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KERR-McGEE NUCLEAR CORPORATION
KERR-McGEE CENTER • OKLAHOMA CITY, OKLAHOMA 73125

August 3, 1977

REGULATORY FILE CY

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Jack Rothfleisch
Fuel Cycle Licensing Branch 1
Division of Materials and Fuel Cycle
Facility Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Rothfleisch:

Please review the attached draft of revised pages (dated August 3, 1977) to our Sequoyah Facilities License SUB 1010. Changes on the draft correspond to the telephone discussion we had on July 26.

During our discussion, we studied about 22 items which were felt to need modification. I believe you will find that at least 19 of these items have been resolved satisfactorily.

The three remaining items include the use of the G.M.R. canister, the Comfo II respirator fit test and the in-plant surface contamination action levels.

You will note that we still desire to use the G.M.R. canister for protection against the combined hazards of H.F. and uranium particulates. We understand, from the manufacturer, that this canister was designed for use at Oak Ridge (and other ERDA installations) to replace the Military M-11 assault canister then in use. We have used the G.M.R. for several years with no plugging problems at our uranium fuel fabrication plant and our conversion plant, particularly for protection against light concentrations of UO_2F_2 H.F. We reluctantly discontinued using this canister about two years ago after being informed that the Bureau of Mines was discontinuing its test schedule for approvals. Since an approval schedule by NIOSH does not seem imminent, your acceptance of this exception is requested.

The question of the Comfo II half mask being exempted from the smoke test (after each time it is donned) for exposures to natural uranium needs to be resolved.

I can find no one here who recalls agreeing to a reduction of the contamination levels listed in Appendix A, page 3-4 during your Sequoyah plant visit September 27 and 28, 1976. (See your letter and attachments of October 8, 1976.)

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The limits you suggest for in-plant contamination action levels are equal to or below those given in Reg. Guide 1.86 which are unrestricted activity levels. The levels as shown on page 3-4 have already been lowered from what they were for several years during our first five year licensing period. We see no practical or reasonable justification for lowering these levels still further.

After you have reviewed this, please call me so we can expedite completion of the final draft of this application for approval.

Very truly yours,

G. J. Sinke

Gerald J. Sinke, Coordinator
Radiation Health & Safety

GJS:hw

Enclosure

B = uCi of known isotope to be buried

A = permissible amount, in uCi, of each isotope that may be buried each month.

Typically, the fluoride sludge weighs 40 Kgs/ft^3 and may contain as much as 4.0 uCi/ft^3 of U (Nat.) plus 2.5 x 10^{-4} uCi/ft^3 of additional Ra-226 and x 10^{-} uCi/ft^3 of Th-230.

An economic evaluation favors this approach to burial of low level waste where large volumes of material containing small amounts of radioactive material must be disposed of by on site burial.

C. With the following exceptions, the Sequoyah Facility respiratory protection program is conducted in accordance with Article 20.103, "Exposure of individuals to concentrations of radioactive materials in air in restricted areas" on the effective date of its amendments dated December 29, 1976.

Exceptions: and

1. The M.S.A. G.M.R. cannister #88182 may be used for protection against UO_2F_2 HF when fitted as a full facepiece respirator. A protection Factor of 50 is used for radioactive particulates. The G.M.R. cannister contains the M.S.A. Ultra-Filter element. The M.S.A. Ultra-Filter respirator is an approved device for protection against radioactive aerosols. The composition of the particulates filter media in the G.M.R. cannister makes it resistant to hydrofluoric acid gas such as encountered with UF_6 aerosols (UO_2F_2 HF). The G.M.R cannister also contains a chemical bed which absorbs HF and other acid gasses and organic vapors, for use in atmospheres containing up to 0.5% by volume of these substances in air.

2. The NIOSH approved M.S.A. Comfo II ½ mask not only fits under the chin, but also around the mouth and nose. When fitted with its appropriate filter cartridges, for protection against radioactive particulates, this respirator will not need to be tested for fit with irritant smoke, prior to use, each time it is donned.* A protection factor of 10 applies.

*Personnel entering the processing areas carry a plastic bagged Comfo II respirator in a pocket of their coveralls or smock. In the event of a UF_6 release at or near their location, they hold their breath, quickly tear open the bag, don the respirator and leave the affected area.

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4.1.1 Solid Waste Treatment and Disposal

Solid waste generated at the Sequoyah Facility originate from operations in the Facility or the treatment of liquid waste. Each material generated must be treated in its own particular fashion in order to ensure no spread of radioactive materials to the environment.

4.1.2 Combustible Wastes

Combustible wastes are examined for contamination and disposed of in two ways. The non-contaminated combustible wastes are burned in an open pit constructed in accordance with Oklahoma Air Pollution Regulations and whose construction has been approved by the Air Pollution Control Board.

A small quantity of contaminated combustible wastes may be burned in a small incinerator described in the original license with the flu gas from the incinerator being discharged to the stack servicing the boilers. The stack effuent is sampled and analyzed. The ash from the incinerator is returned to the process to recover the uranium. This small incinerator is seldom used. It was not used at all during 1976.

4.1.3 Non-Combustible Wastes

a. Used anodes from the fluorine generation system,

b. Scrap contaminated drums resulting from transportation of yellowcake to the Sequoyah site,

c. Maintenance waste generated by the repair or removal of equipment in the plant.

The fluorine anodes are composed of graphite, are not contaminated with radioactive material and constitute a waste of very low volume. It is contmeplated that these will be buried in accordance with the solid waste disposal regulations of the State of Oklahoma.

Contaminated drums are currently being accumulated until sufficient volume is available for the economic disposal through a licensed steel melting furnace.

Items generated under C, that is, contaminated solid, are buried on-site in accordance with 10CFR 20.301 at a designated location at the rear of the active plant area. The site of this burial is shown on Drawing SQ-1, (page 4, Environmental Information, dated June 27, 1975). This site in accordance with directions from the State of Oklahoma had been recorded as a low-level radioactive burial ground in the County records.

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4.1.4 Solids Resulting From Liquid Waste Treatment

As described in previous sections, liquid wastes are treated by the removal of chemical toxicity and subsequently disposed of. The selected treatment generally results in the precipitation of a solid material slightly contaminated with radioactive elements that must be further disposed of.

a. Fluoride Treatment Wastes

Fluoride contaminated liquids are treated with lime in order to precipitate the fluoride as the insoluble calcium fluoride. This procedure results also in the formation of calcium hydroxide and calcium carbonates in excess of those used for the reaction. These materials precipitate at the bottom of a sludge pond and are buried.

b. Raffinate Treatment Wastes

Raffinate is currently neutralized with ammonium which results in the precipitation of heavy metal oxides and hydroxides. These precipitates, along with any acid insoluble contents of the concentrate settle to the bottom of the raffinate storage ponds where they accumulate as sludge. Further treatment of the liquid portion with BaCl results in the precipitation of Barium Radium Sulfate, thus, eliminating radioactivity from the liquid wastes. Proposals have been made to permanently dispose of the liquid portion.

The preferred method of disposal of the solid would involve the collection of the wastes and the transport of it to a uranium mill site for prompt disposal with mill tailings or process it through the mill for uranium recovery.

This procedure must be first found acceptable by the State in which the mill is located. As yet, the applicant has not secured clearance or approval of a State agency for this method of disposal.

Another method would involve the solidification of the wet sludge with cement and disposal in a low level licensed burial site. Proposals have been received from current licensees and a selection will be made after discussions with the State of New Mexico (and possible other states), on the preferred method described above.

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4.2 Environmental Surveillance

The combined liquid effluent stream consisting of the fluoride treatment effluent, the sanitary water treatment system discharge, the overflow from the recirculating cooling water system, and the bypassed plant intake water is sampled continuously at the point where it leaves the immediate plant-area south of the port access road. Daily grab samples are analyzed for temperature, pH, uranium, nitrate and fluoride for purposes of control. Monthly continuous samples and monthly composites are analyzed for uranium, gross alpha, gross beta, nitrate and fluoride. The samples are also analyzed quarterly for 226 Radium and 230 Thorium. In addition, the four individual streams are sampled and analyzed every two weeks to pin-point the major source of contamination.

The Illinois and Arkansas Rivers are sampled monthly upstream and downstream of the plant outfall and are analyzed for the constituents listed above. Two onsite "farm ponds" are sampled quarterly and are analyzed for the same components as above. Samples are taken from water wells as well as from monitoring wells located near the raffinate and fluoride treatment storage ponds and analyzed as above. Additional wells have been added to support this effort.

Air samples are taken along the restircted area fence line (east, west, north, south) and counted daily for radioactive particulate matter. One week continuous air samples are taken each month for fluoride analysis.

Soil samples and vegetation samples are collected and analyzed each April and October. They are analyzed for uranium and fluoride.

4.3 Accident Analysis

Efforts have been to minimize the occurrance of accidents in the plant through the incorporation of all practicable safety features in the design, construction and operating procedures for the facility. Properly engineered handling equipment, installation of automatic safety devices, and training of operating personnel add further to the safety of the operations and provide means to promptly mitigate the consequences of accidents. The effectiveness of these measures is demonstrated by the fact that there have been no accidents to date having any offsite environmental effects.

Incidents having a potential for causing offsite effects are:

. Rupture of waste retention pond embankment.

. Acid storage tank rupture.

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Reporting Effluent Discharges to the NRC

10 CFR part 40.65 requires two reports per year specifying the quantity of each of the principal radionuclides released to unrestricted areas in liquid and gaseous effluents during each ½ year period. The reports are in tabular form following Appendix B of Regulatory Guide 1.21 with appropriate modifications made for the nature of the operation and data available. Page 4-8.2 is an example of the data reported. Information gathered for the reported data is obtained as follows:

1. Liquid Effluent

   There is only one point of discharge for liquid effluents to reach the unrestricted area. This is called the combination stream.

   A. Sampling and Analysis

      A continuous sampler draws 5 milliters per minute and deposits it in a bottle with enough volume to hold 8 hours of sampling. The sampler automatically begins filling a different empty bottle every 8 hours. Samples for chemical analysis are composited daily from the samples. The 8 hour samples are also composited into a monthly sample for fluorimetric analysis of uranium concentrations as well as a gross alpha radiometric analysis. Quarterly, a composite of the monthly samples are analyzed for Thorium and radium. A calibrated flume is used to determine the volume of the combination stream discharge.

   B. Calculation of Uranium Loss

      The laboratory reports gross alpha as pCi/l, and uranium as gms/l. The daily stream gallons are totaled for the month. Data for two calendar quarters are totaled for the report. (See example report pg. 4-8.2, Table II).

      Uranium loss is calculated:

      Ci=gms U/l x gallons x 3.785 l/gal x 6.77E-07 Ci/gm

      Gross alpha is calculated:

      Ci=pCi/l x 1.00E-12 Ci/pCi x gallons x 3.785 l/gal

2. Gaseous Effluent

   Process areas in the building are ventilated by forcing air into the building at a rate sufficient to cause 10 air changes per hour as the air is exhausted through powered ventilators

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TABLE I

Radioactivity in Gaseous Effluent - 1st 1/2 19

		Continuous Mode		Batch Mode	
Activity Released	Unit	1st Qtr.	2nd Qtr.	1st Qtr.	2nd Qtr.
1. Particulates - Elevated Release & Total Release					
Gross Alpha	Ci			0.00E+00	0.00E+00
U - natural	Ci			0.00E+00	0.00E+00
Th-230	Ci			0.00E+00	0.00E+00
Ra-226	Ci			0.00E+00	0.00E+00
Average Release Rate	uCi/sec.			0.00E+00	0.00E+00

2. Other - None

TABLE II

Radioactivity in Liquid Effluents - 1st 1/2 19

		Continuous Mode		Batch Mode	
Nuclide Released	Unit	1st Qtr.	2nd Qtr.	1st Qtr.	2nd Qtr.
Natural Uranium	Ci			0.00E+00	0.00E+00
Gross Alpha	Ci			0.00E+00	0.00E+00
U - natural	Ci			0.00E+00	0.00E+00
Th-230	Ci			0.00E+00	0.00E+00
Ra-226	Ci			0.00E+00	0.00E+00
Volume Released	liters			0.00E+00	0.00E+00

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and non-powered openings which are mainly roof hatches. Besides the above points of effluent release there are stacks at the lab sample prep room, the H.F. off-gas scrubber exhaust, main plant dust collector exhaust and the main plant stack.

Air input to the process areas at 10 changes per hour is $8.62 \times 10^7 F^3$/day. The process areas have eleven sampled powered vents which each move 3,000 CFM of air totaling $4.75 \times 10^7 F^3$/day. The difference between the air input and that exhausted by powered vents is the amount which exhausts through the sampled roof hatches. ($8.62 \times 10^7 F^3$/day—$4.75 \times 10^7 F^3$/day=$3.87 \times 10^7 F^3$ day). Alternately, an air sample is taken from one of the powered vents each day and a sample is taken daily from the centermost roof hatch.

The stack losses are calculated from sampling data gathered daily from the lab sample prep. stack, H.F. scrubber stack and dust collector stack. The exhaust volumes of these stacks are measured at least semi-annually. The main plant stack sample is gathered twice a week. The design exhaust volume is used for calculating the main stack exhaust. The air effluent samples are analyzed radiometrically for gross alpha.

The closest unrestricted area to the plant is State Highway 10 located about 750 feet east of the main process building. An environmental air sampling station is in operation here. Another similar sampling station is positioned, on site, one-half mile southwest of the plant. This location is in the direction of the prevailing wind and maximum concentrations. Samples collected from these stations are composited semi-annually and analyzed for gross alpha, uranium, Th-230 and Ra-226. Ratios of these nuclide concentrations are made to the gross alpha concentration. These ratios are then applied to the gross alpha content released as gaseous effluent from the plant. Calculations are then made showing the releases of each radionuclide during each quarter of the semi-annual period. These procedures and calculations are performed to complete the semi-annual report required by 10 CFR 40.65 (See example report pg. 4-8.2, Table I).

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6. Seepage Well Monitoring

The ponds were constructed as described in the Supplementary Environmental Report already submitted. All construction was supervised by a civil engineer specializing in such construction. Inspection of the placement of the liner and dikes was conducted on daily basis by an on-site inspector. The exact layout of the ponds and the location of monitoring wells were shown in the above mentioned Environmental Report. Figure IV is an up-date map showing the addition of ten monitor wells constructed in 1974. All wells are being tested to determine the migration of raffinate solutions into groundwater and resolve the anomalies in the levels of chemicals appearing in well waters as compared to chemical concentrations in the raffinate pond.

Pond seepage monitor wells may be sampled and analyzed on a weekly or monthly basis. The analysis is done for gross alpha, beta, nitrate, fluoride, and uranium. Radium is analyzed quarterly.

Because of information gained during an extensive investigation conducted October 1976 (as described in our submittal dated January 11, 1977) and because of well modifications (described in our submittal dated May 31, 1977), we have an accurate perspective of the seepage. It is determined that weekly sampling of all the monitoring wells is not necessary, and that a monthly sampling for many of the wells is adequate. Currently, eight monitor wells are sampled weekly because they show abnormal nitrate values. Twenty-seven other monitor wells show no abnormal trends and are sampled monthly. Monitor well analysis data is closely scrutinized and the frequency of sampling and analysis is adjusted from weekly to monthly or vice versa as the need is indicated.

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4.4 Location of Submerged Combustion Burner

A submerged combustion burner is used to process the supernatant liquid in Raffinate ponds 1 and 2 so as to avoid the immediate need to build a third pond. The evaporator is designed to evaporate incoming raffinate at a temperature of 150°F, and return the water or heated raffinate to the pond where further evaporation will take place on the surface of the pond.

The burner is located between the two raffinate ponds as shown on Figure 1.

A process equipment and instrument diagram required for the installation of the submerged combustion bu' er is shown on Figure 2.

Table 1 (pg 4-16) shows stack analysis of the combustion burner during its operation. The table also shows on-site ambient air sample data for the same period.

4.5 Waste Heat

Heat generated in the plant process or supplied as building heat is dissipated to the atmosphere by direct convection or by evaporation from holding ponds or the plant cooling tower.

No significant reduction in visibility has resulted in heat and water from the cooling water setting up fog conditions. Assuming total discharge to the Illinois river of 7 x 10^7 gallons per month the maximum temperature rise of the river water due to plant water temperature has not had any significant impact on the environment. Temperature of the water streams exiting to the river is recorded continuously.

4.6 General Environmental Requirements

To date no permanent method of disposal has been developed with respect to raffinate waste control resulting from operations of uranium conversion facilities. The design, construction and operations of the chemical waste treatment and disposal system presently in operation at the KMNC Sequoyah Facility is in compliance with applicable State and Federal laws, rules and regulations. The waste control system is designed to meet the water Quality Standards for the State of Oklahoma and limits the releases of radioactivity and hazardous materials to the levels consistent with the appropriate NRC and EPA requirements.

In addition, KMNC will make every effort to meet the timely and adequate reports concerning the environment, as required by the following permits and licenses:

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Permits and Certifications

1. Oklahoma Water Resources Board - Waste Disposal Permit IW-70-011. (No time limit provided Water Quality Standards are met).

2. Oklahoma Water Resources Board - Permit to Appropriate Surface Water No. P67-765 (No time limit).

3. Oklahoma State Dept. of Health - Sanitary Waste Treatment Permit (No time limit).

4. NPDES permit No. OK-0000191 (August 30, 1981).

5. Oklahoma Air Pollution Control Division - Open Pit Incinerator (No time limit).

6. Oklahoma Water Resources Board - Certification for Waste Discharges (No time limit).

Approved P ans and Reports

1. U. S. Army Corps of Engineering - Contract No. DACW56-70-C-0083.

2. Engineers Report on Waste Treatment Plant

3. Wastes Disposal Technical Provisions and Specifications.

4. "Domestic Waste Disposal Procedures" by Dr. R. H. Ramsey

5. Oklahoma State Dept. of Health - Open Pit Incinerator Evaluation Tests.

6. Oklahoma Water Resources Board - Spill Control Counter - Measure Plan - Provision of 40 CFR 112 (Three year up-date required October, 1977).

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TABLE I

SUBMERGED COMBUSTION BURNER STACK EFFLUENT

1.0 uCi/cc x 10^{-14}

1974

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
THORIUM	< .64	< 1.79	< .88	< .35	< .60	< .89	< 1.02*	.18	.16	.08	.08	< .02
URANIUM	.22	.27	.18	.28	.17	.03	.07	1.50	2.75	.50	1.55	.66
RADIUM^{226}	.29	.63	.15	.18	.48	.27	.35	.29	.29	.24	.09	**

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
THORIUM	.09	.08	.002	.18	.05	.04	.04	***	.05	.04	.03	.06
URANIUM	.40	.25	.91	1.08	.24	.31	.21	***	.82	.33	.32	.71
RADIUM^{226}	.13	.29	2.52	.52	.15	.27	.32	***	.64	.25	.09	.24

* - Analytical Precision improved after this date.

** - Sample lost

*** - Not operated

Continued page 4-16.1

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TABLE I (Continued)

RESTRICTED AREA FENCE LINE SAMPLES

1.0 uCi/cc x 10^{-12}

U(nat.) by Gross α Count

1974

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
E-1	.12	.10	.10	.10	.10	.12	.14	.35	.25	.35	.20	.20
E-2	.12	.10	.10	.20	.14	.14	.18	.30	.20	.30	.20	.25
E-3	.12	.06	.10	.10	.10	.12	.18	.35	.25	.30	.20	.30
E-4	.08	.08	.10	.10	.08	.14	.12	.25	.20	.25	.20	.20

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
E-1	.25	.25	.15	.20	.30	.30	.75	.30	.25	.30	.25	.40
E-2	.25	.25	.20	.20	.35	.30	.45	.35	.40	.40	.45	.40
E-3	.20,	.15	.15	.20	.15	.20	.30	.25	.25	.40	.35	.25
E-4	.20	.20	.20	.15	.25	.25	.45	.20	.20	.40	.45	.35

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If an employee submits a urine sample >20 µg U/ℓ because of exposure to non-transportable Uranium (or for an exposure of unknown origins), he is given a quart take-home sample bottle. He collects his urine from before retiring, during the nights, and the first voiding after arising. This second sample is considered to be a 24-hour equivalent sample. He returns this sample on his next work shift. Should this second sample be >20 µg/ℓ, he is assigned to non-Uranium work. He is re-sampled daily until a sample shows <20 µg U/ℓ, after which he may return to his regular work assignment.

Special investigative urine samples are also obtained for accidental exposures to soluble Uranium such as UF_6 or UO_2F_2. Small sample bottles are used to collect single voiding samples during the 20 hours following the exposure. The voiding times are recorded. Data obtained is plotted on semi-log paper and calculations are made to determine the uptake of Uranium to the blood. 2.7 mg U is the maximum permitted uptake at any time during a 7-day period. Should this uptake be reached or exceed medical examinations for kidney damage (proteniurio) will be made. For control purposes, any single urine sample >100 µg U/ℓ requires the individual to be assigned to non-Uranium work until a subsequent sample is <20 µg U/ℓ.

Urine sample results unusually high will be investigated by the Manager, Health Physics and Industrial Safety to determine the cause and need for corrective action.

In-vivo (lung) counting of selected individuals is performed annually.

Other employees with the following qualifications are counted once every two years:

a) Routine urinalysis shows no consistently elevated uranium-in-urine concentrations.

b) Little or no exposure to aerosols of class Y uranium chemical forms.

c) Have no previous In-vivo history showing a significant fraction of a body burden of natural uranium or U-235.

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5.8 Contamination Control Practices

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The Sequoyah Facility is divided into three control zones used to prevent the spread of contamination. Radioactive material handling and control practices vary for the three zones and are generally within the criteria described in the following paragraphs.

Restricted area includes the process buildings; the service and storage yards, the sanitary lagoon, and emergency basin #1, comprised of a controlled zone and an uncontrolled zone. This area is bounded by a security fence and access is limited to employees and authorized visitors. Entrances are posted with appropriate signs. Contamination and penetrating radiation levels are maintained low enough in restricted areas to allow personnel and vehicle entry. Work with radioactive material is limited to the restricted area in all cases.

All entrances to the restricted area are conspicuously posted in accordance with Section 20.203(e)(2) and with the words, "any area or room within this plant may contain radioactive material."

Access is controlled administratively and work in these areas by employees and authorized visitors is closely supervised by supervision and health physics personnel. Protective clothing and film badges are required. Equipment, items and vehicles from restricted areas are surveyed and decontaminated or packaged in a safe manner prior to release from the area. See Table II, page 3-7, Appendix A for decontamination levels for unrestricted release of equipment. Personnel working in restricted areas follow procedures specifically designed to confine contamination to restricted areas. Included in these procedures are requirements for clothing changes and washing exposed skin surfaces or a hand and shoe survey and decontamination to less than 500 d/min. Contamination levels are maintained sufficiently low to permit control by normal standard clothing change and washing procedures in all restricted areas.

Controlled zones are areas within restricted areas that normally include powder handling areas and areas where maintenance work on contaminated equipment and clean-up work is performed. Temporary controlled zones may be established in the event of an accidental spill or contamination spread or work performed on contaminated equipment in the maintenance shop. Upon completing a task or work period in a controlled zone, workers vacuum clean their protective clothing prior to leaving the zone if visible quantities of radioactive material was transferred to protective clothing articles. In addition to the above, personnel locker rooms are equipped with clothes hampers for discarding protected clothing and sinks and shower stalls for personnel decontamination. Persons entering controlled zones for inspection or supervision and who do not become contaminated with visible quantities generally follow procedures described for

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3. Respiratory Protection

Respiratory protection equipment is used in circumstances in which adequate limitation of the inhalation of radioactive materials by use of process or other engineering controls is impracticable.

With the following exceptions, the Sequoyah Facility respiratory protection program is conducted in accordance with Article 20.103, "Exposure of individuals to concentrations of radioactive materials in air in restricted areas" on the effective date of its amendments dated December 29, 1976.

Exceptions:

1. The M.S.A. G.M.R. cannister #88182 may be used for protection against $UO_2F_2 \cdot HF$ when fitted as a full facepiece respirator. A protection factor of 50 is used for radioactive particulates.

   The GMR cannister contains the MSA Ultra-Filter element. The MSA Ultra-Filter respirator is an approved device for protection against radioactive aerosols. The composition of the Ultra-Filter media in the GMR cannister makes it resistant to hydrofluoric acid gas such as encountered with UF_6 aerosols ($UO_2F_2 \cdot FH$). The GMR cannister also contains a chemical bed which absorbs HF and other acid gasses and organic vapors, for use in atmospheres containing up to 0.5% by volume of these substances in air.

2. The NIOSH approved M.S.A. Comfo II ½ mask fits under the chin, around the mouth and nose, and for purposes of this license is not an under chin type only facepiece. When fitted with its appropriate filter cartridges, for protection against radioactive particulates, this respirator will not need to be tested for fit with irritant smoke, prior to use, each time it is donned. A protection factor of 10 applies.

Personnel entering the processing areas carry a plastic bagged Comfo II respirator in a pocket of their coveralls or smock. In the event of a UF_6 release at or near their location, they hold their breath, quickly tear open the bag, don the respirator and leave the affected area.

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3.4.3 Facility Monitoring

1. Air Monitoring

a. An air monitoring program is maintained that provides for:

1) continuous collection at strategic work locations in the process area, and

2) breathing zone samples shall be taken to evaluate individual exposures during the performance of specific jobs when it is expected that personnel exposures could exceed 25% of the applicable 10 CFR 20 limits.

b. Procedures are in effect for relating air sample results to personnel exposure during planned and accidental exposure to radioactive material.

2. Contamination Control

Routine measurements of surface contamination are made weekly to reliably demonstrate contamination control. Surface contamination measurements are made by appropriate direct alpha survey techniques and smear tests.

Clean locker rooms, lunchroom, offices, control room and reception area, are maintained below 1000 d/min. by direct alpha survey and <500 dpm/100 cm^2 smearable.

Cleanup activity is performed promptly when "smearable" alpha contamination exceeds 2,000 dpm/100 cm^2 in the operating areas.

Contaminated solid waste is disposed of under controlled conditions that assure protection of personnel and the environs and compliance with regulations.

All persons leaving potentially contaminated process areas, follow locker room procedures that require removal of all protective clothing articles and washing of exposed skin surfaces or a shower. A survey of exposed skin surfaces and decontamination, as necessary, to less than 100 CPM using a GM instrument may be made in lieu of washing or showering.

To guard against contamination, protective clothing is worn by all personnel throughout the plant area

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In-vivo (lung) counting of selected individuals is performed annually. Other employees with the following qualifications are counted once every two years:

a) Routine urinalysis shows no consistently elevated uranium-in-urine concentrations.

b) Little or no exposure to aerosols of class Y Uranium chemical forms.

c) Have no previous In-vivo history showing a significant fraction of a body burden of natural uranium or U-235.

4. Air samples collected in work areas are usually collected each 8-hour shift or daily depending on the location and analyzed by radiometric counting techniques to determine Uranium concentrations in breathing air.

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Samples of airborne and liquid effluent are counted on a Nuclear Measurements Corporation gas proportional Model PC-3A alpha and beta counter. A certified alpha calibration source is used to calibrate a counter. A back-up PC-3A instrument is available.

Environmental water samples are analyzed for uranium using the fluorimetric method both at the Sequoyah Facility and the Kerr-McGee Technical Center, Oklahoma City, Oklahoma. Isotopic analysis is performed on liquid samples at the Kerr-McGee Technical Center.

The beta-gamma survey instruments are calibrated using a 15 millicurie sealed Cobalt-60 in a Technical Operations Model 571 Meter Calibration Kit, or equivalent. Alpha detectors and counting instruments are calibrated against a standard Pu-239 reference source and/or 230 Th source.

5.14 Environmental Surveillance

Environmental surveillance of the facility site is provided by Health Physics personnel or other qualified individuals for the purpose of sample collection and measurement of fluoride, nitrate and alpha and beta radioactivity. The capability to evaluate quantities accidentally released, potential personnel exposure and environmental contamination levels is maintained.

Composited environmental samples are analyzed by an independent laboratory and/or by the Kerr-McGee Technical Center in Oklahoma City, Oklahoma.

Presently, soil samples and vegetation samples are sampled and analyzed twice during the growing season for Uranium and Fluoride. These samples are appropriately obtained near the beginning and the end of the growing season (April and October).

The environmental water samples are counted for gross alpha and beta activity and analyzed fluorometrically for uranium. Chemical analyses are also made for potential chemical pollutants.

5.14.1 Airborne Radioactivity

Trace quantities of uranium are routinely released from the facility through the main stack, the laboratory hood exhausts, the process building exhaust air vents, hydrogen fluoride off-gas scrubber exhaust, dust collector exhaust and roof hatches.

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b. Respirators used at the facility include half-mask MSA Comfo Aerosol Filter Respirators equipped with type "H" ultra filter elements, MSA-GMR Canister or equivalent, full-face MSA Clearvue Respirators, Scott Air Paks, and ACME Respirators with radioactive particulate filter, and/or equipped with an element or organic-acid canister and compressed breathing air respirators.

5.9 Surface Contamination

Surface contamination surveys are conducted weekly. Direct survey techniques using portable alpha survey instruments and smear survey techniques are used. Good housekeeping and dust control practices are maintained and locker room procedures prevent the spread of uranium to office areas that are outside the process area. In cases where airborne contamination has occurred, cleanup of contaminated areas is undertaken immediately.

5.9.1 Liquid Effluent

The Sequoyah plant process generates two major liquid waste streams of varying composition. The solvent extraction circuit raffinate and the waste hydrogen fluoride scrubber product are the two primary process waste streams. Sanitary and domestic waste water are combined with the fluoride effluent and treated before discharged to the river, while raffinate streams are contained in holding ponds.

The Environmental Sampling Schedule for Radioactive Contamination (Based on sample data obtained during the years 1974 through 1976, surface waters, the settling basin monitor well and the residence wells show no sign of elevated parameters. A sampling frequency as shown below is based on these observations):

Sample Location	Sampling Frequency*
Illinois and Arkansas River	Monthly
Combination Stream Outfall	Monthly (Composite from daily samples)
Farm Ponds and School Pond	Quarterly
Salt Fork River and Raw Water	Quarterly
Settling Basin Monitor Wells	Monthly
Raffinate Pond Monitoring Wells	Weekly-Monthly (See pg. 4-9)
Residence Monitoring Wells	Quarterly

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5.0 Environmental Monitoring Program

Air samples are collected daily at the fence line and weekly at stations off-site. These are analyzed for gross alpha and Fluoride.

Vegetation and soil samples are obtained from sampling points that have the maximum ground level concentrations of airborne effluents, as determined by standard diffusion calculations. These are collected semi-annually and are analyzed for Uranium and Fluoride.

Rivers and other surface water ponds are sampled monthly or quarterly and are analyzed for gross α, β, NO_3, F and U. Ra is done quarterly.

Samples from wells monitoring chemical waste ponds are analyzed for U, NO_3, gross α, β, and Ra (quarterly). Depending on the well location it may be sampled monthly, or weekly.

Sampling frequency is based on previous analytical history. Corrective action is taken to prevent effluents with concentrations of contaminates in excess of permissible amounts from reaching the unrestricted areas.

5.1 Raffinate Pond Control

Submerged combustion burning (approved by Amendment No. 2, License No. SUB-1010) will continue to be used for limiting the rate of accumulation of raffinate in the retention ponds. This will include removal of radionuclides by ammonia and barium treatment. This also includes, the seasonal use of some of the resultant liquid as an ammonium nitrate-liquid fertilizer as authorized by the Commission.

Additional tests for raffinate control alternatives are documented in environmental reports previously submitted.

In accordance with paragraph 20.1(c) of 10 CFR 20, every reasonable effort is being made to maintain radiation exposure as far below the permissible limits as possible.

5.2 Solid Wastes

Radioactive waste materials such as contaminated drums, sludges and other solids are buried in accordance with the provisions of 10 CFR 20.304 which permits up to 12 burials per year with as much as 100 mCi of natural Uranium per burial at a minimum depth of four feet and spaced at least six feet apart.

Clean combustible materials such as boxes, crates, paper and rags are burned in an approved open pit incinerator.

An exception to 20.304(a) with respect to burial of Fluoride sludge. Fluoride sludge may be buried as per the Appendix C (10 CFR 20) footnote except that the amount of material buried at one time can exceed unity, but the total for all burials for a calendar year would not exceed "12".

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AUG 01 1977

Kerr-McGee Nuclear Corporation
ATTN: Mr. W. J. Shelley, Director
Regulation and Control
Kerr-McGee Center
Oklahoma City, Oklahoma 73125

Gentlemen:

This will confirm my telephone conversation with G. J. Sinke of your staff on July 26, 1977 regarding the Kerr-McGee Sequoyah Facility renewal application dated January 12, 1977. Questions, comments and requests for additional information included the following:

1. Page 1-6, paragraph 1.8b. Please include information on the Th-230 and Th-232 content of the fluoride sludge.

2. Page 1-6, paragraph 1.8c. Please provide a detailed description of how Kerr-McGee proposes to make use of the full facepiece respirator equipped with the MSA GMR cannister #88182. There is currently no single cannister that is approved by the NIOSH/MESA Testing and Certification Laboratory for use against a combination of hydrogen fluoride and airborne radioactive particulates. Consequently, it is unlikely that the requested exemption can be granted if it is intended to use this equipment for other than emergency escape purposes in the event of an accidental UF_6 release, and no protection factor will be applicable.

   Similarly, the MSA Comfo II half-mask is an under-chin type unit and must be tested for fit with irritant smoke each time it is used in order to be allowed to apply the protection factor of 10. The unit may be used without fit-testing each time only as a precautionary measure, but no protection factor will be applicable under these conditions.

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NRC FORM 318 (9-76) NRCM 0240

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3. Page 4-8.1. The semi-annual reports required by 10 CFR 40.65 call for reporting releases of the principal radionuclides in liquid and airborne plant effluents. It is requested that a commitment be made to include Ra-226, Th-230 and Th-232 effluents in addition to uranium in these reports with an explanation of how the reported quantities of radium and thorium are obtained; i.e., measured or calculated from the U:Th:Ra ratio in the plant feed.

4. Page 4-8.3. With the requirement for reporting radium and thorium emissions, consideration should be given to fluorometric analyses of airborne effluents for uranium. In the description of your procedure for determining stack loses, please include a commitment to verify the design exhaust volumes by actual measurements.

5. Page 4-9. Please rewrite the last paragraph to insure compatability with condition 7c on page iv of the FES (NUREG 75/067) corrected for possible elimination of certain monitoring wells due to plugging back as indicated in your 5-31-77 submittal re raffinate ponds.

6. Page 4-1.1, paragraph 4.1.2. Please state whether the stack servicing the boilers is monitored for radionuclide emissions. Describe what is done with the ash remaining after burning the combustible contaminated wastes.

7. Page 4-1.2, paragraph 4.1.4.
   a) Correct typo "contaminated" for "contamined". Add the words "on site." following the word "buried".
   b) Suggest rewriting to read, "Raffinate is currently neutralized with ammonia which results in ----." Substitute "precipitates" for "precipitants". Correct Ba Cl to Ba Cl_2. Substitute "transportation" for transport it". Please explain the mechanism by which "insoluble contents" of the ore concentrate feed are transported to the raffinate storage ponds.

8. Page 4-10, paragraph 4.6. Please consider rewriting the first paragraph as follows (if you consider the statement to be accurate):

"To date, no satisfactory method has been developed for the permanent disposal of raffinate wastes resulting from operation of uranium conversion facilities. The design, construction, and operation of the chemical waste treatment and disposal systems presently in use at the KMNC Sequoyah facility are in compliance with State and Federal laws, rules and regulations. The waste control system is designed to meet the Water Quality standards for the State of Oklahoma and limits the releases of radioactive and other hazardous materials to the levels consistent with the applicable NRC and EPA regulations."

9. Page 4-11. Either change the heading of this listing or delete items which are not permits or licenses. Please indicate effective dates (and expiration) of permits and licenses.

10. Page 4-16. Please discuss the reasons for the sudden drop in thorium content of the effluent in October, 1974 and continued low values through 1975.

11. Page 4-16.1. Please indicate the parameter being reported in this table, i.e., uranium? Total alpha?

12. Page 5-7, paragraph 5.7.4. Please expand the description of your in-vivo (lung) counting program including the frequency at which lung counts will be performed on designated employees, i.e., operators and maintenance personnel potentially exposed to Class (W) particulate matter. (See WASH-1251, Appendix F)

Please consider restoring the references to Reg. Guides 8.11 as contained in the 7/1/75 version of page 5-7.

13. Page 5-8, third paragraph under Restricted Area. Table II, Appendix A appears on page 3-7 of Appendix A.

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14. Page 5-11, paragraph 5.8.3, Respirators. Please list in tabular form the manufacturer, model number, and approval number (if any) of respirators used in your respiratory protection program.

15. Page 5-11, paragraph 5.9.1. See comment (5). Please review sampling schedule for conformity with description of Environmental Monitoring Program on pages V-22 and V-23 of the FES and with condition 7c on page iv of the FES.

16. Page 5-13, paragraph 5.14. Please review and provide more detailed description of sampling and analysis frequency of soil and vegetation sampling. Provide justifications for proposed change from monthly sampling with vegetation samples analyzed quarterly for uranium, fluoride and nitrate as indicated in your environmental report and the FES.

17. Appendix A, page 3-3.1. See comment (12) regarding in-vivo bioassay program.

18. Appendix A, page 3-4, paragraph 3.4.3(1)(a)(2). Please provide justification for change from 7/1/75 application submittal which read, "breathing zone samples shall be taken when it is suspected that personnel exposure could exceed 25% of applicable airborne exposure limits in 10 CFR 20."

19. Appendix A, page 3-4, paragraph 3.4.3(2). Second paragraph. In discussions during the September 28, 1976 site visit, our notes indicate that the <500 dpm/100 cm2 smearable was to be changed to <100 dpm/100 cm2 smearable.

    Third paragraph. Please provide justification for the action level of 2000 dpm/100 cm2 "smearable" in the operating area.

20. Appendix A, page 3-6. See comment (2) regarding requested "Exceptions".

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Since Mr. Sinke indicated that he did not anticipate any difficulty in responding to any of these comments, it is requested that your response be completed in time to reach us by August 12, 1977.

Sincerely,

Original signed by

J. E. Rothfleisch
Fuel Processing & Fabrication Branch
Division of Fuel Cycle and
Material Safety

OFFICE ➤	FCPF	FCPF				
SURNAME ➤	JERothfleisch:lse	LCRouse				
DATE ➤	07/29/77	08/ /77				

FROM: Kerr-McGee Nuclear Corporati

DATE OF DOCUMENT: July 2, 1977

DATE RECEIVED: July 6, '7

NO: 07090

LTR: X MEMO: REPO: OTHER:

TO: J. E. Rothfleisch

ORIG: X CC: OTHER:

ACTION NECESSARY ☐ CONCURRENCE ☐ DATE ANSWERED:

NO ACTION NECESSARY ☐ COMMENT ☐ BY:

CLASSIF: U POST OFFICE: REG. NO:

FILE CODE: # 40-8027

DESCRIPTION (Must Be Unclassified)

Rpts add'l inf re env impact of expansion of Sequoyah Conversion facility will be submitted approx 7/25

ENCLOSURES

REFERRED TO	DATE	RECEIVED BY	DATE
reg file cy	7/6/77		
L C Rouse			
JRothfleisch			
I&E (2)			
PDR			
LPDR		07090 lcm	

REMARKS

U S NUCLEAR REGULATORY COMMISSION

MAIL CONTROL FORM

FORM NRC-326 (1-75)