

RE: 9678-N

September 27, 1996

**Certified Mail
Return Receipt Requested**

Dr. Carl J. Paperiello, Director
Office of Nuclear Material Safety
and Safeguards
Mail Stop: T-8 A23
U.S. NUCLEAR REGULATORY COMMISSION

RE: License No. SUB-1010; Docket No. 40-8027
Revisions to Amendment Application Submitted on July 19, 1994

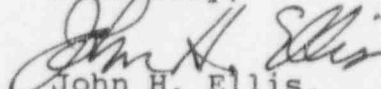
Dear Dr. Paperiello:

On July 19, 1994, Sequoyah Fuels Corporation (SFC) submitted an application to amend License No. SUB-1010 reflecting changes being made to implement the new 10 CFR Part 20 and other administrative changes at SFC. Revised pages from Chapter 12 of the Safety Demonstration section were also included. A revision to the amendment application was submitted on February 2, 1996 which responded to comments received from the NRC staff on July 21, 1995. Errata to the February 2, 1996 revision were submitted on April 2, 1996.

This revision is being submitted to update the application to reflect the changes authorized by License Amendments 21 and 22 which have been approved by the NRC subsequent to the original amendment application, and to make other administrative changes to reflect the current operational status at SFC. Attachment 1 is a "Summary of Changes" identifying the proposed changes included in this revision. Attachment 2 is a copy of the amendment application that incorporates the changes noted above. For convenience, all pages of the application are being submitted, even though some pages may not have changes.

Should you have any questions concerning this request, please contact me at (918) 489-3390 or Craig Harlin at (918) 489-3386.

Sincerely,


John H. Ellis,
President

JHE:mt

Attachments

xc: L.J. Callan, Region IV

9610040016 960927
PDR ADOCK 04008027
C PDR

NL10
11

ATTACHMENT 1
SUMMARY OF CHANGES
Page 1 of 2

This revision includes administrative changes to the amendment application to incorporate the changes for the new 10 CFR 20.

The revision also updates the application to reflect the changes authorized by License Amendments 21 and 22 which have been approved by the NRC subsequent to the original application for amendment.

The changes include the following:

1. The definition of "Sequoyah Facility" in Section 1.6 was revised to reflect the correct figure number and the facility as represented in the License.
2. Item 7 of Section 1.8 was updated to reflect that notifications will be made to the Division of Waste Management.
3. Item 11 of Section 1.8 was corrected to reflect condition 1-10.
4. Note 1 of Appendix I to Chapter 1 was revised to include additional soil sampling requirements for the fertilizer control plot.
5. Appendices II and III to Chapter 1 are no longer applicable and have been deleted.
6. The title of Figure 3-1 has been changed back to "Sequoyah Facility General Arrangement."
7. Subsection 3.3.1.1 has been revised to remove the reference to the Guard House.
8. Subsection 3.3.1.2 has been revised to reflect that entrance to Restricted Area 1 is through "a" change room, and to remove the statement that the Guards may enter through any entrance.
9. Subsection 3.3.3.2 has been revised to indicate that the gas proportional counting system will be source checked each day the counter is used.
10. Subsection 3.3.4.8 has been revised to add the term "occupational" to the dose limit.

Attachment 1
Summary of Changes
Page 2 of 2

11. The liquid environmental samples to be collected under Subsection 5.2.1 have been revised to indicate that the river and surface water samples will be performed annually, and to remove the analysis for Thorium-230. The sampling requirements for the Combination Stream will be performed in accordance with Section 5.1.1. The samples for the monitoring wells will be performed semi-annually.
12. Table 5-1 has been revised to reflect the current detection limits, and to remove the information which is no longer applicable.
13. Table 5-2 has been updated to reflect the revisions of License Amendment 22, and to reflect the current sampling and analytical bases. Some of the notes for the table which are not longer applicable were removed.
14. Subsections 12.4.3 and 12.8.5.1 of the Safety Demonstration section were revised to reflect that personnel will perform monitoring for contamination prior to washing or showering.
15. Subsection 12.8.1 was revised to reflect that the TLDs are exchanged and evaluated on a quarterly basis by a laboratory which is accredited under the criteria of 10 CFR 20.1501(c).

ATTACHMENT 2

Amendment Application

CHAPTER 1. STANDARD CONDITIONS AND SPECIAL AUTHORIZATIONS

1.1 Name

Sequoyah Fuels Corporation is a wholly-owned subsidiary of Sequoyah Fuels International Corporation, which is a wholly-owned subsidiary of Sequoyah Holding Corporation, which is a wholly-owned subsidiary of General Atomics, which is a wholly-owned subsidiary of General Atomic Technologies Corporation. General Atomic Technologies Corporation is controlled by James N. Blue, a United States citizen. The Principal office of Sequoyah Fuels Corporation is located at Sequoyah Facility, I-40 and Highway 10, Gore, Oklahoma 74435.

1.2 Location

The Sequoyah Fuels Corporation, Sequoyah Facility is located 2-1/2 miles southeast of Gore, Oklahoma, on State Highway 10 south of U.S. Highway 64, and north of Interstate Highway 40. This location is approximately 150 miles east of Oklahoma City, Oklahoma and 40 miles west of Fort Smith, Arkansas.

1.3 License Number

The Sequoyah Facility is currently operating under Nuclear Regulatory Commission Source Material License Number SUB-1010. The initial License was granted on February 20, 1970 and was last renewed on September 20, 1985.

1.4 Possession Limits

The maximum amount of Natural or Depleted Uranium that the Licensee is allowed to possess at any one time shall be 20 million MTU.

1.5 Location Where Material Will be Used

Licensed material shall be used at the Sequoyah Fuels Corporation Sequoyah Facility.

1.6 Definitions

Combination stream - the liquid effluent from the facility which is made up of several liquid discharges.

CWE - cooling water system moved by pressure head at Lake Tenkiller.

Depleted uranium (DU) - uranium having a percentage of Uranium-235 less than the approximate 0.7% found in natural uranium.

Depleted UF₄ (DUF₄) - as used in this license, depleted UF₄ means the product of the UF₆ Reduction Plant when DUF₆ is used as feed material.

Depleted UF₆ (DUF₆) - as used in this license, depleted UF₆ means the residual UF₆ from isotopic separation of natural uranium hexafluoride (UF₆).

Fluorination ash - non-volatile compounds of uranium and/or impurities removed in the fluorination step.

GM - Geiger - Mueller

Hazardous Materials - process chemicals present in such quantity and/or concentration as to represent a serious threat to personnel safety in the event of unprotected exposure.

Normal Work Day - A day in which planned work functions are performed in the Restricted Area (normally Monday through Friday, excluding holidays).

Raffinate - the aqueous acidic waste stream from the Solvent Extraction operation.

Raffinate Sludge - the precipitated metals and clay that resulted from neutralization of raffinate with anhydrous ammonia.

Calcium Fluoride Sludge - the precipitated calcium fluoride that resulted from the neutralization of HF scrubber water with quick lime.

SX - solvent extraction

Sequoyah Facility - as used in this license means the area, as shown in Figure 3-1, which encompasses the processing areas, the treated raffinate storage ponds, and all buildings, equipment, structures and other features.

UNH - uranyl nitrate hexahydrate

Other units and definitions are as defined in Title 10 of the Code of Federal Regulations.

1.7 Authorized Activities

The following activities shall be authorized:

1. Storage, handling, packaging, and shipping of natural and depleted uranium compounds.
2. Handling, removal, treatment, storage and disposal of process materials, equipment, and contaminated waste materials, consistent with the provisions of 10 CFR 40.42.
3. Discharge of process effluents, cooling water, and stormwater as allowed by this license and applicable federal and state permits and regulations.
4. Remedial actions as may be specified by the U.S. EPA or the Oklahoma Department of Environmental Quality, subject to NRC concurrence.

1.8 Exemptions and Special Authorizations

Posting Exception

An exception to the posting requirements of 10 CFR 20.1902(e) shall be made for areas and rooms within the plant. All entrances to restricted areas shall be conspicuously posted with a sign having the words "Caution - Any area or room within this plant may contain radioactive material."

Fertilizer Distribution

In accordance with applications dated May 16, and August 15, 1980, August 17, 1982, June 2, 1983, and pursuant to Title 10, Code of Federal Regulations, Part 40, the following activities shall be authorized: (1) the use of ammonium nitrate solution processed from barium-treated neutralized solvent extraction raffinate for fertilizer, and (2) the release of crops grown on land fertilized with the fertilizer authorized in item (1) above, subject to the following conditions:

1. Treated ammonium nitrate shall be used as a fertilizer only for crops which are not used directly as human food, such as animal forage or seed production.
2. Raffinate shall be neutralized, and Ra-226 and other trace metals precipitated from the raffinate in accordance with approved procedures.
3. The treated ammonium nitrate shall be analyzed prior to use and shall be released for use as a fertilizer only if:

- a. The Ra-226 content does not exceed 2 pCi/l of solution or 0.1 pCi/gN for N concentrations in excess of 20 gN/l.
- b. The average uranium concentration does not exceed 0.1 mg/l.
4. The total quantity of nitrogen applied to any land in any one year by using treated ammonium nitrate as fertilizer will not exceed 700 lb. N/Acre.
5. Quantitative analyses for metals and specified isotopes shall be performed as outlined in the enclosed Appendix I, Revision 1.
6. The designated ammonium nitrate fertilizer application control area shall be the Sequoyah Acreage XVII (Agland) plot.
7. If Sequoyah Fuels Corporation decides to discontinue the use of any designated control site as part of the ammonium nitrate fertilizer application area, the Division of Waste Management, NMSS, U.S. Nuclear Regulatory Commission must be informed promptly so alternate areas for long-term testing can be identified. Should more than 30% of a control site be eliminated from application for any reason, an alternate control site will be proposed.
8. Other crops grown on land fertilized with the ammonium nitrate fertilizer solution may be used or sold without restriction if the use or sale is approved by a qualified independent agronomist.
9. Sequoyah Fuels Corporation shall continue to obtain input and recommendations for the overall ammonium nitrate fertilizer use program from Oklahoma State Extension Agronomists.
10. A completion report for the previous calendar year's fertilizer program shall be submitted to NRC by May 1 of each year. The report shall contain a description of the program, the analytical results obtained, an analysis of the results, a discussion of any unusual or unexpected results and a summary of the projected future program.
11. Sequoyah Fuels Corporation is responsible for all tests, controls, arrangements and reports required under Conditions 1-10 above regardless of the ownership of the fertilized land or crops.

APPENDIX I-Revision 1

Required Quantitative Analyses

<u>Element</u>	<u>Soil</u>	<u>Vegetation</u>	<u>Raffinate</u>
As	X	X	X
Ba			X
B	X	X	X
Cd			X
Co	X	X	X
Cr			X
Cu	X	X	X
Fe	X	X	X
Hg			X
Mg			X
Mn	X	X	X
Mo	X	X	X
Ni	X	X	X
Pb	X	X	X
Se			X
V	X	X	X
Zn	X	X	X
U	X	X	X
Th-230	X	X	X
Ra-226	X	X	X

-
- (1) Soil samples representative of the major soil types in each fertilized area shall be collected during each year in which SFC-N is applied. Samples shall be collected prior to the beginning of the growing season, approximately the mid-point of the application season, and about one month after the end of the growing season. Samples shall be individually analyzed for nitrate content. Analyses will be performed for samples in six-inch intervals from 0" to 48". If a problem of excessive accumulation is determined by the consulting agronomist, then further analysis shall be conducted for those elements indicated whose concentrations in the ammonium nitrate fertilizer exceeds the "Recommended Maximum Concentrations of Trace Elements," short term use standards as stated in Water Quality Criteria, 1972.
 - (2) Vegetation samples from the control sites shall be collected and analyzed for all elements listed in Appendix I, Revision 1, either just prior to or immediately after harvest. A statistically sound sampling program shall be used to ensure that the results obtained are representative of the vegetation harvested. Elemental analysis of the ammonium nitrate

fertilized vegetation from the control sites shall serve as an indicator of elemental concentrations in vegetation grown on all other ammonium nitrate fertilized sites subject to the following restrictions:

The loading rate for any site does not exceed that of the control sites. For sites where this restriction is not met, vegetation shall be analyzed. Collection and analysis shall take place prior to or immediately after harvest.

- (3) A representative composite sample of ammonium nitrate fertilizer solution shall be collected during the application season and analyzed for the elements indicated once per year.

CHAPTER 3. RADIATION PROTECTION

3.1 Definitions

The following definitions shall apply to the Sequoyah Facility for the purpose of showing conformance with radiation protection conditions of this license and applicable NRC Regulations. Unless otherwise stated, units and definitions are as defined in 10 CFR 20.

3.1.1 "Protected area" means:

Those areas of SFC property encompassed by a physical barrier and to which access is controlled. For the Sequoyah Facility the protected areas are identified on Figure 3-1, Sequoyah Facility General Arrangement.

3.1.2 "Restricted area" means:

An area of SFC property, access to which is limited by SFC for the purpose of protecting individuals against undue risks from exposure to radiation and radioactive materials. For Sequoyah Facility the restricted areas are identified on Figure 3-1, Sequoyah Facility General Arrangement.

3.1.3 "Controlled Access Area" means:

An established area within a restricted area, which is clearly demarcated, access to which is controlled, and which affords additional isolation of the radioactive material or personnel movement within it. For the Sequoyah Facility the controlled access areas are identified on Figure 3-1, Sequoyah Facility General Arrangement.

Each controlled access area is posted with a sign bearing the words:

Caution
Controlled Access Area

3.1.4 "Physical Barrier" means:

Fences constructed of No. 11 American wire gauge or heavier wire fabric topped by three strands or more of barbed wire on brackets angled outward between 30° and 45° from the vertical with an overall height of not less than eight feet, including the barbed topping.

3.1.5 "Unrestricted Area" means:

For the purpose of meeting the requirements of 10 CFR 20 this includes all areas outside the physical barriers of the restricted area, including the areas outside the protected areas, as shown on Figure 3-1, Sequoyah Facility General Arrangement. This includes a number of areas between the physical barriers of the restricted area and the physical barriers of the protected area. This also includes the Administration and warehouse portions of the Process Building.

3.1.6 "Process Safety Shoes" means:

Safety shoes provided to personnel for use in the restricted areas in lieu of wearing personal shoes and shoe covers. Process safety shoes are removed and left in the restricted area prior to exiting from the restricted area.

3.2 Special Administrative Requirements

Special administrative requirements include the use of Hazardous Work Permits, and a special management committee dedicated to the pursuit of ALARA objectives.

3.2.1 Hazardous Work Permit Program

Hazardous Work Permits (HWP's) shall be authorizations from appropriate facility officials to perform specific tasks which have the potential for increasing the risk of personal exposure to radiation or radioactive materials. The Manager, Health and Safety shall be responsible for establishing a procedure which describes the HWP Program. The procedure shall be reviewed and approved in accordance with the criteria noted in Section 2.7.1. HWP's shall be issued for all operations associated with licensed material which are not covered by established procedures. In accordance with Sequoyah Facility Operating Procedure - Hazardous Work Permits, the Project Supervisor shall be responsible for determining when an HWP is required and for issuing it. The Health and Safety Technicians shall provide appropriate clothing and equipment requirements. At the completion of the work the HWP shall be released in accordance with the requirements noted in the referenced procedure.

3.2.2 ALARA Committee

An ALARA Committee shall be maintained for the Sequoyah Facility. The Committee shall be comprised of personnel from the Licensing, Safety, and Nuclear Compliance Department of General Atomics, and personnel from Sequoyah Fuels Corporation. The General

Atomics membership includes the Corporate Manager, Health Physics and the Corporate Director, Licensing, Safety and Nuclear Compliance. Sequoyah Fuels Corporation membership includes the President, SFC, the Director, Regulatory Affairs, the Manager, Health and Safety, the Manager, Environmental, and the Director, Decontamination and Decommissioning Projects. The Corporate Manager, Health Physics shall serve as the Chairperson of the ALARA Committee.

At least annually, independent ALARA audits shall be directed by the Corporate (GA) Manager, Health Physics resulting in a report to the Committee consisting of a review of trend and cause analysis of radiological exposure conditions within the facility, employee exposures, and progress of administrative and engineering controls needed to assure that exposures to personnel and release to the environment are maintained "as low as is reasonably achievable" (ALARA). The ALARA audits shall be conducted by Corporate (GA) Health Physics personnel or by another independent company.

The ALARA Committee shall meet at least annually to evaluate the trend and cause analysis. The ALARA Committee shall also review exposure and effluent release data to determine (1) if there are any upward trends developing in personnel exposures for identifiable categories of workers, types of operations, or effluent releases, (2) if exposure and release might be lowered in accordance with the ALARA objectives, and (3) if equipment for effluent control is being properly used, maintained, and inspected. From this review, the Committee may recommend additional investigations be conducted and revise equipment and/or procedures to improve ALARA performance. A report documenting the results of the annual meeting shall be prepared by the Chairperson of the ALARA Committee and forwarded to the President, Sequoyah Fuels Corporation. The Manager, Health and Safety shall respond in writing to the recommendations in the annual ALARA report to the Chairperson of the ALARA Committee.

3.3 Technical Requirements

Technical requirements to minimize exposures to radiation and radioactive materials shall include access controls, ventilation controls, monitoring for release of radionuclides, and monitoring for external and internal exposure.

3.3.1 Access Control

3.3.1.1 Protected Area

The Sequoyah Facility is protected by a physical barrier. Access to all areas shall normally be through the South

entrance. Where alternate access points are used, special security measures will be implemented to maintain access control. Employees shall be issued identification badges which are issued as they enter and returned as they leave the site. Visitors shall be issued badges by the watchman as they enter the facility and are normally escorted while on the premises.

3.3.1.2 Restricted Areas

With the exception of the normal access points (change rooms), restricted areas are protected by a physical barrier (fence) with a gate(s) which is (are) normally locked or when unlocked have some other means of positive access control. The keys for the restricted area locks are under the control of security and are issued only to individual(s) authorized in writing by the President or the Manager, Health and Safety.

Personnel access to Restricted Area 1 shall normally be through one of the change rooms. When exiting Restricted Area 1, each person shall again pass through a change room. Washing and showering facilities are provided for personnel who perform hands-on work in the restricted area. Personnel Contamination Monitors (PCMs) are located in the change rooms and are normally used for the exit survey from Restricted Area 1. Individuals leaving any Restricted Area shall monitor exposed skin and personal clothing in accordance with approved procedures prior to exiting the restricted area. The only exception is that those personnel who have entered the restricted area in a vehicle and remained in the vehicle at all times while in the restricted area are exempt from the personal survey prior to exiting the restricted area.

Personnel entering Restricted Area 1 shall, at a minimum, wear shoe covers or process safety shoes. Shoe covers or process safety shoes shall not be required when entering restricted areas, other than Restricted Area 1, if a current contamination survey shows removable alpha activity to be less than 500 dpm/100 cm². Other protective apparel and gear shall be worn, as prescribed in approved procedures, when entering restricted areas or controlled access areas.

Personnel wearing process safety shoes shall put on shoe covers before entering a Controlled Access Area as defined in Section 3.1 of this Chapter and shall remove them before leaving the designated area. Other personnel shall put on shoe covers when entering Restricted Area 1 through a change room and shall change shoe covers when leaving a Controlled Access Area. Personnel entering a Controlled Access Area must wear coveralls or a smock.

3.3.2 Ventilation Requirements

3.3.2.1 Plant Ventilation

All plant buildings which are not physically secured to prevent personnel entry shall have adequate natural or forced ventilation to assure a safe breathing atmosphere as prescribed by OSHA. Where necessary, negative pressure containment systems shall be utilized to prevent the release of radioactive materials or other contaminants into breathing spaces or to the environment.

3.3.2.2 Plant Effluents

Building and containment ventilation systems are exhausted to the atmosphere via plant exhaust stacks. Plant exhaust stacks with the potential of discharging more than 10 g-U(Nat)/month shall be continuously sampled when their respective exhaust fans or other motive devices are in operation.

3.3.3 Instrumentation (Survey, Counting)

Instrumentation shall be provided to determine potential personnel exposure to radiation, airborne radioactivity and surface contamination. The instruments shall be calibrated at least every six months and following any change which may affect the accuracy of the instrument. The instruments shall be calibrated to a source(s) traceable to the National Institute of Standards and Technology.

3.3.3.1 Radiation Exposure Instruments

Ion chamber dose rate instruments and GM survey meters shall be used for measuring dose rates. Geiger-Mueller and scintillation type detectors will be routinely used for measuring beta-gamma and alpha radiation levels, respectively.

3.3.3.2 Airborne Radioactivity

Air sampling filters are counted using a gas proportional counting system. A source shall be used to operationally check the counter each day it is used.

3.3.3.3 Surface Contamination

Surface contamination shall be measured and reported as total dpm/100 cm². A gas proportional personnel contamination monitor shall be used for personnel monitoring. Portable alpha and/or beta-gamma survey meters or gas proportional tool monitors shall be used for surveys to release items for unrestricted use. This same portable instrumentation may also be used for personnel monitoring. Smearable or removable surface contamination samples shall be collected on a paper or cloth wipe and counted using a gas proportional counting system. Results of the smear sample counting shall be reported as dpm/100 cm² of surface sampled.

3.3.4 Internal and External Exposure

Performance requirements for the administrative controls and engineered systems shall be provided to protect operating personnel from excessive internal and external exposure.

3.3.4.1 Ventilation

Ventilation is discussed in 3.3.2.

3.3.4.2 Air Sampling and Analysis

Air sampling shall be performed in at least one representative location in each open process building with a potential for airborne contamination and at active work locations where these radioactive materials may be present.

DAC-hour exposure records shall be kept for all persons working in the plant who might potentially exceed 0.1 ALI (annual limit on intake) during the year. A facility action level (FAL) of 20 DAC-hours in any 40-hour work-week shall require an investigation and correction of the cause of the exposure.

If general breathing air concentration, when averaged over a work day, exceeds the FAL of 0.5 DAC the Manager, Health and Safety, or his designee shall attempt to determine the cause of the elevated airborne activity and notify facility management in accordance with established procedures.

If general breathing air concentration, except for confined areas designated as respiratory protection areas, such as tents or enclosures, exceeds a FAL of 3 DAC the Manager, Health and Safety shall undertake an investigation as to the cause and notify facility management as to the appropriateness

of the corrective action in accordance with established procedures.

When corrective action cannot be immediately taken and the airborne concentration exceeds 1 DAC, respirators shall be used in the problem area until corrective action is taken. Special ventilation may be provided within temporary enclosures constructed around systems requiring maintenance. The requirements for special ventilation shall be listed on the Hazardous Work Permit and include the requirement for enclosure construction, ventilation, air sampling, respiratory protection and clothing requirements.

3.3.4.3 Bioassay for Uranium

The bioassay program shall conform to the guidance provided in NRC Regulatory Guides 8.9 and 8.11. Workers shall be required to provide urine samples in accordance with approved procedures. An action level of 20 ug/l shall require a second sample and if confirmed, the employee shall be placed on work restriction until a subsequent sample measures less than 20 ug/l. An action level of 100 ug/l shall result in immediate work restriction. If the 100 ug/l action level is exceeded, an investigation shall be made to determine the cause of the exposure and corrective action shall be taken and documented.

3.3.4.4 Protective Clothing

Minimum protective clothing for entering Restricted Area 1 shall be shoe covers or process safety shoes. Additional protective clothing shall be based on the activity being performed and shall be specified in approved procedures.

3.3.4.5 Respiratory Protection

A respiratory protection program meeting the guidance of NRC Regulatory Guide 8.15 shall be used in the facility. Respirators are used in locations where airborne concentrations have the potential to exceed 1 DAC and as required by Hazardous Work Permits.

3.3.4.6 Surface Contamination Monitoring

During each day in which work is being performed in a Restricted Area or a Controlled Access Area, visual inspections will be conducted in areas where work is performed. Restricted and Controlled Access Areas in which work is not being

performed will be inspected in accordance with written procedures.

When visible surface contamination is found, it shall be reported to the Health and Safety Supervisor. Removal of the visible contamination shall be performed on a timely basis. In no case shall the delay to initiate decontamination actions exceed one normal work day.

In addition, removable surface contamination smear surveys shall be conducted on a monthly basis in all areas within a Restricted Area or Controlled Access Area where work has been performed within the previous 30 days. All accessible areas which exceed the action guideline levels shown in Section 3.3.4.7 shall be decontaminated on a timely basis. In no case shall the delay to initiate decontamination actions exceed one normal work week.

Periodic removable surface contamination surveys shall be performed in the Restricted Areas and Controlled Access areas, with the exception of buildings that have been closed and secured, as specified in approved plant procedures.

Health and Safety Technicians shall survey items prior to release for unrestricted use and assure that release levels shown in Section 3.3.4.7 are attained.

3.3.4.7 Contamination Control

The following limits shall be applied for purposes of contamination control at the SFC Facility.

Uranium Surface Contamination Limits for Sequoyah Facility

	Alpha Direct dpm/100cm ²	Alpha Removable dpm/100 cm ²	Beta-Gamma Direct dpm/100cm ²	Beta-Gamma Removable dpm/100cm ²
<u>Restricted Areas</u>				
General Restricted Area (Excluding Controlled Access Areas)	---	2,000	---	20,000
Controlled Access Areas ¹	---	4,000	---	40,000
Release from Restricted Area for Unrestricted Use ²	15,000 max. 5,000 avg.	1,000 max. ---	15,000 max. 5,000 avg.	1,000 max.
Skin Surface of Persons Leaving Restricted Areas	---	---	Not Detectable	
Personal Clothing When Leaving Restricted Areas	---	---	100	
<u>Unrestricted Areas</u>				
All Unrestricted Areas	5,000	1,000	5,000	1,000

¹ Items or equipment that have been in the posted Controlled Access Areas of Pond #2, Pond #4, the Raffinate Sludge Centrifuge Area, or the Clarifier A basins shall be subject to the following alpha release limits.

Direct Alpha - 300 dpm/100cm² max., 100 dpm/100cm² avg.
Removable Alpha - 20 dpm/100cm²

²

- All surfaces must be accessible for survey unless it is reasonable to assume from the design and usage that no uranium could have contaminated the inaccessible surfaces.
- The beta-gamma radiation level shall not exceed one millirad (mrad) per hour with an average not in excess of 0.2 mrad/hr as measured at one centimeter with an open-window beta-gamma survey meter with a window thickness of not more than seven milligrams per square centimeter.

3.3.4.8 Personnel Monitoring (External Radiation)

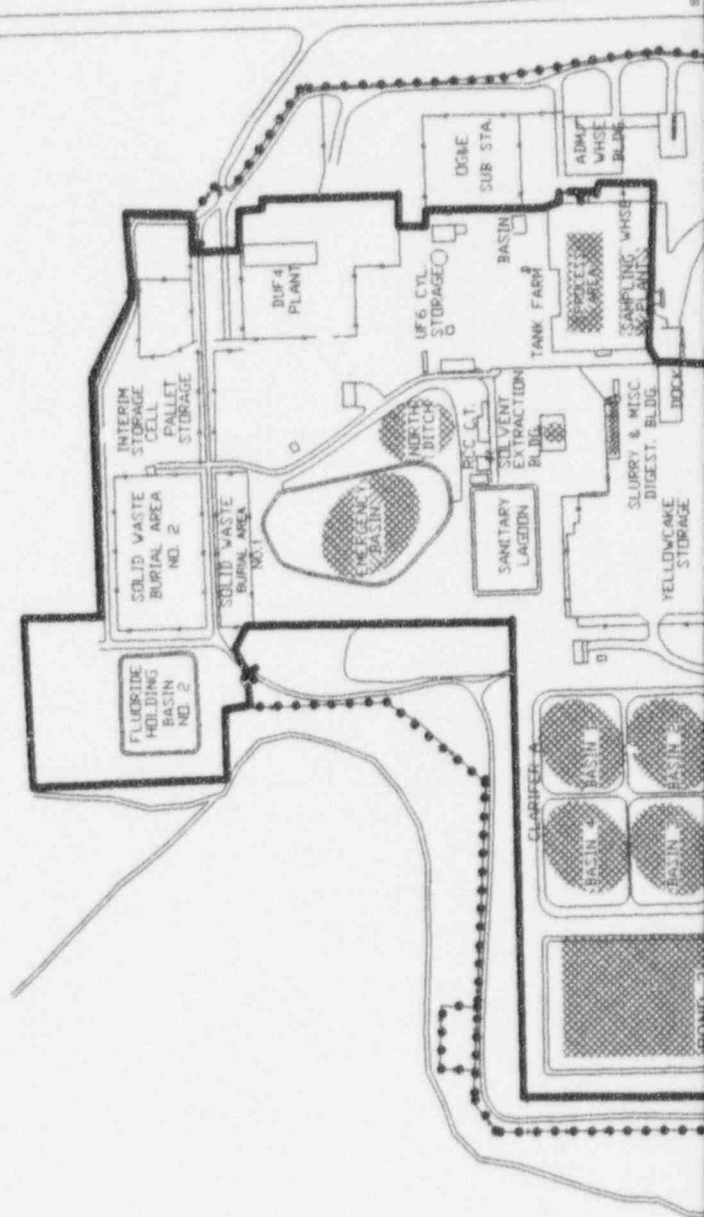
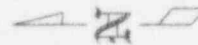
Personnel who routinely work in a restricted area are likely to receive more than 10% of the annual NRC occupational dose limit. These personnel shall be monitored for external dose with a beta-gamma dosimeter, typically by use of an individual thermoluminescence dosimeter (TLD). Visitors and personnel who do not routinely work in a restricted area are not likely to receive more than 10% of the annual NRC occupational dose limit. These personnel will not be monitored for external dose.

LEGEND:

••••• PROTECTED AREA

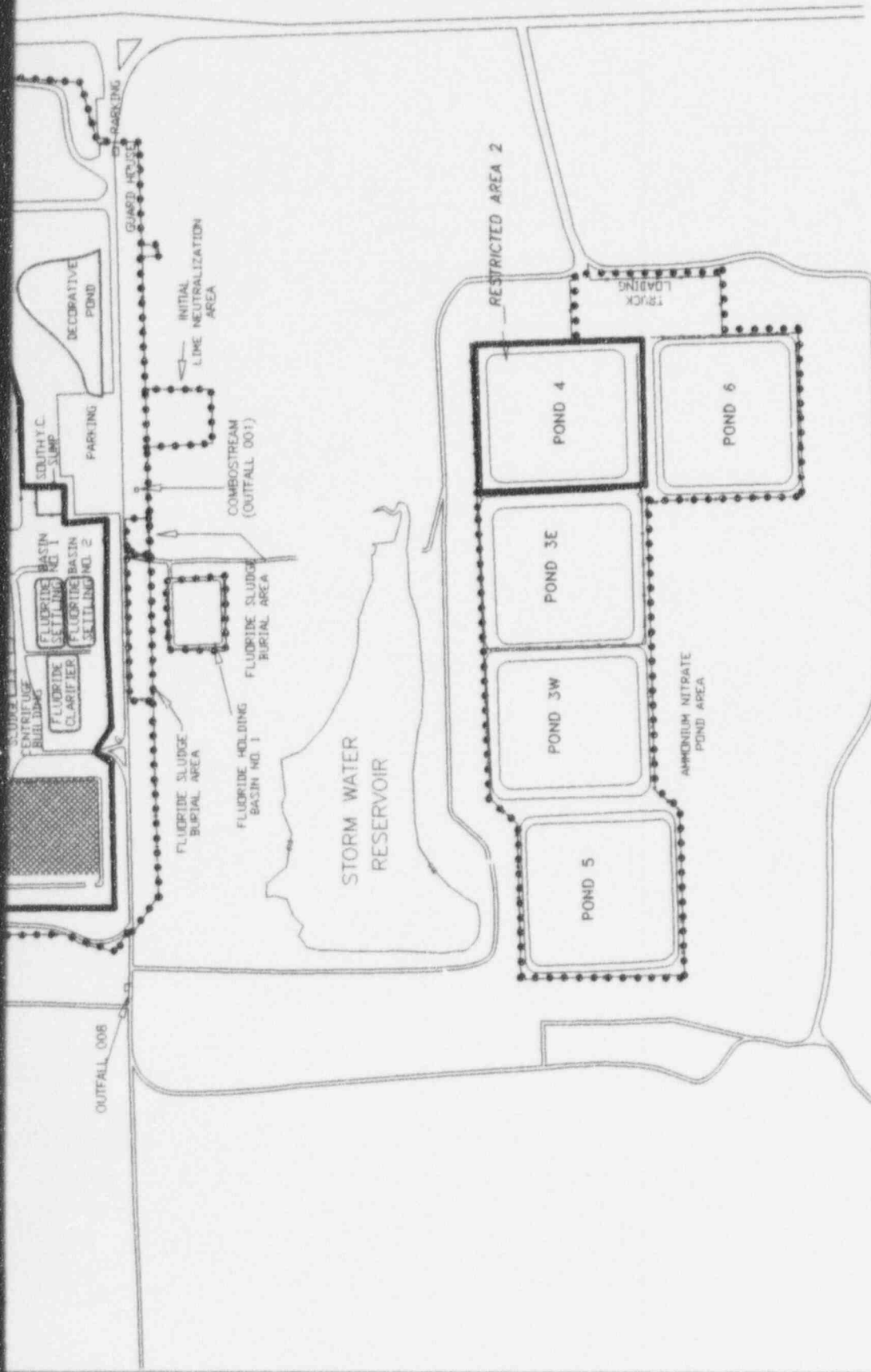
— RESTRICTED AREA

▨ CONTROLLED ACCESS AREA



License No. SUB-1010
 Amend. No. Revision

Docket No. 40-8027
 Date 09/27/96



ANSTEC APERTURE CARD

Also Available on
Aperture Card

SEQUOYAH FUELS CORPORATION			
TITLE: SEQUOYAH FACILITY GENERAL ARRANGEMENT			
PREPARED BY: SFC		FILENAME: NRC0002A	
REVIEWED BY: CH		FIGURE NO. J-1	
DATE: 09/24/96			

9610040016-01

CHAPTER 5. ENVIRONMENTAL PROTECTION

5.1 Effluent Control Systems

Sequoyah Facility shall conduct a dose assessment for the nearest resident on a quarterly basis using site-specific information and methodology in Appendix A of the NRC Environmental Assessment (NUREG-1157). If the quarterly dose commitment to a maximally-exposed individual in the general public exceeds 6.25 mrem for any organ, a report shall be submitted to the Commission within 30 days of the determination of the quarterly dose. In the event that the calculated dose to any member of the public in any consecutive 12-month period is about to exceed the limits specified in 40 CFR 190.10, Sequoyah Fuels Corporation shall take immediate steps to reduce emissions so as to comply with 40 CFR 190.10. As provided in 40 CFR 190.11, the licensee may petition the Nuclear Regulatory Commission for a variance from the requirements of 40 CFR 190.10. If a petition for a variance is anticipated, the licensee shall submit the request at least 90 days prior to exceeding the limits specified in 40 CFR 190.10.

5.1.1 Liquid Effluent

Discharge of liquid process effluents to the unrestricted area is through the combination stream. The combined effluent stream, consisting of the fluoride treatment effluent, the sanitary waste water treatment system discharge, process area storm water, and the excess plant intake water, shall be sampled continuously at the point where it leaves the immediate plant area south of the port access road. (See Figure 3-1, Sequoyah Facility General Arrangement). For purposes of control, 24-hour composite samples shall be analyzed for uranium at least 3 days per week. Other analyses shall be performed according to the requirements of SFC's NPDES Permit No. OK0000191. Monthly composite samples shall be analyzed for uranium, nitrate and fluoride. The samples shall also be analyzed quarterly for thorium 230 and radium-226. The detection levels and action levels for these parameters are provided in Table 5-1. When these levels are exceeded, inspection of the four upstream systems shall be made to determine the cause of the problem. In addition, grab samples from these streams shall be taken individually and analyses shall be performed to pinpoint possible sources of contamination in the event of a high combination sample. A calibrated flume shall be used to determine the volume of the combination stream discharge. The combination stream shall be discharged to the head waters of the Robert S. Kerr Reservoir.

5.1.2 Airborne Effluents

As indicated in Section 3.3.2.2, all exhaust stacks that have the potential of releasing more than 10 g-U(net)/month shall be continuously sampled whenever their respective exhaust fans or other motive devices are in operation, resulting in a discharge flow. When sampling is required, stack sampler filters shall be collected daily during normal work days and measured for gross alpha activity. In the event a continuous sampler is inoperable, a grab sample will be collected at least every eight hours until the stack flow is terminated.

The results of these analyses shall be reported to facility management on each normal work day. Gross alpha activity from these release points are expressed in terms of natural uranium Effluent Concentration (EC) or depleted uranium EC. After accounting for dispersion, an action level of 0.5 EC is established at the facility. When this action level is exceeded, specific area investigations shall be initiated to determine the major cause of the increase in the sample content. The results shall also be used in preparing the monthly uranium loss report and the semi-annual report of discharge to the NRC. Flow rate checks shall be performed weekly for active samplers to assure accurate air sample evaluation on all routine stack air samples.

If the radioactivity at the plant fence boundary exceeds 1.0 EC in a 7 day period, an investigation shall be undertaken to determine the cause of the elevated release and corrective action shall be taken to reduce the release. A report of the investigation shall be prepared and forwarded to the President, SFC with an information copy to the Chairperson, ALARA Committee.

5.1.3 Contaminated Equipment and Materials Disposal

Contaminated equipment and materials, such as burnable waste, empty sample bottles, insulating materials, process sludges, metal and plastic piping, are currently being accumulated and stored above ground and are being reprocessed, decontaminated, compacted or permanently disposed in commercially operated low-level radioactive waste sites.

5.1.4 Compliance Responsibility

The positions having responsibility for effluent control and monitoring to ensure compliance with all applicable standards, rules, and license conditions shall be as follows:

1. Manager, Health and Safety, shall be responsible for monitoring and sampling requirements for airborne effluents.

2. Director, Decontamination and Decommissioning Projects, shall be responsible for proper procedural control of effluent streams.
3. Manager, Environmental, shall be responsible for monitoring and sampling requirements for liquid effluents.

5.2 Environmental Monitoring

Sequoyah Facility shall use the quality assurance guidance outlined in Regulatory Guide 4.16, "Monitoring and Reporting Radioactivity In Releases of Radioactive Materials In Liquid and Gaseous Effluents from Nuclear Fuel Processing and Fabrication Plants and Uranium Hexafluoride Production Plants," and those sections of Regulatory Guide 4.15, "Quality Assurance for Radiological Monitoring Programs (Normal Operations) - Effluent Streams and the Environment," which apply to a uranium conversion facility.

All analysis shall be subject to the detection limits and action levels specified in Table 5-1. If the action level is exceeded, Sequoyah Facility shall investigate and take proper mitigating measures if necessary.

5.2.1 Liquid Environmental Samples (Surface and Well Water)

Samples shall be collected from rivers and other surface waters annually, and analyzed for uranium and radium-226 in accordance with Table 5-2.

An exception to the above surface water sampling program is the sampling frequency of the facility effluent stream 001, called the Combination Stream (2207). This stream shall be sampled and analyzed as described in Section 5.1.1.

Samples from monitoring wells shall be collected semi-annually as described in Table 5-2.

5.2.2 Air Sampling

Continuous air samples shall be collected at the Restricted Area fenceline, from each of the cardinal points of the compass. The filter media shall be removed weekly and, after a one week delay to allow short-lived alpha emitters to decay, counted for gross alpha. The results shall be reported in a monthly health physics report.

Air samples shall be collected weekly from five off-site stations located in relatively high population density areas and also at the point of maximum downwind concentration as determined by

Dames & Moore dispersion calculations. Samples are composited quarterly and analyzed for uranium, Th230 and Ra226. A sample collected at the nearest residence shall be analyzed for uranium solubility quarterly. (See Table 5-2 for sampling guide).

5.2.3 Non-Radiological Monitoring

The major non-radiological parameters monitored are fluorides and nitrates. The Combination Stream (Outfall 001) and the Stormwater Discharge (Outfall 008) shall be sampled and analyzed for fluoride and nitrate as specified in SFC's NPDES Permit No. OK0000191. In addition, groundwater monitoring wells shall be sampled and analyzed for fluoride and nitrate, as specified in Table 5-2.

5.2.4 Lined Impoundment Leak Detection Systems

The following lined impoundments were constructed with leak detection systems or "underdrains" between the synthetic and clay liners: Clarifier A, Ponds 3E, 3W, 4, 5, and 6. If the ponds contain treated raffinate, sludges or process liquids, the underdrains will be pumped on a monthly basis. Liquid found in the underdrains will be sampled and analyzed in accordance with Table 5-2.

TABLE 5-1

**DETECTION LIMITS AND ACTION LEVELS
FOR
ENVIRONMENTAL SAMPLE ANALYSES AT SEQUOYAH FACILITY**

Sample Type	Analysis	Detection Limit	Action Level
Air	Gross Alpha	2.5×10^{-15} uCi/ml	4.5×10^{-14} uCi/ml
	Uranium	1.0×10^{-16} uCi/ml	4.5×10^{-14} uCi/ml
Water	Gross Alpha	10 pCi/l	15 pCi/l
	Uranium	20 ug/l	225 ug/l
	Fluoride	0.4 mg/l	1.6 mg/l
	Nitrate	2 mg/l	20 mg/l
	Radium 226	1.5 pCi/l	3 pCi/l
	Thorium 230	100 pCi/l	200 pCi/l
Soil	Uranium	4 ug/g	40 ug/g
Vegetation	Uranium	0.25 ug/g	2.5 ug/g (dry weight)

TABLE 5-2
SEQUOYAH FACILITY

Page 1 of 3

ENVIRONMENTAL MONITORING SCHEDULE

Sample No.	Sample Location	Sampling and Analyses Frequency
<u>AIR (Continuous Samples)</u>		(see notes)
E-1	East Fence	GA(W)
E-2	West Fence	GA(W)
E-3	South Fence	GA(W)
E-4	North Fence	GA(W)
2103	East - 1000 feet	U,TH,RA(CW-Q)
2105	1/2 Mile SW of Plant	U,TH,RA(CW-Q)
2106	Carlile School	U,TH,RA(CW-Q)
2107	Hwy. 64 North	U,TH,RA(CW-Q)
2108	I-40 South	U,TH,RA(CW-Q)
2109	Nearest Residence	U,US(CW-Q)
<u>SURFACE WATER (Grab Samples)</u>		
2201	Ill River - Up	U,RA(A)
2202	Ill River - Down	U,RA(A)
2203	Ark River - Up	U,RA(A)
2204	Ark River - Down	U,RA(A)
2205	Farm Pond - East	U,RA(A)
2207	Facility Effluent	U,GA,GB, [1], (CC-M)/RA(Q)/TH(Q)/ [2]/ [3]
2209	Salt Branch	U,RA(A)
<u>LINED IMPOUNDMENT UNDERDRAINS</u>		
Each drain with liquid present if impoundment contains treated raffinate, sludges or process liquids.		U,N(M)
<u>MISCELLANEOUS</u>		
<u>SEDIMENT (Grab Samples)</u>		
1.	Confluence of the effluent stream and the Illinois River	TH,RA,U(A)
2.	Upstream of the Illinois River and effluent confluence	TH,RA,U(A)
3.	Downstream of the Illinois River and effluent confluence	TH,RA,U(A)

Sample No.	Sample Location	Sampling and Analyses Frequency (see notes)
WELL WATER (Grab Samples) continued		
2301A	MW - NW/Emergency Basin	N, F, U, GA, GB, RA, [1] (S)
2301B	MW - NW/Emergency Basin	N, F, U, GA, GB, RA, [1] (S)
2302A	MW - NW/Sanitary Lagoon	N, F, U, GA, GB, [1], RA (S)
2302B	MW - NW/Sanitary Lagoon	N, F, U, GA, GB, [1], RA (S)
2303A	MW - W/Clarifier	N, F, U, GA, GB, RA, [1] (S)
2322A	MW - NW Corner of Pond #3W	N, F, U, GA, GB, RA, [1] (S)
2340A	MW - SW Corner of Pond #5	N, F, U, GA, GB, RA, [1] (S)
2341	MW - West of Pond #5	N, F, U, GA, GB, RA, [1] (S)
2342	MW - South of Pond #5	N, F, U, GA, GB, RA, [1] (S)
2343	MW - West of Pond #6	N, F, U, GA, GB, RA, [1] (S)
2344	MW - SW of Pond #6	N, F, U, GA, GB, RA, [1] (S)
2345	MW - SW of Pond #5	N, F, U, GA, GB, RA, [1] (S)
2346	MW - SW of Pond #6	N, F, U, GA, GB, RA, [1] (S)
2347	MW - E of Pond #6	N, F, U, GA, GB, RA, [1] (S)
2348	MW - N of Pond #3E	N, F, U, GA, GB, RA, [1] (S)
2349	MW - N of Pond #4	N, F, U, GA, GB, RA, [1] (S)
2350	MW - NE of Pond #4	N, F, U, GA, GB, RA, [1] (S)
2351	MW - Between Ponds 3E and 4	N, F, U, GA, GB, RA, [1] (S)
2352	MW - Between Ponds 3E and 4	N, F, U, GA, GB, RA, [1] (S)
2353	MW - Between Ponds 3E and 3W	N, F, U, GA, GB, RA, [1] (S)
2354	MW - Between Ponds 3E and 3W	N, F, U, GA, GB, RA, [1] (S)
2355	MW - Between Ponds 3W and 5	N, F, U, GA, GB, RA, [1] (S)
2356	MW - Between Ponds 3W and 5	N, F, U, GA, GB, RA, [1] (S)
FTP-2B	MW - South of Pond 3W	N, F, U, GA, GB, RA, [1] (S)
MW082	MW - East of Pond #2	N, F, U, GA, GB, RA, [1] (S)
MW082A	MW - East of Pond #2	N, F, U, GA, GB, RA, [1] (S)
MW035	N/Pond 1 spoils	N, F, U, GA, GB, RA, [1] (S)
MW035A	N/Pond 1 spoils	N, F, U, GA, GB, RA, [1] (S)
MW041	W/Pond 2	N, F, U, GA, GB, RA, [1] (S)
MW041A	W/Pond 2	N, F, U, GA, GB, RA, [1] (S)
MW046	N/Pond 2	N, F, U, GA, GB, RA, [1] (S)
MW046A	N/Pond 2	N, F, U, GA, GB, RA, [1] (S)
MW047	NW/Pond 2	N, F, U, GA, GB, RA, [1] (S)
MW047A	NW/Pond 2	N, F, U, GA, GB, RA, [1] (S)
MW048	W/Pond 2	N, F, U, GA, GB, RA, [1] (S)
MW048A	W/Pond 2	N, F, U, GA, GB, RA, [1] (S)
MW051	W/Pond 2	N, F, U, GA, GB, RA, [1] (S)
MW051A	W/Pond 2	N, F, U, GA, GB, RA, [1] (S)
MW055	N/Clarifier A	N, F, U, GA, GB, RA, [1] (S)
MW057	SW/Pond 2	N, F, U, GA, GB, RA, [1] (S)
MW057A	SW/Pond 2	N, F, U, GA, GB, RA, [1] (S)
MW058	SE/Pond 2	N, F, U, GA, GB, RA, [1] (S)
MW058A	SE/Pond 2	N, F, U, GA, GB, RA, [1] (S)
MW059A	SW/Pond 2	N, F, U, GA, GB, RA, [1] (S)
MW061A	W/Fluoride Basin #1	N, F, U, GA, GB, RA, [1] (S)
MW064	E/Fluoride Basin #1	N, F, U, GA, GB, RA, [1] (S)
MW064A	E/Fluoride Basin #1	N, F, U, GA, GB, RA, [1] (S)
MW065	S/Fluoride Clar. Basin	N, F, U, GA, GB, RA, [1] (S)
MW065A	S/Fluoride Clar. Basin	N, F, U, GA, GB, RA, [1] (S)
MW092A	E/Reservoir Spillway	U, N (S)
MW093A	W/Reservoir Spillway	U, N (S)
MW095A	Prop. Line/S - Port Rd.	U, N (S)

Sample Analysis Notes

- [1] - If gross alpha is greater than 15 pCi/l or gross beta is greater than 50 pCi/l, then analysis for radium 226 and thorium 230 will be performed.
- [2] - The facility effluent is a continuous sample composited monthly.
- [3] - Special 1-gallon quality assurance sample for February, May, August and November.

<u>Sample Analysis</u>	<u>Frequency</u>
GA - Gross Alpha	D - Daily
GB - Gross Beta	W - Weekly
F - Fluoride	B - Biweekly
U - Uranium	M - Monthly
US - Uranium Solubility	Q - Quarterly
TH - Thorium-230	S - Semi-annual
RA - Radium-226	A - Annual
N - Nitrate (nitrogen)	CW-Q - Composite of weekly samples for quarterly analysis
MO - Molybdenum	CC-M - Composite from continuous sampler for monthly analysis

CHAPTER 12. RADIATION PROTECTION PROCEDURES AND EQUIPMENT

This chapter describes the radiation protection programs, equipment and procedures used at the Sequoyah Facility to protect employee and public health and safety. (See Chapter 3.0 for specific requirements.)

12.1 Radiation Protection Procedures

The protection of employees and the public from radiation and hazardous materials is a principal concern at the Sequoyah Facility. The philosophy that each individual is responsible for his and his fellow worker's safety is supplemented by an aggressive health and safety program to assure that conditions in the facility and in the surrounding environs are safe.

Operating procedures are strictly enforced. Activities are carried out in a manner to prevent excessive personnel exposure to radiation and radioactive materials. Radiation instruments are utilized to detect and measure radiation or contamination and prompt corrective action is taken where appropriate.

12.1.1 ALARA

The management of Sequoyah Fuels Corporation maintains a Health and Safety program designed to maintain exposures to radiological hazards "as low as is reasonably achievable" (ALARA). There are several aspects to this ALARA commitment:

- a. A written company policy, as well as facility procedures, are used to make personnel aware of management's commitment to ALARA. Each individual is required to implement ALARA on the job.
- b. The Corporate (GA) Manager, Health Physics, periodically directs a formal independent ALARA audit, including such items as operating procedures, emergency procedures, survey and monitoring records, bioassay data, training records, past exposure records, incident reports, inspection reports, proposed process or operational changes, and environmental data. In addition, the activities of the Health and Safety, and Environmental staffs are reviewed.

The audit findings are documented in a report which is distributed to the ALARA committee members and others as appropriate. ALARA committee members submit their comments and recommendations to the Corporate (GA) Manager, Health Physics. The Corporate (GA) Manager, Health Physics (Chairperson) schedules ALARA committee

meetings annually, or more frequently when deemed necessary. The composition of the ALARA committee is described in Chapter 3.0.

- c. Workers are trained in radiation protection as is relevant to their jobs, and are given refresher training and tested on their understanding at least once each year. They are encouraged to discuss radiation safety with the Health and Safety staff whenever a concern arises.
- d. The Manager, Health and Safety is well qualified to supervise Health and Safety Technicians and to administer the Health and Safety programs of the Sequoyah Facility. He has the authority to stop unsafe practices and acts promptly to correct unsafe conditions. He does this by communicating with appropriate management and supervision to cease an unsafe operation or correct a potentially unsafe condition.
- e. The Facility Health and Safety staff conducts surveillance programs and investigations to ensure that occupational exposures to radiation or radioactive materials are maintained as far below the specified limits as is reasonably achievable. They are vigilant in seeking new and better ways to perform all jobs involving radiation exposure consistent with ALARA philosophy.
- f. Adequate equipment, supplies and manpower for radiation protection work are provided. The Manager, Health and Safety is responsible for ensuring that proper equipment and supplies are available. He reviews activities involving maintenance and use of such equipment and supplies. The maintenance and use of critical radiation protection equipment and instrumentation is covered by approved procedures.

12.1.2 Radiation Safety Program (General)

The radiation safety program consists of the activities necessary for control of radiation and contamination, and monitoring of internal and external personnel radiation exposures. Elements of the program include:

- o Radiation Protection Standards
- o Procedures
- o Training
- o Contamination Control
- o Surveillance

12.1.3 Health and Safety Standards

The Radiation Protection Standard titled, "Radiation Protection During Decommissioning of a Natural Uranium Conversion Plants," governs radiation protection activities at the Sequoyah Facility. The standard specifies rules, principles and measures established by management for the conduct of the facility operations. The standard and any proposed operational changes which deviate from the standard are approved by the Corporate (GA) Director, Licensing, Safety, and Nuclear Compliance.

12.1.4 Procedures

Operating procedures are reviewed for any unusual health and safety aspects prior to approval. If results from any of the sampling, monitoring, or inspection activities indicate unfavorable trends or potentially unsafe conditions, a report is made to operations management and the cause is investigated. Corrective action is initiated by the appropriate manager. If necessary, specific operations are discontinued or curtailed by management until adequate protective or corrective measures are incorporated to provide for continued safe operation.

Written procedures are prepared by technical personnel and reviewed and approved as provided in Chapter 2.0, Section 2.7.1. Approved procedures are implemented covering the following subjects:

- o Personnel Radiation Exposure Monitoring
- o Access to Restricted Areas and Controlled Access Areas
- o Non-Routine Handling of Radioactive Materials
- o Waste Management
- o Emergency Response
- o Incident Investigation and Reports
- o Respiratory Protection Program
- o Hazardous Work Permits
- o Establishing and Posting Radiation Controlled Areas
- o Contamination Control and Decontamination
- o Radiological Safety Reports and Inspections
- o Radiation and Radioactive Material Incident Investigation and Reporting
- o Bioassay Program
- o In-Plant Air Sampling and DAC-Hour Exposure
- o Survey of Low Specific Activity (LSA) Radioactive Shipments and Receipts
- o Radiation, Contamination and Release Surveys
- o Laundry Facility Operation
- o Airborne and Liquid Effluent Monitoring

12.1.5 Training

Training programs are designed specifically to train facility personnel in the safe handling of radioactive and hazardous materials and the effective operation of equipment at the Sequoyah Facility. General Employee training consists of classroom instruction as described in Chapter 2.0, Section 2.6. Decommissioning Technician training consists of classroom and on-the-job training in specific areas prior to the employee being permitted to work without direct supervision as described in Chapter 2.0, Section 2.6. Monthly Safety meetings are conducted to enhance employee awareness of safety and safety-related matters.

12.1.6 Contamination Control

The Sequoyah Facility is divided into three zones used to prevent the spread of contamination:

- o Restricted Areas
- o Controlled Access Areas
- o Unrestricted Areas

The definitions of these areas are set forth in Chapter 3.0, Section 3.1.

The Restricted Areas are shown in Figure 3-1, Chapter 3.0. The Restricted Areas are bounded by security fences and access is limited to employees and authorized visitors. Entrances are posted with appropriate signs. All entrances to Restricted Areas are conspicuously posted as provided in Chapter 3.0, Section 3.1. Access to Restricted Areas is controlled administratively and work in these areas by employees and authorized visitors is closely supervised by operating supervision and health and safety personnel. Equipment, articles, and vehicles removed from Restricted Areas are surveyed and decontaminated or packaged in a safe manner prior to release from the area.

Controlled Access Areas are normally areas within Restricted Areas that have a higher potential for the presence of uncontained uranium. These areas normally include uranium handling areas and areas where maintenance work on contaminated equipment and clean-up work is performed. Temporary Controlled Access Areas may be established in the event of an accidental spill, contamination spread, or where work is performed on contaminated equipment outside a Controlled Access Area. Permanently established Controlled Access Areas are shown on Figure 3-1, Chapter 3.0.

Personnel access to Restricted Area No. 1 is normally through Change Rooms which are equipped with clothes hampers for discarding protective clothing, and, in some cases, sinks and shower stalls for personnel decontamination. Persons entering Controlled Access Areas follow approved procedures for protective clothing and equipment

requirements. All work in Controlled Access Areas involving potential exposure to hazardous or radioactive materials is performed according to requirements specified on the "Hazardous Work Permit" or in accordance with an approved procedure.

12.1.7 Surveillance

The Health and Safety staff performs surveillance activities in the following areas:

- o Personnel Radiation Monitoring
- o Direct Radiation Surveys
- o Smear Surveys
- o Air Monitoring

See Sections 12.3 and 12.4 for specific information.

12.2 Posting and Labeling

All entrances to Restricted Areas are conspicuously posted in accordance with the requirements stated in Chapter 3.0 of this license.

12.3 Personnel Radiation Monitoring

Personnel exposure to gamma and beta radiation is measured with beta-gamma dosimeters when required under 10 CFR 20. The dosimeters are supplied and evaluated by an outside contractor, and are exchanged on a quarterly basis.

Exposure control guides are established for external personnel exposure to provide a basis for exposure control planning for work groups and facilities, and to minimize the possibility of any individual inadvertently exceeding radiation exposure limits. Using the results of personnel exposure monitoring programs, exposures are controlled in a manner that prevents individuals from exceeding 10 CFR 20 limits.

12.4 Surveillance

12.4.1 Direct Radiation Surveys

Field measurements of beta and gamma exposure rates are made in accordance with approved procedures using calibrated ionization chamber instruments. The Manager, Health and Safety specifies the frequency of these surveys based on evaluation of plant conditions and the activities being performed.

12.4.2 Removable Contamination Surveys

Routine measurements of removable surface contamination are performed in accordance with approved procedures to ensure an acceptable level of contamination control. The Manager, Health and Safety specifies the frequency of these surveys based on evaluation of plant conditions and the activities being performed. Decontamination is performed promptly in accordance with Chapter 3.0, Sections 3.3.4.6 and 3.3.4.7.

12.4.3 Personnel Surveys

Personnel exiting the changes rooms to the Unrestricted area are required to monitor their clothing and exposed skin for contamination. Monitoring will be performed prior to showering or washing.

12.4.4 Release Surveys (Equipment)

Facility equipment and material are surveyed for unconditional release to the unrestricted area in accordance with approved procedures. Release criteria is established in Chapter 3.0, Section 3.3.4.7.

- a. A reasonable effort is made to minimize the contamination present.
- b. Surfaces of premises, equipment or scrap likely to be contaminated, and of such size, construction, or location as to make the surface inaccessible for purposes of measurement are presumed to be contaminated in excess of the levels specified in Chapter 3.0, Section 3.3.4.7.
- c. Premises, equipment or scrap having contaminated surfaces which have been covered by painting, metal plating or other covering material are presumed to be contaminated in excess of the levels specified above, unless it can be established that the contamination was below the above levels prior to applying the covering.

12.4.5 Air Monitoring

The airborne radioactivity monitoring program includes the following elements:

- a. Fixed and portable air sampling systems collect air samples in representative areas of unsecured process buildings and at locations of activities where there is a potential for elevated airborne radioactivity. These samples are collected and analyzed for the purpose of

detecting excessive airborne contamination levels that may result from abnormal operating conditions and for the purpose of trending chronic exposure conditions in the plant. Sample stations are strategically located to sample general breathing air.

- b. Breathing zone samples are collected to evaluate individual exposure during the performance of jobs involving actual or potential exposure to excessive levels of airborne radiation materials. Portable high volume, low volume, and lapel sampling units are available for collection of breathing zone samples.
- c. Approved procedures establish methods for determining air concentrations and exposure levels requiring respiratory protection. Affected areas are posted with respiratory protection requirements, as appropriate.
- d. During air sample collection, the samples are checked for visible quantities of uranium. The Health and Safety Supervisor is notified as soon as practicable of problem areas if visible amounts of uranium are present on the filter media. An effort is made to identify the cause of the problem. After the air samples are counted, the Health and Safety Supervisor is informed of all air samples greater than 0.5 DAC, which is a Facility Action Level (FAL).
- e. If air sample results exceed 3 DAC, an incident report is prepared by operations supervision. A section of the report includes exposure calculations, which are completed by the Health and Safety Department. Incident reports document DAC-hour exposure and inform management of problem areas. Where appropriate, actions are taken to correct problems and prevent recurrence.

12.5 Reports and Records

Records of all Health Physics exposure evaluations (internal and external) are prepared, reported and retained as specified in 10 CFR 20. Trend analyses and reports are prepared and distributed to management. Unusual incidents are investigated (e.g., air samples above 3 DAC) and incident reports are prepared and submitted to management, as appropriate.

ALARA audits are conducted at least annually and directed by the Corporate (GA) Manager, Health Physics, include a trend and cause analysis of radiological exposure conditions within the facility, employee exposures, and progress of administrative and engineering controls needed to assure that exposures to personnel and releases to the environment are maintained as low as is reasonably achievable.

12.6 Instruments

Instrumentation is provided to perform the surveys associated with the radiological control program. All survey and sampling equipment is inspected and calibrated under the direction of the Manager, Health and Safety at intervals as described in chapter 3.0. A semiannual preventive maintenance inspection is also performed by a qualified instrument technician. The following instruments are available at the facility for routine surveying and monitoring:

Radiation Detection and Related Instruments

<u>Type</u>	<u>Detected</u>	<u>Range</u>	<u>Use</u>
Dose Rate Instrument	Beta-Gamma	0-5 R/hr	Survey
Dose Rate Instrument	Beta-Gamma	0-1 R/hr	Survey
Portable Alpha Survey Instr.	Alpha	0-500,000 cpm	Survey
GM Survey (Portable)	Beta-Gamma	0-70,000 cpm	Survey
Personnel Monitor	Alpha	0-500,000 cpm	Personnel Monitor
PCM *	Beta-Gamma	0-500,000 cpm Monitor	Personnel

* Gas proportional personal contamination monitor

Samples of airborne effluents are counted using a gas proportional counter. A certified alpha calibration source is used to calibrate the counter. A back-up instrument is available.

Liquid effluent and environmental water samples are analyzed by independent, commercial laboratories.

The radiation survey instruments are calibrated by an independent vendor. All detectors and counting instruments are calibrated against an NIST traceable certified source.

12.7 Protective Clothing and Equipment

Protective clothing is supplied for routine use by decommissioning and safety personnel. Coveralls, hard hats, safety shoes, and safety glasses are worn routinely. Respirators, acid suits, shoe covers, hoods, face shields and gloves may be specified for work where special hazards exist.

Approved respirators used at the facility for protection against radioactive aerosols include air line respirators, full face filter respirators, self contained breathing apparatus, and emergency escape breathing apparatus.

12.8 Administrative Control Levels

12.8.1 External Exposure

External exposure due to gamma and beta radiation is measured with TLDs (thermoluminescence dosimeters). Employees who routinely work in the restricted areas and therefore have a potential to receive a dose in excess of 10% of the NRC annual occupational dose limit are required to wear a TLD while in a restricted area. TLDs are exchanged and evaluated on a quarterly basis by an independent laboratory accredited under the criteria of 10 CFR 20.1501(c). External Radiation Limits used at the Sequoyah Facility are those found in 10 CFR 20.

12.8.2 Internal Exposure

Internal exposure calculations based on air sample results are performed each day for exposed individuals and DAC-hour exposures are assigned. This calculation is an estimate of internal deposition with credit given for respiratory protection when used.

Internal uranium exposure may be determined by analysis of urine samples. Samples are collected every two weeks from personnel who routinely work in the restricted areas. In accordance with approved procedures, special diagnostic samples are collected following a known significant exposure such as might occur from an accidental spill or leak of uranium material.

A urine sample result greater than 100 ug U/l results in work restriction from controlled areas until a subsequent sample is less than 20 ug/l. A result greater than 20 ug U/l requires a re-sample, and if the second sample is greater than 20 ug U/l, work restriction is imposed until a subsequent urine sample is less than 20 ug U/l.

12.8.3 Facility Stack Sampling (Points of release to the unrestricted areas)

The major points of release from the plant are sampled continuously when the respective stacks are in operation. The locations which are sampled are as follows:

Location

UF₆ Conversion Plant

- a. Powered roof fans
- b. Lab sample prep. room exhaust
- c. HF off-gas scrubber exhaust
- d. Dust collector exhaust
- e. Main plant stack
- f. Lab hood exhausts
- g. Sample plant dust collector exhaust
- h. Miscellaneous digestion dust collector exhaust
- i. HF reactor cooling air exhaust

UF₆ Reduction Plant

- a. Dust collector exhaust
- b. Powered roof fans
- c. Reactor cooling exhaust
- d. Drum dryer exhaust

The gross alpha concentrations from these release points are expressed in terms of EC for the applicable solubility class. Effluent sample results are reported to management in a daily status report. They are used in preparing the monthly Uranium Loss Report and the semi-annual effluent release report to the NRC.

12.3.4 Liquid Effluent

The Combination Stream is the only point of discharge for liquid process effluents to reach the unrestricted area. For purposes of control, 24-hour composite samples shall be analyzed for uranium at least 3 days per week. Other analyses shall be performed according to the requirements of SFC's NPDES Permit No. OK0000191. Monthly composite samples shall be analyzed for uranium, nitrate and fluoride. The samples shall also be analyzed quarterly for thorium-230 and radium-226. The detection levels and action levels for these parameters are provided in Table 5-1. When these levels are exceeded, inspection of the four upstream systems shall be made to determine the cause of the problem. In addition, grab samples from these streams shall be taken individually and analyses shall be performed to pinpoint possible sources of contamination in the event of a high combination sample. A calibrated flume is used to determine the volume of the combination stream discharge. The daily stream gallons are totaled for the month. Data for two calendar quarters are totaled for the semi-annual effluent release report.

12.8.5 Surface Contamination

12.8.5.1 Personnel

Entry into the Restricted Area via a change room by personnel required to wear coveralls, is accomplished by entering the appropriate change room and removing all personal clothing and donning protective clothing obtained from the clean clothing bins and process area safety shoes from the individual shoe lockers provided. Exit from the restricted area is a reverse of the above with a personnel contamination survey, normally utilizing the PCMs, or "frisk" being required prior to exiting the Change Room. Personnel who may enter the Restricted Area obtain appropriate protective equipment in the change room and enter the Restricted Area. Exit from the restricted area will be a reverse of the above with a survey of exposed skin surfaces being required prior to exiting the Change Room (radiation survey instruments are provided in the Change Room to perform this survey). The survey will be performed prior to showering or washing. When contamination is detected, appropriate washing or decontamination will be required before leaving this area. The Health and Safety Department is contacted if assistance is required.

There are secondary control zones within the Restricted Areas called Controlled Access Areas. The Controlled Access Areas are those areas within the Restricted Area that have the highest potential for uranium spills or releases. Shoe cover changes are necessary when exiting from Controlled Access Areas for those personnel wearing shoe covers over their personal shoes. Personnel wearing process safety shoes are to put shoe covers on before entering Controlled Access Areas and remove them when leaving these areas. Coveralls or smocks are required when entering a Controlled-Access Area.

12.8.5.2 Process Area

Surface decontamination guidelines are found in Chapter 3.0, Section 3.3.4.7.

Removable surface contamination surveys are conducted on a frequency based on an evaluation of plant conditions and the activities being performed. The results of this survey are communicated to health and safety and D&D supervision, and where the guideline level is exceeded, facility personnel are required to decontaminate the area in a timely manner. The purpose of this survey is to point out problem areas which could contribute to airborne concentrations with the possibility of internal deposition. When decontamination is completed, the Manager, Project Resource Support requests a re-survey of the area or equipment by the Health and Safety Technician

on duty to ensure that the removable surface contamination levels have been reduced to less than the guideline. If the guidelines have not been met, additional decontamination must be performed.

Removable surface contamination surveys are also done in the facility unrestricted areas on a periodic basis. When the action levels of 1000 dpm/100cm² for either alpha or beta-gamma smearable contamination are exceeded, decontamination is initiated to reduce contamination to acceptable levels.

Surveys of material and/or equipment for unconditional release to the unrestricted area are performed and measurements must meet limits in Chapter 3.0, Section 3.3.4.7. Examples of material released under these conditions are scrap metal or equipment being sent off-site for repair. Appropriate records are maintained.

12.8.5.3 Shipment Surveys

All outgoing radioactive material shipping trucks are surveyed in accordance with approved procedures. If contamination levels are found that exceed release limits, decontamination of the vehicle or its contents is performed by facility personnel until the limits are met. The packaged materials or equipment from the restricted areas that are being shipped are surveyed according to approved procedures prior to loading into the shipping vehicle.

All outgoing contractor vehicles or equipment are checked. If contamination levels are found that exceed release limits, decontamination of the vehicle or its contents is performed by facility personnel until the limits are met. A record of this survey is maintained by Health and Safety.

UF₆ cylinder trucks are surveyed prior to leaving the plant, and appropriate documents are completed and copies of the document accompany the shipment. Where release limits are exceeded, decontamination is performed until limits are met.

12.8.5.4 Miscellaneous Surveys

Removable surface contamination surveys of respirators which have been cleaned and serviced and are

ready for re-issue are done periodically. Records of these surveys are retained on file.

12.9 Respiratory Protection

The facility respiratory protection program meets the requirements of 10 CFR 20 and Regulatory Guide 8.15.

The types of respiratory protection used at the facility are as follows:

- a. The full-face filter respirators are provided for use where airborne radioactive particulate concentrations do not exceed 50 DAC.
- b. Supplied-air (air line respirators or Self-Contained Breathing Apparatus - SCBA) are provided for use where radioactive particulate concentrations exceed 50 DAC, or where acid gas or organic vapors only are present in excess of 2% by volume. SCBA is the only device approved for oxygen deficient atmospheres.

Employees are fitted with each type of respirator they may use at the Facility and checked for respirator seal by using a quantitative fit test (air-line and filter) before working in controlled areas. Appropriate records are kept of these tests.