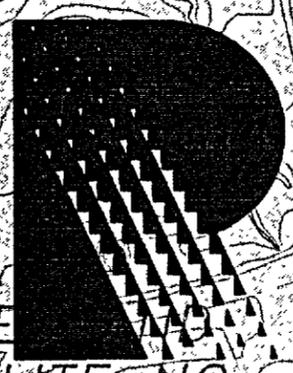


**POWER RESOURCES, INC.**  
**GAS HILLS PROJECT**



OFFICE  
SATELLITE NO. 1

MINE UNIT #4

**AMENDMENT APPLICATION FOR  
USNRC SOURCE MATERIAL LICENSE SUA-1511**

9807020338 980624  
PDR ADCK 04008857  
B PDR

MINE UNIT #2

June, 1998

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## 1. PROPOSED ACTIVITIES

### 1.1 Introduction and Background

This application for an amendment to NRC Source Material License SUA-1511 covers approximately 8500 acres located in the Gas Hills Uranium District in Fremont and Natrona Counties, Wyoming. Power Resources, Inc. (PRI) is proposing to develop an *in situ* uranium production facility (ISL), the Gas Hills Project, in this area which will produce up to 2.5 million pounds of uranium per year over the next 20 years.

The Project will be operated as a satellite to PRI's existing Highland Uranium Project (Source Material License SUA-1511), and will consist of wellfield and ion exchange activities only. Uranium bearing ion exchange resin will be transported by truck to the Highland Central Processing Facility (CPF) for processing into dried yellowcake.

This Project will provide employment for approximately 40 full time employees and a similar number of contractor personnel. In addition, the Project will contribute substantial mineral, property, and sales and use tax revenues to the State of Wyoming.

PRI controls the majority of the mineral rights within the Amendment Area. The majority of the land surface is public land which is administered by the U.S. Bureau of Land Management (BLM). PRI has also applied for a Permit to Mine with the Wyoming Department of Environmental Quality.

The Gas Hills Project is located within the most extensive uranium mining district of Wyoming. The Gas Hills District has produced over one hundred million pounds of  $U_3O_8$  during the last forty years. The history of the Gas Hills Uranium District has been dominated by conventional open pit and underground mine operations with ores processed at one of three uranium mills in the district or transported outside the district for processing. The history of conventional mining and milling in the area has resulted in the reclamation of several thousands of acres of mined lands and several hundreds of acres of lands impacted by uranium milling and tailings disposal operations. By comparison, the proposed ISL project will disturb less than 15% of the land surface within the Amendment Area (i.e. less than 1275 acres), while maximizing resource recovery. ISL allows for the economic recovery of uranium deposits that are no longer viable by conventional mining methods. In addition, the surface disturbance will impact only the near surface materials, and the majority of the disturbed area will remain vegetated during operations.

### 1.2 Location

The Gas Hills Project is located in the eastern portion of the Gas Hills Uranium District of south-central Wyoming in Fremont and Natrona Counties, Wyoming (see Figure 1-1). The Project site is located approximately 45 miles east of Riverton and 65 miles west of Casper.

The nearest population center is Jeffrey City, located 25 miles south of the Project. The area is remote and contains a low population density. The majority of people living in the area reside on widely dispersed ranches. The nearest residence is approximately 12 miles northeast of the Project site.

Access to the Project from Riverton is via 40 miles of paved highway on Wyoming State Highway No.136 and five miles of graded private road. From Casper, access is via 50 miles of paved highway on US Highway No. 20/26 to Waltman, 25 miles of graded county road to the Fremont County line and five miles of gravel private road. Access from Jeffrey City is via 25 miles of existing private haul road. State Highway No.136 is maintained year round. The other routes may be closed during inclement weather. (See Plate 1-2)

The Amendment Area is located at the south end of the Wind River topographic basin, north of and adjacent to the Sweetwater Plateau. The boundary between these two geomorphic provinces is the Beaver Rim, which is a 500 to 700 feet high, north facing erosional escarpment. Elevations within the Amendment Area range from 6700 to 7400 feet above mean sea level, with the highest elevations being on top of the Beaver Rim.

### 1.3 Project Ownership

The Gas Hills Project is predominantly owned by Power Resources, Inc. (PRI). PRI is a wholly owned subsidiary of Cameco Resources U.S. (CRU), which in turn is a wholly owned subsidiary of Cameco Corporation. The lands containing Mine Unit 3 are owned by Geomex Minerals, Inc., a wholly owned subsidiary of Cameco Resources U.S. (CRU), which in turn is a wholly owned subsidiary of Cameco Corporation. PRI operates the Highland Uranium Project under Source Material License SUA-1511 and proposes to operate the Gas Hills Project as a Satellite to the Highland Uranium Project.

### 1.4 Land Ownership

Land surface within the Amendment Area is controlled primarily by the BLM with small parcels of private and state owned land surface scattered across the Amendment area. Land ownership and Land use are discussed in Chapter 2.

### 1.5 General Description of the Proposed Operation

ISL involves the use of a leaching solution, called a lixiviant, to extract the economic mineral (uranium) from the geologic formation in which it occurs, without physically removing the ore bearing strata. As shown schematically on Figure 1-2, ISL is accomplished by injecting the lixiviant through injection wells completed in the ore bearing strata and circulating it through the ore bearing strata, thereby dissolving the uranium. The resultant uranium bearing solution is recovered by pumping production wells located adjacent to the injection wells. The uranium in solution is then recovered at a surface ion exchange facility. The majority of

the treated ground water is returned to the ore bearing strata. A limited purge or bleed volume is removed as waste water for treatment and disposal. Chapter 3 provides a detailed description of the ISL process proposed for the Gas Hills Project.

For many years, ISL has been applied to a variety of economic minerals which can be dissolved in place, including salts (halite, trona, anhydrite, and potash) and metals (copper and uranium). Commercial uranium ISL production in the United States has been practiced since the mid 1960's, and is currently the leading extraction technology for uranium production in the United States

For uranium ISL to be successful, the host formation must be: (1) permeable; (2) below the water table; and (3) must contain uranium minerals in economic quantities that can be dissolved with a leaching solution. Many of the sandstone-hosted "roll front" uranium deposits of the western United States meet these criteria and have proven to be excellent ISL candidates. These roll front deposits were formed by the movement of carbonate-rich ground water carrying oxidized uranium in solution through the host sandstone, and the precipitation of the uranium at an oxidation/reduction boundary within the aquifer.

The goal of the project is to extract up to 2.5 million pounds of uranium per year over an anticipated project production life of at least twenty years. Surface disturbance will include the wellfield pattern areas during wellfield construction, the evaporation ponds, the mineral processing and water treatment facilities, the wellfield header houses, pipeline routes, pump stations and access roads. It is anticipated that less than 1275 acres will be disturbed during the life of the project.

The Gas Hills Project will be operated as a satellite to the Highland Uranium Project. Only wellfield, ion exchange and water treatment activities will occur at the project site. Uranium laden ion exchange resin will be transported by truck from the Gas Hills Project to the Highland Uranium Project (approximately 140 miles) for processing into yellowcake.

Office and water treatment facilities will be housed in the existing Carol Shop Facility (see Plate 1-1E). Ion exchange facilities will be located in the Carol Shop and/or at either of the two potential satellite locations shown on Plate 1-1W. Uranium ore body locations are shown on Plates 1-1W and 1-1E. The approximate average grade of the deposit is 0.15%  $U_3O_8$ .

The wellfields will consist of large groups of injection and production well patterns typically arranged with four corner injection wells and a central production well per pattern (see Figure 3-11). Fluids will be conveyed between the satellite facilities and wellfields through buried pipelines. Small groups of injection and production wells will be piped to central distribution centers, called header houses, where oxidant will be added to the injection fluid. Ancillary equipment that will be used will include truck mounted pump pulling units, truck mounted hose reels, electrical generators, backhoes, and light duty 4-wheel drive vehicles. The wells

will be installed by contract well drillers who will utilize truck mounted rotary drilling rigs and water trucks.

To the best of PRI's knowledge, there are no other mineral, oil, gas, or other natural resources that will be affected by the proposed operation.

## 1.6 Project Schedule

### 1.6.1 Pre-Operational Development Schedule

Prior to Project start up, the Wyoming Department of Environmental Quality (WDEQ) Permit to Mine, NRC License Amendment and other ancillary, federal, state, and local permits and approvals must be received. Figure 1-3 presents the pre-operational development schedule. The critical pre-mining development tasks will be the approval of the Mining Permit and Mine Unit No.1 by WDEQ, the NRC license amendment approval, approval of the project by BLM, and approval of the Permit to Construct by WDEQ for the solar evaporation ponds.

### 1.6.2 Operations Schedule

The mining schedule is based upon an initial production rate of 1 million pounds of  $U_3O_8$  per year, with that rate being increased to the maximum production rate sustainable from the ore sand aquifer, currently estimated to be about 2.5 million pounds of  $U_3O_8$  per year. Actual production rates will be adjusted in response to actual wellfield conditions (eg, flows, leach rates, etc.) and the market demand for uranium

Figure 1-4 provides a current estimated schedule of operational activities for the Gas Hills Project for the first 17 years of operation. Additional ore reserve and resource areas are known to exist within and near the Amendment area, but are not currently drilled adequately to evaluate for mining. These reserve areas have the potential to extend the ultimate project life beyond this initial period.

## 1.7 Waste Management and Disposal Plans

The major types of wastes generated at the Gas Hills Project will include domestic sewage, non-radiologically contaminated solid and liquid wastes, and radiologically contaminated byproduct materials generated in the wellfield, the ion exchange facility, and the waste water treatment and disposal facility

Domestic sewage will be disposed of in conventional septic/leach field systems, and by the use of portable chemical toilets.

Domestic solid wastes such as paper, wood products, office and food wastes will be stored on site in commercial waste containers and periodically removed to a local municipal land fill.

Radiologically contaminated byproduct materials such as ion exchange resin, filter media, and process equipment will be stored on site in appropriate containers or designated areas and periodically removed for disposal at an NRC licensed disposal facility. Details of the proposed waste management and disposal plans are provided in Chapter 4.

#### 1.8 Ground Water Restoration

The ISL process is a continuum from the installation of the wells through the restoration of the affected ground water. After the economic recovery limit of a mine unit has been reached, injection is stopped and ground water restoration is initiated. Ground water restoration is generally accomplished using a combination of techniques including ground water sweep, treatment of ground water by reverse osmosis with reinjection of the treated water, and reductant addition to the formation to precipitate heavy metals back into the formation. Ground water restoration is discussed in detail in Chapter 6.

#### 1.9 Site Decommissioning and Reclamation

As soon as practical after ground water restoration has received final regulatory approval, each mine unit will be reclaimed. This reclamation process includes abandonment of all wells, removal of all buried pipelines and overhead utilities and removal of all surface facilities and roads. Minor topsoil replacement and/or conditioning may be necessary in some wellfield areas and will be determined on a case-by-case basis utilizing soil sample analysis and decommissioning radiological survey results.

Buildings used during the project will be surveyed for radiological contamination prior to dismantlement. Contaminated surfaces will be decontaminated prior to removal. If decontamination to NRC release standards is not possible or practical, the contaminated materials will be disposed of at an NRC licensed disposal facility. With regulatory agency approval and landowner consent, certain buildings and roads may be left for future use by the landowner.

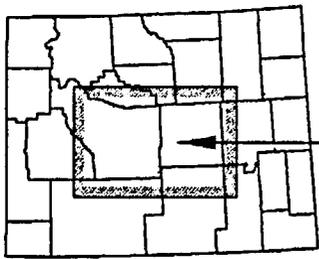
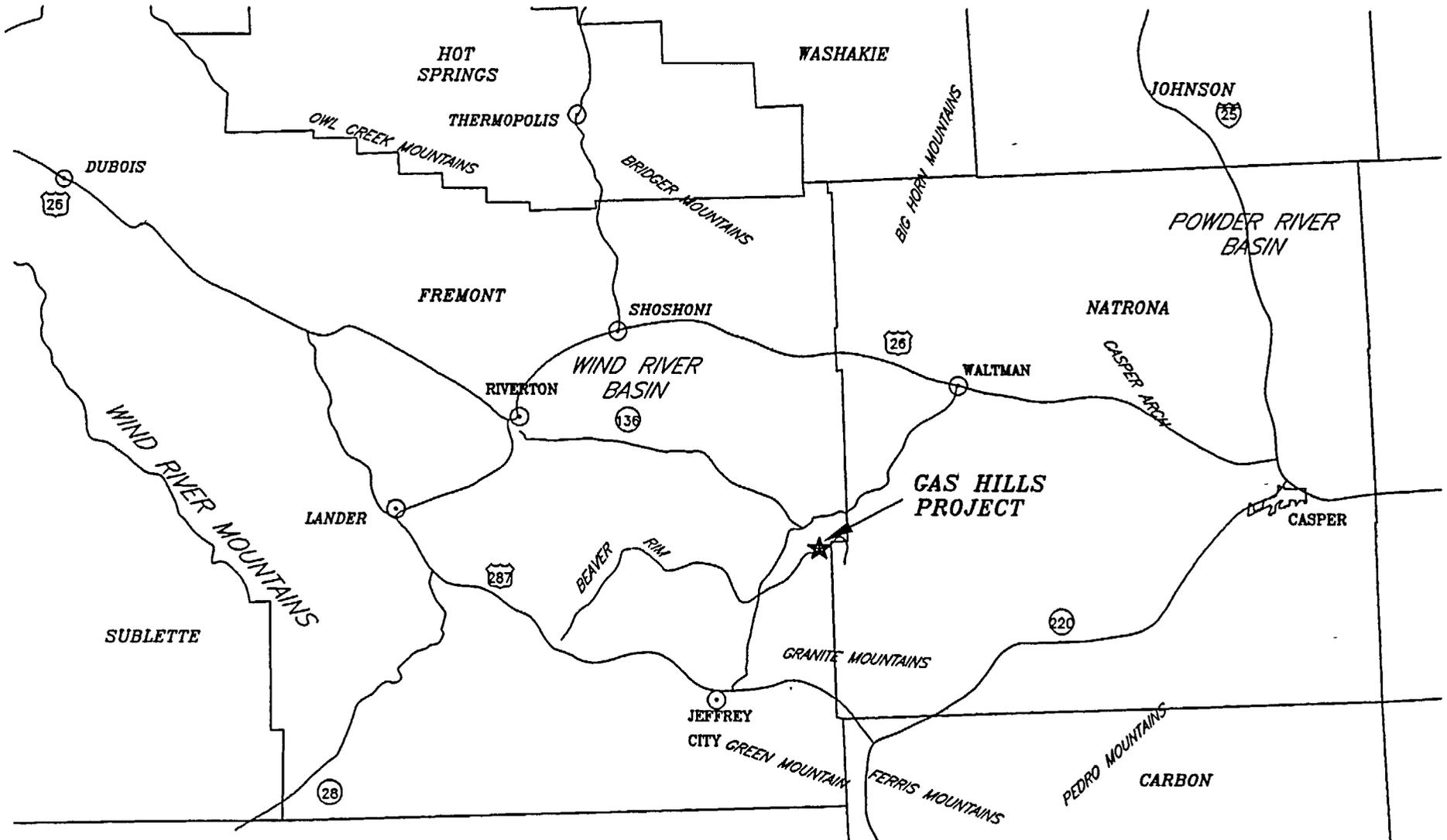
Following decommissioning of each wellfield and final decommissioning of surface facilities, all disturbed surfaces will be recontoured, if necessary, removed topsoil reapplied and the areas revegetated using a seed mixture approved by the WDEQ and US BLM. Decommissioning and reclamation are discussed in detail in Chapter 6.

#### 1.10 Surety Arrangements

PRI is required by the Wyoming Environmental Quality Act and the WDEQ-LQD Rules and Regulations to put in place a surety instrument that will cover the cost of all surface and sub-

surface decommissioning and reclamation and ground water restoration. The amount of the surety instrument is initially based on the estimated cost of reclaiming the facilities and ground water impacted by the first year's proposed activities.

NRC and Wyoming regulations require that the surety estimate be revised on an annual basis to ensure that the surety instrument remains adequate to cover the cost of facility decommissioning, ground water restoration and site reclamation. The surety cost estimate for the Gas Hills Project is provided in Chapter 6.



MAP  
AREA

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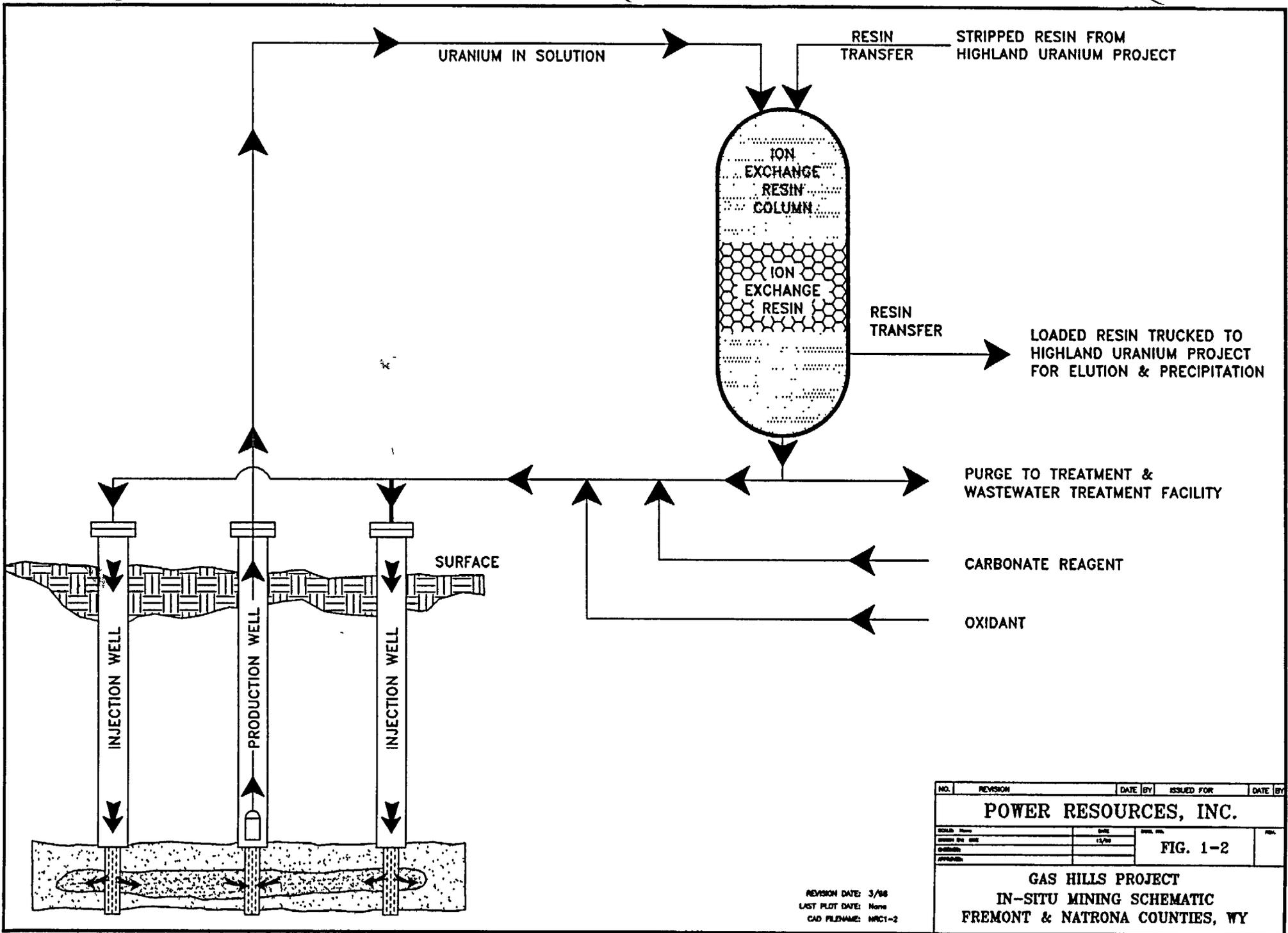


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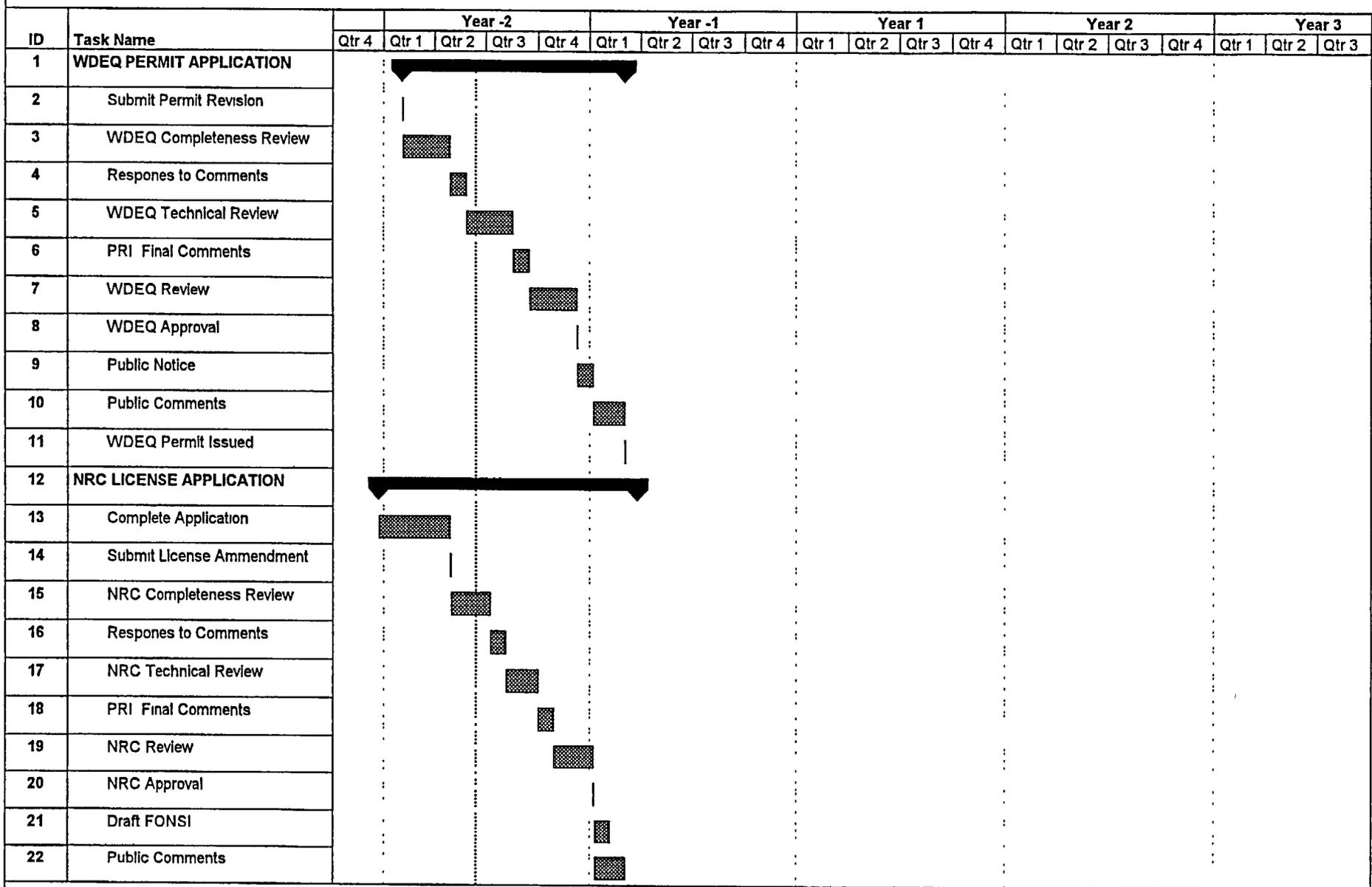
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<b>POWER RESOURCES, INC.</b>				
DESIGN BY	DATE	REV. NO.		
CHECKED BY	12/98		<b>FIG. 1-1</b>	
APPROVED				
<b>GAS HILLS PROJECT          GENERAL SITE LOCATION          FREMONT &amp; NATRONA COUNTIES, WY</b>				



NO.	REVISION	DATE BY	ISSUED FOR	DATE BY
<b>POWER RESOURCES, INC.</b>				
SOLD: None		DATE: 12/90	REV. NO.	FIG. 1-2
DRAWN BY: None				
CHECKED: None				
APPROVED: None				
<b>GAS HILLS PROJECT</b> <b>IN-SITU MINING SCHEMATIC</b> <b>FREMONT &amp; NATRONA COUNTIES, WY</b>				

REVISION DATE: 3/88  
 LAST PLOT DATE: None  
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**FIGURE 1-3  
GAS HILLS PROJECT  
PRE-OPERATIONAL DEVELOPMENT SCHEDULE**



**FIGURE 1-3  
GAS HILLS PROJECT  
PRE-OPERATIONAL DEVELOPMENT SCHEDULE**

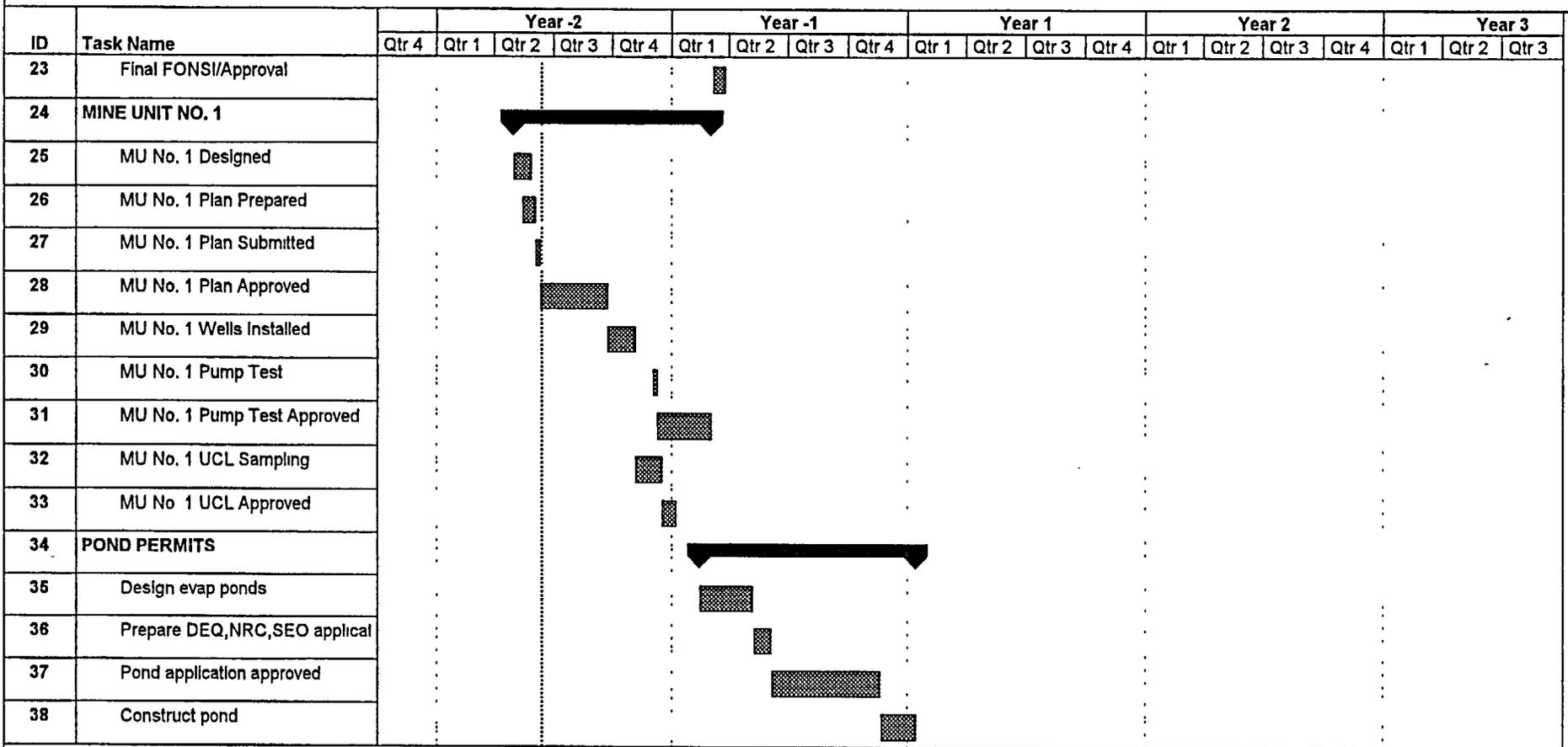


FIGURE 1-4  
GAS HILLS PROJECT  
OPERATIONS SCHEDULE

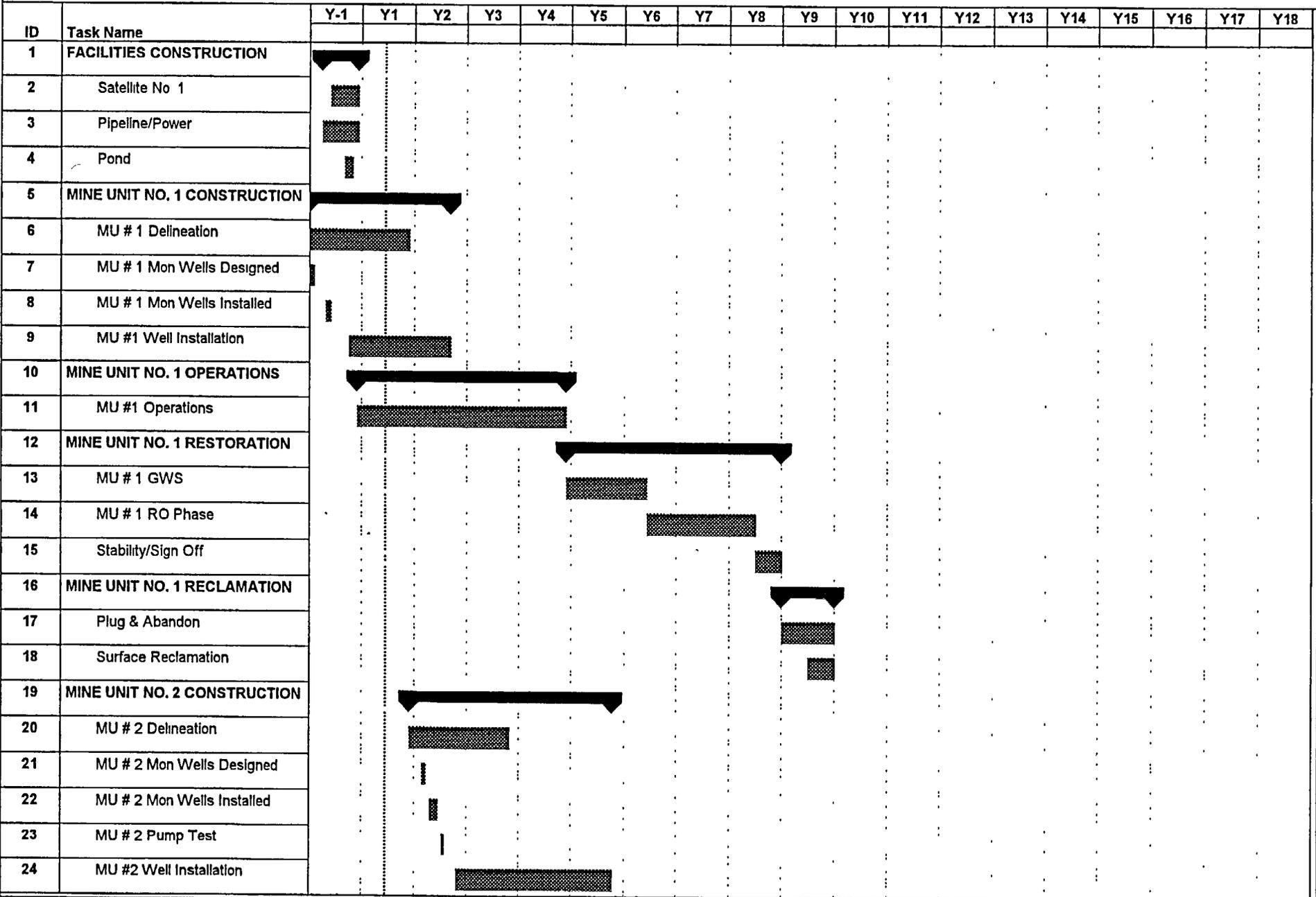
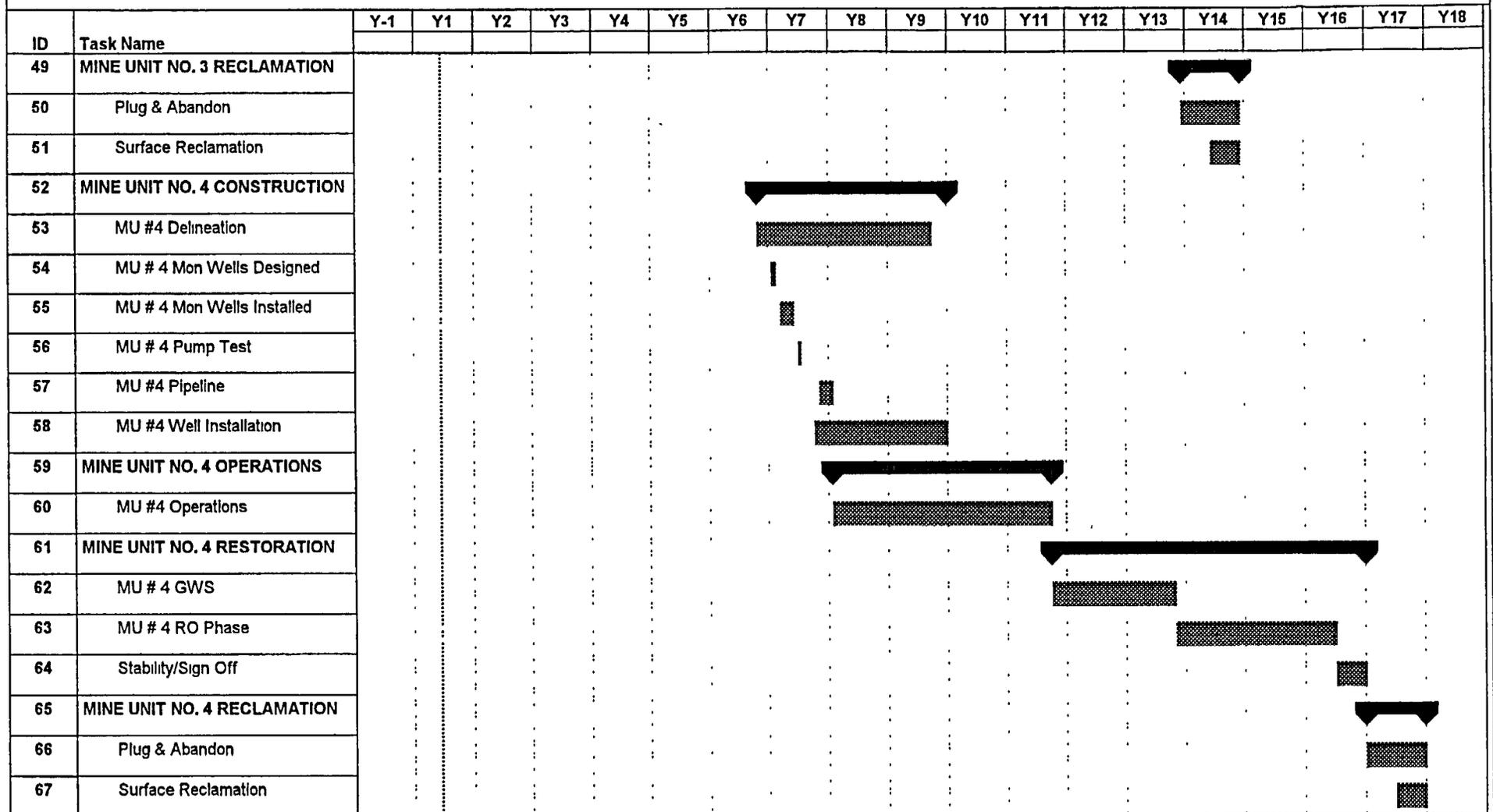


FIG. 1-4  
 GAS HILLS PROJECT  
 OPERATIONS SCHEDULE

ID	Task Name	Y-1	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14	Y15	Y16	Y17	Y18			
25	MU #2 pipelines				█																		
26	MINE UNIT NO. 2 OPERATIONS			█																			
27	MU #2 Operations			█																			
28	MINE UNIT NO. 2 RESTORATION								█														
29	MU # 2 GWS								█														
30	MU # 2 RO Phase										█												
31	Stability/Sign Off														█								
32	MINE UNIT NO. 2 RECLAMATION																						
33	Plug & Abandon																						
34	Surface Reclamation																						
35	MINE UNIT NO. 3 CONSTRUCTION				█																		
36	MU # 3 Delineation				█																		
37	Satellite No 2 built																						
38	MU # 3 Mon Wells Designed																						
39	MU # 3 Mon Wells Installed																						
40	MU # 3 Pump Test																						
41	MU #3 Pipeline																						
42	MU #3 Well Installation								█														
43	MINE UNIT NO. 3 OPERATIONS								█														
44	MU #3 Operations								█														
45	MINE UNIT NO. 3 RESTORATION																						
46	MU # 3 GWS										█												
47	MU # 3 RO Phase												█										
48	Stability/Sign Off																						

FIGURE 1-4  
GAS HILLS PROJECT  
OPERATIONS SCHEDULE



**THIS PAGE IS AN  
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FIGURE,  
THAT CAN BE VIEWED AT THE  
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GAS HILLS PROJECT  
PROJECT LOCATION AND ACCESS  
FREMONT AND NATRONA COUNTIES,  
WY**

**WITHIN THIS PACKAGE... OR  
BY SEARCHING USING THE  
DOCUMENT/REPORT NO.  
PLATE 1-2**

**NOTE: Because of these page's large file size, it may be more convenient to copy the file to a local drive and use the Imaging (Wang) viewer, which can be accessed from the Programs/Accessories menu.**

**D-01**

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Figure 2-2 Population Distribution

Figure 2-3 1992 Archaeological Survey Site Locations

Figure 2-4 1997 Archaeological Survey Site Locations

Figure 2-5 Tornado Statistics

Figure 2-6 Mean Monthly Temperature

Figure 2-7 Gamma Survey for Satellite Area

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Figure 2-9 Gamma Survey for Atlas Mine Area

PLATES

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ADDENDA

Addendum 2-1 BLM Correspondence related to grazing leases  
Addendum 2-2 BLM Correspondence related to Cultural Resources

## 2. SITE CHARACTERISTICS

### 2.1 Site Location And Layout

The Gas Hills Project is located in Fremont and Natrona Counties, Wyoming approximately 45 miles east of Riverton and 65 miles west of Casper. The nearest population center is Jeffrey City located 25 miles south of the project. The area is remote and contains a low population density. The majority of people living in the area reside on widely dispersed ranches. The nearest residence is approximately 12 miles northeast of the Project site.

Access to the Project site from Riverton is via 40 miles of paved highway on Wyoming State Highway No.136 and five miles of graded road. From Casper, access is via 50 miles of paved highway on US 20/26 to Waltman, 25 miles of graded county road to the Fremont County line and five miles of existing graded road. Access from Jeffrey City is via 25 miles of existing mine haul road. State Highway No.136 is maintained year round. The other routes may be closed during inclement weather. (See Figure 1-1).

The Project site is located at the south end of the Wind River topographic basin, north of and adjacent to the Sweetwater Plateau. The boundary between these two geomorphic provinces is the Beaver Rim, which is a 500 to 700 feet high, north facing erosional escarpment. Elevations within the Amendment Area range from 6700 to 7400 feet above mean sea level, with the highest elevations being on top of the Beaver Rim.

Plates 1-1E and 1-1W show the location of the proposed ISL operations, including wellfields, satellite facilities, pump stations, roads, evaporation ponds, and access routes. These proposed facilities are described in detail in Chapter 3.

Plates 2-1 and 2-2 show surface and mineral ownership, respectively, within the Amendment Area, and within one half mile of the Amendment Area boundary.

Plate 1-2 shows the project location and access, rights -of-way and easements, abandoned oil and gas wells, overlapping WDEQ permit areas, political subdivisions (Natrona and Fremont county line) and existing power lines and oil and gas pipelines.

### 2.2 Uses of Adjacent Lands and Waters

Land surface within the Amendment Area is controlled primarily by the U.S. Bureau of Land Management (BLM) with small parcels of private and state lands scattered across the Amendment Area. Current and historical use of the Amendment Area and the surrounding areas for more than two miles includes:

**Uranium mining and milling:** The Gas Hills Mining district has produced more than 100 million pounds of uranium over the last forty years. Three uranium processing facilities are

located within close proximity of the Amendment Area, the UMETCO Minerals Corporation facility (UMETCO), the Pathfinder Mines Corporation facility (PMC), and the American Nuclear Corporation facility (ANC). These facilities and the conventional mines which delivered ore to them have been, or are in the process of being decommissioned and reclaimed. In addition to private sector mine reclamation, the State of Wyoming Abandoned Mine Lands Program (AML) has completed several mine reclamation projects in the area and continues to complete such projects.

**Oil and gas production:** There is no current oil or gas production within the Amendment Area or within two miles of the Amendment Area boundary.

**Sheep and cattle grazing:** The majority of the land surface is controlled by the BLM and is leased for grazing use.

**Recreation use:** The area is used by the general public for recreational purposes including hunting and other outdoor activities.

**Wildlife habitat:** Wildlife habitat is also part of the land use in the area with Mule Deer and Pronghorn Antelope being the primary big game species.

From the 1960's to the early 1980's, areas within and adjacent to the Amendment Area were extensively mined for uranium using conventional surface and underground mining methods. The majority of uranium ore was recovered by surface mining methods. Within the Amendment Area boundary, approximately 20% of the total area has been previously disturbed by either underground or surface mining activities. In addition, exploration of the uranium resources in the area has disturbed the majority of those areas which will be disturbed by ISL wellfields. Plates 2-3E and 2-3W show the areas within and surrounding the Amendment Area that have been previously disturbed by mining activities.

There has been no conventional uranium mining in the area since the mid 1980's due to economic conditions. Current market conditions and the high capital costs involved make it doubtful that conventional methods will be used to recover uranium in this area in the near future. Any additional uranium recovery in the area will likely be by ISL methods.

#### 2.2.1 Nearest Site Boundary

Table 2-1 provides the distances from the geographic center of the Amendment area to the Amendment area boundary for each of the 16 compass directions.

#### 2.2.2 Nearest Residence

There are no permanent residences within two miles of the Amendment Area (see Table 2-2). The nearest downwind residence is located approximately 12 miles northeast of the

Amendment area boundary. Chapter 7 provides a discussion of anticipated radiological impacts to the public.

### 2.2.3 Other Nuclear Fuel Cycle Facilities

As shown on Figure 2-1, nuclear fuel facilities within a 50 mile radius include the three uranium mills within the Gas Hills District, the Split Rock facility near Jeffery City, the Sweetwater facility near Rawlins and the Susquehanna Mill near Riverton, Wyoming. The Gas Hills and Split Rock facilities are in the process of being decommissioned and reclaimed. The Sweetwater facility is currently in standby mode. The Susquehanna Mill site was reclaimed under the Uranium Mill Tailings Remediation and Control Act (UMTRCA).

### 2.2.4 Water Use

Current surface and ground water use in the vicinity of the Amendment Area was investigated by researching permitted water rights located within two miles (3.3 km) of the Amendment Area boundary. These water rights are summarized in Tables 2-3 and 2-4 for surface and ground water rights, respectively.

Water use in the vicinity of the Amendment Area is limited to livestock, wildlife watering and some minor industrial use by the Pathfinder and Umetco mining operations. There is no current domestic or irrigation use of either surface or ground water in the vicinity of the Amendment Area. Given the remoteness of the site and the elevation, approximately 7000 ft above sea level, combined with the marginal quality of the water in the Wind River Aquifer, future domestic or irrigation use of water in the vicinity of the Amendment Area is not projected. Tables 2-3 and 2-4 provide a summary of existing and projected surface and ground water use in the vicinity of the project.

#### 2.2.4.1 Surface Water Use

A list of all surface water rights currently on file with the Wyoming State Engineer's Office within one-half mile radius of the Amendment Area is presented in Addendum D6-8 of Appendix D6. Locations of the surface water rights are shown on Plate D6-4. All surface water rights located within a two mile radius of the project area are shown on Plate 2-4 of this amendment application. The distance in miles of all the surface water rights from the proposed well fields are provided in Table 2-3. There are only three surface water permits within two miles of the project area that are not related to mining. These three reservoirs (permits P10077SR, P9573R, and P28924R) have been permitted by the BLM for wildlife and stock watering purposes. Three other stock reservoirs have been constructed by PRI in reclaimed depressions resulting from previous mining activities (permits P10039R, P10041R, and P10041R). The remaining surface water rights within the two mile radius are associated with mining related activities at the adjacent Umetco and Pathfinder mines. It is not anticipated

that the proposed ISL activities will have any significant impact on surface waters or surface water usage in the vicinity of the Amendment Area.

#### 2.2.4.2 Ground Water Use

All ground water rights located within the project area and to a distance of one-half mile outside the Amendment Area are also presented in Addendum D6-8 of Appendix D6. Locations of ground water rights within one-half mile of the project area are also shown on Plate D6-4. The majority of the ground water rights filed in the vicinity of the Amendment Area are for miscellaneous use as monitor wells and represent no consumptive use of ground water. Water rights which represent a consumptive use of ground water within a two mile radius of the Amendment Area are summarized in Table 2-4 and included on Plate 2-4 of this amendment application.

Information on the distances from the proposed well fields, permitted withdrawal rates, well depths, depths to water, aquifers and water uses are also provided in Table 2-4.

Several ground water rights associated with springs are held by the Matador Cattle Company. These permits include Cameron Spring (P44457W) located approximately one-quarter mile southwest of the southern end of Mine Unit No. 1 within the project area and Sage Hen #1 (P46378) located east of Mine Unit No. 4, both of which discharge from the Wagon Bed Formation. The Wagon Bed Formation is stratigraphically higher than the Wind River Formation. Because no ISL activities will occur in areas where the Wagon Bed Formation crops out, no impact to these springs will occur.

Several other springs permitted for stock usage discharge from the upper stratigraphic units of the Wind River Formation within and adjacent to the Amendment Area (Table 2-4). The elevations of these springs are significantly higher than the Wind River Aquifer water level elevation in the Amendment Area. The springs discharge from perched ground water zones within the Wind River Formation and are located a minimum of one-half mile from any proposed disturbances. Surface disturbance of the spring areas will not occur. ISL mining will take place in stratigraphically lower and hydrologically isolated units. Therefore, proposed ISL activities will not affect the water levels or quality of these springs.

The rest of the ground water rights permitted for consumptive use within the two mile radius of the Amendment Area are all associated with mining related activities. All of the reservoirs which are permitted as surface water rights also have a ground water appropriation where the reservoir is recharged by ground water. These ground water reservoirs are designated as "RES" under the "USES" column in Table 2-4. Most of the wells permitted by the mining companies, Pathfinder and Umetco, are designated for industrial or dewatering usage. Some of the wells were permitted in the 1960's

and were designated as domestic or municipal wells at the time they were filed with the Wyoming State Engineer's Office ( P501G, P557W, P558W, P559W, P439G). These wells were constructed to provide water supply to the man camps which were operational at the time the wells were drilled. None of these wells are currently being used as either domestic or municipal wells. Due to the remoteness of the location and the marginal quality of the water in the Wind River Aquifer, future domestic use of the ground water in the vicinity of the Amendment Area is unlikely.

Due to previous conventional mining operations in the Gas Hills and associated pit dewatering, cones of depression currently exist in and adjacent to the Amendment Area. Based on pre-mining water level elevations developed for Pathfinder's and Umetco's mining operations, and reported in their respective WDEQ permit documents, it is estimated that the Wind River Aquifer water levels within the Amendment Area are presently lowered from five feet to greater than 50 feet depending on proximity to the pits (see Appendix D-6). The proposed ISL operation will have a relatively small bleed rate resulting in minimal additional water level elevation depression. It is anticipated that no additional water level lowering of non-mining ground water rights will occur due to the proposed ISL operations. A slight decrease in the overall rate of recovery of the potentiometric surface from previous mining activities will be the most likely impacted. Sources and use rates are not anticipated to change over the life of the project and beyond. The post-project use will be the same as pre-project use, wildlife and livestock watering.

#### 2.2.5 Abandoned Wells and Drill Holes

A computer database has been compiled listing the coordinates, elevation, depth drilled and completion date of all known exploration and development drill holes completed by previous mineral owners and PRI from the late 1950's to the present. This database has been included as addendum D5-3 of Appendix D5. Approximately 13,500 drill holes have been drilled within the Amendment Area. Plates D5-17E and D5-17W of Appendix D5 show the locations of all known abandoned drill holes within the Amendment Area. Drill hole abandonment is discussed in detail in Chapter 3. Well abandonment is discussed in Chapter 6.

### 2.3 POPULATION DISTRIBUTION

The Amendment Area is located in a remote portion of Fremont and Natrona Counties, approximately 45 miles east of Riverton and 65 miles west of Casper. The nearest population center is Jeffrey City located approximately 25 miles south of the project. The population of Fremont and Natrona Counties, including the population centers of Casper, Riverton and Jeffrey City, have fluctuated since 1940. The population of the area peaked in the 1970's as a result of uranium mining and oil and gas activities. The downturn of both industries resulted in a population decline through the 1980's.

Based upon current 1990 census information, Natrona County has a population of 61,226 and Fremont County has a population of 33,662.

Within 50 miles of the Project, Riverton is the largest population center with 9,202 people, based upon 1990 census data. Baroil, located approximately 37 miles south of the Project has a population of 228, based upon the 1990 census data. Jeffrey City reportedly has a population of less than 100.

Figure 2-2 shows the major population centers within 50 miles of the center of the Amendment Area. Concentric circles have been drawn at 1, 2, 3, 4, 5, 10, 20, 30, 40, 50, 60, 70 and 80 kilometers from the Project center. The radiating lines represent 22½ degree segments and coincide with the 16 major compass points.

Table 2-2 shows the population distribution for each of the segments depicted on Figure D1.1.

There are no schools, hospitals, sports facilities, residential areas or parks within 2 miles of the Amendment Area boundary. Several conventional uranium mines exist within 2 miles of the Amendment Area boundary that are undergoing reclamation and decommissioning.

Livestock grazing is the only agricultural land use on or within two miles of the Amendment Area. The low annual precipitation rate and lack of irrigation water precludes the production of hay and grain crops. No vegetables or milk are produced on or within two miles of the Amendment Area boundary.

The BLM, Lander Resource Area was contacted with respect to livestock grazing within the proposed Amendment Area. The Philp Sheep Company has the current grazing allotment within and surrounding the Amendment Area. Their allotment allows for 308 cattle between May 16 and October 30 and 3,858 sheep between September 1 and December 10 of each year. The Amendment Area represents approximately 22% of the grazing allotment or approximately 57 cattle and 733 sheep. Correspondence from the BLM related to grazing leases is provided in Addendum 2-1 of this Chapter.

The nearest downwind residence is a rural residence located southeast of Waltman, Wyoming, approximately 12 miles northeast of the Amendment Area boundary. The Amendment Area is upwind from the Umetco uranium tailings facility which is adjacent to the WDEQ permit area and located between the WDEQ permit area and the nearest residence.

## 2.4 HISTORIC, ARCHAEOLOGICAL, ARCHITECTURAL, SCENIC, CULTURAL, AND NATURAL LAND MARKS

### 2.4.1 General

A Class III Cultural Resources Inventory was performed over most of the Amendment Area in 1992. This inventory included the re-examination of sites previously inventoried for the WDEQ Permit to Mine 438 located in the Buss area. The 1992 survey, which identified over 30 potential sites, was reviewed by the BLM Lander Resource Office, and four sites were determined to be potentially eligible for nomination to the National Register of Historic Places (NHRP) (see Attachment 2-2 of this Chapter). One site was determined to be eligible for NHRP status. Locations of inventoried sites are shown on Figure 2-3.

Site 48FR3232 contains several stone circle and hearth features and is located in an area that will contain an ISL wellfield. PRI worked with the WDEQ and US BLM during 1997 and 1998 to mitigate potential disturbance by PRI's mineral development drilling activities. In February 1998, Native America Elders were brought to the site to perform an assessment.

The Native America Elders indicated that the features represented prayer or vision quest circles. They requested that all surface disturbances be kept 50 feet away from the site features. PRI agreed to this and abandoned several planned drill hole locations located within 50 feet of the features. This action is documented in a letter dated March 4, 1998 from the US BLM to the Wyoming SHPO who acknowledged concurrence on March 13, 1998. A copy of this letter is provided in Addendum 2-2.

### 2.4.2 1997 Program

In May 1997, an intensive Class III cultural resource inventory was conducted for the 2840 acres located within the western portion of the Amendment Area which had not been previously inventoried. The purpose of the inventory was to locate, record, and evaluate all visible cultural resources within the Amendment Area and to evaluate the eligibility of all discovered sites for nomination to the NHRP.

At the conclusion of the inventory, a total of 36 sites, including 14 isolated artifacts were identified and recorded. These are shown on Figure 2-4.

All of the sites encountered, except site 48FR3874, are not considered eligible for inclusion to the NHRP. This was determined by the density of the artifacts discovered, the type of soils within the site boundary, the potential for contributing significant data important to the prehistory of the area, and shovel tests. The shovel tests were conducted to better define the soil stratigraphy and to determine if any buried cultural materials might be present.

Site 48FR3874 is considered eligible for inclusion to the NHRP. This site appears to contain information important to the understanding of stone circles. Site 48FR3874 located on private land, consists of a single stone circle. However, there is a possible hearth feature located in the eastern portion of the circle. The site is near a proposed pipeline right of way between a proposed satellite and Mine Unit No. 3. No surface disturbance will occur at this site until the required mitigation and site clearance has been received from the WDEQ and US BLM.

#### 2.4.3 Mitigation

Prior to development in any areas containing eligible or unknown eligibility, cultural, and paleontological sites, PRI will notify WDEQ and US BLM and request an evaluation of the site. Should mitigation action be necessary, PRI will work with the WDEQ and US BLM to develop an acceptable plan for protecting or removing the resource. Disturbance of the area will not take place until written authorization to proceed has been issued by the US BLM and WDEQ.

### 2.5 METEOROLOGY

#### 2.5.1 General

The climate of the Gas Hills District is generally classified as semiarid and cool and is influenced by elevation, topography and distance from the oceans. Wyoming is in the latitudes of prevailing westerly winds. Air movement in this direction is most pronounced during the winter, causing greater precipitation on the western slopes of mountains. During the spring and summer, circulation patterns bring moist air and precipitation to Wyoming from the Gulf of Mexico. In the summer, when the air is generally much warmer and thus higher in moisture-carrying capacity, precipitation often evaporates before it reaches the ground. Summers are mild with warm to hot days and cool nights. Winters are harsh with cold temperatures, high winds and infrequent blizzards. Warm days and cold nights are experienced during both spring and fall; wet heavy snowfalls can be expected in both of these seasons. The growing season is between 90 and 120 days long, from late May to early September. July is typically the warmest month and January the coldest.

A National Weather Service (NWS) station, Gas Hills 4E, is located in the Gas Hills. Data has been acquired for the period of September, 1962 through July, 1996 (Wyoming Water Research Institute, University of Wyoming). Data from the Gas Hills NWS Station has been utilized for site characterization by the three existing nuclear fuel facilities (conventional uranium mills) in the Gas Hills area adjacent to the proposed Amendment Area. The Gas Hills NWS Station records temperature and precipitation data only. The nearest complete NWS stations are at Lander, located 55 miles west of the Project site, and Casper, located 58 miles east of the Project site. The data from the Lander station would not be representative of the Gas Hills because of its sheltered position near the Wind River Mountains. Wind

speeds and directions in Casper may be similar, but Casper precipitation, temperature and humidity data would not be representative of the Gas Hills.

### 2.5.2 Precipitation

Precipitation is discussed in Section 2.2 of Appendix D6. Over the 34 year period of records for the Gas Hills 4E station, the mean annual precipitation is approximately 8.9 inches. Figure D6-2-3 of Appendix D6 shows the monthly distribution of precipitation. More than half of the precipitation occurs between April and June.

### 2.5.3 Wind

The closest National Weather Service (NWS) weather station recording wind data is Casper, Wyoming approximately 56 miles northeast of the Amendment Area. The Lucky Mc Mine, adjacent to the Amendment Area recorded wind data intermittently from September 1978 through January 1983. Attachment 1 of Appendix 12 presents a statistical comparison of available wind data from the Gas Hills area and the Casper NWS weather station. This comparison concludes that the Casper data is representative of the Amendment Area and Casper wind data was utilized for the MILDOS calculations provided in Appendix 12.

The predominant wind direction is from the SSW, SW, and WSW. Long term average wind data (NWS Natrona County Airport) show the maximum sustained winds occur during the winter months of December and January with average velocities from the SSW, SW, and WSW exceeding 20 miles per hour. Attachment 1 of Appendix 12, provides wind rose diagrams for the project site.

### 2.5.4 Tornadoes

Figure 2-5 provides tornado statistics by county for Wyoming between 1950 and 1982. A total of three tornadoes per 1000 square miles were reported for the 33 year period. For the same time period, Natrona and Fremont counties reported 24 tornadoes which is nine percent of the state's total, or one tornado per 656 square miles. The surrounding mountain ranges provide a barrier to much of the westward flow of moist air that fuel thunderstorms which often lead to tornadoes. Based on the historical statistics, tornadoes have a very small probability of presenting a significant problem at the Project site.

### 2.5.5 Temperature

Mean monthly temperature data for Gas Hills Station 4E is presented on Figure 2-6. For the 34 year period, the temperature extremes have ranged from 34 degrees below zero to 96 degrees above zero on the Fahrenheit scale. The coldest months are December, January, and February, and the warmest months are June, July, August, and September.

### 2.5.6 Evaporation

Evaporation data is not recorded at the site. The nearest NWS recording station for evaporation is Pathfinder Reservoir, some 60 air miles from the site. Average lake evaporation is estimated at 42 inches annually.

## 2.6 GEOLOGY AND SEISMOLOGY

A detailed description of the regional and Amendment Area geology and seismology is provided in Appendix D5. Appendix D5 is an exact reproduction of the Appendix D5 submitted to the Wyoming Department of Environmental Quality - Land Quality Division and follows the current format required for submission to the Wyoming Department of Environmental Quality - Land Quality Division, based on 1993 Noncoal Rules and Regulations and Wyoming Department of Environmental Quality - Land Quality Division Guideline No. 4, "In-situ Mining." This section was not formatted according to USNRC Regulatory Guide 3.46, dated June, 1982, since the Wyoming requirements are more extensive than those of the USNRC. The only item specified in USNRC Regulatory Guide 3.46 which has not been included is an isopach map of the intended zone of injection or production and associated confining units. This was not provided since multiple ore zones and multiple confining units occur within the project area and isopach maps would be difficult to interpret and construct. Alternatively, subsurface geologic data showing ore zones and confining units have been presented in plan and cross section format for the Amendment Area and for individual mine units.

## 2.7 HYDROLOGY

A detailed description of the regional and Amendment Area hydrology is provided in Appendix D6. Appendix D6 is an exact reproduction of the Appendix D6 submitted to the Wyoming Department of Environmental Quality - Land Quality Division and follows the current format required for submission to the Wyoming Department of Environmental Quality - Land Quality Division, in accordance with 1993 Noncoal Rules and Regulations and Wyoming Department of Environmental Quality - Land Quality Division Guideline No. 4, "In-situ Mining." This section was not formatted according to USNRC Regulatory Guide 3.46, dated June, 1982, since the Wyoming requirements are more extensive than those of the USNRC. Appendix D6 defines surface and ground water hydrologic baseline conditions. Operational controls and potential ground water impacts are described in Chapter 3.

## 2.8 ECOLOGY

The current Wyoming Department of Environmental Quality, Land Quality Division (WDEQ/LQD), Noncoal Rules and Regulations, 1993, require a variety of baseline ecological studies. WDEQ/LQD regulations require submittal of these ecological studies as appendices

to the WDEQ/LQD Permit to Mine Application. The following WDEQ/LQD ecological Appendices are included as attachments to this Amendment Application.

1. A soil survey which maps and describes the general distribution of the soils within the WDEQ permit area; a description of the nature and depth of topsoil that will be removed from proposed affected land prior to disturbance by ISL activities; and, for the proposed Amendment Area, a detailed soil survey and associated laboratory analysis for the soils on the affected lands. This survey is provided in Appendix D7. Proposed topsoil protection plans are described in Chapter 3;
2. A survey of vegetative cover, productivity and species diversity on the proposed affected land prior to disturbance by ISL activities. The vegetative survey is required to include an investigation of potential Threatened and Endangered plant species. This information is provided in Appendix D8;
3. A wildlife survey which includes a list of indigenous species; habitats for Threatened and Endangered species; a description of important habitats and migration routes for wildlife; and a description of surface waters supporting fish (aquatic ecology) that may be affected by the proposed operation. This information is provided in Appendix D9; and
4. In addition, for the proposed Amendment Area, an inventory of wetlands is required. This information is provided in Appendix D11.

The current Department of Environmental Quality, Land Quality Division, Noncoal Rules and Regulations, 1993, require protection of ecological resources within the proposed Amendment Area and reclamation of affected lands to pre-operational conditions. State regulations also require adequate surety provisions for reclamation of all surface facilities and disturbances.

USNRC Regulatory Guide 3.46, part 2.8 Ecology, contains requirements relative to description of flora and fauna but does not require a description of soils. Further, since the proposed amendment does not include the drying of yellowcake, data on the count and distribution of domestic fauna and mapping of principal plant communities is not required.

## 2.9 BACKGROUND RADIOLOGICAL CHARACTERISTICS

A baseline radiological survey and soil sampling program was performed within the Amendment Area to establish and document the nature of the pre-ISL radiological environment, and to detect and document areas having anomalous radiological values because of previous conventional mining activities in the area. The survey and sampling program was performed over those areas where surface disturbance from the proposed ISL activities is

anticipated. Representative soil sampling was performed across the Amendment Area to characterize baseline radionuclide soil concentrations and to verify the surface survey results.

A WDEQ approved surface and ground water sampling program has been performed since 1996 to characterize the baseline radionuclide concentrations as well as other naturally occurring constituents. Baseline water quality data is presented in Appendix D-6 of this application.

Since the proposed activities will not produce particulate emissions, there will be no impact on flora and fauna. Therefore, flora and fauna baseline characterization is not needed. It should be noted that a voluminous quantity of flora data exists for the two conventional facilities surrounding the Amendment Area which has been previously submitted to NRC by Pathfinder Mines Corporation and Umetco Minerals Corporation. These data show that the impact on the biotic environment from conventional mining facilities is minimal. Since the proposed activities will not involve a drying, ore grinding, or tailings circuit, the impact on the environment from the proposed ISL activities will be even less.

#### 2.9.1 Gamma Survey

Surface gamma surveys were conducted in two phases. The first phase was a wide spaced survey of the entire Amendment Area. The area surveyed was divided into grids 150 meters (approximately 500 feet) on a side. The survey was performed using a calibrated Ludlum model 12S scintillometer held at approximately one meter above the surface while traversing a serpentine course over each grid transect. Gamma readings were observed on a continuous basis and averaged and recorded for each grid square. Plates 2-5E and 2-5W display the survey results

The second phase of the gamma surveys included detailed radiometric surveys in areas of proposed processing and waste disposal facilities and within areas of elevated radiometric levels due to historic conventional mining. The detailed radiometric surveys were completed on 33 meter (100 foot) spaced grids. Detailed surveys include:

1. The Carol Shop Facility and proposed evaporation pond areas shown on Plate 2-6;
2. Each of the potential satellite facility locations shown on Figures 2-7 and 2-8 and;
3. The Atlas Mine area shown on Figure 2-9.

The gamma readings generally averaged 20 micro-R/hr in portions of the Amendment Area which have not been previously disturbed by conventional mining. Areas that have been disturbed by previous mining activities exhibited much higher gamma readings. Areas exhibiting the greatest gamma activities are those containing ore and waste stock piles left from previous conventional mining activities (i.e., the Atlas and Two States Mine areas), and conventional mine ore haulage roads, (i.e., the Carol Shop Road). Surface gamma levels in excess of 900 micro-R/hr were observed within the Amendment Area.

### 2.9.2 Soil Sampling

A total of 150 soil samples were collected from 75 sample locations distributed across the survey area. The samples were analyzed for natural uranium, radium-226, thorium-230, and lead-210. The sample locations were selected to provide an accurate representation of baseline conditions in both disturbed and undisturbed areas. Samples were also collected from areas where the sample depth intervals were 0 - 15 cm (0 - 6 inches) and 15 - 30 cm (6 - 12 inches). The sample locations are shown on Plates 2-5E and 2-5W. Analytical results are summarized on Table 2-4.

The analytical data confirms the gamma survey results and the fact that the areas containing anomalously high background concentrations of radionuclides are those that have been previously disturbed by conventional mining activities.

### 2.9.3 Radiometric Correlations

Surface gamma levels generally correlate with surface radium-226 concentrations. A linear regression analysis of surface gamma measurements and radium-226 concentration in the upper 0 - 15 cm, using all data with surface gamma levels equal to or less than 120 micro-R/hr, a reasonable correlation (R squared 0.86) was obtained. This correlation yielded the following relationship:

$$\text{Radium-226 (pci/gm)} = \text{Surface Gamma (micro-R/hr)} (0.426) - 6.55$$

As an example, based on this correlation, a surface gamma level of 20 micro-R/hr should reflect a surface radium-226 concentration of 2 pci/gm. At eight sample locations, a surface gamma level of 20 micro-R/hr was measured. The average surface radium-226 concentration at these locations was 2.14 pci/gm, closely approximating the calculated radiometric correlation.

### 2.9.4 Baseline Radiometric Levels

Data presented herein reflects the current site conditions with respect to baseline radiometric levels. The Two States mine area, an abandoned conventional open pit mine, within the Amendment Area and adjacent to the Carol Shop Facility and the proposed evaporation pond areas, will be reclaimed during 1998 by the State of Wyoming Abandoned Mine Lands Program (AML). Upon completion of the AML Two States reclamation a final clean-up radiometric survey and as-built conditions map will be provided to PRI by AML.

The following summary of baseline surface radiometric levels is based on the surface gamma levels presented on Plates 2-5E, 2-5W, and 2-6, and on Figures 2-7, 2-8, and 2-9, and on surface gamma levels and soil sample analysis presented on Table 2-4.

1. **Evaporation Pond Area:** Gamma levels generally range from 15 to slightly over 20 micro-R/hr with the exception of areas adjacent to the Two States mine where levels are considerably higher (refer to Plate 2-6). Based on data from 33 sample sites in the area, the average radium-226 concentration from 0 - 15 and 15 - 30 cm, is 2.9 and 2.2 pci/gm, respectively.
2. **Carol Shop Facility:** The gamma levels within the existing Carol Shop facility, including the adjacent portions of the Carol Shop Road, range from approximately 20 to 150 micro-R/hr (refer to Plate 2-6). Based on data from 13 sample sites the average radium-226 concentration from 0 - 15 and 15 - 30 cm, is 21.8 and 26.5 pci/gm, respectively.
3. **Carol Shop Road:** This existing mine haul road traverses the Amendment area extending from just east of the Carol Shop proceeding southwest approximately 27,000 feet, crossing Mine Units No. 1 and No. 2. Surface gamma surveys of the road were completed at approximately 33 meter (100 feet) intervals with at least two measurements at each location. Plates 2-5E and 2-5W display the average gamma level per 105 meter (500 foot) intervals. It is apparent that the Carol Shop Road was constructed, at least in part, from mine waste elevated in radionuclides and was also subject to spillage from ore haulage activities. As a result, observed gamma levels are variable. Across the approximately 27,000 linear feet of road surveyed, the average gamma level was 46 micro-R/hr, reflecting an estimated radium-226 concentration of 13 pci/gm.
4. **Mine Units No. 1 through No. 4:** The surface gamma levels, as shown on Plates 2-5E and 2-5W, range from 16 to 30 micro-R/hr, averaging approximately 20 micro-R/hr. Based on radiometric correlations this equates to approximately 2 pci/gm radium-226 from 0-15 and 15-30 cm. Based on 12 sample sites the average radium-226 concentration from 0 - 15 and 15 - 30 cm, is 1.4 and 1.3 pci/gm, respectively.
5. **Mine Unit No. 5:** Surface gamma levels, as shown on Plate 2-5E, range from 21 to 61 micro-R/hr, averaging 33 micro-R/hr. This surface radiometric level correlates with approximately 7.5 pci/gm radium-226. When Mine Unit No. 5 is further delineated, soil samples will be collected to further quantify baseline conditions in this area.
6. **Satellite Area:** Two potential satellite areas have been defined and are shown on Plate 2-5W. Detailed gamma surveys of these areas are shown on Figures 2-7 and 2-8. Surface gamma levels range from 14 to slightly over 20 micro-R/hr (excluding the existing Carol Shop Road). Based on data from 23

sample locations, the average radium-226 concentration from 0 - 15 and 15 - 30 cm, is 2.0 and 1.1 pci/gm, respectively.

7. Atlas Mine Area: This area is within the general limits of Mine Unit No. 3 and was the site of a conventional underground mine site, ore stockpiles, and a mine water discharge settling pond. This area was reclaimed by the Wyoming AML program, however, radiometric levels are elevated ranging for approximately 20 to 150 micro-R/hr. Samples from four locations in the mine and discharge pond areas had gamma levels ranging from 100 to 230 micro-R/hr. The average radium-226 level from 0 - 15 and 15 - 30 cm, is 59.5 and 33.0 pci/gm, respectively.
8. Two States Mine Area: Surface gamma levels in this area range up to 900 micro-R/hr. Based on samples from 8 locations the average radium-226 concentration from 0 - 15 and 15 - 30 cm, is 57.2 and 80.6 pci/gm, respectively. This abandoned mine site will be reclaimed by the Wyoming AML program during 1998. Based on the construction plans and specifications for this project, which define unsuitable materials at a level of 20 pci/gm, it is expected that the reclaimed surface will significantly exceed undisturbed areas but will be below 20 pci/gm.

#### 2.9.5 Ground Water & Surface Water

A discussion of background radionuclide concentrations in ground water and surface water are presented in Sections 2.3.3 and 3.5.2 of Appendix D6.

#### 2.9.6 Air Sampling

A passive air monitoring program for natural gamma and radon 222 is being performed at four locations across the Project site. Since the proposed activities will not include yellowcake precipitation and drying, air particulate sampling will not be performed. The monitoring locations were chosen to represent an upwind background station (PRI-1), a downwind station (PRI-3), an intermediate station (PRI-2) located within close proximity to a proposed wellfield area and a station downwind of the Carol Shop buildings (PRI-4). The locations of these monitoring stations are shown on Plates 1-1W and 1-1E.

Table 2-6 provides the gamma and radon data collected to date at these sampling stations.

### 2.10 BACKGROUND NONRADIOLOGICAL CHARACTERISTICS

Background concentrations of nonradiological parameters in ground water are discussed in Sections 3.5.1, 3.5.3, and 3.5.4 of Appendix D6. These sections discuss baseline water

quality conditions in undisturbed and/or upgradient areas and baseline water quality conditions in areas previously disturbed by conventional mining. Nonradiological parameters which are elevated in disturbed areas include sulfate, TDS, arsenic, selenium, and iron.

Within areas of previous conventional mining, surface mine spoils may locally be acid forming with elevated levels of metals including iron, selenium, arsenic, and molybdenum. In addition the surface mine spoils are subject to wind and water erosion providing a source of off site sediment and fugitive dust. This is documented by a variety of previous studies for conventional mine permits and State of Wyoming Abandoned Mine Lands projects which have been completed within and adjacent to the proposed Amendment Area. The association of iron, selenium, arsenic and molybdenum with uranium in the Gas Hills is also documented in the literature (i.e., Granger and Warren, 1974 and Harshman, 1974).

Ground water restoration, as presented in Chapter 6, addresses both radiological and nonradiological parameters.

## 2.11 OTHER ENVIRONMENTAL FEATURES

The dominant environmental feature within the Amendment Area is related to the impact of past conventional mining. This is a pre-existing condition relative to the proposed operation and has elevated the levels of radiological and nonradiological constituents at the surface and within ground waters which have been impacted by past mining. PRI has attempted to identify and characterize the impacts of previous mining activities and their potential impacts on the proposed ISL activities.

## REFERENCES

University of Wyoming, Department of Geography and Recreation, "Natrona County Wyoming: Environmental Resources Inventory, Population Trends and Land Use Issues", May, 1995.

United States Census Bureau, Wyoming 1990 Census Data.

The National Atlas of the United States, U.S. Department of the Interior, Geological Survey 1970, pp 110-111.

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Pathfinder Mines Corporation, Lucky Mc Weather Station Data

Power Resources, Gas Hills Project, Wyoming Department of Environmental Quality, Land Quality Division, Permit to Mine, December, 1996:

Appendix D7 - Soil assessment

Appendix D8 - Vegetation

Appendix D9 - Wildlife

Appendix D11 - Wetlands

Granger, H. C., and Warren, C. G., 1974, Zoning in the altered tongue associated with roll-type uranium deposits, in: Formation of Uranium Deposits; I.A.E.A, Vienna, P. 315-322.

Harshman, E. N., 1974 Distribution of elements in some roll-type uranium deposits, in: Formation of Uranium Deposits; I.A.E.A., Vienna; p. 169-183.

**TABLE 2-1**  
**DISTANCE FROM AMENDMENT AREA CENTER TO AMENDMENT AREA BOUNDARY IN MILES (km)**

<u>COMPASS POINT</u>	<u>DISTANCE</u>
N	1.61 (2.59)
NNE	1.73 (2.79)
NE	0.82 (1.33)
ENE	3.04 (4.89)
E	2.57 (4.13)
ESE	1.00 (1.62)
SE	0.82 (1.33)
SSE	0.93 (1.49)
S	1.11 (1.78)
SSW	1.19 (1.92)
SW	3.25 (5.23)
WSW	3.30 (5.32)
W	1.16 (1.86)
WNW	0.97 (1.55)
NW	0.56 (0.90)
NNW	0.65 (1.05)

**TABLE 2-2  
GAS HILLS PROJECT  
POPULATION DISTRIBUTION**

Kilometers	N (0.0°)	NNE (22.5°)	NE (45.0°)	ENE (67.5°)	E (90.0°)	ESE (112.5°)	SE (135.0°)	SSE (157.7°)	S (180.0°)	SSW (202.5°)	SW (225.0°)	WSW (247.5°)	W (270.0°)	WNW (292.5°)	NW (315.0°)	NNW (337.5°)	TOTAL
0.0-1.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.0-2.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.0-3.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.0-4.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.0-5.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.0-10.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10.0-20.0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
20.0-30.0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
30.0-40.0	4	4	4	0	0	0	0	0	0	0	0	0	0	0	4	4	20
40.0-50.0	8	29	10	0	0	0	0	10	0	100	4	0	4	4	4	5	178
50.0-60.0	8	12	70	0	0	0	0	0	0	0	20	5	0	0	4	10	129
60.0-70.0	8	12	9	0	0	0	0	50	230	0	12	12	4	0	685	8	1030
70.0-80.0	4	0	8	5	80	0	10	0	0	0	8	8	9000	200	16	16	9355
<b>TOTAL</b>	<b>36</b>	<b>61</b>	<b>101</b>	<b>5</b>	<b>80</b>	<b>0</b>	<b>10</b>	<b>60</b>	<b>230</b>	<b>100</b>	<b>44</b>	<b>25</b>	<b>9008</b>	<b>204</b>	<b>713</b>	<b>43</b>	<b>10720</b>

**NOTES:**

1. Distance in kilometers from center of Project area
2. Population shown is total persons in each sector

TABLE 2-3 - SURFACE WATER RIGHTS

PERMIT NUMBER	APPLICANT	USES	NAME	SEC.	T	R	DISTANCE FROM WELL FIELDS (MI.)
P28924R	USDI/BLM	STOCK	BIG DIAMOND SPRING	22	32	90	2.3
P10077SR	USDI/BLM	WIL	EAST STOCK RESERVOIR	14	33	89	0.94
P8123R	UMETCO MINERALS	IND	TAILINGS POND	15	33	89	0.3
P10444R	UMETCO	IND	NO. 2 EVAPORATION POND	15	33	89	0.3
P8422R	PATHFINDER MINES	MIS (IND)	PROJECT 9 RESERVOIR	16	33	89	0.26
P9573R	USDI/BLM	WIL, STOCK	VECA POND	22	33	89	0.1
P10040R	PRI	STOCK	BUSS III RESERVOIR	27	33	89	0.21
P10041R	PRI/BLM	STOCK	CAP PIT RESERVOIR	27	33	89	0.51
P7938R	SILVER KING MINES	TEM, FLO		27	33	89	0.04
P10039R	PRI	STOCK	BUSS I RESERVOIR	27	33	89	0.13
P7940R	ALTA GOLD CO.	TEM, FLO	DRAINAGE OF BUSS DRAW	28	33	89	0
P9723R	PATHFINDER MINES	STOCK	AREA 5 RESERVOIR	26	33	90	1.49
P6542R	WESTERN NUCLEAR CORP	IND	LAMAC DRAW	27	33	90	2.71
P9722R	PATHFINDER MINES	WIL, STOCK	AREA 4 RESERVOIR	36	33	90	1.02

TEM - Temporary  
IND - Industrial

WIL - Wildlife  
MIS - Miscellaneous

STOCK - Stock Pond  
FLO - Flowing

TABLE 2-4 - GROUND WATER RIGHTS

PERMIT NUMBER	APPLICANT	NAME	USES	DISTANCE FROM WELL FIELDS (MI)	SEC.	T	R	TOTAL DEPTH (FT)	YIELD (GPM)	DEPTH TO WATER (FT)	AQUIFER
P49333W	MATADOR CATTLE CO	BARREL SPRINGS #1	STOCK	2.13	8	32	89	4	1	FLO	WIND RIVER
P44457W	MATADOR CATTLE CO	CAMERON SPRING #1	STOCK	0.38	11	32	90	4	3	0	WAGON BED
P67075W	UNION CARBIDE	GW3B	RES,IND, MIS	0.24	15	33	89	159	7	114	WIND RIVER
P67076W	UNION CARBIDE	GW3C	RES,IND, MIS	0.3	15	33	89	165	4	107	WIND RIVER
P75424W	UMETCO	MW-24	RES, MIS	0.17	15	33	89	156	5.2	120	WIND RIVER
P66157W	UNION CARBIDE	GW3A	RES, MIS	0.21	15	33	89	158	10	101	WIND RIVER
P67077W	UNION CARBIDE	HDW-1	RES,IND	1.02	15	33	89	35	1	FLO	WIND RIVER
P46385W	MATADOR CATTLE CO	COLE #80	STOCK	2.39	18	33	89	2	0.75	FLO	WIND RIVER
P93801W	USDI, BLM	PWR #107 SPRING	STOCK	2.05	18	33	89	NR	10	NR	NR
P104718W	UMETCO	C-18 PIT	DEW, RES	0.1	22	33	89	85	500	80	WIND RIVER
P46378W	MATADOR CATTLE CO	SAGE HEN #1	STOCK	1.19	26	33	89	5	1	FLO	WAGON BED
P71766W	CLEAR CREEK CATTLE CO	BEAVER RIM #2	STOCK	0.77	27	33	89	10	15	FLO	WIND RIVER
P95290W	POWER RESOURCES INC.	BUSS RESERVOIR	MIS, DEW, RES	0.21	27	33	89	210	2000	171	WIND RIVER
P46388W	MATADOR CATTLE CO	MEDICINE SPRINGS #1	STOCK	3.37	7	33	89	6	4	FLO	WIND RIVER
P49121W	MATADOR CATTLE CO	LINCOLN SPRINGS #1	STOCK	2.9	7	33	89	5	3	FLO	WIND RIVER
P53837W	PATHFINDER	AREA 6 MINE SUMP	IND, RES	2.86	13	33	90	200	200	120	WIND RIVER
P3W	PATHFINDER	LUCKY MC #8	IND	1.3	22	33	90	1500	80	392	FRONTIER
P43159W	PATHFINDER	LUCKY MC #14	IND	2.47	24	33	90	1505	500	70	FRONTIER

NR - Not Reported  
RES - Reservoir

DEW - Dewatering  
IND - Industrial

DOM - Domestic  
MUN - Municipal

FLO - Flowing  
MIS - Miscellaneous

STOCK - Stock Pond

TABLE 2-4 - GROUND WATER RIGHTS (CONTINUED)

PERMIT NUMBER	APPLICANT	NAME	USES	DISTANCE FROM WELL FIELDS (MI)	SEC.	T	R	TOTAL DEPTH (FT)	YIELD (GPM)	DEPTH TO WATER (FT)	AQUIFER
P30735W	PATHFINDER	LUCKY MC #12	IND	2.56	24	33	90	1451	310	64	FRONTIER
P439G	PATHFINDER	LUCKY MC #2	DOM	2.17	26	33	90	110	350	20	WIND RIVER
P501G	PATHFINDER	LUCKY MC #3	IND, DOM	2	26	33	90	218	300	95	WIND RIVER
P530G	VITRO MINERALS CORP	JAY #1	IND	1.88	26	33	90	206	100	80	WIND RIVER
P154W	FEDERAL AMERICAN PARTNERS	FEDERAL WATER #8	IND	2.68	28	33	90	270	100	70	WIND RIVER
P46386W	MATADOR CATTLE CO	CLAY RUINS #1	STOCK	0.72	28	33	90	3	0.75	FLO	WIND RIVER
P152W	FEDERAL AMERICAN PARTNERS	FEDERAL WATER #6	IND	2.51	28	33	90	415	100	70	WIND RIVER
P151W	FEDERAL AMERICAN PARTNERS	FEDERAL WATER #5	IND	2.77	28	33	90	289	100	85	WIND RIVER
P559W	ORMSBEE DEVELOPMENT	MIMAR #3	MUN	3.07	28	33	90	110	30	40	WIND RIVER
P558W	ORMSBEE DEVELOPMENT	MIMAR #2	MUN	3.07	28	33	90	110	30	40	WIND RIVER
P648W	FEDERAL AMERICAN PARTNERS	FEDERAL WATER #13	IND	2.68	28	33	90	350	125	NR	WIND RIVER
P557W	ORMSBEE DEVELOPMENT	MIMAR #1	MUN	2.64	28	33	90	110	30	40	WIND RIVER
P89649W	USDI, BLM	WILLOW SPRINGS WELL	STOCK	1.45	34	33	90	190	5	168	WIND RIVER
P87214W	PATHFINDER MINES	AREA 4 RESERVOIR	DEW, RES, MIS	0.3	36	33	90	NR	NR	NR	WIND RIVER
P46522W	PATHFINDER	AREA 7 MINE SUMP	DEW, RES	0.72	36	33	90	350	1000	255	FRONTIER
P87215W	PATHFINDER MINES	AREA 5 RESERVOIR	MIS	0.38	36	33	90	NR	NR	NR	WIND RIVER

NR - Not Reported  
RES - Reservoir

DEW - Dewatering  
IND - Industrial

DOM - Domestic  
MUN - Municipal

FLO - Flowing  
MIS - Miscellaneous

STOCK - Stock Pond

**TABLE 2-5 - BASELINE SURFACE RADIOMETRIC DATA**

**EVAPORATION POND AREA**

SAMPLE ID	LOCATION	RA226		Gamma Reading uR/HR	U-NAT pCi/g	TH230		PB210	
		pCi/g	Prec.			pCi/g	Prec.	pCi/g	Prec.
1-1A	POND AREA	1.3	0.1	22	1.1	0.6	0.1	0.5	0.2
1-1B	POND AREA	1.3	0.1	22	1.1	0.9	0.1	0.6	0.2
1-2A	POND AREA	1.5	0.1	18	1.5	0.9	0.1	0.5	0.2
1-2B	POND AREA	1.6	0.1	18	1.6	1.7	0.3	0.5	0.2
1-3A	POND AREA	1.7	0.1	17	1.2	0.9	0.2	0.7	0.2
1-3B	POND AREA	1.5	0.1	17	0.9	1.0	0.2	0.9	0.2
1-4A	POND AREA	1.3	0.1	18	1.4	1.2	0.2	<0.5	
1-4B	POND AREA	1.5	0.1	18	1.4	1.5	0.2	0.6	0.2
1-5A	POND AREA	1.4	0.1	18	1.4	1.3	0.2	0.5	0.2
1-5B	POND AREA	2.2	0.2	18	1.6	1.5	0.2	0.8	0.2
1-6A	POND AREA	1.5	0.1	17	1.4	1.0	0.2	0.5	0.2
1-6B	POND AREA	2.0	0.2	17	1.7	1.8	0.2	1.0	0.2
1-7A	POND AREA	2.0	0.2	20	1.7	1.8	0.2	1.0	0.2
1-7B	POND AREA	2.9	0.2	20	1.7	2.5	0.2	4.0	0.2
1-8A	POND AREA	2.1	0.2	20	1.8	2.3	0.3	0.6	0.2
1-8B	POND AREA	2.4	0.2	20	1.9	1.9	0.2	1.0	0.3
1-9A	POND AREA	1.3	0.1	20	1.6	1.3	0.2	0.6	0.2
1-9B	POND AREA	2.0	0.2	20	2.1	2.0	0.2	0.6	0.2
1-10A	POND AREA	1.1	0.1	18	1.1	0.6	0.1	<0.5	
1-10B	POND AREA	1.2	0.1	18	1.0	1.3	0.2	<0.5	
1-11A	POND AREA	1.2	0.1	18	1.7	1.1	0.2	<0.5	
1-11B	POND AREA	1.1	0.1	18	2.0	1.1	0.2	<0.5	
1-12A	POND AREA	1.6	0.1	16	1.2	1.0	0.1	0.9	0.2
1-12B	POND AREA	1.3	0.1	16	0.9	0.8	0.2	<0.5	
1-13A	POND AREA	1.2	0.1	18	1.1	1.4	0.2	0.6	0.2
1-13B	POND AREA	1.2	0.1	18	0.8	2.0	0.2	0.6	0.2
1-14A	POND AREA	1.1	0.1	19	0.9	1.0	0.2	<0.5	
1-14B	POND AREA	1.2	0.1	19	0.9	0.8	0.1	<0.5	
1-15A	POND AREA	1.0	0.1	17	0.9	1.1	0.2	<0.5	
1-15B	POND AREA	1.1	0.1	17	0.9	1.5	0.2	0.6	0.2
1-16A	POND AREA	1.8	0.1	20	1.4	1.3	0.2	0.9	0.3
1-16B	POND AREA	1.7	0.1	20	1.2	1.8	0.3	1.1	0.3
1-17A	POND AREA	1.1	0.1	22	1.0	0.7	0.1	0.7	0.2
1-17B	POND AREA	1.2	0.1	22	1.1	1.2	0.2	0.5	0.2
1-18A	POND AREA	1.4	0.1	20	1.3	1.2	0.2	0.7	0.2
1-18B	POND AREA	1.2	0.1	20	1.1	0.9	0.1	0.8	0.2
1-19A	POND AREA	1.7	0.1	28	3.1	1.8	0.2	7.1	0.3
1-19B	POND AREA	1.2	0.1	28	1.5	0.8	0.1	0.5	0.2
1-20A	POND AREA	1.9	0.1	26	2.1	1.9	0.2	0.8	0.2
1-20B	POND AREA	2.1	0.1	26	2.0	2.8	0.3	1.0	0.3
1-21A	POND AREA	1.3	0.1	18	1.2	1.2	0.2	1.1	0.3
1-21B	POND AREA	1.6	0.1	16	1.2	1.2	0.2	<0.5	
1-22A	POND AREA	1.6	0.1	17	1.4	1.7	0.2	<0.5	
1-22B	POND AREA	1.5	0.1	17	1.1	1.1	0.2	<0.5	
1-23A	POND AREA	1.9	0.1	15	1.9	1.8	0.6	5.0	0.2
1-23B	POND AREA	2.3	0.2	15	2.1	6.4	0.7	<0.5	
1-24A	POND AREA	2.5	0.2	18	1.9	2.0	0.6	0.4	0.2
1-24B	POND AREA	2.5	0.2	16	1.8	1.6	0.2	0.4	0.2
1-25A	POND AREA	1.2	0.1	17	1.2	1.1	0.2	<0.5	
1-25B	POND AREA	1.6	0.1	17	1.2	1.9	0.2	<0.5	
1-26A	POND AREA	2.6	0.2	25	2.2	2.1	0.2	0.7	0.2
1-26B	POND AREA	1.9	0.1	25	1.2	1.6	0.2	0.6	0.2
1-27A	POND AREA	1.5	0.1	28	2.2	1.4	0.2	0.5	0.2
1-27B	POND AREA	1.5	0.1	28	1.0	1.3	0.2	<0.5	
1-28A	POND AREA	4.3	0.1	40	5.2	6.5	0.5	5.0	0.3
1-28B	POND AREA	1.9	0.1	40	2.8	2.6	0.3	1.1	0.2
1-29A	POND AREA	33.9	0.6	70	39.6	119.0	2.4	19.2	0.9
1-29B	POND AREA	17.1	0.4	70	153.0	143.0	3.0	12.4	0.7
1-30A	POND AREA	2.8	0.2	30	5.7	3.1	0.3	1.4	0.2
1-30B	POND AREA	1.8	0.1	30	2.4	2.4	0.3	1.1	0.2
1-31A	POND AREA	5.6	0.2	20	10.9	8.6	0.6	2.6	0.2
1-31B	POND AREA	2.4	0.2	20	2.7	2.8	0.3	1.2	0.2
1-32A	POND AREA	1.9	0.1	30	2.2	1.6	0.2	1.1	0.2
1-32B	POND AREA	2.1	0.2	30	2.3	1.7	0.2	0.9	0.2
1-33A	POND AREA	1.5	0.1	20	1.2	1.1	0.2	1.3	0.2
1-33B	POND AREA	1.3	0.1	20	1.1	1.2	0.2	0.9	0.2
AVERAGE		2.5		22.3	4.7	5.7		1.3	
(0 - 15 cm)		2.9							
(15 - 30 cm)		2.2							
RANGE		1.1-33.9		15-70					

A = 0 - 15 cm, B = 15 - 30 cm

**TABLE 2-5 - BASELINE SURFACE RADIOMETRIC DATA (CONT.)**

**WESTERN SATELLITE AREAS**

SAMPLE ID	LOCATION	RA226		Gamma Reading uR/HR	U-NAT pCi/g	TH230		PB210	
		pCi/g	Prec.			pCi/g	Prec.	pCi/g	Prec.
2-1A	SATELLITE	20.0	0.5	16	38.9	19.4	0.7	8.4	0.6
2-1B	SATELLITE	1.4	0.1	16	2.7	1.9	0.2	0.6	0.2
2-2A	SATELLITE	1.0	0.1	15	1.1	1.5	0.2	<0.5	
2-2B	SATELLITE	0.6	0.1	15	0.5	0.4	0.1	<0.5	
2-3A	SATELLITE	1.0	0.1	16	0.8	1.0	0.2	<0.5	
2-3B	SATELLITE	0.9	0.1	16	0.5	0.4	0.1	<0.5	
2-4A	SATELLITE	0.8	0.1	17	0.6	1.3	0.2	<0.5	0.8
2-4B	SATELLITE	0.8	0.1	17	0.7	0.6	0.1	<0.5	
2-5A	SATELLITE	1.0	0.1	16	1.0	1.0	0.2	<0.5	
2-5B	SATELLITE	1.1	0.1	16	0.8	1.3	0.2	<0.5	
2-6A	SATELLITE	1.0	0.1	15	1.1	0.9	0.1	0.4	0.2
2-6B	SATELLITE	1.0	0.1	15	1.0	0.8	0.1	0.5	0.2
2-7A	SATELLITE	0.9	0.1	16	0.9	0.8	0.1	0.5	0.2
2-7B	SATELLITE	0.7	0.1	16	0.8	0.7	0.1	<0.5	
2-8A	SATELLITE	1.0	0.1	16	0.5	0.7	0.2	<0.5	
2-8B	SATELLITE	0.8	0.1	16	0.6	0.7	0.1	<0.5	
2-9A	SATELLITE	0.9	0.1	18	0.7	1.0	0.2	0.5	0.2
2-9B	SATELLITE	0.9	0.1	18	0.7	0.8	0.2	0.4	0.2
2-10A	SATELLITE	0.7	0.1	14	0.8	0.9	0.2	<0.5	
2-10B	SATELLITE	0.9	0.1	14	0.6	0.7	0.1	<0.5	
3-1A	SATELLITE	1.7	0.1	18	3.0	1.8	0.3	0.6	0.2
3-1B	SATELLITE	2.0	0.1	18	3.6	1.6	0.2	0.4	0.2
3-2A	SATELLITE	1.4	0.1	21	1.7	1.5	0.2	0.5	0.2
3-2B	SATELLITE	1.1	0.1	21	1.4	0.9	0.1	<0.5	
3-3A	SATELLITE	1.4	0.1	18	1.5	1.1	0.4	0.5	0.2
3-3B	SATELLITE	1.0	0.1	18	1.1	0.6	0.1	2.9	0.2
3-4A	SATELLITE	1.2	0.1	18	1.1	0.8	0.1	0.8	0.2
3-4B	SATELLITE	1.3	0.1	18	1.1	1.3	0.2	0.5	0.2
3-5A	SATELLITE	1.4	0.1	20	1.4	1.6	0.2	1.5	0.2
3-5B	SATELLITE	1.1	0.1	20	1.0	0.9	0.2	0.6	0.2
3-6A	SATELLITE	1.0	0.1	17	0.9	0.7	0.1	1.4	0.2
3-6B	SATELLITE	1.0	0.1	17	0.9	0.9	0.1	1.0	0.2
3-7A	SATELLITE	1.1	0.1	18	1.2	1.1	0.2	0.6	0.2
3-7B	SATELLITE	1.5	0.1	18	0.4	1.3	0.2	2.7	0.3
3-8A	SATELLITE	1.5	0.1	15	0.8	0.9	0.1	1.5	0.2
3-8B	SATELLITE	1.0	0.1	15	0.9	0.9	0.1	0.2	0.2
3-9A	SATELLITE	1.2	0.1	15	0.8	1.0	0.2	<0.5	
3-9B	SATELLITE	1.1	0.1	15	0.9	0.7	0.1	0.6	0.2
3-10A	SATELLITE	1.3	0.1	15	0.9	1.1	0.2	1.3	0.2
3-10B	SATELLITE	1.2	0.1	15	0.9	0.8	0.1	1.6	0.2
3-11A	SATELLITE	1.3	0.1	16	1.1	1.1	0.2	0.5	0.2
3-11B	SATELLITE	1.1	0.1	16	0.7	0.9	0.2	0.8	0.2
SS #14, A	SATELLITE	1.00	0.20	17	0.8	0.5	0.1	0.9	0.4
SS #14, B	SATELLITE	0.9	0.2	17	0.6	0.4	0.1	1.1	0.4
SS #15, A	SATELLITE	1.4	0.2	20	1.9	0.6	0.1	0.8	0.4
SS #15, B	SATELLITE	1.4	0.2	20	1.2	0.9	0.2	0.4	0.3
AVERAGE		1.5		17	1.9	1.5		0.8	
(0 - 15 cm)		2.0							
(15 - 30 cm)		1.1							
RANGE		0.6 - 2.0		14 - 21					

**ATLAS MINE AREA**

SAMPLE ID	LOCATION	RA226		Gamma Reading uR/HR	U-NAT pCi/g	TH230		PB210	
		pCi/g	Prec.			pCi/g	Prec.	pCi/g	Prec.
4-1A	ATLAS MINE	148.9	1.3	230	82.3	139.0	4.3	79.6	2.1
4-1B	ATLAS MINE	46.9	0.7	230	91.4	33.2	2.0	27.2	1.3
4-2A	ATLAS MINE	31.4	0.6	120	90.0	29.9	2.0	13.8	1.0
4-2B	ATLAS MINE	14.6	0.4	120	70.8	14.4	0.6	6.5	0.4
4-3A	ATLAS MINE	50.7	0.8	120	64.0	79.2	1.5	25.0	1.2
4-3B	ATLAS MINE	58.9	0.8	120	68.4	103.0	1.9	31.1	1.4
SS #20, A	ATLAS MINE	7.2	0.2	100	24.8	3.5	0.3	2.2	0.5
SS #20, B	ATLAS MINE	11.4	0.3	100	8.4	6.5	0.5	4.5	0.6
AVERAGE		46.2		142.50	62.51	51.09		23.74	
(0 - 15 cm)		69.5							
(15 - 30 cm)		33.0							
RANGE		7.2 - 149		100 - 230					

A = 0 - 15 cm, B = 15 - 30 cm

**TABLE 2-5 - BASELINE SURFACE RADIOMETRIC DATA (CONT.)**

**GENERAL PROPOSED MINE UNIT AREAS**

SAMPLE ID	LOCATION	RA226		Gamma Reading uR/HR	U-NAT pCi/g	TH230		PB210	
		pCi/g	Prec.			pCi/g	Prec.	pCi/g	Prec.
SS #1, A	MINE UNIT 1	1.60	0.50	16	0.9	<0.02		0.2	0.2
SS #1, B	MINE UNIT 1	1.10	0.30	16	0.8	<0.02		<0.10	
SS #2, A	MINE UNIT 1	1.30	2.00	25	0.7	2.3	0.7	0.3	0.3
SS #2, B	MINE UNIT 1	1.30	0.20	25	0.6	<0.02		0.5	0.4
SS #4, A	MINE UNIT 1	1.00	1.00	20	0.5	<0.02		0.3	0.3
SS #4, B	MINE UNIT 1	1.10	0.30	20	0.6	<0.02		0.3	0.3
SS #5, A	MINE UNIT 2	1.40	0.30	24	1.1	<0.02		<0.10	
SS #5, B	MINE UNIT 2	1.70	0.30	24	1.2	<0.02		1.1	0.8
SS #6, A	MINE UNIT 2	1.60	0.30	25	1.1	<0.02		<0.10	
SS #6, B	MINE UNIT 2	1.60	0.30	25	1.4	<0.02		<0.10	
SS #7, A	MINE UNIT 4	1.70	0.30	23	2.3	<0.02		0.8	0.8
SS #7, B	MINE UNIT 4	1.90	0.30	23	2.9	<0.02		0.3	0.3
SS #8, A	MINE UNIT 4	1.50	0.30	18	1.1	<0.02		0.4	0.4
SS #8, B	MINE UNIT 4	0.80	0.10	18	0.9	<0.02		0.2	0.2
SS #12, A	MINE UNIT 2	2.90	0.30	22	2.2	1.0	0.1	1.3	0.2
SS #12, B	MINE UNIT 2	1.40	0.20	22	0.8	0.4	0.1	10.8	0.4
SS #13, A	MINE UNIT 2	1.30	0.20	24	0.9	0.5	0.1	1.3	0.4
SS #13, B	MINE UNIT 2	0.90	0.20	24	0.6	0.4	0.1	0.9	0.4
SS #16, A	MINE UNIT 3	1.10	0.20	30	1.7	0.8	0.2	<0.01	
SS #16, B	MINE UNIT 3	0.90	0.20	30	2.2	0.8	0.2	1.2	0.4
SS #17, A	MINE UNIT 3	1.50	0.20	30	1.2	1.7	0.2	1.2	0.4
SS #17, B	MINE UNIT 3	1.30	0.20	30	1.2	0.9	0.2	<0.01	
SS #18, A	MINE UNIT 1	0.09	0.20	20	0.9	0.8	0.2	1.0	0.4
SS #18, B	MINE UNIT 1	1.10	0.20	20	0.9	0.9	0.2	0.9	0.4
AVERAGE		1.3	0.3	23.1	1.2	0.4	0.2	1.0	0.4
(0 - 15 cm)		1.4							
(15 - 30 cm)		1.3							
RANGE		1.1 - 2.9		16 - 30					

**CAROL SHOP FACILITY AREA AND CAROL SHOP ROAD**

SAMPLE ID	LOCATION	RA226		Gamma Reading uR/HR	U-NAT pCi/g	TH230		PB210	
		pCi/g	Prec.			pCi/g	Prec.	pCi/g	Prec.
1-34A	ROAD	13.2	0.4	80	23.1	12.6	0.5	6.4	0.6
1-34B	ROAD	188.0	1.4	80	176.0	292.0	2.9	101.0	1.9
1-35A	ROAD	13.8	0.4	50	34.5	12.6	0.5	8.7	0.6
1-35B	ROAD	14.8	0.4	50	30.9	12.7	0.5	8.2	-0.3
1-36A	ROAD	12.8	0.4	50	21.7	20.2	0.8	6.0	0.6
1-36B	ROAD	13.5	0.4	50	27.5	19.6	0.7	9.0	0.7
1-37A	ROAD	3.2	0.2	60	6.3	3.5	0.3	1.3	0.2
1-37B	ROAD	3.6	0.2	60	6.0	3.7	0.3	1.6	0.2
1-38A	CAROL SHOP	4.5	0.2	32	10.8	4.6	0.3	2.1	0.2
1-38B	CAROL SHOP	3.5	0.2	32	8.0	6.2	0.5	1.7	0.2
1-39A	CAROL SHOP	9.0	0.3	44	14.7	11.5	0.6	4.8	0.3
1-39B	CAROL SHOP	6.2	0.3	44	13.6	7.9	0.4	3.0	0.3
1-40A	CAROL SHOP	1.2	0.1	19	0.8	0.9	0.1	<0.05	
1-40B	CAROL SHOP	1.2	0.1	19	0.8	2.0	0.3	<0.05	
1-41A	CAROL SHOP	1.4	0.1	17	1.3	1.3	0.2	0.6	0.2
1-41B	CAROL SHOP	1.3	0.1	17	0.9	0.8	0.1	<0.05	
1-42A	CAROL SHOP	27.0	0.6	55	48.8	33.7	0.8	17.5	0.9
1-42B	CAROL SHOP	29.5	0.6	55	35.2	38.3	1.0	16.3	0.9
1-43A	CAROL SHOP	41.2	0.7	80	52.1	41.1	1.1	26.8	1.0
1-43B	CAROL SHOP	22.6	0.5	80	57.6	28.6	0.8	11.2	0.7
SS #9, A	ROAD	15.40	1.00	40	1.7	0.5	0.1	<0.01	
SS #9, B	ROAD	7.70	0.80	40	0.7	0.4	0.1	<0.01	
SS #3, A	ROAD	119.00	0.20	180	37.4	177.0	5.8	89.3	3.2
AVERAGE		24.1		53.7	26.6	31.8		13.7	
(0 - 15 cm)		21.8							
(15 - 30 cm)		26.5							
RANGE		1.2 - 188		17 - 180					

A = 0 - 15 cm, B = 15 - 30 cm

**TABLE 2-5 - BASELINE SURFACE RADIOMETRIC DATA (CONT.)**

**TWO STATES MINE AREA**

SAMPLE ID	LOCATION	RA226		Gamma Reading uR/HR	U-NAT pCi/g	TH230		PB210	
		pCi/g	Prec.			pCi/g	Prec.	pCi/g	Prec.
4-4A	TWO STATES	19.7	0.5	60	20.3	34.1	1.1	14.6	1.0
4-4B	TWO STATES	6.2	0.3	60	13.9	2.9	0.3	1.8	0.3
4-5A	TWO STATES	44.2	0.7	100	13.7	18.0	0.8	19.7	1.1
4-5B	TWO STATES	40.7	0.7	100	18.4	32.6	1.0	21.8	1.2
4-6A	TWO STATES	5.3	0.2	50	10.5	5.6	0.4	3.3	0.3
4-6B	TWO STATES	5.3	0.2	50	4.7	5.0	0.4	2.5	0.3
4-7A	TWO STATES	4.9	0.3	90	5.0	4.1	0.3	2.11	0.3
4-7B	TWO STATES	4.1	0.2	90	3.4	5.1	0.5	1.3	0.2
4-8A	TWO STATES	8.3	0.3	70	9.4	16.3	0.4	5.3	0.3
4-8B	TWO STATES	8.7	0.3	70	8.0	4.5	0.3	4.6	0.3
SS #10, A	TWO STATES	38.4	1.6	220	3.1	1.6	0.2	0.4	0.2
SS #10, B	TWO STATES	41.0	1.6	220	2.5	1.9	0.2	1.3	0.2
SS #11, A	TWO STATES	268.0	2.4	900	21.5	50.8	2.2	153.0	1.1
SS #11, B	TWO STATES	504.0	3.3	900	14.5	58.1	2.1	272.0	1.2
SS #19, A	TWO STATES	68.9	1.2	200	19.7	18.0	1.3	36.0	0.9
SS #19, B	TWO STATES	35.1	0.9	200	23.8	6.5	0.5	21.7	0.8
<b>AVERAGE</b>		<b>68.93</b>		<b>221.3</b>	<b>11.5</b>	<b>14.7</b>		<b>36.4</b>	
<b>(0 - 15 cm)</b>		<b>57.2</b>							
<b>(15 - 30 cm)</b>		<b>80.6</b>							
<b>RANGE</b>		<b>4.1 - 504</b>		<b>50 - 900</b>					

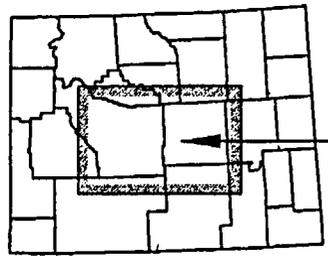
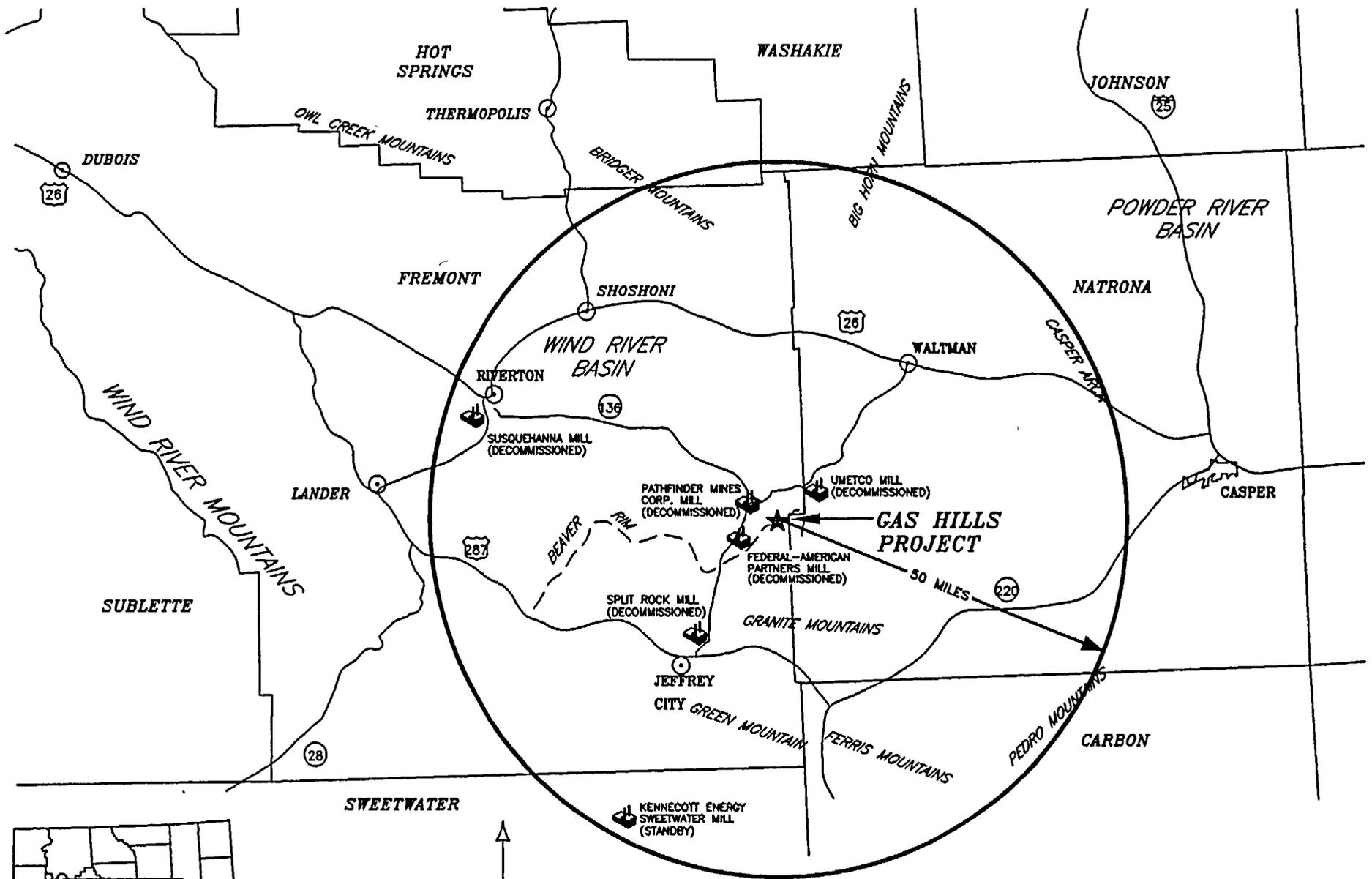
A = 0 - 15 cm, B = 15 - 30 cm

**TABLE 2-6  
AIR QUALITY DATA**

LOCATION	DATE	GAMMA	RADON
		mR/Qtr Avg.	pCi/l Avg.
PRI-1	3 <sup>rd</sup> Qtr 1995	41.4 ± 8.2	4.6
	4 <sup>th</sup> Qtr 1995	30.2 ± 3.6	1.6
	1 <sup>st</sup> Qtr 1996	47.0 ± 15.9	0.8
	2 <sup>nd</sup> Qtr 1996	39.6 ± 6.9	1.0
	3 <sup>rd</sup> Qtr 1996	39.2 ± 2.6	3.5
	4 <sup>th</sup> Qtr 1996	42.8 ± 8.9	0.8
	1 <sup>st</sup> Qtr 1997	35.0 ± 7.3	1.6
	2 <sup>nd</sup> Qtr 1997	26.6 ± 10.8	1.1
	3 <sup>rd</sup> Qtr 1997	40.2 ± 10.9	1.2
	4 <sup>th</sup> Qtr 1997	41.8 ± 15.6	1.5
	1 <sup>st</sup> Qtr 1998	34.8 ± 20.8	1.2
PRI-2	3 <sup>rd</sup> Qtr 1995	33.8 ± 14.5	1.4
	4 <sup>th</sup> Qtr 1995	25.4 ± 2.3	2.1
	1 <sup>st</sup> Qtr 1996	43.6 ± 7.7	0.6
	2 <sup>nd</sup> Qtr 1996	36.2 ± 14.0	1.3
	3 <sup>rd</sup> Qtr 1996	38.0 ± 4.0	1.8
	4 <sup>th</sup> Qtr 1996	39.8 ± 11.5	1.4
	1 <sup>st</sup> Qtr 1997	37.6 ± 7.8	1.5
	2 <sup>nd</sup> Qtr 1997	36.4 ± 2.3	1.2
	3 <sup>rd</sup> Qtr 1997	41.8 ± 6.1	0.7
	4 <sup>th</sup> Qtr 1997	41.0 ± 16.4	1.7
	1 <sup>st</sup> Qtr 1998	42.2 ± 7.8	1.1

**TABLE 2-6 CONTINUED  
AIR QUALITY DATA**

LOCATION	DATE	GAMMA	RADON
		mR/Qtr Avg.	pCi/l Avg.
PRI-3	3 <sup>rd</sup> Qtr 1995	52.6 ± 12.7	2.5
	4 <sup>th</sup> Qtr 1995	35.2 ± 7.9	2.4
	1 <sup>st</sup> Qtr 1996	56.8 ± 12.9	1.3
	2 <sup>nd</sup> Qtr 1996	49.6 ± 3.6	2.0
	3 <sup>rd</sup> Qtr 1996	57.0 ± 14.0	2.4
	4 <sup>th</sup> Qtr 1996	53.8 ± 5.4	1.5
	1 <sup>st</sup> Qtr 1997	42.8 ± 9.4	1.9
	2 <sup>nd</sup> Qtr 1997	44.6 ± 12.4	1.8
	3 <sup>rd</sup> Qtr 1997	56.8 ± 11.9	1.4
	4 <sup>th</sup> Qtr 1997	51.2 ± 15.9	1.9
	1 <sup>st</sup> Qtr 1998	44.0 ± 11.7	1.2
PRI-4	1 <sup>st</sup> Qtr 1998	58.0 ± 11.6	1.6



MAP AREA

WYOMING



 NUCLEAR FUEL CYCLE FACILITY



REVISION DATE: 3/98  
 LAST PLOT DATE: None  
 CAD FILENAME: NRC2-1

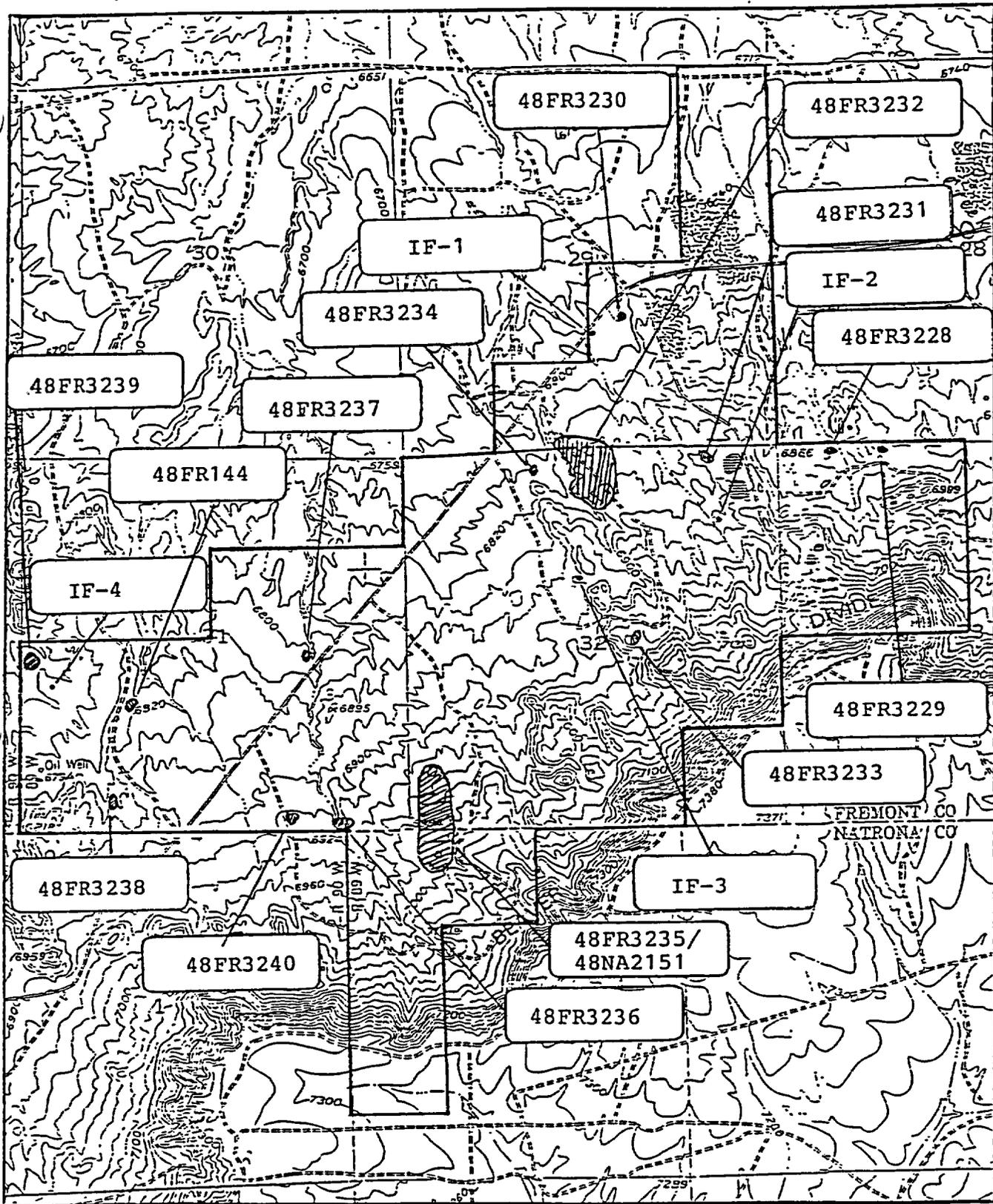
NO	REVISION	DATE BY	ISSUED FOR	DATE BY
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POWER RESOURCES, INC.

SCALE AS SHOWN	DATE	REV. NO.	FIG. NO.
ISSUED BY: [ ]	12/98		FIG. 2-1
DESIGNED BY: [ ]			
CHECKED BY: [ ]			
APPROVED BY: [ ]			

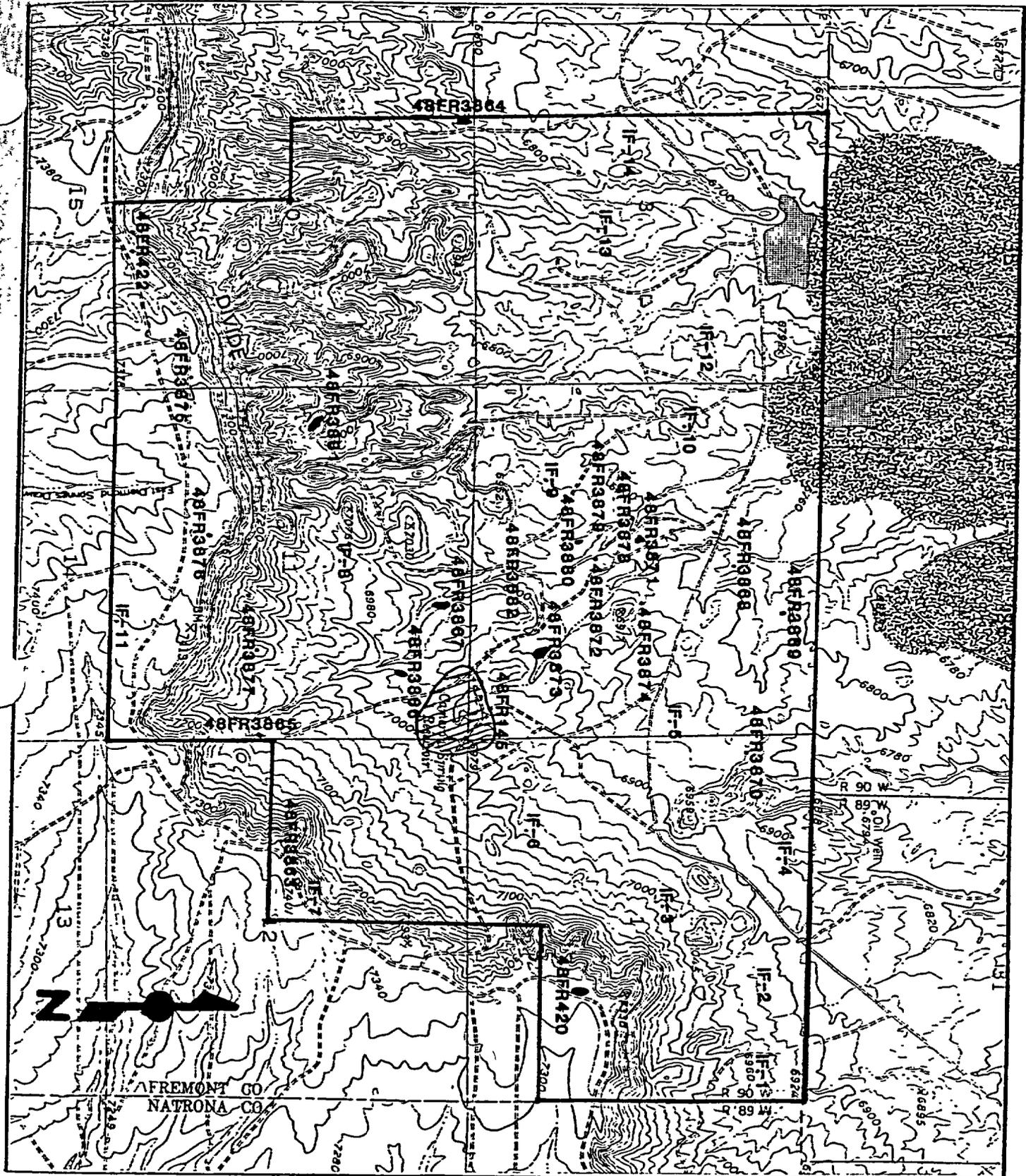
GAS HILLS PROJECT  
 NUCLEAR FUEL CYCLE FACILITIES  
 WITHIN 50 MILE RADIUS OF PROJECT





Project Map  
 Power Resources Gas Hills Block Inventory  
 Sec. 6, T32N, R89W, Natrona County, Wyoming  
 Secs. 29, 31, 32, 33, T33N, R89W Fremont County, Wyoming  
 From: Gas Hills, WY 7.5' topo map photorevised 1984

FIGURE 2-3  
 1992 ARCHAEOLOGICAL SITE LOCATIONS



Project Map  
 Power Resources, Inc.  
 Wyoming DEQ-LQD Mine Permit  
 Sections 1, 2, 3, 10, 11, 12, T32N, R90W  
 Fremont County, Wyoming

— Surveyed Area

FIGURE 2-4  
 1997 ARCHAEOLOGICAL SITE LOCATIONS

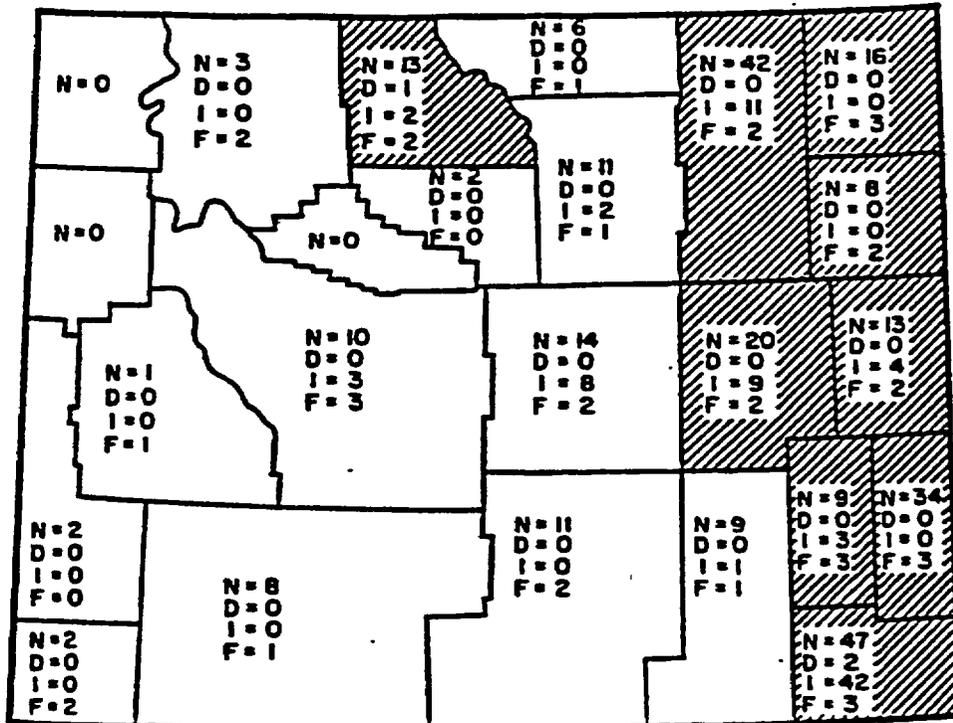
From: Gas Hills, Wyo. USGS topo map (1984)

# TORNADOES REPORTED IN WYOMING BY COUNTY (1950-1982)

**STATE OVERALL:**

N = 277 (=3/1000mi<sup>2</sup>)  
 D = 3  
 I = 85  
 F = 3

▨ = > 3 TORNADOES/1000 mi<sup>2</sup>  
 □ = < 3 TORNADOES/1000 mi<sup>2</sup>



N = TOTAL NUMBER OF TORNADOES REPORTED  
 D = DEATHS  
 I = INJURIES  
 F = FUJITA SCALE INDEX OF MOST DESTRUCTIVE STORM  
 (0 = LIGHT DAMAGE, 5 = INCREDIBLE DAMAGE)

DATA PROVIDED BY: NATIONAL SEVERE STORMS FORECAST CENTER

Figure 2-5 Tornado statistics by county for Wyoming for a 33 year period. Shading indicates counties where tornadoes are most prevalent.

# Mean Monthly Temperature

## Gas Hills 4E (9/1963 to 7/1996)

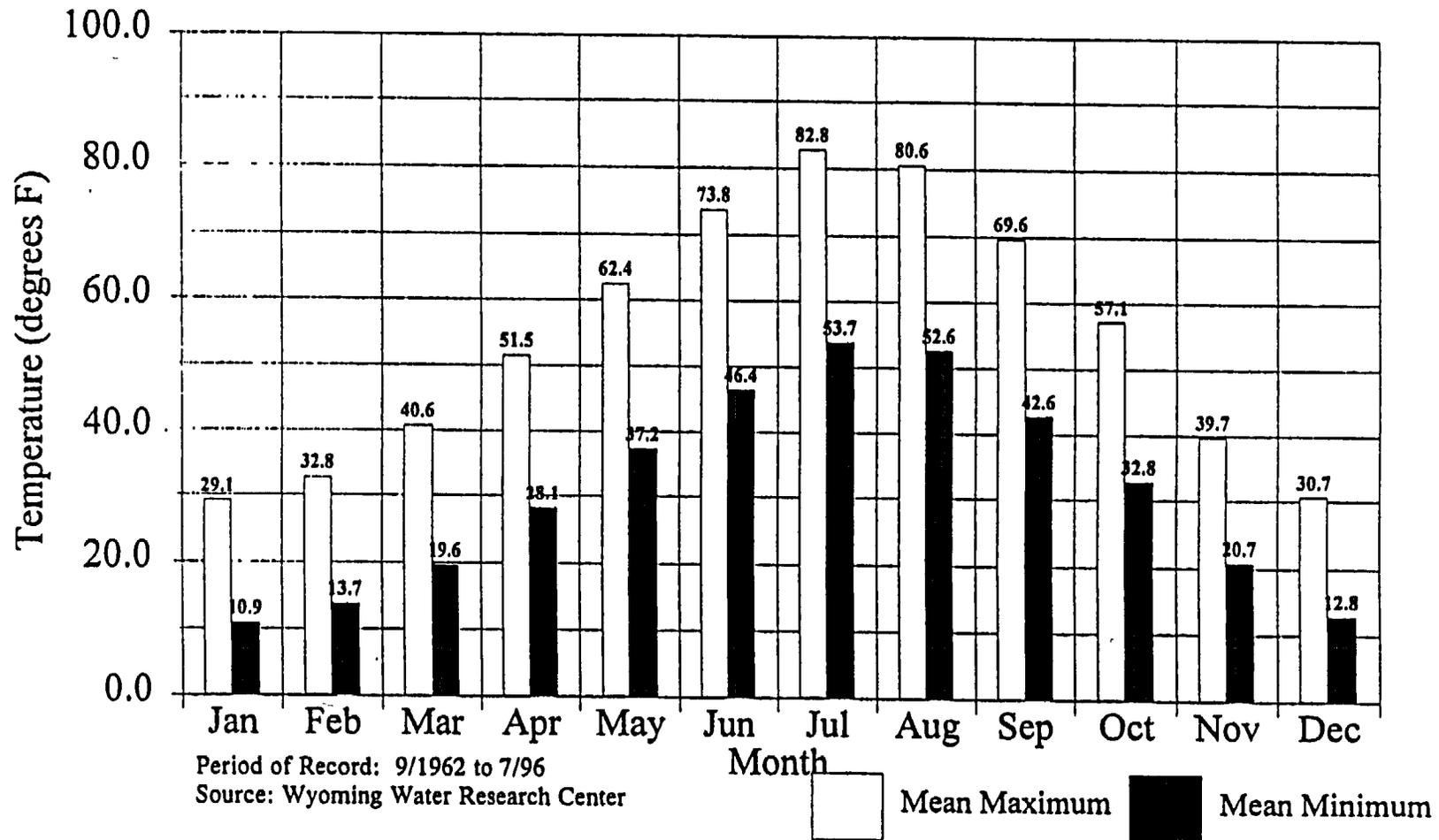
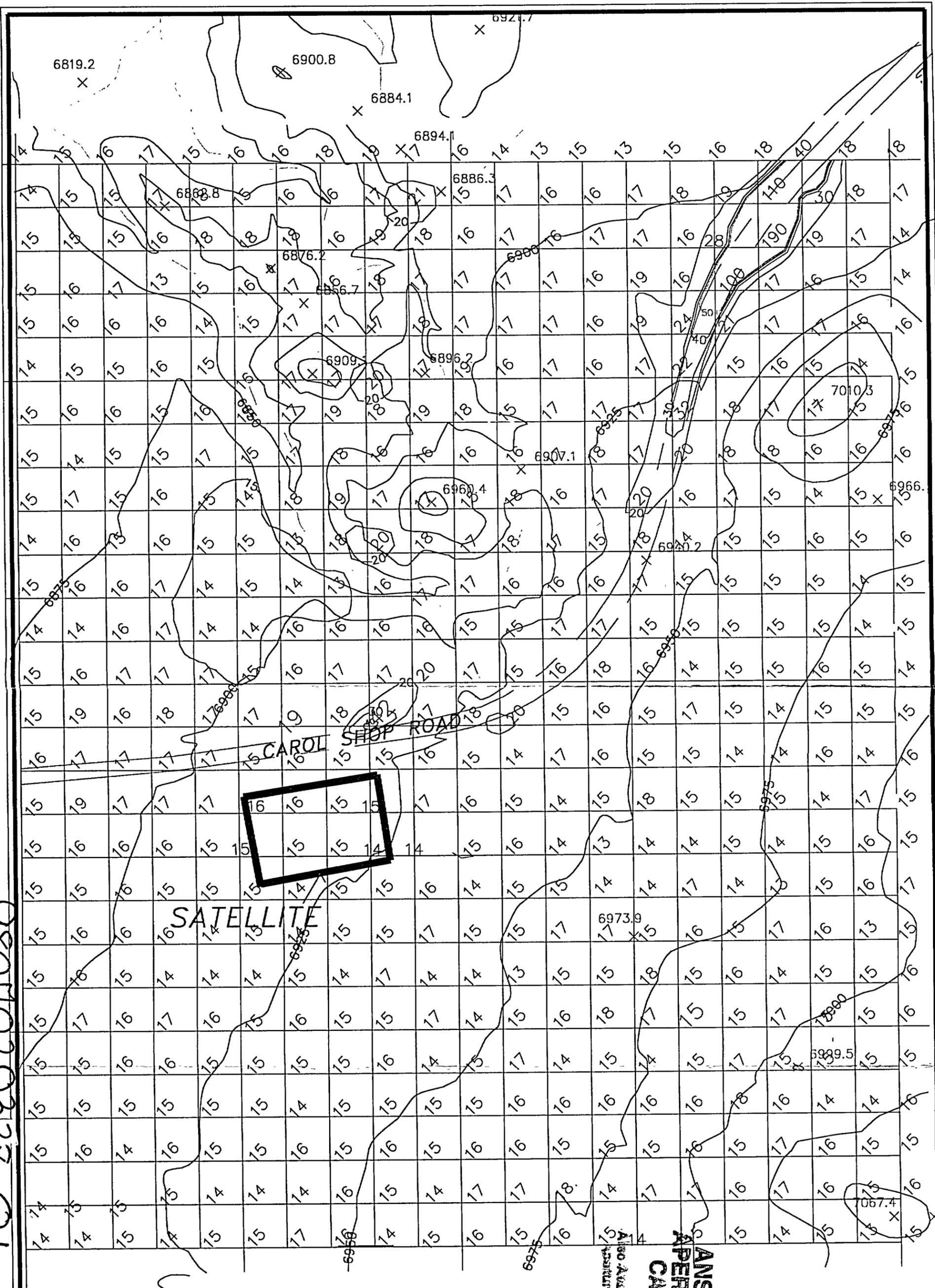


Figure 2-6 Mean monthly temperature: Gas Hills 4E Weather Station

98071020338-01

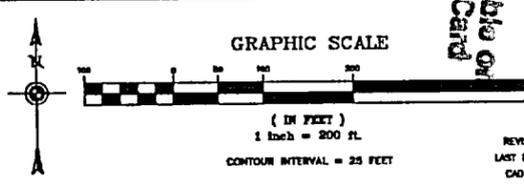


**LEGEND**

16  
20  
6800

GAMMA READING IN  $\mu\text{R}/\text{HR}$   
 GAMMA CONTOUR LINE  
 (CI=10  $\mu\text{R}/\text{HR}$ )

DRAINAGE  
 ELEVATION CONTOUR (CI=25)



ANSI/IEC  
 APERTURE  
 CARD

Also Available on  
 Instrument Card

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**POWER RESOURCES, INC**

FIGURE 2-7

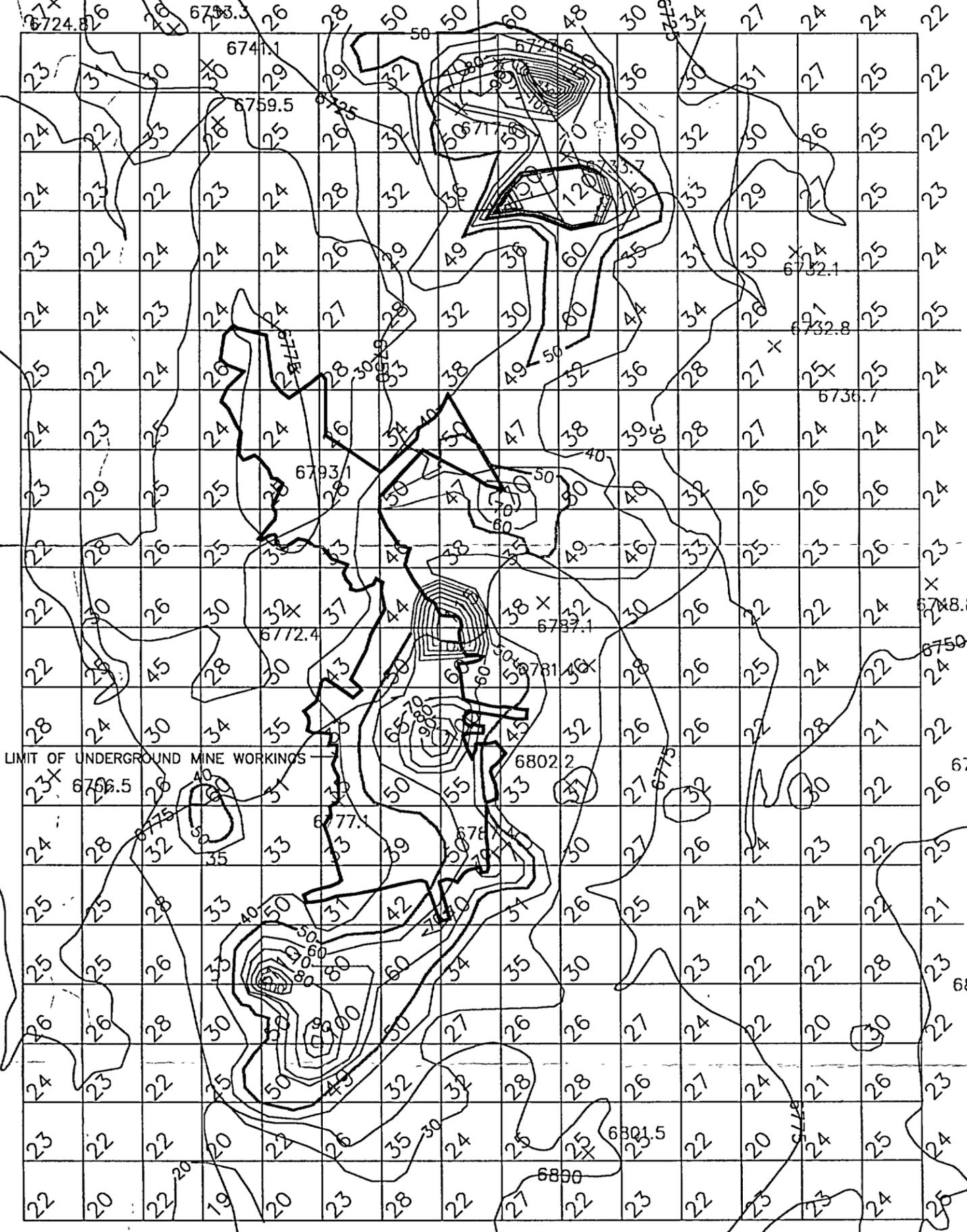
**GAS HILLS PROJECT**  
 GAMMA SURVEY FOR SATELLITE AREA  
 FREMONT AND NATRONA COUNTIES, WY

REVISION DATE: 6/15/86  
 LAST PLOT DATE: 6/15/86  
 CAD FILENAME: 10103W



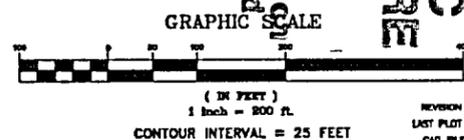
# ATLAS MINE AREA

MINE WATER DISCHARGE SETTLING POND



9801020338-03

LEGEND	
	GAMMA READING IN uR/HR
	GAMMA CONTOUR LINE (CI=10 uR/HR)
	DRAINAGE
	ELEVATION CONTOUR (CI=25)



**ANSTEC**  
**APERTURE**  
**CARD**  
Also Available on  
Aperture Card

REVISION DATE: 8/28/78  
LAST PLOT DATE: 8/28/78  
CAG FILENAME: 10103W

NO.	REVISION	DATE BY	ISSUED FOR	DATE BY
<b>POWER RESOURCES, INC</b>				
FIGURE 2-9				
GAS HILLS PROJECT GAMMA SURVEY FOR ATLAS MINE AREA FREMONT AND NATRONA COUNTIES, WY				

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DRAWING NO. PLATE 2-1  
GAS HILLS PROJECT  
SURFACE OWNERSHIP MAP  
FREMONT AND NATRONA COUNTIES,  
WY**

**WITHIN THIS PACKAGE... OR  
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PLATE 2-1**

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**D-02**

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GAS HILLS PROJECT  
MINERAL OWNERSHIP MAP  
FREMONT AND NATRONA COUNTIES,  
WY**

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PLATE 2-2**

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GAS HILLS PROJECT  
DISTURBED AREAS  
FREMONT AND NATRONA COUNTIES,  
WY**

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PLATE 2-3W**

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GAS HILLS PROJECT  
DISTURBED AREAS  
FREMONT AND NATRONA COUNTIES,  
WY**

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PLATE 2-3E**

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**D-05**

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GAS HILLS PROJECT  
WATER RIGHTS MAP**

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PLATE 2-4**

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**D-06**

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GAS HILLS PROJECT  
RADIOLOGICAL SURVEYS  
FREMONT AND NATRONA COUNTIES,  
WY**

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PLATE 2-5W**

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**D-07**

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GAS HILLS PROJECT  
RADIOLOGICAL SURVEYS  
FREMONT AND NATRONA COUNTIES,  
WY**

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PLATE 2-5E**

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**D-08**

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GAS HILLS PROJECT  
PRE-MINE PLANT SITE  
RADIOMETRIC LEVELS  
FREMONT AND NATRONA COUNTIES,  
WYOMING**

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PLATE 2-6**

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**D-09**

**ADDENDUM 2-1**  
**GRAZING LEASE CORRESPONDENCE**



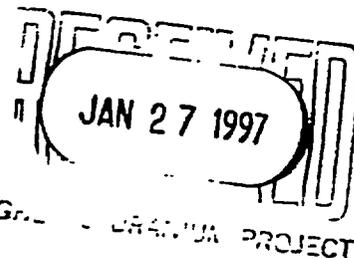
# United States Department of the Interior

BUREAU OF LAND MANAGEMENT

3809

Lander Resource Area  
P O Box 589 (1335 Main Street)  
Lander, Wyoming 82520-0589

January 23, 1997



Paul R. Hildenbrand  
Power Resources, Inc.  
P.O. Box 1210  
Glenrock, Wyoming 82637

Dear Mr. Hildenbrand:

You recently asked the Bureau of Land Management for information on the numbers of livestock and AUMs in the area of PRI's proposed Gas Hills in situ project. The grazing pasture in the area of concern is the Gas Hills allotment and you have indicated that the Nuclear Regulatory Commission will require information about the numbers of livestock which may be in a three mile radius of the central area of operations - the Carol shop- at any time. The following information may help you in the application process, but it is not possible for us to tell you how many animals would be in the area of operations at any one instance.

Philp Sheep Company is the grazing permittee in the allotment and is permitted for the following use:

308 cattle 5/16-10/30 83%PL 1,420 AUMs  
3,858 sheep 9/01-12/10 83%PL 2,127 AUMs

If the entire area within the permit application boundary was disturbed, 795 public AUMs and 20 state AUMs would be removed from the existing forage base. This loss would represent 22% of the currently permitted use in the allotment. Also, this change would represent 57 fewer cattle and 733 fewer sheep permitted to graze in the allotment. If all vegetation was removed in the project boundary, the permit would be reduced to the following numbers:

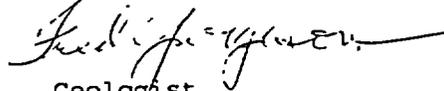
251 cattle 5/16-10/30 79% PL 1,102 AUMs  
3,125 sheep 9/01-12/10 79% PL 1,650 AUMs

The grazing permittee generally turns the livestock out in the allotment at the dates shown above and the animals migrate to the watering holes scattered throughout the allotment. The northern most part of the allotment is wintering range for antelope and the BLM works with the permittee to have the sheep moved from this area due to the competing use for the same forage. Because of this removal procedure, it would be theoretically possible to have all the sheep in the area of the proposed mining operations at one time. This situation is unlikely, however, since the sheep naturally drift to the north and are not herded in the allotment. On the other hand, the cattle are allowed to move throughout the allotment as they do not compete for the same forage and, therefore, it is not likely that all the allotted cattle would be in the proposed mine area at any one time. We have not been able to derive a

number for how many head of cattle one might expect in the mine area at any instance. In the worst case, of course, 308 head could be within the proposed mine permit boundary at once.

I hope this information will be of assistance to you. If you have questions or need additional information, please call me or Mike Tietmeyer, at 307-332-8400.

Sincerely,

  
Geologist

**ADDENDUM 2-2**  
**ARCHAEOLOGICAL CORRESPONDENCE**



# United States Department of the Interior

3809

## BUREAU OF LAND MANAGEMENT

Lander Resource Area  
P O. Box 589 (1335 Main Street)  
Lander, Wyoming 82520-0589

December 5, 1996

- 6 1996

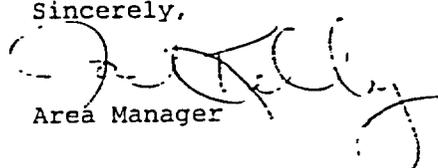
Doug Beahm  
c/o Power Resources, Inc.  
800 Werner Court #230  
Casper, WY 82601

Dear Mr. Beahm:

Enclosed are two topographic maps showing the areas within PRI's proposed mine permit area in the Gas Hills and which lands have, and have not, been surveyed for cultural resources. Any public lands which have not been previously surveyed and may be disturbed by exploration or mining activities in the future, will have to have a class III survey conducted. I hope this information will be of assistance to you.

Should you have any questions, please call Fred Georgeson at 307-332-8415, or Craig Bromley, my staff Archaeologist, at 307-332-8406.

Sincerely,

  
Area Manager

2 Enclosures:

- 1 - Gas Hills quad
- 2 - Ervay Basin SW quad

cc: Craig Bromley, LRA



# United States Department of the Interior

## BUREAU OF LAND MANAGEMENT

Lander Resource Area  
P.O. Box 589  
Lander, Wyoming 82520-0589



8111  
Power Resources  
Gas Hills  
Inv. Rpt.

JAN 25 1993

HIGHLAND URANIUM PROJECT  
RECEIVED

FILE GH 14.7

COPY FOR YOUR  
INFORMATION

January 21, 1993

Marv Hatcher  
Pronghorn Anthropological Associates  
P.O. Box 880  
Mills, WY 82644

Dear Marv:

The following are our comments on your draft report, "Gas Hills Block Inventory for Power Resources Inc. (PAA 92-157)":

### General

1. Overall, the report covers what we need to determine the effects of the project on cultural resources. The discussion on the function and use of stone circles in the project area was especially appreciated.
2. A general discussion of the various cultural activities that occurred within the inventoried block area should be included in this report or in the subsequent report for the previously inventoried lands in T.33N., R.89W., Sections 28, 33, and 34. This discussion should try to relate the various functions of the sites within the project area, and conclude with a discussion of how the area was utilized and what types of sites to expect in future inventories in the area.
3. In the discussion of some stone circle sites, the presence or lack of hearths within the circles was discussed, while in others, it was not. Please document the presence or absence of hearths within all of the stone circle sites found in the project area.

### 48FR144

We consider this site's National Register status to be **Unknown** due the likelihood for buried features, the high amount of thermally-altered stone and lithics, and relatively low level of testing done at the site.

### 48FR3228

We agree that this site should be considered **Not Eligible**.

### 48FR3229

We agree that this site should be considered **Not Eligible**.

### 48FR3230

We agree that this site should be considered **Not Eligible**.

48FR3231

We agree that this site should be considered Not Eligible.

48FR3232

We agree that this site should be considered Eligible.

48FR3233

We agree that this site should be considered Not Eligible.

48FR3234

We agree that this site should be considered Not Eligible.

48FR3235/48NA2151

We feel this site's National Register status should be considered Unknown until further studies and/or testing is conducted. However, whether the site is considered Eligible or Unknown, it makes little difference on how it should be treated at this point; avoidance or further work would be necessary before activities in the vicinity of the site would be allowed.

48FR3236

We feel this site's National Register status should be considered Unknown until further study and/or testing is conducted. However, whether the site is considered Eligible or Unknown, it

makes little difference on how it should be treated at this point; avoidance or further work would be necessary before activities in the vicinity of the site would be allowed.

48FR3237

We agree that this site should be considered Not Eligible.

48FR3238

We agree that this site should be considered Not Eligible.

48FR3239

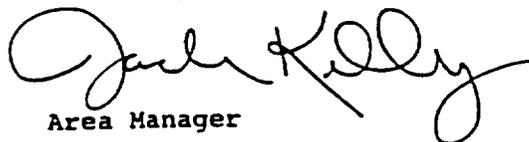
We feel that this site may have more data potential on it due to the number of possible tools and flake types on it. Could the site have a variety of functions besides lithic procurement? Could animal or plant processing activities be indicated by the large number of tools and interior flakes on the site? For these types of reasons, we feel the site's National Register eligibility should be considered Unknown until further studies are done. If these studies indicate that the site has little further data potential, then we would agree that the site's National Register eligibility is Not Eligible.

48FR3240

We agree that this site should be considered Not Eligible.

Thank you for this opportunity to comment on the draft report. Please contact Craig Bromley of this office if you have any questions.

Sincerely,

A handwritten signature in black ink, appearing to read "Jack Kelly". The signature is fluid and cursive, with the first name "Jack" and last name "Kelly" clearly distinguishable.

Area Manager

cc: Bill Kearney, Environmental Director  
Power Resources  
P.O. Box 1210  
Glenrock, WY 82637



# United States Department of the Interior

## BUREAU OF LAND MANAGEMENT

Lander Resource Area  
 P.O. Box 589 (1335 Main Street)  
 Lander, Wyoming 82520-0589

8143  
 BLM Report  
 #:036-98-019 (in reference to  
 Rpt. # 031-93-045)  
 Project/Case/Lease  
 #:WYW-\_\_\_\_\_

March 4, 1998



John Keck, Director  
 State Historic Preservation Office  
 Parks and Cultural Resources Division  
 Wyoming Department of Commerce  
 6101 Yellowstone Road, 2nd Floor  
 Cheyenne, Wyoming 82002

Re: Consultation under Section 106 of the National Historic Preservation Act for the Proposed Power Resource Inc's (PRI) Gas Hills Drilling Program, Fremont County, Wyoming.

Dear Mr. Keck:

According to the Wyoming Statewide Programmatic Agreement, the Bureau of Land Management (BLM) requests your comments on a mining exploration-related undertaking. The proposed undertaking is to drill holes to discover the extent of uranium reserves under the surface. The enclosed report excerpt describes cultural resources found in general area in 1993, before the drilling program had been formulated.

A Class III inventory of all areas of potential effect, following the Archeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines (48FR190), was conducted in 1993 by Pronghorn Archeological Services for the overall proposed undertaking, as indicated in the above referenced report. SHPO reviewed and commented on this report (see project control number 0693KLK009). SHPO and BLM determined at that time that four cultural resource sites were of Unknown Eligibility, and one site was Eligible. These sites are listed in the following table.

SITE NUMBER	SITE TYPE	PREVIOUS ELIGIBILITY	CRITERIA	AFFECTED?	CONCURRENCE?
48FR144	Prehistoric Camp	Unevaluated	D	No	Not necessary
48FR3235/48 NA2151	Prehistoric Camp	Unevaluated	D	No	Not necessary
48FR3236	Prehistoric Camp	Unevaluated	D	No	Not necessary
48FR3239	Prehistoric Lithic Scatter	Unevaluated	D	No	Not necessary
48FR3232	Prehistoric Camp	Eligible	D	Yes unless avoidance is achieved	Requested

In 1997, the drilling program was submitted by PRI. We were then able to assess effects to these sites. The four sites of unknown eligibility were being avoided, but PRI wanted to drill in the vicinity of eligible site 48FR3232. Field inspections to assess effects were done in 1997 and early 1998. Further mapping was conducted, and Native American Elders<sup>1</sup> were brought to the site in February 1998 to assess the site.

Results of this work were as follows:

Five proposed drill holes were within the site 48FR3232 (see enclosed map). The Native American Elders stated that the features were prayer or vision quest circles, and cairns related to those circles. They asked that all surface disturbances be kept 50 feet away from the site features, in order to protect them. PRI readily agreed to do this. After further assessment of the proposed drilling, it was found that one of the five proposed drill holes was still within the site even though it was more than 50 feet from any of the features. PRI was informed that drilling this hole could entail delays due to Section 106 consultation needs, and PRI suggested that they drop this hole as well. In the end, all proposed drill holes within the site were dropped, and avoidance measures have satisfied all parties, including Native Americans. Even though the Arapaho representative did not visit the site, avoidance measures appear to be sufficient to cover any concerns that tribe might have as well.

Therefore, according to Sections VIII.A and VIII.C of the Wyoming Statewide Programmatic Agreement, the project will have no effect upon historic properties. We request your comment within 30 calendar days of receipt of this correspondence under that authority.

#### STIPULATIONS

The BLM will require the following stipulations on the appropriate approval document for this project:

1. CULTURAL RESOURCES, SITE AVOIDANCE. The holder shall adhere to the proposed project revision delineated by PRI and BLM in the field (also see the enclosed map and report excerpt for details) within the following legal locations:

T.33N., R.89W., Section 32 E1/2NE1/4NW1/4, W1/2NW1/4NE1/4  
(Site 48FR3232)

Violation of this stipulation may result in the holder being subject to the penalties and actions contained in the 43CFR7 Regulations, which are on file at all BLM offices.

2. CULTURAL AND PALEONTOLOGICAL RESOURCES STIPULATION. Any cultural and/or paleontological resource (historic or prehistoric site or object or fossil) discovered by the holder, or any person working on his behalf, on public or Federal land shall be immediately reported to the authorized officer. Holder shall suspend all operations in the immediate area of such discovery until written authorization to proceed is issued by the authorized officer. An evaluation of the discovery will be made by the authorized officer to determine appropriate actions

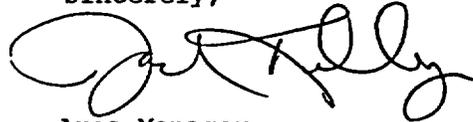
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<sup>1</sup> Shorty Ferris, Jr., Tony Engavo, and Floyd St. Clair, all Eastern Shoshone Elders, inspected the site. Burton Hutchinson, the Arapaho Representative designated for this project, was not able to attend on this trip.

to prevent the loss of significant cultural or scientific values. The holder will be responsible for the cost of evaluation and any decision as to proper mitigation measures shall be made by the authorized officer after consulting with the holder.

Your cooperation in this matter is appreciated. Should you have any questions, please contact my Area Archeologist, Craig Bromley, at 307 332-8406. In correspondence concerning this project, please refer to BLM Report Number 031-98-019.

Sincerely,



Area Manager

2 Enclosures:

- 1 - Excerpts from BLM Report No. 031-93-045 (PAS)
- 2 - Archeological Site Map

cc: Pronghorn Archeological Services (w/o encl.)  
Box 880  
Mills, Wyoming 82644

Debbie Larsen, Land Law Examiner (w/o encl.)

Concurrence: By signing the following, it is indicated that the Wyoming State Historic Preservation Officer agrees with the determinations made in this letter for compliance purposes.

Signatory: Judy F. Wells Date: 3-13-98

SHPO Case Number: 0398RLC048