SEQUOYAH FUELS
A GENERAL ATOMICS COMPANY

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.

NMSS01 Public

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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,

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
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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 UF_6, or the *reduction* of depleted UF_4 to UF_6. 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)

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[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.

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[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 (HNO_3), and sulfuric (H_2SO_4) 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 DUF_4 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, UF_6 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 UF_6 *conversion* processes, and the DUF_4 *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

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[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.

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[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

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[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

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[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

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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

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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

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[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 "nonconvential" (*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 U_3O_8 contains 84.8% uranium by

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[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 UF_6 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 UF_6 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*

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[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 11.e(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*

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[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

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[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

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[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

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[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 $pCi/m^2/s$ 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 heath, 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 POLICYAND/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, UF_6 *conversion* wastes and DUF_4 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

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[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 NWPA 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 NWPA, 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]

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[25] Prior to the adoption of the NWPA, 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 NWPA.

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 terminated[26] 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

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[26] NRC requirements include its acceptance and approval of a long-term surveillance plan (LTSP)

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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

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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	Ra-226 Ci Total	Ra-226 Ci 11.e.2	Th-230 Ci Total	Th-230 Ci 11.e.2	Total Ci	Ci 11.e.2
Soils >40 μgmU/gm	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 % [5]	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[(2)]	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

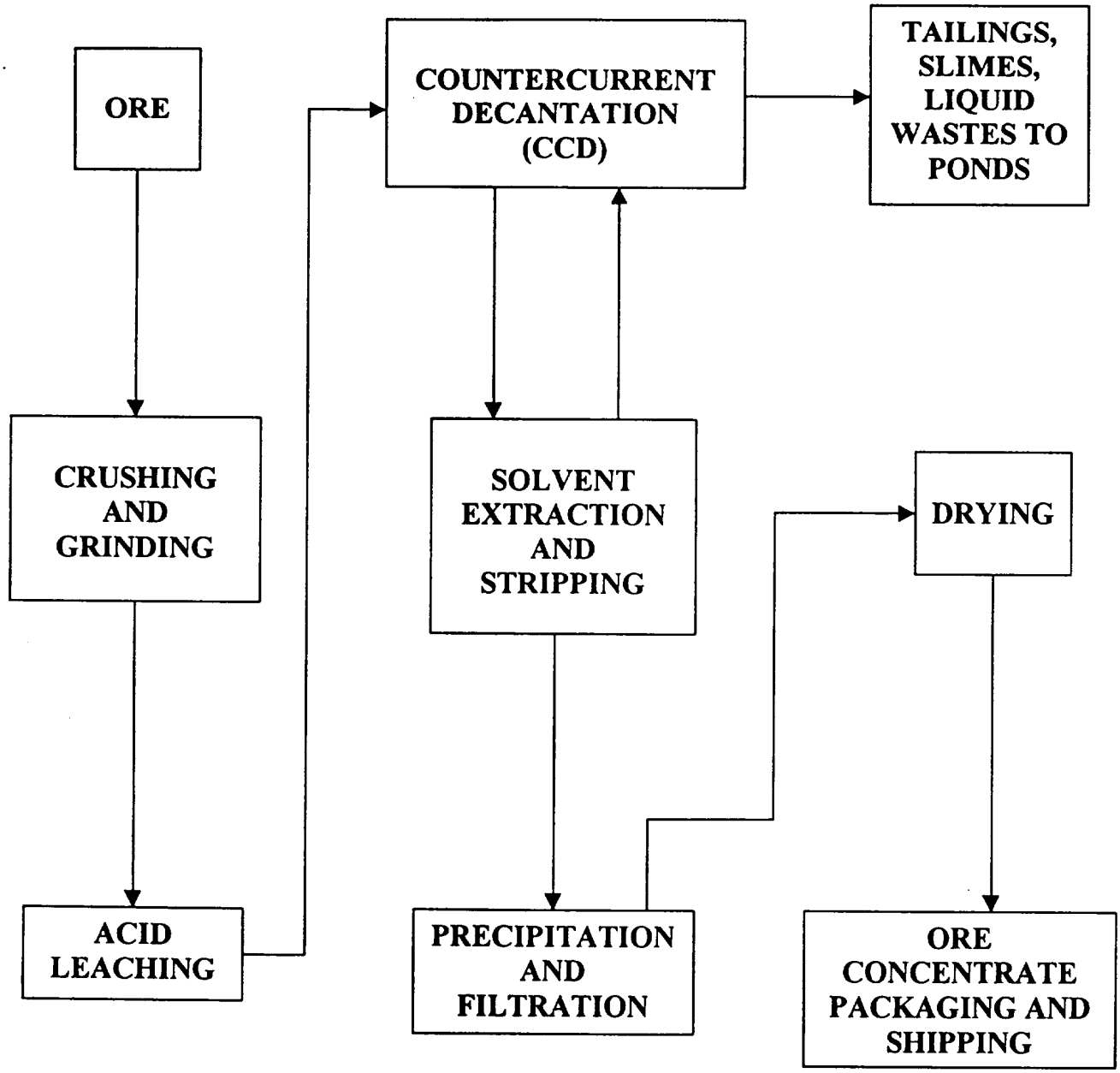
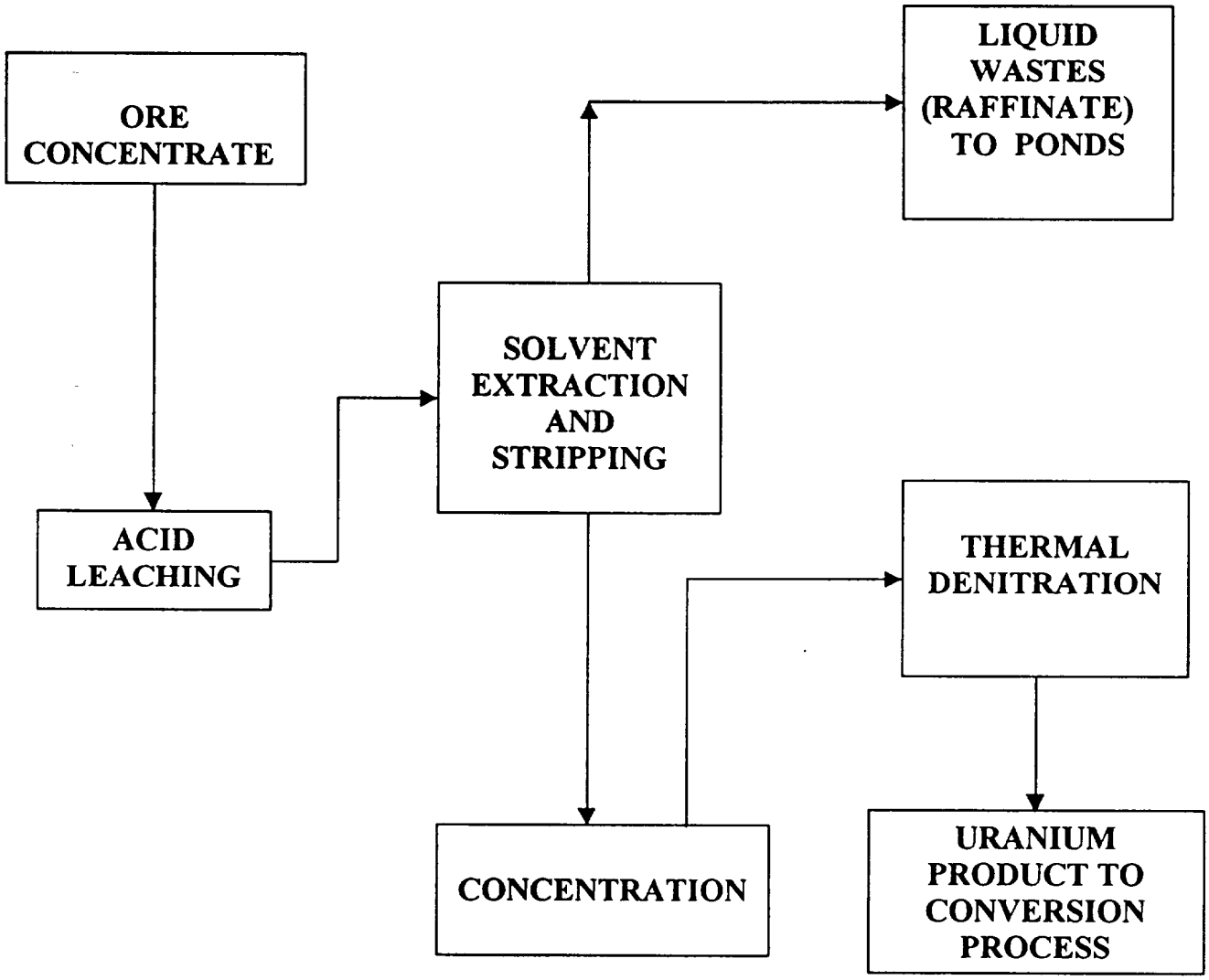


FIGURE 2 –PROCESS FLOW DIAGRAM

SFC URANIUM ORE CONCENTRATE PURIFICATION AND CONCENTRATION