the aquifer zones to be mined and the zones that are the source of water for other uses. The properties of geologic confining layers and the relationship between the screened intervals of the private wells and the mining wells are described in Section 2.7.2. If it is determined that potential impacts from ISR operations may occur, then mitigation measures such as deepening private wells into a separated aquifer can be implemented.

2.2.4.1.3 Potential Groundwater Quality Impacts

Potential water quality impacts in adjacent aquifers from ISR mining activities are related to the identification, control, and clean-up of excursions. During production, injection of the lixiviant into the wellfield results in a temporary degradation of water quality compared to pre-mining conditions. Movement of this water out of the wellfield would result in an excursion. Excursions of lixiviant at ISR facilities have the potential to contaminate adjacent aquifers with radioactive and trace elements that have been mobilized by the mining process. These excursions are typically classified as horizontal or vertical. A horizontal excursion is a lateral movement of mining solutions outside the mining zone of the ore-body aquifer. A vertical excursion is a movement of solutions into overlying or underlying aquifers.

Horizontal excursions of contaminated groundwater in a wellfield can result from an improper balance between injection and recovery rates, undetected high permeability strata or geologic faults, improperly abandoned exploration drill holes, discontinuity and unsuitability of the confining units which allow movement of the lixiviant out of the ore zone, poor well integrity, or hydrofracturing of the ore zone or surrounding units. Past experience from other commercial scale *in situ* recovery projects in Wyoming has shown that when proper steps are taken in monitoring and operating a wellfield, excursions, if they do occur, can be controlled and recovered and that serious impacts on the groundwater are prevented.

The historical experience at other ISR uranium operations indicates that the selected excursion indicator parameters and UCLs (Upper Control Limits) allow detection of horizontal excursions early enough that corrective action can be taken before water quality outside the exempted aquifer boundary is significantly degraded. As noted in NUREG/CR-6733, significant risk from a horizontal excursion would occur only if it persisted for a long period without being detected.

Vertical excursions can be caused by improperly cemented well casings, well casing failures, improperly abandoned exploration wells, or leaky or discontinuous confining layers.

The State of Wyoming and the NRC require restoration of affected groundwater in the mining zone following production activities. Uranium One will be required to return the groundwater in the mining zone to baseline water quality conditions as a primary goal or to class of use standards. The mining aquifer must be exempted by the WYDEQ and the EPA from protection under the Safe Drinking Water Act (SDWA) before mining can occur. One of the criteria for exemption is that the water in the mining zone is not currently used as an underground source of drinking water (USDW) and will not be used as a USDW in the future. By restoring the exempted aquifer, Uranium One ensures that adjacent, non-exempted aquifers will not be affected in the future.

Successful groundwater restoration has been demonstrated using the same methods proposed by Uranium One as discussed in Section 6. Therefore, long term impacts on groundwater quality are expected to be minimal.

2.2.4.1.4 Impacts to Groundwater and Surface Water Quality from Accidental Spills

The rupture of an injection or recovery line in a wellfield, or a trunkline between a wellfield and the satellite facilities, would result in a release of injection or production solution which could contaminate the ground in the area of the break. Potential impacts to groundwater and surface water may occur during operations as a result of an uncontrolled release of process liquids due to a wellfield leak. Should an uncontrolled wellfield release

occur, there could be a potential for contamination of the shallow aquifer as well as surrounding soil. With a slow leak that remains undiscovered or a catastrophic failure, a shallow excursion is one potential impact.
All piping from the Satellite facilities, to and within the wellfields will be buried for frost protection. This also reduces the potential for damage due to vehicles, animals or fatigue from large changes in temperatures over time. Pipelines will be constructed of high density polyethylene (HDPE) with butt welded joints, or equivalent. All pipelines will be pressure tested at operating pressures, prior to final burial and production flow. As described below, routine maintenance and operational evaluation activities that monitor the integrity of the system will also be performed.

Each wellfield will have a number of header houses where injection and production wells will be continuously monitored for pressure and flow. Individual wells may have high and low flow alarm limits set. All monitored parameters and alarms will be observed in the control room via the computer system. In addition, each header house will have a "wet building" alarm to detect the presence of any liquids in the building sump. High and low flow alarms have been proven effective in detection of significant piping failures (e.g., failed fusion weld).

Occasionally, small leaks at pipe joints and fittings in the headerhouses or at the wellheads may occur. Until remedied, these leaks may drip process solutions onto the underlying soil. Uranium One will implement a program of continuous wellfield monitoring by roving wellfield operators and will require periodic inspections of each well that is in service. Small leaks in wellfield piping may occur in the injection system due to the higher system pressures. These leaks seldom result in soil contamination requiring immediate clean up under NRC regulations. Following repair of a leak, Uranium One will require that the affected soil be buffered for contamination and the area of the spill documented. If contamination is detected, the soil is sampled and analyzed for the appropriate radionuclides. Based on analytical results soils may be removed and disposed, as appropriate.

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Table 2.2-3 Source:
NASS 2008

Table 2.2-6 Source:
U.S. NRC 2008

Figure 2.2-2 Notes and Sources:

Figure 2.2-2 (Land Use Within Two-Mile Ludeman Buffer Area) was prepared using a variety of sources. The primary data source was the agricultural land use map from the Wyoming Geographic Information Science Center at the University of Wyoming. This source has five land use categories: 'ir' for irrigated cropland, 'ni' for non-irrigated cropland, 'ur' for urban or built up, 'na' for non-agricultural land, and 'gc' for golf courses. There were no 'ur' or 'gc' polygons in the area analyzed for the two-mile proposed project buffer area Land Use map. Non-agricultural land includes all lands that are not cropland, urban or build up, or golf courses. Site visits confirmed that in the buffer area the use of non-cropland is predominately for rangeland forage.

Recreational sites were identified by using Wyoming Game and Fish Department maps. The North Platte River-Bixby Fishing Access site was the only site found to be inside the two-mile buffer area boundary. The U.S. Department of the Interior, Bureau of Land Management, Wyoming Historic Trails was the source for location of the Bozeman Trail.

Surface water was identified by overlaying the "Hydrography for Wyoming" dataset with the agricultural land use dataset and assigning a land use category of 'sw' for surface water to Hydrography polygons with a Minor1 code of '412' for wide river and '421' for lake or pond within the two-mile buffer area boundary.

Residence sites within the two-mile buffer area boundary were located using ©2008 Google Earth imagery, cross-checked against surface ownership polygons, and compared to general site reconnaissance. Due to limitations with resolution, it was not possible to always distinguish differences between houses and outbuildings. Where buildings were grouped together and isolated from other residence sites, it was assumed that these building groups were farm/ranch residence(s) and outbuildings (and identified as a single residential site for mapping purposes).

Figure 2.2-2 Sources:

©2008 Google

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