

SAFETY EVALUATION REPORT
FOR
UMETCO MINERALS CORPORATION
WHITE MESA URANIUM MILL
LICENSE SUA-1358
DOCKET NO. 40-8681

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1.0 INTRODUCTION

1.1 Description of the Proposed Action

By application dated January 30, 1985 and supplement dated June 20, 1985, Umetco Minerals Corporation requested renewal of Source Material License SUA-1358 for their White Mesa Uranium Mill to authorize processing of 2000 tons per day of uranium bearing ore for the production of 4,380 tons of yellowcake per year. The proposed action is to grant a renewal of the subject license.

1.2 Background Information

Umetco Minerals Corporation (Umetco) is a wholly owned subsidiary of Union Carbide Corporation. In January of 1984, Umetco purchased a controlling interest in the White Mesa uranium mill from Energy Fuels Nuclear, Inc. (EFN). The White Mesa mill operated on a continual basis from August 1979 through February 1983, when operations were suspended. Umetco proposes to resume operations at the White Mesa Mill in late 1985.

1.3 Review Scope

The safety review of the Umetco's request for license renewal included evaluations of (1) the renewal application dated January 30, 1985; (2) a supplement to the renewal application dated June 20, 1985; (3) compliance history for the White Mesa mill; and (4) the following in-plant monitoring data supplied by Umetco:

<u>Type</u>	<u>Years</u>
Airborne Uranium Concentrations	1980-1982
Radon Daughter Concentrations	1980-1982
TLD Penetrating Radiation Levels	1980-1982

Umetco's proposed programs were evaluated against NRC regulations as specified in 10 CFR Part 20 and NRC staff policy as documented in the following publications:

- (1) Regulatory Guide 3.11 - "Design, Construction and Inspection of Embankment Retention Systems for Uranium Mills."
- (2) Regulatory Guide 3.11.1 - "Operational Inspection and Surveillance of Embankment Retention Systems for Uranium Mill Tailings."

- (3) Regulatory Guide 4.15 - "Quality Assurance for Radiological Monitoring Programs (Normal Operations) - Effluent Streams and the Environment."
- (4) Regulatory Guide 8.15 - "Acceptable Programs for Respiratory Protection."
- (5) Regulatory Guide 8.22 - "Bioassay at Uranium Mills."
- (6) Regulatory Guide 8.30 - "Health Physics Surveys in Uranium Mills."
- (7) Regulatory Guide 8.31 - "Information Relevant to Ensuring That Occupational Radiation Exposures at Uranium Mills Will Be As Low As Is Reasonably Achievable."
- (8) Staff Technical Position WM-8201 - "Hydrologic Design Criteria For Tailings Retention Systems."

2.0 AUTHORIZED ACTIVITIES

The renewed license will authorize Umetco to continue to process uranium ore for the production of not more than 4,380 tons of yellowcake per calendar year.

2.1 Facility Description

Umetco's White Mesa mill is located in San Juan County, Utah, approximately 9.95 km southwest of Blanding, Utah. (See Figures 1 and 2.) Major mill features include a six acre ore stockpile area and a small sample plant which is used only infrequently to determine the uranium content of tolled ore. The ore is initially processed in the main mill building which contains a semi-autogenous grinder, acid leach circuit and a counter current decantation circuit (CCD). A separate building houses the solvent extraction circuits, one for uranium and one for vanadium. The solution containing the uranium is then returned to the mill building where it is precipitated, dried and barrelled. Reproductions of the generalized flowcharts for uranium milling and recovery of vanadium at Umetco are included as Figures 3 and 4.

The White Mesa mill occupies 34 acres and the tailings system occupies another 132 acres. The tailings system consists of three partially excavated, synthetically lined cells. Operation of a 2000 tpd mill will fill cells 2 and 3 by the end of the renewal period. A fourth cell had been excavated but is not fully prepared or anticipated for use during the renewal period.

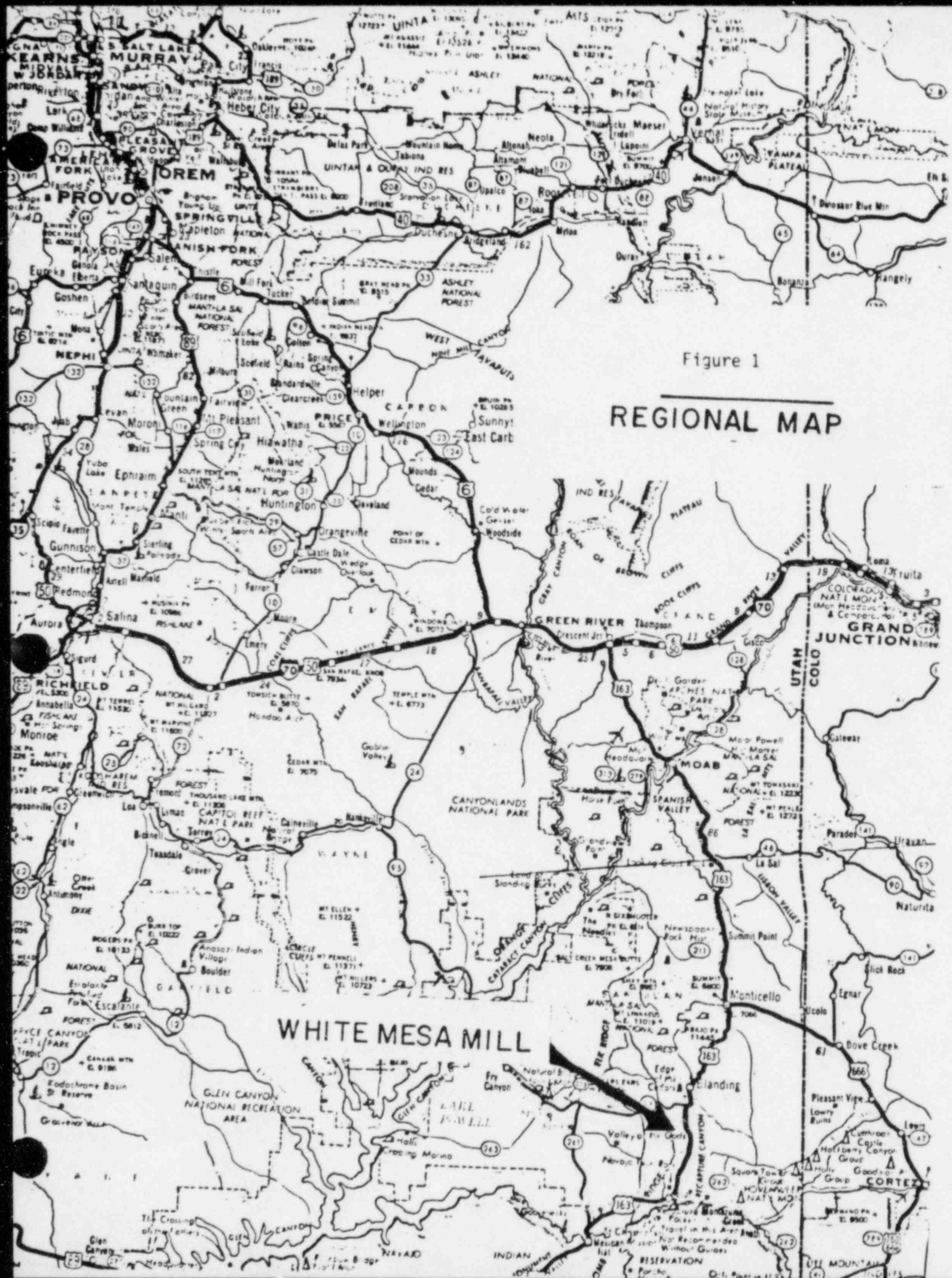


Figure 1

REGIONAL MAP

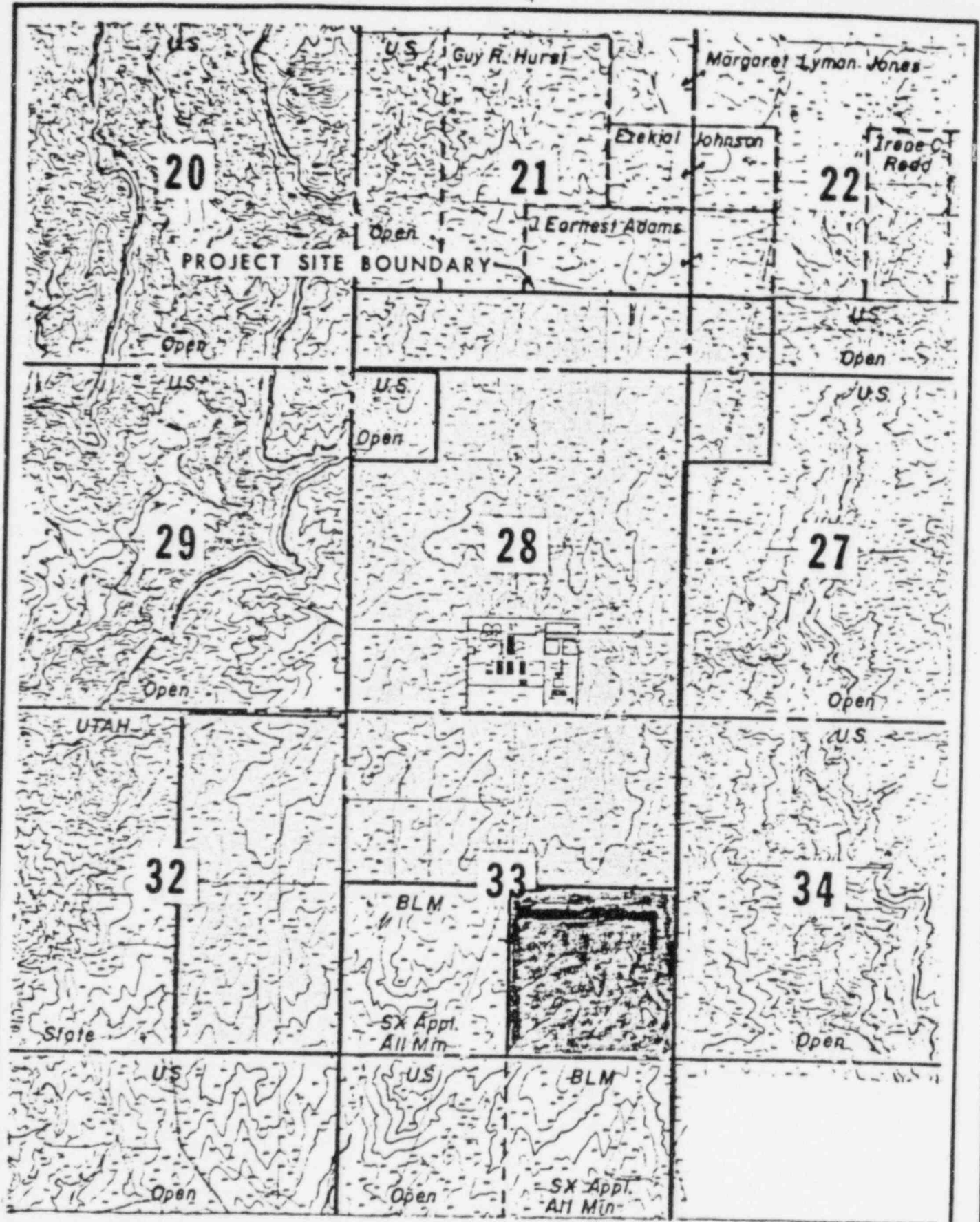


Figure 2

PROJECT SITE MAP

(TOWNSHIP 37 SOUTH RANGE 22 EAST)

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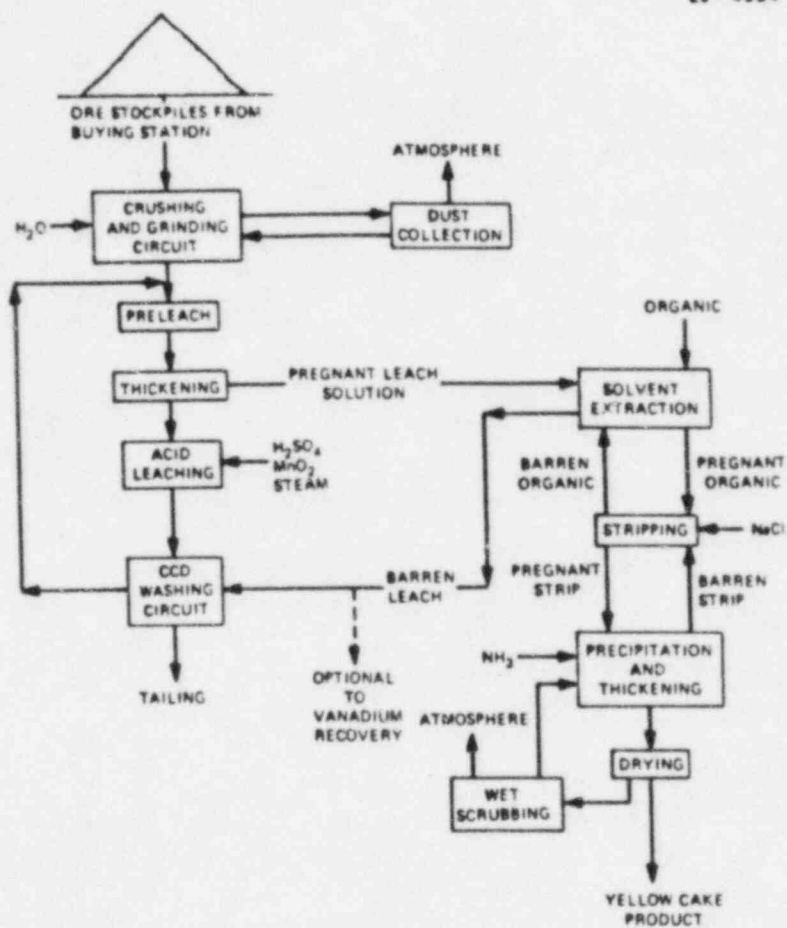


Fig. 3 Generalized flowchart for the uranium milling process. Source: ER, Plate 3.2-1.

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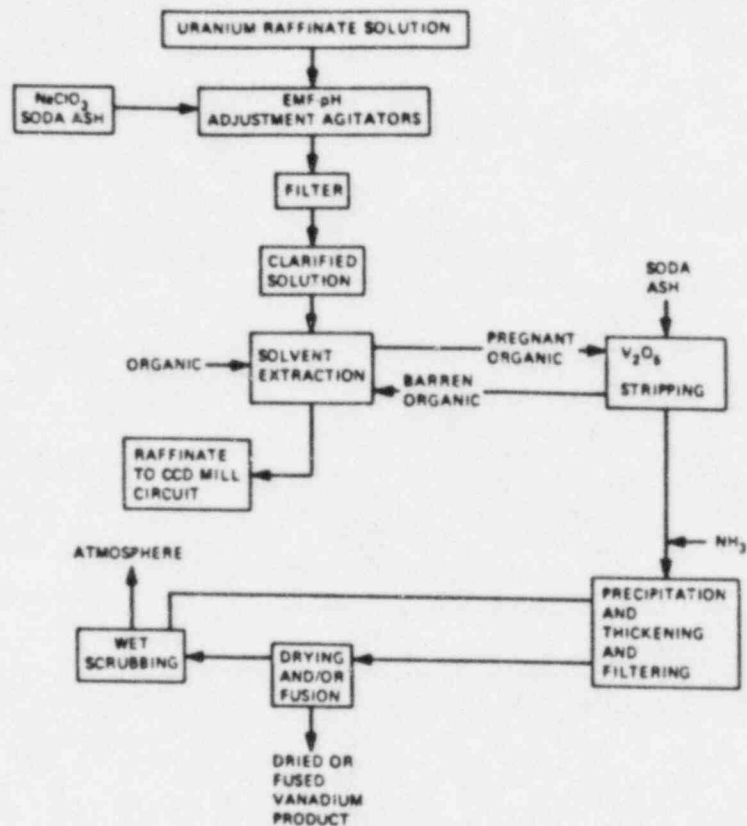


Fig. 4 Generalized flowchart showing recovery of vanadium. Source: ER, Plate 3.2-3.

2.2 Operations

Operations at the White Mesa mill begin with the weighing, sampling and stockpiling of the ore from the various mines. Mine ore as well as stockpiled and crushed ore is usually fed at the rate of 2000 tons per day to the semi-autogenous grinding (SAG) mill. The ground ore is stored as a wet slurry in three agitated tanks. The processing stages include two-stage acid leaching, followed by the recovery of uranium-bearing pregnant solution in a counter-current decantation system.

The uranium is recovered from the pregnant solution utilizing a conventional solvent extraction system. Vanadium, when recovered, is stripped from the barren uranium raffinate also using a solvent extraction circuit.

The basic mill process circuit is shown on Plate 3.1-3 of the renewal application. Any changes to the basic mill circuit as shown on Plate 3.1-3 will require an amendment to SUA-1358.

3.0 FACILITY ORGANIZATION AND ADMINISTRATIVE PROCEDURES

3.1 Organization

Umetco is a wholly owned subsidiary of Union Carbide Corporation (UCC). Umetco corporate headquarters are located at Union Carbide Corporation's headquarters in Danbury, Connecticut. Uranium operations are managed from offices located in Grand Junction, Colorado. Umetco's interests involve mining and processing of various metals, including uranium-bearing ores. The staff at Grand Junction, Colorado provides technical support and coordinates activities for Umetco Minerals Corporation. The plant superintendent, the highest corporate official onsite, reports directly to the Operations Manager-Uranium, who is located in Grand Junction. The relevant company organization is illustrated in Figure 5.

Umetco provided a description of the authority and responsibility of each level of management. The radiation safety staff is described below.

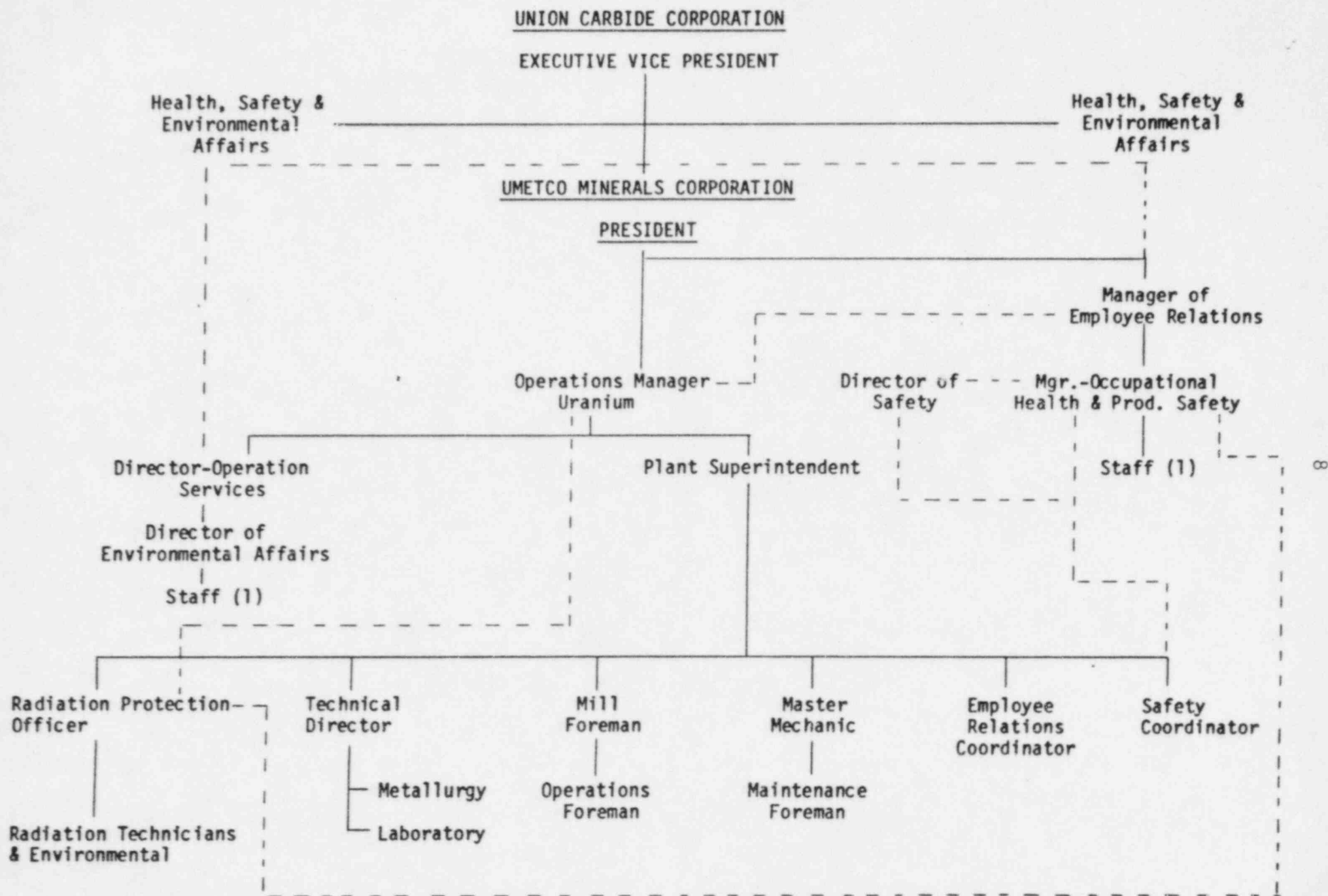
3.2. Radiation Safety Staff and Responsibilities

Umetco stated that the Radiation Protection Officer (RPO) and the Safety Coordinator (SC), neither of whom have production responsibilities, have authority to enforce regulations and to assure employee health and safety inside the mill. They have the authority to cancel, postpone or modify

FIGURE 5

WHITE MESA FACILITY ORGANIZATION

Revised May 1985



any operation or process which poses an immediate radiological safety or environmental hazard. The RPO and SC can escalate their concerns to the Operations Manager-Uranium, or to the appropriate level of management assigned to coordinate activities within the Corporation.

The Safety Coordinator is responsible for developing, implementing, monitoring, reporting and coordinating safety affairs for the mill. The duties include general safety training of personnel, safety procedure and practice development, implementation and enforcement, industrial hygiene monitoring, first aid instruction and fire protection training. MSHA and corporate safety standards compliance verification is also the responsibility of this position. The Safety Coordinator reports to the Plant Superintendent, with lateral reporting functions to the Director of Safety and to the Manager-Occupational Health and Product Safety for the corporation.

The Radiation Protection Officer is directly responsible to assure that the mill radiation safety program meets applicable standards and the requirements of the source materials license. These responsibilities include monitoring, evaluating and reporting environmental impacts which result from operations. The position also oversees the in-plant radiation protection program. This responsibility involves monitoring and evaluation of personnel exposure and conducting area surveys; determination of occupational work modifications relative to radiation protection; personnel radiation protection training; maintenance of plant radiation monitoring equipment; and report preparation in compliance with applicable regulatory requirements. The RPO reviews plant procedures and develops and coordinates procedure modifications for radiological protection and ALARA policy adherence. The Radiation Protection Officer reports to the Plant Superintendent and is authorized to escalate concerns to the Operations Manager-Uranium as he deems necessary.

Radiation and environmental technicians assist the RPO in the collection and analysis of in-plant and environmental samples.

The staff finds the organization of the Radiation Safety Staff to be acceptable.

3.3 Minimum Technical Qualifications for the Radiation Safety Staff

The minimum qualifications of radiation protection personnel associated with uranium processing at the White Mesa mill are as follows:

Plant Superintendent

Must have a B.S. degree in engineering or related physical science, or equivalent experience in management of uranium processing operations.

Radiation Protection Officer

Must have a B.S. degree in environmental, radiological, or related science, or an equivalent relevant experience in radiation protection and occupational health in uranium processing operations.

Radiation and Environmental Technicians

Must have a minimum of a high school diploma. Technicians shall receive training under the supervision of the Environmental Coordinator and/or Radiation Protection Officer. They must have had sufficient training and/or experience to allow them to understand and perform their assigned surveillance, monitoring, and analytical duties.

Since the proposed qualifications for the Radiation Protection Officer do not fully meet the requirements of Regulatory Guide 8.31, Section 2.4.1, the staff will require by license condition that the RPO possess qualifications in accordance with Regulatory Guide 8.31.

The staff finds that the above qualifications for radiation safety personnel, as modified, are adequate.

3.4 Administrative and Operating Procedures

The applicant has assured that activities at the mill involving design, procurement, construction, pre-operational checks, operations and maintenance of safety or environmentally related equipment will be authorized by written procedures approved by the Radiation Protection Officer, and/or the Safety Coordinator. These procedures will comply with Umetco's standards, the conditions of the permits and licenses, and the existing regulatory requirements. The Plant Superintendent is responsible to assure compliance.

Administrative policies and procedures are documented to clearly delineate the authorities and responsibilities for each level within the facility with regard to environmental, radiation protection, and safety related activities. The licensee provided, as appendices to the renewal application, detailed administrative and operating procedures as well as the proposed radiation protection and environmental monitoring procedures. The procedures are comprehensive and cover all aspects of mill operations. The applicant committed to reviewing these procedures annually.

The licensee has stated that any nonroutine maintenance activity which may, by the determination of the Radiation Protection Officer, exceed 25 percent of 10 CFR 20 limits requires a Radiation Work Permit. The Radiation Protection Officer will provide a monthly updated listing of

those areas he deems may exceed this criteria to the Plant Superintendent, Master Mechanic, Operations Foreman, and Technical Operations Superintendent. This listing will be used as a guide by the staff; however, all nonroutine activities require review by the Radiation Protection Officer.

The procedure to be followed for obtaining a Radiation Work Permit will be:

1. The need for the nonroutine activity will be defined, in written form, by the Plant Superintendent, or his designee. Information on the specific work locations, estimated work duration, type of work to be performed, and personnel utilized will be included in the request. This information will be included in the Radiation Work Permit.
2. The Radiation Protection Officer, or his designee, will review the permit, and after insuring that the proposed work will not present a health hazard to the employees, give approval in writing on the permit. The permit will designate time limitations for job performance, define the personnel protective equipment necessary, and define the necessary monitoring surveillance requirements. The Radiation Protection Officer will provide the necessary surveillance and respiratory protection equipment.
3. All supervisors will be given training in and copies of, the requirements for using Radiation Work Permits, with the permits remaining on file for five years.
4. Any supervisor found to be knowingly and willfully violating these procedures will be issued a written warning, and the situation will be reviewed by appropriate management for remedial action.

The staff will require that the RPO's review of nonroutine activities be documented to assure that RWPs are being issued for the appropriate activities. Additionally, although the licensee committed to reviewing the Standard Operating Procedures (SOP's) on an annual basis, they did not state that the RPO will perform this review and that the SOP's will be available to workers in corresponding mill areas. Therefore, these items will be required by license condition.

The staff concludes that the proposed program, as modified, is in accordance with staff position as specified in Regulatory Guide 8.31.

3.5 Inspections and Audits

3.5.1 Inspections

Umetco's proposed program for radiation safety inspections is as follows. A daily documented visual surveillance of all mill areas will be performed by the operating mill foreman, or his designee, to insure proper implementation of good radiation protection practices. On a weekly basis, the Radiation Protection staff performs a documented inspection of all work and storage areas, with a report to the Radiation Protection Officer on any items of noncompliance with operating procedures, licenses requirements, or safety practices affecting radiological safety. The Radiation Protection Officer performs a monthly documented walk-through inspection of all work and storage areas to insure that the radiation protection program is functioning as required.

The staff finds that the above inspection program does not conform to the staff policy provided in Regulatory Guide 8.31. Therefore, the staff will require that the mill foreman and RPO together perform the weekly inspections and that a member of the radiation protection staff perform the daily walkthrough on weekdays, with supervisory personnel performing the walkthrough on weekends when radiation protection staff members are not normally present. Additionally, the staff will require that the RPO prepare a monthly report which includes a review of daily and weekly inspections and a summary of all monitoring and exposure data for the month.

3.5.2 ALARA Audit

Umetco has committed to performing audit reviews to assure managerial control of the radiation protection program. A semi-annual ALARA (As Low As Reasonably Achievable) audit is performed by a team of personnel consisting of: the Radiation Protection Officer, a member of the Corporate Occupational Health Protection staff or a member of the Corporate Environmental Affairs staff, the Plant Superintendent, and a corporate representative of Energy Fuels Nuclear, Inc. The results of this audit are provided to the Manager-Occupational Health and Product Safety, the Director of Environmental Affairs, and the Operations Manager-Uranium. The audit review consists of:

1. A summarization of exposure records
2. Bioassay determinations
3. Inspection documentations
4. Training program activities
5. Radiation Protection meeting records
6. Mill radiological survey data

7. Environmental effluent and monitoring data
8. Overexposure records
9. Review of modified procedures for the period, and
10. Reviews of Radiation Work Permits.

The audit report specifically discusses trends in personnel exposures and effluents, control of effluent equipment, management response to radiological protection concerns, and recommendations to further ALARA implementation.

Additionally, an annual audit, which coincides with one semi-annual audit, reviews basically the same criteria as the audit outline above with an added emphasis on environmental controls and occupational health concerns other than radiological protection. This audit review is submitted to the same managerial staff as the semi-annual audit. The Operations Manager-Uranium is responsible for remedial action in response to the recommendations made in the semiannual and annual audits.

The staff concludes that Umetco's proposed audit program is in accordance with Regulatory Guide 8.31. The staff will, however, require that a copy of the ALARA audit report shall be sent to the Uranium Recovery Field Office, USNRC.

3.6 Radiation Safety Training

Umetco has stated that the purpose of an in-house radiation safety training program is to place in proper perspective, for the employee, the potential short and long-term radiation hazards associated with the job; to acquaint him with the practices instituted by management to keep occupational exposures as low as reasonably achievable; and to assure that he has an understanding (both initially and over the duration of his employment) of the radiation protection procedures he should be following.

The licensee assured that each person, upon reporting for employment at the mill, will receive instruction in mill and personnel safety, including radiological protection procedures, from the Radiation Protection Officer. The instruction includes on-the-job demonstrations of proper safety precautions, and measures to be taken to minimize radiation exposure. 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.

The employee's understanding and retention of proper practices will be verified by the supervisor at the work location through use of periodic checks. If the employee does not exhibit sufficient understanding of the safety procedures, he will receive further instruction from his supervisor. This procedure will be repeated until satisfactory retention is demonstrated. On-the-job training and testing will be conducted and the results recorded to assure that each employee understands applicable radiation protection practices.

In addition, the applicant assured that a portion of the monthly mill safety meeting will be set aside for discussion of radiation protection procedures and, on an annual basis, one of the monthly meetings will be set aside for reindoctrination of the mill staff in radiation protection. Each employee will be tested annually by the Radiation Protection Officer 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 protection, so that they will be better able to provide and evaluate specific job-related training.

The applicant assured that training of on-site contractors would occur prior to their onsite work. The training will consist of topics which are similar to those used for new hires. Details of the contractor training were presented in Appendix E of the renewal application and are adequate. Complete details of the content of all in-house training was submitted as Appendix E to the renewal application.

The staff has determined that the radiation safety training program proposed by the applicant is adequate and in accordance with staff policy as specified in Regulatory Guide 8.31.

4.0 RADIATION SAFETY CONTROLS AND MONITORING

Table 1 summarizes the ventilation, confinement, filtration and dust collection system with regard to emission sources at the White Mesa mill. Specifics are discussed below.

4.1 Ventilation and Effluent Controls

a. Sample Plant

Dust generated during crushing and handling of the ore in the White Mesa sample plant is collected in three automatic reverse jet bag houses. The collected dust is recombined with the ore at

TABLE 1

GAS-MIST-DUST GENERATION AREAS

AREA NO.	DESCRIPTION	GENERATION	CONFINEMENT METHOD	DESCRIPTION AND SPECIFICATION	% EFFICIENCY
1	Sample Plant	Dust	Bag House	9750 CFM	99.6
2	Sample Plant	Dust	Bag House	3000 CFM	99.6
3	Sample Plant	Dust	Bag House	3250 CFM	99.6
4	Ore from Stockpile to SAG Mill-Ore reclaim hopper	Dust	Baghouse dust collectors (3060 sq. feet)	Torit Model T-d 3060Ft ² -Air to Cloth ratio 1.6:1	99.9
5	Pre-leach Agitators and Final Leach Agitators	Mist	Covered tanks, and demister exhaust fans to atmosphere	16,875 CFM	
6	Boiler, Coal Fired	Coal Dust	Wet Scrubber	Ducon 66" UW4	99.5
	Boiler, Coal Fired	Flue Dust	Centrifuged Cyclone	12,000 ACFM Multitype-Dry Cyclone	92.8
7	Boiler, Oil Fired	Flue Gas	None		
8	Uranium and Vanadium Extraction	Vapor	Forced Air Building Ventilation	Up to 6-changes per hour	
9	Yellow Cake Drying and Packaging	Vapor-Dust	Wet Fan Scrubbers (2)	Ducon UW4-1600 CFM	99.5
10	Vanadium Drying-Fusion	Dust	Wet Venturi Scrubber	Sly Wet Venturi Scrubber 12,000 CFM	99.5
11	Vanadium Fugitive Dust	Dust	Wet Venturi Scrubber	Sly Venturi Scrubber 6,980 CFM	99.5

appropriate points in order to avoid influencing the grade of ore via the dust pickup points.

All feeders, chutes and crusher transfer points in the sample plant are enclosed in hoods connected to a system of ducts under negative pressure. The ducts discharge to their respective bag houses. The design parameters for the bag house collectors are summarized in Table 1.

The ducts are sized for air velocities of 3,500 to 5,000 linear feet per minute and equipped with appropriate blast gates. At times when exceedingly dry or dusty ores are encountered, (usually less than four percent moisture), the ore is sprayed with water before it is fed to the sample plant. This practice, which is the responsibility of the sampling plant foreman, reduces the dust potential and results in adequate control of dust within the plant.

b. Mill

Dust generated in the ore hopper area is collected in a reverse jet bag house dust collecting system. In addition, a dust suppression spray system is installed in the mill feeding system and used when exceedingly dry ores are being fed to the SAG mill. Water added for these purposes remains with the ore and goes to process.

Yellowcake particles carried in flue gases from the uranium dryer and packaging area pass through wet fan scrubbers (one on the dryer and one on the packaging process). The solution and particulates collected from the scrubbers are recycled to the No. 1 yellowcake thickener.

Two wet dust collectors also are installed to collect and recycle dust generated from the vanadium drying operation. An isolated portion of the building is utilized for precipitation, drying and packaging of the vanadium. Since the uranium is removed prior to vanadium recovery, very little release of radioactivity is expected in the vanadium drying and fusion step.

In the mill, the processing buildings and equipment are provided with ventilation fans, hoods and ducting to control the concentration of gaseous effluents. A forced air ventilation system designed for the entire solvent extraction and stripping buildings removes kerosene vapors. This ventilation system is designed to provide up to 6 air changes per hour. The ventilation fan is checked visually for proper operation on a daily basis.

c. Area Sources

Umetco provided a general program for control of blowing tailings in an appendix to the renewal application. The procedures, however, were not clear regarding methods to be used for stabilization, personnel who would perform the proposed weekly inspections, and timeframes for implementing stabilization measures. In addition, the Umetco application did not address the control of blowing of ore piles.

The staff will require by license condition that the licensee monitor the performance of the effluent control equipment to assure that the equipment is functioning as designed, and that operations be suspended in areas of the mill where the emission control equipment is not functioning properly. The staff will also require that Umetco submit programs designed to minimize blowing of tailings and ore for USNRC review and approval.

The staff concludes that the mill ventilation and effluent control program, as modified above, is adequate.

4.2 In-Plant Monitoring Data

Since the White Mesa mill operated from August 1979 to February 1983 only, in-plant monitoring data for the years 1980, 1981 and 1982 was reviewed by the staff.

a. Airborne Uranium

These samples were collected routinely in seventeen mill areas during 1980 and 1981, and in nineteen areas during 1982. The highest annual average concentrations occurred near the primary crusher in 1980 (25% of the MPC), in the yellowcake storage area in 1981 (32% of the MPC) and inside the yellowcake dryer enclosure, a respirator required area, in 1982 (95% of the MPC). This latter location is not a routinely occupied area. The next highest concentration was measured in the yellowcake packaging enclosure in 1982 (59% of the MPC). This enclosure is also a designated respirator area at all times.

b. Radon Daughters

Seventeen areas were routinely surveyed each year for radon daughter concentrations. In 1980, the annual average did not exceed 5.4% of the MPC. In 1981, the annual average did not exceed 3.6% of the MPC which occurred in the same area and again in 1982, where the annual average did not exceed 25% of the MPC.

c. Exposure Data

During 1980-1982, fixed TLDs throughout the mill indicated exposure rates ranging from 23 mR/wk to 56 mR/wk. The highest exposure rate occurred in 1982 in the yellowcake packaging room.

Personnel exposures were also monitored using TLDs during these years. All exposures were under 10% of the regulatory limit.

Breathing zone samples collected on mill operators indicated that internal exposures did not exceed 20% of the quarterly limit. The great majority of the breathing zone samples resulted in exposures less than 10% of the quarterly limit.

4.3 External Radiation Control Program

4.3.1 Occupational Exposure

The licensee has committed to using film or TLD badges to determine individual exposures. Badges will be assigned to each employee working at the facility within thirty days of employment at the facility. The badges will be analyzed on a quarterly basis. The cumulative occupational dose of the employees will be filed in accordance with 10 CFR 20.202(a). Exposures exceeding 25 percent of the 10 CFR 20 limits will result in a modification of employee job assignments and a review of conditions which caused the action level to be exceeded.

The staff concludes that the external exposure monitoring program is adequate and in accordance with Regulatory Guide 8.30.

4.3.2 External Radiation Surveys

The licensee stated that radiation area monitoring will be used throughout the mill to assist in detecting abnormal operating conditions. A combination of beta and gamma radiation measurements will be obtained monthly at 36 locations in the restricted area. The locations are listed in Table 5.4-1 of the renewal application. Measurements will be taken at a distance of 2 feet from each source. The radiological health monitoring procedures submitted as Appendix C to the renewal application provides details on all monitoring techniques to be utilized at the White Mesa mill.

The staff finds that the external radiation monitoring program is adequate and in accordance with Regulatory Guide 8.30.

4.4. Internal Radiation Control Program

4.4.1 Airborne Radioactivity Surveys

a. Uranium

Umetco proposes to use several forms of airborne radionuclide sampling to determine personnel exposure to uranium bearing dust. Area monitoring at 20 mill locations will provide the main approach to determining personnel exposure. Areas associated with yellowcake are sampled weekly, while other locations are sampled on a monthly basis. The monitoring locations are shown on Table 5.4-2 of the renewal application.

Umetco indicated that area monitoring for airborne uranium will be accomplished utilizing air samplers calibrated to forty liters per minute (lpm) with a sample duration of sixty minutes. Analysis of samples is performed at the White Mesa Laboratory using fluorometric methods to achieve standard LLD requirements with sample turnaround times of less than one week. Sampling will be performed under conditions typical of employee exposures. A record of the state of operation of both process and effluent control equipment and ventilation conditions will be maintained along with area sampling results.

Yellowcake calciner and packaging operators are required to wear individual air samplers once per week. In addition, mill operating and maintenance personnel working in processing areas where the potential exposure is projected to exceed 25 percent of 10 CFR Part 20 limits for uranium dust will be monitored with individual air samplers on a periodic basis to establish typical uranium dust exposures for these individuals. Individual air samplers consist of a sampling pump and lapel filter holder capable of sampling at a rate of two lpm for eight hours.

b. Radon Progeny

The applicant has stated that radon progeny will be measured on a monthly basis during production periods at the 20 locations utilized for air particulate sampling. The modified Kusnetz sampling and analysis procedure will be utilized.

The staff will require that the quantity of air sampled and the method of analysis utilized for all in-plant air sampling allow a lower limit of detection (LLD) of 10% of the maximum permissible concentration.

The proposed program for airborne particulate monitoring, as modified by the staff, is in accordance with Regulatory Guide 8.30.

4.4.2 Internal Exposure to Radioactivity

Personnel time in the monitored areas is recorded on a daily time card by the employee. Using this information and the respective area airborne concentrations, an employee exposure record is developed. When routine work is performed, assessment of an individual's exposure to airborne natural uranium and radon daughters are calculated using the methods described above. Quarterly breathing zone samples using portable samplers are collected to assure reliability of this procedure.

When nonroutine maintenance is performed, accurate time records are kept to calculate exposures to natural uranium. Breathing zone samples are taken using portable samplers to assure accurate assessment of exposure during nonroutine work assignments.

The applicant proposed to review the observed time spent in each area where routine work is performed. The review will be recorded and the accuracy of the observation reviewed quarterly, or when major changes are made in job assignments.

If an employee reaches an action level of 25 percent of MPC based on the time weight exposure over a period of one quarter, the Radiation Protection Officer institutes an investigation of the work record and exposure history to identify any problem areas. If any problem areas are noted, corrective measures will be taken to ensure that the exposure is as low as is reasonably achievable.

To assure that occupational exposures are determined and evaluated in a timely manner, the staff will require the following:

- (a) Occupational exposure calculations will be performed and documented within one week of the end of each regulatory compliance period as specified in 10 CFR 20.103(a)(2) and 10 CFR 20.103(b)(2).
- (b) Routine airborne ore dust and yellowcake samples will be analyzed in a timely manner to allow exposure calculations to be performed in accordance with this condition.
- (c) Nonroutine ore dust and yellowcake samples will be analyzed and the results reviewed by the RSO within two working days after sample collection.

The staff will further require that the results of the personnel sampling be used to calculate employee exposures when the samplers are used.

The staff concludes that the proposed program for measurement of internal exposure to airborne radioactivity, as modified by the staff, is in accordance with Regulatory Guide 8.30.

4.4.3 Respiratory Protection Program

A complete respiratory protection program was submitted by Umetco as part of Appendix E of the renewal application. Umetco's proposed program includes a management policy statement and written operating procedures which address (a) engineering controls used to meet ALARA goals, (b) decontamination of equipment, (c) routine, nonroutine and emergency use of respirators, (d) a list of circumstances during which relief from respirator use is authorized, (e) training requirements, (f) annual fit testing requirements, (g) annual physical examination requirements and (h) a maintenance, cleaning and storage policy for respirators. The licensee stated that only NIOSH certified respirators and approved HEPA filters are to be used.

The Plant Superintendent is responsible for ensuring that a respiratory protection program, meeting or exceeding that specified by regulation, is established and maintained for the employees under his jurisdiction. The Radiation Protection Officer is responsible for the implementation and direct control of the respiratory protection program.

The Radiation Protection Officer has the following responsibilities.

- A. Supervision of respirator selection procedure;
- B. Establishment of training sessions about respiratory equipment for employees;
- C. Establishment of a continuing program of cleaning and inspection of equipment;
- D. Designation of proper storage areas for respiratory equipment;
- E. Establishment of issuance and accounting procedures for uses of respiratory equipment;
- F. Establishment of medical screening program-procedures for employees assigned to wear respiratory equipment;

- G. Establishment of a periodic inspection schedule of those work places/conditions - requiring respiratory equipment - to determine exposure and/or changing situations; and
- H. A continuing evaluation of the above aspects to assure their continued functioning and effectiveness.

A complete training program for employees and supervisors is included in the program. It includes such topics as (1) need for respirators, (2) respiratory hazards, (3) engineering controls, (4) respirator selection, (5) fit testing, donning, and wearing of respirators, (6) maintenance, storage and exchange requirements, (7) circumstance when you can leave a hazardous area, (8) emergency respirator use, (9) regulations for respirator use (10 CFR 20.103), and (10) additional training required for supervisors.

The staff finds that the proposed respiratory protection program, presented in Appendix E of the renewal application, is adequate and in accordance with staff policy as specified in Regulatory Guide 8.15.

4.5 Bioassay

Umetco has stated that urinalysis will routinely be performed on those employees that are (1) exposed to airborne yellowcake or involved in maintenance tasks in which yellowcake dust may be produced, or (2) routinely exposed to airborne uranium ore dust. Specifically, routine biweekly urinalysis testing will be performed on those employees who have worked in yellowcake packaging, yellowcake precipitation, the grinding area (SAG Mill), ore feed, sample plant, scale house and the sample preparation room. Baseline urinalysis will be performed prior to initial work assignments. Urinalysis will also be performed on employees who have been working on assignments that require a radiation safe work permit, or for any individual that may have been exposed to airborne uranium or ore dust concentrations that exceed 25 percent of the MPC level.

A detailed procedure for collection, preparation and analysis of urine samples was submitted by the applicant as part of Appendix C to the renewal application. Umetco is planning on performing the analyses in house using a lower limit of detection of 5 ug/l. Umetco will use 25% of all submitted samples for quality assurance (QA) checks. In addition, spikes and blanks will accompany the samples. Analyses will be performed by Umetco using a fluorometric technique. Ten percent of all samples, including the QA spikes, blanks and duplicates, will be sent to a contractor lab for analyses in order to compare results. Umetco committed to following the action levels presented in Regulatory Guide 8.22.

Although Umetco committed to meeting the urinalysis program outlined in Regulatory Guide 8.22, no provision is made for performing in vivo measurements. The staff will therefore require that in vivo lung counting be conducted for all mill employees every two years.

The staff concludes that the bioassay program proposed by Umetco, as modified by the staff, is acceptable and in accordance with Regulatory Guide 8.22.

4.6 Contamination Control

4.6.1 Personnel Contamination

Umetco stated that all personnel working within the mill area are provided with change room, shower and laundry facilities. Employees working in the yellowcake product areas or who perform maintenance on equipment from these areas are provided coveralls and are required to change and shower prior to leaving the mill. Employees are also required to monitor themselves with an alpha survey meter prior to leaving the mill site. Alpha contamination on skin or clothes greater than 1,000 dpm/100 cm² shall be cause for additional showering or decontamination and an investigation by radiation protection staff. Spot checks with a survey meter also are made and documented at least quarterly. Coveralls and contaminated clothing are laundered on site.

The staff considers that the above program for personnel contamination is acceptable.

4.6.2 Surface Contamination

Umetco proposes that a combination of fixed and removal alpha radiation survey measurements be obtained bi-weekly at lunch rooms and offices in the restricted and unrestricted areas. Measurements exceeding 1000 dpm/100 cm² require remedial action by the management. In addition, the Radiation Protection Officer is authorized to take action which he deems necessary to maintain levels as low as reasonably achievable. Umetco also stated that respirators would be surveyed prior to use and that activity of greater than 100 dpm/100 cm² found on a respirator will result in its removal from service for cleaning.

The staff will require that surveys for fixed and removable surface contamination be conducted in non-production areas on a weekly frequency. The staff will also require that laboratory surfaces used for bioassay analyses be decontaminated to less than 25 dpm/100 cm² prior to analysis of samples.

The staff concludes that the surface contamination program, as modified by the staff, is acceptable.

4.6.3 Disposal of Contaminated Equipment

Umetco has stated that materials leaving the restricted area must meet requirements of Annex C, "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct or Source Materials," dated September 1984.

The applicant assured that all material originating within the restricted area will be considered contaminated until checked by the Radiation Protection Department. All managers who desire to ship or release material from the facility will inform the Radiation Protection Officer prior to release. No equipment or materials will be released without a documented survey by the Radiation Protection Officer. The Radiation Protection Officer has the authority to deny release of materials exceeding Annex C guidelines.

Umetco also provided a detailed procedure to be followed by mill personnel when equipment is to be proposed for release. This procedure is contained in Appendix C of the renewal application. The applicant assured that the policy and documented release forms are periodically reviewed by the Radiation Protection Officer and the Audit Committee.

In addition, Umetco stated that all equipment contaminated in the mill process will be buried in a designated zone within the restricted area or decontaminated as specified in Annex C Guidelines. All other solid contaminated waste from the milling process will be buried in the tailings retention system.

The applicant did not provide adequate detail regarding the burial of contaminated equipment. A detailed program will be required to be submitted for USNRC review and approval prior to disposal of contaminated equipment. The staff will also require that all liquid effluents from process buildings, with the exception of sanitary wastes, be discharged to the tailings impoundment.

The program proposed by Umetco, as modified by the staff, is acceptable.

4.7 Quality Assurance and Calibration

Administrative Procedures (APs) are used by the licensee to provide uniform guidance and consistency to mill activities. APs cover the sampling procedures and calibration procedures which are an integral part of the quality assurance program at the mill. APs will be reviewed

annually and updated as necessary to incorporate advances in technology and to prevent systematic errors in sampling, monitoring and analyses.

Appendices C and D of the Umetco renewal application delineate the current proposed radiation protection and environmental monitoring procedures. Written operation procedures are detailed in Appendix F for mill operations. Each procedure includes the quality assurance actions which must be taken in order to properly evaluate measurement techniques and effectiveness of the procedure and specifies the type of equipment needed to carry out the necessary actions. Each piece of equipment is described along with its specified calibration frequency, check out procedure, and specifications for normal operation. Section 4 of Appendix E is designated as the Umetco Quality Assurance Program. All sampling, recording, inspection and review methods are documented and detailed.

Umetco has committed to calibrating all radiation monitoring equipment at least semi-annually, and all air sampling equipment at least quarterly. In addition, all equipment will be checked prior to use to assure that it is operating correctly.

The staff concludes that the quality assurance program proposed by Umetco is adequate and in accordance with staff policy as specified in Regulatory Guides 4.15 and 8.31.

5.0 RESTRICTED AREA MARKINGS AND ACCESS CONTROL

The mill and tailings area is fenced and posted with "Restricted Area" signs in accordance with 10 CFR 20.203. The mill will usually be operated seven (7) days per week, twenty-four (24) hours per day. All visitors are required to register at the office and are not permitted inside the plant restricted area without proper authorization and escort. Contractors having work assignments are given security, safety and radiation protection orientation prior to performing their duties without escort.

The staff concludes that the above markings and access control procedures are adequate. A license condition will be issued which exempts the licensee 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 the words, "ANY AREA WITHIN THE MILL MAY CONTAIN RADIOACTIVE MATERIAL."

The proposed program for restricted area markings and access controls is adequate.

6.0 EMERGENCY PROCEDURES AND PREVENTIVE MEASURES

Umetco established, by classification, a spectrum of potential mill accidents ranging from trivial to serious. Umetco also provided detailed emergency plans for each type of accident.

Preventative measures employed at the White Mesa Mill are described below.

Minor Pipe or Tank Leakage

Minor leaks resulting from loose connections in piping or tanks overflowing, etc., will be collected in sumps designed for this type of spill. Sump pumps will be used to return the material to the circuit and the reason for the spill will be determined and corrected.

Major Pipe or Tank Breakage

All of the mill drainage, including large chemical spills from storage tanks, will flow into a large catchment basin upstream from the tailings impoundment site. Tanks which are most likely to overflow are equipped with high level alarms to reduce the possibility of spillage due to tank overflow. Dikes and/or curbs are constructed around process and storage tanks (excluding the water tank) to confine the material in the event of a tank spill.

Fires

The most likely place for a fire to occur would be in the solvent extraction building or in the yellowcake or vanadium dryers. The possibility of a fire as a result of an explosion in the yellowcake dryer and solvent extraction building is remote since Industrial Safety Codes will be strictly enforced. The solvent extraction circuit is located in a separate building due to the large quantities of kerosene present. A fire protection system will be utilized for the main mill building and solvent extraction building which will consist of an automatically activated sprinkling system capable of delivery 2,000 gallons per minute at 100 psig for approximately 2 hours. Umetco committed to checking the fire protection system monthly.

In addition, Umetco provided emergency procedures for transportation accidents which include packaging, marking and labeling of yellowcake drums; the environmental impact of a spill; instructions to drivers who carry radioactive shipments; emergency response responsibilities of Umetco's personnel; spill countermeasures; and NRC notification.

Umetco addressed tailings system accidents by stating that due to the partially below grade design of the tailings disposal system, a break or breach in the containment system which could lead to a release of tailings is not likely. Further, the disposal system was designed in accordance with Regulatory Guide 3.11 and Staff Technical Position WM-8201. In the event of a break, however, any released material will be contained by the downstream catchment dike. If a break occurred, the pumping system would be shut off, personnel removed from the immediate area, and the NRC notified. The break would be repaired and the affected area cleaned up in the safest and most expeditious manner. Umetco's proposed program for inspection of the tailings system, which is in accordance with Regulatory Guide 3.11.1, should assure that signs of embankment distress are identified quickly to allow for remedial measures. This inspection program is discussed in detail in the accompanying Environmental Assessment.

Umetco's proposed program is acceptable.

7.0 MILLSITE DECOMMISSIONING

The mill decommissioning plan generally involves separating reusable materials which can be released to the public and reusable materials that are releasable to another licensed facility from those materials which require special disposal. Equipment and materials to be disposed of are proposed to be buried within the tailings retention impoundment. Items released to the general public will meet Annex C guidelines.

The staff will require that a detailed decommissioning plan be submitted for USNRC review and approval at least twelve months prior to a planned final shutdown. The Environmental Assessment prepared by the staff in support of the license renewal addresses reclamation in detail.

8.0 COMPLIANCE HISTORY

A chronological listing of inspection compliance history for the White Mesa Mill is presented below from 1979 to the present.

October 18, 1979

A construction inspection of dikes 1 and 2 was performed. This occurred just shortly after mill startup. A few recommendations were made but no violations or deviations were identified.

August 6, 1981

No violations or deviations were identified.

November 2-6, 1981

One violation and two significant appraisal findings were identified:

VIOLATION 1

License Condition No. 38 requires, in part, that the licensee perform air particulate monitoring for all stacks from process circuits or areas in which ore, yellowcake, or tailings are handled, and include the results in the semi-annual environmental report to the Nuclear Regulatory Commission.

Contrary to this requirement, two of the three stacks from the sampling plant and the stack from the grinding area of the mill have not been sampled from May, 1980 to November, 1981. The results of the one stack sample had not been included in the semi-annual environmental monitoring reports submitted in June, 1980, December, 1980, and June, 1981 to the Nuclear Regulatory Commission.

CORRECTIVE ACTION

The licensee committed to sample all of the above-mentioned stacks in accordance with License Condition 38.

SIGNIFICANT APPRAISAL FINDINGS

1. Comprehensive written procedures have not been established for respiratory protection and environmental monitoring.
2. The internal exposure control program was found to be weak based on the following:
 - A. Turnaround time between sample collection and reporting of data for airborne uranium sampling was too long (2-4 weeks).
 - B. Uranium plus radon air sample data had not been compared to the quarterly control limits.
 - C. The respiratory protection program did not include medical evaluations of personnel, radiological survey of respirators, and an evaluation of supplied air quality against the grade D criteria.

CORRECTIVE ACTION

Respiratory Protection

The licensee committed to establishing written procedures for all aspects of the respiratory protection program and the environmental monitoring program.

CORRECTIVE ACTION

Turnaround Time

The licensee indicated that every effort would be made to analyze samples in a timely manner, although some delay could not be avoided since the samples had to be sent to vendor laboratories for analysis.

CORRECTIVE ACTION

Radon Quarterly Limits

At the time of mill appraisal, uranium and radon exposure data were being compared to quarterly limits. However, the appraisal team was not able to determine that this was being done due to problems with documentation. This problem has been solved by better documentation and will continue as such in the future.

CORRECTIVE ACTION

Respiratory Protection

Draft criteria for medical evaluations of personnel have been completed, and currently are being considered by mill management. A formalized and company approved set of criteria are expected to be in place by July 1, 1982. Radiological surveys of each respirator are now being conducted immediately after washing and sanitizing.

Evaluation of supplied air quality against grade D criteria will be accomplished using the Orsat method of air analysis. This method analyzes hydrocarbon, carbon monoxide, carbon dioxide, and oxygen content of supplied air. Compliance will be achieved upon receipt of a component (now ordered) which will permit hydrocarbon analysis, probably within 4-5 weeks.

November 2-4, 1982

Nine violations were identified. A civil penalty resulted from the first violation.

VIOLATION 1

10 CFR 20.201(b) requires that each licensee make or cause to be made surveys as (1) may be necessary for the licensee to comply with the regulations in 10 CFR Part 20, and (2) are reasonable under the circumstances to evaluate the extent of radiation hazards that may be present.

Contrary to the above, evaluations of weekly worker exposure to airborne soluble uranium in the product drying and packaging enclosures were not performed to ensure compliance with 10 CFR 20.103(a)(2) during the period from November 1981 to March 1982. Inadequate evaluations of worker exposure to soluble uranium during the week beginning April 5, 1982, resulted in an undetected exposure of one individual to soluble uranium at 1.7 times the limit specified in 10 CFR 20.103(a)(2). In addition, evaluations of worker exposure to other airborne radionuclides in the mill were not performed with regard to the 40-hour control measure as required by 10 CFR 20.103(b)(2) during the period from November 1981 to November 1982.

Corrective actions initiated in response to the violations were as follows:

- A. Two airborne sampling locations were added to the areas to be routinely sampled. The new locations are within the yellowcake dryer and packaging enclosures.
- B. In areas where there is potential for exposure to soluble uranium, the airborne sampling frequency was increased to weekly. The areas of concern are yellowcake precipitation, packaging and storage, and within the yellowcake dryer and packaging enclosures. As soon as the results of the air filter analyses are reported, the exposure for each employee working in the area is evaluated.

In addition, a weekly lapel air sampler is worn by an employee in the yellowcake packaging and precipitation areas. The sample is collected during one normal work shift.

- C. When the results of monthly airborne sampling indicate that concentrations of other radionuclides (radon, insoluble uranium, etc.) approach or exceed 25% of the limits specified in 10 CFR Part 20, Appendix B, Table 1, Column 1, the following actions are initiated:
 1. Mill management is notified in writing of the situation.
 2. The frequency of airborne sampling is increased to weekly.

3. The area is posted as an "Airborne Radioactivity Area."
4. Corrective or investigative action report is prepared.

The above procedures have been in effect since November 5, 1982 and will continue.

VIOLATION 2

10 CFR 20.405 requires that each licensee shall make a report in writing within 30 days to the appropriate NRC Regional Office, with a copy to the Director of Inspection and Enforcement, of each exposure of an individual to radioactive material in excess of applicable limits in 10 CFR 20.103(a)(2).

10 CFR 20.409(b) requires that when a report pursuant to 10 CFR 20.405 is required, the licensee shall also notify the exposed individual. Such notice shall be transmitted at a time not later than the transmittal to the Commission and shall comply with the provisions of 10 CFR 19.13(a).

Contrary to these requirements, such reports had not been submitted by November 4, 1982, the date of the NRC inspection, for an exposure of an individual which occurred during the week beginning April 5, 1982.

CORRECTIVE ACTION

On November 10, 1982, a written notice of the overexposure was mailed to the Nuclear Regulatory Commission, Region IV in Arlington, Texas. On the same day (November 10, 1982) a written notification was hand-delivered to the employee involved. This violation occurred because the licensee had not been evaluating exposures to soluble uranium on a weekly basis. The licensee committed to evaluate exposures to soluble uranium on a weekly basis as discussed under Violation I above. Therefore, overexposures will not go undetected.

Should an overexposure occur again, the procedure will be to notify the responsible parties in the following order:

- A. Mill management (local and corporate).
- B. The appropriate NRC Regional Office and the Director of Inspection and Enforcement, as required by 10 CFR 20.405.
- C. The overexposed individual(s) as required by 10 CFR 20.409(b).

All notifications will be in writing and completed within thirty (30) days of the overexposure.

Compliance with 10 CFR Part 20, Sections 405 and 409(b) was achieved on November 10, 1982.

VIOLATION 3

10 CFR 20.203(d)(2) requires that each airborne radioactivity area shall be conspicuously posted with a sign or signs bearing the radiation caution symbol and the words:

CAUTION (or DANGER)
AIRBORNE RADIOACTIVITY AREA

Contrary to this requirement, the following areas known to be airborne radioactivity areas as a result of monthly air samples were not posted during the indicated periods:

- (a) the secondary crusher area during March through June 1982,
- (b) the grind and leach circuit areas during M 1982, and
- (c) the yellowcake product storage room during August 1981.

CORRECTIVE ACTION

Since November 7, 1982, all areas that have been determined by airborne sampling to exceed 25% MPC of the limits specified in 10 CFR Part 20, Appendix B, Table 1, Column 1, have been properly posted. Also, the following policies have been implemented:

- A. All areas of the mill that have been determined to exceed 25% MPC shall be posted as an "Airborne Radioactivity Area" in accordance with 10 CFR 20.203(d)(2).
- B. The appropriate signs shall be posted in a conspicuous location at all entrances to the area or sections, and such signs shall comply with the specifications set forth in 10 CFR 20.203(b).
- C. The area or sections shall remain posted until at least two (2) consecutive weekly airborne samples indicate concentration below 20% MPC.
- D. Appropriate documentation of the posting shall be maintained on file at the mill site.

These policies have been adhered to and will continue to be standard operating procedure.

Full compliance was achieved on November 7, 1982.

VIOLATION 4

License Condition 11 requires that source material shall be used in accordance with statements, representations, and conditions contained in Section 5.5.1 through 5.5.11 of the licensee's application as revised July 16, 1979.

- A. Section 5.5.2 of the application states that air samplers used for inplant sampling will be calibrated prior to each use and that samples will be taken each month.

Contrary to this requirement, such samplers were not calibrated prior to sampling during the period from June 10 to October 15, 1981.

- B. Section 5.5.3 of the application states that if a worker's quarterly exposure to airborne radioactivity equals or exceeds 25 percent of the regulatory limit, the licensee will institute an investigation to identify the problem.

Contrary to this requirement, no such investigation was conducted for a worker whose exposure exceeded 25 percent of the limit during the fourth quarter of 1981 and for each of the first two quarters of 1982.

- C. Section 5.5.5 of the application states that all employees will be required to monitor themselves with a survey meter prior to leaving the mill and that alpha contamination on skin or clothing greater than 1,000 dpm/100 cm² shall be cause for additional showering or decontamination and an investigation by the radiation safety staff.

Contrary to this requirement, on November 3, 1982, the audible alarm set point of the instrument used for personnel surveys was set at 1,900 dpm/100 cm², thus permitting contamination in excess of the action level to go undetected.

CORRECTIVE ACTION

- A. Air sampling instruments were properly calibrated during the period of June 10 through October 15, 1981, but documentation to demonstrate this is not adequate. It has been Company policy at the White Mesa Mill to calibrate all instruments prior to each use and to document such actions. This policy will be emphasized in the future to avoid a recurrence of the violation.

Full compliance with Section 5.5.2 of the mill license application will begin November 5, 1982.

- B. Prior to the November, 1982 inspection, the employee exposures that were found to be equal to or exceed 25% of the regulatory limit were inadequately investigated and the documentation of the investigations was also inadequate.

A procedure has been adopted that requires a written investigative report each time an employee exposure exceeds 25% MPE. The Radiation Safety Officer will review exposures monthly with mill management to determine whether exposures in excess of 25% MPC have occurred. If so, appropriate investigations and actions will be implemented.

Compliance with Section 5.5.3 of the license application was met on December 1, 1982.

- C. Several conditions contributed to the improper setting of the alarm as indicated below:
1. A documented daily check of the instrument was conducted and it was noticed that the efficiency was dropping. The following entries were taken from the inspection log book:
 - a. October 28, 1982 - 19% efficiency.
 - b. November 1, 1982 - 17% efficiency.
 - c. November 3, 1982 - 14% efficiency (NRC inspection).
 2. The backup instrument had been sent out for repairs on or about October 26, 1982. During the period the problem existed, a replacement unit was not available.
 3. The surface area of the survey meter probe face had been assumed to be greater than the manufacturer had specified. The greater number had been used in determining the set point and the result was unrealistically high setting.

The problem was corrected by lowering the alarm point to an appropriate level, and the manufacturer's specifications for the probe were used in calculating the alarm levels. Daily checks were conducted on the instrument and the appropriate adjustments were made.

On December 20, 1982, the mylar on the survey meter probe face was changed. At this time, the instrument efficiency increased to a normal value and the readings stabilized. On the same date, the policy was established that the set point will be 75%

or less of the maximum allowable limits of 1000 dpm/100 cm², allowing a 25% margin.

Thus, compliance with Section 5.5.5 of the mill license application was achieved on December 20, 1982.

VIOLATION 5

License Condition 21 requires that release of equipment or packages from the restricted area shall be in accordance with License Annex C. The license annex specifies decontamination limits for both fixed and removable contamination.

Contrary to this requirement, although surveys for removable contamination were performed, surveys for fixed contamination were not performed from January 1981 to November 1982.

CORRECTIVE ACTION

Fixed (total) contamination surveys were initiated on November 5, 1982.

VIOLATION 6

License Condition 22 requires that the licensee conduct surface contamination surveys (both smear and total contamination) in all eating areas, change rooms, control rooms, and mill administrative offices, and that area decontamination be in accordance with License Annex C. The license annex specifies decontamination limits for both fixed and removable contamination.

Contrary to this requirement, although surveys for removable contamination were performed, surveys for fixed contamination were not performed from January, 1981 to November, 1982.

CORRECTIVE ACTION

The licensee resumed conducting surface contamination surveys using smear tests and fixed (total) contamination surveys using instrument measurements. Full compliance with License Condition 22 was achieved on November 5, 1982.

VIOLATION 7

License Condition 53 requires that the licensee follow the lower limits of detection (LLD), specified in the condition for environmental monitoring sample analyses, unless alternate LLD's are submitted by the licensee and approved by the Uranium Recovery Licensing Branch.

Contrary to this requirement, environmental air sample data submitted for the first quarter of 1982 included LLD's greater than those specified in the license condition and agreed to by the licensee in his letter dated October 26, 1981.

CORRECTIVE ACTION

Corrective steps that have been taken to insure that future violations will not occur are:

- A. Air particulate samples will now be aggregated for the entire quarter providing sufficient volume for the specified LLD values. The fourth quarter 1982 effluent report will confirm that the licensee is meeting the LLD values for air samples.
- B. The sample volumes are being increased for other types of samples.
- C. The length of the counting time during the analysis conducted by the vendor laboratories has been increased.
- D. An amendment to the license is being prepared to specify a change from the low-volume equipment presently in use to high-volume sampling equipment. This change in equipment should provide sufficient volume to meet LLD values.

With the exception of the license amendment, the foregoing actions were implemented on October 1, 1982 and compliance is evidence in the fourth quarter effluent report for 1982, submitted on February 28, 1983.

VIOLATION 8

10 CFR 40.64(b) requires that each licensee who is authorized to process at any one time and location more than 1,000 kilograms of uranium shall submit to the Commission, within 30 days after September 30 of each year, a statement of his source material inventory. The reports are to be submitted through the Department of Energy, Oak Ridge, Tennessee.

Contrary to this requirement, such reports were not submitted by the licensee for 1981 and 1982.

CORRECTIVE ACTION

The 1982 report was submitted on January 26, 1983, and the 1981 report also was submitted to the above address.

To facilitate the submittal of future reports on time, the licensee has directed the Radiation Safety Officer to be responsible for the

fulfillment of 10 CFR 40.64(b). The Manager of Uranium Processing will verify compliance with this reporting requirement.

VIOLATION 9

License Condition 18 requires that the licensee perform a formal semiannual ALARA audit and submit a copy of the audit report to the NRC. The report is to include a summary of operational data and a discussion of trends in exposures and effluents and performance, maintenance, and inspection of effluent and exposure control equipment.

Contrary to those requirements, the audit reports dated April 6, 1982, and August 31, 1982, did not (1) provide a summary of operational data pertaining to exposure records, bioassay results, implant radiological survey and sampling data, environmental and effluent monitoring data, and radiation overexposures; and (2) discuss performance of exposure and effluent control equipment and trends in personnel exposure and effluents.

CORRECTIVE ACTION

Corrective measures to improve ALARA reporting by licensee were implemented in the audit conducted February 14th through 16th, 1983, and will continue.

These corrective measures include the following:

- A. Comprehensive review of each item in the audit by the audit committee;
- B. A continuous update of trend analysis and data summaries. Thus, if increases in exposures or effluents are observed, rapid solutions can be implemented to resolve problems.

May 11-12, 1983

No violations or deviations were identified.

January 20, 1984

Two violations and one deviation were identified:

VIOLATION 1

10 CFR 20.201(b) requires that each licensee make or cause to be made such surveys as: (1) may be necessary for the licensee to comply with

the regulations in this part, and (2) are reasonable under the circumstances to evaluate the extent of radiation hazards that may be present.

Contrary to this requirement, on November 28, 1983, the licensee failed to make surveys or evaluations necessary to ensure compliance with 10 CFR 20.103(a)(2). On that date, two licensee management personnel entered the yellowcake (natural uranium) packaging enclosure, a designated airborne radioactivity area, after having observed dried yellowcake suspended in the enclosure atmosphere and spilled onto the enclosure floor. No air samples were taken before entering to evaluate the airborne natural uranium concentrations, and no bioassays or other estimates of natural uranium intake were performed on the individuals subsequent to the entries.

CORRECTIVE ACTION

Licensee's Vice President of Uranium and Mineral Operations has issued a written directive to all White Mesa Mill personnel stating that air samples must be taken before entering the yellowcake packaging enclosure for nonroutine work to evaluate airborne natural uranium concentrations. When the potential exists for the airborne natural uranium concentration to exceed 50% of the maximum permissible concentration, all employees entering the yellowcake packaging enclosure will be required to wear individual air samplers when working in the enclosure and to submit urine samples for bioassay purposes.

This directive was issued on March 28, 1984 and posted in appropriate areas in the mill and compliance was achieved as of that date.

VIOLATION 2

License Condition 11 requires, in part, that license material be used in accordance with statements, representations, and conditions contained in Sections 5.1 through 5.4, and Sections 5.5.1 through 5.5.11 of the licensee's revised application dated September 26, 1978.

- A. Section 5.1.2 of the licensee's revised application states that where the need for a nonroutine work or maintenance activity arises in a high radiation area (airborne concentrations), approved Special Work Permits will be required.

Contrary to this requirement, a Special Work Permit was not obtained for the nonroutine work performed by two licensee management personnel on November 28, 1983, in the yellowcake packaging enclosure.

- B. Section 5.5.1.1 of the licensee's revised application states that personnel working in processing areas where the potential personnel exposure might exceed 50 percent of the maximum permissible concentrations will be required to wear individual air samplers during the time worked in these areas.

Contrary to this requirement, individual air samplers were not worn by two licensee management personnel on November 28, 1983, while working in the yellowcake packaging area during a period when the exposure to airborne natural uranium potentially exceeded 50 percent of the maximum permissible concentration.

CORRECTIVE ACTION

- A. In order to avoid this in the future, a Radiation Work Permit will be required for all nonroutine work, regardless of duration, in the yellowcake packaging enclosure.

Included in the directive of the Vice President of Uranium and Mineral Operations, referred to previously, is a requirement that a Radiation Work Permit be obtained in connection with all nonroutine work performed in the yellowcake enclosure regardless of the time required to perform such work.

This directive was issued on March 28, 1984 and posted in appropriate areas in the mill and compliance achieved as of that date.

- B. It has been, and will continue to be, emphasized that all personnel entering the yellowcake enclosure will be required to wear personal air samplers when the exposure to airborne natural uranium potentially could exceed 50 percent of the maximum permissible concentration.

The Vice President of Uranium and Mineral Operations has issued a written directive to personnel that individual air samplers must be worn, as stated in the revised license application, when individuals are working in an area where the exposure to airborne natural uranium could potentially exceed 50 percent of the maximum permissible concentration.

This directive was issued on March 28, 1984 and posted in appropriate areas in the mill and compliance achieved as of that date.

DEVIATION

Airborne uranium samples were not collected from within the yellowcake dryer or packaging enclosures from August 2, 1983 through January 5, 1984. This lack of action has been identified as a deviation of commitments made in the April 7, 1984 letter from Energy Fuels to the Nuclear Regulatory Commission.

CORRECTIVE ACTION

Sampling on a weekly basis was reinstated on January 5, 1984 and a checklist of all completed environmental and health physics surveys has been completed on a weekly basis and forwarded to the Vice President of Operations as part of maintaining quality control.

May 2-3, 1984

No violations or deviations were identified.

May 20-21, 1985

Two violations were identified.

VIOLATION 1

License Condition No. 15 requires, in part, that the licensee establish written operating procedures to minimize dispersal of dust from tailings and ore piles and verify the effectiveness of the control measures utilized by means of a documented weekly inspection.

Contrary to this requirement, the licensee did not have written operating procedures for control of blowing tailings and ore dust. In addition, verification of the effectiveness of the control measures utilized was not documented.

CORRECTIVE ACTION

Corrective steps have been taken which include written operating procedures for minimizing the dusting of tailings and ore piles. Tailings inspectors are now being trained to follow these specific procedures. This training will be completed by July 15, 1985 and the effectiveness of the control measures will be documented beginning the following week, the week of July 21.

Full compliance with License Condition 15, including compliance with operating procedures and documentation of effectiveness of control measures, will be completed by July 25, 1985.

VIOLATION 2

License Condition No. 30 requires, in part, that special work permits be issued for operations which are not covered by a written operating procedure.

Contrary to this requirement, the licensee did not issue special work permits for work involving modifications to the leach tanks.

CORRECTIVE ACTION

The following corrective steps have been taken: Special work permits will be issued on any maintenance or nonroutine work for which there is no effective operating procedure in the future. Special work permits have been issued on the work to be done on the remainder of the leach tanks.

SUMMARY

Although the licensee has sustained numerous violations, the licensee has corrected in a timely manner all items of noncompliance identified during the inspections. In addition, the audit and inspection program described in Section 3.5 of this document will ensure that proper management attention is given to conducting all operations in compliance with the conditions of Source and Material License SUA-1358, as renewed.

9.0 CONCLUSION

Upon completion of the safety review of Umetco's renewal application and compliance history, the staff has made the following findings in accordance with 10 CFR 40, Subsection 40.32:

1. The licensee's application for continued milling of uranium ore at the White Mesa mill is for a purpose authorized by the Act.
2. As noted in Sections 3.2, 3.3, 3.6 and 4.0 of this safety evaluation report, the licensee is qualified by reason of training and experience to utilize source material for the requested purpose in such manner as to protect health and minimize danger to life or property.

3. As noted in Sections 2.0, 3.4, 5.0 and 6.0 of this safety evaluation report, the applicant's proposed equipment, facilities and procedures, as modified by the staff are adequate to protect health and minimize danger to life or property.
4. The renewal of the license will not be inimical to the common defense and security or to the health and safety of the public.

Therefore, the staff has concluded that issuance of a renewed license to Umetco, 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 addendum fulfill the requirements of 10 CFR 40. The staff has further concluded that conformance by Umetco to their proposed radiation safety program, as modified by the staff, should ensure a safe operation and eliminate the deficiencies identified by the Inspection and Enforcement staff during past inspections.

The staff therefore recommends that the revised license for the White Mesa Uranium Mill include the following safety-related conditions:

1. Authorized place of use: The licensee's uranium milling facilities located in San Juan County, Utah.
2. For use in accordance with statements, representations and conditions contained in Sections 3.6.6, 5.1, 5.2, 5.3, 5.4, 6.2 and 6.3 and Appendix E, Section 5, of the license renewal application dated January, 1985 as revised May, 1985, except where superceded by license condition below.

Whenever the word "will" is used in the above referenced sections, it shall denote a requirement.

3. The mill production per calendar year shall not exceed 4,380 tons of U_3O_8 .
4. Any changes in the mill circuit as illustrated and described in Plate 3.1-3 of the renewal application shall require approval by the U.S. Nuclear Regulatory Commission in the form of a license amendment.
5. The license shall implement an interim stabilization program for all tailings not covered by standing water. This program shall include written operating procedures and shall minimize dispersal of blowing tailings. The effectiveness of the control method used shall be evaluated weekly by means of a documented tailings area inspection. The operating procedure shall be submitted for USNRC review and approval within three (3) months of the issuance of this license.

6. The licensee shall conduct a tailings retention system and liner inspection program in accordance with Section 5.5.7 and Appendix D, Section 3.0, of the renewal application. Notwithstanding any statements to the contrary, changes in inspection frequency shall require the approval of the USNRC in the form of a license amendment. Further, copies of the report documenting the annual technical evaluation shall be submitted to the Uranium Recovery Field Office, USNRC, within one month of completion of the report.
7. The licensee is hereby 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 the words, "Any area within this mill may contain radioactive material."
8. The results of sampling, analyses, surveys and monitoring, the results of calibration of equipment, reports on audits and inspections, all meetings and training courses required by this license and any subsequent reviews, investigations, and corrective actions, shall be documented. Unless otherwise specified in the USNRC regulations all such documentation shall be maintained for a period of at least five (5) years.
9. Standard operating procedures (SOPs) shall be established for all operational process activities involving radioactive materials that are handled, processed, or stored. Standard operating procedures for operational activities shall enumerate pertinent radiation safety practices to be followed. Additionally, written procedures shall be established for nonoperational activities to include in-plant and environmental monitoring, bioassay analyses, and instrument calibrations. An up-to-date copy of each written procedure shall be kept in the mill area to which it applies.

All written procedures for both operational and nonoperational activities shall be reviewed and approved in writing by the RPO before implementation and whenever a change in procedure is proposed to ensure that proper radiation protection principles are being applied. In addition, the RPO shall perform a documented review of all existing operating procedures at least annually.
10. The Radiation Protection Officer (RPO) shall have the following education, training and experience:
 - A. Education: A bachelor's degree in the physical sciences, industrial hygiene, or engineering from an accredited college or university or an equivalent combination of training and relevant experience in uranium mill radiation protection. Two

(2) years of relevant experience are generally considered equivalent to one (1) year of academic study.

- B. Health physics experience: At least 1 year of work experience relevant to uranium mill operation in applied health physics, radiation protection, industrial hygiene, or similar work. This experience should involve actually working with radiation detection and measurement equipment, not strictly administrative or "desk" work.
- C. Specialized training: At least 4 weeks of specialized classroom training in health physics specifically applicable to uranium milling. In addition, the RSO should attend refresher training on uranium mill health physics every two (2) years.
- D. Specialized knowledge: A thorough knowledge of the proper application and use of all health physics equipment used in the mill, the chemical and analytical procedures used for radiological sampling and monitoring, methodologies used to calculate personnel exposure to uranium and its daughters, and a thorough understanding of the uranium milling process and equipment used in the mill and how the hazards are generated and controlled during the milling process.

11. The license shall be required to use a Radiation Work Permit (RWP) for all work or nonroutine maintenance jobs where the potential for significant exposure to radioactive material exists and for which no standard written operating procedure already exists. The RWP shall be issued by the RPO or his designate, qualified by way of specialized radiation protection training, and shall at least describe the following:

- A. The scope of the work to be performed.
- B. Any precautions necessary to reduce exposure to uranium and its daughters.
- C. The supplemental radiological monitoring and sampling necessary prior to, during, and following completion of the work.

In addition, the RPO's review of all non-routine activities, committed to in Section 5.3.1 of the renewal application, shall be documented.

12. The licensee shall assure that both the RPO and mill foreman, or qualified designees during their absence, perform weekly inspections of all mill areas to observe general radiation control practices and that a member of the radiation protection staff perform the daily

walkthrough inspection during weekdays, with qualified supervisory personnel performing the walkthrough on weekends. In addition, the RPO shall prepare a monthly report which includes a review of daily and weekly inspections, and a summary of all monitoring and exposure data for the month. A copy of the monthly report shall be submitted to the Operations Manager.

13. A copy of the semiannual ALARA report described in Section 5.3.2.2 of the renewal application shall be submitted to the Uranium Recovery Field Office, USNRC, by March 1 and October 1, 1986, and every year thereafter.
14. The licensee shall maintain effluent control systems as specified in Table 4.1-1 of the licensee's renewal application with the following additions:
 - A. Operations shall be immediately suspended in the affected area of the mill if any of the emission control equipment for the yellowcake drying or packaging areas is not operating within specifications for design performance.
 - B. The licensee shall, during all period of yellowcake drying operations, assure that the scrubber is operating within the manufacturer's recommended ranges for water flow and air pressure differential necessary to achieve design performance. This shall be accomplished by either (1) performing and documenting checks of water flow and air pressure differential approximately every four hours during operation or (2) installing instrumentation which will signal an audible alarm if either water flow or air pressure differential fall below the manufacturer's recommended levels. If any audible alarm is used, its operation shall be check and documented daily.
 - C. Air pressure differential gauges for other emission control equipment shall be read and the readings documented once per shift during operations.
15. Sample volume and analysis for all in-plant air monitoring shall be adequate to achieve an LLD of 10% of the MPC listed in Table 1, Appendix B of 10 CFR 20.
16. The licensee shall utilize the results of lapel sampling in calculating employee exposures when the lapel samplers are used.
17. Occupational exposure calculations shall be performed and documented within one week of the end of each regulatory compliance period as specified in 10 CFR 20.103(a)(2) and 10 CFR 20.103(b)(2). Routine airborne ore dust and yellowcake samples shall be analyzed in a

timely manner to allow exposure calculations to be performed in accordance with this condition. Non-routine ore dust and yellowcake samples shall be analyzed and the results reviewed by the RSO within two working days after sample collection.

18. The licensee shall conduct a bioassay program in accordance with Section 5.4.2.4 of the renewal application with the following addition:
 - A. A urinalysis program shall be conducted for mill personnel as specified in Section 1.4.1 of the "Radiation Protection Procedures Manual" as revised June, 1985.
 - B. In-vivo counting of mill personnel shall be conducted at least once every two years.
 - C. Laboratory surfaces used for bioassay analyses shall be decontaminated to less than 25 dpm alpha (removable)/100 cm² prior to analysis of samples.
 - D. Anytime an action level of 15 ug/l uranium for urinalysis or 9 nCi uranium or an in-vivo measurement is reached or exceeded, the licensee shall provide documentation to the USNRC, Uranium Recovery Field Office, indicating what corrective actions have been performed to satisfy the requirements of Regulatory Guide 8.22. This documentation shall be included and submitted with the semiannual 10 CFR 40.65 report.
 - E. Anytime an action level of 30 ug/l uranium for four consecutive specimens or 130 ug/l uranium for one specimen for urinalysis or 16 nCi uranium for an in-vivo measurement is reached or exceeded, the licensee shall provide documentation within 30 days to the USNRC, Uranium Recovery Field Office, indicating what corrective actions have been performed to satisfy the requirements of Regulatory Guide 8.22.
19. Surveys for fixed and removable alpha contamination shall be conducted in accordance with Section 2.3.2.2 of the "Radiation Protection Procedures Manual" as revised June, 1985. Action levels shall be as specified in Section 2.3.4 of the procedures manual.
20. Calibration of in-plant air and radiation monitoring equipment shall be as specified in Section 3.0 of the "Radiation Protection Procedures Manual" as revised June, 1985, with the exception that in-plant air sampling equipment shall be calibrated at least quarterly. Air sampling equipment shall be checked prior to each use, and the checks documented.

21. The licensee shall submit a detailed decommissioning plan to the USNRC at least twelve (12) months prior to planned final shutdown of mill operations.
22. Within six (6) months of issuance of this license, the licensee shall submit to the Uranium Recovery Field Office a detailed proposal for the disposal of contaminated material and equipment generated at the mill site. The proposal shall include a description of the materials to be disposed of, location(s) of disposal, method(s) of disposal, estimated annual volumes of materials, and an estimate of the impact of the disposal on the tailings management plan.
23. All liquid effluents from mill process buildings, with the exception of sanitary wastes, shall be returned to the mill circuit or discharged to the tailings impoundment.
24. Release of equipment or packages from the restricted area shall be in accordance with Attachment No. 1 to SUA-1358, "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct or Source Materials," dated September, 1984.
25. A decontamination and survey program for barrels containing yellowcake shall be conducted in accordance with Section 1.8 of Regulatory Guide 8.30, "Health Physics Programs in Uranium Mills," prior to shipment.
26. The licensee shall implement a program to minimize dispersal of dust from the ore stockpile area(s). This program shall include written operating procedures. The effectiveness of the control method used shall be evaluated weekly by means of a documented inspection. The operating procedure shall be submitted for USNRC review and approval within three (3) months of the issuance of this license.

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