SEQUOYAH FUELS
A GENERAL ATOMICS COMPANY

RE: 9682-N

October 4, 1996

Certified Mail
Return Receipt Requested

Mr. Michael F. Weber, Chief
Low-Level Waste and Decommissioning
Projects Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: License SUB-1010; Docket No. 40-8027
Letter Dated August 22, 1996, M.F. Weber to J.H. Ellis

Dear Mr. Weber:

In a letter dated August 22, 1996, you requested that Sequoyah Fuels Corporation's (SFC) respond to the Staff comments on the Draft Site Characterization Report (SCR) submitted on February 5, 1996. This letter provides SFC's response to those comments as requested. The Final SCR will be revised as described in the attached response, and will be submitted to the NRC early next year.

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

Sincerely,

John H. Ellis

John H. Ellis
President

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Enclosures

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RESPONSE TO NRC COMMENTS ON SEQUOYAH FUELS SITE CHARACTERIZATION REPORT

General Comments

1. NRC staff needs more information to verify the material volume and activity estimates in the site characterization report (SCR). The information should be provided by site characterization unit. Included in these estimates should be a description of the predominant chemical forms and/or contaminated matrices in each unit and a description of how the volume estimate was derived (i.e. show the assumptions used to derive each estimate such as the area and depth of contamination, assumed concentration, etc., and the source of the information (e.g. from site characterization data, interviews with employees, or site records)).

Response

A list of the assumptions used to derive volume and activity estimates in the Draft SCR has been compiled and is attached for your information. These assumptions will be included, along with a description of chemical forms and/or contaminated matrices.

2. While it is true that the ultimate decommissioning alternative for this site is not known (page 5-4), in the final SCR SFC should estimate the dose impact for each unit, or other contaminated area subdivision, and site wide, that could occur under the no action alternative. While the no action alternative is unlikely to be chosen at this site, it will be evaluated in the EIS among the various decommissioning alternatives. This will require the collection of more site specific data (Section 5.5) to obtain values of necessary, site-specific dose assessment parameters.

Response

NRC comments 60 and 61 on the Site Characterization Plan (SCP) considered dose assessment inappropriate during site characterization and described it as a task to be included in the Decommissioning Plan. Consistent with the response to those comments, SFC did not perform a dose assessment during the site characterization activities. It has been SFC's intent to perform dose assessments as a part of the decommissioning planning effort and include the results in the Plan for Completion of Decommissioning (PCD). SFC is currently conducting a preliminary "No Action Alternative" dose assessment in conjunction with the evaluation of decommissioning alternatives for the Sequoyah Facility. The No Action study will be submitted in October of this year as previously discussed in a letter dated July 10, 1996. SFC recognizes that the preliminary dose assessment may determine that additional data should be collected in order to refine the assessments. Section 5.5 of the SCR also recognizes that the choice of decommissioning alternatives may necessitate additional data collection. All additional data collected prior to the submittal of the Final SCR will be reported therein.

3. Once the dose from each unit is estimated, the final SCR should rank the units according to their no action alternative dose potential. This will serve as a basis for remedial action priority at the site.

Response

SFC is evaluating the "no action" dose potential for various sources and human exposure pathways. The results of the dose assessments performed will be submitted for NRC review along with the proposed decommissioning alternative for the Sequoyah Facility. The projected dose and health risk indices to be provided in the "no action" study will clearly define the related risk potentials.

4. SFC should determine if any State regulatory body should be cognizant of the nitrate plume in the groundwater to the south and west of the plant.

Response

The State of Oklahoma is on distribution for correspondence associated with the environmental conditions at SFC. A copy of both the Draft RCRA Facility Investigation (RFI) and the Draft SCR were sent to the Oklahoma Department of Environmental Quality (ODEQ). Additionally, ODEQ has been represented by members of its staff at the public information meetings held by the NRC, including the meeting where the Draft SCR was discussed. SFC has contacted the ODEQ and has verified that ODEQ is the State agency responsible for the nitrate plumes at this facility.

5. The final SCR should include any data generated after the submittal of the draft SCR.

Response

As stated in the letter transmitting the SCR to the NRC, the final report will include data that was not available at the time the Draft SCR was submitted and data that is collected following submittal of the Draft SCR. SFC plans to include such information in the Final SCR.

6. Any comments made by the U.S. EPA on the draft RCRA facility investigation (RFI) report that would be applicable to the draft SCR should also be addressed.

Response

SFC will revise the RFI to address the EPA comments. Changes to the RFI that affect the corresponding portions of the SCR will be incorporated into the Final SCR.

7. The area east of O-10 that was potentially affected by the 1986 accident should be sampled in accordance with guidance in NUREG/CR-5849. Results and proposed disposition of the area should be in the final SCR.

Response

The area in question has been sampled in accordance with guidance in NUREG/CR-5849 and SFC is awaiting the analytical results. As with all data collected after the Draft SCR was submitted, this information will be included in the Final SCR. However, in this case, the results and proposed disposition may also be submitted prior to the Final SCR in order to expedite release of this property from further consideration if the results indicate that the criteria for unrestricted release has been met.

8. There has been no location identified for the proposed on-site disposal cell, therefore NRC cannot determine if there is adequate characterization or not. SFC should identify the location and general configuration of the cell (footprint, depth relative to ground water, features to inhibit/prevent waste migration, etc.). Additional characterization may be required to evaluate the acceptability of the proposed location.

Response

This comment was addressed in a letter to the NRC dated July 10, 1996, in which SFC committed to a schedule to provide the information requested. Accordingly,

in a letter from John H. Ellis to Michael F. Weber dated August 15, 1996, SFC provided the NRC the preliminary selection of a site for the cell and a map depicting the footprint. The final site selection along with the balance of the information requested will be submitted on the schedule described in the July 10, 1996 letter.

9. Additional characterization is needed in the vicinity of the Ag-land to determine the extent of the plume(s) from the storage ponds.

Response

Consistent with SCR section 4.6, Findings and Conclusions, the nitrate plume emanating from the Fertilizer Storage Pond Area is being further characterized. Three additional wells have been installed and developed downgradient from the pond area (west of Pond 5). The wells were sampled on 9/12/96 and analyzed for nitrates. This information will be included in the Final SCR. Further action in this area is being evaluated with respect to the information gained from these additional wells.

Specific Comments

1. Table 48 is not listed in the List of Tables in the Table of Contents and should be added.

Response

Table 48 will be added to the List of Tables in the Table of Contents in the Final SCR.

2. Page 4-36 - Under the heading "Historical Information Review" there is a reference to Figure 40 depicting the surface water drainage areas, etc. Figure 40 depicts

the hand auger sample locations. This reference should be changed to Figure 42.

Response

The incorrect reference to Figure 40 will be corrected in the Final SCR.

3. Page 4-39 describes the Solid Waste Burial Area No.1 (South) as containing 51,115 cubic feet of low-level radioactive waste. However, page 4-42 states that 43,000 cubic feet of low-level waste is contained in this area. The correct value should be determined and reported in both places.

Response

The actual volume of material buried in Solid Waste Burial Area No. 1 is 43,015 cubic feet. Page 4-39 will be corrected in the Final SCR.

4. Page 4-151 lists a number of groundwater wells that have elevated levels of uranium and their respective uranium values. The concentration value for well MW024A is missing, and should be reported.

Response

The sample result for MW024A for the April 1995 sampling event was 43.1 ug/l as reported in Table 46. This value will be incorporated into the text in the Final SCR.

5. Section 4.7 describes the Data Quality Assessment but does not describe the discrepancy between the Facility Environmental Investigation (FEI) and the SCR data on thorium-230 described on page 4-163 and verified by the NRC contractor's split sampling done on July 19 and 20, 1995. To what extent did the

former SFC lab participate in a laboratory Quality Assurance Program with other labs (e.g. EPA or EML)? If the SFC lab did participate in such a program, what were the results?

Response

An apparent discrepancy in thorium-230 concentrations was identified during development of the draft SCR between recent and historic analysis of raffinate sludges where thorium-230 is known to exist. The recent sample results were significantly lower than expected based upon historic sampling and process knowledge. Some sediment sample results were also suspect. This discrepancy was identified in section 4.6, Findings and Conclusions, of the draft SCR. An investigation was undertaken to determine if the recent sample analyses were valid. As part of the investigation, SFC sent a quantity of prepared sample containing traceable concentrations of thorium-230 to the lab used to analyze characterization samples (Infinity Analytical Services (IAS)), and to two additional labs for the purpose of comparison. The prepared samples confirmed that thorium results were reported as lower than actual values by IAS. The investigation revealed that procedures for the digestion of samples for thorium analysis had been changed, and that insufficient quantities of acid were added to fully digest the sample. The changes resulted in reported concentrations that were lower than actual. A laboratory with demonstrated ability to accurately identify thorium has been selected to re-analyze the samples reported in the draft SCR for thorium-230. The results will be reported in the Final SCR.

IAS was enrolled in the EPA Environmental Radioactivity Performance Evaluation Studies Program. However, this program does not include solid samples similar to soil or sediment. In addition, the only thorium-230 used in this program is a check on gross alpha counting ability. Thus, the EPA cross check program would not detect the problem encountered here.

6. The Attachment II tables (referenced on page 4-156 of volume I) are not in Attachment II, and should be provided.

Response

The table referred to on page 4-156 was inadvertently left out of Attachment II. This table, Site Characterization Radiation and Contamination Survey Structures and Equipment Maximums, is attached for your information and will be included in the final SCR.

7. The figures in Attachment II[I] show areas of elevated survey results from gamma walkover surveys. Are elevated survey results always defined as >13,000 cpm? How was this definition of "elevated" determined? Is that value being used to define the affected areas? Does it correspond to a concentration in soil?

Response

The gamma walkover survey is generally described in section 4.3.6, pages 4-21 through 4-23. On page 4-23, the method used to obtain the "baseline value" for data obtained by the gamma walkover is described.

Are elevated survey results always defined as >13,000 cpm? How was this definition of "elevated" determined?

A gamma walkover was performed at each of 13 different locations where background soil samples were collected. A baseline value was determined from the background data sets collected by the method described on page 4-23, and was found to be 13,031 counts per minute (cpm). The baseline value is the mean plus 2 standard deviations of the background data set averages. It is considered to be the probable upper bound of background in the area surrounding the facility where the contribution from known sources is not present. This baseline value

was used to evaluate gamma walkover data collected during the survey. Walkover data was compared to the baseline value, and survey results which exceeded the baseline value were considered to be different than background, hence "elevated".

Is that value being used to define the affected areas?

The gamma walkover survey was intended to augment the conventional soil sampling procedures by identifying areas of impact that might otherwise be missed. Areas of elevated survey results are candidates for additional sampling. In this regard, the walkover survey may lead to a sharper definition of the affected area boundary but is not being used to define the affected areas. The affected areas at SFC have been determined by soil sampling.

Does it correspond to a concentration in soil?

No attempt was made in the characterization of the Facility to correlate instrument response to a specific soil concentration.

8. Page 1 of Table 5 in Attachment III is missing, and should be provided.

Response

Attached is page 1 to Table 5 for your information.

ENCLOSURE 1

IMPACTED MATERIAL VOLUME AND ACTIVITY ESTIMATES DATA, ASSUMPTIONS AND CALCULATION

1. DUF_4 Slag, Dust Collector Cleanout and Off-Spec DUF_4

844 55-gallon drums of material
1,170,826 lbs (net wt) as DUF_4 (by representative assay)
889,827 lbs (net wt) as DU
$4.04 * 10^8$ g DU
(DU specific activity = 3.6×10^{-7} Ci/g)

Activity = 145.4 Ci DU

Notes: This material is currently stored in the DUF_4 Building under lock and key. It is assumed that it will be removed from the site by the Department of the Army prior to commencing decommissioning of the building.

2. DUF_4 Drummed Contaminated Trash

299 55-gallon drums of miscellaneous trash materials
Volume = 2200 ft^3
DUF_4 content per drum of 10 lbs (Estimation)
2990 lbs DUF_4
2270 lbs DU (1032 Kg DU)
1.03×10^6 g DU
(DU specific activity = 3.6×10^{-7} Ci/g)

Activity = 0.37 Ci DU

Notes: This material is currently stored in the DUF_4 Building under lock and key. It is assumed that it will ultimately be placed in the on-site disposal cell along with other drummed contaminated trash.

3. Empty Contaminated Drums

Approximately 2250 55-gallon drums
Volume = 16,552 ft^3 (uncrushed); ~ 2000 ft^3 if crushed
Estimated holdup = 10 g U_{nat}/drum
22,500 g U_{nat}
(U_{nat} specific activity = 6.77×10^{-7} Ci/g)

Activity = 0.015 Ci U_{nat}

Notes: Drums are currently stored on the South Yellowcake Pad. Deteriorated drums will be crushed and placed in the interim soil cell. Serviceable drums will be retained for use during decommissioning.

4. Scrap Metal

Approximately 100,000 ft^3 (uncompacted)
Estimate up to 500 lbs (227 Kg) of U_{nat} contained in scrap
(U_{nat} specific activity = 6.77×10^{-7} Ci/g)

Activity = 0.15 Ci U_{nat}

Notes: Scrap metal currently stored on South Yellowcake Pad. All of this material is either enclosed in boxes or surplus metal tanks or covered with PVC Pond cover material to limit spread of contamination. The inventory includes about 2800 ft^3 of scrap metal returned from ATG as "undecontaminable".

5. Raffinate Sludge (Unit 17)

Volume: 8.3 million gallons @ an est. 20% solids based on sludge level measurements in the 1A, 2A and 3A Clarifiers. Sludge levels are 10.39 ft, 10.61 ft, and 10.70 ft in 1A, 2A, and 4A, respectively. This volume equates to 1.11×10^6 ft^3.

Weight: (8.3×10^6 gal) * (8.34 lbs/gal) * (0.2 wt% solids) = 13.8×10^6 lbs of solids or 6.28×10^9 g

Radionuclide Content: In 1993, about 80% of the raffinate sludge was stored in Pond 4 with about 15% in Clarifier 4A and the remainder in 1A and 2A. Weighted averages of 1993 sample analyses from Pond 4 and Clarifier 4A for uranium, radium 226 and thorium 230 were as follows (from SCR Table 20):

Uranium - 5977 μgU/g
Radium 226 - 160 pCi/g
Thorium 230 - 5110 pCi/g

By early 1995, all of the raffinate sludge had been moved from impoundment to impoundment to allow relining of the clarifiers and emptying of Pond 4 and was stored in clarifiers 1A, 2A and 4A. 1995 samples for uranium had values of 7040 and 8990 μgU/g, respectively for Clarifiers 2A and 1A. For conservatism, the highest of the above uranium values is used in the following calculations. The radium and thorium analyses for the 1995 samples were determined to be invalid and are currently being reanalyzed. In the interim, the 1993 values are used to calculate the quantities of radium and thorium.

$$\begin{aligned}\text{Uranium} &= (6.28 \times 10^9\ \text{g}) * 8990\ \mu\text{gU/g} \\ &= 5.65 \times 10^{13}\ \mu\text{gU or} \\ &= 56{,}500\ \text{kgU or} \\ &= 38.3\ \text{Ci}\ U_{nat}\end{aligned}$$

Radium 226 = $(6.28 \times 10^9 \text{ g}) * 160$ pCi/g
= 1.00×10^{12} pCi Ra 226 or
= 1.00 Ci Ra 226

Thorium 230 = $(6.28 \times 10^9 \text{ g}) * 5110$ pCi/g
= 3.21×10^{13} pCi Th 230 or
= 32.1 Ci Th 230

Nitrate Content: The nitrate in the raffinate sludge was an average of 23,850 μg/g for a dried sample (SCP sample taken in 1995).

Nitrate = $(6.28 \times 10^9 \text{ g}) * 23{,}850\ \mu\text{g/g}$
= $1.50 \times 10^{14}\ \mu$g nitrate or
= 150,000 kg nitrate

Fluoride Content: The fluoride in the raffinate sludge was an average of 24,590 μg/g for a dried sample (SCP sample taken in 1995).

Fluoride = $(6.28 \times 10^9 \text{ g}) * 24{,}590\ \mu\text{g/g}$
= $1.54 \times 10^{14}\ \mu$g fluoride or
= 154,000 kg fluoride

6. Packaged Contaminated Trash

As of 1/17/96, there were 551 55-gallon drums of packaged contaminated trash stored in the F_2 cell rooms under lock and key. 54 of these drums contain contaminated asbestos and 21 contain trash from the DUF_4 plant. The remainder are from the UF_6 production operation.

Volume: 551 drums * 7.35 ft^3/drum = 4050 ft^3

Activity Estimate: From review of shipping records and composite samples from selected drums, the uranium content ranges typically from 20 to 60 g/drum.

Uranium = 551 drums * 40gU/drum = 22040 gU or 0.015 Ci U_{nat}

7. Calcium Fluoride Sludge

Volume Estimates:

Fluoride Settling Basin #1	=	29,300 ft^3 (1)
Fluoride Settling Basin #2	=	40,000 ft^3 (1)
Fluoride Clarifier (Basin #3)	=	20,000 ft^3 (1)
1991-1992 CaF_2 Production	=	25,000 ft^3 (2)
Fluoride Holding Basin #1	=	171,400 ft^3 (1)
Fluoride Holding Basin #2	=	186,000 ft^3 (1)
Buried Calcium Fluoride	=	153,580 ft^3 (3)
Total	=	625,280 ft^3

(1) Based on an engineering estimate performed in October, 1990.

(2) Calculated based on quantity of UF_6 produced in 1991/92

(3) Based on burial records from SFC Decommissioning File, and validated by drawings showing cell dimensions. Includes 96,380 ft^3 that was buried and 57,200 ft^3 of CaF_2 in west end of Trench 2 that was not covered by soil. The uncovered area has been referred to as Basin #4.

CaF_2 Characteristics:

ETAS(4)	85.0 lb/ft^3	51.0% Solids
OHM(4)	70.0 lb/ft^3	36.0% Solids
avg.	77.5 lb/ft^3	43.5% Solids

(4) Independent characterization dewatering and stabilization studies were performed by ETAS and OHM Corporation's in 1993 and 1994. Different samples were utilized for each study.

Unit 12

Fluoride Settling Basin #1	29,300 ft^3
Fluoride Settling Basin #2	40,000 ft^3
Fluoride Clarifier	20,000 ft^3
1992/1992 Production	25,000 ft^3

Total Volume CaF_2 - Unit 12 114,300 ft^3

114,300 ft^3 * 77.5 lb/ft^3 * 0.435 (solids fraction) = 3.85×10^6 lb CaF_2 (dry)
= 1.75×10^9 g CaF_2 (dry)

U content (from SCR Table 15), 488 μgU/g

1.75×10^9 g * 488 μgU/g * 1×10^{-9} kg/μg = 854 kgU

854 kgU * 6.7×10^{-4} Ci/kg U_{nat} = 0.57 Ci U_{nat}

Ra 226 content (from SCR Table 15), 0.1 pCi/g

1.75×10^9 g * 0.1 pCi/g * 1×10^{-12} Ci/pCi = 1.75×10^{-4} Ci Ra 226

Th 230 content (from SCR Table 15), 0.7 pCi/g

1.75×10^9 g * 0.7 pCi/g * 1×10^{-12} Ci/pCi = 12.25×10^{-4} Ci Th 230

Unit 13

Fluoride Holding Basin #2   171,400 ft^3

171,400 ft^3 * 77.5 lb/ft^3 * 0.435 (solids fraction) = 5.78×10^6 lb CaF_2 (dry)
= 2.62×10^9 g CaF_2 (dry)

U content (from SCR Table 16), 470 μgU/g

2.62×10^9 g * 470 μgU/g * 1×10^{-9} kg/μg = 1231 kgU

1231 kgU * 6.7×10^{-4} Ci/kg U_{nat} = 0.82 Ci U_{nat}

Ra 226 content (from SCR Table 16), 0.07 pCi/g

2.62×10^9 g * 0.07 pCi/g * 1×10^{-12} Ci/pCi = 1.84×10^{-4} Ci Ra 226

Th 230 content (from SCR Table 16), 0.1 pCi/g

2.62×10^9 g * 0.1 pCi/g * 1×10^{-12} Ci/pCi = 2.62×10^{-4} Ci Th 230

Unit 14

Fluoride Holding Basin #1 186,000 ft^3

186,000 ft^3 * 77.5 lb/ft^3 * 0.435 (solids fraction) = 6.27×10^6 lb CaF_2 (dry)
= 2.85×10^9 g CaF_2 (dry)

U content (from SCR Table 17), 780 μgU/g

2.85×10^9 g * 780 μgU/g * 1×10^{-9} kg/μg = 2223 kgU

2223 kgU * 6.7×10^{-4} Ci/kg U_{nat} = 1.49 Ci U_{nat}

Ra 226 content (from SCR Table 17), 0.05 pCi/g

2.85×10^9 g * 0.05 pCi/g * 1×10^{-12} Ci/pCi = 1.43×10^{-4} Ci Ra 226

Th 230 content (from SCR Table 17), 0.1 pCi/g
2.85×10^9 g * 0.1 pCi/g * 1×10^{-12} Ci/pCi = 2.85×10^{-4} Ci Th 230

Unit 15

Buried CaF_2 96,380 ft^3

From burial records, uranium = 1.52 Ci U_{nat}

1.52 Ci U_{nat} ÷ 6.7×10^{-4} Ci/kg U_{nat} = 2268 kgU

Fluoride Holding Basin #1 57,200 ft^3

57,200 ft^3 * 77.5 lb/ft^3 * 0.435 (solids fraction) = 1.93×10^6 lb CaF_2 (dry)
= 0.875×10^9 g CaF_2 (dry)

U content (from SCR Table 18), 462 μgU/g

0.875×10^9 g * 462 μgU/g * 1×10^{-9} kg/μg = 404 kgU

404 kgU * 6.7×10^{-4} Ci/kg U_{nat} = 0.27 Ci U_{nat}

Ra 226 content = N/A

Th 230 content (from SCR Table 18), 2.4 pCi/g

0.875×10^9 g * 2.4 pCi/g * 1×10^{-12} Ci/pCi = 21.0×10^{-4} Ci Th 230

CaF_2 Totals

Volume = 625,280 ft^3

U = 6,980 kg or 4.67 Ci U_{nat}

Ra 226 = 5.02×10^{-4} Ci

Th 230 = 3.87×10^{-3} Ci

8. Contaminated Soils Under Clarifiers and Ponds

Fertilizer Ponds:

Assume:

- Ponds 3W, 5, and 6 unaffected, therefore no clay liner removal required

- removal of 0.5 feet of clay from bottom and sides of Pond 3E

Pond 3E dimensions:

Top: 400 by 400 feet, 18 feet deep, 3 to 1 side slopes, Bottom 292 by 292 feet, sidewall 57 feet.

Volume = (292 * 292 * 0.5) + ((400 * 57 * 0.5) * 4) = 88,232 ft^3

Activity: Uranium, ~10 μgU/g (Estimation)

88,232 ft^3 * 110 lb/ft^3 * 454 g/lb * 10 μgU/g * 1×10^{-9} kg/μg = 44.1 kgU

44.1 kgU * 6.7×10^{-4} Ci/kg U_{nat} = 0.03 Ci U_{nat}

Ra 226 and Th 230 at background

Assume:

- removal of 1.0 feet of clay from bottom and 0.5 feet of clay from sides of Pond 4

Pond 4 dimensions:

Top: 400 by 400 feet, 18 feet deep, 3 to 1 side slopes, Bottom 292 by 292 feet, sidewall 57 feet.

Volume = (292 * 292 * 1.0) + ((400 * 57 * 0.5)* 4) = 130,864 ft^3

Activity: Uranium, ~10 μgU/g (Average of two highest samples from SCR Table 27)

130,864 ft^3 * 110 lb/ft^3 * 454 g/lb * 10 μgU/g * 1 x 10^{-9} kg/μg =
= 65.4 kgU

65.4 kgU * 6.7 x 10^{-4} Ci/kg U_{nat} = 0.04 Ci U_{nat}

Ra 226, 7.70 pCi/g (highest sample from SCR Table 27)

130,864 ft^3 * 110 lb/ft^3 * 454 g/lb * 0.70 pCi/g * 1 x 10^{-12} Ci/pCi =
= 0.0046 Ci Ra 226

Th 230, 14.6 pCi/g (avg. highest two samples from SCR Table 27)

130,864 ft^3 * 110 lb/ft^3 * 454 g/lb * 14.6 pCi/g * 1 x 10^{-12} Ci/pCi =
= 0.095 Ci Th 230

Clarifiers 1A, 2A, 3A, and 4A

Assume removal of 2.0 feet of clay from bottom and 1.0 feet of clay from sides of each clarifier

Clarifier dimensions: Top = 200 by 250 feet, 13 feet deep, 2.2 to 1 side slopes, Bottom 142 by 192 feet, sidewall 31.75 feet.

Volume = (142 * 192 * 2.0) + (900 * 31.75 * 1.0)
= 83,100 ft^3 (per clarifier) * 4 clarifiers
= 332,400 ft^3

Activity:

Uranium, 42 μgU/g - based on weighted average of samples taken from bottom of 3A clarifier in 1993 (SCR Table 20, HA-198). Assumed that 3A would be representative of all clarifiers.

332,400 ft^3 * 110 lb/ft^3 * 454 g/lb * 42 μgU/g * 1 x 10^{-9} kg/μg =
= 697 kgU

$697\ kgU * 6.7 \times 10^{-4}\ Ci/kg\ U_{nat} = 0.47\ Ci\ U_{nat}$

Ra 226 = 0.5 pCi/g (wgtd avg of HA-198)

$332{,}400\ ft^3 * 110\ lb/ft^3 * 454\ g/lb * 0.5\ pCi/g * 1 \times 10^{-12}\ Ci/pCi =$
$= 0.0083\ Ci\ Ra\ 226$

Th 230, 70 pCi/g (wgtd avg of HA-198)

$332{,}400\ ft^3 * 110\ lb/ft^3 * 454\ g/lb * 70\ pCi/g * 1 \times 10^{-12}\ Ci/pCi =$
$= 1.16\ Ci\ Th\ 230$

Pond 2

Assume removal of clay/sludge from bottom down to the depth of each sample plus 1.0 ft from the sidewalls. Samples were taken at the center of each of 21-100 by 100 ft grids on the pond bottom (HA 199 through HA-219 taken in 1991, just prior to covering the pond).

Pond dimensions: Top = 300 by 700 feet, 18 feet deep, 3 to 1 side slopes, Bottom 192 by 592 feet, sidewall 57 feet.

Volume bottom	=	$635{,}000\ ft^3$
Volume sidewalls	=	$114{,}000\ ft^3$
Total volume	=	$749{,}000\ ft^3$

Activity: Weighted averages of the concentrations of radionuclides in samples taken from various depths in each grid was calculated and applied to the volume of material contained in each grid. The quantities for each grid were then summed. (See SCR Table 21)

Example calculation - Hole 1 total depth 3.5 ft or 7-0.5 ft intervals

$$U_{avg.} = \frac{16.4 + 13.5 + [(13.5 + 6.7) \div 2 * 4] + 6.7}{7} =$$
$$= 11\ \mu gU/g$$

$100\ ft * 100\ ft * 3.5\ ft * 110\ lb/ft^3 * 454\ g/lb * 11\ \mu gU/g * 1 \times 10^{-9}\ kg/g =$
$= 19.2\ kgU * 6.7 \times 10^{-4}\ pCi/\ kgU =$
$= 0.013\ Ci\ U_{nat}$

Total Activity:

Uranium = 16,074 kgU or 10.77 Ci U_{nat}
Ra 226 = 1.61 Ci
Th 230 = 48.03 Ci

Pond 1 Spoils Pile

Volume = 437,400 ft^3 (per FEI evaluation)

Activity: (See SCR Table 11)

Uranium, 7.2 μgU/g (based on average of samples taken from pile in 1995 (BH-131A and BH-131B).

437,400 ft^3 * 110 lb/ft^3 * 454 g/lb * 7.2 μgU/g * 1 x 10^{-9} kg/μg = 157 kgU

157 kgU * 6.7 x 10^{-4} Ci/kg U_{nat} = 0.11 Ci U_{nat}

Ra 226, 2.1 pCi/g (avg of 8 samples taken in 1987 - HA-335 through 342)

437,400 ft^3 * 110 lb/ft^3 * 454 g/lb * 2.1 pCi/g * 1 x 10^{-12} Ci/pCi =
= 0.046 Ci Ra 226

Th 230, 47 pCi/g (avg of 8 samples taken in 1987 - HA-335 through 342)

437,400 ft^3 * 110 lb/ft^3 * 454 g/lb * 47 pCi/g * 1 x 10^{-12} Ci/pCi =
= 1.02 Ci Th 230

CaF_2 Basin Soils

Assume that 0.5 ft of soil/clay will be removed from the pit walls and bottoms after CaF_2 is removed.

Basin Dimensions/Soil Volume to Remove

Fluoride Settling Basins #1 and #2
Dimensions: 190 by 75 by 14 ft
Removal Volume:
[190 * 75+(190+190+75+75) * 14] * 0.5 * 2 Units = 21,670 ft^3

Fluoride Clarifier
Dimensions: 220 by 85 by 14 ft
Removal Volume:
[220 * 85+(220+220+85+85) * 14] * 0.5 = 13,620 ft^3

Fluoride Holding Basin #1
Dimensions: 190 by 130 by 16 ft
Removal Volume:
[190 * 130+(190+190+130+130) * 16] * 0.5 = 17,470 ft^3

Fluoride Holding Basin #2
Dimensions: 150 by 200 by 9 ft
Removal Volume:
[150 * 200+(150+150+200+200) * 9] * 0.5 = 18,150 ft^3

East/West Burial Pits
Dimensions: 100 by 200 by 12
Removal Volume:
[100 * 200+(100+100+200+ 200) * 12] * 0.5 = 13,600 ft^3

Burial Pit #3 and #4 (combined dimen.)
Dimensions: 50 by 275 by 12
Removal Volume:
[50 * 275+(50+50+275+275) * 12] * 0.5 = 10,775 ft^3

Total Removal Volume: = 95,285 ft^3

Activity:

Uranium = Assume 20 μgU/g avg. (conservative estimate based on expected low solubility of uranium in CaF_2), no Th or Ra

95,285 ft^3 * 110 lb/ft^3 * 454 g/lb * 20 μgU/g * 1 x 10^{-9} kg/μg = 95.2 kgU

95.2 kgU * 6.7 x 10^{-4} Ci/kg U_{nat} = 0.064 Ci U_{nat}

9. Interim Soil Storage Cell

Dimensions: 100 ft by 160 ft, ht 7.5 to 15 ft

Volume: 86 incident soil	=	12,150 ft^3
Lime Neut. Area Decon	=	65,880 ft^3
SX Excav. Soil	=	44,550 ft^3
Subtotal	=	122,580 ft^3
~2500 55-gal drums Misc. soil and Incin. Ash @ 7.35 ft^3/drum	=	18,375 ft^3
Total volume	=	140,955 ft^3

Activity: (from Preliminary Report on Current Condition, Feb. 23, 1994)

1986 Accident Soil - U_{avg}, 223 μgU/g

12,000 ft^3 * 110 lb/ft^3 * 454 g/lb * 223 μgU/g * 1 x 10^{-9} kg/g = 133 kgU

133 kgU * 6.7 x 10^{-4} Ci/kg U_{nat} = 0.09 Ci U_{nat}

Lime Neut. Area Soil - U_{avg}, 20 μgU/g

65,880 ft^3 * 110 lb/ft^3 * 454 g/lb * 20 μgU/g * 1 x 10^{-9} kg/g = 65.7 kgU

65.7 kgU * 6.7 x 10^{-4} Ci/kg U_{nat} = 0.04 Ci U_{nat}

SX Excavation Soil - U_{avg}, 1800 μgU/g

44,550 ft^3 * 110 lb/ft^3 * 454 g/lb * 1800 μgU/g * 1 x 10^{-9} kg/g = 4000 kgU

4000 kgU * 6.7 x 10^{-4} Ci/kg U_{nat} = 2.68 Ci U_{nat}

SX Excavation Soil - Th 230 = 2.9 pCi/g

44,550 ft^3 * 110 lb/ft^3 * 454 g/lb * 2.9 pCi/g * 1 x 10^{-12} Ci/pCi
= 0.006 Ci Th 230

SX Excavation Soil - Ra 226 = 0.3 pCi/g

44,550 ft^3 * 110 lb/ft^3 * 454 g/lb * 0.3 pCi/g * 1 x 10^{-12} Ci/pCi
= 0.0006 Ci Ra 226

Ash and Soil Drums - Assume 2500 drums at 700 lb/drum and 150 μgU/g (Estimated number and content)

2500 * 700 lb * 454 g/lb * 150 μgU/g = 119 kgU

119 kgU * 6.7 x 10^{-4} Ci/kg U_{nat} = 0. 08 Ci U_{nat}

10. Sanitary Lagoon

Dimensions: 230 ft by 150 ft by 8 ft; 3 to 1 sides
Bottom: (230 - 48) * (150 - 48) = 18,564 ft^2
Sides: [(2 * 230) + (2 * 150)] * 25.2 = 19,228 ft^2

Sediment Estimate

Volume: 6.7 inch depth * 18,564 ft^2 = 10,365 ft^3

Activity: Est. 70 lb/ft^3, 30% solids: 17,200 μgU/g, 275.5 pCi Th 230/g, 5.8 pCi Ra 226/g (analyses are avg's of source data, SCR Table 10)

10,365 ft^3 * 70 lb/ft^3 * 0.3 * 454 g/lb * 17,200 μgU/g * 1 x 10^{-9} kg/μg =
= 1700 kgU

1700 kgU * 6.7 x 10^{-4} Ci/kg U_{nat} = 1.14 Ci U_{nat}

10,365 ft^3 * 70 lb/ft^3 * 0.3 * 454 g/lb * 275.5 pCi/g * 1 x 10^{-12} Ci/pCi =
= 0.027 Ci Th 230

10,365 ft^3 * 70 lb/ft^3 * 0.3 * 454 g/lb * 5.8 pCi/g * 1 x 10^{-12} Ci/pCi =
= 0.0006 Ci Ra 226

Clay Liner Assume 1 ft from sides, 2 ft from bottom (Utilized 3A clay liner values from SCR Table 20 - HA198)

U, 42 μgU/g
Th 230 = 70 pCi/g
Ra 226 =0.5 pCi/g

18,564 * 2 + 19228 * 1 = 56,356 ft^3

56,356 ft^3 * 110 lb/ft^3 * 454 g/lb * 42 μgU/g * 1 x 10^{-9} kg/μg = 118 kgU

118 kgU * 6.7 x 10^{-4} Ci/kg U_{nat} = 0.08 Ci U_{nat}

56,356 ft^3 * 110 lb/ft^3 * 454 g/lb * 70 pCi/g * 1 x 10^{-12} Ci/pCi = 0.20 Ci Th 230

$56,356 \text{ ft}^3 * 110 \text{ lb/ft}^3 * 454 \text{ g/lb} * 0.5 \text{ pCi/g} * 1 \times 10^{-12} \text{ Ci/pCi} =$
$= 0.001$ Ci Ra 226

11. Emergency Basin/North Ditch

Dimensions: (Calculated from facility map)

Emergency Basin Wetted Area = 38,125 ft^2
Emergency Basin Diked Area = 65,000 ft^2
North Ditch Wetted Area = 13,050 ft^2
North Ditch Diked Area = 35,000 ft^2

Volumes:

Assume:

Emergency Basin Sediment @ 4.6 inches thick
$38,125 \text{ ft}^2 * 4.6 \text{ inches}/12 \text{ inches/ft} = 14,600 \text{ ft}^3$

Emergency Basin Contaminated Soils - Est. 2.5 ft
$65,000 \text{ ft}^2 * 2.5 \text{ ft} = 162,500 \text{ ft}^3$

North Ditch Sediment @ 19.1 inches thick
$13,050 \text{ ft}^2 * 19.1 \text{ inches}/12 \text{ inches/ft} = 20,770 \text{ ft}^3$

North Ditch Contaminated Soils - est. 2.5 ft
$35,000 \text{ ft}^2 * 2.5 \text{ ft} = 87,500 \text{ ft}^3$

Activity:

Emergency Basin Sediment

Uranium = 5600 μgU/g (Avg. SCR Table 9)
Thorium 230 = 19,650 pCi/g (")
Radium 226 = 349 pCi/g (")

$14,600 \text{ ft}^3 * 70 \text{ lb/ft}^3 * 0.3 * 454 \text{ g/lb} * 5,600 \mu\text{gU/g} * 1 \times 10^{-9} \text{ kg/}\mu\text{g} =$
$= 779$ kgU

$779 \text{ kgU} * 6.7 \times 10^{-4} \text{ Ci/kg } U_{nat} = 0.52 \text{ Ci } U_{nat}$

$14,600 \text{ ft}^3 * 70 \text{ lb/ft}^3 * 0.3 * 454 \text{ g/lb} * 19,650 \text{ pCi/g} * 1 \times 10^{-12} \text{ Ci/pCi} =$
$= 2.73$ Ci Th 230

$14,600 \text{ ft}^3 * 70 \text{ lb/ft}^3 * 0.3 * 454 \text{ g/lb} * 349 \text{ pCi/g} * 1 \times 10^{-12} \text{ Ci/pCi} =$
$= 0.048$ Ci Ra 226

Emergency Basin Contaminated Soils

Uranium, 269 μgU/g (Avg. SCR Table 9)
Thorium 230, negligible
Radium 226, negligible

162,500 ft^3 * 110 lb/ft^3 * 454 g/lb * 269 μgU/g * 1 x 10^{-9} kg/μg = 2183 kgU

2183 kgU * 6.7 x 10^{-4} Ci/kg U_{nat} = 1.46 Ci U_{nat}

North Ditch Sediment

Uranium = 10,630 μgU/g (Avg. SCR Table 12)
Thorium 230 = 224 pCi/g (")
Radium 226 = 8.7 pCi/g (")

20,770 ft^3 * 70 lb/ft^3 * 0.3 * 454 g/lb * 10,630 μgU/g * 1 x 10^{-9} kg/μg =
= 2105 kgU

2105 kgU * 6.7 x 10^{-4} Ci/kg U_{nat} = 1.41 Ci U_{nat}

20,770 ft^3 * 70 lb/ft^3 * 0.3 * 454 g/lb * 224 pCi/g * 1 x 10^{-12} Ci/pCi =
= 0.044 Ci Th 230

20,770 ft^3 * 70 lb/ft^3 * 0.3 * 454 g/lb * 8.7 pCi/g * 1 x 10^{-12} Ci/pCi =
= 0.0017 Ci Ra 226

North Ditch Contaminated Soils

Uranium, 165 μgU/g (Avg. SCR Table 12)
Thorium 230, negligible
Radium 226, negligible

87,500 ft^3 * 110 lb/ft^3 * 454 g/lb * 165 μgU/g * 1 x 10^{-9} kg/μg = 721 kgU

721 kgU * 6.7 x 10^{-4} Ci/kg U_{nat} = 0.48 Ci U_{nat}

12. Solid Waste Burials

From plant records maintained in the decommissioning file, the volumes and uranium contents of these burial areas is as follows:

Burial Area #1 (south)	Burial Area #2 (north)
Volume = 43,000 ft^3	Volume = 8,100 ft^3
Uranium = 945 kg or 0.64 Ci U_{nat}	Uranium = 60 kg or 0.041 Ci U_{nat}

13. Buildings, Equipment, Structures and Concrete

As a preliminary estimate for buildings, equipment and structures, the volume of each building or structure was calculated from external dimensions. The volume to be disposed of was then assumed to be 20 % of the building volume. See attached sketches for dimensions used.

Main Plant Building:	Floor Area	81,100 ft^2	Volume	2,178,300 ft^3
Solvent Extraction Building:	Floor Area	4,500 ft^2	Volume	180,000 ft^3
DUF_4 Building	Floor Area	8,750 ft^2	Volume	281,250 ft^3
Misc. Digest Bldg:	Floor Area	3,000 ft^2	Volume	75,000 ft^3
Laundry Building:	Floor Area	1,250 ft^2	Volume	12,500 ft^3
Raffinate Loadout Bldg.:	Floor Area	1,000 ft^2	Volume	15,000 ft^3
Cooling Tower:	Pad Area	1,500 ft^2	Volume	30,000 ft^3
RCC Evaporator:	Pad area	625 ft^2	Volume	18,750 ft^3
Bechtel Building:	Floor Area	2,250 ft^2	Volume	27,000 ft^3
Solid Waste Building:	Floor Area	1,500 ft^2	Volume	18,000 ft^3
Incinerator:	Floor Area	500 ft^2	Volume	7,500 ft^3
Totals	Area	105,975 ft^3	Volume	2,843,300 ft^3

Disposal Volume @ 20% of Original = 568,660 ft^3

Concrete and asphalt volumes were estimated by calculating the surface area from a site map (Drawing #3 from the FEI) and applying an approximate average thickness of 12 inches. (See copy of attached marked-up drawing.)

Concrete/Asphalt Volume = 511,795 ft^3

Total Volume = 1,080,455 ft^3

Uranium holdup has not been determined. Since some uranium recovery and decon is planned, an assumed average residual uranium of 250 μgU/g and an bulk density of 200 lb/ft^3 were used to estimate the amount of uranium remaining.

$1{,}080{,}455\ ft^3 * 200\ lb/ft^3 * 454\ g/lb * 250\ \mu gU/g * 1 \times 10^{-9}\ kg/\mu g = 24{,}500\ kgU$

$24{,}500\ kgU * 6.7\ x^{-4}\ Ci/kg\ U_{nat} = 16.4\ Ci\ U_{nat}$

14. Contaminated Soil and Bedrock

The volumes of uranium impacted soils and bedrock were calculated using the isopleth maps for uranium distribution from the FEI (figures 104 through 110 from the FEI and 44 through 50 from the SCR). The surface areas encompassed by the >40 μgU/g contour was determined for each sampling interval. These areas were then multiplied by the thickness of the sampling interval to determine volume. As a conservative measure, no adjustments in volume were made for displacements such as the clarifiers, sanitary lagoon, emergency basin, etc. It was assumed for calculational purposes that the concentrations were uniform through the depth of the individual sampling intervals.

Differences in the uranium contour surface areas (and, hence, the volumes) between the FEI and the SCR are due to the fact that the FEI contours were hand-drawn using engineering judgement, while the SCR contours were computer generated using a Krigging program. The FEI contours are considered to be more representative of the actual uranium distribution, since the computer generated contours do not account for site features and characteristics that would influence the contours.

Soils and Bedrock > 40 μgU/g

Interval (ft)		FEI Area	FEI Volume	SCR Area	SCR Volume
0 - 1		0.916	0.916	1.184	1.184
1 - 5		0.507	2.028	0.563	2.252
5 - 10		0.050	0.250	0.147	0.735
10 - 15		0.049	0.245	0.058	0.290
15 - 20		0.019	0.095	0.046	0.230
20 - 25		0.00	0.00	0.054	0.270
25 - 30		0.008	0.040	0.059	0.295
	Totals	------	3.574	-------	5.256

To approximate the quantity of uranium in the soil/bedrock, a value of 375 μgU/g soil was assigned as an approximate overall average (15% @ 2500, 85% @ 100 μgU/g).

3,574,000 ft^3 * 110 lb/ft^3 * 454 g/lb * 375 μgU/g * 1 x 10^{-9} Kg/g = 66,932 Kg

66,932 KgU * 6.7 x 10^{-4} Ci/Kg U_{nat} = 44.8 Ci U_{nat}

Summary of Material Volume and Activity Estimates

Material	Volume - ft^3	U - Ci (kg)[1]	
Soils >40 μgmU/gm	3,574,000	44.8	(66,932)
Buildings, Equipment, Structures and Concrete	1,080,455	16.4	(24,500)
Calcium Fluoride Sludge	625,280	4.67	(6,980)
CaF2 Basin Clay Liners	95,285	0.06	(95)
Raffinate Sludge	200,000	38.3	(56,500)
Scrap Metal	100,000	0.15	(227)
Pond 2 Residual	749,000	10.8	(16,100)
Solid Waste Burials	51,100	0.68	(1,005)
Pond 1 Spoils Pile	437,400	0.11	(57)
Interim Soils Storage Cell	140,950	2.89	(4,318)
Pond 3E and 4 Clay Liner	219,100	0.07	(110)
Clarifier Clay Liners	332,400	0.47	(697)
Drummed Contaminated Trash[(2)]	6,250	0.38	(1,054)
Empty Drums (crushed)	2,000	0.02	(22)
Sanitary Lagoon Sludge	10,365	1.14	(1,700)
Sanitary Lagoon Soil	56,356	0.08	(118)
Emergency Basin Sediment	14,600	0.52	(779)
Emergency Basin Soil	162,500	1.46	(2,183)
North Ditch Sediment	20,770	1.41	(2,105)
North Ditch Soil	87,500	0.48	(721)
Totals	7,965,291	124.89	(186,303)

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[1] The plant uranium material balance indicates that there should be 259,687 kg of uranium at the Facility. The difference between this quantity and that estimated above (259,687 - 186,303 = 73,384 kg) is assumed to be primarily associated with equipment holdup.

[2] Includes DUF_4 trash.

ENCLOSURE 2

SEQUOYAH FUELS CORPORATION
SITE CHARACTERIZATION RADIATION AND CONTAMINATION SURVEY
STRUCTURES AND EQUIPMENT MAXIMUMS

			Surface Contamination (dpm/100 cm2)		Dose Rate (mrem/hr)			
			Removable		Contact		General Area	
Area	Figure No.	Unit No.	Alpha	Beta/ Gamma	Beta/ Gamma	Gamma	Beta/ Gamma	Gamma
1st Lvl DUF4 Plant	II-1	29	750	8000	0.4	0.4	0.9	0.4
2nd Lvl DUF4 Plant	II-2	29	300	3000	1.5	<0.2	0.9	<0.2
3rd Lvl DUF4 Plant	II-2	29	300	4000	0.8	<0.2	1.4	<0.2
4th Lvl DUF4 Plant	II-2	29	500	3000	2.0	<0.2	1.2	<0.2
5th Lvl DUF4 Plant	II-2	29	300	2800	0.8	<0.2	0.4	<0.2
1st Lvl Misc. Digest	II-3	21	1200	4000	NR	NR	NR	NR
2nd Lvl Misc. Digest	II-3	21	400	5000	NR	NR	NR	NR
3rd Lvl Misc. Digest	II-4	21	600	8000	NR	NR	NR	NR
Raffinate/Centrifuge	II-5	17	500	500	0.4	<0.2	<0.2	<0.2
Process Hallway	II-6	1	700	2400	1.5	0.3	1	0.3
Utilities Area	II-6	1	100	150	1.0	<0.2	<0.2	<0.2
Maintenance Area	II-6	1	200	900	<0.2	<0.2	<0.2	<0.2
Old Warehouse	II-6	1	30	70	<0.2	<0.2	<0.2	<0.2
Cell Rework	II-6	1	600	1700	<0.2	<0.2	<0.2	<0.2
Cell Room #1	II-6	1	170	600	<0.2	<0.2	<0.2	<0.2
Cell Room #2	II-6	1	50	170	<0.2	<0.2	<0.2	<0.2
Old Laundry	II-6	1	90	120	<0.2	<0.2	<0.2	<0.2
UF6 Bldg Admin Area	II-6	1	20	40	<0.2	<0.2	<0.2	<0.2
Process Lab	II-6	1	500	1000	<0.2	<0.2	<0.2	<0.2
Product Shipping	II-6	1	200	700	1.2	0.2	1.7	0.2
1st Level Digestion	II-6	1	1600	6000	0.8	0.4	0.5	0.2
1st Lvl Sampling Plant	II-6	1	500	2000	3.4	0.8	1.7	<0.2
2nd Lvl Sampling Plant	II-7	1	600	1800	2.6	<0.2	3.4	0.2
3rd Lvl Sampling Plant	II-8	1	500	1300	1.7	0.2	2.2	1.5
4th Lvl Sampling Plant	II-9	1	800	1400	4.3	1.8	1.7	0.2
5th Lvl Sampling Plant	II-10	1	500	800	NR	NR	2.6	0.4
Roadway	II-11	NA	30	50	0.15	<0.1	<0.1	0.15
1st Level Denitration	II-12	1	2000	8000	NR	NR	11.1	0.6
2nd Level Denitration	II-12	1	2000	11000	150.0	0.8	10.4	0.4
1st Lvl Red-Hydro	II-12	1	1000	10000	30.0	2.0	6.0	0.3
2nd Lvl Red-Hydro	II-12	1	1300	7000	6.0	0.2	6.9	0.3
3rd Lvl Red-Hydro	II-12	1	2000	8000	NR	NR	8.6	0.4
4th Lvl Red-Hydro	II-12	1	2000	12000	19.8	0.5	18.0	0.9
1st Lvl Fluorination	II-13	1	4000	20000	65.0	2.8	65.0	2.8
2nd Lvl Fluorination	II-13	1	2000	10000	120.0	1.6	69.0	0.8
3rd Lvl Fluorination	II-14	1	2000	11500	86.0	2.0	150.01.2	
4th Lvl Fluorination	II-14	1	1000	9000	6.0	0.4	6.0	0.4

SEQUOYAH FUELS CORPORATION
SITE CHARACTERIZATION RADIATION AND
CONTAMINATION SURVEY
STRUCTURES AND EQUIPMENT MAXIMUMS

			Surface Contamination (dpm/100 cm2)		Dose Rate (mrem/hr)			
			Removable		Contact		General Area	
Area	Figure No.	Unit No.	Alpha	Beta/ Gamma	Beta/ Gamma	Gamma	Beta/ Gamma	Gamma
1st Level SX	II-15	2	1200	8000	0.9	<.02	3.4	<0.2
2nd Level SX	II-15	2	1600	6900	12.0	<0.2	6.0	<0.2
Bechtel Building	II-16	30	70	80	<0.1	<0.1	<0.1	<0.1
Oil Storage Bldg	II-17	30	20	50	<0.1	<0.1	<0.1	<0.1
Solid Waste	II-18	10	100	400	2.0	<0.1	<0.1	<0.1
Hot Warehouse	II-19	30	20	40	<0.1	<0.1	<0.1	<0.1
Cooling Tower**		2	2000	20	9.0	NR	2.6	NR
2nd Lvl Digestion**		1	1000	2600	1.4	0.8	1.2	0.4
3rd Lvl Digestion**		1	750	2300	6.0	1.0	2.0	0.4

NR - Not Recorded

** No Drawing Supplied

ENCLOSURE 3

Table 5
Unit 24, Fertilizer Storage Pond Area

Northing	Easting	Count Rate (cpm)	Northing	Easting	Count Rate (cpm)
193285.2	2836931	7557	193547.2	2837119	9124
193564.8	2837119	8051	193292.5	2837151	9135
193567.5	2837113	8073	193299.6	2837155	9137
193613.4	2837111	8097	193649.5	2837112	9164
193540.9	2837120	8130	193655.6	2837124	9187
193633.5	2837115	8131	193352.9	2836926	9193
193530.9	2837125	8148	193248.2	2837153	9213
193596.6	2837124	8179	193674.7	2837119	9215
193587.2	2837124	8342	193341.8	2837151	9218
193674.9	2837115	8360	193334.1	2837161	9221
193714.2	2837110	8392	193793.7	2837134	9236
193588.8	2837117	8453	193652.9	2837120	9247
193339.9	2837161	8458	193536.1	2837120	9259
193593.4	2837120	8521	193594.2	2837116	9266
193757.6	2837129	8537	193535.9	2837113	9270
193599	2837119	8542	193256.3	2837144	9275
193541.7	2837124	8544	193587.7	2837119	9277
193603.3	2837111	8548	193527	2837114	9301
193562.7	2837114	8572	193301.2	2836931	9312
193552.9	2837119	8585	193311.6	2837162	9320
193598.4	2837112	8616	193697.5	2837123	9324
193506.2	2837121	8637	193608.4	2837112	9324
193790.1	2837133	8640	193523.8	2837120	9337
193618.4	2837112	8643	193196.3	2837148	9337
193570.9	2837120	8701	193349.1	2836927	9350
193606.3	2837123	8728	193267.8	2837123	9351
193327.3	2837157	8737	193636.5	2837119	9351
193321.8	2837157	8756	193489.6	2837123	9354
193525.7	2837114	8775	193529.7	2837120	9359
193281.1	2836930	8777	193610.5	2837116	9359
193812.3	2837106	8787	193803.2	2837136	9363
193582	2837119	8800	193297.7	2837151	9366
193560.3	2837118	8813	193419.5	2837141	9405
193671.5	2837112	8837	193582.7	2837112	9407
193702.8	2837110	8869	193622.5	2837116	9413
193604.9	2837116	8874	193486.8	2837116	9416
193803.9	2837124	8895	193478.5	2837124	9424
193772.2	2837119	8897	193629.7	2837112	9425
193518.2	2837121	8908	193656.7	2837116	9440
193817.5	2837107	8912	193630.9	2837119	9442
193328.5	2837162	8931	193281	2836932	9443
193544.5	2837119	8992	193317.3	2837162	9447
193708.7	2837110	9007	193619.5	2837123	9451
193528.7	2837123	9038	193819	2837113	9452
193486.6	2837128	9058	193523	2837112	9462
193536.4	2837124	9061	193294.9	2836930	9468
193601.6	2837123	9065	193779	2837104	9470
193322.7	2837162	9078	193514	2837125	9472
193807.4	2837106	9085	193761.1	2837119	9472
193385.3	2837123	9086	193314	2836929	9474
193732.6	2837119	9087	193576.5	2837119	9505
193624.2	2837111	9090	193755.1	2837118	9507
193478.7	2837100	9106	193662.9	2837115	9507
193541.2	2837114	9107	193577.6	2837113	9511
193654.8	2837111	9107	193777.5	2837108	9521