



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

REGION IV  
URANIUM RECOVERY FIELD OFFICE  
BOX 25325  
DENVER, COLORADO 80225

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Docket No. 40-2259  
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MEMORANDUM FOR: Docket File No. 40-2259  
FROM: Pete J. Garcia, Jr., Project Manager  
SUBJECT: ENVIRONMENTAL ASSESSMENT

Attached is the environmental assessment prepared to document the staff's evaluation of alternatives for tailings reclamation and mill decommissioning at Pathfinder Mines Corporations's Lucky Mc Mill.

*Pete J. Garcia Jr.*  
Pete J. Garcia, Jr.  
Project Manager

Attachment:  
As stated

Case Closed: X60738

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**ENVIRONMENTAL ASSESSMENT  
FOR THE PROPOSED DECOMMISSIONING AND RECLAMATION  
OF THE PATHFINDER LUCKY MC MILL AND TAILINGS PONDS  
DOCKET NO. 40-2259**

**JULY 1993**

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## 1.0 PURPOSE AND NEED FOR THE PROPOSED ACTION

Pathfinder Mines Corporation (PMC) submitted a proposed tailings reclamation plan for the Lucky Mc Mill to the NRC for review on July 31, 1992. A proposed mill decommissioning plan was submitted to the NRC on March 30, 1992. This submittal was in accordance with Criterion 9 of Appendix A to 10 CFR 40, which requires that financial surety arrangements be established by each uranium mill operator to assure that sufficient funds will be available to carry out the decommissioning of the mill and the reclamation of tailings or waste disposal areas. Criterion 9 further states that the amount of funds to be ensured by the surety arrangements must be based on a Commission-approved plan for decommissioning of mill buildings and the milling site and the reclamation of tailings and waste areas in accordance with technical criteria delineated in Section I of Appendix A.

By letter dated November 20, 1992, PMC submitted a supplement to environmental reports previously prepared and submitted in support of license renewal applications in 1982 and 1989. The supplement describes the expected impacts associated with mill decommissioning and tailings reclamation, and evaluates alternatives for performing the decommissioning and reclamation. Additional information regarding the reclamation and decommissioning alternatives was provided in submittals dated June 4 and June 17, 1993.

The purpose of this environmental assessment is to evaluate alternatives for tailings reclamation and mill decommissioning. The licensee's preferred alternatives call for the decommissioning and disposal of the mill and reclamation of the tailings ponds in place at the licensee's site. The licensee proposes to demolish the mill and dispose of most of the debris along the outslope of Dam No. 2, where it would be covered by large amounts of soil needed to create the relatively flat outslope of the final tailings reclamation plan. The foundations of the mill buildings will be buried in place. The proposed tailings reclamation plan generally consists of the flattening of pile outslopes and the regrading of the pile top to minimize the potential for erosion. A radon barrier layer and erosion protection will then be placed over the tailings and debris to assure that the applicable technical criteria of Section I will be met.

## 2.0 CHARACTERISTICS AND OPERATIONAL HISTORY OF THE MILL AND TAILINGS

Uranium milling operations at the Lucky Mc site began in 1958 and continued with interruptions until all processing activities were terminated in 1988. A total of approximately 11,000,000 tons of ore were milled at the site. The mill utilized a sulfuric acid leaching process, counter current decantation, ion exchange, solvent extraction, precipitation, and yellowcake drying and packaging.

Following extraction of the uranium, the tailings were discharged into a series of ponds formed by constructing embankments across a natural draw. Ponds 1, 2, and 2A are located immediately north of the mill and contain all of the solid tailings generated at the site. Ponds 3, 3A and 4 are located further north and were used only to contain tailings solution. The total area of the tailings retention system to be included in the reclamation plan is about 240 acres.

The tailings ponds at the Lucky Mc site are primarily underlain by the low permeability Cody shale formation. Portions of the ponds, however, are underlain by more permeable alluvial deposits and sediments of the lower Wind River formation. Seepage from the tailings ponds has accounted for much of the saturated thickness of the more permeable formations, which range from 40 feet (12 meters) to 120 feet (37 m).

The licensee has implemented a ground-water corrective action program at the site since 1980 when pumping from a series of collection wells was initiated. A fresh water injection system was placed in operation in 1989 to form a hydraulic barrier to the seepage and reverse the local ground-water gradient so contaminated water can be more effectively collected by the collection wells. The program currently consists of the injection of fresh water in two wells and the collection of contaminated water in nine wells. The corrective action program appears to be successful in mitigating the negative impacts of seepage from the tailings ponds.

### 3.0 ENVIRONMENTAL CHARACTERISTICS OF MILL SITE

#### A. Geography and Demography

The Lucky Mc Mill is located in a remote area of Fremont County in central Wyoming. The site is located at an elevation of 6500 feet (1952 m) in a topographical setting characterized by gently rolling hills. The nearest towns are Jeffrey City, located about 25 miles (40 km) southwest, Riverton, located about 48 miles (77 km) southwest, and Shoshoni, located about 40 miles (64 km) northwest. The nearest large city is Casper, located about 70 miles (112 km) east of the site.

The nearest residence to the site is a home just south of the mine offices which is occupied by a full time resident security guard. The Puddle Springs Ranch, located about 4 miles (5.6 km) west of the mill, is generally unoccupied although the grazing lease holder makes short term visits to the ranch over the course of the year. There are no permanent residences within 6.3 miles (10 km) of the site.

The area surrounding the mill is used for cattle grazing during the warmer months of the year. Extensive mining and minerals extraction has also occurred in the vicinity of the mill. The primary recreational use of the land in the vicinity of the site is for hunting of antelope, deer, and sage hens during the fall months, and cottontail rabbits and coyotes from fall through winter.

The only potable water source in the area is a well owned by Pathfinder which taps a deep aquifer and is routinely sampled as part of an environmental monitoring program. In addition, there are currently no stock watering wells in the vicinity of the site. Surface stock watering ponds do exist within 6.3 miles (10 km) of the site.

B. Meteorology

The Lucky Mc site has a semiarid climate with typical annual precipitation ranging from 5 to 10 inches (13 to 25 cm). More than half of the annual precipitation occurs during the spring months in the form of wet snow and rain. The seasons are distinct, with mild summers and harsh winters. The prevailing wind direction is from the south-southwest, and wind speeds are often high.

Winter storms, which can produce heavy snowfalls, low temperatures, and high winds, are common. Tornadoes occur occasionally, although only one tornado has been reported within 50 miles (80 km) of the site since 1950.

C. Air Quality

No monitoring for non-radiological parameters has been performed at the site. However, the area's low population density and lack of industrial and pollution sources would indicate that the air quality in the vicinity of the site should be good. Sampling for radiological parameters performed by the licensee indicate that emissions of airborne particulates and radon have been well below maximum permissible concentrations.

D. Ecology

The vegetation in the vicinity of the site is classed as sagebrush-steppe. Vegetation mapping of the site by the licensee revealed a total of 18 species in the area. The most abundant species are western wheatgrass and sagebrush. Wildlife in the vicinity of the mill include pronghorn antelope, muledeer, cottontail rabbits, coyotes, bobcats, skunks, and badgers. Twenty-five bird species have been observed in the area, with the most abundant nesting species being the horned lark. Reptiles observed near the site include the northern sagebrush lizard, the bullsnake, and the prairie rattlesnake.

No rare or endangered plant or animal species have been observed in the immediate area of the site. There are four species listed as rare and three species listed as endangered whose range could include the site, although a lack of suitable habitat at the site makes it unlikely that the species inhabit the site.

The licensee contracted with a consultant to perform a confirmatory survey for threatened or endangered animal and plant species. The consultant's report was included as an attachment to the licensee's June 4, 1993 submittal. The consultant concluded that there were no threatened or endangered species which would be impacted by reclamation or decommissioning activities. The licensee stated that the report would be submitted to the U.S. Fish and Wildlife Service for their review and clearance of the site.

### E. Hydrology

The Lucky Mc Mill is located on a drainage divide between Reid Draw and Fraser Draw. Except for the tailings retention system, there are no perennial streams or lakes within 10 miles (16 km) of the site. The nearest stream that can be considered perennial is located about 12 miles (20 km) east of the mill area.

As stated previously, the tailings ponds at the Lucky Mc site are primarily underlain by low permeability Cody shale formation, although portions of the ponds are underlain by the more permeable alluvial deposits and sediments of the lower Wind River formation. The ground water generally exists under water table conditions, although there are occurrences of artesian flow in the Wind River Formation. The depth to the water table ranges from 30 to 200 feet (9 to 60 m) with an average gradient of 90 feet/mile (19 m/km) to the northwest.

Additional information concerning the local or regional hydrology can be found in the Final Environmental Statement (FES) for the Lucky Mc Mill, NUREG-0357, dated November 1977.

### F. Geology

The Lucky Mc Mill is located in the southeastern portion of the Wind River Basin along the western flank of the Dutton Basin Anticline, a northwest-plunging anticline exposing rocks of Precambrian through Tertiary ages. Northeast of the millsite are the Gas Hills, a series of hogbacks of steeply dipping shale and sandstone located along the north and west flanks of the anticline.

The present drainage patterns are the result of the anticlinal structure, and active erosion is removing the overlying Tertiary sediments from the basins and plateaus. Many of the existing drainageways show evidence of having been superimposed onto the structures in older rocks as erosion lowered the level of drainage.

The major bedrock units in the vicinity of the mill are the Wind River and Cody shale formations. The Wind River formation consists of a lower member composed of fine-grained siltstones and mudstones with a maximum thickness of 130 feet (40 m), and an upper member composed of coarser-grained sandstones and conglomerates with a maximum thickness of over 600 feet (180 m). The lower, fine-grained member is the unit underlying portions of the site. The Cody shale is a massively thick formation of shale with some sandstone layers. The Cody shale forms bedrock for most of the tailings retention system.

The mill is located in an area that can expect only minor damage from earthquake activity. Recent seismic maps show the mill region to be in an area where horizontal accelerations from earthquakes will be less than four percent of gravity. Twenty-four earthquakes have been recorded within 100 miles (160 km) of the site, and three have occurred within 50 miles (80 km).

Additional information on the geological setting of the site can be found in the FES.

#### G. Historic and Cultural

Several historical and archeological sites in Fremont County are listed in the Federal Register. The nearest of these, a petroglyph site, is located within five miles (8 km) of the site. In addition, there are no properties listed in the Wyoming Inventory of Historic Sites on or near the mill.

The area immediately surrounding the tailings retention system has been heavily impacted by operations over the years. The reclamation of the tailings in place will only affect areas which have already been heavily impacted. No impacts to historic or cultural resources are therefore expected. The only areas which would be affected by reclamation activities which have not already been impacted would be potential borrow areas for rock and soil.

The licensee stated in the June 4, 1993 submittal that arrangements had been made to have the staff archaeologist with the Bureau of Land Management district office in Lander, Wyoming visit the site to identify areas of concern what would require an updated archeological survey. A consultant will be retained to conduct the actual survey. Pathfinder committed to perform any remediation required as a result of the archeological survey.

#### H. Natural Radiation Environment

The natural radiation environment at a site is a combination of cosmic, cosmogenic, and terrestrial radioactivity. The intensity of cosmic radiation is a function of altitude and is about 50 mRem/yr at the site. Internal and external exposure to cosmogenic radiation is about 1 mrem/yr. Terrestrial radioactivity results primarily from primordial radionuclides in the soil. The exposure from terrestrial radioactivity was estimated in the FES to be about 37 mrem/yr.

The licensee has conducted background radiation monitoring at the site under the NRC license. These data have been reported to the NRC semiannually in accordance with license requirements and 10 CFR 40.65. Baseline data exists for direct gamma radiation, radon, radiological air particulates, vegetation, soil, and ground water.

### 4.0 DECOMMISSIONING AND RECLAMATION PLAN DESIGN

#### A. Mill Decommissioning

The licensee's proposed decommissioning plan consists of demolition of the mill and disposal of the debris either in place or at the toe of the No. 2 tailings dam at the southern edge of Pond 2A. All surface structures and mill equipment will be disposed in Pond 2A. The debris will be placed in lifts not exceeding 3 feet and compacted using



construction equipment. Tanks and pipes will be cut or crushed to minimize void space. A one foot layer of soil will be placed and compacted over each debris layer before the next debris layer is placed. Following the placement of all debris, an interim cover of at least 4 feet of soil will be placed over the disposal area. During the reclamation of the tailings piles, large amounts of soil will be placed over the debris disposal area to achieve final contours.

Mill building foundations will be buried in place. The area will be covered with soil and erosion protection layers in accordance with the tailings reclamation plan. The foundation disposal area will be contiguous with the tailings area.

B. Tailings Reclamation

The licensee's preferred alternative for reclamation of the tailings ponds at the site is to remove contaminated soils from Ponds No. 3, 3A, and 4, and place the material in Ponds No. 1, 2, and 2A, which will be reclaimed in place. Soils contaminated by windblown tailings also will be placed in the ponds to be reclaimed in place.

Ponds No. 1, 2, and 2A will be regraded to achieve very flat slopes on the pile top and reduced outslopes on Dam No. 2A. The piles will then be covered with a radon barrier soil layer designed to attenuate radon emanation from the reclaimed tailings in accordance with Criterion 6 of Appendix A to 10 CFR 40. Portions of the pile tops as well as the dam outslope will be covered with a rock mulch to protect against erosion. Finally, rock riprap will be used to stabilize sections of the drainage channels which will be designed to convey flood runoff off and away from the tailings piles. All rock erosion protection will be sized using probable maximum flood (PMF) design criteria.

C. Assessment of Compliance with Criteria 1 and 3 of Appendix A to 10 CFR 40

The reclamation plan will be designed to meet the applicable technical criteria specified in Section I of Appendix A. The radon barrier will be designed to limit radon emanation from byproduct material to less than 20 pCi/sq. meter-sec. as required by Criterion 6. As stated above, all erosion protection features of the proposed reclamation plan will be designed to withstand PMF flows, thus providing assurance that the 1000-year longevity requirement of Criterion 6 is met.

Criteria 1 and 3 contain general siting and disposal objectives for uranium tailings impoundments. These objectives pertain more appropriately to the siting of new tailings retention systems. However, the objectives are discussed below with respect to the existing tailings retention system, although the system was in operation long before Appendix A was in effect. The objectives are as follows:

- I. Remoteness from populated areas;

2. Natural conditions which contribute to immobilization and isolation of contaminants from ground-water sources;
3. Potential for minimizing erosion, disturbance, and dispersion by natural forces over the long term; and
4. Disposal below grade.

Objective 1 is met by the current site as it is located in a very remote area of Wyoming. Objective 2 is not met by natural conditions at the site, but the immobilization and isolation of contaminants from ground-water sources will be achieved by drying the tailings and placing a cover which will inhibit the infiltration of rainfall which could mobilize contaminants. Objectives 3 and 4 are partially met because the tailings are located at the head of a natural draw, which will provide advantages similar to below grade disposal in that the potential for erosion and disturbance of the tailings are reduced. A discussion of the preferred alternative and alternate disposal methods is presented in the following section.

## 5.0 EVALUATION OF TAILINGS RECLAMATION ACTIONS

### A. Alternative Reclamation Actions

Three reclamation alternatives were considered in the licensee's November 20, 1992 supplement to the Environmental Report, with the preferred alternative being the proposed plan which is discussed in Section 4b of this assessment. The two other alternatives are discussed in this section.

Alternative 1 consists of the modification of an existing pit in the mine area to serve as a below grade tailings disposal facility. The pit which would be selected would already be sufficiently backfilled so that the relocated tailings would be placed above the projected water table following the post-mining recovery of the local piezometric surface. A low permeability clay or synthetic liner would be placed on the pit floor. After evaporation has sufficiently reduced the amount of water in the tailings to allow handling by conventional construction equipment, the tailings would be excavated and transported by truck to the selected mine pit for disposal.

After placement of the tailings and other contaminated materials in the pit, a radon barrier layer would be placed over the tailings. Additional fill would then be placed to achieve final contours, which would be very flat to meet erosional stability criteria. Finally, the surface would be topsoiled and vegetated.

Alternative 2 consists of reclamation in place, but with much flatter slopes on the pile top and outslopes to minimize the amount of rock which would be needed to assure long term stabilization. A radon barrier layer would be placed over the tailings to attenuate radon emanation to required levels. Rock riprap would be placed in areas

designed to convey runoff off the reclaimed tailings. The primary difference in this option and the preferred alternative is that much larger amounts of fill material would be needed to achieve very flat slopes, but the quantity of rock required would be minimized. The greater potential for erosion inherent in this design would be compensated for by thickening the clay radon barrier layer and/or placing a layer of uncontaminated soil over the tailings.

There are two principal advantages associated with relocating the tailings to the mine pit. These advantages are as follows:

- The tailings would be underlain by a low permeability clay or synthetic liner.
- Reclamation could be accomplished in a below-grade manner, meeting the preferred alternative of Criterion 3 of Appendix A.

The primary disadvantages of relocation of the tailings to the mine pit are as follows:

- There is a potential for significant environmental impacts resulting from routine handling of tailings or transportation accidents.
- There would be an unavoidable consumption of energy resources due to construction and transportation activities.
- The relocation results in a significant increase in costs due to transportation of the tailings and the required handling of a much larger volume of material.

The "no action" alternative was not addressed in the licensee's environmental report and will not be addressed in this assessment because Section I of Appendix A to 10 CFR 40 requires that sites containing byproduct material be closed in accordance with a design which meets specific technical criteria. No action is therefore not a viable alternative.

#### B. Unavoidable Adverse Environmental Impacts

Unavoidable adverse environmental impacts resulting from reclamation of the tailings in place will include the generation of dust due to construction activities and the continued leakage of seepage of tailings solution from the tailings pile. In addition, borrow areas for the radon barrier soils and rock erosion protection will be disturbed.

The generation of dust will be controlled by the application of water during construction activities. Further, the ground-water corrective action program currently in effect at the site will continue to be implemented until the requirements of Criterion 5 of Appendix A are met. Finally, all borrow areas will be recontoured and reclaimed to mitigate any long-term impacts.

Relocation of the tailings to the mine pit would result in the same types of adverse environmental impacts as reclamation in place. The generation of dust would be significantly higher under the relocation option because of the extensive handling of tailings which would be required at both the existing and new sites. The impacts from seepage and the disturbance of borrow areas would be very similar for both the relocation and reclamation in place.

C. Potential Accidents

Potential accidents associated with reclamation of the tailings in place would primarily result from earthwork construction activities such as collisions and roll-overs. The environmental impacts associated with such accidents would be minimal.

The potential for accidents would be significantly increased if the tailings were to be relocated. The relocation scenario would involve substantially more construction activity than reclamation in place. In addition, the relocation option would involve hazards associated with transporting the tailings to the new location.

D. Irreversible and Irretrievable Commitments of Resources

Reclamation of the tailings in place would result in some irreversible and irretrievable commitments of resources. First, the reclaimed area will be placed under long-term institutional care as required by Criterion 11 of Appendix A, thereby restricting the land with respect to any future potential uses. Second, naturally occurring soils and rocks will be excavated and used to isolate the tailings. Third, energy resources will be utilized during the construction activities.

All three types of resource commitments would also be incurred if either reclamation option other than the preferred alternative were to be implemented. All options would result in the loss of the disposal area from future potential uses. All alternatives would also result in the use of natural soils and rocks to isolate the tailings, although there would be relative differences in the amounts of soil and rock used under the different alternatives. Finally, the consumption of energy resources would be increased under either of the alternatives.

E. Relationship Between Short-Term Uses of Man's Environment and the Maintenance of Long-Term Productivity

The short-term uses of the environment associated with reclamation of the tailings in accordance with the preferred alternative will be minimal. Impacts which resulted from construction and operation of the tailings facility have already occurred. Impacts from reclamation of the tailings in place include disturbance of borrow areas to obtain cover soils and rock and the generation of dust and noise. The only effect reclamation in place will have on long-term productivity will be restriction of the site from any future productive use without specific NRC authorization.

The relationship between short-term uses of the environment and the maintenance of long-term productivity associated with implementation of either alternative would be very similar to that described for the preferred alternative.

F. Socioeconomic Impacts

Socioeconomic impacts associated with reclamation of the tailings in accordance with the preferred alternative consist of the generation of construction jobs for the short term. These jobs will be eliminated when reclamation activities are completed. Socioeconomic impacts associated with the alternatives evaluated would be very similar.

G. Cost-Benefit Balance of Environmental Action and Alternatives

The licensee provided an estimate of major costs associated with each of the three alternatives. The estimated costs for the various alternatives are as follows:

- 1: Relocation to pit - \$18,948,000
2. Reclamation in place using very flat slopes and vegetative cover - \$7,148,000
3. Reclamation in place using a combination of rock mulch and vegetative cover - \$6,618,000

The cost estimates provided by the licensee did not include overhead or contingency costs. The licensee also provided an estimate of the volume of materials (tailings, cover soils, and rock) which would be handled under each scenario. The volumes estimated are 12,300,000 cubic yards (cy) for alternative 1, 4,500,000 cy for alternative 2, and 2,877,000 cy for alternative 3.

The major benefit associated with relocation of the tailings to the mine pit is reclamation below grade. Reclamation below grade is considered the preferred alternative under Criterion 3 of Appendix A, but is not the required alternative. In addition, reclamation of the tailings in accordance with the preferred alternative has many of the advantages of below grade disposal because the tailings are located in a natural draw. The tailings will basically be disposed of below grade on three sides. There are no significant benefits to reclamation of the tailings in accordance with alternative 2.

The staff concludes that all technical criteria for reclamation of the tailings contained in Section I of Appendix A to 10 CFR 40 can be met by alternatives 1 and 3. Based on the evaluation of the costs and benefits associated with alternatives 1 and 3, the staff concludes that the additional costs of relocating the tailings to the mine pit outweigh the minor benefit which would result. The staff therefore concludes that

the preferred alternative for reclamation of the tailings at the Lucky Mc site is stabilization in place using a combination of rock and soil to control erosion.

## 6.0 EVALUATION OF MILL DECOMMISSIONING ALTERNATIVES

Alternatives for decommissioning the mill were evaluated in the June 4, 1993 submittal. The licensee considered four alternatives for decommissioning the mill. These alternatives are as follows:

1. Removal of all mill structures and equipment and disposal of the debris in the lined mine pit to be used for disposal of the tailings.
2. Removal of all mill structures and equipment and disposal of the debris at the toe of the No. 2 Tailings Dam within the confines of Pond 2A. Concrete foundations would be buried in place.
3. Removal of all mill structures and equipment and disposal of the debris in trenches excavated adjacent to the mill.
4. The same as Alternative 2, but this alternative would include the excavation of trenches adjacent to the mill for the disposal of portions of the mill circuit which the licensee could decide to keep operational for future use in processing solutions from in situ uranium recovery facilities which Pathfinder proposes to operate.

Alternative 1 is based on the relocation of the tailings to a mine pit. As discussed in Section 5 above, the use of a mine pit for disposal of the tailings is not the preferred alternative. This basically eliminates Alternative 1 as a viable alternative. The cost for Alternative 1 was estimated by the licensee to be \$602,000 if the alternative was viable.

Alternative 3 would require the excavation of a series of trenches. This alternative would require a larger system of trenches than Alternative 4, because the entire mill would be placed in the trenches as opposed to only portions of the mill. The licensee estimated the cost for this alternative as \$621,000.

Alternatives 2 and 4 are very similar. The only difference is that in Alternative 4 a portion of the mill could be reserved for possible future use. The cost for Alternative 2 was estimated as \$548,000, while the cost for Alternative 4 was estimated to be \$566,000. Alternative 4 is the alternative preferred by the licensee as it provides the flexibility to preserve portions of the mill circuit for future use. The licensee is currently in the process of deciding whether to preserve portions of the circuit. Should a timely decision be made not to preserve portions of the circuit, the licensee would propose to implement Alternative 2.

The staff review of the four alternatives indicates that all of the alternatives could be designed to achieve compliance with the technical criteria contained in Section 1 of Appendix A to 10 CFR 40. Alternatives 2 and 4, which are the licensee's preferred alternatives depending on the

decision of whether to preserve portions of the mill circuit, would minimize costs while also providing greater assurance of long term isolation of the mill debris due to the large amount of cover which would be placed over the debris to achieve required reclamation contours. The staff therefore agrees that Alternatives 2 and 4 are the preferred alternatives for disposal of mill debris.

The licensee and the staff did not consider the "no action" alternative because Section 1 of Appendix A requires disposal of byproduct material in accordance with a design which meets specific technical criteria.

## 7.0 ENVIRONMENTAL MONITORING DURING DECOMMISSIONING AND RECLAMATION

### A. Meteorological Monitoring

No meteorological monitoring is required under the existing license and none would be required during the closure phase.

### B. Hydrological Monitoring

The hydrological monitoring program currently in effect at the site will continue to be implemented throughout the reclamation phase, although minor modifications to the program may be made in response to changing hydrological conditions. The existing program consists of the quarterly sampling of about 30 ground-water monitor wells. The samples collected from the wells are analyzed for a variety of radiological and nonradiological constituents, including uranium, radium, sulfates, chlorides, selenium, arsenic, and nitrates.

### C. Ecological Monitoring

Ecological monitoring to be performed during the closure phase includes the annual collection of soil and vegetation samples at a background and three site boundary locations. The soil samples are analyzed for uranium, radium-226, and thorium-230. The vegetation samples are analyzed for radium-226 and lead-210.

### D. Radiological Monitoring

Radiological monitoring to be conducted during the closure phase will include the collection of air particulate samples and continuous monitoring of radon and external radiation levels at four locations, including a background and three site boundary locations. The air particulate sampling will be conducted continuously, with filters changed weekly and composited quarterly for analysis. The composite samples will be analyzed for uranium, radium-226, thorium-230, and lead-210.

## 8.0 PERMITS NEEDED FOR DECOMMISSIONING AND RECLAMATION

All activities at the Pathfinder site are conducted in accordance with NRC Source Material License SUA-672. The reclamation and decommissioning plans as approved by the staff will be incorporated into the license. No other permits are needed for site closure activities.

## 9.0 CONCLUSION

The staff concludes that reclamation of the tailings in accordance with the licensee's preferred alternative will meet all technical requirements contained in Section I of Appendix A to 10 CFR 40. Further, the staff concludes that no significant benefits would result from either of the alternatives considered by the licensee. The staff therefore agrees that the preferred alternative for reclamation of the tailings at the Lucky Mc site is reclamation in place using a combination of soil and rock to stabilize the reclaimed pile. The staff also agrees with the licensee's preferred alternative for decommissioning the Lucky Mc Mill. This alternative consists of dismantling the mill and disposing of most of the mill debris within the outslope of Dam No. 2, while the building foundations would be buried in place.

The staff also concludes that the reclamation of the tailings and the decommissioning of the mill in accordance with the licensee's preferred alternatives will not have a significant impact on the environment. Short term impacts to the environment will be minimal, while long term impacts will be reduced to levels determined to be acceptable by promulgation of Appendix A to 10 CFR 40. The staff therefore concludes that, based on the findings of the environmental assessment, an environmental impact statement need not be prepared.

The staff therefore recommends that Source Material License SUA-672 for the Lucky Mc Mill be amended to authorize tailings reclamation and mill decommissioning in accordance with the preferred alternatives and specific designs which meet all technical criteria of Appendix A to 10 CFR 40.



## REFERENCES

1. Title 10, Code of Federal Regulations, Part 40
2. Final Environmental Statement, Lucky Mc Gas Hills Uranium Mill, NUREG-0357, November 1977.
3. Pathfinder Mines Corporation, "Supplement To Applicant's Environmental Report," dated November 20, 1992.
4. Pathfinder Mines Corporation, letter dated June 4, 1993 from T. Hardgrove to R. Hall transmitting revisions to the environmental report supplement.
5. Pathfinder Mines Corporation, letter dated June 17, 1993 from T. Hardgrove to R. Hall transmitting revisions to the environmental report supplement.
6. Pathfinder Mines Corporation, "Source Material License Renewal Application and Environmental Report," dated November 1989.
7. Pathfinder Mines Corporation, "Source Material License Renewal Application and Environmental Report," dated December 1982.

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 LJCallan, RIV  
 LLUR Branch, LLWM, 5E2  
 PJGarcia  
 O:\PJG\2259EA.MEM

PM:URFO <i>YJS</i>	DD:URFO <i>N/A</i>	D:URFO:RIV <i>ALL</i>		
PJGarcia/lv	EFHawkins	REHall		
6/29/93	<i>✓</i> /93	7/23/93		