SAFETY EVALUATION REPORT SOURCE MATERIAL LICENSE UNITED NUCLEAR CORPORATION MORTON RANCH URANIUM MILL

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1.0 DESCRIPTION OF PROPOSED ACTION

By application dated January 1, 1977 and numerous supplements United Nuclear Corporation (UNC) submitted a request for a source material license to operate a new uranium mill in Converse County, Wyoming in an area known as the Powder River Basin.

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A Final Environmental Statement, FES (NUREG-0532), issued in February, 1979, a geotechnical and hydrological safety analysis of the tailings impoundment and this Safety Evaluation Report provide the bases for conditioning a five-year term license.

2.0 REVIEW SCOPE

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The in-plant safety review of the UNC Morton Ranch Uranium Mill included an evaluation of the initial application dated January 1, 1977, a revision of the application dated September 1, 1977, an October 18, 1977 meeting with UNC to discuss deficiencies in their application and a review of the application revisions dated November 15, 1977, July 25, 1978, April 20, 1979, and April 23, 1979.

In addition, an inspection will be conducted by the NRC Office of Inspection and Enforcement Region IV staff (I&E) to evaluate UNC'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 will be located on a 9 ha (22 acrc) bench on a rise just north of the approximately 70 ha (175 acre) solution evaporation/ storage pond and dam. The prominent features on the mill bench will be the main process building, solvent extraction building, lab building, the ore storage pad, several storage tanks, a parking area and roadways. Tailings will be deposited in depleted ore pits just south of the solution pond. Tailings will eventually occupy approximately 55 ha (135 acres).

3.2 Mill Process

A schematic flow diagram for the proposed mill process is shown in Figure 1. The mill will operate 24 hours per day, 330 days a year during its projected 20 year operating life. Based on 1814 MT (2,000 tons) per day of ore, an average ore grade of .077% $U_3 O_8$ and 90.9% recovery the mill will produce 1270 kg (2800 lb) of $U_3 O_8$ perday. However because ore grades and the process rate are







Quantitative Material Flow per Minute in the Proposed Morton Ranch Mill Figure .1

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expected to increase the licensee is limited to a production rate of 1,088,640 kg (2,400,000 lb) of U_3O_8 per year. This is approximately equal to the production from 1814 MT per day of 0.2% U_3O_8 grade ore.

Loaded ore trucks from the mines are weighed and the ore dumped onto one of four 36,290 MT (40,000 ton) capacity stockpiles. A front-end loader transfers the ore to a hopper from where it travels by conveyor belt to a semiautogenous wet grinding mill. The grinding mill discharge is directed to a cyclone separator from which the denser material is returned to the grinder, and the slurry (about 55 weight percent solids) is routed to the leaching section. There the slurry is mixed with sulfuric acid, sodium chlorate and treated with steam to dissolve the uranium from the ore. The uranium bearing solution is then separated from the solids in a countercurrent decantation (CCD) section (thickeners). The tailings (from the last thickener) are pumped to an impoundment and the solution (from the first thickener) is clarified, filtered and pumped to the solvent extraction (sx) circuit.

In the solvent extraction process the uranium is removed from the pregnant aqueous solution by solvent ion-exchange (concentrated into an organic liquid). Most impurities remain in the barren aqueous solution which may be recirculated to the CCD circuit or discharged as tailings. The "pregnant" (uranium rich) organic solvent is cycled to the stripping portion of the sx circuit where the uranium is extracted by water containing ammonium ions. The stripped organic solution is recycled to the extraction portion of the sx circuit. The uranium bearing solution is routed to the precipitation section where ammonia is added to precipitate the uranium as ammonium diuranate. The precipitate is washed, dewatered and heated in a dryer to vaporize the water and traces of ammonia to form yellowcake, the final product. The yellowcake is then crushed and packaged in steel drums for shipment. The yellowcake drying, crushing and packaging operations are carried out in an isolated area served by ventillation systems from which airborne uranium particulates are collected by a wet scrubber.

4.0 FACILITY ORGANIZATION AND ADMINISTRATIVE PROCEDURES

4.1 Organization

The Plant Superintendent for the Morton Ranch project reports directly to the Vice President of UNC/TVA Wyoming and New Mexico Operations. The Plant Superintendent is responsible for directing all activities and personnel of the milling project. The Plant Superintendent will implement and ensure that the approved plant radiation safety program is adhered to in all aspects.



The General Mill Supervisor is responsible for supervising the operation of the mill. The General Maintenance Supervisor is responsible for supervising the maintenance of the mill. Both report to the Plant Superintendent through the Assistant Plant Superintendent. The Metallurgical Engineer and Chief Chemist also report to the Plant Superintendent through the Assistant Plant Superintendent.

The Radiation Safety Officer (KCO) reports directly to the Plant Superintendent and is responsible for all aspects of radiological safety including performance, documentation, and review of a program of environmental and work area surveillance. Radiation Technicians report to the RSO.

4.2 Radiation Safety Staff

The Radiation Safety Officer (RSO) advises the Plant Superstendent and others of potential radiation problems. The RSO has the acthority to halt unsafe practices at any time in any department subject to radiation hazards. Maintenance of exposure records, reviewing and approving operating procedures, performance and quality control of radiological analysis, developing and implementing radiation protection orientation and training programs, and supervising the Radiation Technicians are among the responsibilities of the RSO. This position carries full authority for the operations and requirements of the radiation safety program and the RSO has the necessary authority to discharge his duties. Radiation Technicians make up the RSO's staff and assist the RSO in implementing the entire program.

4.3 Minimum Technical Qualifications for Radiation Safety Staff

The following are the minimum technical qualifications required of the RSO and the Radiation Technicians.

- A. Radiation Safety Officer
 - 1. B. S. degree in an engineering or technical field closely related to a uranium mining and milling operation.
 - Training and/or experience in radiation safety and industrial safety protection.
 - 3. Working knowledge of radiation detection instruments.
 - 4. Knowledge of biological effects of radiation.
 - Working knowledge of analysis procedures, both chemical and mathematical.

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In addition, the mill licensing staff have conditioned UNC's license to require that the RSO have a minimum of two years radiation safety experience or an equivalent combination of experience and training.

B. Radiation Technicians

To qualify for the job of Radiation Technician, an applicant should have a high school diploma, or equivalent, with a science background. In addition, the RSO and other qualified persons give the Radiation Techicians on-the-job training and demonstrations related to their job.

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 of these positions.

4.4 Administrative Procedures

UNC has committed to maintaining sampling and surveying procedures, analytical procedures, respiratory protection procedures and procedures for yellowcake package and sampling.

The mill licensing staff have further required that the licensee also maintain a management control program which shall include use of management approved written operating procedures for the radiation safety program and the environmental monitoring and control program. Written procedures pertaining to all activities carried on in an area shall be available and followed in each area where radioactive material is processed, handled, or stored and shall be reviewed at least annually. In addition, the staff has also required that for any work or maintenance in these areas for which there is no effective operating procedure, and for any nonroutine maintenance or repair work, that a radiation work permit signed by a member of the radiation safety staff be prepared and used for performing these activities.

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 and that this program is consistent with that practiced at other uranium mills.

4.5 Audits and Inspections

UNC has committed to a monthly review by the RSO of survey records to insure completeness, detection of abnormal conditions and adequacy of followup actions. Records of the quality control program utilizing independent laboratories to verify sample analysis accuracy are audited quarterly as are the equipment calibration records. The



course content and records of radiation protection training courses are audited annually. Audits under the ALARA program are discussed below in Section 4.6.

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 yeas.

In addition to the above, the mill licensing staff have conditioned UNC's license to require a daily documented visual surveillance of all mill areas by each shift supervisor to insure proper implementation of good radiation safety practices and a weekly inspection by the Radiation Safety Officerof all work and storage areas and a written report to the Plant Superintendent on any items of non-compliance with operating procedures, license requirements, or safety practices affecting radiological safety.

UNC's audit and inspection program, as supplemented by the specific license conditions developed by the staff and discussed above, is comparable to programs that have proven to be effective at other mills.

4.6 ALARA Program

UNC has committed to keep occupational radiation exposures as low as reasonably achievable. Quarterly, an ALARA committee reviews exposure evaluations with the goal of minimizing exposures, reviews employees suggestions relative to radiation safety protection, and investigates problem areas. The committee chairman is the RSO and the other members are the Plant Superintendent, General Maintenance Supervisor, General Mill Supervisor, Shift Foreman, one hourly maintenance person, one hourly operations person and a radiation technician. Reports of the ALARA committee are furnished to the Plant Superintendent, Resident Manager, and the Vice President UNC/TVA operations. An annual review of the ALARA Committies inspections findings, recommendations and corrective actions is also conducted. This audit will include reviews of operating procedures, effluent and environmental monitoring, and past exposure records to determine how exposures might be 'owered. The Vice President UNC/TVA Operations and the Resident Manager will be added to the ALARA Committee for the annual audit. The Vice President is responsible for acting on the ALARA Committee's recommendations from both the quarterly and annual audits. UNC also intends to employ outside consultants to conduct supplementary inspections and audits as an means of reducing radiation exposures.

In addition, the mill licensing staff has conditioned UNC's license to require that the annual audit report shall include conclusions

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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) in equipment for effluent and exposure control is being properly used maintained and inspected. This requirement was developed by the staff to provide a document which would clearly indicate UNC's compliance with the "ALARA" concept.

UNC's acceptance of this license requirement along with UNC's audits, inspections, employee training, and administrative procedures, demonstrates both a commitment and a mechanism to ensure compliance with the "ALARA" concept.

4.7 Personnel Training

Basic training in radiation protection will be given to all plant employees before starting work. The RSO will develop and implement the radiation protection training program.

Training in radiation protection and plant safety will be given to all new employees. A follow-up session will be conducted with each new employee during the first three months of employment.

An annual test of each employee's understanding . the Radiation Safety Program will be conducted. Plant employees will receive on-the-job training from plant supervisors, the RSO, and the radiation protection staff. Plant employee's job performance with respect to radiation protection will be appraised annually by his supervisor and the RSO to determine if retraining is necessary. Documentation will be retained of new employees indoctrination, orientation and follow-up, of training and test results and of evaluations of on the-job performance.

Additional training will be given to supervisors so they will be able to provide specific job-related training and evaluate their subordinates' performance. Supervisor training will be documented in the same manner as indoctrination training, with retraining required annually.

Radiation technicians will receive on-the-job training and demonstrations from the RSO and other qualified persons. Retraining and/or retesting is required every two years. Training will be documented in the same manner as indoctrination training.

The RSO will receive training biennially which will include recognized schools or courses if available.

In addition the staff has conditioned UNC's license to require the license to conduct at least a 30 min is meeting each month for the purpose of reviewing and updating employees radiation protection training and to maintain records of employee attendance.

The overall training program proposed by UNC when supplemented by the above condition is 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

The mill was designed to combine efficient operations with minimized environmental impacts and safety hazards. To this end the mill circuit is essentially enclosed and wet, thereby eliminating the hazards associated with dry operations. The design of the mill is such that any leaks or spills will be promptly collected and recyled to the appropriate part of the process. Emission control equipment is listed in Table 1.

TABLE 1

Emission Control Equipment Summary

Release Location	Equipment Serviced	Control Employed Wet Scrubber and Wet Grinder	
Stac': 1	Grinding Circuit		
Stack 2	Leach Circuit and Surge Tanks	Wet Scrubber	
Stack 3	Yellowcake Thickeners Precipitation Tanks	Wet Scrubber	
Stack 4	Yellowcake Dryer and Packaging	Wet Scrubber & Bag Dust Collector	
#1 Laboratory Hood	Chemical Laboratory	Wet Scrubber	
#2 Laboratory Hood	Chemical Laboratory	HEPA Filter	

An electrical interlock system will a tomatically shut down the yellowcake dryer if any component fails. A differential pressure modulator automatically shuts down the flow to the bag filter and cycles it to clean to ensure that the bag filter is not operated when plugged. Failure of the scrubbers, including loss of water to the scrubber or power to the fan would be alarmed and the unit automatically shut down. The licensee has committed to documented hourly checks of the drying and packaging area scrubbers and to suspend operations in the area if the scrubbers are malfunctioning. Water flow, air flow, and bag filter differential pressure will be included in the checks.

Spillage of solids, slurry and solutions will be minimized by instrumentation on the control panel: for monitoring flow and tank levels in the leaching, thickening, solvent extraction and precipitation processes. Floor areas within the plant are divided with curbs and equipped with separate floor sump pumps. Spillage from one area is therefore isolated so that it can be returned to the respective process. Yellowcake area shower drain waters and water used to launder procession or sent to the tailings. Laboratory wastes are sent to the tailings.

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

a. Ore Storage Pads

UNC 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. The ore pad and mill area are graded to allow rainwater runoff or spillage to be routed to the tailings pond.

b. Ore Receiving and Grinding

The ore handling conveyors will be sprayed with water as necessary to minimize dust. A dust collection system with a wet scrubber serves the ore handling conveyor transfer points. The ore will be wet ground which will minimize the creation of dust.

c. Leaching

The Leach tank effluents will be vented through a wet scrubber and the acid removed by the scrubber will be returned to the mill 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 from the final stage of thickening to the tailings impoundment area. The solution overflow from the first thickener is sent to the solvent extraction system. No emission control system is utilized at this stage of the process.

e. Solvent Extraction

Vapors from the solvent extraction system will result from evaporation and 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 ammonium diuranate, yellowcake, which is thickened by dewatering. Effluents from this process are vented through a wet scrubber and the water discharged from the scrubber is returned to the process.

g. Concentrate Drying and Packaging

The thickened yellowcake slurry is further dewatered by a centrifuge and pumped to a multiple hearth furnace for drying. The dried yellowcake is passed through a crusher and then packaged in steel drums. The entire drying and packaging operation is conducted in an isolated area equipped with high capacity ventilation systems and a wet scrubber. A bag filter is used to reduce the particle loading to the scrubber from all but the yellowcake dryer exhaust.

h. Tailings Impoundment

UNC will be required to control release of airborne particulates from tailings by use of a water sprinkler system, chemical stabilzation, or covering with soil or water unless the moisture content of the tailings and/or weather conditions are controlling dusting. The effectiveness of the control method used shall be evaluated weekly by means of a documented tailings area inspection. The equipment and techniques to be used by UNC for process effluent control are considered to be state of the art for the uranium milling industry.

5.2 In-Plant External Radiation Monitoring Program

Some measurable 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. Intermediate or final products may accumulate in pipes and tanks and create local radiation areas. A beta-gamma survey will be conducted at four week intervals in each mill circuit. A total of forty-seven locations within the restricted area will be surveyed. The staff have reviewed these points and found both the number and locations to be adequate. In addition, the staff have determined that the survey meters available at the mill will be adequate for these surveys. UNC's license has been conditioned to require that all radiation monitoring and sampling equipment shall be calibrated after repair and at least semiannually or at the manufacturer's suggested interval, whichever is sooner, and also that a check source shall be used to assure that radiation detection instruments are operating properly before each use.

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

5.3 Personnel Dose Rate Monitoring

Film badges will be worn by a representative group in the operational area. Twenty-five employees will wear film badges on a permanent basis. If an employee is expected to reach 25% MPC the employee will be badged. If the area surveys show an area exceeds 25% MPC further monitoring by use of film badges will commence. Control badges will be used at each operators post. Film badges are processed quarterly. This program meets the guidelines described in "IAEA Safety Series No. 43," pages 19 and 20.

5.4 Contamination Surveys

UNC has committed to perform smear surveys for removable alpha in all production and non-production areas prior to startup to establish baseline data and monthly thereafter. If any area exceeds 1000 dpm $\alpha/100$ cm² it will be decontaminated and an investigation to control the source will be initiated by the RSO. In addition, the staff has required that at least bi-weekly surface surveys (both smear and total contamination) be conducted in all eating areas, changes rooms, control rooms, and mill administative offices. The staff has required that decontamination of these areas and 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. The staff has also required that each shift supervisor conduct and document a daily visual s veillance of all mill areas to insure proper implementation of good radiation safety practices, including good cleanup 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.

In addition, all protective clothing will be laundered on site.

5.5 In-Plant Airborne Monitoring Program

Most airborne contaminants in the mill are expected to result from localized sources. Because concentration gradients in the vicinity of

points of releases 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 chanium. 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.

Particulate Sampling

Airborne particulate radioactivity will be sampled monthly at at least forty-seven locations. These locations are based on expected employee occupancy and sources of airborne radioactivity. These General Area (GA) samples will be taken monthly for at least sixty minutes and analyzed for uranium. Th-230 and Ra-226 analysis will be performed semi-annually on a representative sample for each job function area. Special area samples will be taken during all non-routine maintenance of yellowcake processing equipment. The licensee states that all area samples will be performed under conditions typical of employee exposure and that ventilation and processing conditions will be recorded for that area when the sample is taken.

Lapel samplers will provide the data for breathing zone samples. These samplers will be worn by a representative group of mill operators on each shift for one full shift every four weeks to substantiate GA samples. Personnel employed in sample preparation, precipitation, yellowcake drying and packaging areas will be required to wear these samplers on each shift for one full shift per week. Lapel samplers will be worn by mill personnel during all yellowcake area maintenance and any other in-plant maintenance activity that could produce dust.

This program exceeds the staff's minim m requirements for particulate sampling.

Radon Sampling

Radon-222 sampling will be done monthly at nineteen stations for one year after startup and then reduced to one representative sample in seven operational areas per month. The Rn-222 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 radon sampling and analysis will be used.

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

Exposure Calculations

A time study based on computerized daily time sheets 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 and breathing zone airborne concentration data, will be used to calculate exposures. A computer program or equivalent method will be used to determine weekly, monthly, and quarterly exposures.

Exposure data is required by license condition to be reviewed annually 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.

UNC'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, ar Protective Clothing

Persons required to work yellowcake product areas or perform maintenance on equipment om these areas will be issued coveralls. These coveralls will be laundered in facilities maintained at the mill for this purpose.

Clothing change facilities will be provided for mill personnel so that they may leave their work clothes at the mill. Shower facilities are also provided for mill personnel. All employees are required to either shower or monitor themselves for alpha contamination. If clothing is not changed, the clothing will be monitored. Daily shower and clothing change or monitoring records will be maintained. The licensee will perform and document spot surveys for alpha contamination quarterly on all employees leaving the plant. Alpha contamination on skin (or clothes if the employee does not shower) greater than 1,000 dpm/100 cm² shall be cause for additional showering or decontamination and an investigation by radiation safety staff.

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

2. Respirators

UNC's respiratory protection program is based on Regulatory Guide 8.15, "Acceptable Programs for Respiratory Protection" and NUREG-0041, "Manual on Respiratory Protection Against Airborne Radioactive Materials." This program will be directed by the RSO. Respiratory protection will be required for employees if airborne levels are likely to exceed 25% of MPC. Respiratory protection will be used by all employees working in the yellowcake drying and packaging areas.

5.7 Bioassay Program

The licensee has committed to the bioassay program specified in Regulatory Guide 8.22.

6.0 ENVIRONMENTAL AND EFFLUENT MONITORING PROGRAMS

UNC will conduct an effluent and environmental monitoring program as specified in Table 5.5-1 of their application and modified by Condition No. 29 of their license. Sample data will be correlated with meteorological data. The program in Table 5.5-1 adds a sample point in the seepage collection dike, and removes total suspended particulates (TSP) from items analyzed with the low volume samplers. Condition 29 requires that the licensee conduct meteorological monitoring including joint frequency distribution by wind speed, direction, and stability class and it requires that stack samples be taken from an additional mill stack and from stacks from any laboratory hoods serving work stations where ore, yellowcake or tailings are handled. The staff has determined that these changes do not reduce the quality of UNC's monitoring program from that described in the FES.

7.0 RESTRICTED AREA MARKINGS AND ACCESS CONTROL

The entire facility (mill, pond, tailings impoundment) is located within a 21,500 acre mining lease area. The Morton Ranch is fenced. Residences are not permitted within the mine lease area. The mill site restricted area (about 700 acres including the mill, tailings, pond, and tailings impoundment) will be fenced and posted with signs in accordance with 10 CFR 20.203. Visitors to the mill will be admitted only by permission of either the Resident Manager, Plant Superintendent, Foreman, or RSO. All visitors will be required to register and will be escorted while within the secured area. Visitors having work assignments shall be given security, safety and radiation protection orientation prior to being allowed to perform their duties without escort.

By license condition the licensee has been exempted from the requirements of Section 20.203(e)(2) of 10 CFR 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."

8.0 EMERGENCY PROCEDURES

The RSO will develop emergency procedures for the project before operation. A detailed spill prevention plan will be developed. Accidents which are possible for this type of activity have been identified in Section 5 of the FES (NUREG-0532). Precautions and measures which the applicant will take to reduce the possibility of occurrence of these accide is include the following:

1. Tailings Impoundment

UNC will make and document at least daily an inspection of the entire tailings retention system including the embankments of the tailings retention area. UNC will also maintain a minimum of 9 feet of free-board between the top of the tailings dam and the pond level throughout the project life.

2. Fire Protection

The mill fire protection system will include a 1000 gallon capacity fire truck, a fire hydrant system with foam injection capability, 3000 gpm pumps, portable fire extinguishers located throughout the mill and designated employees trained for fire fighting. Heat detectors will automatically activate the foam sprinkler system in the organic area.

Spill Prevention and Containment

Most tanks will be located within the mill building where floor areas are divided with curbs and equipped with separate floor sump pumps. Instrumentation to monitor tank levels and system flow rates will help to prevent spills due to over topping tanks. Outside tanks are enclosed by dikes for containment of spills.

9.0 DECOMMISSIONING

In Response No. 28 of the licensee's Environmental Report, Supplement II (received September 6, 1977), UNC submitted to NRC a decommissioning and

stabilization plan for the Morton Ranch Uranium Mill that outlines a generalized program to return the lands distu bed by the project to their former use and productivity. The plan addresses facility decommissioning, tailings stabilization, and land reclamation by planned revegetation. By submittal dated January 13, 1978 and January 26, 1979, the licensee increased their proposed tailings cover to a minimum of 4 feet of overburden, 2 to 2-1/2 feet of clay, 4 feet additional overburden, and 6 to 8 inches of topsoil. And by submittal dated August 8, 1978, the licensee added a decommissioning plan for the solution pond.

UNC has further committed to submission of a detailed decommissioning plan for approval by the Commission prior to terminating the milling operation and to maintenance of a bond with the State of Wyoming until successful reclamation has been accomplished. In addition, UNC has committed to decommissioning of facilities or equipment in accordance with Annex C, "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licensing for Byproduct, Source or Special Nuclear Material," which is an informal guide prepared by NMSS staff.

10.0 BONDING

Prior to the initiation of milling activities and the associated generation of tailings, UNC will be required by license condition to revise their present bond held by Wyoming Department of Environmental Quality to include tailings and mill site reclamation costs reviewed and approved by the NRC staff. UNC will also be required by license condition to submit to NRC staff a copy of the annual revision of the bond covering mill decommissioning and mill site and tailings area reclamation as well as supporting documentation showing a breakdown of the costs associated with reclaiming the mill and the tailings area.

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 Headquarter staff, the staff has concluded that issuance of a license to UNC, 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 40. The staff has further determined that conformance by UNC to their proposed conditions, as well as those developed by the staff, should ensure a safe operation.

The staff, therefore recommends that UNC be issued a license subject to the following conditions:

- 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-1356.
- Authorized place of use: The licensee's uranium milling facilities located in Converse County, Wyoming.
- 11. For use in accordance with statements, representations, and conditions contained in subsection 2.1, Figure 2.2-3, Section 3, Section 4 exclusive of subsection 4.2.1, Section 5 (including appendices), and subsection 7.5, all from licensee's application dated January 1, 1977 and supplements dated November 15, 1977, July 25, 1978, April 20, 1979 and April 23, 1979. Whenever the word "will" or "should" is used in the above mentioned sections, it shall denote a requirement.
- The maximum mill throughout shall not exceed 2,400,000 lbs. of u₃J₈ per year.
- 13. The licensee is hereby exempted from the requirements of Section 20.203(e)(2) of 10 CFR 20 for reas 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 and dust collection systems as illustrated and described in pages 3-3, 3-4, 3-27A and 4-2 of the licensec's application and supplements shall require approval by the NRC in the form of a license amendment.
- 15. The licensee shall stabilize and reclaim the solution pond and tailings disposal area in conformance with Section 3.2.5, Section 10.4.4 and Section 10.4.5 of NUREG-0532, dated February 1979 and Response No. 12 of licensee's August 8, 1978 submittal. In addition, surety arrangements covering the tailings reclamation costs shall be maintained as required in Condition No. 17 of this license.
- 16. The licensee shall decommission the mill site in conformance with Response No. 28 of Supplement II of their Environmental Report, undated, received by NRC September 6, 1977, and licensee's submittal dated May 4, 1978. In addition, surety arrangements covering the mill site decommissioning costs shall be maintained as required in Condition No. 17 of this license.
- 17. Prior to the initiation of mill activities and the associated generation of tailings, the licensee shall revise the reclamation bond held with the Wyoming Department of Environmental Quality to include tailings and mill site reclamation costs. The licensee shall submit this bond 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. NRC, Washington, D.C. 20555. The licensee is required to receive approval of the bond held with the Wyoming Department of Environmental Quality from NRC prior to the initiation of mill activities and the associated generation of tailings. Within 30 days of each annual revision thereafter, the license shall submit to the Uranium Recovery Licensing Branch a copy of the annual revision of the bond covering mill decommissioning and mill site and tailings area reclamation as well as supporting documentation showing a breakdown of the costs associated with reclaiming the mill and the tailings area.

- 18. 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. NRC, Washington, D.C. 20555 documentation that ownership of lands to be used for tailings disposal has been acquired as described on pages 2-1, 2-1A and 2-4A of the licensee's application and supplements.
- 19. The licensee shall minimize dispersal of dust from the ore piles by water sprinkling or other dust suppression techniques as stated on pages 3-14 and 4-1 of the licensee's application and supplements, unless a documented weekly inspection indicates that the moisture content of the ore and/or weather conditions are controlling dusting.
- 20. The licensee shall control release of airborne particulates from tailings by use of a water sprinkler system, chemical stabilization, or covering with soil or water unless the moisture content of the tailings and/or weather conditions are controlling dusting. The effectiveness of the control method used shall be evaluated weekly by means of a documented tailings area inspection.
- 21. Mill tailings other than samples for laboratory research shall not be transferred from the site without specific prior app rail 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.
- 22. The licensee shall conduct and document at least one inspection of the tailings embankment per day and shall immediately notify Region IV, USNRC, Office of Inspection and Enforcement, Arlington, Texas, by telephone and telegraph of any failure is the dam retention system, tailings discharge system or tailings impoundment which results in a release of radioactive material. This requirement is in addition to the requirements of 10 CFR 20.
- 23. The licensee shall maintain between the maximum operating pond level and the top of the dam a minimum of nine feet of freeboard.

- 24. Construction, maintenance, and operation of the tailings retention system shall be in accordance with the specifications, representations, and commitments in the following documents:
 - A. Report of Investigation and Design, Tailings Disposal Area, Morton Ranch Mine and Mill, Converse County, Wyoming, for United Nuclear Corporation by Dames and Moore, October 31, 1977.
 - B. Addendum I to October 31, 1977 Dames & Moore Report, United Nuclear Corporation's Response to NRC's January 31, 1978 letter requesting additional information, UNC Transmittals dated February 24, 1978 and April 10, 1978.
 - C. Addendum II to October 31, 1977 Dames & Moore Report, United Nuclear Corporation's Response to Q-2 Questions as Set Forth by the U. S. Nuclear Regulatory Commission, letters dated April 17, 1978 and May 2, 1978, Requesting Additional Information, UNC Transmittal dated June 13, 1978.
 - D. Addendum III to October 31, 1977 Dames & Moore Report, United Nuclear Corporation's Response to NRC's Comment on Embankment Foundation, UNC Transmittal dated Decem 12, 1978.
 - E. Contract Specifications and Drawings for Evaporation Pond and Embankment Near Casper, Wyoming for United Nuclear Corporation, Morton Ranch Mine, prepared by Dames and Moore, Revised December 1978.
 - F. Letter from Plant Superintendent, Wyoming Operations, United Nuclear Corporation to USNRC, revising riprap gradation, Docket No. 40-8602, February 5, 1979.

In addition, the tailings dam shall be raised to crest elevation 5282 feet prior to mill operation. Also, the licensee shall not expand the tailings disposal area by raising the height of the dam beyond that recified in the Contract Specification, item "E" above, or by constructing any additional dams not specified in the above documents without specific prior approval of the NRC obtained through application for amendment of this license.

- 25. The licensee shall comply with the following regarding construction, maintenance and operation of the tailings retention system:
 - A. Notify Region IV, USNRC, Office of Inspection and Enforcement, Arlington, Texas and the Uranium Recovery Licensing Branch, USNRC, Washington D.C., at least six weeks prior to the following construction features to provide adequate time for onsite inspections by the NRC:

- i. When for idation excavation is near completion and prior to placement of embankment f 11.
- ii. During embankment fill placement at approximately 10 percent and 70 percent stages of completion.
- B. Submit to the Uranium Recovery Licensing Branch, USNRC, Washington, D.C., within six months after completion of each stage of construction, as-built drawings showing construction details of the basin liner, key trench, backfill operations in open pits within reservoir, embankment and instrumentation, and a construction report summarizing the following:
 - Specification requirements and actual gradation test results on materials used.
 - ii. Compaction control test results.
 - iii. Construction equipment and procedures.
 - iv. Unexpected conditions and problems encountered in construction, and method employed to resolve these problems.
- C. Submit to the Uranium Recovery Licensing Branch, USNRC, Washington, D.C. for approval your operational inspection and surveillance program for the mill tailings embankment retention system and discharge/ decant systems. This program shall be submitted by January 1, 1980.
- 26. The licensee shall immediately notify the Uranium Recovery Licensing Branch, USNRC, Washington, D.C. and the O'fice of the Wyoming State Archeologist if any buried archeological materials including bones, firepits or any other artifacts of earlier cultures are encountered during site preparation or operation. Upon discovery of archeological materials the licensee shall halt activities in the immediate vicinity until there has been an opportunity for the NRC to determine the significance of the site and, in indicated, all mitigating measures deemed appropriate by the NRC have been completed. In addition, prior to disturbance of any lands for mill-related activities, not included in the survey documented in Volume II of the licensee's Environmental Report (dated 1976) or the survey documented in licensee's January 10, 1978 submittal, the licensee shall have an archeological survey performed and shall not proceed with any land disturbance until the survey report has been reviewed and approval to proceed has been received from the NRC.
- 27. Before engaging in any activity which the licensee reasonably determined was 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-0532), the licensee shall provide a written evaluation of such activities and obtain prior approval of the NRC for the activity.

- 28. If unexpected harmful effects or evidence of irreversible damage not otherwise identified in NUREG-0532 dated February 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.
- 29. In addition to the effluent and environmental monitoring program described in Table 5.5-1 of the licensee's application and supplements, the licensee shall semi-annually measure the flow rate, obtain a representative sample and analyze the samples for U-nat for the yellowcake thickeners and precipitation tanks stack and from stacks from any laboratory hoods/stacks serving work stations where ore, yellowcake, or tailings are handled. Alse, in addition to the meteorological monitoring program described in the licensees application the licensee shall prepare joint frequency distribution by wind speed, direction, and stability.

The results of these additional effluent and meteorological monitoring requirements shall be included in the licensees semiannual environmental monitoring report to NRC.

Radon monitoring shall be as stated in Table 6.3 of NUREG-0532, dated February 1979.

30. The licensee shall maintain a management control program which shall include use of management approved written operating procedures, reviewed and approved by the radiation safety staff, for all aspects of mill operations, including the radiation safety program and the environmental monitoring and control program. Written procedures pertaining to all activities carried on in the area shall be available and followed in each area where radioactive material is processed, handled, or stored and shall be reviewed at least annually.

In addition, for any work or maintenance in these areas for which there is no effective operating procedure and for any nonroutine maintenance or repair work, a radiation work permit signed by a member of the radiation safety staff shall be prepared and used for performing these activities.

31. 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 and 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). 32. A weekly inspection shall be made by the Radiation Safety Officer of all work and storage areas and a written report submitted to the Plant Superintendent on any items of noncompliance with operating procedures, license requirements, or safety practices affecting radiological safety.

Each shift supervisor shall conduct and document a daily visual surveillance of all mill areas to insure proper implementation of good radiation safety practices, including good clean-up practices to minimize surface buildup of radioactive particulates.

- 33. 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. NRC, Washington, D.C. 20555. This report shall indicate any differences in land use from that described in the licensee's Environmental Report (dated 1976) and supplements or the previous annual report. The first annual report shall be submitted by March 1, 1980, and then with the environmental monitoring report submitted by March 1 each year thereafter.
- 34. The annual audit report specified on page 5-23 of the licensee's application and supplements 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.
- 35. Eating in restricted areas shall only be allowed in control rooms, offices, or enclosed lunch areas.
- 36. In addition to the statements on page 5-23 of the licensee's application, the licensee shall compute exposures in accordance with the requirements of 10 CFR 20.
- 37. The licensee shall conduct at least a thirty minute meeting for mill employees each month for the purpose of reviewing radiation protection topics and shall maintain records of employee attendence.
- 38. All radiation monitoring and sampling equipment shall be calibrated after repair and at least semiannually or at the manufacturer's suggested interval, whichever is sooner. Also, a check source shall be used to assure that radiation detection instruments are operating properly before each use.
- 39. In addition to the provisions of Section 5.2 of the licensee's application, the Radiation Safety Officer shall have a minimum of two years radiation safety experience or an equivalent combination of experience and training.

- 40. The General Area air samples specified on page 5-20 of the licensee's application and supplements shall be taken and analyzed for uranium at least monthly.
- 41. The licensee shall provide the Uranium Recovery Licensing Branch, USNRC, Washington, D.C., with an evaluation of the stability of the proposed pit liner. NRC approval of the liner design and incorporation of the approved design into this license by amendment shall be required prior to construction of the liner.

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Lawrence W. Rossbach Un nium Recovery Licensing Branch Division of Waste Management

Approved by:

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Ross A. Scarano, Section Leader Uranium Recovery Licensing Branch Division of Waste Management