SEQUOYAH FUELS CORPORATION: PROPOSED LICENSE AMENDMENT FOR 11e.(2) BYPRODUCT MATERIAL

Presented by:

Anthony J. Thompson
Warren U. Lehrenbaum
David C. Lashway
Shaw Pittman
June 2000

BACKGROUND

- SFC OPERATES A NUCLEAR FUEL-CYCLE FACILITY IN GORE, OKLAHOMA ("THE FACILITY"), PURSUANT TO NRC SOURCE MATERIAL LICENSE SUB-1010.
- NRC HAS NOT YET APPROVED FINAL SITE CLOSURE REQUIREMENTS FOR THE FACILITY, NOR COMPLETED THE PLANNED EIS EVALUATING SITE CLOSURE OPTIONS.

BACKGROUND (cont'd)

- AS PART OF THE FINAL SITE CLOSURE, SFC MUST DISPOSE OF A LARGE VOLUME OF WASTES (ABOUT 80% OF ON-SITE WASTES) THAT WERE GENERATED FROM FRONT-END *URANIUM RECOVERY* PROCESSES INVOLVING THE *CONCENTRATION* AND *PURIFICATION* OF LICENSED SOURCE MATERIAL ORE CONCENTRATES.

BACKGROUND (cont'd)

- THESE URANIUM RECOVERY PROCESSES (*e.g.*, THE ACID-LEACH PROCESS) ARE SIMILAR TO THOSE PROCESSES CONDUCTED AT A "CONVENTIONAL" URANIUM MILL.

BACKGROUND (cont'd)

- THE WASTE MATERIALS CREATED FROM THE URANIUM RECOVERY *CONCENTRATION* AND *PURIFICATION* PROCESSES ARE 11e.(2) BYPRODUCT MATERIAL
  - The *Concentration* and *Purification* Processes Took Place at the Front-End of the Facility's Operations Separately From, And Prior To, The *Conversion* Of Concentrated And Purified Ore Into UF_6, Or The *Reduction* Of Depleted UF_4 To UF_6.

BACKGROUND (cont'd)

- Different operations occurred in different areas of facility, including (1) the recovery of uranium through *concentration* and *purification* processes, (2) the *conversion* of concentrated and purified ore into UF_6, and (3) the *reduction* of UF_6 into UF_4.
- These *different* operations resulted in the creation of *separate* and *distinct* wastes which were *segregated* according to source.

BACKGROUND (cont'd)

- Uranium Recovery: (1) soils in and around facility that are contaminated with varying levels of uranium due to spills of uranium ore and uranium bearing liquids from the *concentration* and *purification* processes, (2) materials resulting from the demolition of site structures and equipment used to concentrate and purify source material ore concentrates, (3) raffinate sludge produced as a result of the SX *concentration* and *purification* process at the front-end, and (4) chipped pallets that were used to ship source material ore concentrates to the facility are 11e.(2).

BACKGROUND (cont'd)

– Conversion: debris from building and structures and equipment used for the *conversion* and *reduction* processes.

BACKGROUND (cont'd)

- ISSUE OF WHETHER WASTES AT CONVERSION FACILITY CAN BE 11E.(2) HAS ONLY BEEN ADDRESSED ON A FACILITY BASIS (*i.e.*, MILLS VS. CONVERSION FACILITIES).
  - SFC Preliminary Plan for Completion of Decommissioning (Feb. 16, 1993): SFC advanced suggestion that its Facility be remediated as an 11e.(2) byproduct material disposal site, with the application of 10 C.F.R. Part 40, Appendix A site closure criteria.

BACKGROUND(cont'd)

- NRC OGC responded to SFC suggestion with "informal views" that "hexafluoride *conversion plants* had never been considered as *uranium mills*, and were not contemplated as such in [UMTRCA]." *See* Memorandum from J. Taylor, NRC to NRC Commissioners (July 6, 1993) (emphasis added)
- SFC agrees that *conversion* processes processes are not the same thing as milling processes.

BACKGROUND (cont'd)

– 1980 GEIS at A065:

"Comment: The inclusion of uranium hexafluoride and other plants under the provisions of this rule is proper, since they do indeed have similar waste disposal problems."

"Response: With one exception, only source and byproduct material produced by the extraction or *concentration* of source material from ores is governed by the regulations being implemented in conjunction with this statement . . . .

BACKGROUND (cont'd)

- The Staff response here is consistent with SFC's proposal as it focuses on the nature of the process involved *(i.e.*, extraction or *concentration* vs. *conversion*.
- Addressing SFC's uranium recovery wastes separately is not inconsistent with, just *different* from, past treatment.

BACKGROUND (cont'd)

- A facility vs. facility approach results in the reasonable conclusion that *conversion* facilities are not conventional *uranium mills*.
- However, front-end *uranium recovery* processes at the SFC Facility have the same purpose as and are similar (SX) to uranium mill processes.
- The SX process is essentially *an extension of the milling process to ensure on-spec material*.

BACKGROUND (cont'd)

– If SFC had no front-end *uranium recovery* processes and contaminated source material ore concentrates were returned to a conventional uranium mill for further *concentration* and *purification*, the reprocessing wastes generated would unquestionably be 11e.(2) byproduct material.

BACKGROUND (cont'd)

- SFC's *URANIUM RECOVERY* WASTES ARE IN ESSENTIALLY THE SAME POSTURE AS URANIUM MILL TAILINGS AT LICENSED URANIUM MILLS PRIOR TO PASSAGE OF UMTRCA IN 1978, EXCEPT THAT NOW THERE IS A MATURE, EFFECTIVE SITE CLOSURE PROGRAM IN PLACE.

BASES FOR CLASSIFICATION OF FRONT-END WASTES AS 11e.(2)

- SFC's *URANIUM RECOVERY* WASTES MEET THE DEFINITION OF 11e.(2) BYPRODUCT MATERIAL
  - 11e.(2) byproduct material is defined as:

    "The tailings or wastes produced by the extraction or *concentration* of uranium or thorium from *any ore* processed primarily for its source material content."

42 U.S.C. 2014e.(2) (emphasis added).

BASES FOR CLASSIFICATION OF FRONT-END WASTES AS 11e.(2)

— The definition of 11e.(2) should be read broadly. *See Kerr McGee* v. *NRC*, 903 F.2d 1, 7 (D.C. Cir. 1990) ("It is clear . . . That the definition . . . was designed to extend the NRC's regulatory authority over all wastes resulting from the extraction or *concentration* of source materials in the course of the nuclear fuel cycle.").

(REGULATED vs unregulated materials issue

BASES FOR CLASSIFICATION OF FRONT-END WASTES AS 11e.(2)(cont'd)

- Thus, under the definition, three requirements must be met for material to be 11e.(2): (1) the material must be produced by the extraction or *concentration* of uranium, (2) the uranium or thorium must be extracted from *any ore,* and (3) the ore must be *processed primarily* for its source material content in a nuclear fuel cycle facility. SFC's *uranium recovery* wastes satisfy all three requirements.
    1. SFC's *uranium recovery* wastes were produced by the *concentration* of uranium.

BASES FOR CLASSIFICATION OF FRONT-END WASTES AS 11e.(2)(cont'd)

- The term *concentration* is neither defined nor explained in UMTRCA, its legislative history, or NRC regulations. Therefore, we look to the ordinary meaning of the words used, and that meaning is conclusive. *American Tobacco Co. et al. v. Patterson et al.*, 456 U.S. 63, 68 (1982).
- The front-end wastes resulted from processes meeting the definition of the term *concentration*. *See* Webster's II New College Dictionary (1995).

BASES FOR CLASSIFICATION OF FRONT-END WASTES AS 11e.(2)(cont'd)

– GEIS supports conclusion that wastes generated from *concentration* processes are 11e.(2):

> "Conventional uranium milling as used herein refers to the milling of ores primarily for the recovery of uranium; it involves the processes of crushing, grinding, and leaching the ore, followed by chemical separation and *concentration* of uranium."

BASES FOR CLASSIFICATION OF FRONT-END WASTES AS 11e.(2)(cont'd)

– Further, GEIS supports conclusion that *concentration* processes are milling:

> "The milling techniques currently used, with such minor modifications as increasing the concentration of acid used in leaching or improving resins for *concentration* of uranium, will likely continue . . . ."

BASES FOR CLASSIFICATION OF FRONT-END WASTES AS 11e.(2)(cont'd)

– GEIS includes section entitled "*Concentration* and *Purification* Processes" and concludes these processes are *milling*:

> "Following the extraction of uranium values from the ore by the acid leach or alkaline leach process, the resulting impure and dilute leach solutions have to undergo *concentration* and *purification* as a prerequisite to the production of a final, high-grade, uranium product. A number of major techniques are used to effect this stage of the milling process. They are: *[I]on exchange . . . solvent extraction . . . eluex process . . . improved eluex process . . .*"

BASES FOR CLASSIFICATION OF FRONT-END WASTES AS 11e.(2)(cont'd)

- For Processing to be "Milling" It Need Not Be Physically Located at a "Conventional" Uranium Mill. *See* GEIS at 2.2.3, 12.5 (heap leaching is milling and produces 11e.(2) wastes); Mem. from Howard Shapar, Executive Legal Director, NRC to Chairman Ahearn, NRC (April 28, 1980) (ISL mining underground is milling, is subject to NRC jurisdiction, and produces 11e.(2) wastes).
- Thus, SFC's SX *uranium recovery* processes at SFC can be considered a milling process.

BASES FOR CLASSIFICATION OF FRONT-END WASTES AS 11e.(2)(cont'd)

- Milling is defined as:

> *Uranium Milling* means any activity that results in the production of by-product material as defined in this part.

No location req'd

10 C.F.R. § 40.4.

BASES FOR CLASSIFICATION OF FRONT-END WASTES AS 11e.(2)(cont'd)

2. SFC's Front-End Wastes Were Produced From Processing *Ore*.

Term *ore* is to be interpreted broadly under UMTRCA and licensed source material ore concentrates which are concentrated and purified by SFC's front-end processes fit within scope of that term.

NRC has noted:
"The fact that the term "*any ore*" rather than "*unrefined and unprocessed ore*" is used in the definition of 11e.(2) byproduct material imply

BASES FOR CLASSIFICATION OF FRONT-END WASTES AS 11e.(2)(cont'd)

[sic] that a broader range of feed materials could be processed in a mill, with the wastes still being considered as 11e.(2) byproduct material."

"Legislative history confirms the validity of a broad interpretation of the term "*any ore*."

57 Fed. Reg. 20, 532.

BASES FOR CLASSIFICATION OF FRONT-END WASTES AS 11e.(2)(cont'd)

- Implicit in the definition of "*unrefined and unprocessed* ore" in 10 C.F.R. 40.4 and exemption for it in 10 C.F.R. 40.13 is that there is "*refined and processed ore*" that can be milled with the resultant waste designated 11e.(2). Indeed, licensed source material ore (*e.g.,* Cabot materials and Cotter concentrates milled at IUC), would qualify as "*refined and processed ore*" and the waste from processing these materials are unquestionably to be 11e.(2).

> 0.05 %

BASES FOR CLASSIFICATION OF FRONT-END WASTES AS 11e.(2)(cont'd)

- NRC has explicitly identified one type of "*refined and processed ore*." *See* 57 Fed. Reg. 20,532, col. 1.

    3. SFC's Front-End Processes Were Primarily for the Recovery of Uranium.

- (at SFC) The *sole* purpose, not just the primary, purpose of the *concentration* of the licensed source material ore concentrates was to recover uranium.

BASES FOR CLASSIFICATION OF FRONT-END WASTES AS 11e.(2)(cont'd)

- *Concentration* was required because material received at SFC facility historically varied in purity (from a low of about 65% uranium by weight to as high as 83%, depending on the supplier).
- Impurities had to be removed prior to *conversion* because they could plug the fluidized bed reactors used in *conversion* process and/or could result in the production of off-spec material.

~84% w/o = 'pure'

Recovered > 99.5% U

BASES FOR CLASSIFICATION OF FRONT-END WASTES AS 11e.(2)(cont'd)

- NRC ROUTINELY LICENSES PORTIONS OF FACILITIES DIFFERENTLY.
  - Fuel-cycle Facilities, Including SFC's, Routinely Have Multiple Licenses or License Conditions for Different Types of AEA Materials to Which Different Regulatory Standards Apply (*e.g., Cabot, HMI*).
    monazite → license
  - NRC Licenses Portions of Non-fuel Cycle Facilities.

BASES FOR CLASSIFICATION OF FRONT-END WASTES AS 11e.(2)(cont'd)

- SFC Front-End Wastes Are Physically, Chemically, and Radiologically Similar to "Conventional" Mill Tailings.
  - See GEIS at B-11-14. (Handout)
  - See EPA's Uranium TRD at 43-44.
  - Primary waste stream from front-end processes was raffinate from the SX line.

BENEFITS OF DESIGNATION OF MATERIAL AS 11e.(2)

- About 80% Of Wastes Result From Front-end Processes.
- Well Understood And Workable 10 C.F.R. Part 40, Appendix A Criteria Would Apply.
- Dispute About On-site vs. Off-site Disposal With State Of Oklahoma Would Be Resolved.
- Clean-up Soils To Standards In Criteria 6 to allow Release For Unrestricted Use.

BENEFITS OF DESIGNATION OF MATERIAL AS 11e.(2) (cont'd)

- Waste Disposal Cell Would Be Subject To 1,000 Year Closure Requirement (Which Assumes Over Designed "Passive" Controls And No "Active" Maintenance).
- Transfer Property To Mandatory Long-term Government Custodian Licensed In Perpetuity By NRC.
- More Flexibility With Respect To Achieving The Remediation Of Radioactive And Non-radioactive Constituents In The Groundwater. (*e.g.*, Ability To Propose ACL's.)

BENEFITS OF DESIGNATION OF MATERIAL AS 11e.(2) (cont'd)

- Applicability Of Clearly Defined Radiation Protection Standards For Radon Emissions Which Provide "An Ample Margin Of Safety For The Protection Of Public Health."
- No Cost To The Government.