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5.0 COST-BENEFIT ANALYSIS

LC ISR, LLC has evaluated the costs and the benefits associated with uranium production in order to formulate the Project. Historically, several companies considered mining uranium within the Permit Area, but the costs outweighed the benefits at that time. However, due to the increased demand for uranium, associated price increase, and improved technologies, LC ISR, LLC believes the benefits now outweigh the costs.

Although the specific amount of yellowcake produced will depend on the market price and the cost of production, LC ISR, LLC anticipates producing about one million pounds of uranium per year. Based on current information and projections, the anticipated life of the Project is eight years. Current demand/supply projections indicate that the price should remain sufficiently high to support the Project over that time frame. With appropriate regulatory approval, the Plant could take loaded resins from other ISR sites in the region, even after the ISR operation at the Permit Area is complete.

5.1 Costs

Since exploratory studies of the Permit Area were commenced in the late 1960's, production methods have been improved to minimize costs. The primary method of producing uranium from deposits such as those in the Permit Area has shifted from conventional open-pit or underground mining to ISR. Open-pit and underground mining require the ores be physically removed from the ground, which would be associated with not only high operating costs (especially with low-grade ores), but also with increased exposure of radioactive materials to the atmosphere and with significant surface disturbance. In contrast, ISR operations lower the operating cost and minimize disturbance by chemically removing the mineral and leaving the matrix surrounding the ore intact. While some alternatives to various steps in ISR operations have been considered for the Project, such as facility locations, the overall costs do not differ substantially with the choice of alternative.

5.1.1 Health and Environmental Costs

LC ISR, LLC proposes the Project for the societal benefit of a uranium supply, knowing that health and environmental costs will be minimized by ISR operations. The health and environmental costs that were evaluated include:

- disturbance of soil and vegetation,
- disturbance to wildlife and wildlife habitat,

- disturbance of hydrogeology,
- use of groundwater,
- depletion of uranium minerals,
- production of waste,
- potential exposure to radioactive material, and
- impact on aesthetics.

The soil, vegetation, hydrology, wildlife, and wildlife habitat will be temporarily disturbed during the Project. These natural resources were characterized during studies of the baseline conditions at the Permit Area, which are summarized in **Section 3** of this report. The resources will be reclaimed to support the approved post-project land use of livestock and wildlife grazing, which is similar to the pre-project land use, in accordance with applicable standards and regulations. Reclamation activities are described in more detail in **Section 1** of this report and **Section 6** of the Technical Report. Because ISR operations are conducted in a series of mine units, which are installed, produced, and reclaimed sequentially, only portions of the Permit Area will be disturbed at a given time.

Inherent to the proposed action, the uranium mineral will be depleted. However, this mineral will provide a source of fuel for producing nuclear energy. Currently, the nation and the public are strongly supporting alternative sources of energy, including nuclear energy, to reduce dependence on foreign petroleum supplies and to reduce carbon emissions. The proposed action will remove uranium, in a safe and controlled manner, from the geological formation in which it naturally occurs. By doing so, the radioactivity of the material associated with uranium will be reduced. This will improve the health of humans and the environment that may otherwise be exposed to the ores.

Groundwater will serve as a tool to recover uranium. Groundwater will be: pumped from the production wells in the ore zone; oxidized by the addition of lixiviant (a bicarbonate-based solution); re-introduced to the ore zone through the injection wells; recovered from the production wells; treated at the Plant for removal of uranium; and circulated through this system again and again. Ultimately, the majority of the water will be restored and returned to the aquifer containing the ore zone. A fraction of the groundwater will be consumed as waste. This fraction of consumed groundwater will be minimized by concentrating the waste through multiple wastewater treatments where feasible.

Various types of wastes will be produced from the Project. These wastes may be categorized as domestic sewage, non-radiological wastes, and radiological wastes. Materials will be decontaminated or treated to reduce the volume of waste. Radiological waste will be removed from the Permit Area and disposed at an NRC-licensed facility or will be disposed of in a UIC Class I well, depending on the type of waste, in accordance with current NRC regulations. All other wastes will also be disposed of according to the applicable local, state, and federal regulations.

Exposures to radioactive materials were estimated using results from the radiation survey and the MILDOS model. Estimated public exposure to radioactive materials is negligible due to the remote location of the Permit Area, the nature of ISR operations, and the ore processing technologies. Occupational exposure will be reduced or eliminated by providing the proper training, guidance, and PPE to safely handle, store, decontaminate, and/or dispose waste materials.

Interference with other uses of the Permit Area will be limited due to the lack of development in the area and the reclamation requirements. For example, due to limited development of groundwater in the area to date, minimal impact to other water users outside the Permit Area is anticipated. As another example, hunting will be restricted at the Permit Area during production and reclamation to reduce safety concerns; but in the long term, hunting access will be improved due to road construction and maintenance. To ensure that future users of the Permit Area are aware of the presence of abandoned wells, a deed notice of the mine unit locations will be required. Any decreases in aesthetics at the Permit Area, such as increased noise, will be minimal due to the remoteness of the Permit Area, the nature of ISR operations, improved technologies, and required reclamation. In addition, the activities at the Permit Area, such as well installation, are similar to the activities associated with other extractive industries in the region (e.g., oil and gas drilling).

There is no difference in health and environmental costs between the Preferred Alternative and the Other Alternatives considered for the Project.

5.1.2 Internal Costs

In order to quantitatively compare the costs to the benefits of the Project, internal and external costs were estimated. Internal costs impact LC ISR, LLC and cover the construction, operation, and reclamation phases of the Project.

The primary internal costs will include:

- capital costs associated with obtaining claims and regulatory approvals, including permits, and environmental studies;
- capital costs of facility construction;
- operation and maintenance costs;
- costs of groundwater restoration;
- costs of facility decommissioning, including radiological decontamination; and
- costs of surface reclamation.

These estimated costs are provided in [Table 5.1-1](#). Because of the sequential development of mine units during ISR operations, some of the facility construction costs are distributed throughout the life-of-Project rather than concentrated during the initial Project development.

There is no significant difference (if any) in total internal project costs between the Preferred Alternative and the Other Alternatives considered for the Project.

5.1.3 External costs

External costs impact the local economy and include the services and resources of the neighboring communities. The primary external costs will affect:

- housing;
- public facilities and services;
- historic, scenic, and recreational resources; and
- natural and material resources.

As with the internal costs, some of the external costs are distributed throughout the life of the Project due to the nature of ISR operations, rather than concentrated during the initial Project development.

Impacts to housing availability are expected to be dispersed because of the remoteness of the Permit Area, the relatively small number of the workforce (both on payroll and on contract), and the progressive nature of construction and reclamation in the Permit Area. In addition, short-term, overnight housing may also be provided in the remote Permit Area. (Some drillers prefer long workdays to take advantage of daylight and good weather. During production, personnel will be on-site 24 hours per day.) Because of energy-related projects throughout Wyoming, workforce and housing availability has become a critical factor in some locations. However, in response, state and local agencies have been assisting industries and communities to address these issues.

The costs associated with increased demand of public facilities and services are expected to be minimal. Water supply and some waste disposal facilities will need to be developed by the operator of the Project, because of the lack of such facilities in the vicinity of the Permit Area. (The nearest population center, Bairoil, is about 15 miles to the northeast.) The relatively small increase in the workforce will not overtax education and health resources. Existing emergency response and medical treatment capabilities handle industrial accidents similar to those that could occur at the Permit Area; and a variety of industrial and hazardous materials are transported on Interstate 80 through Rawlins, which is about a 50-mile drive southeast of the Permit Area. Therefore, basic services

are already established that can support the Project. Representatives from LC ISR, LLC met with the Sweetwater County commissioners on October 16, 2007. LC ISR, LLC described the operations and schedule of the Project to the commissioners and answered related questions. Additional public consultation is planned.

Historic, scenic, and recreational resources within the Permit Area were identified during studies of the baseline conditions, as summarized in **Sections 3.9** and **3.10** of this report. Of the historical sites identified in the Permit Area, only one has the potential for being disturbed by future mine unit development activities. Mitigation plans for sites of historical significance are described in **Section 4.8** of this report. The limited presence of local residents and/or regular visitors, lack of roads, and austere topography reduces the number of people who might be impacted by noise or facility visibility. The construction equipment and facilities in the landscape (e.g., drilling rigs, header houses and the Plant) are of limited height and will not be visible to bypassing travelers on any major roads. In addition, reclamation is required once the facilities are decommissioned. As noted earlier, hunting, which is the primary recreational activity, will be restricted for safety reasons during operations, but will not be permanently affected, and may be improved due to wildlife habitat reclamation and improved transportation routes.

During the implementation of the Project, natural and material resources will be used. The natural resources include uranium and groundwater. The goal of the Project is to maximize uranium recovery; thus, uranium will be depleted. Groundwater will be used as a medium to extract the uranium; the Project is designed to re-use the groundwater as much as possible and limit losses to waste. Material resources needed for the Project include a variety of industrial products such as automotive fluids, building materials, well casing, piping, and cement, as well as energy. Processing chemicals will also be needed, although most of these are relatively benign.

There is no difference in external costs between the Preferred Alternative and the Other Alternatives considered for the Project.

5.2 Benefits

Outside of the economic benefits to the operator, the estimated community benefits resulting from the Project are shown in [Table 5.2-1](#). The local communities within Sweetwater County will benefit economically from the Project development, construction, and operation because of employment opportunities, including skilled jobs on the Project and an improved tax base for other local jobs. The economic benefit of expenditures related to the Project will magnify as funds are dispersed throughout the communities. Approximately 70 to 90 individuals (including both full-time employees and subcontractors) will be employed during the Project. Local businesses will also be

subcontracted for many services, such as drilling, and will employ additional individuals. Domestic supplies and equipment will be purchased from local vendors.

The local, state, and federal governments will receive various revenues from employee income taxes, severance taxes, ad valorem taxes, and sales taxes. The estimated benefit from taxes is shown in [Table 5.2-1](#).

In addition to the specific, tangible Project benefits, the Project also provides more diverse benefits. For example, regional recreation may be enhanced following the reclamation of the disturbed area, because of improved access and the reclamation of the Permit Area to wildlife and livestock grazing. As another example, due to the remoteness and low population of the Great Divide Basin in which the Project is located, the baseline studies and monitoring associated with the Project have greatly increased the information available on natural resources. Required monitoring during the Project will continue to provide scientific data about this basin.

The Project will support energy-independent and environment-friendly policies. The uranium production will assist to supply a reliable, economical, domestic source of uranium while applying new technologies to minimize disturbance. The Project will also help offset the deficit in annual domestic uranium production and help meet increasing energy demands. Between 1989 and 2003, annual domestic uranium production decreased by 75 percent. The US produces about two percent of the world uranium, while it consumes over 25 percent of the total production. As of 2006, the world produced just over 50 percent of the annual consumption of U_3O_8 . The gap between demand and supply has been filled by stockpiles and uranium from non-traditional sources (e.g., dilution of weapon-grade uranium). There are concerns about the long-term availability of uranium from non-traditional sources. The Project, once in full-scale production, will add 1,000,000 pounds of U_3O_8 per year to the market. With appropriate regulatory approval, the processing facilities could also take loaded resins from other ISR sites in the region, even after the ISR operation is complete in the Permit Area.

There is no difference in the benefits between the Preferred Alternative and the Other Alternatives considered for the Project.