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SAFETY EVALUATION REPORT  
SOURCE MATERIAL LICENSE  
ENERGY FUELS NUCLEAR, INC.  
WHITE MESA URANIUM MILL

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## 1.0 DESCRIPTION OF PROPOSED ACTION

By application dated February 6, 1978, revision to the contents of the application dated September 26, 1978, and numerous supplements, Energy Fuels Nuclear (EFN) submitted a request for a source material license to possess and use source material at a new uranium mill on the White Mesa near Blanding, San Juan County, Utah.

A Final Environmental Statement (FES), NUREG-0556, issued in May 1979, and this Safety Evaluation Report provide the bases for conditioning a 5-year term license.

## 2.0 REVIEW SCOPE

The in-plant safety review of the EFN White Mesa Uranium Mill included an evaluation of the initial application dated February 6, 1978, review of a completely revised application dated September 26, 1978, a June 29, 1979 meeting with EFN to discuss the proposed radiological safety program, review of a revised application dated July 6, 1979, a July 12, 1979 meeting with EFN to discuss all unresolved issues, review of a revised application dated July 16, 1979, and a supplement dated August 3, 1979.

In addition, an inspection will be conducted by I&E, Region IV, staff to review EFN's development and implementation of administrative and operating procedures and monitoring programs prior to mill startup. Any problem areas identified by I&E will be corrected prior to startup of milling operations.

## 3.0 AUTHORIZED ACTIVITIES

### 3.1 Facility Description

The mill facilities will include an ore buying station to receive and store ore and milling process facilities. The ore buying station flowsheet and a general layout of process components are included in Plates 3.1-1 and 3.1-2 of the application. The milling process facilities will consist of several buildings of assorted sizes housing equipment in an arrangement similar to that illustrated in the Block Flowsheet (Plate 3.1-3) of the application (some of the milling process components, e.g., tanks, will not be housed). The mill site will occupy about 1480 acres with a surface area of about 450 acres for the tailings impoundment. (Only about 333 acres will actually be used for storage of tailings liquids/solids.)

### 3.2 Ore Buying Station Operations

Ore is received at the ore buying station (OBS) from numerous small mines in the vicinity of Blanding. All ore is crushed in a jaw crusher to a nominal 1 1/2-inch size which is stored for later processing at the mill. A small fraction of the ore is further crushed and pulverized to a -100 mesh size for assay.

### 3.3 Mill Operations

The proposed mill will utilize an acid leach-solvent extraction process for uranium recovery. Provisions for vanadium byproduct recovery are included in the design. The nominal processing capacity of the mill is 1800 MT (2000 tons) per day. The expected average ore grade is 0.125%  $U_3O_8$ . The process will recover approximately 94% of the uranium in the ore. The proposed mill would operate on a 24-hour/day, 340 days per year, schedule. Based on the above design parameters, the annual  $U_3O_8$  production of the proposed White Mesa mill will be approximately 730 MT (800 tons). The estimated annual vanadium ( $V_2O_5$ ) production is 1480 MT (1630 tons).

Since the daily and annual ore grade and the percent recovery may vary and result in a fluctuation in production rate, the mill will be authorized to produce a maximum of 4700 pounds of  $U_3O_8$  per day, averaged over a 340-day year, for an annual total 730 MT (800 tons). Since the average grade of ore over the 15 years is expected to remain at 0.125%, and since the radiological source term for tailings was based on an average ore grade of 0.15%, the source term and resulting doses from tailings presented in the FES (NUREG-0556 of May 1979) are considered conservative.

#### 3.3.1 Uranium Circuit

The flow sheet for the uranium circuit of the proposed mill is shown in Plate 3.1-3 of the application. The ore would undergo a sequence of crushing, grinding, leaching, countercurrent decantation, and solvent-extraction steps. The extracted uranium would be precipitated, dried, and packaged for shipment.

Most ores would be fed to the mill via the ore buying stations. Because the ores will originate from many different mines, blending will be necessary to ensure optimal processing amenability. This blending will occur as the ore is fed to the mill.

Ore received at the ore buying stations is crushed to less than 3.8 cm (1.5 in.) during the sampling process. As the ore is fed to the mill, a semiautogenous grinding (SAG) mill will reduce the feed size to smaller than a 28-mesh (0.589 mm or 0.0232 in.) screen. The ore slurry produced by the SAG mill will be leached in two stages with sulfuric acid, manganese dioxide (or an equivalent oxidant), and steam in amounts that will produce an acid solution with a temperature of 71° (160°F). Acid consumption will be reduced by neutralizing the alkaline components of the ore with excess acid in the pregnant leach solution in a preleach stage. It is anticipated that approximately 95% of the uranium contained in the crude ore will be dissolved over a leaching period of up to 24 hours. The uranium-bearing solution will be separated from the barren waste by countercurrent decantation using thickeners. Polymeric flocculants will be used to enhance the settling characteristics of the suspended solids. The decanted pregnant leach solution is expected to have a pH of approximately 1.5 and contain less than 1 g of  $U_3O_8$  per liter. The barren waste will be pumped to the tailings retention area.



Solvent extraction will be used to concentrate and purify the uranium contained in the decanted leach solution. In a series of mixing and settling vessels, the solvent extraction process will use an amine-type compound carried in kerosene (organic) which will selectively absorb the dissolved uranyl ions from the aqueous leach solution. The organic and aqueous solutions will be agitated by mechanical means and then allowed to separate into organic and aqueous phases in the settling tank. This procedure will be performed in four stages using a counterflow principle, in which the organic flow is introduced to the preceding stage and the aqueous flow (drawn from the bottom) feeds the following stage.

It is estimated that, after four stages, the organic phase will contain about 2 g of  $U_3O_8$  per liter and the depleted aqueous phase (raffinate) about 5 mg per liter. The raffinate will be recycled to the counter-current decantation step previously described or further processed for the recovery of vanadium. The organic phase will be washed with acidified water and then stripped of uranium by contact with an acidified sodium chloride solution. The barren organic solution will be returned to the solvent extraction circuit, and the enriched stripping solution containing about 20 g of  $U_3O_8$  per liter will be neutralized with ammonia to precipitate ammonium diuranate (yellowcake). The yellowcake will be settled in two thickeners in series, and the overflow solution from the first will be filtered, conditioned, and returned to the stripping stage.

The thickened yellowcake slurry will be dewatered further in centrifuges to reduce its water content to about 40%. This slurry will then be pumped to an oil-fired multiple-hearth dryer (calciner) at  $650^{\circ}C$  ( $1200^{\circ}F$ ). The dried uranium concentrate (about 90%  $U_3O_8$ ) will be passed through a hammer mill to produce a product of less than 0.6 cm (1/4 in.) size. The crushed concentrate, which is the final product of the plant, will then be packaged in 55-gallon drums for shipment.

#### 4.0 FACILITY ORGANIZATION AND ADMINISTRATIVE PROCEDURES

##### 4.1 Organization

The authority and responsibilities of each level of management as shown in Table 5.1.1-1 of the application are as follows:

The Chairman of the Board is responsible for all of the practices and decisions made by those management personnel reporting to him. He delegates the authority for the decisions in the uranium mining and mill operations to the President and Vice President of Uranium Operations.

The Vice President (and General Manager) of Uranium Operations reports directly to the President of the Company, and is responsible for uranium milling operations. The Radiation Safety Officer (RSO) reports on a direct line through the Licensing Director to the Vice President.

The Manager of Uranium Processing is the site manager and is responsible to the Vice President of Uranium Operations for conducting the company's milling operations in a safe and efficient manner. These responsibilities

include production operations, maintenance procedures, and overall security practices.

The Mill Superintendent is responsible for directing all activities and personnel of the milling project. The Mill Superintendent reports directly to the Manager of Uranium Processing.

The Metallurgist will be responsible for the metallurgical control of the plant, which will include mill recovery and reagent usage, and for the metallurgical testing required to insure that optimum conditions are being maintained in the mill and that accurate sampling is being conducted in the mill and sampling plants. The Chief Chemist is responsible for the Chemical Laboratory and the analytical work performed in the laboratory. The Metallurgist and Chief Chemist report to the Mill Superintendent.

This organization is similar to organizations at operating uranium mills that have proven to be effective. The RSO is responsible for the radiation safety program at the millsite, reports directly to EFN corporate headquarters and is not part of the production line organization.

#### 4.2 Radiation Safety Staff

The Radiation Safety Officer, with the assistance of his staff and with the assistance and supervision of the Licensing Director, is responsible for plant safety and the radiological protection of plant personnel and the public. This responsibility includes training of all personnel in radiation and industrial safety; monitoring performance and quality control of radiological analyses; monitoring plant effluents; monitoring, evaluating, and maintaining records of personnel exposures and plant area surveys; posting radiation areas; providing for radiation safety staff surveillance of tasks in higher than routine radiation exposure areas; maintaining plant radiation monitoring equipment; preparing reports to regulatory agencies; and developing procedures for radiological protection. He is also responsible for investigating personnel safety-related incidents. He reviews normal plant procedures and equipment for radiological safety. Both the Licensing Director and the RSO have the authority to cancel, postpone or modify any operation or process which poses an immediate radiological hazard. The Radiation Safety Officer will report directly to the Vice President of Uranium Operations. He works closely with the Manager of Uranium Processing, but is not part of the line organization at the mill. Radiation Technicians make up the RSO's staff and assist the RSO in implementing the radiological safety program. The Radiation Technicians will be assigned virtually full time to radiation safety program activities. If they are asked to perform other duties, these will not be in production or in areas where their program duties is impaired.

The authority, duties and responsibilities of the RSO are adequate to implement the radiation safety program and are consistent with those at operating uranium mills that have proven to be effective.

#### 4.3 Minimum Technical Qualifications for Radiation Safety Program Positions

Minimum qualifications have been established for key positions in implementing the radiation safety program (i.e., developing, conducting, approving, and auditing the program). These requirements are documented in Energy Fuels job descriptions and are summarized below for each position (only B.S. degrees from accredited colleges or universities fulfill the requirement for "B.S. degrees").

##### Vice President of Operations:

Must have a B.S. degree in engineering or related physical science from an accredited college or university, or equivalent relevant experience. He must have demonstrated knowledge and competence in administration, personnel management, and business procedures, and an in-depth knowledge of uranium mining and milling operations. A minimum of ten (10) years of management experience is required.

##### Licensing Director:

Must have a B.S. degree in environmental or radiological science, or a related science, or equivalent relevant experience in radiation safety and contamination control at a nuclear facility or a combination of education and experience. He must have demonstrated experience in the performance and/or management of radiation safety, environmental, and occupational health programs, with at least three (3) years experience in these positions. He must have specialized training in radiation protection, with at least a biannual refresher course, and a working knowledge of radiation detection instruments, the biological effects of radiation and the radiochemical and mathematical aspects of analysis procedures.

##### Radiation Safety Officer (RSO):

Must have a B.S. degree in environmental or radiological science from an accredited college or university, equivalent relevant experience in radiation safety and contamination control at nuclear facility or a combination of education and experience. Relevant experience equivalent to a B.S. degree shall be at least four years of relevant radiation safety program experience. He must have demonstrated experience in the performance of radiation safety, environmental, and occupational health activities with at least two (2) years of experience in these positions.

##### Radiation technicians:

Must have a highschool diploma. They must have sufficient training and/or experience to enable them to perform assigned surveillance, sampling and analytical duties. In addition, they will receive special training and instruction from the RSO regarding the execution of their specific tasks and what is required to assist the RSO.

These minimum technical qualifications assure that the individuals filling these radiation safety positions have an adequate formal educational

background and/or the necessary specific training and experience to carry out the duties and fulfill the responsibilities of these positions.

#### 4.4 Administrative Procedures

Administrative policies and procedures will be documented to clearly delineate the authorities and responsibilities for each level within the organizational structure with regard to safety-related activities.

The results of sampling, analysis, surveys, monitoring, equipment calibration, training, reports on audits and inspections, subsequent reviews, investigations and corrective actions will be documented and maintained for at least five years.

All radiation protection procedures will be documented within a Health and Safety Manual. The Manual will detail health and safety procedures employed for radiological protection; describe monitoring equipment, and its locations and use; define monitoring and reporting procedures; and describe the use of Special Work Permits as authorization to perform work in areas which might result in exposures to airborne concentrations in excess of 10 CFR Part 20 limits.

A system of routine preventative maintenance is provided to assure plant reliability. The system provides for a specific schedule of preventative maintenance on safety-related equipment to be carried out in accordance with approved procedures. However, where the need for a nonroutine work or maintenance activity arises in areas which could lead to exposures to airborne concentrations in excess of 25% of 10 CFR Part 20 limits as determined by the RSO, approved Special Work Permits will be required and will be used. The procedures of obtaining a Special Work Permit will be as follows:

1. The need for the nonroutine activity will be defined and approved, in writing, by the General Mill Foreman or Mill Superintendent. Information on the specific work locations, duration of time at the location, types of work to be performed, and personnel to be utilized, will be included. This material will be provided as part of the Special Work Permit.
2. The Radiation Safety Staff will review the Permit and, after insuring that the proposed work will not present a health hazard to the employees, approve the Permit in writing. The Permit will stipulate the duration of time that the defined personnel shall work in the location and all personnel protective equipment to be supplied. The Radiation Safety Staff will provide the necessary surveillance and respiratory equipment.

All supervisors will be given training in the requirements for using Special Work Permits. Special Work Permits will be kept on file for 5 years.



The licensee shall maintain written operating procedures specifically for the radiation safety program and the environmental monitoring and control program and written procedures pertaining to all activities carried on in an area shall be available in each area where radioactive material is processed, handled, or stored and shall be reviewed at least quarterly. In addition, for any work or maintenance for which there is no effective operating procedure, and for any nonroutine maintenance or repair work, a Special Work Permit signed by the radiation safety staff shall be prepared and used for performing these activities.

In addition, the licensee shall be required by license condition to maintain a management control program which shall include written operating procedures, reviewed and approved by the Radiation Safety Officer, for all aspects of mill operations, including the radiation safety program and the environmental monitoring and control program. Approval by the RSO shall be indicated by the signature of the RSO on the procedure.

The staff has determined that these administrative procedures are adequate to assure that all operations are reviewed for health and safety problems prior to performance.

#### 4.5 Inspection and Audit Program

##### 4.5.1 Inspection Program

EFN has committed to a daily documented visual surveillance of all mill areas by the operating mill foreman to insure proper implementation of good radiation safety practices and weekly documented inspection by the Radiation Safety Staff of all work and storage areas and a report to the RSO on any items of noncompliance with operating procedures, license requirements, or safety practices affecting radiological safety. The RSO shall perform an unannounced monthly documented walk-thru inspection of all work and storage areas to ensure the radiation safety program is working as required. The RSO also performs a monthly review of radiation safety and exposure records and radiation survey records for adherence to the ALARA philosophy (see Section 4.6). Appropriate actions will be taken promptly by the RSO to correct any problems or deficiencies noted during inspections by the RSO and the Radiation Safety Staff. A report of the reviews by RSO and Radiation Safety Staff, including the results of the reviews and follow-up actions, shall be sent by the RSO to the manager of Uranium processing on a monthly basis.

##### 4.5.2 Audit Program

EFN has proposed a system for regular involvement by Management in the review procedure to ensure that operations at the plant are conducted in a safe manner and in accordance with approved procedures. An Internal Audit Committee, composed of the Radiation Safety Officer, Licensing Director, Mill Superintendent, Chief Chemist and the Manager of Uranium Processing, will be formed. The Audit Committee will:



- Perform a quarterly review/audit of the radiation safety program, including all procedures, exposure records and data, records from radiation safety staff reviews (including the results of the monthly review by the RSO of exposure records), and from the inspection, equipment calibration and training programs. This inspection will cover the data included in the reports prepared in accordance with license requirements. A written report to the Vice President of Uranium Operations, describing the results of the audit and followup actions and recommendations of the committee concerning the radiological safety program will be provided. Particular emphasis will be placed on operating anomalies, and records of violations of procedures.

The Vice President will be responsible for taking action concerning these recommendations. Copies of the report will go to the RSO, Licensing Director, and Manager of Uranium Processing. Note: The frequency of quarterly review/audit of the radiation safety program may be found to be higher than necessary. This may be indicated if it is EFN's experience that the level of effort necessary to perform such a comprehensive review is not justified by any noticeable improvement in the radiation safety program. If this is found to be the case, EFN may request a license amendment to reduce the frequency, e.g., to semi-annually.

- Perform followup inspections to determine if violations have been corrected, and anomalies either eliminated or satisfactorily explained.
- Immediately investigate abnormal occurrences relating to personnel radiological safety, and assure that corrective actions are taken to correct the situation. The Committee must approve any corrective actions taken.
- Perform unannounced, unscheduled inspections of all phases of the plant operations.
- Note trends and deviations with respect to the ALARA concept (see Section 4.6) and report these to higher management.

The committee will insure that the plant safety program is maintained at the highest level of performance, and in accordance with all requirements of the license.

EFN's audit and inspection program is comparable to programs that have been proven to be effective at other mills and at other types of facilities handling radioactive materials.

#### 4.6 ALARA Program

EFN has committed to keep occupational radiation exposures as low as reasonably achievable. Monthly, the RSO performs a documented review of all personnel exposure records and radiation survey records for trends or

deviations from "as low as reasonably achievable" (ALARA). Quarterly, the Internal Audit Committee committee reviews exposure evaluations with the goal of minimizing exposures, and investigates problem areas as described in Section 4.5.2, above. The committee members are the Radiation Safety Officer, Licensing Director, Mill Superintendent, the Chief Chemist, and the Manager of Uranium Processing. Reports of the committee are furnished to the Vice President of Uranium Operations, with copies to the Manager of Uranium Processing, the Licensing Director, and the RSO. The Vice President is responsible for acting on the Committee's recommendations from all audits.

In addition, the mill licensing staff has conditioned EFN's license to require that the quarterly audit report by the Internal Audit Committee shall include conclusions and recommendations of a review of all audits and inspections, as well as employee exposures (including bioassay data), effluent release data and environmental data to determine (1) if there are any upward trends developing in personnel exposures for identifiable categories of workers or types of operations or effluent releases, (2) if exposures and effluents might be lowered under the concept of as low as reasonably achievable, and (3) if equipment for effluent and exposure control is being properly used, maintained and inspected. This review shall include a review of radiation safety and environmental monitoring programs data collected during the three previous quarters. This requirement was developed by the staff to provide a document which would clearly indicate EFN's compliance with the "ALARA" concept.

EFN's programs for audits, inspections, employee training, and administrative procedures, demonstrate both a commitment and a mechanism to ensure compliance with the "ALARA" concept.

#### 4.7

##### Personnel Training

The RSO will develop and implement the radiation protection training program. Each person, upon reporting for employment at the mill, will receive from the RSO instruction in mill and personnel safety, including radiological safety procedures. The instruction would include on-the-job demonstrations of proper safety precautions and measures to be taken to minimize radiation exposure. These instructions and precautions are summarized in the form in Appendix C of the Source Material License Application. Each employee will also be provided a safety manual which covers radiation safety and industrial safety procedures including personal hygiene, instructions for use of monitoring and safety equipment, and procedures for handling spills and maintaining clean working conditions. Each employee will be required to pass a written test on his or her understanding of radiation safety and hygiene. Complete retraining of all workers will be performed at least once every 2 years. Records will be kept on the training program.

The employee's understanding and retention of proper radiation protection practices will be appraised by the supervisor and the radiation protection staff at the work location through use of documented periodic checks. If the employee does not exhibit sufficient grasp of the safety procedures,

he will receive further instruction from his supervisor. This procedure will be repeated until satisfactory retention is demonstrated.

In addition, a minimum of one-half hour during the monthly mill safety meeting will be set aside for discussion of radiation safety procedures and, on an annual basis, one of the monthly meetings will be set aside for reindoctrination of the mill staff in radiation safety. Each employee will be tested annually by the RSO on his understanding of radiation protection as it is related to his job. All supervisors will be required to periodically attend specific training courses in radiation and industrial safety so that they will be better able to provide and evaluate specific job related training. This training will be at commercially offered courses in radiation protection and surveillance (specific to uranium processing, where possible) or by contracting qualified consultants to provide these training services.

The overall training program proposed by EFN is considered consistent with training programs within the milling industry that have proven to be effective.

## 5.0 RADIATION SAFETY CONTROLS AND MONITORING

### 5.1 Effluent Control Techniques

Dust from the ore buying station crushing circuit is collected in three (3) reverse jet bag houses and recombined with the crushed ore. The mill circuit is essentially enclosed and wet, and the design of the mill is such that any leaks or spills will be collected and recycled to the appropriate part of the process.

The dust collecting, venting and fume control systems in the plant are designed to control emissions when the plant is operating at a design rate of 2000 TPD. (See Table 4.1-1 of the application.)

Table 4.1-2 (of the application) summarizes information regarding the mill discharge stacks and effluents.

The failure of all dust collector, ventilator and scrubber fans will be indicated as follows:

- a. Ore buying station. Because of an electrical interlock, if any of the reverse jet bag houses stops operating, the crushing circuit will shut down.
- b. Ore feed to mill. Failure of baghouses will be indicated by loss of vacuum. (Negative pressure checks will be made and logged every two hours.)
- c. Pre-leach tank and leach tank exhaust fans. Failure of the fans to the demister will be indicated at the area control panel.

- d. Solvent extraction and stripping building ventilator fans. Failure of the fans will be indicated at the area control panel by loss of the "running light."
- e. Precipitation tank exhaust fan. Failure of the fan to the demister will be indicated at the area control panel.
- f. Yellowcake dryer wet fan scrubber. Because of an electrical interlock, failure of the water supply (low flow trip) to the scrubber or high temperatures in off-gases from the scrubber will cause failure of the yellowcake feed pump, oven burners, and scrubber (see Plate 4.1-2 of the application) fan. Dryer temperature is automatically controlled and an audible alarm indicates excessive temperature in the oven (excessive temperatures could lead to an excessively dry, dusty product). Adjustable flow switches on the water supply will be set to ensure that the dryer cannot startup or continue operating with water flow at less than that which is required for maximum scrubber efficiency. A flowmeter will also be visually checked and the checks logged twice per shift.
- g. Yellowcake packaging wet fan scrubber. Failure of the water supply to scrubber will cause failure of the scrubber fan.

Scrubber circuits from the concentrate drying and packaging areas will be checked every hour and documented. Manometer readings of dryer off-gases will be recorded twice per shift. Water to the scrubbers will also be checked twice per shift and the check will be documented (low flow might cause decrease in scrubber efficiency).

The staff has further required by license condition that operations shall be immediately suspended in the affected areas of the mill if any of the emission control equipment for the ore crushing or feed areas or the yellowcake drying or packaging areas is inoperative, since failure of either of these systems could result in higher than normal releases of radioactivity to the environment and/or a build-up of airborne radioactivity in the mill.

Spillage of solids, slurry and solutions will be minimized by level controllers and high level alarms on all major tanks and sumps. If spillage occurs material will be contained by dikes or curbs and will drain or be directed to sumps and the material can be pumped back to appropriate points in the mill circuit. Spills from some uncurbed outside tanks will flow via a specially excavated catchment basins where they will be contained and subsequently cleaned up.

The following is a description of the specific effluent control techniques to be utilized at various stages in the mill circuit:

- a. Ore Buying Station and Ore Storage Pads

Dust generated during crushing and handling of the ore in the ore buying station is collected in three automatic reverse jet bag



houses. When dry or dusty ore is fed to the sampling plant the ore is first sprayed with water.

EFN will be required to minimize dispersal of dust from the ore piles by water sprinkling or other dust suppression techniques, unless a documented weekly inspection indicates that the moisture content of the ore and/or weather conditions are controlling dusting. Runoff from the ore stock pile as a result of rain or snow will be collected in the sedimentation pond.

b. Ore Receiving and Grinding

Dust in the SAG-mill feed system will be collected in baghouses and returned to the crushed ore. A dust suppression spray system will be installed in the mill feeding system and used when exceedingly dry ores are being fed to the SAG mill. Water added for these purposes will remain with the ore and go to process.

c. Leaching

Gaseous effluents from the pre-leach and leach tank (along with those from the precipitation tanks) will be vented through a demister and the liquid (acid) removed by the demister will be returned to the mill circuit (via the C.C.D. thickener circuit).

d. Washing and Clarification

At this wet stage of the operation, the uranium charged leach solution is separated out and the tailings are discharged to the tailing impoundment area. No emission control system is utilized at this stage of the process.

e. Solvent Extraction and Stripping

Kerosene and other vapors from solvent extraction and stripping operations will escape to the atmosphere through building ventilator fans.

f. Precipitation

At this stage of the process, the uranium bearing solution is neutralized with ammonia to precipitate out ammonia diuranate, yellowcake, which is thickened. Effluents from this process are vented through a demister (along with pre-leach tank and leach tank effluents).

g. Concentrate Drying and Packing

The thickened yellowcake slurry is further dewatered by centrifuges and pumped to a oil-fired multiple-hearth furnace for drying. The dried yellowcake is then passed through a hammer-mill (crusher) and then packaged in 55-gallon steel drums. The entire drying and



packaging operation will be conducted in an isolated area with a negative ventilation pressure equipped with self-closing access doors.

Yellowcake particles carried in flue gases from the uranium dryer and packaging area will pass through wet fan scrubbers (one on the dryer and one on the packaging process) and the solution and particulates collected from the scrubbers will be recycled to the No. 1 yellowcake thickener. Specification for the fan type scrubber shows the efficiency to be greater than 99%. Plate 4.1-2 of the application illustrates the fan type scrubber, although scrubbers with equivalent efficiencies would be as acceptable. The anticipated air flow for each scrubber will be 1600 cfm. Scrubber discharges will be combined into one stack. The stack exit is approximately 34 inches in diameter and 80 feet above ground level.

h. Tailings Impoundment

EFN will be required to implement an interim stabilization program that minimizes to the maximum extent reasonably achievable dispersal of blowing tailings. This program shall include the use of written operating procedures that specify the use of specific control methods for all conditions. The effectiveness of the control methods used shall be evaluated weekly by means of a documented tailings area inspection.

i. Laboratory

The laboratory fume hoods will collect air and mixed chemical fumes from wet analyses for venting to the atmosphere. These gases will contain nonradioactive chemicals, including HCl and NO<sub>2</sub>. The volume of gaseous fumes emitted from the laboratory operations will be small. Effluent streams from laboratory operations producing particulates will be filtered (through bag filters) prior to release.

The equipment and techniques to be used by EFN for process effluent control are considered to be satisfactory.

5.2 In-Plant External Radiation Monitoring Program

Some measureable external radiation exposure may be anticipated in areas associated with incoming ore and in the product storage areas, where the radiation level will increase with time of storage of the product because of the buildup of daughter products. Under unusual conditions, intermediate or final products may accumulate in pipes and tanks and create local radiation areas. A beta-gamma survey will be conducted monthly to determine the levels of external radiation present at representative locations. A total of thirty-six (36) locations in the restricted area have been identified.\* The staff have reviewed these

\*Locations are described in Table 5.5-2 of the application.

points and found both the number and locations to be adequate. In addition, the staff has determined that the survey meters available at the mill will be adequate for these surveys.

Instruments will be calibrated after repair and as recommended by the manufacturer or at least semiannually, whichever is sooner. To assure that the instruments operate properly before each use, a check source will be used to assure operating order.

EFN's in-plant external radiation monitoring program along with its personnel external radiation dose monitoring program is adequate for the hazards anticipated and meets standard health physics practices.

### 5.3 Personnel External Radiation Dose Monitoring

All mill and maintenance employees will wear film badges during working hours. The badges will be exchanged on a monthly basis, and the exposed badges will be returned to the supplier for processing and reading.

EFN has committed that any badge exposure exceeding 25% of the 10 CFR 20 exposure limits in any calendar quarter will be evaluated and the situation causing the exposure will be investigated and corrective action initiated promptly. Appropriate action will be taken to reduce the levels of exposure to as low as it is reasonably achievable.

### 5.4 Contamination Control Program

#### A. Contamination Surveys

EFN will be required to conduct surface contamination surveys (both smear and total contamination) of clean areas, e.g., administration offices, eating areas, change rooms, and control rooms on a biweekly basis. Survey and decontamination procedures shall conform with Annex C, "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct Source or Special Nuclear Material," dated November 1976. Areas which have activities greater than Annex C limits will be decontaminated and resurveyed and an investigation to control the source shall be initiated by the RSO. In addition, the operating Mill Foreman shall conduct and document a daily visual surveillance of all mill areas to insure adequate radiation safety practices, including good clean up practices to minimize unnecessary surface buildup of radioactive particulates.

The above is an acceptable surface contamination control program that meets current standard health physics practices.

#### B. Sanitary and Other Mill Wastes

All applicable State of Utah, Division of Health standards will be met in the design and operation of the sanitary facility associated with the mill complex. Sanitary wastes will be disposed of through a

septic tank and leach field designed and operated in accordance with applicable regulations.

The tailings impoundment will not be used for disposal of materials which are not contaminated with tailings or other materials with radioactivity such as yellowcake. Land burial of such contaminated materials will be in the tailings impoundment and in accordance with written procedures that ensure the tailing impoundment system is not damaged. Coveralls used in the yellowcake area will be laundered onsite at the mill and mill personnel will be provided with a change room (with showers) and laundering facility to allow them to leave their work clothes at the mill. All liquid effluents from the laboratory, the laundry and showers will be discharged to the tailing retention system. All mill liquids from process buildings (with the exception of sanitary wastes) will be recycled or discharged to the tailings impoundment.

C. Contaminated Equipment

The license will be conditioned to require that release of equipment or packages from the restricted area shall be in accordance with Annex C, "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material," dated November 1976.

5.5 In-Plant Airborne Radiation Monitoring Program

Most airborne contaminants in the mill are expected to result from localized sources. Because concentration gradients in the vicinity of points of release are expected to exist and produce large variations, frequent measurements are required for exposure evaluation and control measures.

The rationale for conducting an airborne monitoring program is based upon the following facts. During the initial stages of processing the ore, U, Ra-226, and Th-230 are expected to be in equilibrium; but, during subsequent operations, this equilibrium will be disturbed, and the concentration of individual radionuclides must be measured for the assessment of hazards. In the precipitation and product recovery sections, airborne material expected would normally be uranium. Radon concentrations may occur near ore storage bins and crushing and grinding circuits. Exposures due to airborne concentrations may also occur in sample preparation and assay rooms. In many cases, because of the physical layout of the process, airborne effluents in one area may tend to influence exposures in other adjacent areas.

In addition, the staff has required that in-plant airborne monitoring be performed under conditions typical of employee exposures and that along with results of airborne activity, a record of the state of operation of both process and effluent control equipment and ventilation conditions be kept.

### Particulate Sampling

Airborne particulate radioactivity will be sampled monthly at at least seventeen locations.\* These locations are based on expected employee occupancy and sources of airborne radioactivity. Each sample taken will be of at least a 60-minute duration. All samples will be analyzed for natural uranium content. In addition, filter samples collected in representative areas will be analyzed for Ra-226, Th-230 and Pb-210 semiannually.

Personnel breathing zone samplers will be worn by personnel in process locations where the airborne concentrations could exceed 25% of the 10 CFR Part 20, Appendix B, limits, and will be analyzed for uranium. In addition, breathing zone air sampling and area airborne sampling during maintenance work which could result in exposures in excess of 25% of the 10 CFR Part 20 limits, e.g., any yellowcake area maintenance work, will be conducted. The need for breathing zone sampling and for special area airborne sampling will be determined by the RSO.

### Rn-222 Sampling

Particulate sample points will also be sampled monthly for radon daughter concentration. Sampling will be done when ventilation is as low as commonly found during the period and ventilation conditions at the time of sampling will be recorded. The modified Kusnetz method of sampling and analysis will be used.

The staff has reviewed this sampling program and has found the number, type, and location, as well as the frequency of sampling, to be sufficient.

### Exposure Calculations

A time study of all mill and maintenance employees will be conducted to determine the amount of time spent in each area. This information, along with the area airborne concentration, will be used to calculate exposures. Any abnormal exposures will be included in the exposure calculation and records.

When routine work is performed, assessment of an individual's exposure to airborne natural uranium and radon daughters will be calculated using the results of the prescribed sampling in each area and the time spent in each area of exposure as determined by careful observation of the task performed by each individual exposed. Quarterly breathing zone samples using prescribed portable samplers will be taken to assure reliability of this procedure. Individuals wearing samplers will be determined by analysis of routine samples and their likelihood of reaching the action level of 25% MPC.

\*Locations are described in Table 5.5-3 of the application.



When nonroutine maintenance is performed, accurate time records will be kept to calculate exposure to natural airborne uranium. Dust samples taken while work is being done will be used in this exposure assessment. Periodic breathing zone samples using prescribed portable samplers and approved cyclone attachment will be taken to assure accurate assessment of exposure during nonroutine work assignments.

For each job category, work assignments will be studied to determine amounts of time normally spent in areas with possible airborne concentrations in excess of 25% MPC. Actual time spent in such areas will be observed and documented at least quarterly and the estimated amounts of time spent revised accordingly. The RSO will review exposure data at least weekly to ensure that exposures for each job category are as low as reasonably achievable.

If an employee reaches an action level of 25% of MPC based on TWE (time/weight exposure) over a period of one quarter, the RSO will institute an investigation of their work record and exposure history to identify any problem areas. If any problem areas are noted, they will be studied and necessary corrective measures taken to ensure that the exposure is as low as reasonably achievable.

EFN's program for monitoring in-plant airborne activity and determination of employee exposures is adequate and comparable to the programs carried out successfully at existing mills.

## 5.6

### Protection Equipment for Personnel

#### 1. Showers, Change Rooms, and Protective Clothing

All mill personnel will be provided with change room, shower and laundry facilities so that they may leave their work clothes at the mill. Persons required to work in yellowcake product areas or perform maintenance on equipment from these areas will be issued coveralls and required to change and shower prior to leaving the mill. All coveralls and contaminated clothing will be laundered on the property.

Prior to leaving the restricted area, all mill employees will monitor themselves with an alpha radiation survey meter. Alpha contamination on skin or clothes greater than 1000 dpm/100 cm<sup>2</sup> shall be cause for additional showering or decontamination and an investigation by radiation safety staff. In addition, the licensee shall perform spot surveys for alpha contamination at least quarterly on workers leaving the plant.

The above program is adequate to minimize as much as is reasonably possible the spread of contamination from the plant process areas to unrestricted areas.



## 2. Respirators

EFN's respiratory protection program will include written procedures and personnel training in use, care and selection of respirators as outlined in ANSI Z-88.2-1969. The program will be directed by the RSO. EFN will not apply protection factors for the use of respiratory equipment in estimating employee exposures.

### 5.7 Bioassay Program

EFN has committed to the bioassay program outlined in Regulatory Guide 8.22. Whenever "should" is found in that document, it shall denote a requirement. In addition to the quality control program outlined in Regulatory Guide 8.22 the applicant has committed to developing a documented quality assurance program in accordance with Regulatory Guide 4.15.

This program is considered adequate to indicate any uptake and/or retention of radioactive material by mill personnel.

### 5.8 Quality Assurance Program

The documented quality assurance program for all sampling and analyses performed as part of the In-Plant Radiological Safety Program shall be in accordance with Regulatory Guide 4.15 and the Branch Position for Operational Radiological Environmental Monitoring Programs for Uranium Mills.

## 6.0 ENVIRONMENTAL AND EFFLUENT MONITORING PROGRAMS

EFN will conduct an effluent and environmental monitoring program summarized in Appendix G of the license application (Table 6.2 of the FES, NUREG-0556 of May 1979). The licensee is required by license condition to conduct a monitoring program to collect onsite meteorological data, e.g., wind speed and direction at one hour intervals, and to annually reduce this data to a joint frequency distribution by wind speed, direction, and stability class. In addition, the air particulate monitoring program described in Appendix G of the application for "ore crusher stack" shall be performed for all stacks from areas or process circuits in which ore, yellowcake or tailings are handled. Finally, although the control monitoring location (in Section 35, T37S, R21E) is not located 15 km from the millsite as indicated in Appendix G of the application, it is considered an adequate control location.

The quality assurance program for sampling and analyses shall be in accordance with Regulatory Guide 4.15 and the Branch Position for Operational Radiological Environmental Monitoring Programs for Uranium Mills.

The staff has determined that EFN's monitoring program is equivalent to that described in the FES.

## 7.0 RESTRICTED AREA MARKINGS AND ACCESS CONTROL

The mill and tailings impoundment will be fenced and posted with signs in accordance with 10 CFR 20.203. Plate 2.1-2 of the application is a plot plan of the mill site and shows the layout of fencing around the mill and tailings impoundment. Parking facilities for employee and visitor vehicles will be outside this fenced area.

By license condition the licensee has been exempted from the requirements of Section 20.203(e)(2) of 10 CFR Part 20 for areas within the mill, provided that all entrances to the mill are conspicuously posted in accordance with Section 20.203(e)(2) and with words, "Any area within this mill may contain radioactive material."

All visitors will be required to register and will not be permitted inside the restricted area without proper authorization and escort. Access to the restricted area by the public will be strictly controlled by physical barriers and security personnel.

Contractors having work assignments will be given security, safety and radiation protection orientation prior to performing their duties without escort.

## 8.0 EMERGENCY PROCEDURES

The Radiation Safety Officer will establish emergency procedures for the project. Accidents which are possible for this type of activity have been identified in Section 5 of the FES (NUREG-0556). Precautions and measures which the applicant will take to reduce the possibility of occurrence of these accidents include the following:

### 1. Tailings Impoundment

EFN will conduct and document an inspection of the tailings discharge system once per shift. EFN will make and document at least daily an inspection of the entire tailings retention system including the embankments of the tailings retention area and the exposed protect soil cover over the liner and make repairs if any erosion occurs.

EFN is specifically prohibited by license condition from constructing any of the tailings impoundment system embankments until the system design has been reviewed and approved by the NRC in accordance with Regulatory Guide 3.11. During the NRC review the system operating and inspection requirements will be determined such as required free board and items to be included in inspections, e.g., placement and condition of discharge piping and equipment.

EFN will be required to maintain adequate freeboard in the in-use tailings impoundment cell and the evaporation cell(s) throughout the project life.

## 2. Fire Protection

An automatic water sprinkling system will be installed in the main mill building and the solvent extraction building. EFN will ensure that any fire at the site will be controlled by adequately trained local experienced fire fighting personnel. Training will include orientation training in radiation protection and specific instruction in the hazards associated with uranium mill fires and the precautionary measures, e.g., respiratory equipment, that are required for each of these.

## 3. Spill Prevention and Containment

- Tanks will be equipped with high level alarms and/or level controllers to reduce the possibility of spillage due to tank overflow. Dikes and/or curbs will be constructed around process and storage tanks (excluding the water tank) to confine the material in the event of tank spill and/or channels will divert spilled material to sumps and basin for subsequent return to the process circuit or tailings impoundment. In the event of an ammonia tank spill, the material would be expected to quickly evaporate. A sulfuric acid tank spill would flow via a specially excavated channel to the catchment basin where it would be fully contained and subsequently cleaned up.

## 9.0 DECOMMISSIONING

EFN will be required to provide for reclamation of the tailings impoundment areas and mill site in accordance with the plan described in Sections 3.3 and 10.3.2 (Alternative 1) of NUREG-0556, dated May 1979, subject to revisions based on the conclusions of the Final Generic Environmental Impact Statement on Uranium Milling and any related rulemaking. This reclamation plan will allow unrestricted use of the site (excluding the tailings disposal area). Decontamination procedures for facilities or equipment shall conform with Annex C, "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source or SNM," EFN will maintain financial surety arrangements adequate to cover the costs of reclaiming the tailings impoundment and decommissioning the mill.

## 10.0 SURETY ARRANGEMENTS

EFN will be required by license condition to submit to the NRC a copy of the surety arrangements to be in place with the State of Utah to cover the costs of tailings area reclamation and mill facility decommissioning and will be required to obtain the approval of the NRC concerning those surety arrangements and any future revisions to those arrangements.

## 11.0 CONCLUSION

Upon completion of the safety review of the licensee's application and a review of this SER and the proposed license conditions by I&E, Region IV, and Headquarters staff, the staff has concluded that issuance of a license

to EFN, subject to the additional conditions developed by the staff, will not constitute an undue risk to the health and safety of the public, and has determined that the application and supplements fulfill the requirements of 10 CFR Part 40. The staff has further determined that conformance by EFN to their proposed conditions, as well as those developed by the staff, should ensure a safe operation.

The staff, therefore, recommends that EFN be issued a license subjected to the following conditions:

9. The licensee is hereby authorized to possess byproduct material in the form of uranium waste tailings generated by the licensee's milling operations authorized under SUA-1358.
10. Authorized place of use: The licensee's uranium ore buying and milling facilities located in San Juan County, near Blanding, Utah.
11. For use in accordance with statements, representations, and conditions contained in Subsection 2.1.1 and Plates 2.1-1 and 2.1-2, Subsections 3.2 and 3.5 through 3.7 and Plates 3.1-1 through 3.1-5, Section 4 and Tables 4.1-1 and 4.1-2, Section 5 (and tables), Subsection 6.3, and Section 7 of the licensee's application dated February 6, 1978, and revisions dated September 26, 1978, and July 6 and 16, 1979 and a supplement dated August 3, 1979. Whenever the word "will," "would" or "should" is used in the above, it shall denote a requirement.
12. The maximum mill throughput shall not exceed 4700 pounds of barreled  $U_3O_8$  per day, averaged over a year.
13. The licensee is hereby exempted from the requirements of Section 20.203(e)(2) of 10 CFR Part 20 for areas within the mill, provided that all entrances to the mill are conspicuously posted in accordance with Section 20.203(e)(2) and with words, "Any area within this mill may contain radioactive material."
14. Any changes in the mill circuit or effluent collection systems, as illustrated and described in Subsections 3.2 and 3.5, Plates 3.1-1, 3.1-2, 3.1-3 and 3.1-5, Section 4, and Tables 4.1-1 and 4.1-2, of the licensee's application, shall require approval by the NRC in the form of a license amendment.
15. Operations shall be immediately suspended in the affected areas of the ore buying station or the mill if any of the emission control equipment, for the ore crushing or feed areas or the yellowcake drying or drumming areas specified in Table 4.1-1 of the licensee's application, is inoperative.
16. The results of sampling, analyses, surveys and monitoring, the results of calibration of equipment, reports on audits and inspections, and all meetings and training courses, committed to in Sections 4.5 and 7 and Subsections 3.2 and 3.5 through 3.7 and 6.3 of



the licensee's application and supplements and in the additional conditions to this license, as well as any subsequent reviews, investigations, and corrective actions, shall be documented. Unless otherwise specified in NRC regulations, all such documentation shall be maintained for a period of at least 5 years.

17. The licensee shall maintain a management control program which shall include written operating procedures, reviewed and approved by the Radiation Safety Officer, for all aspects of mill operations, including the radiation safety program and the environmental monitoring and control program. Approval by the RSO will be indicated by the signature of the RSO on the procedure.
18. A formal report of the quarterly review/audit of all audits and inspections as well as employee exposures (including bioassay data), effluent release data, and environmental data shall be prepared by the Internal Audit Committee and along with conclusions and recommendations submitted to the Vice President of Uranium Operations to determine (1) if there are any upward trends developing in personnel exposures for identifiable categories of workers or types of operations or effluent releases, (2) if exposures and effluents might be lowered under the concept of as low as reasonably achievable, and (3) if equipment for effluent and exposure control is being properly used, maintained, and inspected. This review shall include a review of the results of radiation safety and environmental monitoring programs data collected during the three previous quarters.
19. Eating and/or smoking shall only be allowed in control rooms, offices, or enclosed lunch areas.
20. In-plant airborne monitoring, committed to in Section 5 of the licensee's application and supplements, shall be performed under conditions typical of employee exposures. Along with results of airborne radioactivity, a record of the state of operation of both process and effluent control equipment and ventilation conditions shall be kept.
21. Release of equipment or packages from the restricted area shall be in accordance with Annex C, "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material," dated November 1976 (enclosed).
22. The licensee shall conduct at least biweekly surface contamination surveys (both smear and total contamination) in all eating areas, change rooms, control rooms, and mill administrative offices. Decontamination of these areas shall be in accordance with Annex C, "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material," dated November 1976 (enclosed).



23. The licensee shall implement a program to minimize dispersal of dust from the ore piles by water sprinkling or other dust suppression techniques, unless a documented weekly inspection indicates that the moisture content of the ore and/or weather conditions are controlling dusting. This program shall include the use of written operating procedures that specify the use of specific control methods for all conditions.
24. The licensee shall construct the tailings disposal facility to incorporate the features described in Alternative 1 of Section 10.3.2 and Section 3.2.4.7 of NUREG-0556, dated May 1979, subject to revisions based on the conclusions of the final Generic Environmental Impact Statement on Uranium Milling and any related rulemaking.
25. Construction of any of the tailings embankments shall not begin until the system design has been reviewed and approved by the NRC in accordance with Regulatory Guide 3.11. NRC approval shall be incorporated into this license by amendment and shall be required prior to embankment construction. Required freeboard and other operating requirements shall be determined during the review.
26. The licensee shall construct the liner system for the tailings area only after the final liner and liner system specifications and the program for installation, maintenance and inspection of the liner system have been reviewed and approved by the NRC staff. NRC approval shall be incorporated into this license by amendment and shall be required prior to liner construction.
27. The licensee shall provide for stabilization and reclamation of the mill site and tailings disposal areas and mill decommissioning as described in Alternative 1 of Section 10.3 and in Section 3.3 of NUREG-0556, dated May 1979, subject to revisions based on the conclusions of the Final Generic Environmental Impact Statement on Uranium Milling and any related rulemaking. Decontamination shall be in accordance with Annex C, "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material," dated November 1976 (enclosed). In addition, surety arrangements shall be provided prior to the initiation of mill operations and maintained in order to ensure completion of the mill site and tailings area stabilization, reclamation, and decommissioning plans.
28. Prior to the initiation of mill activities and the associated generation of tailings, the licensee shall submit to the Uranium Recovery Licensing Branch, U.S. Nuclear Regulatory Commission, Washington, DC 20555, documentation that ownership of lands to be used for tailings disposal has been acquired as described in the licensee's application and supplements.
29. At least three months prior to the initiation of mill operations and the associated generation of tailings, the licensee shall submit the

proposed surety arrangements as well as supporting documentation showing a breakdown of the costs associated with mill decommissioning and mill site and tailings area reclamation to the Uranium Recovery Licensing Branch, U.S. Nuclear Regulatory Commission, Washington, DC 20555. The licensee is required to receive approval of the surety arrangement held with the Utah Department of Natural Resources, Division of Oil, Gas and Mining, from NRC prior to the initiation of mill operations and the associated generation of tailings. Within 30 days of each revision thereafter, the licensee shall submit to the Uranium Recovery Licensing Branch a copy of the proposed revision of the surety arrangements covering mill decommissioning and mill site and tailings area reclamation as well as supporting documentation showing a breakdown of the costs associated with these actions and to obtain approval of the NRC.

The NRC will not terminate the license until final reclamation meets applicable NRC regulations.

30. The licensee shall implement an interim stabilization program that minimizes to the maximum extent reasonably achievable dispersal of blowing tailings. This program shall include the use of written operating procedures that specify the use of specific control methods for all conditions. The effectiveness of the control methods used shall be evaluated weekly by means of a documented tailings area inspection.
31. The licensee shall conduct and document at least one inspection of the tailings embankment per day and shall immediately notify Region IV, U.S. Nuclear Regulatory Commission, Office of Inspection and Enforcement, Arlington, TX, by telephone and telegraph of any failure in the dam retention system or tailings discharge system which results in a release of radioactive material and/or of any of any unusual conditions which if not corrected could lead to such a failure. This requirement is in addition to the requirements of 10 CFR Part 20.
32. The licensee shall monitor the use of the tailings impoundment by wildlife in conjunction with the program to conduct and document an inspection of the tailings discharge system once per shift.
33. The licensee shall consult and coordinate with the Utah Division of Wildlife Resources regarding the extent of fencing and other ways to mitigate any adverse impacts that may occur to deer and shall document the results of these actions.
34. Before engaging in any activity not previously assessed by the NRC, the licensee shall prepare and record an environmental evaluation of such activity. When the evaluation indicates that such activity may result in a significant adverse environmental impact that was not assessed, or that is greater than that assessed in the Final Environmental Statement (NUREG-0556), the licensee shall provide a

written evaluation of such activities and obtain prior approval of the NRC for the activity.

35. If unexpected harmful effects or evidence of irreversible damage not otherwise identified in NUREG-0556 dated May 1979 are detected during construction or operations, the licensee shall provide to the NRC an acceptable analysis of the problem and a plan of action to eliminate or significantly reduce the harmful effects or damage.
36. Mill tailings other than samples for research shall not be transferred from the site without specific prior approval of the NRC obtained through application for amendment of this license. The licensee shall maintain a permanent record of all transfers made under the provisions of this condition.
37. The results of the effluent and environmental monitoring program required by this license shall be reported in accordance with 10 CFR Part 40, Section 40.65. In addition, a copy of the report shall be sent directly to the Uranium Recovery Licensing Branch, U.S. Nuclear Regulatory Commission, Washington, DC 20555.
38. In addition to conducting the environmental monitoring program summarized in Appendix G of the application, the licensee shall perform air particulate monitoring as described in Appendix G of the application for "ore crusher stack" for all stacks from areas or process circuits in which ore, yellowcake or tailings are handled. Also, the licensee shall conduct a monitoring program to collect onsite meteorological data, e.g., wind speed and direction at 1-hour intervals and to annually reduce this data to a joint frequency distribution by wind speed, direction, and stability class. The results of these additional effluent and meteorological monitoring requirements shall be included in the licensee's semi-annual environmental monitoring report to the NRC.
39. The licensee shall conduct an annual survey of land use (grazing, residences, wells, etc.) in the area within five miles of the mill and submit a report of this survey annually to the Uranium Recovery Licensing Branch, U.S. Nuclear Regulatory Commission, Washington, DC 20555. This report shall indicate any differences in land use from that described in the licensee's Environmental Report (January 1978) and supplements or the previous annual report. The first annual report shall be submitted by August 1, 1980, and by August 1 each year thereafter.
40. The licensee shall avoid by project design where feasible the archeological sites designated "Eligible" in the attached Table A, below. Sites that will ultimately be located within 100 feet of the perimeter of the reclaimed tailings impoundment area are considered unavoidable and shall be recovered through archeological excavation.
41. The licensee shall conduct testing as required and shall report the results of the testing to enable the Commission to determine if those

archeological sites designated "Undetermined" in Table A are of significance warranting their redesignation as "Eligible." This action by the licensee shall be completed by January 1, 1981. In all cases such testing and a review of the testing results by the Commission shall be completed before any aspect of the undertaking affects a site.

42. The licensee shall conduct archeological and historic surveys and testing on the NE1/4 of Section 33, T37S, R22E to identify such additional sites as may be located there and to enable the Commission to evaluate their significance. The results of surveys and testing shall be reported to the Commission no later than December 1, 1979. The licensee shall avoid any site within this area until the Commission has reviewed the licensee's report and has advised the licensee of its determinations. If the Commission, upon review, amends Table A to include additional sites, the licensee shall take such action with respect to such additional sites as may be required for the sites that have initially been designated.
43. Condition 42, above, will apply to lands associated with the undertaking, but which have not currently been identified, e.g., to borrow areas outside the current project boundaries, with the exception that the results of surveys and testing may be reported to the Commission after December 31, 1979.
44. The licensee shall avoid any archeological site designated "Undetermined" in Table A.
45. When it is not feasible to avoid an archeological site designated "Eligible" in Table A, the licensee shall institute a data recovery program with respect to the site which the Commission determines will satisfactorily mitigate any adverse effect.
46. The licensee must cooperate with the Commission in the development and implementation of a monitoring program with respect to the preservation of cultural resources. The licensee shall have obtained the written approval of the Commission with respect to this program before initiation of ground-disturbing activities. The plan shall, among other things, include provision for (1) the presence during specified operations of an archeological contractor satisfactory to the Commission, and (2) appropriate action, including notice to the Commission and the SHPO and suspension of ground disturbing activities, upon discovery of previously unidentified cultural resources. An archeological contractor acceptable to the SHPO and meeting the minimum standards for a principal investigator as specified by the Secretary of the Interior will be considered satisfactory to the Commission.
47. The licensee shall recover through archeological excavation all "Eligible" archeological sites listed in Table A which are located in borrow areas, stockpile storage areas and construction areas. Recovery of all sites will be completed no later than December 31,



1982, with sites in the area of the first three tailings impoundment cells (the two evaporation cells and the first tailings cell) being recovered first.

48. The licensee shall have the archeological contractor approve the plan for the layout of haul roads, i.e., to best avoid sites, and shall obtain the written approval of the Commission for this plan prior to earth moving activities.
49. The licensee shall provide the additional documentation required to obtain a determination of eligibility for the "Earth Dam," "Range War Site," "Kunen Jones Home," "Posey War Sites," and "White Mesa Community" cultural sites prior to October 1, 1979. If the Earthen Dam is determined to be "Eligible," the licensee shall ensure that the Earthen Dam is recorded prior to its demolition or alteration so that there will be a permanent record of its existence. Energy Fuels Nuclear, Inc. will first contact the Historic American Engineering Record (HAER), Heritage Conservation and Recreation Service (Department of the Interior, Washington, DC 20243; telephone 202-343-4256) to determine the level of documentation required. All documentation must be accepted by the HAER prior to demolition or excavation. Copies of all documentation found acceptable to the HAER shall be provided to the Commission within one month of acceptance by the HAER.


TABLE A

Archeological Sites Related to the White Mesa Project

Eligible Sites			Undetermined Sites			Non-Eligible Sites			
42Sa	6379	6699	42Sa	3766	6436	7685	42Sa	6380	
	6385	6739		6381	6437	7686		6384	
	6387	6740		6382	6438	7688		6386	
	6388	7653		6383	6440	7692		6397	
	6392	7655		6389	6442	7694		6404	
	6393	7656		6390	6445	7695		6684	
	6394	7657		6391	6686	7696		6685	
	6395	7658		6398	6697	7699		6754	
	6396	7659		6399	6752	7750		7654	
	6403	7660		6400	6753	7751		7698	
	6405	7661		6401	6757	7752			
	6408	7665		6402	7662	7753			
	6427	7668		6406	7663	7754			
	6429	7675		6407	7664	7875			
	6430	7684		6419	7669	7876			
	6432	7687		6420	7670				
	6435	7689		6421	7671				
	6439	7690		6422	7672				
	6441	7691		6423	7673				
	6443	7693		6424	7674				
	6444	7696		6425	7676				
	6698	7700		6426	7679				
				6428	7680				
				6431	7681				
				6433	7682				
				6434	7683				
Total: 44			Total: 67			Total: 10			

*E. A. Trager, Jr.*

E. A. Trager  
Uranium Recovery Licensing Branch  
Waste Management Division

Approved by: 

Hubert J. Miller, Section Leader  
New Facilities Section  
Uranium Recovery Licensing Branch

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