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40-8903

(HOMESTAKE)
MINING COMPANY

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January 31, 1991

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Mr. Ramon E. Hall, Director
Nuclear Regulatory Commission
Region IV
Uranium Recovery Field Office
P.O. Box 25325
Denver, CO 80225

RE: **License No. SUA-1471**
Final Reclamation Plan and Interim Surety

Dear Mr. Hall:

Enclosed are five copies of the Final Reclamation Plan for the Homestake Mining Company Grants Operation. This Reclamation Plan is being submitted to satisfy License Condition No. 28, of Source Materials License SUA-1471, and pursuant to Title 10, Code of Federal Regulations, Part 40. The Reclamation Plan consists of two volumes: Volume 1 contains the text, tables and figures; and Volume 2 contains the appendices.

Also enclosed, in accordance with License Condition No. 28, is a Parent Company Guaranty. The Parent Company Guaranty has been written in favor of the NRC, and complies with Title 10, Code of Federal Regulations, Part 40, Appendix A, Criteria 9 and 10. Included with the signed and notarized Parent Company Guaranty are the following additional items: letter from the Chief Financial Officer; auditor's special report; Homestake Board of Directors resolution; 1989 Form 10-K and Annual Report; and Form 8-K, dated May 4, 1990.

Homestake looks forward to working with you and your staff during the review of the Reclamation Plan.

This is one document — 2 vols.

Sincerely,

Jerry W. Danni
Regional Manager
Environmental Affairs

JWD:mef

Enclosure

DESIGNATED ORIGINAL
Certified By [signature]

cc: Craft, Fred
Hiles, Mark
Kuhn, Alan

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RECLAMATION PLAN

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HOMESTAKE MINING COMPANY

GRANTS OPERATION

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VOLUME 1

TEXT, TABLES, AND FIGURES

JANUARY, 1991

LICENSE NO. SUA-1471 DOCKET NO. 40-8903

PREPARED BY AK GEOCONSULT, INC.
WITH:
APPLIED ENVIRONMENTAL CONSULTING, INC.
JENKINS ENVIRONMENTAL, INC.
RADIANT ENERGY MANAGEMENT

91-0216

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1.0 INTRODUCTION

1.1 General

This plan describes the designs, activities, schedule, and estimated costs of reclaiming Homestake Mining Company's Grants uranium mill site. It has been prepared in accordance with pertinent federal regulations, guidelines and standards as well as those sound technical practices not addressed by regulation. Specifically, this plan has been prepared to comply with the requirements of 10 CFR 40, Appendix A, 1-1-89 Edition. Other specific requirements or guidelines developed by or for the USNRC have also been used in the preparation of this plan and are referenced as appropriate in the following sections.

This plan has been prepared by sections that generally correspond to the subdivisions of the NRC's "Recommended Outline for Site-specific Reclamation and Stabilization Cost Estimates." The following portions of Chapter 1.0 describe the Homestake Grants Operation site and the history of its operation. Chapter 2.0 describes the plans for decommissioning the mill facility and includes sections describing the health and safety plan (2.1), decontamination (2.2), mill demolition (2.3), mill area cover and grading (2.4), and contaminated soil cleanup (2.5). Chapter 3.0 describes the radiological surveys associated with the reclamation process. Sections of this chapter address the soil radium and gamma surveys performed before, during and after contaminated soil cleanup, as well as radon flux measurements performed after radon barrier construction. Chapter 4.0 describes the restoration of the tailing impoundments, including interim stabilization (4.1), long-term stabilization (4.2), revegetation and fencing (4.3), and other restoration and protection measures (4.4). Chapter 5.0 describes the ground water restoration and monitoring program in summary form; the complete ground water restoration plan has been prepared and submitted under separate cover. Chapter 6.0 addresses post-closure care and monitoring. The schedule for site reclamation is discussed in Chapter 7.0, and the estimated costs are addressed in Chapter 8.0.

1.2 Site Description

The Homestake uranium mill is located approximately 5.5 miles north of Milan, New Mexico in Section 26, Township 12 North, Range 10 West, in Cibola County (Figure 1). Homestake's Mine Ion Exchange (IX) plant is located in the southwestern part of McKinley County, New Mexico in the Ambrosia Lake area adjacent to Homestake's mine facilities. The IX plant is approximately 18 miles northwest of Grants, New Mexico in Section 25, Township 14 North, Range 10 West.

The facilities that existed at the mill site at the time of the submittal of this plan are illustrated on Figures 2 and 3 and listed in Table 1. During mill operations, ore was stockpiled at the ore pad north of the mill after being weighed on the receiving scale. These two components made up the ore receiving section. Ore was passed through the Crushing and Sampling Section, consisting of a grizzly impact breaker, rotary dryer and reciprocating samplers. Crushed ore was temporarily stored in the fine ore bins. Ore was passed through the Grinding Section, consisting of two ball mills and thickener tanks into the Uranium Leaching Section and then through the Precipitation Section. Uranium and vanadium were removed before packaging, storage and shipping. The mill site also contains a variety of miscellaneous structures needed to support and manage the milling operations. The solid byproduct material, mill tailings, was transported by slurry pipeline initially to a small tailing impoundment located southwest of the main mill facility and, subsequently, to a large tailing impoundment located directly west of the main mill facility.

1.3 History of Operations

The Homestake mill has been a major producer of uranium concentrate since 1958. Homestake's milling facilities were constructed and originally operated as two distinct partnerships, with Homestake Mining Company acting as the managing partner of both. The larger of the two mills was organized as Homestake-Sapin Partners, with a nominal milling capacity of 1750 tpd. The smaller mill was organized as Homestake-New Mexico Partners, with a nominal milling capacity of 750 tpd. Both mills were designed to be alkaline leach-caustic precipitation processes for concentrating uranium oxide from ores with average grades of 0.05 to 0.30% U_3O_8. Combining these two milling facilities in 1961 resulted in a mill with a nominal through-put capacity of 3400 tpd.

The Homestake-New Mexico Partners Mill commenced operations in April, 1958, while the Homestake-Sapin Partners Mill started up in May, 1958. Both mills operated independently, each with its own tailing impoundments, until November 9, 1961, when the partnerships were merged. Homestake-Sapin Partners was the surviving organization.

In January, 1962, the former New Mexico Partners Mill ceased operations as a complete and independent mill. The Sapin Partners Mill continued to utilize a portion of the smaller mill's facilities. In April, 1968, through a change in the distribution of ownership, Homestake-Sapin Partners became United Nuclear Corporation's interest, and the operation became United Nuclear-Homestake Partners. United Nuclear's interest was purchased by Homestake in March, 1981, and the operation became Homestake Mining Company-Grants.

Two tailing impoundments were developed on HMC's property. In December, 1953, the U.S. Atomic Commission (AEC) and Homestake-New Mexico Partners signed a contract for the delivery of yellowcake to the federal government. The second contract was signed with the AEC in 1961 for the delivery of additional yellowcake. The first and smaller of the two impoundments resulted entirely from these contracts with the federal government. The total quantity of tailings placed in this first impoundment was 1.22 million tons. It is located in the S.W. 1/4 of Section 26, Township 12 North, Range 10 West, NMPM. Tailing material deposited within this impoundment was contained entirely by an embankment composed of compacted natural soils. The embankment was compacted by heavy equipment and brought to a height of 20-25 feet. The crest was a minimum of 10 feet wide, with the base being approximately 40 feet wide. The impoundment covers an area of about 40 acres. In 1990, an evaporation pond was constructed in this impoundment to assist in the dewatering of the large tailing impoundment and to hold water pumped from the collection wells of the ground water restoration plan. After ground water restoration is completed (10-15 years), the evaporation pond and small impoundment will be reclaimed as discussed is Section 4.2.2

The larger of the two impoundments, located in the N 1/2, Section 26, Township 12 North, Range 10 West, NMPM resulted from production under both federal government and commercial contracts. Homestake-Sapin Partners and the AEC entered into a contract to deliver yellowcake to the federal government in April, 1957. Two other contracts were signed with the AEC in 1960 and 1961. In addition, numerous contracts were placed with electric utilities for nuclear reactor fuel production. The total quantity of tailings generated under AEC contracts was 10-11 million tons. In addition, another 10-11 million tons of commercial tailings were generated and comingled with the AEC tailings. Until 1966, HMC deposited tailing material into only one cell of the large impoundment. Subsequently, HMC added an additional cell adjacent to and west of the existing cell. Since that time tailing disposal has been alternating between the two cells (east and west) whenever necessary to maintain optimal operating conditions. The starter dike for the large impoundment was constructed in compacted six-inch lifts of natural soils excavated within the tailing area. The dike was constructed to a height of about 10 feet and a width of about 10-15 feet at the top and 25-30 feet at the bottom. The impoundment was built out by centerline method until 1981, when an inboard offset of the crest was made to improve stability conditions of the impoundment. Successive lifts were added by centerline method to the offset crest dike around the entire circumference of the impoundment. Throughout its operation the large impoundment was operated with a two-cell configuration. The impoundment presently covers approximately 170 acres and is approximately 85-100 feet high. The east and west ponds cover approximately 55 and 40 acres, respectively, as measured from the crest centerline.

Throughout most of its operation, the large impoundment was constructed by splitting the slurried mill tailings into coarse and fine fraction using a cyclone separator. The coarse fraction was hydraulically placed along the centerline and outslope to build out the impoundment by the centerline method. The fine split of tailings was discharged across the beach toward the pond. Mill tailings are composed of uranium-depleted fine and coarse sand fractions and slimes consisting of -#200 mesh-sized materials. The clarified liquid that was discharged into the ponds was recycled through decant towers back to the mill for reuse as process water. During the latter stages of mill operations, when production rates were low, cyclone separation was not used and the tailing slurry was discharged directly across the beaches into the tailing pond. This method of operation confined disposal to a single pond at a time, with the other pond used for evaporation as needed. To date, the large tailing impoundment has received between 21 and 22 million tons of tailings. HMC discontinued milling operations in February, 1990 and has no plans to resume operations of the tailing impoundments. HMC performed mill washdown and other cleaning activities in preparation for reclamation, which will start in 1991 and is expected to follow the schedule shown on Table 2.

During the last years of mill operations, the placement and maintenance of tailings were performed in accordance with the Tailings Management Plan (D'Appolonia, 1982). This plan specified practices which assured compliance with the NRC Regulatory Guide 3.11 and 3.11.1, as well as New Mexico State Engineer requirements. At least 5 feet of freeboard and 50 feet of beach width were maintained at all times. The piezometric levels and movement monitoring points of the tailing embankment were surveyed on a regular basis. Stability analyses were performed at least annually and more frequently in most cases to ensure that the static and pseudostatic factors of safety of the embankment were at least 1.5 and 1.0, respectively.

HMC's NRC-licensed mine Ion Exchange (IX) facility is located on Section 25, T14N, R10W, NMPM. This facility encompasses two buildings. The main IX building encloses the process equipment such as IX columns, pipes, pumps and elution vessels The main building also encloses the eluate loading-unloading area and equipment used in transferring the material to the tank truck for transport to and from the mill. The smaller building which was the original IX building has since been converted to a warehouse and is now used for storage of spare IX equipment and supplies.

2.0 FACILITY DECOMMISSIONING

HMC plans to decommission the mill facilities in three phases to allow some flexibility in the use of existing structures during the demolition and reclamation of the mill facilities and reclamation of the large and small tailing ponds. In the first phase, the "back end" of the mill will be decommissioned. The back end consists of all processing facilities except the ore receiving, crushing and sampling sections, which constitute the "front end" of the mill. The front end will be decommissioned during Phase 2, approximately one year after Phase 1, to preserve for that time the option of using the front end with a new "back end" mill at the designated alternative mill site (AK GeoConsult, 1989). Phase 3 consists of the administration building, change house, laboratory building, shop building, and ore truck shops that will be used until completion of ground water restoration. The mill components of each phase are identified on Figure 3. The schedule for facility decommissioning and other reclamation is shown on Table 2.

All the decommissioning activities will be guided and monitored by the Health and Safety Radiation Procedures which are contained in Section 2.1. The Resident Manager will be responsible for all activities associated with the decommissioning of the HMC facilities. The Radiation Protection Administrator (RPA), as designated in NRC License Condition 21, shall be responsible for the radiation protection program and training described in Section 2.1.

The 1986 plan (HMC, 1986) proposed placing the dismantled mill facilities and foundations in the toe area of the stabilized large tailing impoundment. In the decommissioning plan proposed herein, HMC will bury in place the non-asbestos siding and roofing, structural supports and other materials that can be cut or crushed to flat shapes with very little void space. Equipment or materials that cannot be flattened will be placed in the large tailing impoundment or existing trenches or pits in the mill area that will be backfilled.

The HMC mill contains the following major processing and miscellaneous structures that will be dismantled during the decommissioning phases:

- Ore receiving section and receiving scale (Phase 2)
- Crushing and sampling section, to include grizzly, impact breaker, rotary dryer, and reciprocating samplers (Phase 2)
- Fine ore storage section with four ore storage bins and receiving bin (Phase 2)
- Grinding section with ball mill and thickening tanks (Phase 2)
- Uranium leaching section with leaching autoclaves, leaching pachuca tanks, solution storage tanks, and Ion Exchange facility (Phase 1)
- Precipitation section with pregnant solution tank, precipitation and precipitate thickener tanks (Phase 1)
- Vanadium removal section and associated roasting furnace (Phase 1)
- Packaging storage and shipping section with yellowcake drying, packaging drum storage, and loadout (Phase 1)

- Miscellaneous structures to include shops, warehouses, administrative building, laboratories, change house, and old mill facilities that have been inoperative since 1961 (all three phases)
- Old ore pad (Phase 2)
- Ore truck maintenance shops (Phase 3)
- Mine IX Plant (Phase 1)

A plan view of all the mill structures that will be dismantled is shown on Figure 3. In addition, Figure 3 also shows in which phase these facilities will be dismantled. Table 1 lists the major mill components.

HMC plans to salvage the ore truck maintenance shops that are shown on Figure 2. These buildings will be the only ones salvaged because the other mill buildings and most equipment are considered too old to have any reasonable salvage value. Prior to release for unrestricted use, the ore-truck shops and any equipment to be salvaged will be monitored in accordance with License Condition 14 which specifies the procedures contained in NRC "Guideline for Decontamination of Facilities and Equipment Prior to Release from Unrestricted Use or Termination of License for Byproduct or Source Material," dated September, 1984

2.1 Health and Safety Radiation Procedures

Decommissioning of the HMC uranium mill facilities will be conducted under the guidance of Radiation Work Permits (RWP's), previously developed in accordance with NRC License Condition #24 and with the programs listed in License Condition #10 pertaining to ALARA, quality assurance, bioassay, respirator protection, emission control and monitoring programs. The standard procedures already established for these programs are included in Appendix A of this plan. The primary internal radiological hazard associated with decommissioning and decontamination is resuspension of surface contamination resulting in concentrations of airborne radioactive material. The primary external radiological hazard is gamma and beta radiation exposure. Beta radiation exposure will be predominantly associated with areas and equipment where aged yellowcake may still exist.

The Radiation Work Permit procedures require that each area of the mill be inspected to evaluate potential hazards, especially radiological hazard, prior to sequential dismantling. In all cases the equipment and general work area will be de-energized (electricity shut off) and washed down with water, as necessary, prior to work performance. This has been shown to be an effective method of reducing the resuspension of radioactive material.

The health and safety procedure contains the following sections

- Management control
- Radiation safety training
- Radiation work permits
- Radiation protection and monitoring
- Security
- Hazard Control

sequence in each phase after evaluating the potential hazards of changing the sequence. Figure 3 shows which facilities will be dismantled during each phase. Table 2 shows the schedule for decommissioning and reclamation schedule for the mill, and Appendix C1 contains the estimated demolition quantities and costs.

As work is designated to be performed in each area of the mill, a RWP will be filled out by the RPA prior to performance of the work. In all cases electricity to the equipment and general work area will be shut off as necessary, and all surfaces will be hosed down with water prior to work performance. HMC has been successful using this method of reducing resuspension of radioactive particles during maintenance operations at the mill.

Because there is no salvage potential for equipment, except for three ore-truck shops, the process area can be dismantled while minimizing the potential exposure to personnel. The facilities will be dismantled from the outside in, with the roof and sides being dismantled first from the outside of the buildings. This procedure will be followed using equipment such as fork lifts, loaders and cranes, thus increasing the distance from potential radiation sources and providing shielding. Removing the sides and roof of the facilities also provides increased ventilation, thus further reducing the potential of exposure to personnel. Following removal of the sides and roof of a building, equipment and material within the building will be removed, cut and crushed to shapes and sizes that can be disposed of without leaving significant residual void spaces. Wooden materials will be pulverized and mixed with inorganic debris. The structural elements will be brought down and cut or crushed, then compacted and buried in immediate vicinity. Except for the slabs of the Phase 3 structures which will be removed and buried in the small tailing impoundment, foundations will be buried in place. Any machinery or other uncrushable components with significant void space will be filled with a sand-cement slurry grout before burial. Finally, gravelly sand fill will be placed to fill voids in and form a cover over the mill debris, as described in Section 2.4. This method of dismantling facilities meets the goal of ALARA. Final detailed dismantling procedures will be determined after selection of a contractor and review by the NRC of the proposed procedures. The estimate of volumes and weights of demolition debris is included in Appendix C1.

The mine IX facility will be decommissioned in accordance with NRC requirements after the end of its useful economic life. Decommissioning will involve the dismantling of IX process equipment, removal of all contaminated piping and tankage and decontaminating the two buildings and the building grounds to levels acceptable for unrestricted release. Materials not salvaged will be disposed of in the large tailing impoundment.

2.4 Mill-Area Cover and Grading

The total area of reclamation within the mill area is approximately 50 acres, of which approximately 44 acres will contain buried mill debris. A flood diversion levee, described in Section 4.4.2 and shown on Figure 4, will divert the Lobo Canyon floods to the north and west of the mill and the reclaimed tailing embankments. The entire mill site south of the levee will be recontoured to achieve the final grades illustrated in Figure 4

3.0 RADIOLOGICAL SURVEYS

Radiological surveys will be performed during and after the reclamation activities, initially to delineate areas of excess radium content in soils and subsequently to verify adequacy of soil clean-up. These include gamma measurements using a calibrated microR meter. In conjunction with the gamma surveys, conducted on a radial grid with 100-meter spacing between sample points (Figure 5), soil samples will be collected at designated grid locations to provide a basis for gamma-radium correlation. If elevated levels of gamma or Ra-226 are detected in any area, then additional surveys will be conducted on a 10-meter grid covering that area. The gamma and Ra-226 surveys in the mill facilities area, IX plant and ore storage area will be conducted on a 10-meter grid. Radiological surveys (field gamma and soil radium) are necessary to determine the extent of soil contamination caused by mill operations and windblown tailings. In addition, recently enacted (EPA, 1989) amendments to the Clean Air Act require measurements of radon flux through the soil cover constructed as a radon barrier over tailings.

3.1 Annual Surveys

In accordance with License Condition 19-D, HMC has been conducting annual radiological surveys for several years. These surveys have not included gamma measurements or soil radium samples in the mill area, which is assumed to be contaminated to levels high enough to require cleanup of surficial soil throughout the mill area. The 1990 soil and gamma survey conducted by HMC has been used as the basis for the estimated extent of soil cleanup described in this plan. The 1991 survey will incorporate some refinements to both equipment and methods (e.g., lead shielding to block shine from impoundment and statistical correlation between gamma readings and Ra-226 content of soil). This survey will be used to guide cleanup efforts associated with Phase 1 mill demolition. Consequently, the 1991 survey grid will include the mill area. Subsequent surveys, described below, will serve as the annual surveys for 1992 and 1993.

Annual surveys up to 1987 indicated that an area north and northeast of the large tailing impoundment had soil radium concentrations that exceeded the 10.5 pCi/g Ra-226 limit allowed by License Condition 19-D. Because these radium levels were apparently due to windblown tailings, the NRC directed HMC to remove soils with excessive radium. HMC performed these clean-up activities in 1987-1988, disposing of the contaminated soils at the north and east toes of the large impoundment and on the small impoundment. Subsequent radiological surveys of the cleaned-up area showed that the clean-up efforts were successful in reducing soil radium to the required limit.

3.2 Post-Phase 1 Survey

The gamma and soil radium survey conducted after the completion of Phase 1 mill demolition will cover the entire survey grid used in previous annual surveys and will also cover a 10-meter sampling grid in the mill area. After the back end of the mill is demolished during Phase 1, the contaminated soils in this area, as determined by the survey, will be cleared away before placement of cover soil. This post-phase 1 survey will also serve as the 1992 annual survey required by License Condition 19-D.

3.3 Post-Phase 2 Survey

This survey will be limited in scope, covering only the area that had been occupied by the front end of the mill. This survey will be performed on a 10-meter grid and will include the ore pad as well as the rest of the ore handling and crushing sections. The front end structures and the ore storage area will be completely removed, including shallow foundations, in those locations that will be north of the diversion levee. An estimated 2-3 feet of contaminated soil will have to be removed from the ore storage area prior to this radiological survey. The portions of the ore pad and front end of the mill located under or south of the levee will be covered by clean fill material in accordance with the designs for the construction of the levee and for the mill area soil cover. Because this Phase 2 survey is limited in scope and will be performed in the latter part of 1992, it will not be used as an annual survey.

3.4 Final Survey

This survey will be the post-cleanup, post-impoundment-closure survey. This survey will be performed after the radon barrier cover has been placed on the large tailing impoundment and the interim cover has been placed on the exposed surfaces of the small impoundment, i.e. after all tailing surfaces have been covered and no subsequent windblown particulate release from the impoundments will be possible. This survey, conducted during 1993, will be the final annual survey. It will cover the complete survey area on a 100-meter grid, including the mill area, using a microR meter for gamma readings. Soil samples for Ra-226 testing will not be collected unless gamma readings and 1991 gamma/radium correlations indicate possible excess soil radium in specific locations. Any soil still having excess radium levels will be removed for disposal on the small impoundment and that location will be resurveyed.

3.5 NESHAP Radon Flux Measurements

HMC will use Method 115 of 40 CFR 61, Subpart T (EPA, 1989) to measure actual radon flux through the completed radon barrier (soil cover). One hundred canisters will be distributed across the surface of each tailing impoundment. These canisters will be placed on the large impoundment during 1993 or whenever cover construction is completed and on the small impoundment after cessation of evaporation pond operations and the reclamation of that impoundment is completed, estimated to be 10-15 years from the date of this submittal.

4.5 Revegetation and Fencing

Approximately 750 acres will be disturbed enough to require revegetation. These areas include:

- Flood control levee (12 acres)
- Mill facilities (50 acres)
- Borrow areas (500 acres)
- Contaminated soil areas (175 acres)
- Brine pond area (8 acres)
- Mine IX Plant (5 acres)

The revegetation plan is based on vegetation species currently on site and inadjacent borrow areas, on the ability to provide species diversity, and on adaptability of the species to the soil conditions. Both sod and bunch-grass species have been selected to help provide soil stability and minimize erosion. Due to climatic conditions, the seeding will be accomplished between mid-June and mid-September. This period of time has the most favorable average moisture and temperature conditions for seed germination. Seed bed preparation will be conducted following grading of each area listed above. Table 5 lists the selected permanent seed mixture and seeding rates.

The agronomic soil in the area is primarily the Aparejo-Venadito complex. This soil unit is found on flood plains and within large drainage areas. In addition, the Penistaja Fine Sandy Loam soil unit is in the vicinity of the mill area. The soils from the borrow areas will be used for fill and cover and are capable of sustaining vegetative cover. A soil survey conducted by the Soil Conservation Service in 1986 further defines these soil units (USDA, 1986).

The areas to be revegetated will have seedbeds prepared as follows:

- Flood Control Levee: After construction, the surface area will be scarified with a disk or harrow to provide a surface for drill or broadcast seeding.

- Mill Area: The reclaimed mill area, shown on Figure 4, will have two feet of clean soil cover that will be disked or harrowed to provide a surface for drill or broadcast seeding. Any area outside of the burial area that has been compacted due to demolition activities will be ripped with a bulldozer or equivalent equipment with ripper shanks which will make parallel cuts on the contour. The area will then be disked or harrowed to provide a surface for drill or broadcast seeding.

- Borrow Areas and Contaminated Soil Removal Areas: Areas that have been compacted through the use of heavy equipment during soil excavation will be ripped as discussed above. The total area affected will then be disked or harrowed to provide a surface for drill or broadcast seeding.

- Brine Ponds: Upon removal of the liner material and final grading, the area will be scarified as discussed above for preparation of drill or broadcast seeding.

- Mine IX Plant: The building area, the parking area, and evaporation pond area will be revegetated in the same manner as the borrow areas.

All seeding will follow as closely as possible after seedbed preparation has been accomplished for each area within the constraints of climatic conditions. As discussed above, optimum seeding time is between mid-June and mid-September. Planting in other time periods may be limited to the planting of preparatory crop.

Two methods of effectively seeding the area to be revegetated include drill and broadcast seeding. Drill seeding will be the primary method of seeding. Broadcast seeding is not considered as effective as drill seeding because of uneven seed distribution and seed desiccation if proper depth placement is not accomplished. Drill seeding offers uniform placement of seeds, requires fewer seeds per acre seeded, can be drilled directly into preparatory crop stubble, and provides a uniform stand of seeded plants. All seeding will be conducted along the contour or at a right angle to the prevailing wind.

If broadcast seeding is used, seeding will be accomplished using a cyclone-type broadcaster. After seeding, the area will be conditioned by raking, harrowing, or other methods to ensure proper seed coverage with soil. Conditioning will be conducted on the contour or at a right angle to the prevailing wind.

It can be anticipated that during some years the revegetation program may not achieve desired results. A yearly evaluation will be made to determine revegetation success. If revegetation is not successful, the area(s) requiring revegetation will be reseeded with the appropriate seed mixture, contained in Table 5.

Mulch will be applied to all seeded areas to conserve soil moisture and protect against erosion. Application will immediately follow seeding and fertilization. Areas that were seeded with a preparatory crop may not require mulching when perennial species are seeded due to the stubble stand. This will have to be determined on an area-by-area basis. All slopes within the affected area will be gentle, so no special mulch (e.g., cellulose wood fiber, burlap netting, etc.) will be required. Straw or hay mulch will be used, applied at 2,000 pounds per acre. The straw or hay mulch will be anchored with a straw crimper. A commercial fertilizer will be applied at a rate recommended by the manufacturer.

Fencing will be used to control access into the license area. The fencing will inhibit casual entry and exclude livestock from the license area. The license area is already fenced, so only replacement or extension of this fence should be necessary. To enclose the property and separate it from public road rights-of-way, about 19,500 feet of three-strand barbed wire has been estimated, but only a fraction of this will be new fencing.

7.0 SCHEDULE

The mill decommissioning process started in February, 1990 with HMC's mill closure. The decommissioning activities conducted during 1990 included removal of some PCB's and other hazardous chemicals from the site to licensed disposal facilities. These materials were not contaminated with radioactivity. General cleanup during 1990 was conducted as well, including a washing down of the mill equipment and buildings and removal of residual resource materials. As a necessary first step in the dewatering of the large tailing impoundment, Homestake constructed an evaporation pond on the small tailing impoundment during 1990. This allowed the discharge of collection well water to be switched from the large impoundment to the evaporation pond to initiate the process of dewatering the large impoundment.

Table 2 shows the schedule for reclamation activities, beginning with 1991. This schedule is based on the assumption of, and contingent upon, approval for each reclamation activity early enough to start that activity on the date shown on Table 2. The necessary approvals will include those of the NRC as well as other regulatory agencies (e.g., NMEID approval of asbestos removal). Upon formal approval of HMC's decommissioning plan and selection of a contractor for dismantling equipment and buildings, it is anticipated that the next activity beginning in 1991 will be the removal of heavy residual contamination and asbestos from the mill facility. Phase I of mill demolition is scheduled to begin in June, 1991 and to be completed by the end of January, 1992. Phase II mill demolition will be conducted in the third quarter of 1992. The third phase of mill demolition will occur after the completion of the ground water restoration program and closure of the evaporation pond.

There are two critical paths for the reclamation schedule. The first of these involves the sequence of activities involved in the demolition of the mill. Timely approval of this plan is critical to maintaining the schedule shown on Table 2. If the necessary approvals can be obtained by April, 1991, it will be possible to initiate the several sequential decommissioning efforts as shown in Table 2. The other critical path involves the dewatering and reclamation of the large tailing impoundment. This critical path is influenced by and essentially dependent on the rate at which the tailing impoundment can be dewatered. This includes not only the removal of the free pond wa..., which can expedited by several different methods, but also by the drainage of sufficient pore water to allow earthwork required for recontouring and cover construction to start. The latter is very time-dependent and can be influenced to only a limited degree by direct actions on the part of Homestake.

If the sequence and timing of reclamation activities shown on Table 2 can be executed as shown, the primary reclamation activities of the site will be completed by the end of 1993. Activities remaining in 1994 and beyond include the completion of ground water restoration and monitoring program, the completion of dewatering of the large tailing impoundment pore water (directly linked to the ground water restoration time schedule), and the placement of the rock cover if primary consolidation is still occurring in the large impoundment by the end of 1993.

40-8903

RETURN ORIGINAL TO PDR, HQ.

RECLAMATION PLAN

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HOMESTAKE MINING COMPANY

GRANTS OPERATION

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VOLUME 2

APPENDICES

JANUARY, 1991

LICENSE NO. SUA-1471 DOCKET NO. 40-8903

PREPARED BY AK GEOCONSULT, INC.
WITH:
APPLIED ENVIRONMENTAL CONSULTING, INC.
JENKINS ENVIRONMENTAL, INC.
RADIANT ENERGY MANAGEMENT

91-0216

LIST OF APPENDICES

APPENDIX A

HEALTH AND SAFETY RADIATION AND SURVEY PROCEDURES

CONTENTS

FIELD GAMMA SURVEY

Standard Operating Procedure

EQUIPMENT

1. Eberline PRM-7 microR meter or equivalent
2. Map showing sectors

PROCEDURE

Prior to Survey

1. Meters are calibrated against known standards and a pulse rate meter. Calibration is performed either prior to survey or at minimum of every six months.

2. Check the instrument model, serial number, battery check, high voltage reading and the last date the instrument was calibrated.

3. To verify consistency in the gamma intensity measured, a Cesium-137 gamma check source is used each day prior to surveying. Check and record.

4. A variability check is conducted for each scale of the meter. Between 10 and 20 readings should be obtained for each scale.

Survey

1. Using a land survey point or equivalent as reference, the gamma survey is conducted based on compass directional transects from center of tailing facility.

2. Survey measurements over large areas are taken at a maximum of 100 foot intervals on each of the 16 directional transects from the tailing facility. Shorter intervals, usually of 50 meters are required for definition of isolated areas of contamination.

3. At each survey point, the reading should be taken at 1 meter, resetting the meter prior to each reading and allowing 30 seconds to elapse before recording next reading.

at lease 1 reading <u>with</u> Pb (on ground) at 1 meter; and 4) at least 1 reading <u>with</u> Pb (on ground) at 5 centimeters resetting the meter prior to each reading and waiting 30 seconds before recording next reading or probe end protected from shine using a lead shield.

5. A compass is used to walk the grid from point to point. Distances between measurement points are determined using both a tape measure and pacing. Four large areas, pacing is used with periodic taped verification of the distance paced.

SOIL SAMPLING

Standard Operating Procedure

EQUIPMENT

1. USGS approved Auger or equivalent.
2. Balance and weights
3. Rotary grinder
4. Trays
5. Multichannel analyzer
6. Plastic bags
7. Marking pens
8. Cans
9. Trowel
10. Oven

PROCEDURE

1. Collect soil samples for analyses of the following:

   - Ra-226

2. Collect samples with an Auger or similar device. Approximately 1500 grams (one quart volume) should be collected for analyses from at least 0 - 15 cm additional check samples in some locations to be collected at the following depths:

   - 16 - 30 cm
   - 31 - 46 cm

3. Place samples in a cloth or plastic bag and label with the following information:

   - Date sampled.
   - Sampling location.

4. Transfer sample from sample bag to a metal tray, remove and discard leaves, twigs, roots and other vegetal debris.

5. Place trays in oven and dry for 24 hours at 100° to 125° C.

6. Remove tray from oven. Allow sample to cool to room temperature.

7. Grind soil sample to at least 28 mesh.

8. Weigh empty can and lid, which will hold soil sample, record weight and label sample, approximately 10% of sample is sent to another lab for wet chemistry analysis comparison.

9. Place sample in preweighed can and hand pack. Add additional sample until container is full.

10. Seal container with silicone cocking. Record date and time.

11. Weigh sealed container. Record net weight.

12. Let canned soil sample age for no less than 15 days to reach equilibrium.

13. Ensure that the multi channel analyzer settings are correct before reading samples.

14. Place reference source sample in the well of the detector, close the shield and acquire a spectrum. Read for 1000 seconds. Record reading.

15. Place empty can in the well and read same as source. Record reading.

16. Place sample in the well of the detector and read.

17. Read the region of interest of the peak created by Bi 214 on Channel 122 for Ra-226.

18. $\frac{\text{net Cts}}{\text{Reference Material}} \times \frac{1.711EEX10^5}{\text{Net Wt}} = \frac{\text{pCi}}{1.44 \text{ ad. factor}} = \text{Ra pCi/g}$