

POLICY ISSUE
(Notation Vote)

June 4, 2002

SECY-02-0095

FOR: The Commissioners

FROM: William D. Travers
Executive Director for Operations

SUBJECT: APPLICABILITY OF SECTION 11e.(2) OF THE ATOMIC ENERGY ACT
TO MATERIAL AT THE SEQUOYAH FUELS CORPORATION
URANIUM CONVERSION FACILITY

PURPOSE:

To request Commission approval that certain Sequoyah Fuels Corporation (SFC) waste can be classified as Atomic Energy Act, Section 11e.(2) byproduct material.

SUMMARY:

The SFC uranium conversion facility is included in the Site Decommissioning Management Plan (SDMP) as a result of contamination that occurred during the plant's operations, which ceased in 1992. In March 1999, SFC submitted a decommissioning plan to remediate the site and terminate the license in accordance with the restricted release provisions in the 1997 License Termination Rule (LTR) in 10 CFR 20.1403. In January 2001, SFC formally requested that the staff evaluate whether a portion of its waste could be considered as 11e.(2) byproduct material and, thereby, be remediated under the uranium mill tailings impoundment regulations in Appendix A of 10 CFR Part 40. SFC had made a similar request in 1993 to classify the same materials on site as 11e.(2) byproduct material, but the staff did not agree with its proposal at that time. This paper discusses SFC's most recent request, two options for responding to this

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request, the advantages and disadvantages of each option, and recommends that SFC's waste from the front-end of its Gore, OK, operation be considered 11e.(2) byproduct material. This paper also addresses the recommendations of a panel that reported on a Differing Professional View (DPV) filed by two staff members. The DPV was based on an earlier draft of this paper that also concluded that front-end material could be considered to be 11e.(2) byproduct material.

DISCUSSION:

SFC has thus far been unable to obtain an independent third party/custodian for institutional controls for restricted release under the LTR provisions in 10 CFR Part 20, Subpart E. In a letter dated January 5, 2001, SFC asked the staff to inform it of the applicability of Section 11e.(2) of the AEA to the waste from the front-end process of the Gore, OK, uranium conversion facility, to determine if the facility could be decommissioned pursuant to 10 CFR Part 40, Appendix A. If so, the U.S. Department of Energy (DOE),¹ pursuant to Section 202 of Title II of the Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA), would be required to assume responsibility under the general license for requirements in the Long-Term Surveillance Plan (LTSP) after license termination by the U.S. Nuclear Regulatory Commission (NRC). If the site were remediated under 10 CFR Part 40, DOE would become the general licensee and provide assurance that the LTSP is appropriately implemented. SFC argues that the initial processing of material at the Gore site was equivalent to the processing at a uranium mill (i.e., solvent extraction of uranium from the feedstock). Therefore, SFC submits, the wastes at the Gore site from the initial material process should be classified as Section 11e.(2) byproduct material, to be decommissioned under the criteria in Part 40, Appendix A. SFC has stated that this waste, which is generally segregated from the waste from the back end of the conversion process, is estimated to be about 80 percent of the residual radioactive material at the site. SFC further argues that the staff is more familiar with the decommissioning process in 10 CFR Part 40, Appendix A, and the LTSPs in particular that are implemented by DOE at mill tailings impoundments. The staff has yet to authorize a restricted release of a site under the provisions of the LTR. Therefore, SFC believes that decommissioning under the 10 CFR Part 40, Appendix A, process would be more appropriate, less costly, and take less time than decommissioning the site under the LTR process.

The staff has previously considered the issue of classifying the waste from the front-end process of the Gore, OK, uranium conversion facility as 11e.(2) byproduct material. In a July 1993 memorandum to the Commission, the Executive Director for Operations (EDO), supported by the Office of the General Counsel (OGC), concluded that the waste was not 11e.(2) byproduct material. This conclusion was based on the previous view that uranium hexafluoride conversion

¹ Under UMTRCA, the State of Oklahoma could assume responsibility before DOE was required to. Oklahoma has indicated that it does not wish to assume responsibility for the SFC site.

plants had not been considered as uranium mills and were not contemplated as such by UMTRCA. OGC has advised the staff that it has reconsidered its position.²

Attachments to this paper provide detailed background information on these matters. Attachment 1 describes the site in a general fashion and also describes two SFC proposals to classify waste as 11e.(2) byproduct material -- one made in 1993, the other in 2001. The staff's response to the 1993 proposal is in Attachment 2, a memorandum from J. Taylor, EDO, to the Commission, dated July 6, 1993. Attachment 3 is a SFC presentation in a June 2000 meeting with the staff. SFC's formal request for review on this issue is set forth in a January 5, 2001, letter to NRC (Attachment 4).

The staff believes that the activity at the front-end of the Sequoyah processing was uranium milling, and thus produced 11e.(2) byproduct material as its wastes. In Attachment 5, "Uranium Milling Activities at the Sequoyah Fuels Corporation Uranium Conversion Facility," the staff discusses in detail why this classification is justified. That attachment contains a plain-language, working definition of uranium milling, based on the language in UMTRCA and Part 40:

Uranium milling is an activity or set of processes that extracts or concentrates uranium or thorium from any ore primarily for its source material content, and the resulting tailings or wastes are 11e.(2) byproduct material.³

The front-end of the Gore facility can reasonably be viewed as a continuation of the milling process that was started at a licensed uranium mill. Since all wastes from such milling are 11e.(2) byproduct material, a strong argument can be made that the waste from that stage of the milling process which occurred at the SFC facility can be considered 11e.(2) byproduct material. In that regard, it should be noted that the staff previously considered all waste at a uranium mill, including some yellowcake from the milling process, to be 11e.(2) byproduct material, because the staff had not divided the milling process into its constituent parts to determine precisely at which stage uranium is no longer being extracted or concentrated from ore. The staff has not found it necessary to label the feed for each step of the milling process as "ore" as the basis for classifying the waste from that step as 11e.(2) byproduct material. When yellowcake underwent additional concentration at the front-end of SFC, it was a continuation of uranium milling, i.e., another step in the milling process. Thus, that part of the processing at a conversion facility fulfills the "extraction or concentration" terms in the definition of 11e.(2) byproduct material.

² OGC has advised the staff that the definitions of uranium milling and 11e.(2) byproduct material are process-related definitions and not restricted to a particular location of activity nor the physical characteristics of a material. Although the tailings and waste from the front-end of SFC's facility can continue to be classified as source material, this material can also be classified as 11e.(2) byproduct material if the process that took place at the front-end of SFC's facility can be considered a continuation of uranium milling. As a result, the front-end wastes could fall under the legislative and regulatory definitions of two different licensed materials and it would be a policy decision by the Commission as to whether to classify the front-end wastes as source material or 11e.(2) byproduct material.

³ As stated in NRC's December 13, 2000, Director's Decision, although pre-UMTRCA mill tailings may be chemically, physically, and radiologically similar to 11e.(2) byproduct material, it is not material over which NRC has jurisdiction.

The staff has identified two options for responding to SFC's request: (1) continue with the previous view and disagree with SFC's arguments, and continue decommissioning the site under the LTR; or (2) agree with SFC's arguments and classify some SFC waste as Section 11e.(2) byproduct material. SFC has only requested a decision on whether its front-end waste can be considered to be 11e.(2) byproduct material. Thus, decommissioning under that classification or under the LTR, on which its current decommissioning plan is based, are the only two options examined in this paper.

In evaluating these options, the staff has identified a general framework for decision-making involving complex sites undergoing decommissioning, and specific considerations for the SFC site under this framework (Attachment 6). The criteria in the framework are based on the Agency's four Strategic Plan performance goals. The staff's evaluation of SFC's proposal is based not only on whether there is a valid legal argument that the wastes can be classified as 11e.(2) byproduct material, but also on other important factors, such as protection of public health and safety, the imposition of unnecessary regulatory burden, and the effect on public confidence, and agency efficiency.

The need for a broader framework to consider the issues presented in this paper is driven by significant changes in the external environment since the passage of UMTRCA that affect the management and disposal of low-activity, long-lived radioactive wastes from contaminated sites. States and Compacts have been unable to develop new disposal sites under the Low-Level Radioactive Waste Policy Amendments Act of 1985, and two of the three operating low-level waste (LLW) sites are limited in the waste that they can accept in this category. As availability of LLW disposal options has diminished, remediation programs have grown. NRC's Site Decommissioning Management Program (SDMP) was established in 1990 and sites in this program require disposal of hundreds of cubic meters of low-activity material.⁴ During this same period, the uranium mining and milling industry has been in decline and the National Mining Association (NMA), and the mill operators they represent, have been encouraging the greater use of existing mill tailings impoundments for disposal of contaminated materials from sites undergoing decommissioning. NMA stated in its September 11, 2001, petition for rulemaking, that conventional mill tailings impoundments have 20 million metric tons (or approximately 20 million cubic meters) of additional disposal capacity that could be used for other similar wastes. Several companies that operate Resource Conservation and Recovery Act (RCRA) hazardous waste facilities in the U.S. have pursued acceptance of low-specific-activity⁵ radioactive waste licensed under the AEA, to complement the technologically enhanced naturally occurring materials they have been accepting. NRC has approved a number of requests for disposal of unimportant quantities of source materials in such facilities, and several States have included acceptance criteria for radioactive wastes in their RCRA permits for such facilities.

⁴ In a staff requirements memorandum dated August 22, 1989, the Commission directed the staff to develop a comprehensive strategy for NRC activities to deal with contaminated sites, to achieve closure on decommissioning issues in a timely manner.

⁵ By "low-specific activity," the staff means here "unimportant quantities" or less than 0.05% by weight of uranium and/or thorium.

In spite of the alternatives that have developed for these kinds of waste, there still remain obstacles to safe disposal alternatives for low-activity wastes, because of their classification as a particular kind of waste (e.g., as 11e.(2) byproduct material or source material). The purpose of the framework in Attachment 6 is to: (1) address wastes which, in a specific case, may be classified as more than one type of radioactive material; and (2) identify disposal/remediation options that best meet the four NRC Strategic Plan performance goals. This increased flexibility may lead to safe disposal alternatives with lower costs, increased competition, and faster cleanups. In the case of SFC, consideration of the four performance goals provides insights on the advantages and disadvantages of classifying some wastes as 11e.(2) byproduct material. Such a classification is different from the staff's previous position that 11e.(2) byproduct material could only be produced at uranium mills; however, this is outdated in light of the significant changes in the external environment over the last 20 plus years.

The options, both of which are protective of the public health and safety, are discussed below, along with their major advantages and disadvantages.

Option 1: Continue Decommissioning the Site under the LTR.

Under this option, the licensee would continue to decommission the site under the restricted release provisions of the LTR (i.e., 10 CFR 20.1403), including demonstrating compliance with the requirements for institutional controls and associated financial assurances. In this process, the licensee is responsible for providing sufficient financial assurance to enable an independent third party/custodian to assume necessary long-term control and maintenance of the site. Because of the significant quantity of materials with long-lived radionuclides (140,000 - 240,000 cubic meters in contaminated soils, sludge, and groundwater), SFC proposed an unnamed party, "equivalent to DOE," as the custodian. However, SFC has not been able, to date, to identify an entity willing to undertake this responsibility. Section 151(b) of the Nuclear Waste Policy Act of 1982 (NWPA) allows, but does not compel, DOE to assume ownership and control of sites like SFC at no cost to the government. SFC has met with DOE to discuss this issue, but has not obtained a commitment from it at this time. The staff has also been seeking to develop a Memorandum of Understanding (MOU) with DOE to provide long-term care under Section 151(b), but in January 2002, DOE informed the Chairman that it would be seeking to transfer its long-term stewardship responsibilities to the U.S. Department of the Interior (DOI) or another government organization with a land-management mission. Thus, there is considerable uncertainty about whether this provision can be used, or at least when it would be available for use by an NRC or Agreement State licensee. SFC has not proposed the use of the unrestricted release provisions of the LTR, which would be substantially more costly (an estimated several tens of millions of dollars more than an onsite cell).

Advantages

- This approach is consistent with previous staff position on this issue and may avoid some controversy by not reconsidering staff positions on 11e.(2) byproduct material.

- This approach maintains staff's previous position on 11e.(2) byproduct material by defining it in terms of the location where processing takes place, viz., a uranium mill (although the statute makes no reference to where the processing takes place).
- This approach avoids interpretations based on detailed analyses and arguments over what constitutes "milling," "ores," and "extraction or concentration" -- the key terms in the definition of 11e.(2) byproduct material.
- This approach utilizes SFC's existing decommissioning plan.

Disadvantages

- SFC does not have a commitment from an independent third party/custodian for institutional controls as required by 10 CFR 20.1403, and it is not clear that it will ever be able to obtain such a commitment. No NRC licensee with a privately owned site has been able to obtain an independent third party/custodian for institutional controls, and DOE ownership and control of such sites under Section 151(b) is highly uncertain at this time. The effort to negotiate an MOU with DOE to facilitate such transfers has been unsuccessful because of DOE plans to transfer this responsibility to DOI.
- Continued delays in SFC acquiring an independent third party/custodian expend SFC's limited financial resources needed for decommissioning.
- Continued delays in implementing decommissioning under LTR increase unnecessary regulatory burden and it might be inefficient for the staff to continue its safety and environmental reviews with the feasibility of the LTR option so uncertain.
- The staff's previous position that 11e.(2) byproduct material can only be produced at a uranium mill unnecessarily limits flexibility provided by the language in UMTRCA.
- If SFC is unable to obtain an independent third party/custodian, or have DOE assume long-term care responsibilities, SFC contends would need to decommission the site for unrestricted use under the LTR, which is substantially more costly.

Option 2: Classify Some SFC Waste as Section 11e.(2) Byproduct Material and Decommission Under 10 CFR Part 40, Appendix A.

Under this option, NRC would agree with SFC's proposal that the residual radioactivity produced as a result of the front-end process at the uranium conversion facility can be classified as byproduct material as defined in Section 11e.(2) of the AEA. Under this option, SFC has stated, in its January 5, 2001, submittal, that 11e.(2) byproduct material would be disposed of in a 10 CFR Part 40, Appendix A, tailings impoundment at the site. At the completion of remediation, ownership and control of the 11e.(2) byproduct material cell would be transferred to DOE, under Title II of UMTRCA.

In its proposal, SFC expects that DOE would also agree to assume control of any non-11e.(2) byproduct material contained in the 11e.(2) cell, either under the November 2000 interim guidance set forth in Regulatory Issue Summary 2000-23, "Recent Changes to Uranium Recovery Policy," or Section 151(b) of the NWPA. As with Option 1, DOE is not required to assume control for non-11e.(2) byproduct material that might be disposed of on site, either under UMTRCA or NWPA 151(b). A DOE decision would be needed to determine the ultimate disposition of non-11e.(2) byproduct material. The remainder of the site would be released for unrestricted use under the LTR and/or Appendix A of Part 40.⁶

SFC has proposed an onsite disposal cell, but classification of front-end wastes as 11e.(2) byproduct material could also lead to other remediation options. Mill tailings could be directly disposed in an offsite mill tailings impoundment at an existing uranium mill, without having to obtain DOE and LLW Compact approvals -- conditions that are specified by the staff in Regulatory Issues Summary 2000-23, for non-11e.(2) byproduct materials. Similarly, if the non-11e.(2) byproduct material at SFC could not be disposed in the tailings impoundment or left as residual radioactivity under the restricted release provisions of the LTR, the amount of material requiring offsite disposal would be reduced by classifying front-end wastes as mill tailings. SFC has not proposed any of these alternatives, but would have the flexibility to choose them if NRC agrees with their proposal for classification of 11e.(2) byproduct material at the site.⁷ This flexibility may be needed if DOE is unable or unwilling to accept non-11e.(2) byproduct material left on site. This flexibility would also enable SFC to develop options based on other considerations -- in addition to public health and safety -- such as their feasibility, cost, and time to implement.

Advantages

- This option provides a more certain resolution of long-term control for most, if not all, of SFC's waste, by using DOE as the long-term custodian under UMTRCA, if these wastes are left on site. This option provides what may be the only viable path forward for site decommissioning, given the uncertainties associated with implementing the existing restricted release provisions of the LTR.
- The staff position of 11e.(2) byproduct material under this option is more in line with the language in UMTRCA than the previous staff position that considered mill tailings to be produced at uranium mills, only.

⁶ Although SFC has not indicated which criteria would be used for areas outside of a disposal cell, cleanup of these areas for unrestricted release might be more efficient if only one set of regulations, either the LTR or Appendix A of 10 CFR Part 40, were used. The LTR would apply to non-11e(2) byproduct material, and Appendix A to the mill tailings. The release criteria for mill tailings and source material are both protective, but different in their approaches. SFC could request an exemption from one set of regulations, assuming the exemption criteria would be met.

⁷ In fact, in SFC's April 30, 2002, response to staff's Request for Additional Information, SFC stated that it is conducting studies to de-water raffinate sludges, and if successful, may ship them to a uranium mill.

- NRC and DOE have experience in implementing the Part 40, Appendix A, decommissioning process. NRC staff expects to be able to review this option more efficiently.
- DOE's Office of Environmental Management and Office of the General Counsel have reviewed the proposal and indicated that DOE does not have any formal position on the classification issue, and will accept NRC's designation (see Attachment 7).
- The Cherokee Indian Nation, in a letter sent on April 11, 2002, prefers this option, if offsite disposal of all of the material is not possible.
- This option gives SFC flexibility in choosing onsite/offsite disposal options by considering the front-end wastes to be either 11e.(2) byproduct material or source material. SFC can choose the optimum alternative with this flexibility, taking into account factors such as cost, public acceptance, and efficiency.

Disadvantages

- This option is not consistent with the previous staff position on the applicability of AEA Section 11e.(2) to the SFC site, which was focused on the location of the activity (i.e., not at a uranium mill) rather than on the milling process and the language of the statute.
- This option is not consistent with the current source material license and would require SFC to submit a request to amend its license to reclassify a portion of its waste,⁸ and to substantially revise its existing Decommissioning Plan and submit it as a reclamation plan under Part 40. Although there would be an increased burden on the licensee in the immediate future, SFC considers it to be worth the investment to have a more certain path for decommissioning.
- The overall approval of the site decommissioning plan may be delayed because the new license amendment request would offer an opportunity for a hearing to any affected party. Presently, the identities of parties that may object to an UMTRCA disposal cell (11e.(2) cell) at the SFC site are not known.
- For onsite disposal of all wastes, SFC would need to obtain approval for disposal of the non-11e.(2) wastes in an 11e.(2) cell, which is not guaranteed. The staff does not intend to approve a decommissioning plan which includes an 11e.(2) cell without the non-11e.(2) material being addressed.⁹ This would require DOE, the State of Oklahoma,

⁸ The staff is currently considering an amendment to authorize SFC to decommission the facility under the LTR. A hearing on the amendment is pending before a Presiding Officer. The hearing has been held in abeyance at this time, as staff waits for completion of the environmental impact statement.

⁹ Before the staff could docket a license application for 11e.(2) materials, SFC would need to resolve its approach for the non-11e.(2) material and DOE's acceptance of it in the 11e.(2) cell, if necessary.

and, potentially, Central LLW Compact approval, in addition to NRC approval. Alternatively, SFC could propose that non-11e.(2) wastes be disposed offsite (to meet the unrestricted release criteria in the LTR), attempt to leave the material onsite under the restricted release provisions of the LTR, and/or provide another acceptable approach.

- 10 CFR Part 40, Appendix A, does not have the public participation requirements of the LTR. However, the staff expects that SFC would continue to actively engage the public, given the interest of the public, local and State governments, and the Cherokee Nation in the resolution of this license termination.
- There is the potential for unknown and unintended consequences from this change in the staff's position on the classification of this waste as 11e.(2) byproduct material. The staff position limits the flexibility offered in this case to the milling process (i.e., activities involved with the extraction or concentration of uranium). The staff cannot foresee any adverse consequences in this limited decision. The only other commercial conversion facility in the U.S., the Honeywell plant at Metropolis, IL, currently does not perform milling operations.¹⁰ The three other sites in the SDMP that are considering restricted release, and in need of a third party/custodian, are clearly not involved in milling activities, and therefore could not be considered for an 11e.(2) byproduct material classification of their wastes. Once the fuel cycle is beyond natural uranium oxide, and the conversion processes take place, the milling process is clearly completed. Although the staff is mindful of a concern that there may be unintended consequences from Option 2, each case must be considered on its own merits to determine if the milling process is involved. If, however, other licensees were to argue for additional flexibility in classification of their wastes, in order to reduce disposal costs, for example, it is possible that schedules for remediating sites could be affected and additional staff resources would be needed to address any licensee proposals.

The staff believes this option is viable, notwithstanding the EDO's 1993 view. If the Commission extends 11e.(2) byproduct material treatment to the SFC front-end waste, the waste would then be classifiable as both source material, because of its uranium and thorium content, and 11e.(2) byproduct material, because of the process by which it was created. In a similar situation at the Stepan Chemical Company site in Maywood, New Jersey, the staff, in a September 20, 2001, letter to Envirocare of Utah, Inc., classified material that could be both source and 11e.(2) byproduct material, as 11e.(2) byproduct material.

Two staff members submitted a DPV on an earlier draft of this paper that recommended Option 2. A Panel evaluated their submittal and prepared the report in Attachment 8. Attachment 9 contains the DPV. The staff continues to believe that Option 2 is viable. The staff has addressed the recommendations of the DPV Panel in this revised paper.

¹⁰ Although uranium milling was not performed at Honeywell in the recent past, the staff is determining whether uranium milling was ever performed at this facility. If so, some wastes could be potentially be classified as 11e.(2) byproduct material. Honeywell has not indicated that it would pursue this classification with NRC.

COORDINATION:

OGC has reviewed this paper and has no legal objection. The hearing pending before the Atomic Safety and Licensing Board (ASLB), regarding SFC's decommissioning plans, does not involve any issue related to classification of material at the Gore site as Section 11e.(2) byproduct material. Thus, no separation-of-function issues are raised by this paper.

RECOMMENDATION:

Both options are legally viable and protective of public health and safety and the environment. Based on the above considerations, and after weighing the advantages and disadvantages of the options, the staff recommends that the Commission approve Option 2 -- that SFC front-end waste can be classified as Section 11e.(2) byproduct material.

/RA by CPaperiello Acting For/

William D. Travers
Executive Director
for Operations

Attachments:

1. Background information
2. Staff memo to Commission on SFC Plan, 1993
3. SFC June 2000 slide proposal to categorize waste as 11e.(2)
4. SFC January 2001 Proposal to classify waste as 11e.(2)
5. Uranium Milling Activities at Sequoyah Fuels Corporation
6. Decision-Making Framework
7. DOE letter re taking over site
8. DPV Panel Report
9. DPV

BACKGROUND INFORMATION
APPLICABILITY OF SECTION 11e.(2) OF THE ATOMIC ENERGY ACT TO MATERIAL AT
THE SEQUOYAH FUELS CORPORATION URANIUM CONVERSION FACILITY

In 1970, Sequoyah Fuels Corporation (SFC), a subsidiary of Kerr-McGee, began operation of a facility near Gore, in southeast Oklahoma, to convert uranium oxide to uranium hexafluoride, to prepare the material for enrichment. In early 1987 a second process was initiated to convert depleted uranium hexafluoride from the U.S. Department of Energy (DOE) enrichment facilities to depleted uranium tetrafluoride. In late 1987, ownership of the SFC facility was transferred to a subsidiary of General Atomics (GA). After an uncontrolled release of nitrous oxide in November, 1992, SFC announced cessation of operations. After a December 1993, Commission meeting with GA and SFC, the U.S. Nuclear Regulatory Commission (NRC) issued a Demand for Information requiring information on how the facility would be decommissioned and how those activities would be funded. SFC responded with its "Preliminary Plan for Completion of Decommissioning," dated February 16, 1993. In Section 2.4 of this plan (, SFC stated that certain activities at the site included the concentration of uranium from yellowcake, thereby resulting in wastes that meet the definition of 11 e.(2) byproduct material, (i.e., "... any ore processed primarily for its source material content."). Therefore, SFC argued, the facility would be more appropriately decommissioned using the criteria in 10 CFR Part 40, Appendix A, which addresses the regulation and decommissioning of uranium milling facilities. A July 6, 1993, Memorandum from James Taylor, Executive Director for Operations, NRC, to the Commission (Attachment 2) addressed SFC's argument stating that "... hexafluoride conversion plants had never been considered as uranium mills, and were not contemplated as such in the Uranium Mill Tailings Radiation Control Act of 1978."

In March 1999, SFC submitted a decommissioning plan to remediate the site and terminate the license in accordance with the 1997 License Termination Rule (LTR) in 10 CFR 20.1403 for restricted conditions. The plan proposes that all waste would be placed in an on-site disposal cell, the design of which is based on mill tailings disposal cell criteria in Part 40, Appendix A, followed by institutional controls to be provided by a party "such as DOE." To date, however, the State of Oklahoma, the U.S. Army Corps of Engineers, and the Cherokee Nation have declined the opportunity to assume responsibility for institutional controls. DOE could accept ownership of the site under Section 151(b) of the Nuclear Waste Policy Act of 1982, but is exploring the transfer of its land management responsibilities to another federal agency and is not interested at this time in proceeding with section 151(b) transfers. No other party has been identified to assume this responsibility.

Because of perceived uncertainties associated with acquiring and implementing institutional controls, in June 2000, representatives of SFC made a presentation to the staff (Attachment 3) again asserting that, because of the similarity of the processing at SFC to that at uranium mills, much of the waste at SFC (75-80 percent) should be considered byproduct material as defined in Section 11e.(2) of the Atomic Energy Act. In January 2001, SFC submitted a formal request to NRC to evaluate this concept (Attachment 4).



~~CONFIDENTIAL~~
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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 6, 1993

MEMORANDUM FOR: The Chairman
 Commissioner Rogers
 Commissioner Remick
 Commissioner de Planque

FROM: James M. Taylor
 Executive Director for Operations

SUBJECT: CLARIFICATION OF STAFF REMARKS

At the close of the periodic briefing of the Commission on operating reactors and fuel cycle facilities on June 25, 1993, Commissioner Remick asked a question regarding the criteria that might be used in the decommissioning of the Sequoyah Fuels facility at Gore, Oklahoma.

Dr. John H. Austin responded for the staff. Dr. Austin noted that Sequoyah Fuels had proposed to remediate its site by being declared an 11e(2) byproduct material disposal site, therefore using 10 CFR Part 40, Appendix A, as the criteria. Dr. Austin's description of the Sequoyah Fuels proposal was based upon section 2.2.2 of the Preliminary Plan for Completion of Decommissioning, dated February 16, 1993. That section of the Preliminary Plan suggests that the Sequoyah Fuels decommissioning waste might be able to be characterized as 11e(2) byproduct material, thus importing Appendix A criteria.

OGC has provided informal views that hexafluoride conversion plants had never been considered as uranium mills, and were not contemplated as such in the Uranium Mill Tailings Radiation Control Act of 1978. The uranium contaminated decommissioning wastes at Sequoyah Fuels do not fit the definition of 11e(2) byproduct material and thus fall outside the coverage of the Act. This was the legal advice referred to by Dr. Austin in his remarks to the Commission.

However, even if the decommissioning waste at Sequoyah Fuels could not be characterized as 11e(2) byproduct material that does not preclude the application of 10 CFR Part 40, Appendix A, criteria in the evaluation of the applicant's proposal. As long as the NRC lacks codified residual radiation criteria applicable to fuel cycle decommissioning (apart from uranium mill tailings disposal areas) the staff has the discretion to apply criteria that have been endorsed by policy directive, such as the Site Decommissioning Management Program Action Plan, found in analogous codified regulations, or developed for application to a specific case.

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PDR COMMS NRCC
CORRESPONDENCE PDR

DOK

Dr. Austin's remarks may suggest that, as a consequence of placing the site on the SDMP list, a decision had been made to use the Action Plan criteria, although he noted in response to a comment by the Chairman that if analysis supports something less stringent than Action Plan criteria, the staff would give it serious consideration.

To assure that there is no misunderstanding, we would like to clarify that, although the Sequoyah Fuels site has been put on the SDMP list, no decision had yet been taken by the staff as to the criteria against which the Sequoyah decommissioning effort would be evaluated. Such decision awaits a full site characterization and detailed decommissioning plan, including the nature and extent of the radioactive waste materials, the physical characteristics of the site, and the technical design of any onsite disposal cell.

Original signed by
James M. Taylor

James M. Taylor
Executive Director
for Operations

cc: SECY
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H. Thompson
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PDR

* See previous concurrence.

OFC	OGC *	OGC *	NMSS *	NMSS*	NMSS *
NAME	RFonner	JScinto	JAustin	RBangart	RBernero
DATE	07/1/93	07/1/93	07/1/93	07/1/93	07/1/93
OFC	OGC *	EDD			
NAME	MMalsch	JTaylor			
DATE	07/1/93	07/1/93			

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 PROCESSES) 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 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] . . .
elux process . . . improved elux 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).

7 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.

(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.

Recovered / 7 99.5% U

~84% w/o = 'pure'

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*).
 - ↳ *normalize* → *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.



RE: 0101-N

January 5, 2001

Certified Mail – Return Receipt Requested
Receipt No. 7099 3220 0002 3295 7055

Larry W. Camper, Branch Chief
Decommissioning Branch
Division of Waste Management
Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
11545 Rockville Pike
Rockville, Maryland 20852-2738

**Re: Request for Review of Sequoyah Fuels Corporation's
Waste Designation**

Dear Mr. Camper:

Sequoyah Fuels Corporation (SFC) hereby requests that the Nuclear Regulatory Commission (NRC) review whether various wastes that resulted from the front-end processes at its facility located in Gore, Oklahoma, should be designated as byproduct material as defined in section 11e.(2) of the Atomic Energy Act of 1954, as amended, 42 U.S.C. §§ 2011 *et seq.* As indicated in the enclosed memorandum and in SFC's June 21, 2000, presentation to various NRC personnel, SFC believes that the wastes resulting from the front-end processes meet the definition of 11e.(2) byproduct material and should be designated as such. The memorandum also addresses SFC's plans to deal with the waste materials located at the facility that are not properly classified as 11e.(2) byproduct material.

Following your review of the memorandum and the resolution of any questions or concerns that may result therefrom (and assuming that NRC finds that SFC's approach has merit), SFC will submit a formal request to amend Source Material License SUB-1010 to authorize the handling, storage, and disposal of 11e.(2) byproduct material at the facility.

NMSSOIPublic

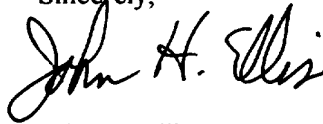
January 5, 2001

Page 2

We look forward to your response to this request. We note, in closing, that SFC believes that designation of the wastes resulting from the front-end processes as byproduct material will allow for the development of a cost-effective decommissioning plan and more importantly, closure of the site in a manner that ensures protection of the public and health and safety.

Thank you for your consideration.

Sincerely,

A handwritten signature in black ink that reads "John H. Ellis". The signature is written in a cursive style with a large initial "J" and "E".

John H. Ellis

President

Sequoyah Fuels Corporation

Enclosures

cc: Michael Weber
Philip Ting
John T. Greeves
Joseph J. Holonich
Daniel M. Gillen
James C. Shepherd, NRC Project Manager
James Lieberman
Stuart A. Treby
Charlotte E. Abrams
Phyllis A. Soebel
Mike H. Fliegel
Steve Jantzen
David Mullon
Mike Broderick

I. INTRODUCTION

Sequoyah Fuels Corporation (SFC) operates a Nuclear Regulatory Commission (NRC) licensed nuclear fuel-cycle facility and is evaluating requesting an amendment to NRC Source Material License SUB-1010 to authorize the handling and disposal of byproduct material, as defined in section 11e.(2) of the Atomic Energy Act of 1954 (AEA), as amended by the Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA), 42 U.S.C. §§ 2011 *et seq.* Specifically, SFC seeks to dispose of wastes at its Gore, Oklahoma facility (hereinafter, the Facility) the majority of which were generated from *uranium recovery* processes involving the *concentration* and *purification* of licensed source material *ore* concentrates. These *concentration* and *purification* processes took place at the front end of the Facility's operations and prior to, and separately from, the *conversion* of concentrated and purified ore into UF₆, or the *reduction* of depleted UF₄ to UF₆. While in the past SFC's license has not contained a provision permitting the possession and disposal of 11e.(2) byproduct material with respect to the waste material generated from the uranium *concentration* and *purification* processes at the Facility, a recent review of the provisions of the AEA, NRC regulations, guidance documents, and policy statements indicates such an amendment is appropriate.

The timing of this request is favorable because it comes prior to NRC approval of final site closure requirements for the Facility. Indeed, it comes prior to the completion by NRC of a planned environmental impact statement (EIS) evaluating site closure options and, therefore, also prior to the initiation of major site cleanup activities by the licensee. In this respect, SFC's front-end *concentration* and *purification* wastes are presently in essentially the same status as uranium mill tailings at licensed uranium mills just prior to passage of UMTRCA in 1978. UMTRCA

was enacted to address concerns about NRC's lack of authority over the disposal and long term control of the tailings (which were regulated during operations under the mills' source material licenses), after the cessation of milling operations. The passage of UMTRCA and development of its implementing regulations addressed those post-operations concerns about uranium mill tailings and other milling wastes prior to any of the existing, licensed (*i.e.*, active/Title II) facilities having their licenses terminated. An affirmative decision on a license amendment request for SFC will have essentially the same impact on the regulatory treatment of SFC's 11e.(2) (*concentration* and *purification*) wastes as UMTRCA did on the regulatory treatment of uranium milling wastes after its passage in 1978, except that the Title II regulatory program developed subsequent to the passage of UMTRCA is now (some twenty plus years later), a mature, effective site closure program.¹

The justification for a license amendment is compelling for a variety of reasons, not the least of which is that the majority of the wastes at the site are removed from the obvious regulatory limbo where they had resided prior to promulgation of NRC's 1997 decommissioning and decontamination (D&D) rules, 62 Fed. Reg. 39058 (July 21, 1997), and where, to some extent, they still reside as illustrated by the current litigation before an Atomic Safety and Licensing Board Presiding Officer.² For example, although the 1997 D&D rules are currently applicable to D&D activities at the SFC site (absent approval of an SFC license amendment)

¹ We note that there is a pending controversy as to whether or not certain FUSRAP wastes, which were generated at facilities that were not licensed by NRC prior to the effective date of UMTRCA, are 11e.(2) byproduct material. Since the SFC facility is licensed by the NRC and the *concentration* and *purification* wastes at issue here were generated pursuant to that license, any resolution of the pending controversy would be irrelevant to the SFC wastes.

² See *In the Matter of Sequoyah Fuels Corporation, (Gore, Oklahoma)*, NRC Dkt. No. 40-8027-MLA-4.

their implementation will be a matter of first impression to the Staff, the licensee, and the Board.³ Additionally, the current ASLB proceeding effectively addresses the application of 10 C.F.R. Part 40, Appendix A Criteria only as *persuasive* precedent (*i.e.*, best available control technology (BACT)) for onsite closure rather than having Appendix A as the controlling regulatory program and NRC Uranium Recovery Section Staff as primary rather than “consulting” reviewers.

Granting SFC a license amendment resolves most of the substantive issues in the ASLB proceeding by explicitly defining the regulatory requirements for long term stabilization on-site of the 11e.(2) waste including: the control of radon emissions, the surface soil cleanup standards for radium, uranium and thorium, the applicable ground water corrective action requirements for both the radiological and non-radiological constituents of the 11e.(2) material in groundwater, a mandatory governmental custodian for the site subject to NRC license in perpetuity, as well as the mechanism for funding long-term monitoring and surveillance and even *active* maintenance should it be deemed necessary. Additionally, Section 84(c) of UMTRCA, as reflected in the Introduction to 10 C.F.R. Part 40, Appendix A, provides the licensee and NRC staff with significant *flexibility* to address site specific conditions as long as equivalent protection of public health and the environment is reasonably assured. Finally, Appendix A has been demonstrated to be workable. NRC’s Uranium Recovery Section staff and Title II licensees understand the performance orientation of the Appendix A Criteria and the related guidance (*e.g.*, that for surface stabilization and alternate concentration limits (ACL's)), so it will not be necessary to

³ For example, a variety of issues including *restrictive use* and durable vehicles for assuring any necessary long-term funding and long-term site custodianship, will be matters of *first impression* in that proceeding.

reinvent the wheel to address final disposal of the majority of the decommissioning wastes at the SFC facility in a timely and cost-effective manner as would be the case under the D&D rule.

As a result of the timing of SFC's license amendment and the underlying legal and policy justifications, favorable action by NRC will not, in fact, result in conflict with past practices. In effect, it merely results in a new and *different* approach to the majority of wastes at the site. As the record will demonstrate below, NRC does not have to reverse any formal decisions regarding the nature of a *conversion facility's* wastes but rather can take a *different* approach to a clearly definable portion of the wastes generated by activities (*concentration* and *purification*) that at a *conventional mill* would unquestionably generate 11e.(2) byproduct material.⁴

Final site closure and license termination will be accomplished most appropriately for at least the *concentration* and *purification* milling wastes (approximately 77% by volume and 92% of the total radionuclide inventory of the waste at the site) pursuant to the regulations set forth in 10 C.F.R. Part 40, Appendix A for 11e.(2) byproduct material. Accordingly, an amendment to SUB-1010 to permit SFC to handle and dispose of 11e.(2) byproduct material generated by its front-end uranium *recovery* (as opposed to its uranium *conversion*) processes at the Facility is appropriate.

⁴ Indeed, although not at a *conventional mill*, NRC has recently confirmed that certain uranium recovery wastes (*i.e.*, seven (7) chipped wooden pallets contaminated by licensed source material ore concentrates [*i.e.*, yellow-cake]) at a *conversion facility* are 11e.(2) byproduct material suitable for disposal in a licensed 11e.(2) facility. See Letter from John J. Surmeier, NRC, to William Paul Goranson, Quivira Mining Company (Nov. 10, 1999).

II. BACKGROUND

SFC operates a nuclear fuel-cycle facility licensed by NRC at U.S. Interstate-40 and Oklahoma State Highway 10 (Post Office Box 610), Gore, Oklahoma 74435. SFC engaged in *different* operations in *different* areas of the Facility, pursuant to NRC Source Material License SUB-1010, including (1) the *recovery* of uranium by *concentration* and *purification* processes, (2) the *conversion* of concentrated and purified uranium ore into UF_6 between the years of 1970 and 1993, and (3) the *reduction* of UF_6 into UF_4 from February 1987 until 1993. Again, as will be demonstrated, these operations occurred in separate areas within the processing buildings or, in some cases, within separate facilities, and created separate and distinct waste streams.

Operations at the Facility can generally be summarized as follows. Following receipt of licensed source material *ore* concentrates at the Facility, the *ore* was subjected to *concentration* and *purification* processes to further purify the licensed source material *ore* concentrates. These *concentration* and *purification* processes were essentially identical to *uranium recovery* processes conducted at *conventional* uranium mills. The purpose of the *concentration* and *purification* processes was to control the grade of materials entering the *conversion* process so as to avoid the contamination of the *conversion* processing system which, if permitted to occur, would lead to the production of off-specification material.

Following the *concentration* and *purification* processes, the materials were transferred to the *conversion* facility which produced high purity UF_6 using the purified source material *ore* concentrates as feed material (hereinafter, UF_6 Facility).

Also located at the Facility was a wholly separate *reduction* facility which produced UF_4 using depleted UF_6 as feed material (hereinafter, DUF_4 Facility).

In addition to the facilities for *concentration and purification, conversion, and reduction*, the SFC site also includes: (1) a storage area for the licensed source material *ore* concentrates received from *conventional* uranium mills; (2) a licensed source material *ore* concentrate sampling facility; (3) a bulk storage area for chemicals such as ammonia (NH₃), tributylphosphate-hexane solvent, and hydrofluoric (HF), nitric (HNO₃), and sulfuric (H₂SO₄) acids; (4) a facility for electrolytic production of fluorine from HF; (5) treatment systems and storage ponds for both radiological and non-radiological liquid effluent streams; and (6) a facility for the recovery and beneficial use of ammonium nitrate solution (which results from the solvent extraction system) as fertilizer on SFC-owned land.

The Facility occupies approximately 85 acres of the 600 acre site. The 85-acre Facility is presented in more detail in Figure 3-1 of SUB-1010. The total area under roof is comprised of manufacturing, warehousing, and office space in seven (7) principal buildings. The Main Process Building (MPB) contains administrative offices, a process laboratory, the sampling plant, the major *conversion* processing operations, fluorine generation operations, a utility area and a maintenance area. About 200 feet west of the MPB is the Miscellaneous Digestion Building (MDB), where yellowcake slurry was received and processed. Facilities in this building enabled slurry to be dissolved in nitric acid for sampling before being piped into the concentration and purification circuit in the Solvent Extraction Building (SEB), which is located about 150 feet west of the MPB. A one-story warehouse about 200 feet north of the MPB provides storage for spare mechanical equipment. A solid waste sorting building north of the MPB provides sorting and waste handling capabilities. About 400 feet north of the MPB is the DUF₄ Facility. In October 1990, SFC added an Administration Building located about 100 feet east of the MPB.

Additional facilities include the following: a licensed source material *ore* concentrates (yellowcake) drum storage area, an electrical substation, UF₆ cylinder storage area, tank farm for liquid chemicals and fuel oil, cooling tower for waste heat dissipation, sanitary sewage facilities, retention ponds for calcium fluoride sludge, retention ponds for processing raffinate (the byproduct from the licensed source material *ore concentration/purification* by solvent extraction (SX) process which contains radioactive material) into fertilizer and raffinate sludge, a raffinate sludge concentration and loading facility, retention ponds for fertilizer, and a reservoir for an emergency water supply. These areas are shown on Figure 3-1 of SUB-1010.

By letter dated February 16, 1993, SFC notified NRC of its decision to suspend all production operations permanently, including uranium *recovery by concentration* and *purification* processes and subsequent *conversion* operations, and to decommission the facility. Since July 1993, the *concentration* and *purification* processes, the UF₆ *conversion* processes, and the DUF₄ *reduction* processes have been shut down.

For further information regarding the facility operations, see Chapter 10 of License SUB-1010 which contains a description of the facility and the areas where licensed materials were processed and handled. Figure 3-1 shows the general arrangement of the protected area of the facility. Also, Chapter 16 of License SUB-1010 provides a description of the different facility processes.

III. MATERIAL SOURCES, COMPOSITION AND VOLUMES

Table 1 lists the various types of waste materials, estimated volumes and radionuclide contents SFC expects to have to address during Facility decommissioning. The table also defines the portion of each waste type attributable to licensed source material *ore concentration*

and *purification* processes that should be designated as 11e.(2) byproduct material. The following is a brief description of the sources and composition of each waste type.

Soils in and around the facility, including soils in the interim soils storage cell, that are contaminated with varying levels of uranium, make up the largest volume of waste at the Facility. Contamination of most of these soils resulted directly from spills of uranium ore and uranium bearing liquids from the *concentration* and *purification* processes at various times during the operating life of the facility. SFC estimates that two (2) to five (5) million cubic feet of soil, depending on the cleanup criteria prescribed by NRC, will be excavated and placed in the disposal cell. Soil contamination, primarily from natural uranium, exists at depths ranging from a few inches to as much as 20 to 30 feet near the MPB. These contaminated soils are located under and around the MPB, SEB, MDB, the raffinate treatment and storage ponds, source material *ore* concentrates storage areas and drum/scrap storage areas. A detailed description of the contaminated soil types, locations, quantities, contaminant levels, *etc.*, can be found in SFC's Site Characterization Report, which was submitted to NRC on December 18, 1998. SFC estimates that almost 90% of the waste soil volume at the site will be 11e.(2) byproduct material.

Materials resulting from the demolition of site structures and equipment comprise a second waste type found at the Facility. Approximately 50% of the volume of this waste originates from the buildings and equipment used to concentrate and purify the licensed source material *ore* concentrates and, therefore, will be 11e.(2) byproduct material.

Raffinate sludge was produced as a result of neutralizing the acidic raffinate stream from the SX concentration and *purification* process with anhydrous ammonia. It is analogous to the slimes generated at a uranium mill and will be 11e.(2) byproduct material. Similarly, the pond 2

residue, the pond 1 spoils pile, the clay liners from ponds 3E and 4, and the clarifier clay liners each contain varying amounts of raffinate sludge and will be 11e.(2) byproduct material.

Solid waste burials and drummed contaminated trash are wastes that were generated throughout the facility. Approximately fifty percent of this material came from the *concentration* and *purification* process areas and will be 11e.(2) byproduct material.

Crushed drums and chipped pallets originated from licensed source material *ore* concentrates shipments to the facility and will be 11e.(2) byproduct material.⁵ Similarly, contaminated sludges from the Sanitary Lagoon, Emergency Basin and North Ditch as well as the underlying soils, are also attributable in part to the *concentration* and *purification* processes and will be 11e.(2) byproduct material.

Thus, 77% by volume of and 92% of the radionuclide inventory in the wastes will be 11e.(2) byproduct material.

In contrast to the wastes discussed above, wastes resulting from the *conversion* and *reduction* processes will not be 11e.(2) byproduct material. For example, calcium fluoride sludges, clay liners from the calcium fluoride sludge impoundments, structures and equipment used for *conversion* and *reduction* processes, soils contaminated by activities associated with *conversion and reduction* processes, and scrap metal originating from *conversion and reduction* facilities will not be byproduct material. In total, the non-byproduct waste materials are estimated to be approximately 23% of the total volume of decommissioning wastes at SFC's site

⁵ We note again that wood chips from wood pallets used to handle and store 55-gallon drums of licensed source material *ore* concentrates at the Allied Signal processing facility were designated as 11e.(2) byproduct material and were permitted to be disposed of at the Quivira-Ambrosia Lake 11e.(2) disposal facility. See Letter from John J. Surmeier, NRC, to William Paul Goranson, Quivira Mining Company (Nov. 10, 1999).

and approximately 8% of the total radionuclide inventory in the various waste streams. Details of the waste volume and radionuclide contents of the major waste types at the site and SFC's estimate of the distribution between 11e.(2) byproduct material and non-byproduct material wastes are contained in Table 1.

IV. THE FACTUAL, LEGAL, AND POLICY BASES LEADING TO THE DETERMINATION THAT CERTAIN URANIUM RECOVERY WASTES AT THE FACILITY ARE 11E.(2) BYPRODUCT MATERIAL

A. Introduction

The issue of whether 11e.(2) byproduct material is generated at *conversion facilities* was addressed on a general or macro basis in the past, but only in terms of entire facilities (*i.e., mills vs. conversion facilities/plants*) as opposed to processing activities (*i.e., concentration/purification vs. conversion*). Specifically, SFC had at one time advanced a suggestion that the Facility be remediated as an 11e.(2) byproduct material disposal site, thereby allowing the application of the 10 C.F.R. Part 40, Appendix A site closure criteria. *See* SFC Preliminary Plan for Completion of Decommissioning (Feb. 16, 1993); *see also* Memorandum from James Taylor, EDO, NRC, to NRC Commissioners (July 6, 1993). The NRC Office of General Counsel responded to SFC's suggestion with "*informal views*" that "hexafluoride *conversion plants* had never been considered as *uranium mills*, and were not contemplated as such in [UMTRCA]." *Id.* (emphasis added). Accordingly, OGC asserted that "[t]he uranium contaminated decommissioning wastes at [SFC] do not fit the definition of 11e.(2) byproduct material and thus fall outside the coverage of the Act." *Id.*

This issue was also addressed by NRC in the 1980 GEIS. Specifically, the GEIS states:

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. (79)

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, in accordance with the intended scope of this effort and the authority provided under PL 95-604, as amended. The exception is the prohibition of major construction before completion and documentation of a full environmental assessment. This requirement is being made applicable to mills and other major fuel cycle facilities.

GEIS at A-65 (emphasis added). Although the comment addresses *plants*, read carefully, the response is consistent with SFC's proposed amendment as it indicates that *concentration* process wastes are subject to regulation under 10 C.F.R. Part 40, Appendix A, but implies that *conversion plants* are not.

A *facility versus facility* or *plant versus plant* analysis results in a predictable general conclusion that *conversion facilities/plants* are not uranium *mills*. The conclusion is different when careful analysis is focused on the front-end uranium recovery *concentration* and *purification* processes (and the wastes generated thereby) separately from the *conversion* and *reduction* processes at SFC's *conversion plant*. Since the *concentration* and *purification* processes and wastes generated therefrom at the SFC *conversion plant* have never been analyzed separately before, to do so now is not *inconsistent* with past practices, rather it is just a *different* way of looking at the issue.

Additionally, a series of relatively recent events reflect the Commission's reexamination of the scope of uranium recovery (UR) activities that produce 11e.(2) byproduct material. The National Mining Association (NMA) submitted a White Paper to the NRC in 1998 addressing a variety of regulatory issues of concern to NRC UR licensees, including specifically the definition and designation of certain UR waste materials as 11e.(2) byproduct material under the AEA, as

amended by UMTRCA. The White Paper detailed the legislative history of section 11e.(2) and discussed the scope of NRC's jurisdiction to regulate such materials. Following public hearings on the issues raised in the White Paper, NMA submitted the White Paper Addendum in August 1999, which focused on a pre-1978/post-1978 11e.(2) byproduct material issue, (*i.e.*, whether uranium production wastes satisfying the definition of 11e.(2) byproduct material produced for the Manhattan Engineering District (MED) or Atomic Energy Commission (AEC) prior to 1978, the date UMTRCA was enacted, are properly considered 11e.(2) byproduct material).

Building on treatment of one issue in the White Paper, in 1998, International Uranium (USA) Corporation (IUC) filed a Petition requesting that the Commission reexamine its policy on processing *alternate feed* (*i.e.*, *ore* other than conventional, natural *ore*) for its uranium content in a licensed mill such that the wastes generated are properly considered 11e.(2) byproduct material. That petition was followed shortly by litigation which involved that core issue. *In the Matter of International Uranium (USA) Corporation*, Docket No. 40-8681-MLA-4 ("Ashland 2"). Ultimately, the Commission issued a decision in Ashland 2 that focused largely on the scope of the definition of 11e.(2) byproduct material and its necessarily close relationship with the Commission's definition of the term *ore* that effectively modified the then existing alternative feed policy. More recently, addressing perhaps the most fundamental issue raised in the NMA White Paper, the Commission reversed a policy which stood for twenty (20) years regarding jurisdiction of non-Agreement States over the non-radiological components of 11e.(2) byproduct material at licensed uranium recovery sites. *See* Memorandum from Annette Vietti-Cook, Secretary, NRC to William D. Travers, EDO, NRC (Aug. 11, 2000). This decision has implications for Oklahoma's interest in the final site closure determination for the SFC facility.

These Commission actions are examples of a recent trend on the part of the Commission to reexamine its policies and interpretations, and where appropriate, to think creatively, (*i.e.*, “outside the standard regulatory boxes”), about its existing rules, policies, procedures and guidance consistent with its Strategic Assessment Rebaselining Initiative (SARI). The SARI called for the reassessment of NRC activities to redefine the basic nature of the work of the agency and the means by which that work is accomplished, and to apply to these redefined activities a rigorous screening process to produce a new set of assumptions, goals, policies, and strategies for NRC. See U.S. NRC, Strategic Planning Framework (Sept. 16, 1996) at DSI 2. This SARI-like approach is reflected in decisions which demonstrate that, where necessary, NRC will change its policies. See *Kansas Gas & Elec. Co.*, (Wolf Creek Generating Station, Unit 1), 49 NRC 441, 460 (1999) (referencing *Chevron U.S.A., Inc. v. Natural Resources Defense Council, Inc.*, 467 U.S. 837, 863-64) (Agency interpretations “are not” ‘carved in stone’ but rather must be subject to re-evaluation of their wisdom on a continuing basis.”); see also *In the Matter of International Uranium (USA) Corp.*, slip op. at 15, citing *Envirocare of Utah v. NRC*, 194 F.3d 72, 78 (D.C. Cir., Oct. 22, 1999) (The agency is free to choose a new interpretation which may “represent a sharp shift from prior agency views or pronouncements,” so long as the agency gives “adequate reasons for changing course.”). At least in part because of these events, and indeed in keeping with them, SFC was prompted to take another look at the definition of 11e.(2) byproduct material as it relates to those portions of its Facility that engaged in processes that are essentially identical to the tail-end *uranium recovery concentration* and *purification* processes at a *conventional* uranium mill. This reevaluation indicates that if these same *concentration* and *purification* processes were carried out at a *conventional* mill site, the wastes would unquestionably be 11e.(2) byproduct material. Because these *uranium recovery* processes

take place prior to, and distinctly separate from, *conversion* processes at SFC's facility, logically, factually and legally, they can, and should, be considered uranium *recovery* (by further *concentration* and *purification*) wastes that result from processing licensed source material *ore* concentrates *primarily* for their source material content. That is, the *concentration* and *purification* processes that occurred at the Facility were essentially an extension of the milling process or, said another way, were milling processes not physically located at a *conventional* mill facility. Importantly, as noted below, the definition of milling in 10 C.F.R. Part 40 was carefully tailored by NRC to include milling at physical locations other than at *conventional* uranium mill facilities.

Finally, as a matter of legal protocol, it is appropriate for the licensee to propose that the Commission reconsider the proper licensing mode for the wastes generated from the front-end *uranium recovery concentration* and *purification* processes, since licensees generally have the primary responsibility for ensuring that the nuclear materials are managed to satisfy all applicable regulatory criteria under the AEA regulatory system, including specifically, proposing license amendments. *See* NRC NUREG-1350, Vol. 7 at 2. Further, SFC believes that it is particularly appropriate to do so at this time, prior to completion of an EIS and prior to NRC approval of final license termination plans for the Facility. Indeed, given that Congress' primary focus in creating a new class of AEA-regulated waste material (*i.e.* 11e.(2) byproduct material) in UMTRCA was on the long-term control and disposal of such wastes and SFC is in the process of evaluating final site closure options for NRC approval, now is an excellent time to address those issues before events would make such a determination more difficult and perhaps impracticable.

As noted above, granting SFC a license amendment will effectively resolve a whole series of issues that until 1997, and to some extent even now, have resulted in the wastes at the Facility being placed in a sort of regulatory “limbo.” Specifically, SFC estimates that approximately 77% by volume of the process wastes and contaminated soils and 92% of the total radionuclide inventory in wastes at the site are 11e.(2) byproduct material, which, under a license amendment, will be subject to the well-understood and mature Appendix A regulatory program. This established regulatory program answers the following questions: the criteria for restricted versus unrestricted use; long term control standards (*i.e.*, 1000 years without *active* maintenance requirement); radiation protection standards (*i.e.* the radon exhalation limit that provides an *ample margin of safety* for public health); a mandated perpetually licensed Government custodian; and groundwater corrective action criteria for both radiological and non-radiological constituents of 11e.(2) byproduct material in ground water. In addition, as a practical matter, the grant of a license amendment will lead to timely final site closure without the need for wholesale revisions to SFC’s proposed license termination plan which relies significantly on 10 C.F.R. Part 40, Appendix A Criteria as BACT rather than as controlling regulatory criteria. Finally, given the previous high profile, contentious debate at the Commission level regarding concerns that SFC would not have adequate financial resources to properly decontaminate and decommission the facility, resolving disposal issues for 77% of the waste at the site (with related potential alternatives for the other 23% to be discussed separately) will assure that adequate resources exist to promptly close the site and terminate the license.

B. *All Wastes Generated As A Result Of Uranium Recovery from Concentration and Purification Processes Are 11e.(2) Byproduct Material*

In evaluating whether materials qualify as 11e.(2) byproduct material, the appropriate starting point is the definition of “byproduct material” as set forth in Section 11e.(2) of the AEA.

That definition provides that the following types of materials constitute 11e.(2) byproduct material:

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).

As this definition reveals, there are three elements that cause a material to be considered 11e.(2) byproduct material. First, the material must be produced by the extraction or *concentration* of uranium or thorium. Second, the uranium or thorium must be extracted or *concentrated* from an *ore*. And third, the *ore* must be processed *primarily* for its source material content. As demonstrated below, SFC's uranium recovery wastes (wastes generated from the *concentration* and *purification* of uranium from licensed source material *ore* concentrates) satisfy all three elements of this definition and these wastes, therefore, qualify as 11e.(2) byproduct material.

1. SFC's Uranium Recovery Wastes Were Produced By The Extraction or *Concentration* of Uranium, Consistent With The Definition of 11e.(2) Byproduct Material

As indicated, the first element of the definition of 11e.(2) byproduct material requires that the material be produced "by the extraction or *concentration* of uranium." A plain reading of this language indicates that the processing activities that SCF engaged in to recover uranium from licensed source material *ore* concentrates, namely, *concentration* and *purification*, are precisely the types of activities that generate wastes satisfying the definition of 11e.(2) byproduct material. This conclusion also is consistent with established principles of statutory construction.

Where a term (in this case, *concentration*) is neither defined in the statute nor explained in the legislative history, the Supreme Court advises that “we assume ‘that the legislative purpose is expressed by the ordinary meaning of the words used.’ Thus, ‘[absent] a clearly expressed legislative intention to the contrary, that language must ordinarily be regarded as conclusive.’” *American Tobacco Co. et al. v. Patterson et al.*, 456 U.S. 63, 68 (1982) (citations omitted). In the absence of a definition or explanation of meaning in the legislative history, it is appropriate to turn to the “ordinary understanding” or “dictionary definition” of a term. See *Babbitt v. Sweet Home Chapter of Communities for a Great Oregon et al.*, 515 U.S. 687, 696 (1995). Also, statutes and regulations must, if possible, be construed in such a fashion that every word has some operative effect. *United States v. Nordic Village, Inc.*, 502 U.S. 30 (1992).

A review of UMTRCA and the legislative history underlying the definition of 11e.(2) byproduct material shows that the term “*concentration*” is neither defined nor explained; therefore, to give the term operative effect, one looks to its ordinary meaning. The dictionary definition of the verb form “to concentrate” is “[t]o increase the concentration of (a solution or mixture).” *Webster’s II New College Dictionary* (1995). The noun “concentration” is further defined as “[t]he amount of a specified substance in a unit amount of another substance.” *Id.* Thus, when Congress defined 11e.(2) byproduct material to include wastes produced by the *concentration* of uranium or thorium, given the clear meaning of the word, wastes resulting from processes like SFC’s, which are designed to increase the *concentration* of uranium from processing licensed source material *ore* concentrates, satisfies the definition. Therefore, designating as 11e.(2) byproduct material wastes at the Facility that resulted from the *concentration* of uranium through the SX uranium *recovery* process is consistent with the definition of *concentration* and with its plain meaning in UMTRCA.

Moreover, there is abundant evidence that NRC explicitly contemplated that a *variety* of *concentration* and *purification* processes would result in the creation of 11e.(2) byproduct material. NRC's Final Generic Environmental Impact Statement on Uranium Milling (GEIS) assumes that wastes generated from the *concentration* of uranium are properly considered 11e.(2) byproduct material and must be disposed of in accordance with 10 C.F.R. Part 40, Appendix A. The Introduction to the GEIS states:

Conventional uranium milling as used herein refers to the milling of ores mined 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.

See U.S. Nuclear Regulatory Commission, Final GEIS on Uranium Milling, NUREG-0706, Vol. 1, 1-1 (Sept. 1980) (emphasis added). In discussing the evolution of modern conventional milling techniques, the GEIS envisions *concentration* of uranium as a milling process:

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

GEIS at 3-11. The GEIS also includes a diagram and an extensive explanation of milling processes. This generic description encompasses processes similar to SFC's *concentration* and *purification* processes. In fact, in one description of milling processes, the GEIS has a specific section entitled "*Concentration and Purification Processes*," which states:

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 . . .

GEIS at B-9 (emphasis added).

Thus, to the extent that SFC's *solvent extraction* process is primarily intended to further concentrate and purify source material from licensed source material *ore* concentrates, the wastes created as a result of such processing are 11e.(2) byproduct material.

2. SFC's Uranium Recovery Wastes Were Produced From Processing "Ore"
As That Term is Used in AEA Section 11e.(2)

The second element in the definition of 11e.(2) byproduct material requires that uranium be concentrated or extracted from "*ore*." As discussed below, the term "*ore*" is intended to be interpreted broadly under UMTRCA and the licensed source material *ore* concentrates processed by SFC fit squarely within the intended scope of that term.

One of Congress' central objectives in enacting UMTRCA was to amend the AEA to create a comprehensive program for regulating tailings and other wastes generated from uranium *ore* processing activities, during active milling operations and, in particular, after termination of such operations. Pub. Law No. 95-604 at 2(b)(2), 92 Stat. 3022. A key element of this program was the amendment of the definition of "byproduct material" to include the materials described in what is now Section 11e.(2) of the AEA. In particular, 11e.(2) byproduct material was defined to include wastes from processing *any ore primarily* for its source material content. By developing such a broad definition of 11e.(2) byproduct material, Congress sought to ensure that *all* wastes from NRC-licensed uranium milling operations (*i.e.*, uranium extraction and *concentration* activities) would be regulated under UMTRCA's comprehensive regulatory regime, including both radiological and non-radiological wastes from the extraction and

concentration of uranium at licensed *nuclear fuel-cycle* facilities. Thus, as NRC has noted,⁶ the D.C. Circuit has recognized that “a broad reading of the definition [of 11e.(2) byproduct material is] in line with Congressional expectations.” Specifically, in *Kerr McGee v. U.S. Nuclear Regulatory Comm’n*, the D.C. Circuit concluded that:

It is clear from this exchange [in the legislative history] that the definition of “byproduct material” proposed by [then NRC Chairman] Dr. Hendrie and adopted by Congress 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*.

Kerr McGee vs. U.S. Nuclear Regulatory Commission, 903 F.2d 1,7 (D.C. Cir. 1990) (emphasis added).

To achieve regulatory control over the broad range of wastes intended to be covered by the definition of 11e.(2) byproduct material, Congress had to ensure that an equally wide range of materials would qualify as *ore*, so that *all* wastes generated from processing such *ore primarily* to recover its source material content at a licensed *nuclear fuel cycle* facility would be covered under UMTRCA’s regulatory program. Thus, Congress defined 11e.(2) byproduct material as the tailings and wastes produced by the extraction of uranium at such a facility from *any ore*. As 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 [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.

57 Reg. at 20,532.

⁶ 57 Fed. Reg. 20525, 20532, col. 2 (May 13, 1993).

NRC further noted that:

Legislative history confirms the validity of a broad interpretation of the term "any ore." The definition of 11e.(2) byproduct material as originally presented in UMTRCA was:

The tailings or wastes produced by the extraction or *concentration* of uranium or thorium from any source material.

However, there was a concern that tailings resulting from the processing of *ore* containing less than 0.05 percent uranium (the minimum concentration that would still meet the definition of [licensable] source material) would fall outside the definition. To preclude that possibility, it was suggested that the words "any ore processed primarily for its source material content" be substituted for "any source material."

Id. (emphasis added).

Indeed, because 11e.(2) byproduct material is defined as being derived from processing *ore*, the concepts of *ore* and 11e.(2) byproduct material are inextricably interrelated under UMTRCA. As a result, NRC has defined the term *ore* broadly, as follows:

Ore is a natural or native matter that may be mined and treated for the extraction of any of its constituents or *any other matter* from which source material is extracted in a licensed uranium or thorium mill.

60 Fed. Reg. 49,296 (Sept. 22, 1995) (emphasis added).⁷

The definition of *unrefined* or *unprocessed ore* contained in 10 C.F.R. § 40.4 and the exemption for it contained in § 40.13 derive from the AEA and its legislative history wherein

⁷ Although this definition is framed in terms of material that is processed at a "licensed uranium or thorium mill," as the legislative history indicates, the definition of 11e.(2) byproduct material was in part designed to apply to, and distinguish between, wastes from *nuclear fuel cycle* facilities as opposed to wastes from non-fuel cycle facilities that had "*side-stream*" or *secondary* uranium recovery operations. In this regard it is significant that this definition of "*ore*" was developed in connection with NRC's Alternate Feed Policy, 60 Fed. Reg. 49,296 (Sept. 22, 1995), which was specifically intended to address the processing of alternate feed materials at licensed uranium mills.

Congress indicated that the Commission was not to have authority over uranium mining (*i.e.*, extraction of *unrefined or unprocessed ore*). As a result, natural *ore* (even if containing concentrations of uranium greater than the 0.05% *licensable* source material level set forth in § 40.4) only becomes subject to NRC jurisdiction when it arrives at a licensed uranium mill.⁸ Logically, therefore, an alternate feed that is not “*unrefined or unprocessed ore*” (*i.e.*, not *natural ore*) that is licensable because it contains greater than 0.05% source material would be a “*refined or processed ore*.”⁹ As demonstrated by recent amendments to IUC’s uranium mill license, an *alternate feed* (*i.e.*, *ore* that qualifies as *any other matter*) can be a waste from a non-fuel cycle facility that contains *licensable* levels of source material (*i.e.*, *licensed source material ore*) such as the feed material from Cabot Corporation (Amendment 4 to Source Material License SUA-1358 (Aug. 15, 1997)), that contained an average of 0.05 to 0.5 percent uranium; or, the feed materials from DOE's inventory of uranium process wastes called the Cotter Concentrates that contained as much as 27 percent uranium (Amendment 1 to Source Material License SUA – 1358 (April 2, 1997)).¹⁰ Further, as the Commission’s IUC decision referenced

⁸ Whether source material levels are greater or less than 0.05% uranium (and even before processing) *unrefined or unprocessed ore* becomes subject to NRC jurisdiction at a mill. See GEIS Vol. II at A-88.

⁹ Indeed, NRC has explicitly identified one type of “*refined or processed*” ore as follows:

Some mines have to be dewatered as the shafts or pits fill with ground-water. This water often contains dissolved constituents as a result of flow through and contact with ore bodies. It must therefore be treated before it can be discharged offsite. *Treatment is often via ion-exchange columns which concentrate high levels of uranium on resins or the eluate.* Several mills (Western Nuclear Inc., Split Rock, Wyoming, and Atlas Minerals Corp., Moab, Utah) have obtained license amendments and *processed these residues/wastes through the mill.*

The NRC staff approved the processing of these alternate feed materials, considering them to be refined and processed ore.

57 Fed. Reg. 20532, col. 1. (emphasis added).

¹⁰ Technically speaking the Cotter Concentrates were not licensed source material *ore* concentrates

Footnote continued on next page

above indicates, and the legislative history substantiates, wastes containing less than licensable source material levels (*i.e.*, less than 0.05% uranium) still can be an *ore* in the form of an alternate feed.¹¹

Therefore, it goes without saying that further concentrating and purifying licensed source material *ore* concentrates (*i.e.*, *refined or processed ore*) primarily for the source material content creates a waste stream that is 11e.(2) byproduct material, even if the licensed source material *ore* concentrates in the form of yellowcake normally contain higher levels of uranium (*i.e.*, 65 to 83 percent) than other licensed source material *ores* (*e.g.*, Cabot's 0.05-0.5 percent, or even the Cotter Concentrates' 27 percent).

Given Congress' and NRC's expressed intent to ensure regulatory oversight of *all* wastes from UR operations at licensed uranium mills, and, which in turn necessitates the broad interpretation of the word *ore*, it is not surprising that NRC's definition of uranium milling set forth in 10 C.F.R. § 40.4 is also extremely broad and does not limit milling processes only to *conventional* uranium mills. Section 40.4 states that: "*Uranium milling means any activity that results in the production of byproduct material as defined in this part.*" (Emphasis added). It

Footnote continued from previous page

because they were under DOE control and DOE is self-regulating under the AEA and, therefore, is not required to have a license. However, similar wastes from a licensed private sector facility containing such levels of source material would be licensed source material *ore* concentrates.

¹¹ Even 11e.(2) byproduct material effectively becomes a licensed *refined and processed ore* if reprocessed in a licensed uranium mill to remove uranium and the wastes from the reprocessing are 11e.(2) byproduct material. Congress explicitly contemplated the reprocessing of uranium mill tailings and NRC has recognized as much. See *Uranium Mill Facilities, Notice of Two Guidance Documents: Final Revised Guidance on the Disposal of Non-Atomic Energy Act of 1954, Section 11e.(2) Byproduct Material in Tailings Impoundments; Final Position and Guidance on the Use of Uranium Mill Feed Materials Other Than Natural Ores*, 60 Fed. Reg. 49, 296 (1995).

would seem that NRC consciously constructed this broad definition of milling to be consistent with the Staff's determinations that: (a) "the same tailings management and disposal criteria proposed for conventional mills should be applied to such activities" (*i.e.*, "heap leaching or the use of semi-portable milling equipment") at smaller or low-grade ore bodies located far from (or at least away from) *conventional* mill facilities (GEIS Vol. 1, p. 12-20, Vol. II, p. B-9); and (b) the underground leaching of uranium from an ore body at an *in situ* leach (ISL) uranium recovery facility is functionally "a form of processing that mirrors conventional milling, but does so underground." Memorandum from Howard K. Shapar, Executive Legal Director, NRC to Chairman Ahearne, NRC (April 28, 1980).¹² Thus, a milling process designed for further *concentration* and *purification* of uranium at a licensed fuel cycle facility other than a *conventional* mill satisfies the definition.

Again, this *broad* definition of milling is consistent with Congressional intent to interpret the definition of 11e.(2) byproduct material *broadly* to assure that *all* wastes from the extraction or *concentration* of source material *primarily* for its source material content in a licensed *nuclear fuel-cycle facility* will be subject to NRC jurisdiction. Moreover, as a practical matter, the similarities between the "conventional" milling process and SFC's *concentration* and *purification* processes are apparent upon comparing the two processes. Figure 1, (taken from

¹² This latest conclusion was recently reaffirmed in a letter to Ms. Katie Sweeney of NMA. The letter discusses the definition of "uranium milling" as "*any* activity that results in the production of byproduct material as defined in this part" with reference to "conventional" and "nonconventional" (*i.e.* ISL uranium recovery) "uranium milling" while noting, that "only facilities that conduct uranium milling" are subject to UMTRCA (*i.e.* create 11e.(2) byproduct material.) Secondly, according to the letter, a "non-fuel cycle UR operation . . . which does not generate 11e.(2) byproduct material, is not a milling activity according to the definitions." See Letter from Paul H. Lohaus, NRC to Katie Sweeney, NMA (Nov. 22, 2000) (emphasis added).

GEIS at 5-3), is a process flow diagram depicting a typical uranium mill utilizing an acid leach process. Figure 2 depicts the SFC uranium *ore concentration* and *purification* process. As can be seen by comparing these two flow diagrams, the SFC process is an acid leach process that utilizes SX technology to further concentrate and purify the source material from source material *ore* concentrates. The SFC process generates a raffinate waste stream, a recycled nitric acid stream, and a final dry uranium product.¹³

3. SFC Processed Uranium Ore Concentrates *Primarily* For Recovery of Uranium

The third and final element in the definition of 11e.(2) byproduct is that the *ore* must be processed *primarily* for its source material content. This element is easily satisfied by SFC, since the *sole* purpose, not just the *primary* purpose, for SFC's *concentration* and *purification* of licensed source material *ore* concentrates was to recover further concentrated and purified uranium from those concentrates.

In order to appreciate the purpose behind SFC's *concentration* and *purification* processes, it is important to understand that the concentration and purity of uranium found in the licensed source material *ore* concentrates delivered to SFC varied greatly, depending on where the material was originally milled. Specifically, *ore* concentrates received at the SFC facility historically ranged in uranium content from a low of about 65% uranium by weight to as high as 83%, depending upon the supplier. (As a comparison, pure U₃O₈ contains 84.8% uranium by

¹³ At a *conventional* mill, an alkaline or acidic solution is used to precipitate the uranium which when dried breaks down into uranium oxide product (*i.e.* yellowcake). At the SFC Facility, the front-end process used a nitric acid (rather than sulfuric acid) based solution which when dried resulted in a uranium oxide product (*i.e.* yellowcake). Like a *conventional* mill, SFC's front-end processing of the licensed source material *ore* concentrates by SX was *primarily* for the source material content.

weight.)¹⁴ Impurities, which made up the weight difference in the *ore* concentrates (up to about 20% in the worst material), had to be removed prior to *conversion* to UF₆ for two primary reasons. First, many of the impurities were low melting point salts that could cause plugging of the fluidized bed reactors used in the first two steps of the *conversion* process. Second, some of the impurities, if not removed, could follow the uranium through the process, resulting in out-of-specification UF₆ product. Thus, the purpose for the *concentration* and *purification* that occurred in the SX portion of the SFC Facility was essentially identical to that which occurred in the final *concentration* and *purification* processes at the more efficient uranium mills that supplied SFC with licensed source material uranium *ore* concentrates -- to create a high quality, "on-specification" product. Indeed, due to the variability in the quality of the feed stock, the uranium *concentration* activities that occurred in the SX circuit at SFC can appropriately be thought of as a necessary continuation of the milling process.¹⁵ *Importantly, if licensed source*

¹⁴ The Cotter Concentrates referenced above contained uranium concentrations as high as 27.44%.

¹⁵ When considering the classification of SFC's SX operations, it is useful, for comparison, to consider EPA's analysis of the line of demarcation between milling/beneficiation, versus processing/conversion/reduction in the context of the exemption of *beneficiation* wastes from the Resource Conservation and Recovery Act (RCRA) (42 U.S.C. § 6901 *et seq*) Subtitle C requirements as a result of the so-called Bevill Amendment, which exempted among other things "solid waste from the extraction, *beneficiation*, and processing of ores and minerals" from the definition of hazardous waste. 40 C.F.R. § 261.4(b)(7).

EPA has concluded that *concentration* and *purification* processes constitute *beneficiation*, not *processing* as those terms are defined under RCRA. Instead of regulating wastes resulting from extraction and *beneficiation* as Subtitle C hazardous wastes, EPA has indicated that these wastes should be regulated under Subtitle D of RCRA. *Id.* Under the RCRA scheme, however, *processing* wastes are treated differently than extraction and *beneficiation* wastes. Specifically, in June 1991, EPA issued a regulatory determination, *see* 56 Fed. Reg. 27300, stating that 20 specific types mineral processing wastes should not be treated as RCRA Subtitle C hazardous wastes; any mineral processing wastes not specifically included in the 20 wastes were to be treated as Subtitle C wastes. 54 Fed. Reg. 36592. Thus, EPA differentiates, for regulatory purposes, between *extraction* and *beneficiation* wastes (which are non-hazardous) and *processing* wastes (some of which are hazardous and some of which are non-hazardous).

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*material ore concentrates were sent to a conversion facility but contained too many impurities and were returned to the mill for further processing, no one could seriously question that the wastes from such reprocessing would be 11e.(2) byproduct material.*¹⁶ The fact that these milling processes occurred at the SFC facility rather than a *conventional* uranium mill does not alter that conclusion.

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EPA's regulation implementing the Bevill Amendment is set forth at 40 C.F.R. § 261.4(b)(7). Under section 261.4(b)(7), solid waste from the *beneficiation* of ores and minerals, including overburden from the mining of uranium ore, is exempt from regulation as hazardous waste. *Beneficiation* of ores and minerals is:

restricted to the following activities; crushing, grinding, washing, dissolution, crystallization, filtration, sorting, sizing, drying, sintering, pelletizing, briquetting, calcining to remove water and/or carbon dioxide; roasting, autoclaving, and/or chlorination in preparation for leaching (except where the roasting (and/or autoclaving and/or chlorination)/leaching sequence produces a final or intermediate product that does not undergo further beneficiation or processing); gravity concentration; magnetic separation; electrostatic separation; floatation; ion exchange; *solvent extraction*; electrowinning; precipitation; amalgamation; and heap, dump, vat, tank, and in situ leaching.

40 C.F.R. § 261.4(b)(7)(i). The 20 exempted processing wastes are identified in section 261.4(b)(7)(ii). Notably, even if not explicitly exempted by UMTRCA, uranium mill tailings are exempt from RCRA Subtitle C regulation under the above *beneficiation* definition. See U.S. EPA, *Technical Resources Document, Extraction and Beneficiation of Ores and Minerals, Volume 5, Uranium* (Jan. 1995) at 66 ("Uranium TRD"). Similarly, SFC's *concentration* and *purification* processes at the facility constitute *beneficiation* under the definition above, thus, wastes resulting from SFC's *concentration* and *purification* processes, like uranium mill tailings, are not subject to regulation as hazardous waste under Subtitle C of RCRA. Uranium TRD at 43-44. Nevertheless, as discussed in the following section, the wastes resulting from the SFC concentration processes are radiologically and chemically similar to wastes generated at a *conventional* uranium mill. We note that under the Bevill Amendment and implementing regulations, wastes resulting from *any sort of* further *beneficiation* process following *conversion* processes would not be exempt from RCRA Subtitle C regulation.

¹⁶ Approximately ten (10) percent of the ore concentrate that was stored at the SFC facility at the time of shutdown (approximately 2.5 million pounds of uranium) subsequently could not be processed at the Allied-Signal facility in Metropolis, Illinois because of impurity levels and/or excessive moisture. This material was sent to the CAMECO mill in Blind River, Ontario to be reprocessed. The wastes resulting from that reprocessing at a *conventional* mill in the United States would be sent to the mill's tailings pond as 11e.(2) byproduct material.

Moreover, the fact that previously the Facility had not been divided up into different licensing categories (*i.e.*, *concentration/purification vs. conversion/reduction*) for purposes of identifying 11e.(2) wastes presents no impediment to doing so now. At various times, fuel cycle facilities, including SFC's, can have multiple licenses or multiple license conditions for different types of AEA materials to which different regulatory standards apply. For example, SFC held a Byproduct Materials License (No. 35-12636-03) from August 24, 1989 until September 11, 1995, for the radioactive sources and calibration instruments used in its environmental laboratory, and over 40 "conditions" were added to SFC's license over the operating history of the plant. In addition, NRC has traditionally licensed portions of non-fuel cycle facilities and/or specific types of materials at such facilities while leaving other portions of the facilities and other types of materials unlicensed. (*See e.g.*, *Cabot Industries*, SMB-920, NRC Dkt. No. 40-6940, and SMB 1562 NRC Dkt. No. 40-9027; *Heritage Minerals Inc.*, SMB 1541, NRC Dkt. No. 40-8980.). Therefore, there is ample precedent for differentiating between wastes from different portions of a fully licensed fuel-cycle facility, as is proposed now by SFC.

C. SFC Wastes are Physically, Chemically, and Radiologically Similar to "Traditional" Mill Tailings

Designating SFC's uranium recovery wastes as 11e.(2) byproduct material is appropriate primarily because those wastes satisfy the definition of 11e.(2) byproduct material, as just discussed, but also as a practical matter because the relevant SFC materials are, in all important respects except for the volume, quite *similar* to tailings generated at *conventional* uranium mills. The wastes generated from the processes at the SFC facility involving the *concentration* and *purification* of uranium from licensed source material *ore* concentrates processed *primarily* for their source material content (*i.e.*, the 11e.(2) byproduct material wastes at the Facility), include

the raffinate wastes resulting from processing *ore* through the SX process which are similar to the slimes component of *conventional* uranium mill tailings. Other 11e.(2) wastes include contaminated soils from source material *ore* concentrate spills, which along with windblown tailings present in surface soils, are a typical component of 11e.(2) wastes at *conventional* mills, and any equipment used in the SX processes that cannot be adequately decontaminated.¹⁷ For example, the primary waste stream from the SFC uranium *concentration* and *purification*

¹⁷ See GEIS at B-11-14 for a description of typical *conventional* mill tailings, and EPA's Uranium TRD similarly describes wastes generated by *conventional* mills:

Most wastes generated by conventional mills are disposed of in tailings impoundments. Wastes are primarily disposed of in the form of a slurry composed of tailings, gangue (including dissolved base metals), spent beneficiation solutions, and process water bearing carbonate complexes (alkaline leaching) and sulfuric acid (acid leaching), sodium, manganese, and iron. The characteristics of this waste vary greatly, depending on the ore, the beneficiation procedure, and the source of the water (fresh or recycled). The liquid component is usually decanted and recirculated to the crushing/grinding or leaching circuit.

Tailings typically consist of two fractions, sands and slimes. The sand and slimes may be combined and deposited directly in the impoundment or may be distributed through a cyclone such that the sand fraction is directed toward the dam while the slimes are directed to the interior of the pond (Merritt, 1971).

The fate of radionuclides is of special interest in uranium mill tailings. Radium-226 and thorium-230 are the principal constituents of concern and are associated with the slime fraction of the tailings. Radon-222 (gas) is also a tailings constituent. The concentrations of radionuclides in the tails will vary depending on the leach method used (thorium is more soluble in acid than alkaline leaches); typically, tailings will contain between 50 and 86 percent of the original radioactivity of the ores depending on the proportion of radon lost during the operation (Merritt, 1971). Other tailings constituents (including metals, sulfates, carbonates, nitrates, and organic solvents) would also be present in the tailings impoundment depending on the type of ore, beneficiation methods, and waste management techniques. (For updated information on specific hazardous constituents, see 60 *Federal Register* 2854, January 11, 1995, which is attached in Appendix C).

Uranium TRD at 43-44. Moreover, sludges and resin beads, which are not like raw ore or waste rock, that are byproducts of the *in situ* leach UR process are classified as 11e.(2) byproduct material by NRC.

processes was the raffinate stream from the SX line. Like the raffinate stream from an acid-leach mill, this stream was an acidic aqueous stream containing the impurities that were removed from the licensed source material *ore* concentrates. The stream was neutralized with anhydrous ammonia in a lined holding pond, causing the impurities to precipitate out as a sludge that resembles the slimes from a *conventional* milling acid-leach process. The sludge is composed of complexes of various metals, natural uranium, radium-226 and thorium-230 in a clay-like matrix consisting of particles, most of which will pass a 200-Mesh screen. Table 2, Constituent Concentrations in SFC Soils and Sludges Versus Mill Tailings, provides a summary comparison. The uranium and thorium-230 concentrations in SFC's raffinate sludge are somewhat higher than typical slimes from conventional uranium mills, while the radium-226 concentration is roughly the same as in such slimes. This is due to the fact that most of the other impurities were removed at the conventional mills and wound up in their slimes streams. Also, most mills were very effective at separating radium-226 from the uranium, so a much smaller relative amount of radium wound up in the licensed source material *ore* concentrates that SFC used for feed. Thus, the wastes resulting from the SFC *concentration* processes are radiologically and chemically *similar* to wastes generated at a *conventional* uranium mill, although the volume is considerably smaller.

All wastes from processing *primarily* for uranium at a *conventional* mill are 11e.(2) byproduct material including both radiological and non-radiological components (which may include hazardous components in the tailings and mill components such as pipes, vats, *etc.*) and

are exempt from RCRA.¹⁸ Thus, it is important to recognize that while typical *conventional* mill tailings contain large sand fractions from ore crushing, 11e.(2) byproduct material includes *any and all* wastes from primary uranium recovery operations such as those at ISL uranium recovery facilities that do not generate any sand tailings.

V. BENEFITS OF DESIGNATING SFC CONCENTRATION AND PURIFICATION WASTE MATERIALS AS 11E.(2) BYPRODUCT MATERIAL

Designating the waste materials from SFC's *concentration* and *purification* processes as 11e.(2) byproduct material provides significant benefits to NRC, the State of Oklahoma, SFC, and the general public.

First, as stated above, 77% by volume of and 92% of the radionuclide inventory in the wastes at the SFC facility result from the *concentration* and *purification uranium recovery* processes,¹⁹ therefore, the long-term oversight and disposal requirements for the dominant portion of the waste at the SFC site will be controlled by the well-understood and workable

¹⁸ See Memorandum from Paul H. Lohaus, Chief, Operations Branch, Div. Of Low Level Waste Management and Decommissioning, NRC to NRC UR Licensees at 1 (March 15, 1989):

All tailings and wastes included in this definition [of 11e.(2) byproduct material], such as process fluids and nonradioactive ore residues, are thus byproduct material. Wastes from the decommissioning of buildings and equipment whose primary function was to conduct the extraction or concentration of uranium or thorium from ore processed primarily for its source material content, are considered to be byproduct material. These byproduct material wastes generated by uranium recovery licensees are not mixed wastes and are not subject to EPA regulation under RCRA.

(Emphasis added).

¹⁹ Designating the wastes as 11e.(2) byproduct material will result in the re-classification of approximately 77% of the wastes on-site, which are comprised of *all* wastes (both radiological and non-radiological) resulting from the *concentration* and *purification* processes, *i.e.*, the raffinate and sludges, the SX circuit equipment, the uranium and thorium spills in soil, raffinate sludges and liners, and contaminants in the groundwater (except arsenic). Arsenic in the site groundwater is suspected to originate from arsenic-bearing sludges formed during the production of fluorine gas which was used in the *conversion* process, and therefore, may need to be addressed outside of the 11e.(2) context.

criteria contained in 10 C.F.R. Part 40, Appendix A. Site cleanup and disposal of the 11e.(2) material would no longer be subject to 10 C.F.R. § 20.1401, *et seq.*, cleanup standards which are new to NRC staff and licensees, and the guidance for which in many respects is not yet final. Disputes about on-site or off-site disposal will no longer be an issue. For example, site closure issues, such as whether the entire site should be released for unrestricted use, which has been the subject of a dispute between the State of Oklahoma and SFC, would be resolved. When the wastes are designated as 11e.(2) byproduct material and Appendix A applies, the majority of the site could be cleaned up to satisfy the soil cleanup standards in Criterion 6 and based on satisfying such standards could be released for unrestricted use. The waste disposal cell, however, would be subject to the 1,000 year closure requirement set forth in Criterion 6 (which assumes over-designed “*passive*” controls and no “*active*” maintenance), and would have to be transferred with any other property necessary for disposal of byproduct material (*i.e.*, any diversion ditches, access roads or land necessary for groundwater corrective action) to a long-term governmental custodian licensed in perpetuity by NRC.²⁰

A second benefit of designating the predominant waste stream as 11e.(2) byproduct material is that to the extent necessary, SFC and NRC would be granted more flexibility with respect to achieving the remediation of radioactive and non-radioactive constituents in groundwater. Specifically, 10 C.F.R. Part 40, Appendix A, Criterion 5D requires the creation of a corrective action plan the “*objective* of [which] is to return hazardous constituent concentration

²⁰ We note that SFC plans to stabilize the raffinate with coal ash, which along with contaminated soils will assure better long-term stability of the impoundment. Typical *conventional* mill tailings contain huge volumes of water that must be removed to demonstrate 90% compaction so that the long term covers will not be jeopardized by future differential settlement. SFC’s proposed approach effectively mirrors *waste form* considerations such as those in 10 C.F.R. Part 61 or in the Envirocare 11e.(2) byproduct material license.

levels in groundwater to the concentration limits set as standards.” (Emphasis added). In case a licensee cannot meet the *objectives* that were developed pursuant to the Appendix A requirements, the Appendix A criteria explicitly provide alternatives that can be used to satisfy the goal of *reasonable assurance* of protection of public health, safety and the environment. The Commission may exclude a particular constituent from the set of objectives on “a site specific basis if it finds that the constituent is not capable of posing a substantial present or potential hazard to human health or the environment.”²¹ *Id.* at Criterion 5B(3). Another option is for the licensee to propose alternate concentration limits (ACL’s) that present no substantial hazard where the constituent levels are such that the limits that might otherwise apply “may not be *practically achievable* at a specific site.” *Id.* at Criterion 5B(6) (emphasis added).

Yet another option is for the licensee to “propose” *alternatives* to any requirement in Appendix A. *See* 10 C.F.R. Part 40, Appendix A, Introduction; Atomic Energy Act § 84c. Here, where the wastes are designated 11e.(2) byproduct material thereby rendering Appendix A applicable, SFC would either have to show that site groundwater meets the specific requirements of Appendix A or propose site specific ACL’s or other *alternatives* that are ALARA, and, after considering practicable corrective actions, ensure that constituents of concern will not pose a substantial present or potential hazard to human health or the environment, in accordance with the provisions of the AEA and Criterion 5B(6). Any ACL’s or other *alternatives* that are submitted and approved by NRC could have the important effect of determining the size and shape of that portion of the site property that will be required to be transferred to the long-term

²¹ This could be done by restricting access to groundwater within the property turned over to the long term custodian such that public health, safety and the environment are protected at the potential points of public exposure outside of the boundary under control of the long-term governmental custodian. It could also be done by restricting use of the groundwater by covenants or easements that run with the title to the property (e.g., “Drilling of domestic water wells

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governmental custodian. The ability to exclude particular constituents and utilize ACL's or *alternatives* will provide SFC, NRC and the State with the significant flexibility to permit the site to be closed while ensuring adequate protection of public health and safety.

As noted above, a third significant benefit of designating the wastes as 11e.(2) byproduct material is the statutorily and regulatory mandated long-term governmental custodian for the site. As mandated by UMTRCA, title to the wastes and land necessary for the disposal of the 11e.(2) byproduct material must be transferred to the U.S. Department of Energy or to the State at its option. Moreover, the disposal cell for the 11e.(2) wastes would have to be designed to permanently isolate the wastes such that *active* maintenance would be unnecessary and to provide *reasonable assurance* of the control of radiation hazards for 1,000 years, to the extent reasonably achievable, and in any case for at least 200 years.

The fourth benefit is a clearly defined radiation protection standard for radon emissions (designated the primary public health threat from 11e.(2) byproduct material) from the disposal cell that, when satisfied, EPA has stated unequivocally provides *an ample margin of safety for the protection of public health*. See 58 Fed. Reg. 32174 (June 8, 1993). Satisfaction of the 20 pCi/m²/s radon emission standard is, therefore, by definition safe and should alleviate the concerns of the State and members of the local public. Modeling of radon emissions from the SFC cell at 10,000 years (peak radon emission point), indicates that actual emissions will be more than a factor of ten (10) lower than the standard.

Finally, the fact that § 83 of UMTRCA requires that transfer of 11e.(2) byproduct material and any property necessary for byproduct disposal be accomplished at no cost to the

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is not permitted. Groundwater may be used for irrigation and/or stock-watering only.”).

government provides additional benefits. First, Criterion 10 assures that adequate funds will be available for long-term surveillance costs (\$250,000 in 1978 dollars or approximately \$670,000), and a negotiated amount of additional funding if any *active* maintenance is expected. Second, the fact that normally the only long-term funding that *actually* is remitted to the government is solely for surveillance should provide additional comfort to the State and the local public because it indicates that the design requirements for 11e.(2) disposal cells are ultra-conservative and, therefore, provide the necessary *reasonable assurance* that public health, safety and the environment will be protected. Thus, SFC would be required to pay the minimum of \$250,000 (in 1978 dollars), to the U.S. Treasury or appropriate State agency, prior to license termination for long-term surveillance costs and perhaps more if any “*active*” maintenance (*i.e.*, fences, vegetation control and ground water monitoring) is contemplated due to site specific circumstances.

VI. THE SEPARATE *CONVERSION/REDUCTION* WASTES COULD, WITH NRC’S AND DOE’S APPROVAL, BE DISPOSED WITH THE 11E.(2) WASTES UNDER NRC’S *NON-11E.(2)* DISPOSAL POLICY AND/OR DOE SHOULD TAKE THE *NON-11E.(E)* WASTES UNDER SECTION 151(B) OF THE NUCLEAR WASTE POLICY ACT

In addition to providing for long term control and custodianship of the 11e.(2) byproduct material that comprises approximately 77% by volume of and 92% of the radionuclide inventory in the wastes at the SFC site, as described above, the license amendment could also form the centerpiece of a broader strategy for achieving long-term stabilization, isolation and control over the remaining radiological wastes on site. Specifically, if an 11e.(2) disposal facility is authorized pursuant to the proposed license amendment, with NRC’s and DOE’s approval, UF₆ *conversion* wastes and DUF₄ reduction wastes remaining at the SFC site could be also disposed of in the 11e.(2) facility pursuant to NRC’s *Non-11e.(2)* Disposal Policy, 60 Fed. Reg. 49,296

(1995) and/or DOE should accept title to and custody of the *conversion/reduction non-11e.(2)* wastes under section 151(b) of the Nuclear Waste Policy Act (NWPA), 42 U.S.C. § 10101 *et seq.*, because the criteria for DOE to take title and custody under that act will be satisfied.

A. The *Conversion/Reduction* Wastes Can Be Disposed Of With The 11e.(2) Wastes Under NRC's *Non-11e.(2)* Disposal Policy

Under the current *Non-11e.(2)* Disposal Policy,²² NRC may permit *non-11e.(2)* waste containing *source material* to be disposed in an 11e.(2) disposal facility provided that the following criteria are satisfied:

- The material is not subject to regulation as hazardous waste under RCRA and does not contain materials regulated under other federal authorities such as the Toxic Substances Control Act (TSCA).
- Disposal of the material would not implicate concerns under the Comprehensive Environmental Response, Compensation, and Liability Act, (CERCLA).
- There would be no significant environmental impact from disposal of the material.
- Disposal of the material would be accomplished in a manner that satisfies the criteria in 10 C.F.R. Part 40, Appendix A.

²² SFC notes that NRC's current *Non-11e.(2)* Policy discussed herein is presently being revisited by the agency in the context of a new 10 C.F.R. Part 41 rulemaking. Specifically, in the Commission's recently issued Regulatory Issue Summary ("RIS"), it states, among other things, that the NRC staff should remove the prohibition against the disposal of CERCLA, TSCA, and RCRA wastes in 11e.(2) byproduct material licensed impoundments. While SFC's materials do not contain such wastes, it is notable that the Commission is considering extending yet again the types of *non-11e.(2)* wastes that can be disposed safely in 11e.(2) impoundments. See NRC Regulatory Issue Summary 2000-23 Recent Changes to Uranium Recovery Policy (Nov. 30, 1998), at (<http://www.nrc.gov/NRC/GENACT/GC/RI/2000/ri00023.html>).

- The relevant Regional Low Level Waste Compact(s) approve of the disposal.
- DOE commits to take title to the disposal facility after closure.
- 10 C.F.R. Part 61 Waiver.

The *conversion/reduction* wastes would satisfy all of these criteria.

First, there are no constituents in the *non-11e.(2)* byproduct material *conversion/reduction* wastes that would be placed in the on-site disposal cell that would cause these wastes to be regulated under RCRA (including specifically *listed* hazardous wastes), TSCA or any other federal environmental statutes.²³

Second, disposal of the *conversion/reduction* wastes would not implicate any CERCLA concerns. The wastes are not now regulated as CERCLA wastes, and even if they were, their disposal on site would be eligible for the CERCLA on-site remediation exemption. *See* 42 U.S.C. § 9621(e)(1). Moreover, because the SFC facility is licensed by NRC it is not subject to listing on the NPL. *See* 48 Fed. Reg. 40658, 40681 (Sept. 8, 1983).

Third, most of the *non-11e.(2)* *conversion/reduction* wastes are physically, chemically, and radiologically *similar* to 11e.(2) byproduct material in general, and they are similar to, and in some cases virtually identical to, SFC's *concentration* and *purification* wastes. For example, the buildings, structures, and equipment utilized in the *conversion/reduction* processes and the soils contaminated by the *conversion/reduction* activities, which make-up 65% of the *non-11e.(2)* waste volume, are impacted with varying levels of natural or depleted uranium and are thus

²³ Under a RCRA Consent Order signed in 1993, SFC completed a RCRA Facility Investigation of the Facility. The Final RFI Report, approved by EPA Region VI, concludes that there were no RCRA constituents in the *non-11e.(2)* wastes at levels that would cause the wastes to become RCRA *characteristic* hazardous waste, nor were there any

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nearly identical to the *concentration* and *purification* wastes. The calcium fluoride sludge waste, which makes up the remaining 35% of the *non-11e.(2)* waste, although containing calcium which is not found in the *concentration* and *purification* wastes, is radiologically less active than the front-end wastes, is even more physically stable, contains less heavy metals, and therefore, will not result in significant incremental environmental impact when disposed of with the other wastes.²⁴

This similarity and stability of the materials is significant. Specifically, the criteria for 11e.(2) disposal facilities set out in Appendix A are designed to provide *reasonable assurance* that human health and the environment will be adequately protected from both the radiological *and* non-radiological hazards associated with 11e.(2) byproduct material. The high degree of similarity between the SFC *conversion/reduction* wastes and the SFC 11e.(2) byproduct material ensures that disposal of the *conversion/reduction* wastes in an 11e.(2) disposal facility that complies with Appendix A will protect human health and the environment with an *ample margin of safety*. In short, because the *conversion/reduction* wastes are so *similar* to the *concentration/purification* 11e.(2) byproduct material, there will be no significant *incremental* impact to human health and the environment resulting from the disposal of *conversion/reduction* wastes in an SFC's 11e.(2) byproduct material impoundment.

Fourth, again, given the similarity of the *conversion/reduction* wastes, the fact that they are less radioactive (particularly with respect to radon emissions) and, in the treated form, are

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listed hazardous wastes or TSCA wastes present.

²⁴ The *conversion/reduction* wastes will add about 8% to the radionuclide inventory in the disposal cell and will contribute about 3% to the peak radon exhalation rate.

Plan, Appendix B) they can be disposed in a manner that satisfies the reclamation and closure criteria of Part 40, Appendix A.

Fifth, because *non-11e.(2)* byproduct material would otherwise be regulated as low-level radioactive waste by NRC or Agreement States, typically a licensee must obtain approval for the disposal of such material by the regional low-level waste compact in whose jurisdiction the wastes originates as well as approval by the compact in whose jurisdiction the wastes will be disposed. Here, approval to dispose of *conversion/reduction* wastes on-site by the relevant low-level waste compact(s) would not be necessary because the materials are not being sent off-site much less out of State for disposal.

Sixth, DOE (or the State) where *non-11e.(2)* material is to be disposed in a licensed 11e.(2) facility must be informed of NRC's findings and proposed approval to dispose of *non-11e.(2)* byproduct material. A concurrence and commitment from DOE (or the State) to take title to the tailings impoundment after closure must be received before granting a license amendment to permit such disposal. As discussed below, DOE should be willing to accept title to and custody of the site after the NRC approved closure is completed.

Seventh, to formally obtain NRC authorization for the disposal, SFC must amend its license under 10 C.F.R. Part 40 and must obtain an exemption to the requirements of 10 C.F.R. § 61.6 - - license for land disposal of radioactive waste. This should not pose a concern at the SFC Facility because Oklahoma is not an Agreement State for Part 61 purposes. Moreover, in the RIS, the Commission directs NRC staff to pursue a generic exemption to this requirement in the context of the Part 41 rulemaking. RIS at 3. While no generic exemption is yet in effect, the Commission's intent to waive this requirement is certainly clear from the RIS.

Accordingly, the *conversion/reduction* wastes at the SFC Facility can be disposed of as *non-11e.(2)* byproduct material along with the 11e.(2) byproduct material in an on-site tailings impoundment under NRC's *Non-11e.(2)* Policy.

B. Section 151(b) Criteria for DOE To Take Title To and Custody Of *Conversion/Reduction* Wastes Will Be Satisfied

DOE should accept title to and custody of the SFC disposal facility following license termination where the 11e.(2) byproduct material and *conversion/reduction non-11e.(2)* byproduct material wastes are disposed on-site because the section 151(b) criteria will be satisfied.

As discussed above, under UMTRCA, DOE is *required* to take title to and custody of 11e.(2) byproduct material following license termination. Under the NWPAA however, DOE has the *discretion* to accept title to and custody of AEA wastes other than 11e.(2) byproduct material. Specifically, under section 151(b) of the NWPAA, DOE has the authority to accept title to and custody of AEA wastes (including *non-11e.(2)* byproduct material), provided that: (i) NRC requirements for site closure are satisfied; (ii) the transfer of title and custody to DOE is without cost to the Federal government; and (iii) Federal ownership and management of the site is necessary or desirable to protect public health and safety and the environment. 42 U.S.C. § 10171(b).²⁵

²⁵ Prior to the adoption of the NWPAA, and in conjunction with NRC's original *non-11e.(2)* policy, DOE indicated to NRC that it would accept title to sites where 11e.(2) byproduct material and *non-11e.(2)* material were disposed. See 57 Fed. Reg. 20,525, 20,528 (1992). Specifically, DOE indicated that it would accept title to sites where *non-11e.(2)* byproduct material was disposed if (1) no adverse environmental impact would result from the disposal, and (2) there are no outstanding environmental compliance issues under RCRA or CERCLA. *Id.* SFC disposal of the *conversion/reduction* wastes meets the standards set forth in the original guidance, the current guidance and if changed pursuant to the RIS, the new guidance, as well as the standards contained in the NWPAA.

UMTRCA's statutory and regulatory license criteria almost by definition will satisfy the section 151(b) criteria at the SFC facility, so DOE should accept title to and custody of the *conversion/reduction non-11e.(2)* byproduct material wastes following license termination. First, NRC requirements for site closure must be satisfied before any 11e.(2) or for the matter other type of AEA license is terminated²⁶ and DOE will not take title to the site until the license is terminated. These requirements ensure that DOE will only take title to and responsibility for a site that meets NRC's site closure requirements. Further, the final SFC site closure plan has not yet been prepared and if deemed necessary by NRC or DOE, can specifically include consideration of the disposal of the *non-11e.(2)* wastes.

Second, SFC will increase the funds transferred to the government under 10 C.F.R. Part 40, Appendix A, Criteria 10 to ensure that the requirement in section 83 of UMTRCA - - that title transfer must occur at no cost to the government - - is satisfied, thereby satisfying the section 151(b) requirement that the transfer of the *non-11e.(2)* wastes must be at no cost to the government.

Finally, since (i) the portions of site necessary for disposal of 11e.(2) byproduct disposal represents 77% by volume of the wastes at the site, (ii) the *non-11e.(2)* material is so *similar* to the 11e.(2) material and will generate less radon emissions, (iii) the potential risk of public exposure from transportation accidents in the event of off-site disposal will be avoided, (iv) the site will be subject to the extremely conservative controls for *conventional* uranium mill tailings impoundments including the 1000 year design requirement with no *active* maintenance *conventional* uranium pursuant to the Appendix A criteria, and (vi) a licensed governmental

²⁶ NRC requirements include its acceptance and approval of a long-term surveillance plan (LTSP)
Footnote continued on next page

custodian will be present in perpetuity, the final criteria of section 151(b) of the NWPA is satisfied.

Accordingly, factually, legally and policy-wise this represents an appropriate case for DOE to take title to and custody of *non-11e.(2)* byproduct material wastes under section 151(b) of the NWPA.

VII. CONCLUSION

The Commission should classify SFC's *concentration* and *purification* wastes as 11e.(2) byproduct material. To the extent that designating the wastes from the *concentration* and *purification* processes as 11e.(2) byproduct material is a departure from the manner in which the wastes have been viewed in the past, it is important to keep in mind that the past characterization was based on licensee and agency interpretations regarding *conversion plants/facilities* versus *conventional* uranium mills which "are not 'carved in stone' but rather must be subject to re-evaluation of their wisdom on a continuing bases." *Kansas Gas & Elec. Co.*, (Wolf Creek Generating Station, Unit 1), 49 NRC 441, 460 (1999) (referencing *Chevron U.S.A., Inc. v. Natural Resources Defense Council, Inc.*, 467 U.S. 837, 863-64). The agency is free to choose a new interpretation which may "represent a sharp shift from prior agency views or pronouncements," see *In the Matter of International Uranium (USA) Corp.*, slip op. at 15, so long as the agency gives "adequate reasons for changing course." *Envirocare of Utah v. NRC*, 194 F.3d 72, _____. This should be particularly true here, since no final decisions have been made by the licensee or NRC regarding site closure and subsequent license termination. Thus, NRC

Footnote continued from previous page
submitted by DOE (or the State) pursuant to 40 C.F.R. § 40.28.

should consider waste designation on a *process/operations* basis rather than on a “*facility/plant*” basis. Notably, only an “informal” opinion premised on a “*facility/plant*” approach was offered by NRC in the past. SFC notes that the prime focus of UMTRCA regarding 11e.(2) wastes is to address and assure long term control which is precisely the stage SFC has now reached under its license. The plain meaning of the definition of 11e.(2) byproduct material, the legislative history of the Act, and the policy reasons elaborated above, all support the designation of the front-end uranium recovery *concentration* and *purification* process waste materials as 11e.(2) byproduct material.

For the foregoing reasons, the NRC should approve an amendment to Source Material License SUB-1010 to authorize the handling and disposal of byproduct material. Such an amendment will permit SFC to dispose of 77% by volume and 92% of the radionuclide of the wastes located at the Gore, Oklahoma Facility in a manner that ensures adequate protection of public health and safety and that is cost-effective. Granting SFC a license amendment to dispose of 11e.(2) byproduct material paves the way for disposal of the non-11e.(2) AEA wastes at the site under NRC’s Non-11e.(2) Policy and/or section 151(b) of the NWPA under circumstances that factually, legally and policy-wise could hardly represent a better initial case for NRC and DOE (or the State.).

Table 1 - Summary of Waste Material Volume and Activity Estimates

Material	Volume - ft ³ Total	% 11.e.2 Waste	Volume - ft ³ 11.e.2 Waste	U - CI	U - CI 11.e.2 Waste	Re-226 CI Total	Re-226 CI 11.e.2	Th-230 CI Total	Th-230 CI 11.e.2	Total CI	CI 11.e.2
Soils >40 µgmU/gn	3,574,000	90 % ¹	3,216,600	44.8	40.3	0	0	0	0	44.8	40.3
Buildings, Equipment, Concrete	1,080,455	50 % ²	540,227	16.4	8.2	0	0	0	0	16.4	8.2
Calcium Fluoride Sludge	625,280	0 % ³	0	4.67	0	.011	0	1.5	0	6.18	0
CaF2 Basin Clay Liners	95,285	0 % ³	0	0.06	0	0	0	0	0	0.06	0
Raffinate Sludge	1,000,000	100 % ⁴	1,000,000	38.3	38.3	1.00	1.00	145.0	145.0	184.3	184.3
Scrap Metal	100,000	50 % ²	50,000	0.15	0.08	0	0	0	0	0.15	0.08
Pond 2 Residual	749,000	100 % ⁴	749,000	10.8	10.8	1.60	1.6	48.0	48	60.4	60.4
Solid Waste Burials	51,100	50 % ²	25,550	0.68	0.34	0	0	0	0	0.68	0.4
Pond 1 Spoils Pile	437,400	100 % ⁴	437,400	0.11	0.11	.05	.05	1.0	1.0	1.15	1.15
Interim Soils Storage Cell	140,950	50 % ³	70,475	2.89	1.45	0	0	0	0	2.89	1.45
Pond 3E and 4 Clay Liner	219,100	100 % ⁴	219,100	0.07	0.07	0	0	0.1	0.1	0.17	0.17
Clarifier Clay Liners	332,400	100 % ⁴	332,400	0.47	0.47	0.01	0.01	1.2	1.2	1.68	1.68
Drummed Contaminated Trash ⁽⁵⁾	6,250	50 % ²	3,125	0.38	0.19	0	0	0	0	0.38	0.19
Empty Drums (crushed)	2,000	100 % ⁶	2,000	0.02	0.02	0	0	0	0	0.02	0.02
Sanitary Lagoon Sludge	10,365	100 % ⁷	10,365	1.14	1.14	.01	0.01	0.5	0.5	1.65	1.65
Sanitary Lagoon Soil	56,356	100 % ⁷	56,356	0.08	0.08	0	0	0	0	0.08	0.08
Chipped Pallets	3,000	100 % ⁶	3,000	0	0	0	0	0	0	0	0
Emergency Basin Sediment	14,600	25 % ⁸	3,650	0.52	0.13	.12	0.03	4.7	1.17	5.34	1.33
Emergency Basin Soil	162,500	25 % ⁸	40,625	1.46	0.37	0	0	0	0	1.46	0.37
North Ditch Sediment	20,770	25 % ⁸	5,192	1.41	0.35	0.03	0.01	0.1	0.03	1.54	0.39
North Ditch Soil	87,500	25 % ⁸	21,875	0.48	0.12	0	0	0	0	0.48	0.12
Totals	8,768,308	n/a	6,786,940	124.89	104.52	2.83	2.71	202.1	197	329.81	304.28
% 11.e.2 Material			77 %		84%		96 %		97 %		92%

Notes for Table 1

Note 1 – This percentage is based on the fact that majority of the soil contamination is due to handling yellowcake, empty yellowcake drums and spills from the purification portion of the process. The 1986 rupture of a loaded UF6 product cylinder and routine releases from the facility vents contributed the balance of the soil contamination.

Note 2 – This percentage is a rough estimate of the volume of demolition wastes from the facilities, structures and equipment utilized in the ore concentrate handling and purification activities.

Note 3 – This percentage is based on the fact that all the wastes in these categories resulted from the chemical conversion steps in the process.

Note 4 – All materials identified by this note are the result of handling and storing raffinate sludge.

Note 5 – The interim soil storage cell contains contaminated soils collected following the 1986 accidental release of UF6, soils from excavations in the solvent extraction yard (purification system) and other materials from the handling and purification of ore concentrates.

Note 7 – Most of the uranium ore concentrate delivered to the site was shipped in palletized 55-gallon drums.

Note 7 - The Sanitary Lagoon was contaminated from spills associated with the purification process.

Note 8 – These two areas received wash-downs from the cleanup following the 1986 accident. In addition, they were used temporarily to store raffinate sludge.

“0” values generally mean radionuclide content is at or slightly above natural background

TABLE 2
 CONSTITUENT CONCENTRATIONS IN SFC SOILS AND SLUDGES VERSUS MILL TAILINGS

Constituent	SFC Raffinate Sludge ^a	SFC Soils ^a	Average Inactive U Mill Tailings ^b	"Typical" Soil ^b
Uranium (pCi/g)	2,500 - 19,200 Avg - 8990	<0.67 - 1,548	38 - 380	0.75
Th-230 (pCi/g)	2,930 - 48,200 Avg - 23,030	0.1 - 6.4	340 - 1,000	0.38
Ra-226 (pCi/g)	<14 - 190 Avg - 118	0.1 - 1.2	340 - 1,000	1.5
Arsenic (µg/g)	17.3 - 1,350	<10 - 27.9	0.8 - 254	6
Barium (µg/g)	13.9 - 2,750	26.5 - 262	18 - 3,860	500
Cadmium (µg/g)	<0.7	<0.7 - 5.6	0.07 - 8.7	0.06
Chromium (µg/g)	15.2 - 259	5.2 - 32.7	1 - 2,030	100
Copper (µg/g)	14.8 - 794	2.6 - 71.4	3 - 1,160	20
Iron (µg/g)	1,060 - 58,000	6,680 - 45,400	90 - 213,000	38,000
Lead (µg/g)	<10 - 515	<10 - 129	2.5 - 3,060	10
Mercury (µg/g)	0.02 - 0.34	<0.01 - 0.05	0.001 - 109	0.03
Selenium (µg/g)	<10 - 87.2	<10	0.2 - 391	0.2
Silver (µg/g)	<0.6 - 65.5	<0.6	0.03 - 3.8	0.1
Vanadium (µg/g)	<0.6 - 3,950	10.2 - 43.6	80 - 3,990	100
Zinc (µg/g)	<0.5 - 579	<0.5 - 150	17 - 359	50

^a Results obtained during SFC Site Characterization and RCRA Facility Investigation activities, and reported in the subsequent results reports.

^b Data provided for the average inactive mill tailings column represent the range in average concentrations measured at each of 19 tailings piles. Thorium-230 activity concentration is assumed to be the same as radium-226 activity concentration. Data from Table 3-2 and EPA-520/4-82-013-1, "Final Environmental Impact Statement for Remedial Action Standards for Inactive Uranium Processing Sites (40CFR192)", Volume I, (Final Report), Office of Radiation Programs, Washington D.C., October, 1982.

FIGURE 1 –PROCESS FLOW DIAGRAM
TYPICAL ACID-LEACH URANIUM MILL

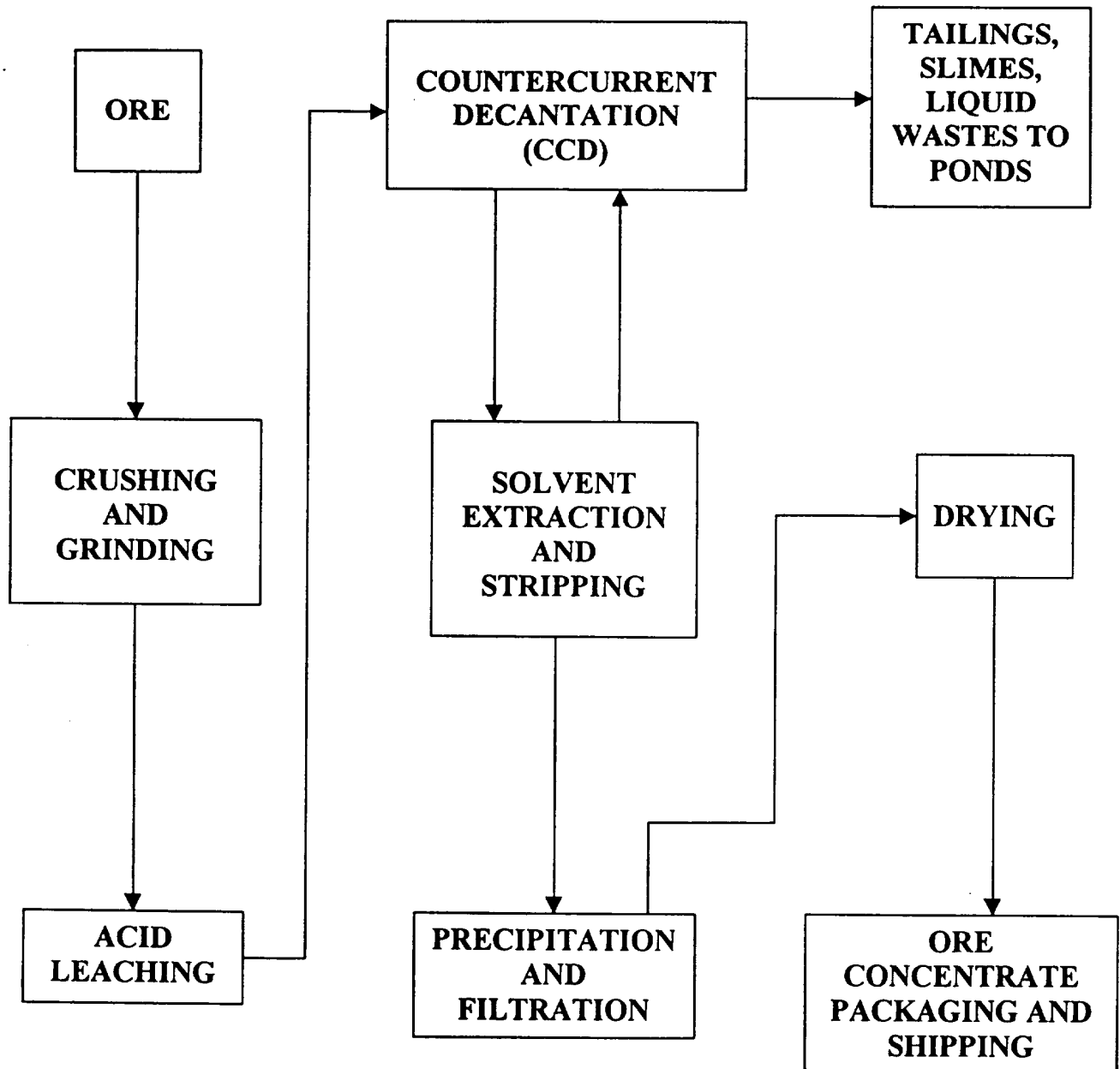
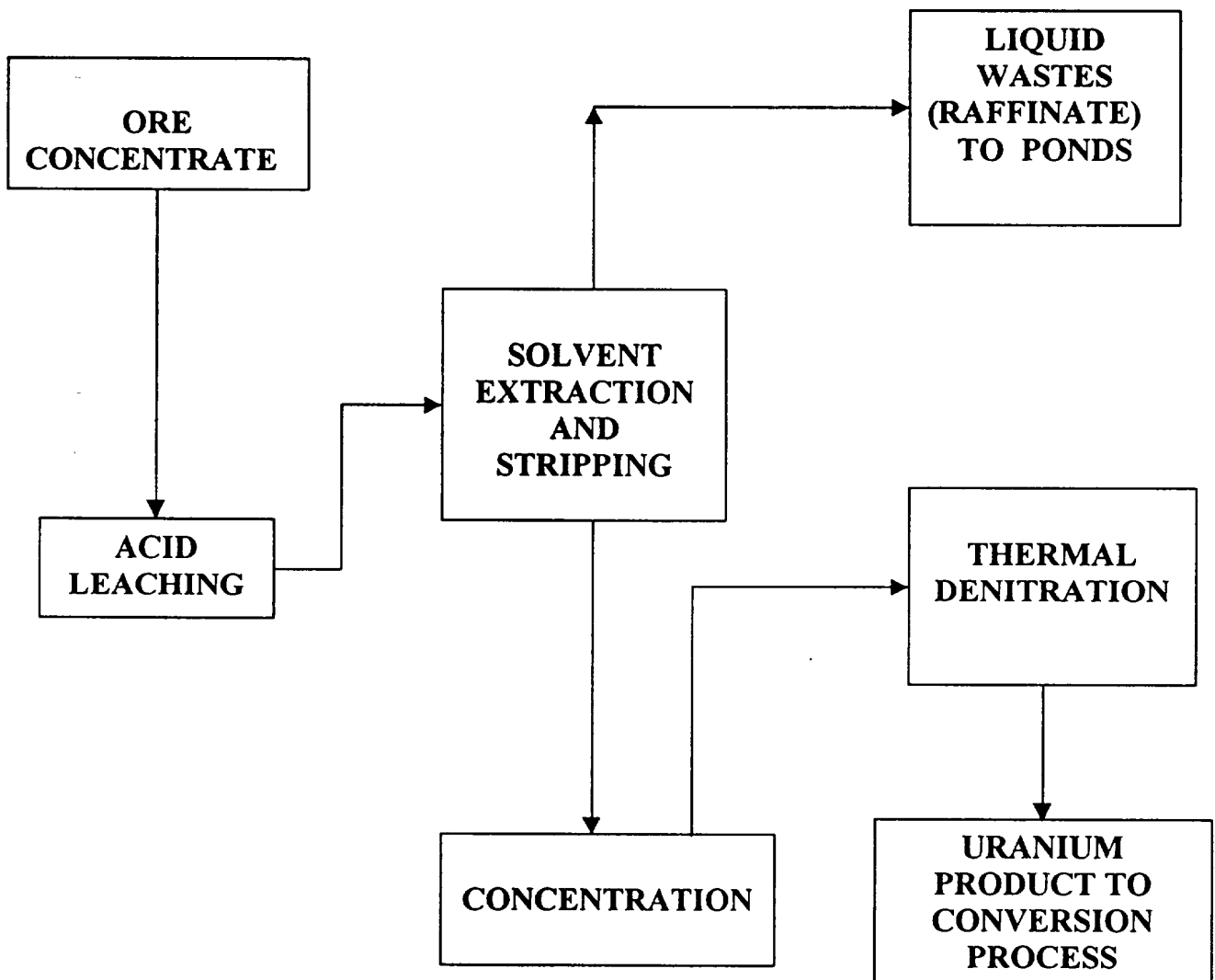


FIGURE 2 –PROCESS FLOW DIAGRAM

SFC URANIUM ORE CONCENTRATE PURIFICATION

AND CONCENTRATION



URANIUM MILLING ACTIVITIES AT SEQUOYAH FUELS CORPORATION

1. INTRODUCTION

Sequoyah Fuels Corporation (SFC) describes previous operations at its Gore, Oklahoma, uranium conversion facility as: (1) the recovery of uranium by concentration and purification processes; and (2) the conversion of concentrated and purified uranium ore into uranium hexafluoride (UF₆), or the reduction of depleted uranium tetrafluoride (UF₄) to UF₆. SFC contends that these operations occurred in separate areas within the processing buildings or, in some cases, within separate buildings, and created separate and distinct waste streams.

The staff has previously considered the issue of classifying the waste from the front-end processes of SFC's facility as 11e.(2) byproduct material. In a July 1993 memorandum to the Commission, the Executive Director for Operations (EDO), supported by the Office of General Counsel (OGC), concluded that the waste was not 11e.(2) byproduct material. This conclusion was based on the historical view that UF₆ conversion plants had not been considered as uranium mills and were not contemplated as such by the Uranium Mill Tailings Radiation Control Act (UMTRCA) of 1978. Consequently, these wastes were considered source material, along with the wastes generated later in the conversion process, because of their concentration and where they were processed.

OGC has reconsidered this position, since the regulatory definitions of uranium milling and 11e.(2) byproduct material are process-related definitions and not restricted to a particular location of activity nor the physical characteristics of a material. Although the tailings and wastes from the front-end of SFC's facility can continue to be classified as source material (physical characteristic of the material), OGC believes that this material can also be classified as 11e.(2) byproduct material if the processes that took place at the front-end of SFC's facility can be considered a continuation of uranium milling. As a result, the front-end wastes from SFC could fall under the legislative and regulatory definitions of two different licensed materials. This would allow the use of the decision-making framework in Attachment 6. As detailed below, OGC's view of wastes at SFC is supported by the staff's understanding of what constitutes uranium milling.

2. WHAT CONSTITUTES URANIUM MILLING

Title 10, Code of Federal Regulations (10 CFR) 40.4 provides the following definitions of uranium milling and byproduct material:

Uranium milling means any activity that results in the production of byproduct material, as defined in 10 CFR 40.4.

Byproduct material means the tailings or wastes produced by the extraction or concentration of uranium or thorium from any ore primarily for its source material content, including discrete surface wastes resulting from uranium solution extraction processes. Underground ore bodies depleted by such solution extraction operations do not constitute "byproduct material," within this definition.

With the exception of “byproduct material,” as defined in section 11e. of the [Atomic Energy] Act, all other terms defined in section 11 of the Act shall have the same meaning when used in the regulations in this part.

A fundamental, plain-language, working definition of uranium milling can be constructed from the somewhat circular references contained in the above regulatory definitions:

Uranium milling is an activity or series of processes that extracts or concentrates uranium or thorium from any ore primarily for its source material content, and the resulting tailings or wastes are 11e.(2) byproduct material.¹

The regulatory and working definitions of uranium milling and byproduct material are definitions based on a process rather than the location of an activity or the characteristics of a material. The regulations do not address when milling is completed. Once the fuel cycle is beyond natural uranium oxide, and conversion processes is initiated, the milling process is clearly completed.

Source material is clearly defined by its characteristics in 10 CFR 40.4 as:

“*Source material* means: (1) Uranium or thorium, or any combination thereof, in any physical or chemical form or (2) ores which contain by weight one-twentieth of one percent (0.05%) or more of: (i) Uranium, (ii) thorium or (iii) any combination thereof. Source material does not include special nuclear material.”

Ore is not defined in the uranium milling regulations nor its enabling legislation. The common-use definitions of ore, as defined in Webster’s Ninth New Collegiate Dictionary, are: (1) a mineral containing valuable constituent (as metal) for which it is mined and worked; (2) a source from which valuable matter is extracted. For the purposes of alternate feed at licensed conventional uranium mills, the staff developed the following working definition of ore (NRC, 2000):

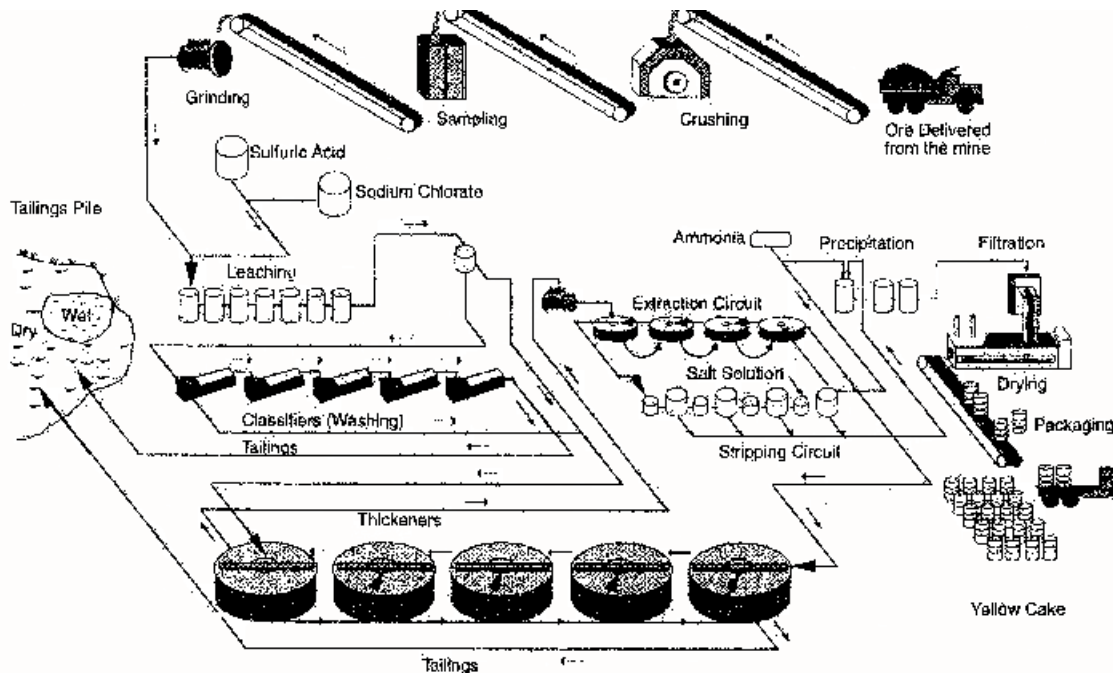
“*Ore* is a natural or native material that may be mined and treated for the extraction of any of its constituents or any other matter for which source material is extracted in a licensed uranium or thorium mill.”

This working definition is consistent with the common-use definition and was constructed with a limitation on where the activity occurred (i.e., a uranium mill), to allow the use of non-typical feed stocks in conventional uranium mills. It eliminates the creation, by definition, of large quantities of mixed waste (commingled Atomic Energy Act (AEA) and non-AEA waste materials) in uranium mill tailings impoundments by classifying all the material as 11e.(2) byproduct material. Side-stream process circuits at mineral processing facilities, which are licensed because they extract uranium

¹ As stated in NRC’s December 13, 2000, Director’s Decision, although pre-UMTRCA mill tailings may be chemically, physically, and radiologically similar to 11e.(2) byproduct material, it is not material over which NRC has jurisdiction.

for its source material content, are not affected by this working definition.² The small volume of wastes from these side-stream circuits is normally commingled with the wastes from the other mineral circuits and are managed as non-AEA material.

Uranium milling, as an activity or set of processes, is described in NUREG-0706, the “Final Generic Environmental Impact Statement on uranium milling” (NRC, 1980) as conventional and non-conventional recovery processes. NUREG-0706 examined both conventional and non-conventional uranium recovery processes as licensed activities, in the context of evaluating the



Source: Energy Information Administration

Figure 1 Conventional Uranium Milling

environmental impacts associated with those activities. Several process stages are involved in conventional milling: the crushing, grinding, and leaching of the ore; followed by chemical separation, concentration, and drying of the uranium, as shown in Figure 1. As illustrated, all process stages for conventional milling, from accepting ore; extracting, concentrating, and purifying

²Licensing source material recovery from side-stream processes at facilities other than uranium mills was explicitly addressed in the legislative history. UMTRCA does not include the wastes from side-stream production, such as uranium extraction from phosphate processing, because the ore was not “processed primarily for its source material content.” Conversely, staff has considered other minerals, such as vanadium, extracted as a side-stream of a uranium mill, as not licensed material; however, the wastes from that side-stream are 11e.(2) byproduct material because the original ore is processed primarily for its source material content. Rare-earth processing and other facilities, along with the resulting wastes, can be licensed as source material, if the extraction results in a concentration of uranium or thorium above 0.05 weight percent.

source material; to disposing tailings are conducted in a continuum at one location. In the context of regulatory oversight, the licensed processes that comprise milling occur at one location, a mill.

Non-conventional processing, also identified in NUREG-0706, comprise other technologies, such as *in-situ* extraction of natural ore bodies, leaching uranium-rich tailings piles or low-grade ores (often called heap leaching), and uranium extraction from mine water and wet-process phosphoric acid. Non-conventional processing usually encompasses one or several of the processing stages (depending upon the application) that are performed at a conventional milling facility. The distinction among non-conventional milling activities is that these activities often occur at locations other than a uranium mill.

As an example, the extraction circuit, precipitation circuit, drying and packaging at an *in-situ* extraction operation are conducted in a centralized processing plant; whereas the leaching “circuit” is performed underground, often at a location different than where the other process circuits occur. The depleted ore body is not considered 11e.(2) byproduct material; however, discrete wastes generated at the surface are managed as 11e.(2) byproduct material and disposed of at a licensed uranium mill tailings facility. Often times, the leaching occurs at distant wellfields. The extraction circuits, using an ion-exchange resin technology, are located at small decentralized satellite facilities near the distant wellfields. The partially processed source material is then transported by truck to the central processing plant for final concentration, purification, and packaging. In this example, the source material extraction occurs at one location and the concentration / purification occur at another.

As another example, when heap leaching was performed in the past, the low-grade ore was leached above-ground with acid on a constructed leaching pad at a remote location. The diluted source material solution was trucked to a uranium mill or partially concentrated at the remote location and then shipped. The depleted ore heap was then managed as 11e.(2) byproduct material in a manner similar to conventional uranium mill tailings. For these activities, the extraction occurred at a different location than the remainder of the processing.

The dispersed milling operations typified by non-conventional uranium processing resemble the milling operations in the early days of the uranium industry during the 1950s and 1960s. Many of the early mills licensed by the Atomic Energy Commission (now the UMTRCA Title I mills) were often existing metal extraction mills refitted to process uranium ore or were constructed to perform only one or a few of the milling processes at one location. For example, the mill in Lowman, Idaho, processed dredge material from other locations by mechanical separation and sent produced solid material to other mills for chemical extraction, concentration, and purification. Other mills, such as the one in Green River, Utah, were built as ore-upgrading mills, which performed ore grinding and separation. The up-graded ore concentrate was shipped by rail to another mill located in Rifle, Colorado, where it was processed into uranium oxide (DOE, 2002). Each of these mills and several others accomplished only a portion of the milling process at dispersed locations, but were all licensed operations at one time.

Regardless of the characteristics, wastes from uranium milling are classified as 11e.(2) byproduct material. The characteristics of the wastes from non-conventional milling can vary according to the composition and characteristics of the incoming feed material. Heap leach wastes resemble the

coarser fractions of conventional uranium mill tailings, and may be devoid of the finer fractions, because the aggressive ore grinding has not occurred. *In-situ* extraction wastes resemble the finer fractions of conventional uranium mill tailings, since the leaching occurs underground and the ore grinding does not occur at all. Similarly, the characteristics from each process step within a conventional uranium mill will vary among themselves.

Wastes generated during the later concentration and purification stages at a conventional mill (e.g., the solvent extraction processes) will have little or no radium composition in the waste stream, since the radium-bearing fractions are typically removed in the early stages. The distinctiveness of these later-stage wastes is lost when they are ultimately blended with other waste streams in the tailings impoundment. If, for some reason, these wastes had been segregated and handled differently at a conventional uranium mill, they would still have been managed as 11e.(2) byproduct material, even though their characteristics would be dissimilar to other wastes from earlier process stages.³

3. SFC INITIAL PROCESSING AS URANIUM MILLING

A reasonable argument can be made, from a technical perspective, that the initial processing conducted at the SFC facility in Gore, Oklahoma, is merely the completion of the milling process started at other locations. Uranium milling entails many processing steps, which, as previously discussed, are not required to occur at a single location, but often do. The later stages at a conventional mill involve concentrating and purifying the source material, using solvent extraction, precipitation, and drying processing circuits. These same processes were performed at the front-end of the SFC facility for the same reason they are conducted in the later stages of the milling process at a conventional mill.

The source material that is processed at a conventional uranium mill and was processed at the front-end of the SFC facility are the same chemical form, natural uranium oxide. The later stages at the SFC facility converted the natural uranium oxide (typically U_3O_8) into UF_6 for subsequent processing into special nuclear material at an enrichment facility. The conversion to a new chemical form, which occurred midway through the processing at SFC, represents a clear demarcation between uranium milling and uranium conversion. The other licensed commercial conversion facility, in Metropolis, Illinois, currently does not include the source material purification stage before conversion to UF_6 .⁴ The processes at that facility are entirely geared toward converting U_3O_8 to UF_6 . Conventional uranium mills are able to concentrate and purify the U_3O_8 to such a degree that the Metropolis conversion facility can process it without the risk of impurities compromising the conversion processes. Other mills, whether antiquated or because of differences in the incoming ore composition, had not achieved that level of purification. The SFC

³ The classification and management of wastes as 11e.(2) byproduct material are uniquely limited to uranium milling. Other fuel-cycle processes that concentrate or purify uranium, such as during conversion, enrichment, or fuel manufacturing, would not meet the legislative constraints of milling and the resulting wastes would not meet the classification of 11e.(2) byproduct material.

⁴ Although uranium milling was not performed at Honeywell in the recent past, the staff is determining whether uranium milling was ever performed at the facility. If so, some wastes could be potentially classified as 11e.(2) byproduct material. Honeywell has not indicated that it would pursue this classification with NRC.

facility accepted the U_3O_8 from those facilities and further processed it to remove those impurities and it produced an acceptable grade of U_3O_8 for conversion.

Whether the incoming source material to SFC meets the definition of "ore" is not relevant to the argument of waste classification. Declaring an incoming feed for individual milling-process stages as "ore," throughout the continuum of milling, is an artificial and unnecessary distinction. When milling is done at one site, the feed for each stage is not considered when making 11e.(2) byproduct material determinations for the classification of wastes for each stage. Similarly, uranium milling has, and does, occur at different locations under regulatory oversight without the construct of individual processing feeds meeting the definition of "ore." Thus, there is no need to consider the feed at SFC as ore, because the front-end process at SFC was simply the last step in the milling activity, which occurred away from a uranium mill, before the material was suitable for conversion to UF_6 .

SFC, with the front-end purification process, had been licensed as a conversion facility under 10 CFR Part 40 at the time UMTRCA was enacted. In retrospect, a pure licensing separation between the front-end purification processes and the remaining conversion processes could have been made at that time. However, such a distinction would have probably been viewed as unnecessarily burdensome for the time, given that protection of public safety, the environment, and the common defense were maintained under the existing license.

4. REFERENCES

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NRC (U.S. Nuclear Regulatory Commission). 1980. NUREG-0706, "Final Generic Environmental Impact Statement on Uranium Milling," Project M-25. Office of Nuclear Material Safety and Safeguards.

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DECISION-MAKING FRAMEWORK

1. BACKGROUND

Since the passage of the Uranium Mill Tailings Radiation Control Act (UMTRCA) of 1978, decommissioning and waste disposal programs have significantly changed. States and Compacts had at one time planned on developing a dozen new low-level radioactive waste disposal sites, but have been unable to develop any new regional disposal capacity under the Low-Level Waste Policy Act of 1980. As a result, future disposal options are uncertain. Costs for conventional low-level radioactive waste (LLW) disposal have increased by more than a factor of 10 as disposal options have become more limited. At the same time, there are now large programs for remediating contaminated sites, including the Nuclear Regulatory Commission's (NRC) Site Decommissioning Management Program (SDMP).¹ These programs have of millions of cubic meters of radioactive waste that required isolation and/or disposal. For comparison, much of the wastes from these sites, that are contaminated by uranium and thorium, would be classified as very low-level waste if the wastes were under the purview of the European Community.

With the small number low-level radioactive waste (LLW) disposal facilities and the high costs of disposal, generators have pursued other options. Several Resource Conservation and Recovery Act (RCRA) hazardous waste facilities are authorized by their State regulatory agencies to accept very low-activity nuclear fuel cycle waste for disposal and are an option for certain types of low-activity waste at NRC-licensed sites. NRC has granted approval for disposal at several of these sites for "unimportant quantities" of source material. The U.S. Army Corps of Engineers (COE), in implementing the Formerly Utilized Sites Remedial Action Program, has also explored new and less costly options for disposal of low-activity waste, and continues to use RCRA Subtitle C facilities. In addition, COE has sent materials to uranium mills as an "alternate feed material" for natural ores. The materials from a contaminated site, which normally would be considered waste, are processed in the uranium mill, the residual uranium extracted, and the tailings disposed of in the existing tailings impoundment. In some cases, waste from contaminated sites have also been directly disposed of in mill tailings impoundments. With the decline in the uranium mining and milling business over the last two decades, companies with uranium mills, and the National Mining Association representing these companies, have pursued this business and have asked NRC to reconsider its policies that govern direct disposal and alternate feed material and allow for the expanded use of tailings impoundments for disposal of other types of materials.

NRC has been aware of these changes in the external environment and the need for revising its regulatory program. The rulemaking on transfer of "unimportant quantities" of source material will address transfers for disposal of these materials and clarify NRC's expectations for such disposals. NRC's Jurisdictional Working Group,² consisting of representatives from Federal agencies with responsibilities for low-activity materials and the Organization of Agreement States

¹ In a staff requirements memorandum dated August 22, 1989, the Commission directed the staff to develop a comprehensive strategy for NRC activities to deal with contaminated sites, to achieve closure on decommissioning issues in a timely manner.

² The Jurisdictional Working Group was formed in response to the Commission's SRM on SECY-99-259, dated March 9, 2000.

and Conference of Radiological Control Program Directors, is examining methods for more rationally addressing risk management of low-end materials, particularly technologically enhanced naturally occurring radioactive materials (TENORM) and low-activity source materials. In November 2000, at the direction of the Commission, the staff issued NRC Regulatory Issue Summary 2000-23, "Recent Changes to Uranium Recovery Policy," that provides more flexibility in allowing non-11e.(2) byproduct material to be disposed of in uranium mill tailings impoundments. All these changes are informed by the increased use of risk insights. Waste disposal regulations are often based on the pedigree of the waste (uranium mill; spent fuel; and non-fuel cycle activities, such as oil drilling, that produce TENORM, etc.) rather than the hazard that wastes pose. Consideration of risks and alternative means for managing risk have opened up other options, such as RCRA hazardous waste facilities for low-activity source material.

In 1997, NRC issued its License Termination Rule (LTR) in 10 CFR Part 20, Subpart E. The rule allows for restricted release of sites under certain conditions. The rule defines conditions for leaving greater amounts of residual radioactivity on site than for unrestricted release. In practice, however, no NRC licensee has yet been able to find an independent third party/custodian who would enforce the institutional control provisions of the rule. In effect, the only options available to many licensees with sites contaminated with uranium or thorium is to clean up to unrestricted release levels or to keep their site under a specific license. The U.S. Department of Energy (DOE) has thus far not been willing to exercise its authority, under section 151(b) of the Nuclear Waste Policy Act (NWPA) of 1982, to become the long-term custodian for sites desiring restricted release. DOE does not have similar discretion if the residual radioactivity is 11e.(2) byproduct material.

The staff believes that further improvements in risk-informing decisions are possible for managing and disposing of large volumes of wastes. These improvements also have the potential to increase competition for waste disposal, decrease the burden on licensees, and better harmonize the regulation and management of radioactive materials in the U.S. In this section, the staff discusses considerations for guiding present and future decision-making on the disposition of wastes from the decommissioning of sites contaminated with large volumes of uranium and/or thorium, when those materials can be viewed as meeting more than one regulatory definition of licensed material, especially 11e.(2) byproduct material. NRC in the past may have narrowly defined the classification of materials and unnecessarily constrained the remediation and disposal options. NRC developed its Strategic Plan (NUREG-1614) in late 2000 and began to use it in the Agency's planning and budgeting process, including evaluation of policy options, using the four performance goals from the Strategic Plan. Thus, previous staff positions are not necessarily based on the more recent and broader consideration of the four Strategic Plan performance goals.

- Maintain safety, protection of the environment, and the common defense and security;
- Increase public confidence;
- Make NRC activities and decisions more effective, efficient, and realistic; and
- Reduce unnecessary regulatory burden on stakeholders.

Above all, this framework assures that available risk information and other important factors are factored into the proper disposition of waste materials, within the constraints of the legislative and regulatory requirements for the licensed material.

In this Attachment, the staff discusses specific considerations that go into achieving the above four performance goals for these types of sites. The objective of this framework is to identify effective and efficient solutions, as long as they achieve adequate protection of the public health and safety and meet the laws and regulations that apply to remediation.

This framework applies to sites having large volumes of materials contaminated with relatively low concentrations of uranium and/or thorium. These materials need to be either removed from the sites for processing or disposal and/or stabilized onsite so that they do not present a significant hazard to the public or the environment. The volumes of materials at these sites are large and may be several hundred thousand cubic meters or more. Thus, substantial funds may be needed to dispose of this material offsite, since disposal costs can range from \$165 - 700 per cubic meter (\$5-20 per cubic foot) for these types of waste. Differences between different disposal options can be substantial, given the large volumes involved. In addition, licensees may request restricted release scenarios for sites because of the cost burden for offsite disposal or processing.

The staff intends to use this framework for decision-making, as described below, and will discuss these criteria in papers sent to the Commission on specific sites.

2. FRAMEWORK FOR DECISION-MAKING

Decision-making for sites contaminated with large volumes of low-activity waste is complex and involves a number of different factors--interpretations of law, assessment of risks to demonstrate compliance with applicable laws and regulations, large costs, and significant interest from affected parties. These stakeholders include licensees who are responsible for remediating a site; members of the public who are affected by wastes left on site or disposed of at another site; and disposal facility operators who are competing for business, among others. These decisions often involve policy matters and consideration of all the factors, together. The following criteria are intended to help identify all the important issues that need to be considered in the decisions to classify long-lived, low-activity waste that is present at many SDMP sites. At the end of each criterion, its specific applicability to the SFC request to classify much of its waste as 11e.(2) byproduct material is discussed.

1. Consistent with law and regulations – Classification of wastes is one of the primary factors affecting the remediation of contaminated sites. Whether a waste is LLW, TENORM, 11e.(2) byproduct material, or pre-UMTRCA mill tailings determines the set of regulations that apply for cleanup and disposal, and may have a significant impact on the costs of remediation, even though these wastes are often similar in their radiological hazards. Classification of wastes as 11e.(2) byproduct material or some other waste category must be consistent with existing law and regulations.³ Legislative and regulatory language is often developed to broadly address issues, but at the same time, allows some flexibility in implementation and interpretation. When a material clearly falls completely within the constraints of a particular legislative or regulatory definition, absent any compelling reasons, the staff does not intend to expend any effort to remove or modify that

³ Licensees, of course, may request, and NRC may grant, exemptions to regulations under certain conditions. However this section, does not address exemptions.

determination. However, when a statute or regulation allows broad interpretations, thus allowing a material to meet more than one definition of radioactive material or waste, for example, the staff will consider the consequences of each classification. As an example, uranium mill tailings licensed after 1978 that contain greater than 0.05% source material could be considered to be either 11e.(2) byproduct material or licensable source material (and therefore LLW). In such a case, other available information will be examined in light of the factors identified here, to decide the best disposition of the material.

SFC Considerations: SFC's proposal to classify some front-end material from the conversion facility as 11e.(2) byproduct material is an example of the kind of approach that can be taken to classify waste (and therefore define a decommissioning approach) in a manner that is safe, meets applicable laws, and enables consideration of other important factors in remediation. Attachment 5 discusses in detail the staff's justification for classification of front-end SFC wastes as 11e.(2) byproduct material. OGC has concluded that such a position is consistent with laws and regulations, for the reasons described in the analysis.

2. Maintain safety, protection of the environment, and the common defense and security – This factor, like the first, must be met when deciding the proper disposition of a material. This factor embraces NRC's regulatory mission over the civilian uses of radioactive materials such that the proposed disposition must assure protection of public health and safety, the environment, and the common defense. Ultimately, the classification and disposition of a material must assure that this factor is adequately achieved.

There are opportunities for more risk-informed management of low-activity materials containing uranium and/or thorium. Presently, for example, the classification of a material as 11e.(2) byproduct material or licensable source material often allows for only one disposal method for each, even though the physical, chemical, and radiological characteristics, and the resulting risk, may be similar. In some cases, 11e.(2) byproduct material, source material, TENORM, and other types of LLW could be safely disposed of in either mill tailings impoundments, LLW disposal facilities, or RCRA Subtitle C, or even Subtitle D, facilities (for very low concentrations). These facilities use different methods for managing risk that have been developed consistent with the laws and regulations for each program. Although the legal definitions may preclude disposal in alternative facilities, risk considerations may not. Thus, at the request of a licensee, where flexibility is appropriate and legally allowed for classifying materials, the staff will use that flexibility to determine whether other types of disposal facilities may be protective.

SFC Considerations: Wastes consisting of yellowcake and materials contaminated with yellowcake have, since the passage of UMTRCA, been considered to be 11e.(2) byproduct material at uranium mills and are disposed of in tailings impoundments at mills [by definition, all wastes generated at a uranium mill are 11e.(2) byproduct material]. Thus, the disposal of front-end wastes from SFC in a tailings impoundment would be consistent with current practice, although the amounts and percentages of yellowcake vs. other, more conventional mill tailings, would differ.

There are also some differences in the radiological constituents between SFC wastes that are proposed to be 11e.(2) byproduct material, and the average tailings in an impoundment. These tailings usually contain small amounts of uranium on average (38-380 pCi/g) and larger amounts of radium (340-1000 pCi/g of Ra-226) and thorium-230 (340-1000 pCi/g). The SFC proposed 11e.(2) byproduct material on average contains approximately 300 pCi/g of uranium, 10 pCi/g of Ra-226, and 580 pCi/gram of Th-230. The raffinate sludge at SFC contains an average of 8990 pCi/g of uranium, and 23,030 pCi/g of Th-230,⁴ but when mixed with the lower concentration soils and other 11e.(2) byproduct material at SFC, produces a tailings impoundment with average concentrations of uranium and thorium in the range of conventional mill tailings. The radium content is considerably less at SFC than conventional mill tailings, and thus the radon hazard is less. It should be noted that the above values for conventional mill tailings are average concentrations, and the concentrations of waste vary with the stage of the milling process. Uranium mills also dispose of yellowcake as 11e.(2) byproduct material, and its concentrations of uranium and thorium are similar to those of yellowcake and other higher activity wastes at SFC.

From a risk management standpoint, whether yellowcake or front-end wastes are disposed in a tailings impoundment, which mainly relies on the RCRA design provisions for hazardous waste facilities, or under the restricted release provisions of the LTR, is not significant. Both are protective of public health and safety. The 10 CFR Part 40, Appendix A, provisions, which are based on RCRA, rely on engineered barriers and long-term controls to ensure isolation of the waste. The LTR provisions rely on reducing the residual radioactivity at the site to levels that would not result in radiation exposures over 25 mrem/yr and as low as is reasonably achievable with restrictions in place, and 100 mrem/yr or 500 mrem/yr, if restrictions fail. Although these regulations are different, both can be protective for the SFC wastes. The back-end wastes from the SFC conversion processes, which will likely be proposed for disposal in the tailings impoundment, are also expected to be safely isolated, given the requirements of 10 CFR Part 40, Appendix A.

3. Make NRC activities and decisions more effective, efficient, and realistic – There are several considerations affecting this factor that may arise for a site undergoing cleanup. They include the following:

- Staff use of established procedures and practices (such as 10 CFR Part 40, Appendix A) for onsite stabilization, in lieu of developing new or unique ones.
- Staff use of the restricted release provisions of the LTR in 10 CFR Part 20, Subpart E, which are relatively new and haven't yet resulted in a completed termination and require experience in the establishment of procedures and practices.

⁴ January 5, 2001, letter from John Ellis, Sequoyah Fuels Corporation, to Larry Camper, NRC, Table 2. Average concentrations of total 11e.(2) byproduct material at SFC derived from values in tables.

SFC Considerations: The staff believes that a prompt, well-documented, and reasoned decision on the licensee's proposal to classify some wastes as 11e.(2) byproduct material will lead to the most effective and efficient use of resources by all parties. Assuming that the classification issue is resolved, finding a third party/long-term custodian for the site under the LTR is expected to be problematic. DOE is proposing to transfer its stewardship responsibilities to another Federal agency, and is therefore unwilling to proceed with a memorandum of understanding that would define the conditions under which it would assume responsibility for NRC sites under Section 151(b) of the NWPA. Determining whether DOE's successor for stewardship would be willing to take the SFC site is unclear and will take staff time to resolve. SFC has been unable, to date, to find an organization willing to accept the independent third party/custodian responsibilities needed to have a restricted release under the LTR. Thus, Option 1 may not be viable, and it would not be efficient for NRC staff to continue its review of the current SFC LTR decommissioning plan and develop a final Environmental Impact Statement (EIS) given this uncertainty. This is consistent with the staff's existing phased approach to reviewing future restricted use proposals which necessitates resolution of the institutional control issue before other technical reviews and the EIS are started. Staff and licensee resources will thus be used more efficiently.

Decommissioning under 10 CFR Part 40, Appendix A, in Option 2 would provide more certainty for success and is expected to be more efficient. Staff requested DOE's opinion on SFC's proposal. DOE responded, in a May 2001 letter (Attachment 8), stating that it does not have any formal position on the issue, leaving classification of the material up to NRC. DOE acknowledged its statutory responsibilities under section 83 of the Atomic Energy Act (AEA), as amended by UMTRCA, and requested prior notice, for budget purposes, if NRC decides that the materials from the front-end process are to be defined as 11e.(2) byproduct material. DOE did not address whether it would accept non-11e.(2) byproduct material in the disposal cell. Before the staff could approve a licensing action for 11e.(2) byproduct material, SFC would need to resolve its approach for the non-11e.(2) byproduct material.

4. Reduce unnecessary regulatory burden on stakeholders – The licensee is primarily responsible for determining the safety of an operation and the disposition of its licensed material. This is considered and integrated into the prevailing laws and regulations, and is a necessary burden that the licensee must bear. NRC assures the licensee's actions are, at a minimum, adequate to address safety. As the regulator, NRC might impose additional burdens on the licensee, either intended or unintended, which may or may not enhance the adequacy of safety. The staff should be aware of those burdens when evaluating proposed alternatives and interpreting legal and regulatory requirements. The staff should take those burdens into account and discriminate between those that are necessary and those which are not. The staff, for example, is generally aware of a range of disposal costs for different types of facilities and is able to approximate the cost of disposal in consideration of potential economic burdens.

Because licensees are best equipped to determine what the burdens may be, their specific proposals to NRC for disposal or decommissioning will consider this factor. The staff will also consider what the burdens might be and, more importantly, not rule out approaches

that are safe and meet applicable laws and regulations. This is particularly important for sites such as those where the cost differences between different regulatory approaches can be so significant.

For any new interpretations or changes from previous staff positions, the staff will also consider what potential “unintended consequences” might result, so that potential impacts on previous decisions or future decisions are anticipated and factored into the decision-making process.

SFC Considerations: SFC thus far has been unable to identify an independent third party/custodian willing to accept the responsibilities needed to have a restricted release under the LTR. If SFC were unable to implement its proposed option for classifying front-end material as 11e.(2) byproduct material, then, as a practical matter, offsite disposal of all of the wastes would be required, and would cost substantially more than an onsite remedy.⁵ This assumes that SFC would continue to be unable to identify an independent third party/custodian for the site, to use restricted release provisions of the LTR. The completion of an Memorandum of Understanding with DOE, that would have allowed for the transfer of sites to DOE as the long-term custodian under section 151(b) of the (NWSA), is highly uncertain. DOE is exploring transferring its stewardship responsibilities to another agency, and the staff believes that it will be difficult for SFC to obtain a commitment from DOE or its successor, if the responsibilities are transferred. In any event, a DOE transfer to another agency could take more time and thus delay SFC decommissioning, and use more of the limited SFC funds for decommissioning. Classification of the front-end wastes as 11e.(2) byproduct material might also provide other alternatives for SFC to remediate the site, in addition to installing a 10 CFR Part 40, Appendix A, disposal cell, such as direct disposal of the material in an existing tailings impoundment. SFC is in the best position to determine how to minimize unnecessary regulatory burdens.

With respect to “unintended consequences” from an NRC decision to classify front-end wastes at SFC as 11e.(2) byproduct material, the staff believes that the flexibility offered in this case in interpreting UMTRCA is limited to the milling process (i.e., activities involved with the extraction or concentration of uranium) and cannot foresee any adverse consequences in this limited decision. The only other commercial conversion facility in the U.S., the Honeywell plant at Metropolis, IL, currently does not perform milling operations.⁶ The three other sites in the SDMP that are considering restricted release are clearly different from SFC and could not be considered for an 11e.(2) byproduct material classification of their wastes. Once the fuel cycle is beyond natural uranium oxide, and the conversion processes is initiated, the milling process is clearly completed.

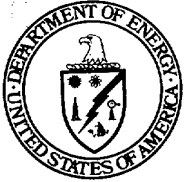
⁵ SFC has not provided a cost estimate for an 11e.(2) cell. The staff estimates, based on the cost for a cell meeting the 10 CFR Part 40, Appendix A, requirements, that SFC would save several tens of millions of dollars with an onsite remedy.

⁶ Although uranium milling was not performed at Honeywell in the recent past, the staff is determining whether uranium milling was ever performed at this facility. If so, some wastes could be potentially be classified as 11e.(2) byproduct material. Honeywell has not indicated that it would pursue this classification with NRC.

5. Increase public confidence – Each site has specific public confidence issues that need to be considered. Holistically, the staff expects that the public's confidence in NRC's regulatory activities will increase if all the other previous factors are adequately addressed and communicated to all stakeholders. However, site-specific public issues and concerns may overtake the importance of some of the other factors in the decision-making.

SFC Considerations: The staff will gain a thorough understanding of the public's views on these alternatives when it prepares the EIS and publishes it for public comment. In the meantime, the staff is aware of several of the views of stakeholders. The State of Oklahoma is opposed to becoming the third party for enforcing institutional controls for a license terminated under the restricted release provisions of the LTR. The staff believes that the State is more open to a site that would be under the control of DOE as the permanent landowner under UMTRCA, than continued delays in remediating the site. In its recent undated letter (sent on April 11, 2002), the Cherokee Indian Nation stated that while it prefers offsite disposal, if onsite disposal is necessary, it prefers that DOE be the long-term custodian. The Cherokee Indian Nation also indicated that if onsite disposal is necessary, it would be interested in being a contractor to DOE to carry out long-term care and monitoring activities, but is not prepared to be the third party under the LTR. A few members of the local public appear to be opposed to any onsite disposal remedy.

In theory, any decision which might facilitate decommissioning and minimize delays would increase the likelihood of SFC's successful remediation of the site and termination of its license. Thus, public confidence could be increased by Option 2 that offers the prospect for a long-term custodian and a path to completion.



Department of Energy
Washington, DC 20585

May 13, 2001

John T. Greeves
Director, Division of Waste Management
Office of Nuclear Material Safety and Safeguards
Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Mr. Greeves:

Thank you for your February 20, 2001, letter requesting the Department of Energy's (DOE) opinion on the Sequoyah Fuels Corporation (SFC) January 5, 2001, proposal, to designate a portion of the material at Gore, Oklahoma site as Atomic Energy Act section 11e.(2) byproduct material. DOE appreciates this opportunity to comment on the SFC proposal. Our Office of Environmental Management and the Office of General Counsel have reviewed the proposal, and although DOE has no formal opinion on this matter, we have submitted some general comments (attached).

Thank you again for this opportunity to comment on the SFC proposal. I have enjoyed working with your office on these and other related matters. If you have any questions please contact me at 202-586-6382 or Mr. David Geiser, Acting Director, Office of Long-term Stewardship at 202-586-9280.

Sincerely,

A handwritten signature in black ink, appearing to read "Gerald Boyd", written over a horizontal line.

Gerald Boyd
Deputy Assistant Secretary
for Science and Technology
Office of Environmental Management

Attachment



**Department of Energy Comments on the
Sequoyah Fuels Corporation January 5, 2001 Proposal to Designate Certain
Material at the Gore, Oklahoma Site as Atomic Energy Act
Section 11e.(2) Byproduct Material**

The Sequoyah Fuels Corporation (SFC) January 5, 2001 proposal asserts that the Nuclear Regulatory Commission (NRC) should designate approximately 77% (by volume) of the process wastes and contaminated soils at its Gore, Oklahoma site as Atomic Energy Act (AEA) section 11e.(2) byproduct material. The SFC requests that NRC amend the SFC license to allow for the possession and on-site disposal of 11e.(2) byproduct material. If the SFC license is amended, SFC would seek to dispose of the remaining 23% (by volume) of non-11e.(2) waste in the on-site 11e.(2) disposal cell. SFC proposes that the disposal and long-term management of the non-11e.(2) material could occur pursuant to the NRC policy on non-11e.(2) disposal in 11e.(2) disposal cells (60 Fed Reg. 49,296 (1995)) and/or pursuant to an exercise of the Department of Energy's discretionary authority under the Nuclear Waste Policy Act (NWPA) section 151(b).

As a general matter, consistent with its responsibilities under section 83 of the Atomic Energy Act of 1954, as amended by the Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA), the Department of Energy (DOE) is prepared to take title to the land and 11e.(2) byproduct material at NRC-licensed disposal cells, at the time the 11e.(2) license is terminated, if the State in which the disposal site is located does not exercise its option to do so. The licensee would need to transfer the land and byproduct material without cost to the United States, and DOE's sole responsibilities, under a license issued by the NRC, would be to monitor and maintain the site and take any emergency measures necessary to protect public health and safety.

DOE has recently released the baseline estimate for the cost, scope and schedule of its anticipated long-term stewardship responsibilities (*A Report to Congress on Long-term Stewardship*). This analysis is based on projections that include estimates of our future potential responsibilities under UMTRCA. These budget and management planning projections identify 28 sites that may be transferred to DOE for long-term stewardship under section 83 of the AEA, but do not take into account the possibility of a transfer of the SFC site. Consequently, DOE would need sufficient notice of a potential site transfer, so that it could take appropriate actions to ensure that any necessary funds for long-term stewardship are available to DOE at the time of transfer.

SFC proposes that, if its license is amended, the remaining non-11e.(2) material at the site could be addressed by two different options: disposal in the on-site 11e.(2) disposal cell or disposal in a separate cell. If the NRC allows the disposal of the non-11e.(2) material in the 11e.(2) licensed disposal cell, DOE would expect that the licensee would need to comply with the conditions set forth in the NRC staff's 1995 policy on the disposal of non-11e(2) byproduct material in 11e.(2) disposal cells before transfer of the cell to DOE.

If NRC allows the disposal of the non-11e.(2) material in a separate cell, DOE's decision whether to exercise its discretionary authority to accept the transfer of the separate cell would depend in part upon compliance with the applicable requirements for site transfer, the availability of resources for long-term surveillance and maintenance, and the resolution of any outstanding liability and dual regulation issues before transfer. We anticipate that, pursuant to our March 2001 agreement in principle, both NRC and DOE will continue to seek to develop a memorandum of understanding that would define the criteria and process that each agency would use to make determinations regarding the potential transfer of non-11e.(2), low-level waste sites to DOE.

March 8, 2002

MEMORANDUM TO: Martin J. Virgilio, Director
Office of Nuclear Material Safety
and Safeguards

FROM: Daniel M. Gillen, Chairman /RA/
Differing Professional View Panel

SUBJECT: PANEL REPORT: REVIEW OF THE DIFFERING PROFESSIONAL VIEW
ON A COMMISSION PAPER ON "APPLICABILITY OF SECTION 11e.(2)
OF THE ATOMIC ENERGY ACT TO MATERIAL AT THE SEQUOYAH
FUELS CORPORATION URANIUM CONVERSION FACILITY"
(DPV-NMSS-2001-01)

In response to your November 29, 2001, memorandum on this subject, I hereby forward to you the attached report of our ad hoc panel convened to review a Differing Professional View (DPV). The DPV addressed the recommendations presented in a Commission Paper on the applicability of Section 11e.(2) of the Atomic Energy Act, as amended, to a portion of the waste at the Sequoyah Fuels Corporation Uranium Conversion Facility.

Attachment: Ad Hoc Panel Report on DPV

cc: D. Sollenberger
A. Campbell
R. O'Connell

**REPORT OF AN AD HOC PANEL
CONVENED TO REVIEW THE DIFFERING PROFESSIONAL VIEW ON
A COMMISSION PAPER ON “APPLICABILITY OF SECTION 11e.(2) OF
THE ATOMIC ENERGY ACT TO MATERIAL AT
THE SEQUOYAH FUELS CORPORATION
URANIUM CONVERSION FACILITY”**

/s/

Daniel M. Gillen, Chairman

/s/

Andrew C. Campbell, Member

/s/

Dennis M. Sollenberger, Member

Date: March 8, 2002

Purposes

The purposes of this Ad Hoc Panel were as follows: 1) to review the Differing Professional View (DPV) on recommendations presented in the Draft Commission Paper on the "Applicability of Section 11e.(2) of the Atomic Energy Act (AEA) to Material at the Sequoyah Fuels Corporation (SFC) Uranium Conversion Facility," 2) to review the Draft Commission Paper with respect to the issues raised in the DPV, and 3) to report to the Director, NMSS on the merits of the positions taken in the DPV with regard to the recommendations of the Commission Paper.

Background

The SFC uranium conversion facility is one of the sites included in the Site Decommissioning Management Plan. In 1993, SFC submitted its "Preliminary Plan for Completion of Decommissioning," in which it stated that certain activities at the site included the concentration of uranium from yellow cake. SFC argued that the resulting wastes meet the definition of 11e.(2) byproduct material, and the site could be remediated under the Uranium Mill Tailings Radiation Control Act of 1978, as amended (UMTRCA).

In a memorandum to the Commission (July 6, 1993), the NRC Executive Director of Operations, stated that the Office of the General Counsel had provided an informal view that "the uranium contaminated decommissioning wastes at Sequoyah Fuels do not fit the definition of 11e.(2) byproduct material and thus fall outside the coverage of the Act."

In March 1999, SFC submitted a decommissioning plan to remediate the site and terminate the license in accordance with the 1997 License Termination Rule (LTR), in 10 CFR 20.1403, for license termination under restricted conditions.

In January 2001, SFC formally requested that the staff evaluate whether a portion of the SFC waste could be considered as 11e.(2) byproduct material. The Division of Waste Management Commission Paper prepared in response to that request discusses two options for responding to the request: (1) continue with the historical view that would disagree with the SFC arguments, and continue decommissioning the site under the LTR; or (2) agree with the SFC arguments and classify some SFC waste as Section 11e.(2) byproduct material. The staff concludes that both options are legally viable, and ultimately, after discussing the advantages and disadvantages, recommends that the SFC waste from the front-end of its Gore, Oklahoma operation be considered 11e.(2) byproduct material.

Mr. Fliegel and Mr. Lusher reviewed the Draft Commission Paper and prepared a DPV. They believe that in reaching its recommendation, the Draft Commission Paper does not adequately discuss the complex issues involved. They consider that the significance of this decision is whether NRC adheres to and appropriately follows legislation and regulations governing the remediation of mill tailings sites and the disposition of 11e.(2) byproduct material. They do not believe there is a significant safety issue involved. They believe that the staff recommendation in the Draft Commission Paper arbitrarily reinterprets the fundamental definition of 11e.(2) byproduct material and will create more problems for the NRC in future site decommissioning activities under both the LTR and UMTRCA.

Discussion

Areas of Agreement in the DPV and Draft Commission Paper

Prior to discussing the areas of differing views, it is important to summarize some key areas of agreement on this issue. The Draft Commission Paper and the DPV both consider the two options for disposal of the Sequoyah wastes to be technically feasible and provide equivalent health and safety protection. In addition, the Draft Commission Paper and the DPV both acknowledge that if the wastes are 11e.(2) material, the Department of Energy (DOE) would be required to take custody of the disposal area for long term care under the general license in 10 CFR 40.28.

The Draft Commission Paper and the DPV both acknowledge that approximately 20 to 25% of the wastes are not from the solvent extraction (SX) process and would have to be addressed separately, including getting prior DOE approval for the material to be disposed of in any SFC 11e.(2) disposal cell. However, the Commission Paper should state specifically that the termination of the Sequoyah license ultimately is based on DOE agreeing to take title to source material wastes and provide perpetual care either as a LLW disposal cell under Section 151b of the AEA or as an 11e.(2) disposal cell with LLW disposed of in it under UMRCA.

The panel agrees with the points discussed above, but suggests that the information provided in the Draft Commission Paper needs to be made clearer on the circumstances of DOE acceptance related to each option.

Areas of Differing Views in the DPV and Draft Commission Paper

The fundamental area of disagreement between the Draft Commission Paper and the DPV is whether the material at the SFC facility can be classified as 11e.(2) byproduct material. The DPV addresses three questions about this issue: 1) does the material fit the definition of 11e.(2) byproduct material? 2) does the material fall within the intent of Congress when it enacted UMRCA? and 3) are the radiological characteristics of the material similar to typical 11e.(2) byproduct material? This report considers these questions relevant to the issue, and discusses each of them in the context of what is discussed in the Draft Commission Paper and the merits of information provided by the DPV.

1. Definition of 11e.(2) Byproduct Material

A key area of concern in the DPV by Fliegel and Lusher is the definition of byproduct material in section 11e.(2) of the AEA as amended. They contend that the waste SFC is proposing to be treated as 11e.(2) byproduct material does not fall within previously accepted definitions (see Figure 1). Therefore, they disagree with the staff preferred option in the draft Commission Paper to accept the SFC proposal. They note that the 1993 EDO memorandum stated that, "The uranium contaminated decommissioning wastes at Sequoyah Fuels do not fit the definition of 11e.(2) byproduct material and thus fall outside the coverage of the Act."

The 11e.(2) byproduct material definition in the statute is as follows: "...the tailings or waste produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content." Fliegel and Lusher agree that the material is "waste," but contend that in order for it to be considered 11e.(2) byproduct material two issues need to be considered: 1) whether the material was produced by the "extraction or concentration of uranium" and 2) whether the yellow cake material that was processed at Sequoyah was an "ore." The panel agrees that these are the key considerations in assessing this material against the 11e.(2) definition.

Extraction/concentration: The licensee argues (and the staff agrees by its recommended option) that the process of further refinement of the yellow cake is “concentration” of the uranium. They further argue that because this chemical process is similar to what is done at a uranium mill, the SFC waste meets this part of the definition. The DPV makes the following counter points:

- The material that was processed was an impure grade of yellow cake that was being purified in preparation for the process of converting it to UF₆. It was not an ore or alternate feed material being processed in a milling operation.
- Extraction and concentration at a mill from ore or other source material is different from converting yellow cake to a chemical form suitable for the conversion to UF₆. The former was done as an integral part of the mining and milling process prior to shipment to SFC, whereas the latter was done as an integral part of the UF₆ conversion process at SFC.
- If the purification of yellow cake is considered part of the milling process for the purposes of defining 11e.(2) byproduct material, then any waste from any process involving the purification and conversion of products containing uranium or thorium also could qualify. This would expand the definition to include other U/Th processing or conversion facilities.

In 1970, many of the milling facilities only dried the yellow cake with low temperature dryers, resulting in a product that would require additional processing to meet the chemistry requirements for the conversion process selected by Sequoyah. As the Panel understands it, the conversion process requires a specific chemical form of uranium that is not the product of the milling facilities. Therefore, although concentration occurs, the goal at the front end of this conversion facility is primarily achieving the specific chemical form needed to match the particular requirements of the UF₆ conversion process.

Ore: In the Draft Commission Paper, the staff indicates that yellow cake could be classified as an “ore” in the context of the uranium processing that took place at the front-end of the Gore facility. Although the staff notes in the discussion of options that this interpretation is at odds with previous practice and regulatory guidance, it is arguing that, because neither “ore” nor “milling process” are specifically defined in the legislation and regulations, the SFC proposal is not legally precluded. The DPV makes the following points:

- Historically, the NRC has defined “ore” as material (natural ores or alternate feed materials) from which natural uranium and/or thorium is initially extracted or concentrated at a uranium or thorium mining and/or milling operation. This definition has not been applied to the further refinement of yellow cake at conversion facilities separate from a mill.
- “Ore” is not defined in the AEA or NRC regulations. Staff proposed in 1992 to define “ore” as a “. . . natural or native material that may be mined and treated for the extraction of any of its constituents or any other matter from which source material is extracted in a licensed uranium or thorium mill.” Subsequently, the Commission has used this definition to permit alternate feed materials to be processed at “licensed uranium or thorium mills.”
- The yellow cake processed at SFC would not fit these definitions. If it became acceptable to define it as “ore” or alternate feed material, then any process utilizing a purification step for material containing uranium or thorium could be defined as such.

The Draft Commission Paper proposes that the front end of the Sequoyah facility can be considered as a continuation of the milling started at a facility licensed as a mill (see Figure 1). Under this view, the “ore” would be the original ore brought to the mill that supplied the yellow cake to the Sequoyah facility. The DPV argues, that if this were the case, any process at any nuclear fuel cycle facility that results in an increase in the concentration of uranium (or thorium) would have its wastes qualify as 11e.(2) byproduct material, as the uranium or thorium would have started out as ore at some uranium or thorium mill.

The Panel considers that the Draft Commission Paper has not fully addressed the historical background associated with the NRC definition of “ore” for classifying wastes as 11e.(2) byproduct material.

2. Intent of UMTRCA

In further responding to the Draft Commission Paper recommendation that the Sequoyah wastes be considered 11e.(2) material, the DPV discusses UMTRCA and its intended purpose with regard to byproduct material regulation. The DPV points out that prior to the enactment of UMTRCA, uranium mill tailings were not regulated under the AEA, because the tailings usually contained less than 0.05 percent uranium and thorium and thus were exempt, under 10 CFR 40.13(a), as unimportant quantities of source material. Uranium mill tailings did contain sufficient quantities of radium, left from the processing of the uranium ore, to present a potential radiological hazard. UMTRCA was enacted to close a regulatory gap by creating the legislative framework to control the radiological hazard of previously unregulated radioactive material, which it defined in adding Section 11e.(2) to the AEA. The DPV authors note that, in contrast to uranium mill tailings, the wastes at the Sequoyah facility were always under NRC regulatory authority as source material. Thus, UMTRCA does not provide additional protection to the public with respect to the Sequoyah facility wastes nor to source material wastes at other NRC regulated facilities. The DPV concludes that there is no evidence that Congress sought to include such material, that was already under NRC regulatory jurisdiction, in the definition in AEA Section 11e.(2).

In 1993, the view of OGC was that, “. . . hexafluoride conversion plants were never considered as uranium mills and were not contemplated as such in the Uranium Mill Tailings Radiation Control Act of 1978” (UMTRCA).

The Draft Commission Paper does not present a position on the intent of UMTRCA. The panel believes that the intent of UMTRCA is an additional factor that should be included in the Paper for the Commission’s full consideration of this issue.

3. Radiological Characteristics of Sequoyah Wastes

The Draft Commission Paper does not address the waste characteristics at the Sequoyah facility. The DPV raises this as an issue, and discusses the radiological characteristics of the wastes and how they differ from the typical 11e.(2) wastes at current Title I sites and the generic analysis in the Final Generic Impact Statement on Uranium Milling, September 1980, NUREG-0706 (GEIS). The DPV uses the data in Sequoyah’s submittal of January 5, 2001.

The issues raised in the DPV were as follows:

- The DPV concludes that the radiological characteristics of the Sequoyah wastes are significantly different from current Title I wastes and the radiological impacts considered in the GEIS.
- The radiological content of the Sequoyah wastes (in particular the sludge which was discussed in the DPV) equate to 1.7% source material content for uranium only. This is higher grade material than was processed to generate the original yellow cake that was sent to Sequoyah.
- The DPV points out that the mix of radionuclides in the Sequoyah wastes are significantly different than those analyzed in the GEIS or by EPA in issuing its uranium milling standards, and that this difference would need to be addressed in any design of a decommissioning plan for this site. Design issues could include groundwater protection, limiting water infiltration, and the ingrowth of radium from the high thorium concentration of the wastes during the 1000 year design life of the facility. Radon emanation, which was the focus of UMTRCA, does not appear to be the major radiological risk to be managed from these wastes.

Although the definition of 11e.(2) does not consider waste characteristics, the panel believes that the DPV issues on the waste differences and possible disposal design differences are important considerations. The Final Commission Paper should acknowledge the waste differences and discuss the impact on disposal design so that the Commission can fully consider the impacts of any decision it makes.

Consequences of the Policy Decision

The DPV raises the issue that reclassifying the Sequoyah wastes as 11e.(2) may have unanticipated consequences, both with respect to the Sequoyah facility and to other facilities subject to NRC regulation. It further points out 1) that there might be other facilities that could, under the recommended revised interpretation, reclassify some wastes as 11e.(2) byproduct material, and 2) that the proposed reclassification might have the effect of bringing some wastes that have not been regulated by NRC, such as from side stream recovery operations at phosphate facilities, under NRC authority. These possibilities are not discussed in the Draft Commission Paper.

The Panel agrees with the DPV that the proposed Sequoyah proposal and staff recommendation could leave open the possibility for other facilities in the fuel cycle to make similar arguments for 11e.(2) waste. This issue needs to be considered more fully in the Final Commission Paper.

Other Points of the DPV

The DPV also considers the question of whether the Commission Paper recommendation provides an easier path to remediating the Sequoyah site, and discusses the two options of the Draft Commission Paper in light of the performance goals identified in the NRC Strategic Plan. Although the Panel comments on the path to remediation in its recommendations, it does not consider these discussions as primary determining factors in answering the question of where to draw the line in defining 11e.(2) byproduct material, and as such has not addressed these discussions specifically.

Recommendations

The Panel has evaluated the DPV, the Draft Commission paper and attachments, and a variety of related background documents to determine if the issues raised in the DPV warrant further consideration and inclusion in the Final Commission Paper. The recommendations of the panel are intended to improve the quality of the information provided to the Commission so that it has a sufficient basis to make a decision on the staff position for responding to the SFC proposal.

As discussed above, the DPV presented by Fliegel and Lusher raises several important considerations that were not included in the Draft Commission Paper discussion. These considerations relate to the definition of 11e.(2) byproduct material, the intent of UMTRCA, the radiological characteristics of the waste, and the consequences of implementing the recommended option of the Draft Commission Paper. The DPV primary concern is that the staff recommended acceptance of the SFC proposal ignores the clear differences in the operations and functions of and will blur long-held regulatory distinctions between mining and milling operations and other uranium or thorium processing facilities, such as UF6 conversion facilities (see Figure 1). The DPV argues that staff acceptance of the re-definition of 11e.(2) byproduct material in the SFC proposal will lead to a situation where any facility working with uranium and/or thorium could fall under the regulatory framework specifically developed for mining and milling operations.

It does not appear that the Draft Commission Paper has made a complete case for recommending Option 2, i.e., acceptance of the SFC proposal. In particular, the paper is lacking in the following areas:

- The Draft Commission Paper does not discuss the bases for the general change in OGC's interpretation of the definition of 11e.(2), or the particular change in OGC's position on the applicability of UMTRCA to the SFC waste.
- Although the Commission Paper acknowledges the need for DOE approval, it should state specifically that the termination of the Sequoyah license ultimately is based on DOE agreeing to take title to source material wastes and provide perpetual care either as a LLW disposal cell under Section 151b of the AEA or as an 11e.(2) disposal cell with LLW disposed of in it under UMTRCA.
- In discussing extraction/concentration, the Draft Commission Paper does not recognize that although concentration occurs, the goal at the front end of this conversion facility is primarily aimed at achieving the specific chemical form needed to match the particular requirements of the UF6 conversion process.
- The Draft Commission Paper has not fully addressed the historical background associated with the NRC definition of "ore" for classifying wastes as 11e.(2) byproduct material.
- The Draft Commission Paper does not present a position on the intent of UMTRCA, and the panel believes that the intent of UMTRCA is an additional factor that should be included in the Paper for the Commission's full consideration of this issue.
- The Draft Commission Paper does not address the waste characteristics at the Sequoyah facility, nor any significance of its differences from typical uranium milling wastes.

- The Draft Commission Paper does not address the possible unintended consequences of its recommendation with regard to other facilities in the fuel cycle making similar arguments for 11e.(2) waste.

It appears that the impetus for the staff recommendation to define SFC wastes as 11e.(2) byproduct material primarily is based on concerns about providing for long-term institutional control of the site. In its proposal, SFC makes a number of arguments dealing with the staff experience with decommissioning under Appendix A of 10 CFR part 40 in contrast to limited experience with decommissioning under the License Termination Rule (LTR) in Subpart E of 10CFR Part 20. Further, the Draft Commission Paper recommends that the Sequoyah facility waste be classified as 11e.(2) byproduct material, because it would result in a well tested and defined process for decommissioning the site. The panel believes that it may be more appropriate for the staff to seek ways to ensure the LTR decommissioning process works effectively, particularly with respect to provisions for long-term institutional care, rather than addressing ways to fit the SFC site into the mill tailings program. Acceptance of the SFC proposal may result in the NRC having to deal with long-term control issues at other decommissioning sites by exception and on a case-by-case basis, rather than through establishment of a robust LTR process.

The Commission will need a clear presentation of all the issues discussed above to make a well-informed policy decision. The Panel recommends that the Draft Commission Paper be revised to address the areas itemized above. With this additional information included in the Commission Paper, the Panel's opinion (given the information available to it and the regulatory framework as it exists) is that the case for Option 2 as it stands is not a strong one, and that the staff may wish to consider other options.

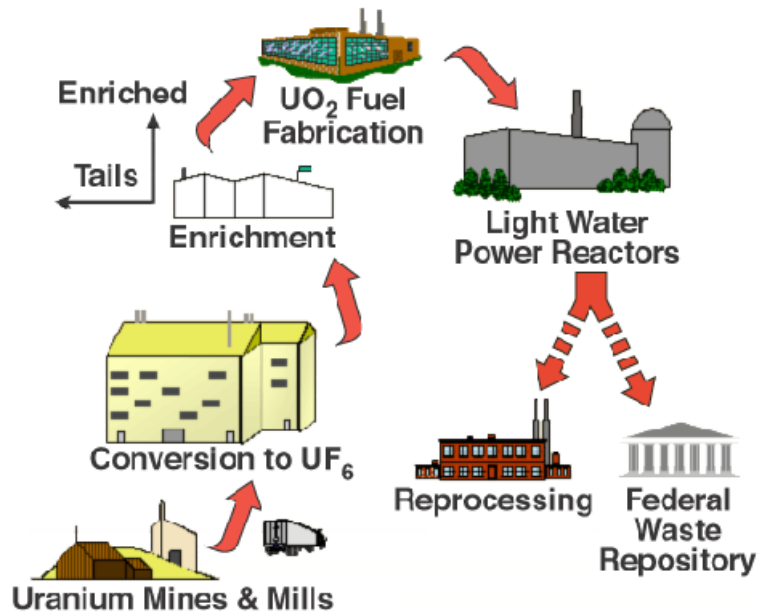


Figure 1. Graphical representation of uranium fuel cycle taken from NRC's website. The DPV argues that the definition of 11e(2) byproduct material in the AEA is applied to wastes from mining and milling operations, and that the regulatory framework has been developed to deal specifically with those wastes and was not intended to be applied to UF_6 conversion facilities.

November 9, 2001

MEMORANDUM TO: Melvyn Leach, Chief
Fuel Cycle Licensing Branch
Division of Fuel Cycle Safety & Safeguards, NMSS

FROM: Myron Fliegel /RA/
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Health Physicist
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SUBJECT: DIFFERING PROFESSIONAL VIEW ON COMMISSION PAPER TITLED:
APPLICABILITY OF SECTION 11e.(2) OF THE ATOMIC ENERGY ACT
TO MATERIAL AT THE SEQUOYAH FUELS CORPORATION URANIUM
CONVERSION FACILITY"

Please find attached our Differing Professional View (DPV) on the subject Commission Paper. We request that the DPV be attached to the Commission Paper.

Attachment: DPV

November 9, 2001

DIFFERING PROFESSIONAL VIEW ON COMMISSION PAPER TITLED:
"APPLICABILITY OF SECTION 11e.(2) OF THE ATOMIC ENERGY
ACT TO MATERIAL AT THE SEQUOYAH FUELS CORPORATION
URANIUM CONVERSION FACILITY"

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We have reviewed the Commission Paper that this Differing Professional View is attached to and disagree with its recommendation. Furthermore, we believe that the Commission Paper does not adequately discuss the complex issues involved in reaching its recommendation. We recognize that the safety significance of the decision on whether to treat the Sequoyah facility wastes as byproduct material as defined in sec. 11e.(2) of Atomic Energy Act of 1954, as amended (AEA) or as source material waste, are minimal. The significance of the decision relates more to whether we adhere to legislation and regulations and follow them appropriately, even if that sometimes creates problems in the short term. We believe that arbitrarily reinterpreting fundamental definitions will, in the long term, create more problems.

Can the material reasonably be considered to be 11e.(2) byproduct material?

The first issue that must be addressed is whether the material at the Sequoyah Fuels Corporation (SFC) facility can reasonably be considered to be 11e.(2) byproduct material. We will address three aspects of this issue: 1) how well does the material fit the definition of 11e.(2) byproduct material, 2) how does it comport with the intent of Congress when it enacted the Uranium Mill Tailings Radiation Control Act of 1978, as amended (UMTRCA), and 3) how do the radiological characteristics of the material compare with typical 11e.(2) byproduct material.

Definition of 11e.(2) byproduct material

The definition of byproduct material in section 11e.(2) of the AEA is "the tailings or waste produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content." There is no argument that the material in question at Sequoyah is waste. However, two questions that need to be considered are whether the waste was produced by the "extraction or concentration" of uranium and whether the material that was processed at Sequoyah was an "ore."

The material that was processed at Sequoyah was an impure form of yellow cake, with the product of the processing being a purer form of yellow cake. The licensee argues that the process is "concentration" of the yellow cake (and thus of the uranium), is similar to what is done

at a uranium mill, and thus meets that aspect of the definition in AEA sec 11e.(2). We would argue that one can differentiate between “concentration” and “purification.” The concentration of yellow cake at a uranium mill is an integral component of a continuous process that starts with uranium ore and ends with uranium product. That product, the yellow cake, is the source material that the ore was processed for. The purpose of a uranium mill is to extract and concentrate uranium found in ore and produce a useful uranium product. On the other hand, one can contemplate examples in which material containing a significant percentage of uranium is purified or converted into another material (e.g., another chemical form) with a higher percentage of uranium. Are wastes from such a process to be considered 11e.(2) byproduct material because the uranium has been slightly “concentrated?” The licensee’s argument, that the purification of yellow cake at Sequoyah is the “concentration” contemplated in the definition of 11e.(2) byproduct material, is not obvious and, if accepted, could be used at other fuel cycle facilities that concentrate uranium.

The licensee also argues that the impure yellow cake processed at the Sequoyah facility can be considered to be “ore” in the context of the definition in AEA section 11e.(2), but that argument does not withstand scrutiny. While neither the AEA nor NRC regulations define the term “ore,” and it thus could be broadly construed, its meaning is not unlimited in scope and should be properly constrained. “Ore,” in the context of the AEA, has been used to refer to material which is the source of the uranium and/or thorium that is, or can be, used to produce special nuclear material. The historical view has been that its meaning should be confined to material from which natural uranium and/or thorium is initially extracted or concentrated, at a uranium or thorium mill during the milling process. Under this view, “ore” would not include uranium or “yellow cake” that has already been extracted from the “ore” even if it was further refined (i.e., concentrated and purified). It follows under this view that the term “ore” should be limited to natural ores and other materials, such as alternate feed material, that are traditionally used in the milling process to obtain uranium and thorium for eventual production of special nuclear material.

Furthermore, in a *Federal Register* notice on May 13, 1992 (57 FR 20525) staff proposed a definition of the term “ore” to be applied in the definition in AEA section 11e.(2). The definition proposed was: “ore is a natural or native matter that may be mined and treated for the extraction of any of its constituents or any other matter from which source material is extracted in a licensed uranium or thorium mill.” Although the definition has not been codified in NRC regulations,¹ it has been reviewed and approved by the Commission on several occasions since then and has remained unchanged. The intent of the definition was to allow tailings and wastes from processing of alternate feed material at a licensed mill to meet the 11e.(2) byproduct material definition so that it could be disposed of in the mill’s tailings pile. However, the Commission purposely put constraints in the definition, primarily by limiting it to alternate feed material processed in a “licensed uranium or thorium mill,” to limit its use. The yellow cake processed at the Sequoyah facility would not meet the ore definition, as the facility is not a licensed uranium mill.

The Commission Paper also proposes a different way to resolve the “ore” problem. It proposes to consider the Sequoyah facility to be a continuation of the milling started at a facility licensed as a

¹ The Commission directed the staff to put the definition in NRC regulations. On several occasions the staff initiated efforts to do that, but for various reasons, never completed the effort.

mill. Under this view, the ore would be the original ore brought to the mill that supplied the yellow cake to the Sequoyah facility. The difficulty with this view is similar to that identified above in the discussion on concentration. That is, any process at any nuclear fuel cycle facility that results in an increase in the concentration of uranium (or thorium) would have its wastes qualify as 11e.(2) byproduct material, as the uranium would have started out as ore at some uranium mill.

In sum, a plain reading of the definition in sec. 11e.(2) of the AEA would lead one to conclude that the wastes at the Sequoyah facility do not meet that definition. Recognizing that the agency has some latitude in interpreting the AEA and its regulations, it may be helpful to consider the intent of Congress in creating the definition in sec.11e.(2) of the AEA.

Intent of UMTRCA

The AEA was amended by UMTRCA to include a second definition of byproduct material [sec. 11e.(2)]. The reason for this addition of radioactive material brought under NRC regulatory authority is discussed Sec. 2.(a), which states “The Congress finds that uranium mill tailings at active and inactive mill operations may pose a potential and significant radiation health hazard to the public, and that the protection of the public health...require...the stabilization, disposal,, and control...of such tailings in order to prevent or minimize radon diffusion into the environment...”

Prior to the enactment of UMTRCA, uranium mill tailings were not regulated under the AEA because the tailings usually contained less than 0.05 percent uranium and thorium and thus were exempt, under 10 CFR 40.13(a), as unimportant quantities of source material. Uranium mill tailings did contain sufficient quantities of radium, left from the processing of the uranium ore, to present a potential radiological hazard, including that of radon release, if they were not properly stabilized and controlled. UMTRCA was enacted to close a regulatory gap by creating the legislative framework to control the radiological hazard of previously unregulated radioactive material.

In contrast to uranium mill tailings, the wastes at the Sequoyah facility were always under NRC regulatory authority as source material. UMTRCA did not provide additional protection to the public with respect to the Sequoyah facility wastes nor to source material wastes at other NRC regulated facilities. There is no evidence that Congress sought to include such material, that was already under NRC regulatory jurisdiction, in the definition in AEA sec. 11e.(2).

Radiological characteristics of Sequoyah waste

It is interesting to consider the radiological characteristics of the Sequoyah facility wastes and compare them to typical uranium mill tailings. In its January 2001 request, SFC included a table (Table 2, p. 46) listing concentrations of various constituents in the Sequoyah waste and in mill tailings at inactive (i.e., UMTRCA Title I) mill sites and in soils. The table below contains radiological information for the wastes at the Sequoyah facility and for Title I tailings, extracted from the SFC table, and similar information for a “model mill” described in NRC’s Final Generic Environmental Impact Statement on Uranium Milling, NUREG-0706, 1980.

Radiological constituent concentrations in SFC wastes and U mill tailings

Constituent (pCi/g)	Sequoyah Raffinate Sludge ^a	Title I mill tailings ^b	NRC "model mill" tailings ^c
Uranium	2500 - 19,200 avg - 8990	38 - 380	39
Th-230	2930 - 48,200 avg - 23,030	340 - 1000	280
Ra-226	<14 - 190 avg - 118	340 - 1000	280

a SFC January 5, 2001 submittal; p.46.

b FEIS for Remedial Action Standards for Inactive Uranium Processing Sites (40CFR192), EPA, 1982.

c Final Generic EIS on Uranium Milling, NUREG-0706, 1980.

It is evident from the table that the Sequoyah facility wastes are very different, radiologically, from uranium mill tailings. Uranium and thorium concentrations are two orders of magnitude higher for the Sequoyah wastes, and present an increased radiological risk, while radium concentrations are less than half that typical of uranium mill tailings. For the Sequoyah facility wastes, the primary radiological concern would be the uranium and thorium content, rather than radon diffusion into the environment, as stated in sec. 2.(a) of UMTRCA.

In summary, the wastes at the Sequoyah facility 1) do not appear to meet a plain reading of the definition found in sec. 11e.(2) of the AEA, 2) do not appear to be the type of material Congress intended to include in the definition, and 3) are not similar to typical uranium mill tailings in radiological characteristics. At best, the basis for considering the material to be 11e.(2) byproduct material is weak. In our opinion the basis is flawed and will not withstand scrutiny by an impartial judge. However, even if we assume that there is sufficient basis to consider the material to be 11e.(2) byproduct material, there are several other issues to consider

Does this provide an easier path to remediating the site?

The Commission Paper recommends that the Sequoyah facility waste be classified as 11e.(2) byproduct material because it would "result in a well tested and defined process for decommissioning the site..." However, we see potential pitfalls in this approach that could result in further delays in decommissioning the site, including the possibility of the 11e.(2) classification being overturned.

As discussed above, the basis for classifying the Sequoyah facility wastes as 11e.(2) byproduct material is, at best, weak. If the Commission makes the decision that the wastes are 11e.(2) byproduct material, the issue is closed within NRC and to stakeholders - unless it is challenged in Federal Appeals Court. However, if it is challenged in Federal Appeals Court, the weak basis for classifying the Sequoyah facility wastes as 11e.(2) byproduct material will be examined in detail by an impartial judiciary. The issues and arguments raised in the first section of this paper, along with perhaps other issues identified by the parties, will be argued, reviewed, and debated. This process can take a considerable amount of time. If, at the end of the process, it is decided that

the Sequoyah facility wastes are not 11e.(2) byproduct material, the decommissioning process will have to start over again.

Additionally, as the Commission Paper points out, even accepting the licensee's argument concerning the classification of the wastes at the Sequoyah facility, a significant amount of waste would still not be classified as 11e.(2) byproduct material. In its January 5, 2001 submittal, SFC states that almost a quarter of the waste (23 percent, which amounts to almost 2 million cubic feet) could not be classified as 11e.(2) byproduct material. This material would have to be disposed of, either with the 11e.(2) byproduct material as non-11e.(2) byproduct material, or in a separate cell. For the material to be disposed of as non-11e.(2) byproduct material, the recently updated "Interim Guidance on Disposal of Non-Atomic Energy Act of 1954, Section 11e.(2) Byproduct Material in Tailings Impoundments" would be followed. The Commission Paper states that approval from the State of Oklahoma, the Central Compact, and the Department of Energy (DOE) would be needed, in addition to NRC approval. It is not clear that such approvals would be readily obtained. Additionally, the argument in the Commission Paper that the recommended approach would "result in a well tested and defined process for decommissioning the site..." is predicated on the assumption that SFC receives the approvals for the non-11e.(2) component of the waste. However, the non-11e.(2) process is not well tested or defined; indeed the industry has complained on several occasions about the difficulty of process. Thus, even if NRC agrees to classifying some of the Sequoyah facility wastes as 11e.(2) byproduct material, decommissioning the site may be frustrated by the inability to get the necessary approvals for the non-11e.(2) component of the waste.

The other option identified in the Commission Paper for the non-11e.(2) component of the waste, is to dispose of it in a separate cell at the site, under the License Termination Rule (LTR). However, this would bring us back to the problem that classifying some of the waste as 11e.(2) byproduct material was designed to resolve; i.e., obtaining an institutional control custodian.

In summary, even if some of the waste material at the Sequoyah facility could be reasonably considered to be 11e.(2) byproduct material, it is problematic whether reclassifying it as such would result in a more expedient path to site decommissioning.

Unanticipated consequences of "novel" interpretation of 11e.(2)

In addition to the concerns identified above, another potential problem is that reclassifying the Sequoyah wastes as 11e.(2) may have unanticipated consequences, both with respect to the Sequoyah facility and to other facilities subject to NRC regulation. An example of unanticipated consequences resulting from reinterpretations of what is, and what is not, 11e.(2) byproduct material may be instructive.

Recently, the staff revised its interpretation of 11e.(2) byproduct material. It concluded that material that met the definition in sec. 11e.(2) of the AEA (i.e., material that was tailings or waste produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content) was not 11e.(2) byproduct material if it was not under NRC (or Agreement State) license at the time of, or after, the enactment of UMTRCA. The intent of the revised interpretation was to preclude NRC from having to regulate the U.S. Army Corps of Engineers (ACE) as it worked at remediating sites under the Formerly Utilized Sites Remedial

Action Program (FUSRAP). Much of the radioactive material at FUSRAP sites met the definition in AEA sec. 11e.(2). Before being transferred to ACE, remediation activities at FUSRAP sites had previously been performed by DOE, which is not a “person” subject to NRC regulation under the AEA and thus neither the material nor the DOE activities were licensed by NRC at most of the FUSRAP sites. The reinterpretation of 11e.(2) byproduct material solved the immediate problem of regulating ACE activities at FUSRAP sites. However, it was not recognized, until late in the process, that material from FUSRAP sites had been sent by DOE to an NRC licensed site for disposal as 11e.(2) byproduct material. Under the revised interpretation, that site now has a mixture of 11e.(2) byproduct material and similar radioactive material not regulated under the AEA, along with material that may be regulated under the Resource Conservation and Recovery Act, in its 11e.(2) byproduct material cell. The long-term ramifications of that situation have not yet been resolved.

The change in interpretation of AEA sec. 11e.(2) recommended in the Commission Paper is a significant departure from past practice by the agency. As such, it may affect other licensees or facilities in ways not currently anticipated. For example, are there other facilities that could, under the recommended revised interpretation, reclassify some wastes as 11e.(2) byproduct material? Could the proposed reclassification have the effect of bringing some wastes that have not been regulated by NRC, such as from side stream recovery operations at phosphate facilities, under NRC authority? Any time we reinterpret legislation and regulations and reverse years of agency practice, we run the risk of unanticipated consequences.

The problem is with decommissioning process

The underlying reason for the proposal to reclassify some Sequoyah facility wastes as 11e.(2) byproduct material is that the decommissioning process applicable to the facility has implementation problems. It appears to us that the solution should be to remedy those problems, rather than try to force the Sequoyah facility wastes into the mill tailings program.

As we understand it, the major problem confronting SFC under the decommissioning regulations in 10 CFR 20.1403 is the need to identify a long-term custodian. DOE apparently is reluctant to accept the role as custodian for the site, even though it could do so under current legislation. Perhaps a reinterpretation of the requirements in §20.1403 rather than the definition in AEA sec. 11e.(2) may be possible. Perhaps a request from the highest levels in NRC to DOE would help. Perhaps a request to Congress, to enact legislation requiring DOE to take such sites, is needed. The solution to problems related to implementing the requirements in §20.1403 should begin there, rather than in reinterpreting the definition in AEA sec. 11e.(2), with all the potential problems that could create.

Performance goals

We have also analyzed the two options presented in the Commission Paper (continue decommissioning the site under the requirements in the LTR, and reclassify some of the wastes as 11e.(2) byproduct material) with respect to the performance goals identified in the NRC Strategic Plan.

Maintain safety, protection of the environment, and the common defense and security

Decommissioning the Sequoyah site under the requirements in either 10 CFR 20.1403 (option 1) or 10 CFR Part 40, Appendix A (option 2) would meet this goal. A major argument to reclassify some of the wastes as 11e.(2) byproduct material is that it would be more likely to lead to actual site decommissioning than it would be if the current process were continued. However, as shown above, that argument is highly problematical. We conclude that neither option is more likely to lead to achievement of this goal.

Increase public confidence

To reach this goal, the NRC must be viewed as an independent, open, efficient, clear and reliable regulator. It can be argued that reclassifying the Sequoyah wastes as 11e.(2) byproduct material, primarily because the licensee sees that as a more expedient path to decommissioning, will not increase public confidence. As discussed in the Commission Paper, in 1993 SFC made an argument that some of the wastes could be considered to be 11e.(2) byproduct material. In a July 6, 1993 Memorandum to the Commission, the Executive Director of Operations wrote "The uranium contaminated decommissioning wastes at Sequoyah Fuels do not fit the definition of 11e.(2) byproduct material..." The Commission Paper does not present a strong argument to revise that conclusion, other than the perception that it may be more expedient. In 1997, NRC promulgated the LTR to address decommissioning at sites like Sequoyah. However, because of problems with the LTR, SFC is once again asking NRC to reclassify some of the wastes as 11e.(2) byproduct material. Agreeing to the reclassification will not make NRC look independent, efficient, or reliable. We conclude that option 1 will enhance achievement of this goal, while option 2 will be detrimental to this goal.

Make the NRC activities and decisions more effective, efficient, and realistic

The Strategic Plan states "In working toward this performance goal, the NRC will apply its Principles of Good Regulation, which include efficiency, clarity, and reliability." The primary justification for option 2 is that the current regulatory framework for decommissioning the Sequoyah facility, §20.1403, is proving difficult to implement. It appears to us that improving the regulatory framework of §20.1403 would be the appropriate way of achieving this goal. Reclassifying material because of implementation problems with the regulatory framework under which it has always been regulated, does not appear to us to be a sign of reliable regulation. We conclude that option 2 will be detrimental to this goal.

Reduce unnecessary regulatory burden on stakeholders

Decommissioning the Sequoyah site under the requirements in either 10 CFR 20.1403 or 10 CFR Part 40, Appendix A imposes a regulatory burden on SFC. The argument for option 2 could be construed as an argument that doing so would reduce the regulatory burden on SFC. However, as shown above, that argument is highly problematical. Furthermore, another stakeholder, the State of Oklahoma, has initiated a hearing on SFC's proposed decommissioning plan. The Commission Paper states that if option 2 is approved, the current decommissioning plan would require significant changes. If Oklahoma (or another stakeholder) identifies concerns with the revised decommissioning plan, it would have to initiate another hearing to address those concerns. The regulatory burden on stakeholders other than SFC could therefore be increased under option 2. We conclude that option 2 could be detrimental to this goal.

Conclusion

For all the reasons identified and discussed above, we conclude that the wastes at the Sequoyah facility should not be reclassified as 11e.(2) byproduct material, i.e., that option 1 should be chosen.