Attachment 1

Redacted Pages for the Legal and Evidentiary Presentation of the Sierra Club et al.

B. NFS License Amendment Applications

NFS has broken its request for authorization of the BLEU Project into three separate license amendment applications, which were submitted between February 2002 and October 2003.

1. First license amendment application – February 2002

NFS' first license amendment application, submitted on February 28, 2002, sought NRC permission to build and operate a Uranyl Nitrate Storage Building ("UNB"). Letter from B. Marie Moore, NFS, to Director, Office of Nuclear Material Safety and Safeguards, Hearing File Document # 11 (hereinafter "First License Amendment Application").[4] As summarized in an EA prepared by the NRC in June of 2002:

> The application contains a request to authorize the licensee to store LEU-bearing material at the Uranyl Nitrate Building. Low enriched uranyl nitrate solutions, prepared by the Westinghouse Savannah River Company at the DOE's Savannah River Site near Aiken, South Carolina, will be shipped to the UNB beginning in early 2003. These uranyl nitrate solutions will be limited to a weight percent enrichment of ≤ 5 percent of ^{235}U and transported from Savannah River Site (SRS) to NFS in Type B packages. Low enriched uranyl nitrate solutions will also be produced in the downblending facility onsite and stored in the USB [sic]. The UNB will contain approximately 243 LE uranyl nitrate tanks, each having a capacity of [redacted]

Environmental Assessment for Proposed License Amendments to Special Nuclear Material License No. SNM-124 Regarding Downblending and Oxide Conversion of Surplus High-Enriched Uranium at 1-2, Hearing File Document # 17 (hereinafter "2002 EA"). As also described in the EA:

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[4] The NRC provided a defective notice of an opportunity to request a hearing at 67 Fed. Reg. 45,555 (July 9, 2002), and subsequently revised it at 67 Fed. Reg. 66,172 (October 30, 2002).

> The UNB will also house a [redacted] tank for storing natural UN blend stock produced from uranium trioxide (UO3) in the Oxide Conversion Building (OCB). This product will be shipped to the SRS in [redacted] batches using tank trailers. A central control and instrumentation system will be used to monitor and control the UNB operations. The UNB will have a berm of [redacted] capacity for spill containment. . . .

Id. at 2-5.

The First License Amendment Application included, as an attachment, an ISA for the UNB, which was later revised. The most recent revision appears to be Revision 3, which was submitted under cover of a letter from B. Marie Moore, NFS, to Director of NMSS, NRC, on January 30, 2004. Integrated Safety Analysis Summary, Blended Low Enriched Uranium (BLEU) Project, Uranyl Nitrate Building (UNB).[5]

2. Second license amendment application – October 2002

On October 22, 2002, NFS submitted its second license amendment request, which would allow NFS to downblend HEU to low-enriched uranium in the BLEU Preparation Facility ("BPF"). Letter from B. Marie Moore, NFS, to Director, Office of Nuclear Material Safety and Safeguards, NRC, Hearing File Document # 23 (hereinafter "Second License Amendment Application").[6]

The Second License Amendment Application is described as follows in the June 2002 EA:

> Process equipment previously used in the NFS 200 Complex will be relocated to an existing but inactive production area in Building 33, to be designated as the BPF. Approximately 7.4 Mg (7.4 MT) of HEU aluminum alloy and 9.6 Mg (9.6

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[5] Revision 3 of the ISA for the UNB is not included in the NRC's Hearing File, and did not appear on the NRC's ADAMS system index when an attempt to locate it was made on October 14, 2004.

[6] The NRC published notice of receipt of the application and an opportunity to request a hearing at 68 Fed. Reg. 796 (January 7, 2003).

MT) of HEU metal (buttons) will be used to produce high-enriched UN. This will be downblended with UN produced from 211.7 Mg (211.7 MT) of natural uranium oxide to give the required low-enriched UN solution in 18.92-m^3 (5,000-gal) batches. . . .

A multi-stage process will be used to convert the HEU aluminum alloy to UN solution. The aluminum will be first stripped from the HEU aluminum alloy ingots in a dissolver with geometry favorable to nuclear safety. Sodium hydroxide (30 percent solution), sodium nitrate (45 percent solution), and barium hydroxide will be trickled over the ingots, dissolving the aluminum and leaving behind a sodium diuranate ($Na_2U_2O_7$) precipitate containing the uranium. Sodium nitrate suppresses the formation of hydrogen during the dissolution reaction forming ammonia instead. The small amount of hydrogen that is produced will be diluted with air to a safety concentration. . . . The sodium diuranate solid will be separated from the solution and dissolved in nitric acid (70 percent solution) to produce UN [$UO_2(NO_3)_2$] solution. The UN solution will then be purified using a previously licensed liquid-liquid extraction process (NRC License SNM-124). This system, however, will be designed so that a wet-pipe sprinkler system will not be required for fire suppression. . . .

A new system will be used to convert the HEU metal (buttons) into UN solution. The HEU metal will be first converted to oxide by heating it in a furnace with favorable nuclear geometry in the presence of air. The oxide will then be transferred to a dissolver with geometry favorable to nuclear safety and reacted with nitric acid (70 percent solution) and hydrogen peroxide (30 percent solution) to produce UN solution . . .

The natural uranium oxide will be likewise dissolved in nitric acid to produce natural UN solution blendstock for diluting the high-enriched UN in the downblending process.

The high-enriched UN will be downblended to low-enriched UN, using a previously licensed batch process (NRC License SNM-124). This system, however, will employ larger capacity tanks. The blendstock dissolver tank will hold [redacted], and the enrichment blend tank will hold [redacted]. The limits on ^{235}U concentration will remain the same . . .

Basic and acidic waste solutions will be collected separately in two bermed [redacted] tanks located adjacent to the BPF and pumped to the Waste Water Treatment Facility (WWTF) for treatment. . . .

Id. at 2-1 - 2-5.

Attachment 2

Corrected Pages for Staff Response to Legal and Evidentiary Presentation

The BLEU Project calls for the use of four buildings at NFS's Erwin site, collectively referred to as the BLEU Complex.[8] The BLEU Complex is to consist of the BLEU Preparation Facility, to be located in an existing structure, and three newly constructed buildings: the Uranyl Nitrate Building, Oxide Conversion Building, and Effluent Processing Building.[9] Downblending operations are to occur at the BLEU Preparation Facility (BPF), located in an existing but inactive production area at the NFS site.[10] The BPF will utilize some existing process equipment to be relocated from within the NFS site.[11] HEU aluminum alloy and HEU metal (buttons) will be converted into a high-enriched uranyl nitrate (UN) solution.[12] Using a previously licensed process for License No. SNM-124, the high-enriched UN will be downblended with a UN solution blendstock, produced from the dissolving of a natural uranium oxide in nitric acid, to produce batches of low-enriched UN solution.[13]

The Uranyl Nitrate Building (UNB) will be authorized to store low-enriched UN solution produced at the BPF.[14] Low-enriched UN solutions, limited to a weight percent enrichment of ≤ 5 percent of U^{235}, prepared by the Westinghouse Savannah River Company at DOE's Savannah River Site, will be shipped to the UNB.[15] Twenty-four (24) high density polyethylene tanks with a capacity of [redacted] will be used to store low-enriched UN solution from the BPF,

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[8] *Id.* at 2-1.

[9] *Id.*

[10] *Id.*

[11] *Id.*

[12] *Id.*

[13] *Id.* at 2-1 to 2-5.

[14] *Id.* at 2-5.

[15] *Id.* at 1-2.

and one [redacted] tank will be used to store natural UN blendstock produced at the Oxide Conversion Building.[16] The UN blendstock will be shipped to the Savannah River Site.[17]

The Oxide Conversion Building (OCB) will process the low-enriched UN solution into a UO_2 powder using the ammonium diuranate (ADU) process, a process licensed for use for the last 20 years at Framatome ANP, Inc.'s Richland Plant under NRC License No. SNM-1227.[18] The UO_2 powder will be then shipped to the Framatome ANP, Inc. Richland facility for use in manufacturing nuclear fuel.[19] A dilute sodium nitrate waste stream used in the ADU process will be sent to the Effluent Processing Building for treatment.[20] At the OCB, UO_3 will also be dissolved in nitric acid to produce a UN solution blendstock that will be stored in the UNB.[21]

The Effluent Processing Building (EPB) will receive the liquid sodium nitrate waste stream from the OCB, and will be treated via a new, two-step process.[22] First, the waste stream will be treated with sodium hydroxide to recover ammonia.[23] Then, the waste stream will be fed into an evaporator, producing a concentrated sodium nitrate solution.[24] The overheads stream from the

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[16] *Id.* at 2-5.

[17] *Id.*

[18] *Id.* at 1-3, 2-5.

[19] *Id.* at 2-1, 2-7.

[20] *Id.* at 2-7.

[21] *Id.*

[22] *Id.*

[23] *Id.*

[24] *Id.*

Attachment 3

Corrected Pages for Exhibit 1
to Staff Response

duration of the current license. These ongoing efforts in contaminant source reduction are expected to reduce the potential for migration of additional contaminants from impacted site areas. As a result, environmental concentrations of a number of contaminants, from past operations, are expected to decrease with time. Continued monitoring of plant effluents and site contamination to demonstrate compliance with existing State and Federal regulations provides confidence that continued operations at the facility can be conducted while public health and safety and protection of the environment are being maintained.

1.3 Description of the Proposed Action

The proposed action currently before the NRC is to allow NFS to construct and operate a Uranyl Nitrate Storage Building (UNB) outside the NFS protected area. The other activities which were considered to contribute to the environmental impacts for this project are to increase the ^{235}U possession limit, to construct and operate an Oxide Conversion Building, to construct and operate a new Effluent Processing Building, and to relocate HEU to LEU downblending operations within the NFS protected area. HEU is defined by the U.S. [redacted] as uranium enriched in the isotope ^{235}U to 20 percent or greater, at which point it becomes suitable for use in nuclear weapons (Ref. 10). [redacted] LEU as uranium with a content of isotope ^{235}U greater than 0.7 percent and less than 20 percent and is not suitable for use in nuclear weapons (Ref. 10). The duration of the project is five years from the time that material is delivered to the site. A total of 461,000 kg of uranium (as LEU) will be processed in the BLEU complex with an approximate annual throughput of [redacted] of uranium (as LEU) per year.

The DOE has prepared an EIS which evaluated several options for the disposition of surplus HEU. The option chosen in that EIS was to downblend a portion of the surplus HEU as commercial fuel at the NFS site, and to downblend the rest of it to waste at the Savannah River Site. The environmental impacts of this option are discussed at length in the DOE EIS (Ref. 10). This EA serves to evaluate the site-specific impacts, which were not evaluated at length in the DOE EIS. The DOE EIS was used to prepare this document, and is referenced when the analyses were appropriate. Where it is not referenced, the NRC performed an independent analysis.

The first of the three license amendment applications was submitted to the NRC in a letter dated February 28, 2002. The application contains a request to authorize the licensee to store LEU-bearing material at the Uranyl Nitrate Building. Low enriched uranyl nitrate solutions, prepared by the Westinghouse Savannah River Company at the DOE's Savannah River Site near Aiken, South Carolina, will be shipped to the UNB beginning in early 2003. These uranyl nitrate solutions will be limited to a weight percent enrichment of $\leq$5 percent of ^{235}U and transported from Savannah River Site (SRS) to NFS in Type B packages. Low enriched uranyl nitrate solutions will also be produced in the downblending facility onsite and stored in the USB. The UNB will contain approximately 24 LE uranyl nitrate tanks, each having a capacity of [redacted]

The second of the three license amendment applications is expected to be submitted to the NRC by the end of July 2002. This application will contain information regarding specific license changes necessary to downblend HE UAl_x alloy and HEU metal to LE uranyl nitrate solutions within the NFS protected area.

License SNM–124). This system, however, will be designed so that a wet-pipe sprinkler system will not be required for fire suppression (Ref. 2).

A new system will be used to convert the HEU metal (buttons) into UN solution. The HEU metal will be first converted to oxide by heating it in a furnace with favorable nuclear geometry in the presence of air. The oxide will then be transferred to a dissolver with geometry favorable to nuclear safety and reacted with nitric acid (70 percent solution) and hydrogen peroxide (30 percent solution) to produce UN solution (Ref. 2).

The natural uranium oxide will be likewise dissolved in nitric acid to produce natural UN solution blendstock for diluting the high-enriched UN in the downblending process.

The high-enriched UN will be downblended to low-enriched UN, using a previously licensed batch process (NRC License SNM–124). This system, however, will employ larger capacity tanks. The blendstock dissolver tank will hold [redacted] and the enrichment blend tank will hold [redacted] The limits on ^{235}U concentration will remain the same (Ref. 2).

Basic and acidic waste solutions will be collected separately in two bermed [redacted] tanks located adjacent to the BPF and pumped to the Waste Water Treatment Facility (WWTF) for treatment (Ref 2).

2.1.1.3 Operations at the UN Building

The Uranyl Nitrate Building (UNB) is located in the proposed BLEU Complex. This new facility will store up to [redacted] of low-enriched UN solution received from the BPF. The UN solution will be stored in 24 high density polyethylene (HDPE) tanks arranged in 4 rows of 6. Each tank will have a capacity of [redacted]. The UNB will also house a [redacted] tank for storing natural UN blend stock produced from uranium trioxide (UO_3) in the Oxide Conversion Building (OCB). This product will be shipped to the SRS in [redacted] batches using tank trailers. A central control and instrumentation system will be used to monitor and control the UNB operations. The UNB will have a berm of [redacted] capacity for spill containment (Ref. 2).

2.1.1.4 Operations at the OCB

Low-enriched UN solution will be converted to UO_2 powder in the proposed OCB, using the Framatome ANP, Inc. process. This process has been used for over 20 years at the Framatome ANP, Inc., Richland Plant, under NRC License SNM–1227. The liquid waste processing system to be used at the OCB for concentration of dilute sodium nitrate waste stream, however, is not used at Richland. An overview of the processes occurring at the proposed BLEU Conversion Complex is shown in Figure 2.3. The areas that do not have a parallel in Richland are the UNB and the Liquid Waste Processing System. These are shown within dashed borders in the diagrams.

In the oxide conversion process, the UN solution is first mixed with ammonium hydroxide and water to produce ADU solids. The ADU [$(NH_4)_2U_2O_7$] solids are then separated using a continuous centrifuge and cross filter. The solids are next dried in a screw dryer and then

Attachment 4

Corrected Page for Exhibit 3
to Staff Response

Table 4.21. Storage and usage of potentially hazardous chemicals at the NFS Erwin Plant.

Type	Chemical	Average annual use	Maximum quantity stored	Average shipment size	Approximate number of shipments/yr
Compressed gas	Acetylene	7 cyl	[redacted]	2	4
Liquified gas	Hydrogen	10×10^6 ft^3		1.8×10^5 ft^3	57
Fuel	#2 diesel oil	199 gal		66 gal	3
	Natural gas	4.54×10^4 ft^3		--	Pipeline
	Lubricating oils	1000 gal		100 gal	10
	Gasoline	2000 gal		500 gal	4
	Propane	20,000 gal		2000 gal	10
Process chemicals	67% Nitric acid	43,000 gal		2600 gal	12
	Tributyl phosphate	594 gal		198	3
	AMSCO 125	2000 gal		500	4
	Hydrochloric acid	7000 gal		700 gal	9
	Ammonium hydroxide (25%)	4000 gal		700 gal	6
	Sodium hydroxide	1700 gal		425 gal	4
	Acetone	700 gal		175 gal	4
	Methyl alcohol	2700 gal		385 gal	7
	Detergent	2000 gal		1000 lb	2
	Sulfuric acid	534 gal		100 gal	5
	Hydrogen peroxide	11,500 gal		1500 gal	8
	Aluminum nitrate	3000 gal		2000 gal	2
	Phosphoric acid	396 gal		66 gal	6
Radioactive chemicals	Low enriched uranium	36,400 lb (16,500 kg)		3,100 lb (1,400 kg)	12
	High enriched uranium[a]				
	Plutonium	0		0	0

[a]Refers to a classified product

Source: NFS 1984a.