TABLE OF CONTENTS

2.0 Alternatives 2-1
2.1 No-Action Alternative 2-1
2.2 Alternatives Considered but Eliminated 2-1
2.2.1 Open Pit Mining 2-1
2.2.2 Underground Mining 2-2
2.2.3 Evaporation Ponds for Process Water Disposal 2-3
2.2.4 Shipping Loaded Resin 2-3
2.3 Proposed Action 2-4
2.4 Reasonable Alternatives 2-4
2.4.1 Alternate Plant/Facility Locations 2-4
2.4.2 Scale of Monitor Rings 2-5

LIST OF FIGURES

Figure 2.4-1 Potential Plant Site Locations

2.0 ALTERNATIVES

2.1 No-Action Alternative

Under this alternative, no ISR operations would be conducted within the Permit Area. There would be no uranium produced from the Permit Area and no favorable or unfavorable impacts from this alternative.

2.2 Alternatives Considered but Eliminated

Underground and open pit mining represent the two currently available alternatives to ISR of the uranium resources in the Permit Area. Use of evaporation ponds for process water disposal was considered as an alternative to the UIC Class I wells. Shipping of loaded ion exchange resin, rather than yellowcake slurry, was also considered.

2.2.1 Open Pit Mining

Open pit mining requires the removal of all material covering the orebody (overburden) and then the ore itself. The ore would then be transported to a conventional mill for further processing and extraction through grinding, leaching, purifying, concentrating, and drying.

From an economic point of view, open pit mining of the relatively low grade and moderate depth of the Lost Creek orebodies would require a much larger investment than ISR, especially in the early phase, when a significant investment would be required for acquisition of heavy equipment to perform the earthwork to expose the orebody. The overall size of the operation facilities would be larger because of greater manpower and material handling requirements.

Waste rock piles from excavation of the overburden and the mine pit would make permanent changes to the topography, with a disturbed area approximately three times the area of the orebody mined, in order to maintain slope stability. Potential personnel injury rates and potential radiological exposures at the mining site would also be higher with open pit mining than what would be experienced with ISR.

A mill tailings pond would be required to contain the millions of tons of waste produced from the uranium mill. This tonnage would represent a large volume of radioactive tailings slurry covering a large area of ground surface. Conventional mill operation

would involve higher risks of spillage and radiological exposure to both personnel and the environment than those associated with the proposed ISR operations.

Open pit mining at the Permit Area would also require substantial dewatering of the pit to depress the potentiometric surface of all aquifers. Large quantities of groundwater would be discharged to the surface. Some of this groundwater contains naturally elevated radium-226 (Ra-226), radon and uranium, which would have to be treated before discharge and the residue disposed of as radioactive solid waste.

2.2.2 Underground Mining

Underground mining of the uranium resources at the Permit Area would involve sinking of shafts to the vicinity of the orebodies, horizontally driving crosscuts and drifts to the orebodies at different levels, physically removing the ore and transporting the mined ore to the conventional mill for further processing. Processes for milling and uranium extraction from underground mined ores would be the same as those for ores mined from the open pit.

When one considers the alternative of underground mining, the economic and environmental disadvantage closely parallel those of an open pit mine. These, as stated above, include large amounts of initial investment, permanent changes to the topography (though in a smaller scale than open pit mining because less amounts of waste rock are being generated), generation of a significant amount of mine tailings, increased risks of injury and potential exposure to radioactive materials during mining and milling, and surface discharge of groundwater from mine dewatering with elevated radionuclide concentrations.

One major concern for underground uranium mining is the potential exposure of miners to radon gas if the gas is not continuously vented to the atmosphere. Subsequent land surface subsidence could also occur after the completion of underground mining.

Economic costs and environmental impacts associated with open pit and underground mining clearly show that ISR is the more viable uranium extraction technique to use. The initial investment is lower; the tailings problem is completely eliminated; radiation exposure and environmental impacts are minimized; and the groundwater resource is preserved. In addition, because of the reduced costs, lower grade ores can be recovered through ISR than can be recovered from open pit and underground mines.

2.2.3 Evaporation Ponds for Process Water Disposal

Using evaporation pond(s) and/or UIC Class I well(s) for process water disposal are the most common practices for uranium ISR operations. The evaporation pond alternative was considered for the Project but eliminated for the following reasons.

- Productivity and efficiency: Due to the severe winter weather conditions at the Permit Area, evaporation ponds would be frozen and covered with snow for several months, making any evaporation close to impossible.
- Area of land surface disturbance: The size of the evaporation pond(s) would have to be large enough to accommodate the extremely low evaporation rate during the winter and to support the constant year-round production rate of the Project. A preliminary feasibility study indicates that the evaporation ponds would be approximately 21 acres in total area to sustain the proposed production rate.
- Clean-up and reclamation: The solid wastes that precipitate from the process water are radioactive and extensive efforts are needed during the reclamation phase to clean up and dispose of these solid wastes.

UIC Class I wells will be drilled and used (together with Storage Ponds) for process water disposal at the Permit Area instead, as described in the sections that follow.

2.2.4 Shipping Loaded Resin

Shipping uranium-laden resin is a standard industry practice for satellite processing plants in conjunction with processing facilities. However, the option of shipping resin for processing and drying versus shipping slurry was eliminated for the following reasons.

- Productivity and efficiency: LC ISR, LLC's Project anticipates a production rate of one million pounds U_3O_8 per year. The average load of resin would be 500 cubic feet at a loading rate of eight pounds per cubic foot, or 4,000 pounds U_3O_8 per transfer (load). This would require a shipment of loaded resin to a separate facility approximately every 1.5 days. The Project will process slurry and require the transport of approximately 15,000 pounds U_3O_8 to a drying facility at a time. This will require a shipment every 5.5 days.
- Environmental health and safety: The transport of resin over slurry would increase the time an equipment operator would spend in transit by more than 350 percent.
- Operating cost: Processing the uranium at the Permit Area into slurry will reduce not only the transportation cost, but will reduce the number of trucks, trailers and equipment operators. Standby materials, such as resin and transport equipment, will also not be required. In addition, the cost for toll processing of resin will be

recovered against the Plant investment over the life of the Project, yielding a more valuable asset to be used in processing for other projects or toll processing of resin.

2.3 Proposed Action

The Project will use ISR technology to extract uranium from permeable, uranium-bearing sandstones located at depths ranging from 300 to 700 feet. Once extracted, the uranium will be recovered by means of ion exchange, which uses commercially available anionic resin. Periodically, the ion exchange resin will become saturated with uranium. Uranium will be removed from the ion exchange resin by conventional elution processing. The ion exchange resin, now stripped of uranium, will be returned to recover additional uranium. The uranium removed during the elution processing step will be precipitated, washed to remove impurities and filtered for shipment as slurry. The detailed operation plan is presented in **Section 1.2** of this report.

2.4 Reasonable Alternatives

2.4.1 Alternate Plant/Facility Locations

Two locations were considered for the Plant (**Figure 2.4-1**). The primary areas of concern were: 1) proximity to the ore, 2) surface geology, and 3) environmental issues, including sage grouse and raptor nests. Plant Site One, which is located in the Northwest Quarter of the Southeast Quarter of Section 18, Township 25 North, Range 92 West, was selected as the preferred alternative. Plant Site Two (located in the Northeast Quarter of the Southeast Quarter of Section 19, Township 25 North, Range 92 West) was considered, but not chosen based on the following.

- Proximity to ore: This location is reasonably close to the known ore trends, and has potential for future operations. This alone precludes it from being the first choice for the Plant site.
- Surface geology: No issues were noted.
- Environmental issues: No primary drainage concerns were noted. While this location does not encroach upon a two-mile lek (sage grouse mating area) buffer area, it is closer than the proposed Plant Site One.

2.4.2 Scale of Monitor Rings

A mine unit consists of ISR amenable production zones within a sandstone bounded by an upper and lower hydrologic barrier. In the simplest scenario, there is a single production zone; and a monitor well ring radially bounds that production zone, as one of the primary means of ensuring control of mining solutions within a mine unit. In more complex systems, there may be more than one production zone stacked vertically within a sandstone, and there may be more than one sandstone, with multiple production zones stacked vertically.

Depending on the location within the Permit Area, there may be only a single production zone underlying the Permit Area, or there may be multiple production zones in more than one sandstone. For this permit application, the term "sand" is applied to a specific production zone, and the term "horizon" is applied to the sandstone that contains one or more production zones. Specifically, LC ISR, LLC is proposing to recover uranium from the HJ Horizon, which has up to three production zones, the Upper, Middle, and Lower HJ Sands (UHJ, MHJ, and LHJ Sands, respectively). There are also shallower and deeper horizons within the Permit Area, in particular, the KM Horizon. LC ISR, LLC is not proposing to recover uranium from those horizons at this time, but may request a license amendment to recover uranium those horizons in the future.

Because of the different ore depths, several scenarios are possible for well completions. The Project proposes relatively small monitor rings, each containing approximately 1.2 million pounds of reserves, within the HJ Horizon. In the simplest scenario, where only one sand is present in a horizon, the production, injection, and monitor wells will be installed in that sand. Where more than one sand is present in the horizon, e.g., the MHJ and LHJ Sands, uranium will be recovered from one sand at a time. The production and injection wells will be installed with the lowest sand in the horizon and ore from that sand recovered. The lowest sand will then be sealed off, and the well completed in the next sand up. This process continues until ore has been recovered from all the targeted sands within the horizon. Restoration occurs in the reverse, with the uppermost sand being restored then sealed off and the next sand below opened up for restoration, in progression until all the sands are restored. The wells in the monitor ring will be designed so the open intervals correspond to the depths of the sands adjacent to each well. This is the Preferred Alternative. Other Alternatives include the following.

- Multiple Completions

  An alternate scenario to the one above is the completion of wells across multiples sands within the same horizon, using the same wells and the same monitor ring. However, this is not considered an appropriate alternative because of the difficulties of ensuring the injection and production fluids are

being efficiently distributed to the various sands in the horizon and of monitoring the performance of the mine unit.

- Larger Rings Encompassing More Reserves

  Another option is the installation of a ring that contains production of several million pounds of reserves from one sand within a horizon. This option requires the installation of pattern areas within a monitor ring covering a much larger area. The wells are completed in the same manner as the preferred option. Because of the increase in scale, the construction time, evaluation of pump tests, and all other activities associated with installing and producing the mine unit would increase dramatically. Final restoration/reclamation of the mine unit would be delayed until all operations for the area were complete. Therefore, this option is not considered the most efficient approach.