SAFETY EVALUATION REPORT

FOR
OPERATION OF THE GAS HILLS PROJECT
***IN SITU* LEACH URANIUM RECOVERY FACILITY**
IN FREMONT AND NATRONA COUNTIES, WYOMING

JANUARY 2004

DOCKET NO. 40-8964

U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS
DIVISION OF FUEL CYCLE SAFETY AND SAFEGUARDS
FUEL CYCLE FACILITIES BRANCH

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INTRODUCTION

Background

In a letter to the U.S. Nuclear Regulatory Commission (NRC) dated June 24, 1998, Power Resources , Inc. (PRI) submitted an application requesting an amendment to Source Materials License SUA-1511 for the Highland Uranium Project to allow the operation of a satellite *in situ* leach (ISL) uranium recovery facility at the Gas Hills Project site in Fremont and Natrona Counties, Wyoming (PRI 1998). This application was supplemented and revised by PRI in letters dated September 24 (PRI 1999a) and November 11, 1999 (PRI 1999b), in response to NRC requests for additional information dated May 21 (NRC 1999a) and July 15, 1999 (NRC 1999b), respectively. Subsequent revisions to the application were provided by PRI in letters dated May 3, 2002 (PRI 2002) and October 10, 2003 (PRI 2003).

While PRI's application for the Gas Hills Project was originally proposed as an amendment to the Highland Uranium Project license (SUA-1511), PRI subsequently acquired the operating Smith Ranch *in situ* leach uranium recovery facility located adjacent to the Highland facility, and, in August 2003, the staff approved PRI's request to integrate the Highland license into the Smith Ranch Source Materials License SUA-1548. As such, PRI's request to amend the Highland license for the Gas Hills Project became a request to amend the newly combined Smith Ranch-Highland license (SUA-1548) upon the integration of the two licenses for these contiguous facilities. In this regard, ISL uranium recovery is regulated by the NRC pursuant to the requirements of Part 40 of Title 10 of the Code of Federal Regulations (10 CFR Part 40), "Domestic Licensing of Source Material," and PRI must obtain approval from NRC to conduct uranium recovery activities at Gas Hills Project site.

Review Scope

Consistent with the requirements of 10 CFR Parts 40.32 and 40.45, the PRI license amendment request will be approved by the NRC if, among other things:

- The application is for a purpose authorized by the Atomic Energy Act; and
- The applicant is qualified by reason of training and experience to use the source material for the purpose requested in such manner as to protect health and minimize danger to life or property; and
- The applicant's proposed equipment, facilities and procedures are adequate to protect health and minimize danger to life or property; and
- The issuance of the license will not be inimical to the common defense and security or to the health and safety of the public.

To determine whether the stipulations above will be met as conditions for approval of the proposed action, the NRC staff has performed an evaluation of the safety and environmental aspects of the proposed action, including an evaluation to determine PRI's compliance with the specific requirements and objectives set forth in 10 CFR Part 40, Appendix A (Criteria Relating to the Operation of Uranium Mills and the Disposition of Tailings or Wastes Produced by the

Extraction or Concentration of Source Material From Ores Processed Primarily for Their Source Material Content), and 10 CFR Part 20 (Standards for Protection Against Radiation). The SER provided herein constitutes the safety portion of the staff's evaluation and an Environmental Assessment (NRC 2004) has been prepared in parallel with this SER to address the environmental impacts of the proposed action. The staff's evaluation, as described in the Sections below, was conducted in accordance with the guidance provided in the "Standard Review Plan for In Situ Leach Uranium Extraction License Applications" (SRP), NUREG-1569 Rev. 1, June 2003.

1.0 PROPOSED ACTIVITIES

The staff has completed its review of the proposed activities at the Gas Hills Project ISL uranium recovery facility using the review procedures in SRP Section 1.2 and the acceptance criteria in SRP Section 1.3. PRI has acceptably described the proposed activities at the Gas Hills Project including the (1) corporate entities involved, (2) location of the proposed facility, (3) land ownership, (4) ore-body locations and estimated U_3O_8 content, (5) proposed solution extraction method and recovery process, (6) operating plans, design throughput, and annual uranium production, (7) schedules for construction, startup, and duration of operations, (8) waste management and disposal plans, (9) groundwater quality restoration, decommissioning, and land reclamation plans, and (10) surety arrangements covering facility decommissioning, groundwater quality restoration, and site reclamation. PRI has also adequately described the areas within the Gas Hills Project that were disturbed from prior conventional uranium mining activities in the region. Lastly, PRI has appropriately described the studies conducted at the Gas Hills Project or cited prior operational experience at other ISL facilities to support its planned operations and groundwater quality restoration at the Gas Hills Project.

Based on the information provided in the application and the detailed review conducted of the description of the proposed activities at the Gas Hills Project ISL facility, the staff concludes that the description of the proposed activities is acceptable and is in compliance with the following requirements: 10 CFR Part 40.31, which describes the general requirements for an application for a specific license, and 10 CFR Part 51.45, which requires a description of the proposed action sufficient to allow the staff to evaluate the impacts on the affected environment.

2.0 SITE CHARACTERIZATION

2.1 Site Location and Layout

The staff has completed its review of the site characterization information concerned with site location and layout at the Gas Hills Project facility. The review was performed using the review procedures in SRP Section 2.1.2 and the acceptance criteria in SRP Section 2.1.3.

PRI has acceptably described the site location and layout with appropriately scaled and labeled maps showing the regional location, site configuration, principal facilities and structures, geologic features, topography, exclusion area boundaries and fences, property ownership including leases and adjacent properties, and nearby population centers and transportation links. Supporting data sources are appropriately referenced by PRI.

Based on the information provided in the application and the detailed review conducted of the characterization of the site location and layout for the Gas Hills Project facility, the staff concludes that the information is acceptable and is in compliance with 10 CFR Part 51.45 which requires a description of the affected environment and sufficient site characterization data to aid the NRC in its conduct of an independent evaluation.

2.2 Uses of Adjacent Lands and Waters

The staff has completed its review of the site characterization information concerned with the uses of the adjacent lands and waters to the Gas Hills Project facility. The review was performed using the review procedures in SRP Section 2.2.2 and the acceptance criteria in SRP Section 2.2.3.

PRI has acceptably described the present and projected land use, including residential, commercial, industrial, agricultural, wildlife, grazing, and recreational (hunting and other outdoor activities) use. Appropriate information on the location and extent of each use has been provided. In particular, the description and associated tabulated data of the location, nature, and amounts related to each use point of surface and groundwater adjacent to the site are acceptable for determination of likely impacts of the proposed Gas Hills Project. Tabulated data on water withdrawal rates, types of water use (livestock, wildlife, and industrial), and source are acceptable. The tabulated data on all exploration and development drill holes and abandoned wells are also acceptable. PRI has adequately described the location of other nuclear fuel cycle facilities within a 80-km [50-mi] radius of the site.

Based on the information provided in the application and the detailed review conducted of the characterization of uses of adjacent lands and waters to the Gas Hills Project facility, the staff concludes that the information is acceptable and is in compliance with the following requirements: 10 CFR Part 51.45, which requires a description of the affected environment containing sufficient data to aid the NRC in its conduct of an independent analysis, and 10 CFR Part 40, Appendix A, Criteria 5B(4) and 5G(3), which provide criteria for identification of underground sources of drinking water and exempted aquifers and the current uses of groundwater.

2.3 Population Distribution

The staff has completed its review of the site characterization information concerned with population distribution and food production near the Gas Hills Project facility. This review included an evaluation using the review procedures in SRP Section 2.3.2 and the acceptance criteria in SRP Section 2.3.3.

PRI has acceptably described the population distribution using population data from census sources. A map showing the significant population centers within 80-km [50-mi] of the approximate center of the Gas Hills Project site is provided. A table and accompanying map providing population in pie-shaped wedges, centered on each of the 16 compass points, are included. Nearest residence distances are noted for each sector. The nearest residence is approximately 12 miles northeast of the site and PRI notes that there are no schools, hospitals, sports facilities, or parks within 2 miles of the site boundary. There is also no food production within 2 miles of the site boundary.

Based on the information provided in the application and the detailed review conducted of the characterization of population distribution for the Gas Hills Project facility, the staff concludes that the information is acceptable and is in compliance with 10 CFR Part 51.45 which requires a description of the affected environment containing sufficient data to aid the NRC in its conduct of an independent analysis.

2.4 Meteorology

The staff has completed its review of the site characterization information concerned with meteorology at the Gas Hills Project facility. This review included an evaluation using the review procedures in SRP Section 2.5.2 and acceptance criteria outlined in SRP Section 2.5.3.

The licensee has acceptably described the site meteorology by providing data from National Weather Service stations located in the Gas Hills (temperature and precipitation data) and in Casper (wind data), including available joint frequency distribution data on wind direction and speed, stability class, and period of record. The data cover a sufficient time period to constrain long term trends and support atmospheric dispersion modeling. PRI has acceptably demonstrated that meteorologic data used for assessing environmental impacts are representative of long-term meteorologic conditions at the site.

Based on the information provided in the application and the detailed review conducted of the characterization of meteorology at the Gas Hills Project facility, the staff concludes that the information is acceptable to allow evaluation of the spread of airborne contamination at the site and development of conceptual and numerical models and is in compliance with 10 CFR Part 51.45 which requires a description of the affected environment containing sufficient data to aid the NRC in its conduct of an independent analysis. The characterization also meets the requirements of 10 CFR Part 40, Appendix A, Criterion 7, which requires pre-operational and operational monitoring programs.

2.5 Geology and Seismology

The staff has completed its review of the site characterization information concerned with geology and seismology at the Gas Hills Project facility. This review included an evaluation using the review procedures in SRP Section 2.6.2 and acceptance criteria in SRP Section 2.6.3.

PRI has acceptably described the geology and seismology by providing: (1) a description of the local and regional stratigraphy; (2) geologic, topographic, and isopach maps at acceptable scales showing surface and subsurface features and locations of all wells and site explorations used in defining stratigraphy; (3) a geologic and geochemical description of the mineralized zone and the geologic units adjacent to the mineralized zone; (4) an inventory of nearby economically significant minerals and energy-related deposits; (5) a description of the local and regional geologic structure; (6) a discussion of the seismicity and seismic history of the region; (7) a generalized stratigraphic column that includes thickness of rock units, representation of lithologies, and definition of the mineralized horizon; and (8) a description and map of the soils.

Based on the information provided in the application and the detailed review conducted of the characterization of the geology and seismology at the Gas Hills Project site, the staff concludes that the information is acceptable to allow evaluation of the geologic and seismologic

characteristics of the site and associated conceptual and numerical models. The information is also in compliance with 10 CFR Part 40.31(f), which requires inclusion of an environmental report in the application, and 10 CFR Part 51.45, which requires a description of the affected environment containing sufficient data to aid the NRC in its conduct of an independent analysis.

2.6 Hydrology

The staff has completed its review of the hydrologic site characterization information for the Gas Hills Project facility. This review included an evaluation using the review procedures in SRP Section 2.7.2 and the acceptance criteria outlined in SRP Section 2.7.3.

PRI has acceptably described the hydrology by providing: (1) estimates of the local and regional hydraulic gradients, using potentiometric surface maps with acceptable contour intervals, including the mineralized aquifer; (2) hydrologic cross-sections, based on an appropriate number of bore holes; (3) acceptable comprehensive chemical and radiochemical analyses of water samples from in and near the mineralized zones that define the pre-operational baseline water quality conditions; (4) all hydraulic parameters used to determine expected operational and restoration performance; and (5) characterization of surface water in the facility and nearby areas, including presentation of such information on maps. Zones of interchange between surface and groundwater have been identified. PRI has provisions for acceptable erosion protection against the effects of flooding from West Canyon Creek and for berms, culverts, rock riprap, and drainage and diversion channels, such that the suggested criteria in NUREG-1620 (NRC 2003) have been followed and the design meets the requirements of 10 CFR Part 40, Appendix A.

Based on the information provided in the application and the detailed review conducted of the characterization of the hydrology at the Gas Hills Project site, the staff concludes that the information is acceptable to allow evaluation of the site and associated conceptual and numerical models and is in compliance with 10 CFR Part 51.45, which requires a description of the affected environment containing sufficient data to aid the NRC in its conduct of an independent analysis.

2.7 Ecology

The staff has completed its review of the site characterization information concerned with ecology at the Gas Hills Project site. This review included an evaluation using the review procedures in SRP Section 2.8.2 and the acceptance criteria outlined in SRP Section 2.8.3.

PRI has described the ecology by providing acceptable (1) inventories of terrestrial species, including threatened or endangered species listed in 50 CFR Part 17, (2) surveys of locally significant domestic flora and fauna, (3) discussions of important species found within a radius where impacts are reasonably expected to occur and estimations of their current and historical abundance, and (4) thorough descriptions of the species-environment relationship for important species.

Based on the information provided in the application and the detailed review conducted of the characterization of the ecology at the Gas Hills Project site, the staff concludes that the information is acceptable to allow evaluation of the site ecology and associated conceptual and

numerical models and is in compliance with 10 CFR Part 51.45, which requires a description of the affected environment containing sufficient data to aid the NRC in its conduct of an independent analysis.

2.8 Background Radiological Characteristics

The staff has completed its review of the information concerned with the background radiological characteristics at the Gas Hills Project site. This review included an evaluation using the review procedures in SRP Section 2.9.2 and the acceptance criteria outlined in SRP Section 2.9.3.

PRI has acceptably established the background radiological characteristics by providing: (1) monitoring programs to determine background radiological characteristics that include radionuclides monitored, sampling frequency, and methods, location, and specific activity; (2) air quality stations located consistent with the prevailing wind directions; (3) time periods for pre-operational monitoring that allow for 12 consecutive months of sampling; and (4) radiologic analyses of soil samples at 0-15 cm and 15-30 cm depth intervals.

Based on the information provided in the application and the detailed review conducted of the characterization of the background radiological characteristics at the Gas Hills Project site, the staff concludes that the information is acceptable to allow evaluation of the radiological background of the site and is in compliance with 10 CFR Part 51.45 which requires a description of the affected environment containing sufficient data to aid the NRC in its conduct of an independent analysis.

2.9 Background Non-Radiological Characteristics

The staff has completed its review of the information concerned with the background non-radiological characteristics at the Gas Hills Project site. This review included an evaluation using the review procedures in SRP Section 2.10.2 and acceptance criteria outlined in SRP Section 2.10.3.

PRI has acceptably established the background non-radiological characteristics by documenting (1) the water quality in various surface water bodies and groundwater locations (e.g., total dissolved solids, trace metals, and other chemical constituents content) and (2) the information on soil characteristics within the site environs from previous studies for conventional uranium mine permits and State of Wyoming Abandoned Mine Lands projects.

Based on the information provided in the application, and the detailed review conducted of the characterization of the background non-radiological characteristics at the Gas Hills Project site, the staff concludes that the information is acceptable to allow evaluation of the non-radiological background of the site and is in compliance with 10 CFR Part 51.45, which requires a description of the affected environment containing sufficient data to aid the NRC in its conduct of an independent analysis.

3.0 DESCRIPTION OF PROPOSED FACILITY

3.1 *In Situ* Leach Process and Equipment

The staff has completed its review of the ISL process and equipment proposed for use at the Gas Hills Project facility. This review included an evaluation using the review procedures in SRP Section 3.1.2 and the acceptance criteria in SRP Section 3.1.3.

PRI has acceptably described the mineralized zones, demonstrated protection against vertical migration of water, proposed tests for well integrity that assure facility stability, and demonstrated that the ISL process will meet the following criteria: (1) down hole injection pressures are less than formation fracture pressures; (2) overall production rates are higher than injection rates; (3) plant material balances and flow rates are appropriate; (4) lixiviant makeup is such that restoration goals can be achieved in a timely manner; (5) recovery efficiency is assessed through mass balance calculations; and (6) reasonable estimates of gaseous, liquid, and solid wastes and effluents are provided. PRI has used its prior experience in other ISL uranium recovery operations (e.g., Highland Uranium Project) to support the evaluation of corresponding process activities at the Gas Hills Project facility. PRI has provided acceptable operating plans, schedules, and timetables for well-field operation, surface reclamation, and groundwater restoration.

Based on the information provided in the application and the detailed review conducted of the ISL process and equipment for the Gas Hills Project, the staff concludes that the proposed ISL process and equipment are acceptable and are in compliance with the following requirements: 10 CFR Part 40.32(c), which requires the applicant's proposed equipment, facilities, and procedures to be adequate to protect health and minimize danger to life or property; 10 CFR Part 40.32(d), which requires that the issuance of the license amendment will not be inimical to the common defense and security or to the health and safety of the public; 10 CFR Part 40.41(c), which requires the applicant to confine source or byproduct material to the location and purposes authorized in the license; and 10 CFR Part 40, Appendix A, Criterion 2 for non-proliferation of small disposal sites; Criterion 5A for groundwater protection; Criterion 5B for secondary groundwater protection; Criterion 5C for maximum constituent concentration values for groundwater protection; and Criterion 13 for identification of hazardous constituents. The related reviews of the 10 CFR Part 20 radiation protection aspects of the ISL process and equipment are addressed in SRP Sections 4.0, "Effluent Control Systems," and 5.0, "Operations."

3.2 Satellite Facilities Equipment

The staff has completed its review of the equipment proposed for use and materials to be processed in the satellite facilities, well-fields, and chemical storage facilities at the Gas Hills Project. This review included an evaluation using the review procedures in SRP Section 3.2.2 and the acceptance criteria outlined in SRP Section 3.2.3.

Based on the information provided in the application and the detailed review conducted of the equipment to be used and materials to be processed in the satellite facilities, well-fields, and chemical storage facilities for the Gas Hills Project, the staff concludes that the proposed equipment to be used and materials to be processed in the satellite facilities, well-fields, and

chemical storage facilities are acceptable and are in compliance with the following requirements: 10 CFR Part 40.32(c) which requires that the applicant's proposed equipment, facilities, and procedures be adequate to protect health and minimize danger to life or property; 10 CFR Part 40.32(d), which requires that the issuance of the license amendment will not be inimical to the common defense and security or to the health and safety of the public; and 10 CFR Part 40.41(c), which requires the applicant to confine source or byproduct material to the locations and purposes authorized in the license.

3.3 Instrumentation

The staff has completed its review of the instrumentation and control systems proposed for use at the Gas Hills Project facility. This review included an evaluation using the review procedures in SRP Section 3.3.2 and the acceptance criteria outlined in SRP Section 3.3.3.

The instrumentation and control systems have been acceptably described for facility systems and components, including the well-fields, trunk lines, and production circuit. The instrumentation allows for continuous monitoring and control of systems, including total inflow to the satellite buildings, total waste flow to the evaporation ponds, and tank levels. Appropriate alarms and interlocks are part of the instrumentation systems. Each critical system is equipped with an acceptable backup system that automatically activates in the event of a failure of the operating system or a common cause failure such as a power failure.

Based on the information provided in the application and the detailed review conducted of the instrumentation and control systems for the Gas Hills Project facility, the staff concludes that the proposed instrumentation is acceptable and is in compliance with the following requirements: 10 CFR Part 40.32(c), which requires applicant proposed equipment, facilities, and procedures to be adequate to protect health and minimize danger to life or property; 10 CFR Part 40.32(d), which requires that the issuance of the license amendment will not be inimical to the common defense and security or to the health and safety of the public; and 10 CFR Part 40.41(c), which requires the applicant to confine source or byproduct material to the locations and purposes authorized in the license.

4.0 EFFLUENT CONTROL SYSTEMS

4.1 Gaseous Effluents

The staff has completed its review of the control systems for gaseous effluents proposed for use at the Gas Hills Project facility. This review included an evaluation using the review procedures in SRP Section 4.1.2 and the acceptance criteria in SRP Section 4.1.3.

PRI has acceptably described the ventilation systems and the types of effluents released to the atmosphere. PRI has provided for monitoring and control systems (i.e., ventilation) for the types of effluents generated (i.e., radon). PRI has also specified acceptable monitoring criteria and has located the facility monitoring and control systems for the required functions to optimally assess worker exposure in locations of likely maximum concentrations determined by PRI's analysis of airflow patterns. PRI has demonstrated that ventilation systems are acceptable for preventing radon gas buildup where recovery solutions enter the satellite

buildings and tanks are vented during the extraction process. By providing information on the health and safety impacts of system failures and identifying contingencies for such occurrences, PRI has acceptably shown that effluent control systems will limit radiation exposures under both normal and accident conditions. PRI has committed to occupational radiation doses and doses to the general public that meet regulatory dose limits and as low as is reasonably achievable (ALARA) goals.

Based on the information provided in the application and the detailed review conducted of the control systems for gaseous effluents for the Gas Hills Project facility, the staff concludes that the proposed control systems for gaseous effluents are acceptable and are in compliance with the following requirements: 10 CFR Part 20.1101, which requires that an acceptable radiation protection program that achieves ALARA goals is in place; 10 CFR Part 20.1201, which defines the allowable occupational dose limits for adults; 10 CFR Part 20.1301, which defines dose limits allowable for individual members of the public; 10 CFR Part 20.1302, which requires compliance with dose limits for individual members of the public; and 10 CFR Part 40, Appendix A, Criterion 5(G)(1), which requires that the chemical and radioactive characteristics of wastes be defined.

4.2 Liquid and Solid Wastes

The staff has completed its review of the effluent control systems for liquid and solid wastes at the Gas Hills Project facility. This review included an evaluation using the review procedures in SRP Section 4.2.2 and the acceptance criteria outlined in SRP Section 4.2.3.

PRI has acceptably described the common liquid effluents generated at the facility (reverse osmosis system permeate and brine) from water treatment of well-field production bleed and restoration water, well work-over water, and satellite buildings wash-down water. Appropriate control methods, including diversion of brine solutions to surface impoundments (evaporation ponds) and land application of permeate, are identified. Prior to any land application of permeate, PRI will obtain the required National Pollutant Discharge Elimination System (NPDES) permit from the State of Wyoming. On-site evaporation pond system designs are prescribed in acceptable detail, including engineering plans and drawings. PRI has shown that the evaporation pond facilities (a total of 6) are adequate to handle production and restoration activities and has designed installation and operation of the evaporation ponds such that the ponds can contain the entire contents of any other leaking or inoperative pond. PRI has demonstrated that the evaporation ponds and associated liners are properly designed.

The evaporation ponds will be inspected on a daily basis, including the exposed liner above the water surface, the berms around the ponds, fences, and any diversion and/or storm runoff control measures. If, at any time, flow is observed from the evaporation pond leakage detection system sump pump, water samples will be collected and chemically analyzed (chloride, bicarbonate, and conductivity). The planned sampling and analysis of water collected in the leakage detection system are acceptable. PRI has an appropriate corrective action plan that allows for the contents of a given evaporation pond to be transferred to another evaporation pond with no release of contamination. PRI has an acceptable action plan to notify the NRC, collect and analyze samples, and file a written report in the event of pond leakage.

PRI has provided acceptable plans and procedures to address contingencies for all reasonably expected system failures during well-field operations and processing activities in the satellite buildings. The satellite buildings will be provided with sumps and curbs to contain the contents of any tank that may leak, overflow, or fail. The facility has acceptable alarms to notify operators of pressure transients within the well-field pipeline systems. The information provided by PRI on the health and safety impacts of system failures and the preventive measures and mitigation of such occurrences demonstrates that the effluent control systems will limit radiation exposures under both normal and accident conditions. PRI has acceptable procedures in place to both document and report leakage and spill events. PRI has acceptable plans for both the storage and disposal of contaminated solid wastes generated during facility operations (piping and equipment, filter media, and solid residue and liners from the evaporation ponds). Contaminated waste materials and the effluent control systems will be managed to ensure that occupational doses and doses to the general public are in compliance with the limits of 10 CFR Part 20 and are as low as is reasonable achievable. Solid wastes that cannot be decontaminated for unrestricted release will be disposed in an NRC-licensed facility. In this regard, PRC has a disposal agreement with Pathfinder Mines Corporation to dispose of Gas Hills Project byproduct material wastes at the Shirley Basin tailings facility.

Based on the information provided in the application and the detailed review conducted of the effluent control systems for liquid and solid wastes for the Gas Hills Project facility, the staff concludes that the proposed effluent control systems for liquid and solid wastes are acceptable and in compliance with 10 CFR Part 20.1101, which requires that an acceptable radiation protection program is in place to achieve occupational doses and doses to members of the public that are ALARA; 10 CFR 20.1201, which defines the allowable occupational dose limits for adults; 10 CFR 20.1301, which defines the allowable dose limits for individual members of the public; 10 CFR Part 20.1302, which requires compliance with dose limits for individual members of the public; 10 CFR Part 40, Appendix A, Criterion 2, which requires that the applicant provide an estimate of the amount of contaminated material that will be generated and objective evidence of an agreement for disposal of these materials, either in a licensed waste disposal site or at a licensed mill tailings facility to ensure the non-proliferation of waste disposal sites; Criteria 5A(1) through 5A(5), which define design provisions for surface impoundments; Criterion 5E which requires measures to protect groundwater; Criterion 5F, which provides requirements for seepage control; Criterion 5G(1), which requires that the chemical and radioactive characteristics of wastes be defined; and Criterion 6(6), which limits the concentration of radium in soils.

5.0 OPERATIONS

5.1 Corporate Organization and Administrative Procedures

The staff has completed its review of the corporate organization and administrative procedures proposed for use at the Gas hills Project facility. This review included an evaluation using the review procedures in SRP Section 5.1.2 and the acceptance criteria outlined in SRP Section 5.1.3.

PRI has an acceptable corporate organization that defines management responsibilities and authority at each level. PRI's definition of the responsibilities and procedures with respect to

development, review, approval, implementation, and adherence to operating procedures, radiation safety programs, environmental and groundwater monitoring programs, quality assurance programs, routine and non-routine maintenance activities, and changes to any of these items is acceptable. Integration among groups that support operation and maintenance of the facility is demonstrated. Integration between facility construction and plant management is acceptably detailed. PRI has established a Safety and Environmental Review Panel, with support from other qualified staff members, or consultants, as appropriate.

Based on the information provided in the application and the detailed review conducted of the corporate organization and administrative procedures for the Gas Hills Project facility, the staff concludes that the proposed corporate organization and administrative procedures are acceptable and are in compliance with 10 CFR Part 20.1101, which defines radiation protection program requirements. In addition, the requirements of 10 CFR Part 40.32(b), (c), and (d) are also met as they relate to the proposed corporate organization and Safety and Environmental Review Panel functions.

5.2 Management Control Program

The staff has completed its review of the management control program proposed for use at the Gas Hills Project facility. This review included an evaluation using the review procedures in SRP Section 5.2.2 and the acceptance criteria outlined in SRP Section 5.2.3.

PRI has an acceptable management control program that assures that all safety-related operating activities can be conducted according to written operating procedures. PRI has existing standard operating procedures that are acceptable. PRI has acceptably identified radiation protection, maintenance activities (especially radiation areas), development of well fields, and Safety and Environmental Review Panel reviews as areas where standard operating procedures are acceptable and correctly applied. PRI has demonstrated that non-routine work or maintenance activity will comply with radiation safety requirements and that radiation work permits will be issued for activities where standard operating procedures do not apply.

PRI has acceptable record keeping and retention and reporting programs that will be adequate to ensure that the licensee is able to track, control, and demonstrate control over the source and byproduct materials that are processed, produced, or stored at the facility during its operating life, through decommissioning, and to license termination. The record keeping and retention plans will assist in ensuring that both on-site and off-site exposures are kept within regulatory limits. PRI has demonstrated an acceptable program to maintain records on spills, likely contamination events, and unusual occurrences for use in calculating annual surety amounts and to ensure acceptable decommissioning. PRI will maintain records for decommissioning, off-site disposal of byproduct material, and off-site releases of radioactivity, as permanent records for the facility that will be transferred to any new owner or licensee, as appropriate, and ultimately to the NRC, before license termination. Reports will be made to the NRC as required by 10 CFR Parts 20 and 40.

Based on the information provided in the application and the detailed review conducted of the management control program for the Gas Hills Project facility, the staff concludes that the proposed management control program is acceptable and is in compliance with 10 CFR Part 40, Appendix A, Criterion 8A, which specifies documentation requirements for waste

retention systems; 10 CFR Part 20.1101, which defines radiation protection program requirements; 10 CFR Part 20, Subpart L and Subpart M, which define requirements for record keeping and reporting; and 10 CFR Part 40.61(d) and (e), which also define requirements for record keeping.

5.3 Management Audit and Inspection Program

The staff has completed its review of the management audit and inspection program proposed for use at the Gas Hills Project facility. This review included an evaluation using the review procedures in SRP Section 5.3.2 and the acceptance criteria outlined in SRP Section 5.3.3.

PRI has an acceptable management audit and inspection program that provides frequencies, types, and scopes of reviews and inspections; action levels; and corrective action measures sufficient to implement the proposed actions.

Based on the information provided in the application and the detailed review conducted of the management audit and inspection program for the Gas Hills Project facility, the staff concludes that the proposed programs are acceptable and are in compliance with 10 CFR Part 20.1702, which requires the use of process or other engineering measures to control the concentrations of radioactive material in the air; and 10 CFR Part 20.1101, which contains requirements for maintaining radiation exposure limits ALARA. In addition, the requirements of 10 CFR Part 40.32(b), and (d) are met as they relate to the acceptability of management audits to ensure protection of health and to minimize danger to life and property. The requirements of 10 CFR Part 40, Appendix A, Criterion 8A, are met as they relate to inspection of waste retention systems.

5.4 Qualifications for Personnel Conducting the Radiation Safety Program

The staff has completed its review of the qualifications of facility personnel conducting the radiation safety program at the Gas Hills Project facility. This review included an evaluation using the review procedures in SRP Section 5.4.2 and the acceptance criteria outlined in SRP Section 5.4.3.

Based on the information provided in the application and the detailed review conducted of the qualifications of the personnel conducting the radiation safety program for the Gas Hills Project facility, the staff concludes that the qualifications of the personnel are acceptable and are in compliance with 10 CFR Part 20.1101, which defines radiation protection program requirements, and 10 CFR Part 40.32(b), which specifies requirements for applicant qualifications. The qualifications of personnel conducting the radiation safety program are acceptable and are in accordance with the guidance provided in NRC Regulatory Guide 8.31.

5.5 Radiation Safety Training

The staff has completed its review of the radiation safety training program at the Gas Hills Project facility. This review included an evaluation using the review procedures in SRP Section 5.5.2 and the acceptance criteria outlined in SRP Section 5.5.3.

The radiation safety training program at the Gas Hills Project facility is consistent with the guidance contained in NRC Regulatory Guides 8.31, 8.13, and 8.29. The content of the training material, on-the-job training, and the extent and frequency of retraining are acceptable. Radiation safety instructions for employees are acceptable.

Based on the information provided in the application and the detailed review conducted of the radiation safety program for the Gas Hills Project facility, the staff concludes that the radiation safety program is acceptable and is in compliance with10 CFR Part 20.1101, which defines radiation protection program requirements, and 10 CFR Part 40.32(b), as it relates to applicant qualifications through training.

5.6 Security

The staff has completed its review of the security measures at the Gas Hills Project facility. The review included an evaluation using the review procedures in SRP Section 5.6.2 and the acceptance criteria outlined in SRP Section 5.6.3.

The security measures at the Gas Hills Project site demonstrate that PRI has acceptable active and passive constraints on entry to the licensed and restricted areas. PRI has identified acceptable passive controls such as fencing, locks, and warning signage for site control and active security systems for buildings.

Based on the information provided in the application, and the detailed review conducted of the security measures for the Gas Hills Project facility, the staff concludes that the security measures are acceptable and are in compliance with 10 CFR Part 20, Subpart I, which provides requirements for the security of stored material and control of material not in storage.

5.7 Radiation Safety Controls and Monitoring

5.7.1 Effluent Control Measures

The staff has completed its review of the effluent control measures at the Gas Hills Project facility. This review included an evaluation using the review procedures in SRP Section 5.7.1.2 and the acceptance criteria outlined in SRP Section 5.7.1.3.

PRI has acceptable effluent control measures at the Gas Hills Project site and has demonstrated that important effluent streams are properly controlled. PRI has provided for acceptable building ventilation systems in buildings where radon gas is vented. PRI has acceptable inspection frequencies to ensure specified performance of operating equipment. Record keeping and monitoring procedures are acceptable. Acceptable event response procedures for equipment failures or spills are described by PRI.

Based on the information provided in the application and the detailed review conducted of the effluent control measures at the Gas Hills Project facility, the staff concludes that these measures are acceptable and in compliance with 10 CFR Part 20.1301, which provides dose limits for members of the public; 10 CFR Part 20.1101, which defines radiation protection program and ALARA requirements; 10 CFR Part 20.1201(a), which provides occupational dose limits; and 10 CFR Part 20, Subpart M, which defines requirements for reports.

In addition, the staff concludes that the effluent control measures meet the requirements of 10 CFR Part 40.32(b) to protect health and minimize danger to life and property.

5.7.2 External Radiation Exposure Monitoring Program

The staff has completed its review of the external radiation exposure monitoring program at the Gas Hills project facility. This review included an evaluation using the review procedures in SRP Section 5.7.2.2 and the acceptance criteria outlined in SRP Section 5.7.2.3.

PRI has proposed an acceptable external radiation exposure monitoring program at the Gas Hills Project site. PRI has provided an acceptable description of the locations of external radiation monitors. The external radiation monitors are acceptably placed. PRI has established appropriate criteria to determine which employees should receive external radiation monitoring. PRI has demonstrated that the range, sensitivity, and calibration of external radiation monitors will protect health and safety of employees during the full scope of facility operations. Planned radiation surveys are adequate. Planned documentation of radiation exposures is acceptable. PRI's monitoring program is acceptable for protection of workers from alpha, beta, and gamma radiation.

Based on the information provided in the application and the detailed review conducted of the external radiation exposure monitoring program at the Gas Hills Project facility, the staff concludes that the external radiation exposure monitoring program is acceptable and is in compliance with 10 CFR Part 20.1101, which defines a radiation protection program and ALARA requirements; 10 CFR Part 20.1201(a), which specifies occupational dose limits; 10 CFR Part 20.1501, which provides requirements for surveying and monitoring; 10 CFR Part 20.1502, which defines conditions requiring individual monitoring of external dose; 10 CFR Part 20, Subpart L, which specifies record keeping requirements; and 10 CFR Part 20, Subpart M, which defines reporting requirements.

5.7.3 Airborne Radiation Monitoring Program

The staff has completed its review of the airborne radiation monitoring program at the Gas Hills Project facility. This review included an evaluation using the review procedures in SRP Section 5.7.3.2 and the acceptance criteria outlined in SRP Section 5.7.3.3.

PRI has an acceptable airborne radiation monitoring program at the Gas Hills Project site. PRI has provided an acceptable description of the locations of the airborne radiation monitors. The airborne radiation monitors are acceptably placed. PRI has demonstrated that the range, sensitivity, and calibration of monitors of airborne radiation will enable accurate determinations of the concentrations of airborne radioactive species so as to protect the health and safety of employees during facility operations. The workers are acceptably protected from radon gas releases from venting of process tanks and from spills and maintenance activities. Planned radiation surveys are acceptable. Planned documentation of radiation exposures is consistent with the requirements of 10 CFR Part 20. PRI's respiratory protection program is acceptable. PRI's program for monitoring uranium and sampling for radon or its daughters is acceptable. Employee internal exposure calculations will be performed in accordance with 10 CFR Part 20.1204(a).

Based on the information provided in the application and the detailed review conducted of the airborne radiation monitoring program at the Gas Hills Project facility, the staff concludes that the airborne radiation monitoring program is acceptable and is in compliance with 10 CFR Part 20.1101, which defines radiation protection program and ALARA requirements; 10 CFR Part 20.1201(a), which specifies individual occupational dose limits; 10 CFR Part 20.1201(e), which specifies allowed intake of soluble uranium; 10 CFR Part 20.1202, which describes the means of compliance when summing internal and external doses; 10 CFR Part 20.1203, for determination of dose from airborne radiation; 10 CFR Part 20.1208, which specifies the exposure limits to a fetus during pregnancy; 10 CFR Part 20.1301, which identifies public dose limits; 10 CFR Part 20.1702, which allows licensees to limit dose to individuals by controlling access, limiting exposure times, prescribing use of respiratory equipment, or use of other controls; 10 CFR Part 20, Subpart L, which specifies record keeping requirements; 10 CFR Part 20, Subpart M, which provides requirements for reports and notification; and 10 CFR Part 40, Appendix A, Criterion 8, which provides requirements for control of airborne effluents.

5.7.4 Exposure Calculations

The staff has completed its review of the measures proposed for exposure calculations at the Gas Hills Project facility. This review included an evaluation using the review procedures in SRP Section 5.7.4.2 and the acceptance criteria outlined in SRP Section 5.7.4.3.

PRI has provided acceptable measures for exposure calculations at the Gas Hills Project site. PRI has methods for determining intake of radioactive materials by personnel in work areas. PRI's exposure calculations for natural uranium and airborne radon daughter exposure are acceptable and are in conformance with the guidance in Regulatory Guide 8.30 and Regulatory Guide 8.34. PRI has acceptable methods to calculate prenatal exposures consistent with Regulatory Guide 8.13. All exposure calculation methods for routine operations, non-routine operations, maintenance, and cleanup activities are acceptable and are consistent with Regulatory Guide 8.30 and Regulatory Guide 8.34. Time studies or actual employee occupancy times and the results of radioactive material monitoring will be utilized in exposure calculations. PRI has considered anticipated efficiencies of airborne particulate control systems in exposure calculations. All reporting and record keeping is in conformance with Regulatory Guide 8.7.

Based on the information provided in the application and the detailed review conducted of the methodology for exposure calculations at the Gas Hills Project facility, the staff concludes that the measures proposed for exposure calculations are acceptable and are in compliance with 10 CFR Part 20.1101, which defines radiation protection program requirements; 10 CFR Part 20.1201(a), which specifies individual occupational dose limits; 10 CFR Part 20.1201(e), which specifies allowed intake of soluble uranium; 10 CFR Part 20.1202, which describes the means of compliance when summing internal and external doses; 10 CFR Part 20.1203, for determination of dose from airborne external radiation; 10 CFR Part 20.1204, which provides requirements for determination of internal exposure; and 10 CFR Part 20.1208, which specifies the exposure limits for a fetus.

5.7.5 Bioassay Program

The staff has completed its review of the bioassay program at the Gas Hills Project facility. This review included an evaluation using the review procedures in SRP Section 5.7.5.2 and the acceptance criteria outlined in SRP Section 5.7.5.3.

PRI has established an acceptable bioassay program at the Gas Hills Project facility that is consistent with the guidance in Regulatory Guide 8.22. An acceptable program for baseline urinalysis and exit bioassay is in place. An acceptable program to curtail uranium intake is established, and appropriate action levels are set. PRI has established reporting and record keeping protocols in conformance with the requirements of 10 CFR Part 20, Subpart L.

Based on the information provided in the application and the detailed review conducted of the bioassay program at the Gas Hills Project facility, the staff concludes that the bioassay program is acceptable and is in compliance with 10 CFR Part 20.1204, which provides requirements for the determination of internal exposure, and 10 CFR Part 20, Subpart L, which establishes record keeping requirements.

5.7.6 Contamination Control Program

The staff has completed its review of the contamination control program at the Gas Hills Project facility. This review included an evaluation using the review procedures in SRP Section 5.7.6.2 and the acceptance criteria outlined in SRP Section 5.7.6.3.

PRI has established an acceptable contamination control program at the Gas Hills Project site. Acceptable controls are in place to prevent contamination from entering clean areas or from leaving the site. The standard operating procedures will include provisions for contamination control, such as maintaining change rooms, showers, and lockers for clean clothing and providing alpha radiation monitoring equipment for use before leaving radiation areas. Acceptable action levels have been set in accordance with Regulatory Guide 8.30, and plans for surveys are in place for skin and personal clothing contamination. PRI has established that all items removed from the restricted area are surveyed by radiation safety staff and meet release limits. All reporting and record keeping is done in conformance with protocols established in Regulatory Guide 8.7. PRI has demonstrated that the range, sensitivity, and calibration of monitoring equipment will protect the health and safety of employees during the full scope of facility operations. PRI has demonstrated that contaminated surfaces will not be covered unless, before covering, a survey documents that the contamination level is below the limits specified in Table 5.7.6.3-1 of SRP Section 5.7.6.3. PRI will determine the radioactivity on the interior surfaces of pipes, drain lines, or duct work by making measurements at appropriate access points that will have been shown to be representative of the interior contamination. PRI has committed to establishing that contamination on equipment or scrap will be within the limits in Table 5.7.6.3-1 (SRP Section 5.7.6.3) before unrestricted release. To relinquish possession or control of equipment or scrap with material in excess of the limits specified in Table 5.7.6.3-1, PRI will provide detailed information on the contaminated material and provide a detailed health and safety analysis that shows that the release of the contaminated material will not result in an unreasonable risk to the health and safety of the public.

Based on the information provided in the application and the detailed review conducted of the contamination control program at the Gas Hills Project facility, the staff concludes that the contamination control program is acceptable and is in compliance with 10 CFR Part 20.1101, which defines radiation protection program and ALARA requirements; 10 CFR Part 20.1501, which provides survey and monitoring requirements; and 10 CFR Part 1702, which has provisions for limiting dose to individuals by controlling access, limiting exposure times, prescribing use of respiratory equipment, or using other controls.

5.7.7 Airborne Effluent and Environmental Monitoring Programs

The staff has completed its review of the airborne effluent and environmental monitoring programs at the Gas Hills Project site. This review included an evaluation using the review procedures in SRP Section 5.7.7.2 and the acceptance criteria outlined in SRP Section 5.7.7.3.

PRI has established acceptable airborne effluent and environmental monitoring programs at the Gas Hills Project site. The programs are consistent with the guidance in Regulatory Guide 4.14. PRI will sample radon, air particulate material, and direct radiation. Locations of monitoring stations are consistent with Regulatory Guide 4.14. Instrumentation is appropriate.

Based on the information provided in the application and the detailed review conducted of the airborne effluent and environmental monitoring programs at the Gas Hills Project site, the staff concludes that the airborne effluent and environmental monitoring programs are acceptable and are in compliance with 10 CFR Part 20.1302, which requires effluent monitoring to determine dose to individual members of the public; 10 CFR Part 20.1501, which specifies survey and monitoring requirements; 10 CFR Part 20, Subpart L, which establishes record keeping requirements; and 10 CFR Part 40.65, which specifies effluent and environmental monitoring requirements.

5.7.8 Groundwater and Surface Water Monitoring Programs

The staff has completed its review of the groundwater and surface water monitoring programs at the Gas Hills Project facility. This review included an evaluation using the review procedures in SRP Section 5.7.8.2 and the acceptance criteria outlined in SRP Section 5.7.8.3.

PRI has established acceptable groundwater and surface water monitoring programs at the Gas Hills Project site. PRI has established an acceptable well-field baseline sampling program, including the number of samples, constituents sampled, and appropriate statistical methods to remove outliers. PRI has selected acceptable excursion indicator constituents and an approach for establishing upper control limits. Appropriate criteria are used to establish monitor well locations for all aquifers likely to be affected. Appropriate well-field test procedures are established. PRI has defined acceptable operational approaches for the groundwater and surface water monitoring programs, including identifying appropriate wells for monitoring for excursion indicators, monitoring frequency, and criteria for determining the presence of an excursion. PRI has prepared an acceptable groundwater corrective action plan, including notification of NRC and subsequent reporting in the event of an excursion. PRI has defined an acceptable sampling program for the surface water bodies (Cameron Spring Reservoir, Section 32 stock pond, and West Canyon Creek) that lie within the facility boundary, including standard approaches for monitoring with a schedule and a list of analyzed constituents.

Based on the information provided in the application and the detailed review conducted of the groundwater and surface water monitoring programs at the Gas Hills Project facility, the staff concludes that the groundwater and surface water monitoring programs are acceptable and are in compliance with 10 CFR Part 40.32(c), which requires the applicant's proposed equipment, facilities, and procedures to be adequate to protect health and minimize danger to life or property; 10 CFR Part 40.32(d), which requires that the issuance of the license will not be inimical to the common defense and security or to the health and safety of the public; 10 CFR Part 40.41(c), which requires the applicant to confine source or byproduct material to the locations and purposes authorized in the license; and 10 CFR Part 40.31, which defines requirements for applications for specific licenses. The groundwater and surface water monitoring programs are also in compliance with 10 CFR Part 40, Appendix A, Criteria 5B(1), 5B(5), and 5C, which provide concentration limits for contaminants; 10 CFR Part 40, Appendix A, Criterion 5D, which requires a groundwater corrective action program; and 10 CFR Part 40, Appendix A, Criteria 7 and 7A, which require groundwater monitoring programs.

5.7.9 Quality Assurance

The staff has completed its review of the quality assurance program at the Gas Hills Project facility. This review included an evaluation using the review procedures in SRP Section 5.7.9.2 and the acceptance criteria outlined in SRP Section 5.7.9.3.

PRI has established an acceptable quality assurance program at the Gas Hills Project site. The quality assurance program has been applied to all radiological, effluent, and environmental programs, consistent with the guidance in Regulatory Guide 4.15. PRI has agreed to retain survey and instrument calibration records for 3 years and to retain records to demonstrate compliance with 10 CFR Part 20 requirements and evaluate dose, intake, and releases to the environment until NRC terminates the license.

Based on the information provided in the application and the detailed review conducted of the quality assurance program at the Gas Hills Project facility, the staff concludes that the quality assurance program is acceptable and is in compliance with 10 CFR Part 20.1101, which provides requirements for radiation protection programs; 10 CFR Part 20, Subpart l, which specifies record keeping requirements; and 10 CFR part 20, Subpart M, which defines reporting and notification requirements.

6.0 GROUNDWATER QUALITY RESTORATION, SURFACE RECLAMATION, AND FACILITY DECOMMISSIONING

6.1 Plans and Schedules for Groundwater Quality Restoration

The staff has completed its review of the plans and schedules for groundwater quality restoration proposed for use at the Gas Hills Project facility. This review included an evaluation of the methods that will be used to develop the groundwater restoration program and schedules using the review procedures in SRP Section 6.1.2 and the acceptance criteria outlined in SRP Section 6.1.3.

PRI has committed to adopt well-field groundwater restoration standards that are representative of the pre-operational baseline groundwater conditions. As a secondary restoration goal, PRI has committed to restore all affected groundwater to at least the pre-mining State class of use standards.

PRI's method for estimating well-field pore volume is acceptable, taking into account the estimated effective porosity of the contaminated region and the lateral and vertical extent of contamination. With respect to the methodology for undertaking restoration, PRI provided an acceptable approach that includes a mix of groundwater sweep, reverse osmosis, and groundwater re-injection. The well-field specific mix of this approach will be determined as part of the groundwater restoration plan for each individual well-field. In addition, PRI has proposed an acceptable method for determining the extent of well-field flare and for ensuring acceptable restoration of the flare. PRI has committed to an acceptable schedule for complete restoration for any well-field after ore extraction ceases.

PRI has presented an acceptable list of indicator constituents to be monitored and has specified acceptable criteria to determine the success of restoration on a well-field average basis. The number of pore volume replacements necessary to achieve the primary restoration targets has been provided and is acceptable. PRI has adopted a primary restoration program that will return the water quality of the production zone and affected aquifers to baseline water quality or to acceptable State class of use water quality standards. PRI's post-restoration stability monitoring program is acceptable. The methods proposed for abandoning wells and sealing them to restore the well-field to pre-extraction hydrologic conditions are acceptable. PRI has evaluated the consumptive water impacts of the Gas Hills Project facility using acceptable methods.

Based on the information provided in the application and the detailed review conducted of the plans and schedules for groundwater quality restoration for the Gas Hills Project facility, the staff concludes that the proposed plans and schedules for groundwater quality restoration are acceptable and are in compliance with 10 CFR Part 40.32(c), which requires the applicant's proposed equipment, facilities, and procedures to be adequate to protect health and minimize danger to life or property; and 10 CFR Part 40.32(d), which requires that the issuance of the license will not be inimical to the common defense and security or to the health and safety of the public.

6.2 Plans for Reclaiming Disturbed Lands

The staff has completed its review of the plans for reclaiming disturbed lands proposed for use at the Gas Hills Project facility. This review included an evaluation of the disturbed lands reclamation program using the review procedures in SRP Section 6.2.2 and the acceptance criteria outlined in SRP Section 6.2.3.

PRI has acceptable plans for a pre-reclamation survey used to establish baseline site conditions. PRI has acceptably considered results from operational monitoring and other information relative to areas of expected contamination in its reclamation plans. Areas to be evaluated include all buildings and structures, including the Carol Shop facility and satellite building, header houses, and pump stations, all locations with buried piping, including piping within and between mine units and process and water treatment facilities and piping to the

evaporation ponds, and all site roads used for transport of radioactive materials. PRI has proposed acceptable methodology to determine areas to be re-sampled or sampled with higher than normal frequency per unit area. PRI has defined appropriate procedures for the pre-reclamation survey and the means used to identify areas for cleanup using the acquired survey data. Methods proposed for reclamation and an acceptable plan for surface restoration, including identification of potential irreversible changes, have been provided. All cleanup activities will be performed in accordance with an approved decommissioning and reclamation plan and applicable Wyoming Department of Environmental Quality (WDEQ) and NRC rules, regulations, permits, and license conditions. The detailed (final) decommissioning and reclamation plan will be submitted to both WDEQ and NRC for review and approval.

Based on the information provided in the application and the detailed review conducted of the plans for reclaiming disturbed lands for the Gas Hills Project facility, the staff concludes that the proposed plans are acceptable and are in compliance with 10 CFR Part 40.32(c), which requires applicant proposed equipment, facilities, and procedures to be adequate to protect health and minimize danger to life or property; 10 CFR Part 40.41(c), which requires the applicant to confine source or byproduct material to the locations and purposes authorized in the license; 10 CFR Part 40, Appendix A, Criterion 2, which requires the applicant to dispose of 11e.(2) byproduct materials either in a licensed waste disposal site or at a mill tailings facility to demonstrate non-proliferation of waste disposal sites; and 10 CFR Part 40, Appendix A, Criterion 6(6), which identifies cleanup criteria requirements.

6.3 Removal and Disposal of Structures, Waste Materials, and Equipment

The staff has completed its review of the methodologies for removal and disposal of structures and equipment used at the Gas Hills Project facility. This review included an evaluation of the methods that will be used to develop the procedures for removal and disposal of structures, waste materials, and equipment using the review procedures in SRP Section 6.3.2 and the acceptance criteria outlined in SRP Section 6.3.3.

PRI has established an acceptable program for the measurement and control of residual contamination on structures and equipment. PRI has made acceptable plans for measurement of radioactivity on the interior of pipes, drain lines, and ductwork by making appropriate measurements at all traps and other access points where contamination is likely to be representative of system-wide contamination. All premises, equipment, or scrap likely to be contaminated, but that cannot be measured, will be treated by PRI to be contaminated in excess of limits and will be handled accordingly. For all premises, equipment, or scrap contaminated in excess of specified limits for unrestricted use, PRI will provide detailed, specific information describing the premises, equipment or scrap in terms of the extent and degree of radiological contamination. PRI will provide a detailed health and safety analysis that will demonstrate that the contamination and any use of the premises, equipment or scrap will not result in an unacceptable risk to the health and safety of the public or the environment. PRI plans to conduct a comprehensive radiation survey to establish that any contamination is within limits for release of the premises, equipment, or scrap for unrestricted use. All 11e.(2) byproduct materials in excess of the limits for release of materials for unrestricted use will be disposed either in a licensed waste disposal site or at a mill tailings facility.

Based on the information provided in the application and the detailed review conducted of the methodologies for removal and disposal of structures, waste materials, and equipment for the Gas Hills Project facility, the staff concludes that the methodologies are acceptable and are in compliance with 10 CFR Part 40.32(c), which requires the applicant's proposed equipment, facilities, and procedures to be adequate to protect health and minimize danger to life or property; 10 CFR Part 40.41(c), which requires the applicant to confine source or byproduct material to the locations and purposes authorized in the license; and 10 CFR Part 40, Appendix A, Criterion 2, which requires the applicant to dispose of 11e.(2) byproduct materials either in a licensed waste disposal site or at a mill tailings facility to demonstrate non-proliferation of waste disposal sites.

6.4 Methodologies for Conducting Post-Reclamation and Decommissioning Radiological Surveys

The staff has completed its review of the methodologies for conducting post-reclamation and decommissioning radiological surveys proposed for use at the Gas Hills Project facility. This review included an evaluation of the methods that will be used for the post-reclamation and decommissioning radiological surveys using the review procedures in SRP Section 6.4.2 and the acceptance criteria outlined in SRP Section 6.4.3.

PRI has developed acceptable methodologies for verification of cleanup (final status survey plan) that demonstrate that the radium concentration in the upper 15 cm (5.9 in.) of soil will not exceed 15pCi/g. Also, the cleanup of other residual radionuclides in soil will meet the criteria developed with the radium benchmark dose approach, including a demonstration of ALARA and application of the unity test of 10 CFR Part 40, Appendix A, Criterion 6(6), where applicable.

Based on the information provided in the application and the detailed review conducted of the methodologies for conducting post-reclamation and decommissioning radiological surveys for the Gas Hills Project facility, the staff concludes that the methodologies are acceptable and are in compliance with 10 CFR Part 40.32(c), which requires the applicant's proposed equipment, facilities, and procedures to be adequate to protect health and minimize danger to life or property; 10 CFR Part 40.32(d), which requires that the issuance of the license will not be inimical to the common defense and security or to the health and safety of the public; 10 CFR Part 40.41(c), which requires the applicant to confine source or byproduct material to the locations and purposes authorized in the license; and 10 CFR Part 40, Appendix A, Criterion 6(6), which provides standards for cleanup of radium and other radionuclides in soil.

6.5 Financial Assurance

The Staff has completed its review of the financial assurance cost estimate for the Gas Hills Project facility. This review included an evaluation of the methods used to develop the financial assurance cost estimate for the facility using the review procedures in SRP Section 6.5.2 and the acceptance criteria outlined in SRP Section 6.5.3.

The financial assurance cost estimate provided in the application (PRI 1998) for the proposed Gas Hills Project was based on 1997 dollars, and, as such, is currently outdated as it has not been adjusted for inflation. However, in a letter dated October 10, 2003, PRI indicated that it has a surety instrument (Letter of Credit) in place with the State of Wyoming for the existing

facilities (Carol Shop Building, roads, and monitor wells) at the Gas Hills Project site. This existing surety instrument is for $617,400 and PRI has requested that the WDEQ approve an increase in the surety to $639,000 for the next annual period of interest to account for inflation. PRI also noted that it does not anticipate initiating further development (construction of additional facilities) at the Gas Hills Project for the next several years and that further development would be dependent on an improvement in market conditions for recovered uranium. Given the uncertainty over the future development of the Gas Hills Project, the staff considers the proposed surety of $639,000 to be acceptable for the current state of the Gas Hills Project. This surety ensures that sufficient funds would be available for reclamation of the Gas Hills Project by an independent contractor, if necessary. While the proposed surety of $639,000 is adequate for the current state of the Gas Hills Project, the staff plans to condition the Smith Ranch/Highland license (SUA-1548) to require PRI to establish an updated surety instrument prior to the initiation of any new development activities at the Gas Hills Project.

Based on the information provided in the application and the detailed review conducted of the financial assurance cost estimate for the current state of the Gas Hills Project, the staff concludes that the amount of the proposed financial surety and the bases for that amount are acceptable and are consistent with 10 CFR Part 40, Appendix A, Criterion 9, which requires that financial surety arrangements be established by each uranium recovery facility operator.

7.0 ACCIDENT CONSIDERATIONS

The staff has completed its review of PRI's description of the potential impacts from accidents at the Gas Hills Project facility. This review included an evaluation of the accidents considered using the review procedures in SRP Section7.5.2 and the acceptance criteria outlined in SRP Section 7.5.3.

PRI has acceptably described all likely significant impacts from accidents from facility operations. PRI has provided an acceptable analysis of potential accidents and their consequences that reflects the facility design, site features, and planned operations. PRI has identified likely impacts from such accidents and has described measures to mitigate accident impacts. The accidents evaluated have considered past operating experience from similar facilities. Adequate response and remediation procedures have been identified or referenced, and the facility personnel will be qualified to implement them. PRI's response program for radiological accidents will comply with the notification requirements of 10 CFR Parts 20.2202 and 20.2203.

Based on the information provided in the application and the detailed review conducted of the accidents considered for the Gas Hills Project facility, the staff concludes that the accidents will not result in significant impacts. The accidents considered demonstrate PRI's compliance with 10 CFR Part 40.32(c), which requires the applicant's equipment, facilities, and procedures to be adequate to protect health and minimize danger to life or property; and 10 CFR Parts 20.2202 and 20.2203, which define response program requirements for radiological accidents.

8.0 CONCLUSIONS AND LICENSE CONDITIONS

Based on the staff's detailed safety review, as provided herein, the staff concludes that the proposed Gas Hills Project satisfies the requirements of 10 CFR Part 40, Appendix A, and 10 CFR Part 20. In a parallel environmental review, the staff has also determined that the Gas Hills Project will not have a significant impact on the environment. Lastly, the staff concludes that, consistent with the requirements of 10 CFR Parts 40.32 and 40.45:

- PRI's license amendment application for the Gas Hills Project is for a purpose authorized by the Atomic Energy Act; and
- PRI is qualified by reason of training and experience to use the source material for the purpose requested in such manner as to protect health and minimize danger to life or property; and
- PRI's proposed equipment, facilities, and procedures are adequate to protect health and minimize danger to life or property; and
- The issuance of the license will not be inimical to the common defense and security or to the health and safety of the public.

Based on the foregoing findings and conclusions, the staff has determined that PRI's request to amend the Smith Ranch-Highland Source Materials License SUA-1548 to allow the operation of the Gas Hills Project satellite *in situ* leach uranium recovery facility is acceptable. Accordingly, the staff approves PRI's amendment request for the Gas Hills Project, subject, however, to the following revised or new license conditions:

<u>License Condition 9.1 (Revised)</u>

9.1 The authorized places of use shall be the licensee's Smith Ranch-Highland Uranium Project (SR-HUP), which is the primary processing facility, and Highland, Ruth, North Butte, and Gas Hills Project as Satellite In-situ Leach (ISL) facilities, in Converse, Johnson, Campbell, and Fremont and Natrona Counties, Wyoming, respectively. As satellite facilities, operations at the Highland, Ruth, North Butte, and Gas Hills facilities shall be limited to shipments of loaded ion exchange (ix) resin or yellowcake slurry which will be transported to the central processing plant at Smith Ranch, as further explained in the commitments, representations, and statements listed in License Condition 9.3.

<u>License Condition 9.3 (Revised)</u>

9.3 The licensee shall conduct operations in accordance with the commitments, representations, and statements contained in the license application and/or amendments for each facility, which are hereby incorporated by reference. These submittals include the following: Smith Ranch and Highland Uranium Project dated November 15, 1999,and May 14, 1993, respectively, as amended by submittals dated September 27, 2000, and October 12, 2000, September 27, 2001, October 18, 2001, October 22, 2001, and February 28, 2002, May 6, 2003, July 09, 2003; Ruth/North Butte license application dated April 1, 1992, as amended by submittals dated March 7, 1989, and October 3, 1998, September 24, 1999, and November 11, 1999; and Gas Hills Project application dated June 24, 1998, as

amended by submittals dated September 24, 1999, November 11, 1999, May 3, 2002, and October 10, 2003, which are hereby incorporated by reference, except where superseded by license conditions below.

License Condition 9.5 (Revised)

9.5 The licensee shall maintain an NRC-approved financial surety arrangement, consistent with 10 CFR 40, Appendix A, Criterion 9, adequate to cover the estimated reclamation and closure costs, if accomplished by a third party, for all existing operations and any planned expansions or operational changes for the upcoming year. Reclamation includes all cited activities and groundwater restoration, as well as off-site disposal of all 11e.(2) byproduct material.

Within three months of NRC approval of a revised closure (decommissioning) plan and its cost estimate, the licensee shall submit for NRC review and approval, a proposed revision to the financial surety arrangement if estimated costs exceed the amount covered in the existing financial surety. The revised surety instrument shall then be in effect within 30 days of written NRC approval of the surety documents.

Proposed annual updates to the surety amount, required by 10 CFR 40, Appendix A, Criterion 9, shall be provided to NRC ninety days prior to the anniversary date (e.g., renewal date of the surety instrument/vehicle) of September 30 of each year for Smith Ranch-Highland Uranium Project, March 26 for Ruth, April 30 for North Butte, and August 7 for the Gas Hills Project. If NRC has not approved a proposed revision 30 days prior to the expiration date of the existing surety arrangement, the licensee shall extend the existing arrangement, prior to expiration, for one year. Along with each proposed revision or annual update of the surety, the licensee shall submit supporting documentation showing a breakdown of the costs and the basis for the cost estimates with adjustments for inflation, maintenance of a minimum 15 percent contingency, changes in engineering plans, activities performed, and any other conditions affecting estimated costs for site closure.

At least 90 days prior to beginning construction associated with any planned expansion or operational change which was not included in the annual surety update, the licensee shall provide for NRC approval an updated surety to cover the expansion or change. The licensee shall also provide NRC with copies of surety-related correspondence submitted to the State of Wyoming, a copy of the State's surety review, and the final approved surety arrangement. The licensee also must ensure that the surety, where authorized to be held by the State, identifies the NRC-related portion of the surety and covers the above-ground decommissioning and decontamination, the cost of offsite disposal of 11e.(2) byproduct material, soil and water sample analyses, and groundwater restoration associated with the site. The basis for the cost estimate is the NRC-approved site closure plan or the NRC-approved revisions to the plan. Reclamation or decommissioning plan cost estimates, and annual updates, should follow the outline in Appendix E to NUREG-1569 (NRC, 2003), entitled "Recommended Outline for Site-Specific *In Situ* Leach Facility Reclamation and Stabilization Cost Estimates."

Power Resources, Inc. shall continuously maintain an approved surety instrument for the Smith Ranch Project, in favor of the State of Wyoming, in the amount of no less than $14,456,300.00, for the purpose of complying with 10 CFR 40, Appendix A, Criterion 9, until a replacement is authorized by both the State of Wyoming and the NRC.

The licensee shall continuously maintain an approved surety instrument for the Highland Uranium Project in the amount of no less than $21,278,100.00, in favor of the State of Wyoming, for the purpose of complying with 10 CFR 40, Appendix A, Criterion 9, until a replacement is authorized by both the State of Wyoming and the NRC.

The licensee shall continuously maintain an NRC-approved surety instrument for the current non-operational Ruth facility in the amount of no less than $102,300.00, in favor of the State of Wyoming, for the purpose of complying with 10 CFR 40, Appendix A, Criterion 9, until a replacement is authorized by both the State and the NRC.

The licensee shall continuously maintain an NRC-approved surety instrument for the current non-operational North Butte facility in the amount of no less than $55,400.00, in favor of the State of Wyoming, for the purpose of complying with 10 CFR 40, Appendix A, Criterion 9, until a replacement is authorized by both the State and the NRC.

The licensee shall continuously maintain an NRC-approved surety instrument for the current non-operational Gas Hills Project facility in the amount of no less than $639,000, in favor of the state of Wyoming, for the purpose of complying with 10 CFR 40, Appendix A, Criterion 9, until a replacement is authorized by both the State and the NRC.

At least six months prior to the expected commencement of construction of a commercial facility at the Ruth, North Butte, and Gas Hills Project sites, the licensee shall submit for NRC and State approval, an itemized cost estimate for implementation of the NRC-approved decommissioning/restoration plan for the commercial facility. Site construction activities shall not commence until the NRC and State approve the surety amount and accept the surety arrangement. This surety shall be written in favor of the State of Wyoming or the NRC for the purposes of complying with 10 CFR 40, Appendix A, Criterion 9, and shall be continuously maintained until a replacement is authorized by both the State and the NRC.

<u>License Condition 9.6 (Revised)</u>

9.6 The licensee shall dispose of 11e.(2) byproduct material from the Smith Ranch-Highland Uranium Project, Ruth, North Butte, and Gas Hills Project ISL facilities at a site licensed by NRC or an NRC Agreement State to receive 11e.(2) byproduct material. The licensee's approved waste disposal agreement must be maintained on-site. In the event the agreement expires or is terminated, the licensee shall notify NRC in writing, in accordance with License Condition 9.2, within 7 days after the date of expiration or termination. A new agreement shall be submitted for NRC approval within 90 days after expiration or termination unless further delay is justified, or the licensee will be prohibited from further lixiviant injection.

License Condition 9.9 (Revised)

9.9 Before engaging in any developmental activity not previously assessed by the NRC, the licensee shall administer a cultural resource inventory. All disturbances associated with the proposed development will be completed in compliance with the National Historic Preservation Act (as amended) and its implementing regulations (36 CFR 800), and the Archaeological Resources Protection Act (as amended) and its implementing regulations (43 CFR 7).

In order to ensure that no unapproved disturbance of cultural resources occurs, any work resulting in the discovery of previously unknown cultural artifacts shall cease. The artifacts shall be inventoried and evaluated in accordance with 36 CFR Part 800, and no disturbance of the area shall occur until the licensee has received authorization from the NRC to proceed.

For the Gas Hills Project, the licensee shall comply with the stipulations for cultural resource protection in the Programmatic Agreement provided in the NRC letter to the Advisory Council on Historic Preservation, dated December 16, 2003.

10.3 Gas Hills Project (New License Conditions)

10.3.1 The licensee shall conduct additional surveys for prairie dog towns and mountain plover prior to the onset of construction activities. If the surveys indicate that prairie dog towns may be impacted by construction activities, the licensee shall consult with the U.S. Fish and Wildlife Service for guidance on conducting surveys for the black-footed ferret. The surveys for mountain plover shall be conducted between May 1 and June 15 (3 surveys at 14 day intervals), prior to construction, to determine the absence/presence of plovers. If plover nests are detected, construction activity within one-quarter mile of the nest shall cease for at least 7 days after nestling hatching.

10.3.2 Prior to the onset of commercial in situ leach activities, the licensee shall prepare a new operations plan, in accordance with the guidance in NUREG-1569 (June 2003), for the NRC review and approval.

10.3.3 Prior to the onset of commercial in situ leach activities, the licensee shall propose plans for the conduct of daily visual inspections of the Gas Hills Project evaporation pond embankments, fences, and liners, including measurements of pond freeboard and checks of the leak detection system. The licensee shall also describe the actions it will take for fluid detected in the leak detection system standpipe, including the sampling and analysis of standpipe fluids and plans for the transfer of the evaporation pond contents to an alternate cell for the conduct of evaporation pond repairs.

REFERENCES

Power Resources, Inc., 1998. Gas Hills Project, Amendment Application for NRC Source Material License SUA - 1511. Submitted to NRC by letter dated June 24, 1998 from P. Hildenbrand, PRI, to J. Holonich, U.S. Nuclear Regulatory Commission.

Power Resources, Inc., 1999a. Letter dated September 24, 1999, from P. Hildenbrand, PRI, to J. Surmeier, U.S. Nuclear Regulatory Commission.

Power Resources, Inc., 1999b. Letter dated November 11, 1999, from P. Hildenbrand, PRI, to J. Surmeier, U.S. Nuclear Regulatory Commission.

Power Resources, Inc., 2002. Letter dated May 3, 2002, from W. Kearney, PRI, to R. Weller, U.S. Nuclear Regulatory Commission.

Power Resources, Inc., 2003. Letter dated October 10, 2003, from W. Kearney, PRI, to G. Janosko, U.S. Nuclear Regulatory Commission.

U.S. Nuclear Regulatory Commission, 1999a. Letter dated May 21, 1999, from N. Stablein, U.S. Nuclear Regulatory Commission, to P. Hildenbrand, Power Resources, Inc.

U.S. Nuclear Regulatory Commission, 1999b. Letter dated July 15, 1999, from J. Surmeier, U.S. Nuclear Regulatory Commission, to P. Hildenbrand, Power Resources, Inc.

U.S. Nuclear Regulatory Commission, 2004, Letter dated January 14, 2004, from G. Janosko, U.S. Nuclear Regulatory Commission, to W. Kearney, PRI.