RAS 5856

February 6, 2003

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
BEFORE THE SECRETARY

In the matter of	)	
	)	
Nuclear Fuel Services, Inc.	)	Docket No. 70-143
	)	
(Materials License SNM-124)	)	
	)	

SECOND REQUEST FOR HEARING BY FRIENDS OF THE NOLICHUCKY RIVER VALLEY, STATE OF FRANKLIN GROUP OF THE SIERRA CLUB, OAK RIDGE ENVIRONMENTAL PEACE ALLIANCE, AND TENNESSEE ENVIRONMENTAL COUNCIL

I. INTRODUCTION

As provided by the U.S. Nuclear Regulatory Commission's ("NRC's" or "Commission's") Notice of Receipt of Amendment Request and Opportunity to Request a Hearing, 68 Fed. Reg. 796 (January 7, 2003), petitioners, Friends of the Nolichucky River Valley ("FNRV"), the State of Franklin Group of the Sierra Club, Oak Ridge Environmental Peace Alliance ("OREPA"), and Tennessee Environmental Council ("TEC"), hereby request a hearing regarding Nuclear Fuel Services's ("NFS's") second license amendment application for the "BLEU Project" at NFS's facility in Erwin, Tennessee.

Petitioners request that any aspect of this hearing that is held as a public meeting be conducted locally. It should also be conducted in the evening so that working people can attend.

II. STANDING

Petitioners submit the following information in support of their standing to challenge NFS's second license amendment application:

A. Standing Information in First Hearing Request

Petitioners incorporate by reference the discussion of standing in their First Hearing Request and their reply to NFS's opposition to their First Hearing Request.[1] They also continue to rely on the standing declarations submitted in support of their First Hearing Request.[2] This information is equally relevant to the second license amendment application as it is to the first application.

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[1] *See* Request for Hearing by Oak Ridge Environmental Peace Alliance, Tennessee Environmental Council, State of Franklin Group/Sierra Club, Friends of Nolichucky River Valley at 3-8 (November 27, 2002) (hereinafter "Petitioners' First Hearing Request"); Reply by Oak Ridge Environmental Peace Alliance, Tennessee Environmental Council, State of Franklin Group/Sierra Club, Friends of Nolichucky River Valley to Applicant's Answer to Their Hearing Request (January 6, 2003) (hereinafter "Petitioners' Reply re First Hearing Request").

[2] *See* Declaration of Frances Lamberts (November 25, 2002), attached as Exhibit 1; Declaration of Ruth Gutierrez (November 22, 2002), attached as Exhibit 2; Declaration of Trudy L. Wallack (November 25, 2002), attached as Exhibit 3; Declaration of Park Overall (November 22, 2002), attached as Exhibit 4; Declaration of Chris Erwin (August 7, 2002), copy attached as Exhibit 5. (Mr. Erwin's original declaration was filed with the Secretary on August 8, 2002.) Ms. Lamberts is a member of the State of Franklin Group of the Sierra Club, FNRV and TEC. Ms. Gutierrez is a member of the State of Franklin Group of the Sierra Club. Ms. Wallack is a member of FNRV. Ms. Overall is a member of FNRV, OREPA, and TEC. Mr. Erwin is a member of OREPA.

B. Information Undermining NFS's Claims that Discharges to Nolichucky River are Too Low to Cause Harm

In response to Petitioners' First Hearing Request, NFS claimed that the Environmental Assessment[3] ("EA") shows the BLEU Project's radiological discharges to the Nolichucky River are extremely small. NFS Answer at 9. However, Petitioners have discovered significant discrepancies in the data underlying the EA, which undermine the credibility of NFS's claim. In addition, the EA acknowledges that discharges to the Nolichucky River may include unknown quantities of groundwater contaminants migrating to the Nolichucky River. In considering Petitioners' standing, the Presiding Officer must take into account the cumulative effects of these illegal discharges, as well as legal discharges.

1. Discrepancies in data underlying the EA

As demonstrated in the attached Declaration of January 6, 2003 by Dr. Arjun Makhijani (hereinafter "Makhijani Declaration"), the EA makes incorrect and misleading assertions regarding NFS's estimates of radiological discharges to the environment.[4] In Section 5.1.1.2, the EA claims that Tables 5.1 and 5.2 present estimates of liquid and airborne radiological releases from the proposed BLEU Project. The EA cites two source

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[3] Finding of No Significant Impact and Environmental Assessment (TAC No. L30873) (January 29, 1999).

[4] The original of the Makhijani Declaration was filed on January 6, 2003, in support of Petitioners' Reply Re First Hearing Request. On January 16, 2003, NFS moved to strike the Makhijani Declaration and thus preclude its consideration with respect to the First Hearing Request. In order to ensure consideration of the Makhijani Declaration with respect to their second hearing request, Petitioners are hereby re-submitting the Declaration and their arguments regarding its relevance to standing.

documents submitted by NFS: a letter from B.M. Moore, NFS, to NRC, regarding "NFS Responses to NRC's Request for Additional Information to Support an Environmental Review for BLEU Project" (March 15, 2002) (hereinafter "RAI Response"); and a letter from B.M. Moore, NFS, to NRC, regarding "Additional Information to Support an Environmental Review for BLEU Project" (January 15, 2002) (hereinafter "Additional Information Letter"). *See* EA at 5-4 – 5-5; Makhijani Declaration, pars. 3 and 4. In fact, however, the EA reports radiological discharge estimates from only one of those sources, the Additional Information Letter. *Id.,* par. 5. Significantly higher estimates in the RAI Response are not reported in the tables or anywhere else in the EA; nor is the discrepancy explained.

For instance, the EA does not provide data from the RAI Response which estimates liquid plutonium discharge estimates that are six times higher than reported in the EA. Makhijani Declaration, pars. 6-8. As discussed in paragraph 8 of Dr. Makhijani's Declaration, he considers this discrepancy to be significant for two important reasons. First, assuming that the dose is proportional to the release, the higher figure of plutonium releases would cause the estimated plutonium dose to increase from 0.436 mrem to about 2.7 mrem. By itself, this plutonium dose is higher than the entire dose estimate from all radionuclides via that water pathway in the EA. A 2.7 mrem dose from plutonium is also far higher than that typically expected from atmospheric testing fallout, which is the basic point of comparison for plutonium doses when that comparison is to "background" dose from plutonium. Second, the discrepancy raises a significant concern that NFS and the NRC do not have an adequate basis for estimating plutonium releases.

If plutonium release estimates can increase by a factor of six in the two months that elapsed between the January 15, 2002, Additional Information Letter and the March 15, 2002, RAI Response, Dr. Makhijani questions what is to guarantee that they will not increase again by a factor of six, ten or even fifty in the next two years? Makhijani Declaration, pars. 8, 13.

Similarly, the EA fails to disclose discrepancies in NFS's estimates of airborne radiological releases. Table 5.2 fails to report higher estimates of plutonium and americium discharges that are contained in the RAI Response. The plutonium discharge estimates in the RAI Response are between six and almost 39 times higher than the levels estimated in the EA and the Additional Information Letter. The americium discharge estimates reported in the RAI Response are between nine and almost 60 times higher than the estimates reported in the EA and the Additional Information Letter. Makhijani Declaration, paragraphs 10-12.

Also disturbing is NFS's acknowledgement that its estimates of radiological discharges to the environment may increase again in the future. Makhijani Declaration, par. 13.

As Dr. Makhijani concludes, the discrepancies cited above are significant for two important reasons. First, they indicate that releases from the proposed BLEU Project may be significantly higher than estimated by the NRC or NFS. Second, they also demonstrate an unacceptably low level of scientific care and rigor by the NRC in preparing the EA, which undermines the credibility of the NRC's low estimates for liquid and airborne releases from the proposed BLEU Project. Makhijani Declaration, par. 14.

2. Health risks caused by illegal discharges

As discussed in the standing declarations submitted by Petitioners, their claim to standing is based not only on information in the EA regarding normal effluent discharges to the environment, but also on harm caused by illegal discharges.[5] Their concern is well-founded on NFS's acknowledged history of contaminating the environment. *See* EA, Section 3.9.

In addition, the EA specifically acknowledges the potential for contamination of the Nolichucky River by migration of contaminated groundwater from the NFS site. In Section 3.9.3, the EA describes "[h]igh localized groundwater concentrations of uranium (up to 1,223 kBq/m^3 (33,059 pCi/L)) and technetium" near surface impoundments. EA at 3-16. While the EA states in Section 3.9.3 that migration offsite has not been detected, *id.*, in Section 5.1.1.1, the EA states that:

> Groundwater monitoring conducted by NFS indicates that plumes of uranium, tetrachloroethylene, TCE, 1,2-dichloroethylene, and vinyl chloride could migrate offsite in the direction of the Nolichucky River.

EA at 5-2. Thus, in considering Petitioners' standing, the Presiding Officer must take into account the potential that illegal discharges of radiological and toxic chemicals will compound the adverse health effects of legal discharges. Given NFS's history of environmental contamination, the questionable nature of the radiological discharge estimates provided in the EA, and the known potential for migration of groundwater contamination to the Nolichucky River, the Presiding Officer is not "in a position at this threshold stage to rule out as a matter of certainty the existence of a reasonable

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[5] *See* Declaration of Frances Lamberts, pars. 4-5; Declaration of Ruth Gutierrez, pars. 4-5; Declaration of Trudy L. Wallack, par. 6; Declaration of Park Overall, par. 5.

possibility" that that radiological impacts of the proposed BLEU Project may have an adverse impact on petitioners' health. *Yankee Atomic, supra,* CLI-96-7, 43 NRC 235, 247 (1996) quoting *Yankee Atomic Electric Co.* (Yankee Nuclear Power Station), LBP-96-2, 43 NRC 61, 70 (1996).

III. PETITIONERS' AREAS OF CONCERN

Pursuant to 10 C.F.R. § 2.1205(e), Petitioners submit the following areas of concern that they seek to litigate. As required by § 1205(e), Petitioners have described their concerns "in detail," *i.e.,* with "the minimal information needed to ensure the intervenor desires to litigate issues germane to the licensing proceeding." *See* Statement of Considerations to 10 C.F.R. Part 2, Subpart L, 54 Fed. Reg. 8,269, 8,272 (February 28, 1989); *Sequoyah Fuels Corporation* (Source Materials License No. Sub-1010), LBP-94, 40 NRC 314, 316, *affirmed* 40 NRC 64 (1994). *See also Babcock & Wilcox Company* (Pennsylvania Nuclear Services Operations, Parks Township, Pennsylvania), LBP-94-12, 39 NRC 215, 217 (1994).[6]

A. Concerns Regarding Compliance With NEPA

The EA prepared by the NRC Staff is not sufficient to support the issuance of a license amendment for the proposed BLEU Preparation Facility ("BPF"), for the following reasons:

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[6] In its Memorandum and Order of November 19, 2003, the Presiding Officer suggested that parties should limit the concerns stated in their hearing requests to the safety and environmental issues raised by the particular license amendment application in question. In keeping with that order, the Petitioners have focused their environmental concerns on the impacts of the operation of the BLEU Preparation Facility, which is the principal subject of the second license amendment application. However, Petitioners wish to note that some of their concerns relate to the overall impacts of the BLEU Project.

1. The NRC Staff has not prepared a complete environmental analysis for the proposed BFP. The EA states that:

> This EA does not serve as approval for the three proposed activities, rather it assesses the environmental impacts of the actions. As each amendment application is submitted, the NRC staff will do a safety evaluation, which will be the basis for the approval or denial of the requests. As part of the safety evaluation, the NRC will perform an environmental review. If the review indicates that this EA effectively assesses the environmental effects of the proposed action, then no further assessment will be performed. However, if the environmental review indicates that this EA does not fully evaluate the environmental effects, another EA [or environmental impact statement (EIS)] will be prepared in accordance with NEPA.

EA at 1-1. The NRC has not yet conducted its safety review for the second license amendment application, and therefore it has not yet fully evaluated the environmental effects of operating the BPF.[7]

2. The operation of the proposed BPF involves activities with potentially significant environmental impacts, which have not previously been evaluated in an EA or EIS. Therefore, pursuant to the National Environmental Policy Act, 42 U.S.C. § 4332, the NRC must prepare an EIS.

a. Potentially significant impacts

The activities at the BPF involve storage, handling, and processing of very large quantities of radioactive and toxic material:

> Approximately 7.4 Mg (7.4 MT) of HEU aluminum alloy and 9.6 Mg (9.6 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

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[7] In a telephone conversation with Judges Rosenthal and Judge Cole and the parties on January 17, 2003, counsel for the NRC Staff confirmed that the Staff intends to issue separate EAs for the second and third license amendment applications. Transcript at 40-41.

> oxide to give the required low-enriched UN solution in 18.92-m^3 (5,000 gal) batches (Ref 1).

EA at 2-1. As also described in the EA, the process of converting HEU aluminum to UN solution is a "multi-stage" process involving the use of concentrated liquid chemicals, including sodium hydroxide, sodium nitrate, and barium hydroxide. *Id.*

The EA acknowledges that operation of the BPF is dangerous:

> The conversion of HEU materials to low-enriched uranium dioxide at the BLEU Project will require the handling, processing, and storage of radioactive material and hazardous chemicals. An uncontrolled release of these materials from accidents could pose a risk to the environment as well as to workers and public health and safety.

EA at 5-7. The EA further describes the hazards as follows:

> Primary hazards associated with the operation of the BLEU Preparation facility involve: spill of chemical and or radioactive material in the building, leak in a storage tank or supply piping, release of gaseous and particulate effluents (chemical and/or radioactive materials) due to a malfunction of the process off gas treatment system, and upset in the control of process parameters leading to undesirable reactions and release of hazardous or explosive compounds such as hydrogen, hydrogen peroxide, ammonia, NO2, nitric acid vapors. The loss of control of the process may include release of radioactive materials and nuclear criticality.

EA at 5-8. Thus, the EA itself demonstrates that operation of the BPF poses the risk of a serious leak, explosion or other accident that could have a significant adverse effect on the quality of the human environment. Therefore, the NRC should be required to prepare an EIS that addresses these impacts in detail, and also discusses the costs and benefits of alternatives and mitigative measures.

b. Operation of BPF involves new activities

According to the EA, some of the HEU downblending activities are "new." EA at 5-8. Thus, their environmental impacts have not been evaluated in any previous EIS or EA. However, the EA also claims that some other activities are not new:

> Many of the proposed process operations are *patterned after* existing, NRC licensed processes, so operational experience and history build confidence that operations can be executed safely.

EA at 5-7 (emphasis added). The EA also states that:

> Proposed process operations, such as the downblending of high-enriched UN to low-enriched UN, liquid-liquid extraction to purify UN solution, and HEU storage, are *very similar* to corresponding processes presently licensed under NRC License SNM-124 (Ref. 1). Other process operations are new.

Id. at 5-8 (emphasis added). The EA's statement that an activity or process is "patterned after" or "very similar to" a process that was previously evaluated in an EIS or EA does not suffice to show that no further NEPA evaluation is required. The NRC has not shown that the nature and quantity of the materials to be used at the BPF, or the processes that they will be subjected to, are so like NFS's pre-existing processes that they are covered by previous environmental analyses. Nor has the NRC shown that these issues have been addressed in the generic EIS prepared by the Department of Energy for downblending of HEU. As conceded in the EA, the DOE's generic EIS does not address site-specific environmental impacts at length. *See* EA at 1

3. In preparing the EA, the NRC Staff apparently assumed that accidents involving HEU and/or hazardous chemicals at the BPF and the BLEU Project in general are not credible, and therefore that no EIS is needed. *See, e.g.,* October 30, 2002, Federal Register Notice, 67 Fed. Reg. at 66,175 ("Accidental releases of contaminants to groundwater appear unlikely due to design and control measures implemented by NFS";

"safety controls to be employed in the processes for the BLEU Project appear to be sufficient to ensure planned processing will be safe.") However, there are three principal reasons why the EA lacks a reasonable factual basis for making such a determination.

a. NRC Staff has not completed environmental review

As discussed above, the NRC Staff has not completed its environmental review for the proposed BPF. The environmental review will be conducted in conjunction with the Staff's safety review. Given that radiological accidents constitute the principal means by which the NFS Erwin facility could have an adverse impact on the environment, and given that the NRC's chief area of expertise lies in assessing compliance with its safety regulations for the control of radiological releases, the NRC cannot be considered to have taken the proverbial "hard look" at the environmental impacts of the expansion of the NFS-Erwin facility if it has not reviewed any license amendment application regarding the safety of the proposed operation. *See Natural Resources Defense Council v. Morton,* 458 F.2d 827, 838 (D.C. Cir. 1972).

b. License amendment application concedes accidents are credible

The license amendment application for the BPF contains an extensive discussion of the chemical and radiological hazards of the materials and processes to be used at the BPF. In accordance with 10 C.F.R. § 70.61, the Integrated Safety Analysis submitted in support of the application provides a hazards analysis that evaluates the

consequences of various credible scenarios.[8] As demonstrated by a review of Chapters 3 and 4, the downblending of HEU is an inherently dangerous process, involve the use of large quantities of toxic and radiological material in a manner that has the potential to cause fires and explosions. Even if NFS has reduced the probability of accidents to acceptably low levels through the use of various control measures, this does not excuse the NRC from preparing an EIS. The environmental impacts that must be considered in an EIS include "reasonably foreseeable" impacts which have "catastrophic consequences, even if their probability of occurrence is low." 40 C.F.R. § 1502.22(b)(1). Only if the probability of accidents is so low as to be "remote and speculative" can the NRC avoid the obligation to prepare an EIS. *Limerick Ecology Action v. NRC,* 869 F.2d 719, 745 (3rd Cir. 1989), citing *Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council, Inc.,* 435 U.S. 519, 551 (1978).

c. NFS history of environmental contamination

The NRC Staff appears to base its Finding of No Significant Impact on the assumption that NFS will comply with its permit. However, over the course of its operating history, NFS has had a long history of exceeding permit limitations with respect to the emission of effluent to the environment, with the result that soil and groundwater on the Erwin site are contaminated. *See* Section 3.9 of the EA. As discussed above at page 6, the EA also raises the concern that contaminated groundwater

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[8] *See* Letter from B. Marie Moore, NFS, to Director, NMSS, NRC, re: ISA Summary for the BLEU Preparation Facility (October 14, 2002) and Attachment II, ISA Summary (Non-Proprietary Version).

may migrate offsite.[9] In addition, NFS has reported and/or been cited on numerous occasions for violations of its permit, some of which resulted in spills and/or exposure of workers to contamination. These incidents demonstrate a serious risk that NFS will continue to pollute the environment, causing significant adverse impacts to the health and welfare of workers, the public, and the general environment. NFS is also responsible for significant environmental contamination elsewhere: in 2001, cleanup costs at the former nuclear fuel processing plant in West Valley, New York, were estimated at $4.5 billion.[10]

4. Impacts of acts of malice or insanity on BPF

Operation of the BPF will involve transport, storage, handling, and processing of tons of HEU, an attractive target for terrorists and insane individuals who might seek to do harm to the facility, or to steal HEU for the production of a nuclear weapon. As noted in a recent publication by the Pugwash Conferences on Science and World Affairs, a relatively small amount of HEU can be made into a crude but powerful nuclear bomb using information available in open and easily available sources.[11] The events of September 11, 2001, and subsequent investigations by the NRC, demonstrate that such an

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[9] NFS has been sued by a neighboring landowner for offsite groundwater contamination. *See Impact Plastics Incorporated, Preston Tool and Mold Inc. and General M. O'Connor v. NFS Inc.* (No. 2:02CV148). The case is now pending in Federal District Court for the Eastern District of Tennessee in Greenville.

[10] GAO-01-314, Nuclear Waste: Agreement Among Agencies Responsible for the West Valley Site is Critically Needed (May 2001).

[11] Jeffrey Boutwell, Francesco Calogero, Jack Harris, *Nuclear Terrorism: The Danger of Highly Enriched Uranium (HEU),* Pugwash Issue Brief (September 2002). A copy of this report can be found at www.pugwash.org/publication.htm.

attack or theft is foreseeable. An EIS should be prepared to address the significant risk of such intentional destructive acts or theft of HEU.[12]

B. Safety Concerns Regarding the February 28, 2002 Application

1. NFS has not demonstrated that it has made adequate arrangements to fund the decommissioning of the BPF at the end of the facility's life, and thus has not demonstrated compliance with 10 C.F.R. § 70.23(a)(5) or § 70.25. Consideration of the adequacy of financial assurance for decommissioning should take into account NFS's liability for cleaning up existing contamination on the NFS site, and also at West Valley, New York. The NRC should not license an expanded operation at the Erwin site until it has reasonable assurance that NFS has adequate resources to clean up *both* existing contamination and any additional contamination that may occur as a result of operation of the BPF.

2. NFS has not demonstrated that it can and will comply with 10 C.F.R. §§ 70.23(a)(2), (3), or (4) in operating the BPF. These provisions require that the application must show that:

> (2) The applicant is qualified by reason of training and experience to use the material for the purpose requested in accordance with the regulations in this chapter;
> (3) The applicant's proposed equipment and facilities are adequate to protect health and minimize danger to life or property;

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[12] Petitioners acknowledge that recent decisions by the Commission hold that the National Environmental Policy Act does not require consideration of the impacts of terrorist attacks in EISs, and that this contention would be inadmissible under those holdings. *See, e.g., Private Fuel Storage, LLC* (Independent Spent Fuel Storage Installation), CLI-02-25 (December 18, 2002). Nevertheless, Petitioners ask the Presiding Officer to rule on the admissibility of this concern, in order to preserve their rights of appeal.

(4) The applicant's proposed procedures to protect health and to minimize danger to life or property are adequate.

As discussed above in Section II, NFS has a long history of contaminating the soil and groundwater at the NFS site, and is also alleged to have caused offsite contamination. NFS has also been cited on numerous occasions for violations of its permit, including violations that resulted in spills or contamination of workers.[13] Taken together, these incidents reflect a pervasive pattern of inadequacies in management, procedures, and equipment that undermine NFS's ability to comply with NRC safety regulations.

[13] *See, e.g.,* NRC Inspection Report 2002-205 (September 9, 2002) (failure to follow procedure resulted in inadvertent discharge of fissile solution; conduct of process operations involving critical masses of fissile material) NRC Inspection Report 2001-09 (February 8, 2002) (failure to detect, report or control worker contamination); EA-99-218 (October 19, 1999) (NFS cited for failure to conduct searches in accordance with physical protection plan, failure to follow procedures for special nuclear material, and failure to control and account for SNM in assigned locations); EA-96-213 (EA cited for inadequate configuration control and management system).

IV. CONCLUSION

For the foregoing reasons, petitioners have demonstrated that they have standing to participate in this proceeding. Moreover, they have presented a set of admissible areas of concern.

Respectfully submitted,

Diane Curran
Harmon, Curran, Spielberg & Eisenberg, LLP
1726 M Street N.W., Suite 600
Washington, DC 20036
202/328-3500
FAX: 202/328-6918
e-mail: dcurran@harmoncurran.com

Dated: February 6, 2003

January 6, 2003

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
BEFORE THE PRESIDING OFFICER

In the matter of	)	
	)	
Nuclear Fuel Services, Inc.	)	Docket No. 70-143
	)	
(Materials License SNM-124)	)	
	)	

DECLARATION OF JANUARY 6, 2003 BY DR. ARJUN MAKHIJANI

Under penalty of perjury, I, Dr. Arjun Makhijani, declare as follows:

1. I am President of the Institute for Energy and Environmental Research. IEER has been doing nuclear-related studies for more than fifteen years and is an independent non-profit organization located in Takoma Park, Maryland. Under my direction, IEER produces technical studies on a wide range of environmental issues to provide advocacy groups and policymakers with sound scientific information and analyses as applied to environmental and health protection and for the purpose of promoting the understanding and the democratization of science.

2. I have a Ph.D. (Engineering), granted by the Department of Electrical Engineering of the University of California, Berkeley, where I specialized in the application of plasma physics to controlled nuclear fusion. I also have a master's degree in electrical engineering from Washington State University, and a bachelor's degree in electrical engineering from the University of Bombay. I am qualified by training and experience as an expert in the fields of plasma physics, electrical engineering, nuclear engineering, and energy-related technology and policy issues. I have served as a nuclear engineering expert witness in lawsuits and testified as such. A copy of my curriculum vita is attached as Exhibit 1 to this declaration. Over the past 30 years, I have developed extensive experience with nuclear fuel cycle-related issues, including standards and strategies for radioactive waste storage and disposal, accountability with respect to measurement of radioactive effluent from nuclear facilities, health and environmental effects of nuclear testing, strategies for disposition of fissile materials, energy efficiency, and other energy-related issues. As reflected in my curriculum vita, which is attached, I have authored or co-authored many publications on these subjects. I have testified before Congress on several occasions regarding issues related to nuclear waste, reprocessing, environmental releases of radioactivity, and regulation of nuclear weapons plants. Since 1997, I have been on the expert team monitoring independent audits of the compliance of Los Alamos National Laboratory with the radiation release portion of the Clean Air Act (40 CFR 61 Subpart H), conducted under a Consent Decree, which was the result of a federal court finding that Los Alamos was out of compliance with Subpart H. In that capacity I have reviewed extensive records, models, facilities, procedures, measurements, and other

aspects of the Los Alamos National Laboratory air emissions control and measurement program in order to determine whether the audits were being properly conducted and whether they were thoroughly done. I have also served as a member of the Radiation Advisory Committee of the U.S. Environmental Protection Agency's (EPA's) Science Advisory Board from 1992 to 1994 and on the EPA's Advisory Subcommittee on Radiation Standards, which is part of the National Advisory Committee on Environmental Policy and Technology. In addition, I have served as a consultant to numerous organizations, as mentioned in my CV.

3. I have reviewed the estimates of radiological releases for the proposed BLEU Project at the NFS-Erwin plant, which are contained in Tables 5.1 and 5.2 of the U.S. Nuclear Regulatory Commission's (NRC's) Environmental Assessment for Proposed License Amendments to Special Nuclear Material License No. SNM-124 Regarding Downblending and Oxide Conversion of Surplus High-Enriched Uranium, Nuclear Fuel Services, Inc., Erwin, Tennessee Plant, Docket 70-143 (June 2002). I have also reviewed related information in two NFS documents that are cited by the NRC as the documentation of the calculations and the Environmental Assessment's (EA's) estimates of radioactive and chemical effluent releases for the proposed BLEU Project. These documents consist of a letter from B.M. Moore, NFS, to NRC, regarding "NFS Responses to NRC's Request for Additional Information to Support an Environmental Review for the BLEU Project" (March 15, 2002) (hereinafter "RAI Response"); and a letter from B.M. Moore, NFS, to NRC, regarding "Additional Information to Support an Environmental Review for BLEU Project" (January 15, 2002) (hereinafter "Additional Information Letter"). The Additional Information Letter and RAI Response are cited in Section 5 of the EA as References 5 and 8, respectively. I have been assisted in this review by Annie Makhijani, Project Scientist at Institute for Energy and Environmental Research (M.S., Chemistry, University of Maryland, 1994).

4. In Section 5.1.1.2 of the EA, the NRC addresses radiological impacts of the proposed BLEU Project operations. According to the EA:

> Based on source material properties and processing information, NFS has estimated the quantities of airborne and liquid effluents and used this information to estimate doses to the maximally exposed individual. The documentation of these calculations are [sic] provided in the additional information letter (Ref. 5) and RAI response (Ref. 8). Effluent and dose calculation results by release point are provided in Tables 5.1 and 5.2.

5. As discussed above in paragraph 4, the text of the EA cites both the Additional Information Letter and the RAI Response as sources of the information contained in Tables 5.1 and 5.2 of the EA. Nevertheless, my review of these documents show that the EA ignores data in the RAI Response that is substantially different from the data provided in the Additional Information Letter. The RAI Response contains estimates for liquid and airborne releases of plutonium and uranium that are significantly higher than the estimates provided in the EA and Additional Information Letter. For ease of reference, copies of the relevant tables from the EA, the Additional Information Letter, and the RAI Response are attached as exhibits to this Declaration. The exhibits are as follows:

Exhibit 2: EA Table 5.1;
Exhibit 3: EA Table 5.2;
Exhibit 4: Additional Information Letter, Attachment 23, Table 1;
Exhibit 5: Additional Information Letter, Attachment 23, Table 2;
Exhibit 6: Additional Information Letter, Attachment 22, Table 1;
Exhibit 7: RAI Response, Attachment IV, Table 3-1;
Exhibit 8: RAI Response, Attachment IV, Table 3-3
Exhibit 9: RAI Response, Attachment IV, page 3

Liquid Effluent Estimates

6. Table 5.1 of the EA is entitled "Comparison of current liquid effluent releases with estimated effluents and doses from the proposed action." Despite the fact that the text of the EA cites the RAI Response as part of the "documentation of these calculations" (pp. 5-4 and 5-5), the table itself does not use or cite data from the RAI Response. Instead, the EA relies solely on the Additional Information Letter, as indicated in the note below Table 5.1. However, the RAI Response contains an estimate of plutonium discharged into the liquid stream that is about six times higher than the estimate reported in the EA and the Additional Information Letter. It also contains an estimate of americium discharged to the liquid stream that is more than nine times higher than reported in the EA and the additional information letter. This is demonstrated below in Table 1:

Table 1: Discrepancies in Estimates of Liquid Effluent between the EA/Additional Information Letter and the RAI Response

Radionuclide	EA Table 5.1 Ci/yr	Additional Information Letter (Attachment 23, Table 1) Ci/yr	RAI Response (Attachment IV, Table 3-3) Ci/yr	Absolute difference between RAI resp and EA	Ratio of estimates (RAI Resp/EA)
Uranium (232, 233, 234, 235, 236, 238)	1.05E-04	1.10E-04	1.30E-04	2.50E-05	1.24
Thorium (228, 230, 231, 232, 234)	9.10E-03	9.10E-03	9.10E-03	0.00E+00	1
Plutonium (238, 239/240, 241)	3.09E-02	3.10E-02	1.90E-01	1.59E-01	6.15
Americium	5.56E-04	5.56E-04 (from Attachment 23 Table 2)	5.3E-03 (Attachment G)	4.74E03	9.53
Technetium	1.75E-04	1.80E-04	1.80E-04	(rounding difference only)	(rounding difference only)

7. In Table 5.1 of the EA, the NRC used the lower plutonium discharge figure from the Additional Information Letter, without providing any explanation as to why it ignored the higher figure in the RAI Response. Nor did the EA explain what caused the liquid plutonium discharge estimate to increase by a factor of six in the short space of the two months that passed between the submittal of the Additional Information Letter and the RAI Response.

8. I consider the EA's failure to report the estimate in the RAI Response significant, for two important reasons. First, assuming that the dose is proportional to the release, the higher figure of plutonium releases would cause the plutonium dose to increase from 0.436 (last column of table 5.1 on page 5-5 of the EA) to about 2.7 mrem. The latter figure for plutonium dose alone is higher than the entire dose estimate from all radionuclides via that water pathway in the EA. The 2.7 mrem dose from plutonium is far higher than that typically expected from plutonium in atmospheric testing fallout, which is the basic point of comparison for plutonium doses when that comparison is to "background" dose from plutonium. Second, the discrepancy raises a significant concern that NFS and the NRC do not have an adequate basis for estimating plutonium releases. If plutonium release estimates can increase by a factor of more than six in two months, what is to guarantee that they will not increase again (see below).

Airborne Effluent Estimates

9. Table 5.2 of the EA is entitled "Comparison of current airborne effluents with estimated effluents from the proposed action (including the combined dose estimates.)" Despite the fact that the text of the EA cites the March 15, 2002, RAI Response as part of the "documentation of these calculations" (pp. 5-4, 5-5), Table 5.2 itself does not use or cite data from the RAI Response. Instead, it relies solely on the January 15, 2002, Additional Information Letter, as stated at the note at the bottom of Table 5.2. Once again, the omission is significant, because various estimates of airborne plutonium releases to the air from different facilities are from six to almost 39 times higher in the RAI Response than in the EA or the Additional Information Letter. Similarly, estimates of americium releases are nine to almost 59 times higher in the RAI Response than in the EA and Additional Information Letter.

10. Tables 2, 3, and 4 below illustrate the fact that for each sector for which airborne radiological estimates are provided (BLEU Production Facility, BLEU Complex, Waste Water Treatment Facility), Table 5.2 of the EA ignores some significantly higher discharge estimates in the RAI Response for certain radionuclides, including plutonium and americium.

Table 2: BLEU Preparation Facility Air Effluent Discrepancies

Radionuclide	EA Table 5.2 , and Additional Information Letter, Attachment 22, Table 1 Ci/yr	RAI Response, Attachment IV, Table 3-1 Ci/yr	Absolute Difference	Ratio of estimates
Uranium	1.10E-03	1.10E-03	0.00E+00	no change
Thorium	1.70E-05	1.70E-05	0.00E+00	no change
Plutonium	1.40E-07	8.50E-07	7.10E-07	6.07
Americium	2.50E-09	2.30E-08	2.05E-08	9.20

Table 3: BLEU Complex Air Effluent Estimate Discrepancies

Radionuclide	EA Table 5.2 , and Additional Information Letter, Attachment 22, Table 1 Ci/yr	RAI Response, Attachment IV, Table 3-1 Ci/yr	Absolute Difference	Ratio of estimates
Uranium	2.30E-05	2.30E-05	0.00E+00	no change
Thorium	3.40E-07	3.40E-07	0.00E+00	no change
Plutonium	2.80E-09	1.80E-08	1.52E-08	6.43
Americium	5.00E-11	4.80E-10	4.30E-10	9.6

Table 4: Waste Water Treatment Facility Air Effluent Estimate Discrepancies

Radionuclide	EA Table 5.2 , and Additional Information Letter, Attachment 22, Table 1 Ci/yr	RAI Response, Attachment IV, Table 3-1 Ci/yr	Absolute Difference	Ratio of estimates
Uranium	4.70E-05	4.80E-05	1E-06	1.02
Thorium	2.00E-05	1.20E-04	1.00E-04	6
Plutonium	1.60E-07	6.20E-06	6.04E-06	38.8
Americium	2.90E-09	1.70E-07	1.67E-07	58.6

11. Just as it did with respect to liquid plutonium discharge estimates in Table 5.1 of the EA, in Table 5.2 the NRC used the Additional Information Letter's lower airborne plutonium and americium discharge estimates for the BLEU Preparation Facility (BPF), without providing any explanation as to why it ignored the higher figures in the RAI Response. Nor did the EA explain what caused the plutonium and americium airborne discharge estimates to increase by factors ranging from 6 to nearly 59 respectively, in the short space of the two months that passed between the submittal of the Additional Information Letter and the RAI Response.

Other Problems

12. The EA has not been prepared with due diligence on other grounds as well. Specifically, the source terms for liquid effluents listed in Table 5.1 of the EA do not correspond to the doses listed for those releases. Rather, a detailed examination of the Additional Information Letter and the RAI Response against the estimates in Table 5.1 led me to conclude that the dose estimate in Table 5.1 includes many more radionuclides than are listed there. The lumping together of decay products should have been specified in the table. It is misleading not to have done so.

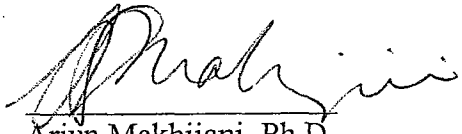
Conclusions

13. I consider the six-fold increase of plutonium in liquid discharges and the six to almost 59 fold increases in airborne discharges of transuranic radionuclide estimates that is reflected in a comparison of the EA, NFS's Additional Information Letter, and RAI Response to be significant. As discussed above, if plutonium release estimates can increase by a factor of six in two months, what is to guarantee that they will not increase again by a factor of six, ten, or even fifty in the next two years? If it increases again by about a factor of four, it would exceed the claimed ALARA limit of 10 millirem.
NFS itself has stated on page 3 of Attachment IV of the RAI Response that its discharge estimates may go up in the future by unspecified amounts, raising questions about the validity of the analysis and the assurances provided to the public in the EA:

> The concentrations for the caustic discharge stream were calculated assuming that the percentages of uranium and the radioactive impurities going with the caustic discharge stream remain unchanged. The BFP process will use centrifuges to separate the uranium from the caustic discharge stream. These centrifuges may change the radionuclides ratios, causing some of the impurities to be concentrated in the caustic discharge stream. If the radioactive impurities are concentrated to a significant degree, the consequences analyzed using the data in Table 2-2 may be biased low. When a consequence has been evaluated as being just below the next higher consequence level, more accurate source term data may be needed to ensure that the consequence level is not any higher than what was already indicated.

14. In summary, I find that the discrepancies cited above, between the EA/Additional Information Letter and the RAI Response, are significant, for two important reasons. First, they indicate that releases from the proposed BLEU Project may be significantly higher than estimated by the NRC or NFS. Second, they also demonstrate an unacceptably low level of scientific care and rigor by the NRC in preparing the EA, which undermines the credibility of the NRC's low estimates for liquid and airborne releases from the proposed BLEU Project.

I certify that the factual information presented above is true and correct to the best of my knowledge, and that the opinions expressed herein are based on my best professional judgment.



Arjun Makhijani, Ph.D

Dated: January 6, 2002

Curriculum Vita of
Arjun Makhijani

Address and Phone:

Institute for Energy and Environmental Research
6935 Laurel Ave., Suite 204
Takoma Park, MD 20912
Phone: 301-270-5500
e-mail: arjun@ieer.org
Website www.ieer.org

Education:

Ph.D. University of California, Berkeley, 1972, from the Department of Electrical Engineering. Area of specialization: plasma physics as applied to controlled nuclear fusion. Dissertation topic: multiple mirror confinement of plasmas.

M.S. (Electrical Engineering) Washington State University, Pullman, Washington, 1967. Thesis topic: electromagnetic wave propagation in the ionosphere.

Bachelor of Engineering (Electrical), University of Bombay, Bombay, India, 1965.

Current Employment:

1987-present: President and Senior Engineer, Institute for Energy and Environmental Research, Takoma Park, Maryland. (part-time in 1987).

Other Long-term Employment

1984-88: Associate Professor, Capitol College, Laurel, Maryland (part-time in 1988).

1983-84: Assistant Professor, Capitol College, Laurel, Maryland.

1977-79: Visiting Professor, National Institute of Bank Management, Bombay, India. Principal responsibility: evaluation of the Institute's extensive pilot rural development program.

1975-87: independent consultant (see page 2 for details)

1972-74: Project Specialist, Ford Foundation Energy Policy Project. Responsibilities included research and writing on the technical and economic aspects of energy conservation and supply in the U.S.; analysis of Third World rural energy problems; preparation of requests for proposals; evaluation of proposals; and the management of grants made by the Project to other institutions.

1969-70: Assistant Electrical Engineer, Kaiser Engineers, Oakland California. Responsibilities included the design and checking of the electrical aspects of mineral industries such as cement plants, and plants for processing mineral ores such as lead and uranium ores. Pioneered the use of the desk-top computer at Kaiser Engineers for performing electrical design calculations.

Professional Societies:

Institute of Electrical and Electronics Engineers and its Power Engineering Society
American Physical Society
Health Physics Society
American Association for the Advancement of Science

Awards:

The John Bartlow Martin Award for Public Interest Magazine Journalism of the Medill School of Journalism, Northwestern University, 1989, with Robert Alvarez.

Consulting Experience, 1975-1987

Consultant on a wide variety of issues relating to technical and economic analyses of alternative energy sources; electric utility rates and investment planning; energy conservation; analysis of energy use in agriculture; US energy policy; energy policy for the Third World; evaluations of portions of the nuclear fuel cycle.

Partial list of institutions to which I was a consultant in the 1975-87 period:

Tennessee Valley Authority
Lower Colorado River Authority
Federation of Rocky Mountain States
Environmental Policy Institute
Lawrence Berkeley Laboratory
Food and Agriculture Organization of the United Nations
International Labour Office of the United Nations
United Nations Environment Programme
United Nations Center on Transnational Corporations
The Ford Foundation
Economic and Social Commission for Asia and the Pacific
United Nations Development Programme

Languages: English, French, Hindi, Sindhi, and Marathi.

Reports, Books, and Articles (Partial list)

Hower, G.L. and A. Makhijani, "Further Comparison of Spread-F and Backscatter Sounder Measurements," *Journal of Geophysical Research*, ***74***, p. 3723, 1969.

Makhijani, A., and A.J. Lichtenberg, *An Assessment of Energy and Materials Utilization in the U.S.A.*, University of California Electronics Research Laboratory, Berkeley, 1971.

Logan, B. G., A.J. Lichtenberg, M. Lieberman, and A. Makhijani, "Multiple-Mirror Confinement of Plasmas," *Physical Review Letters*, ***28***, 144, 1972.

Makhijani, A., and A.J. Lichtenberg, "Energy and Well-Being," *Environment*, ***14***, 10, June 1972.

Makhijani, A., A.J. Lichtenberg, M. Lieberman, and B. Logan, "Plasma Confinement in Multiple Mirror Systems. I. Theory," *Physics of Fluids*, ***17***, 1291, 1974.

A Time to Choose: America's Energy Future, final report of the Ford Foundation Energy Policy Project, Ballinger, Cambridge, 1974. One of many co-authors.

Makhijani, A., and A. Poole, *Energy and Agriculture in the Third World*, Ballinger, Cambridge, 1975.

Makhijani, A. *Energy Policy for the Rural Third World*, International Institute for Environment and Development, London, 1976.

Kahn, E., M. Davidson, A. Makhijani, P. Caeser, and S. Berman, *Investment Planning in the Energy Sector*, Lawrence Berkeley Laboratory, Berkeley, 1976.

Makhijani, A. "Solar Energy for the Rural Third World," *Bulletin of the Atomic Scientists*, May 1977.

Makhijani, A. "Energy Policy for Rural India," *Economic and Political Weekly*, 12, Bombay, 1977.

Makhijani, A., *Some Questions of Method in the Tennessee Valley Authority Rate Study*, Report to the Tennessee Valley Authority, Chattanooga, 1978.

Makhijani, A., *The Economics and Sociology of Alternative Energy Sources*, Economic and Social Commission for Asia and the Pacific, 1979.

Makhijani, A., *Energy Use in the Post-Harvest Component of the Food Systems in Ivory Coast and Nicaragua*, Food and Agriculture Organization of the United Nations, Rome, 1982.

Makhijani, A., *Oil Prices and the Crises of Debt and Unemployment: Methodological and Structural Aspects*, International Labour Office of the United Nations, Final Draft Report, Geneva, April 1983.

Makhijani, A., and D. Albright, *The Irradiation of Personnel at Operation Crossroads,* International Radiation Research and Training Institute, Washington, D.C., 1983.

Makhijani, A., K.M. Tucker, with Appendix by D. White, *Heat, High Water, and Rock Instability at Hanford*, Health and Energy Institute, Washington, D.C., 1985.

Makhijani, A., and J. Kelly, *Target: Japan - The Decision to Bomb Hiroshima and Nagasaki,* a report published as a book in Japanese under the title, *Why Japan*? Kyoikusha, Tokyo, 1985.

Makhijani, A., *Experimental Irradiation of Air Force Personnel During Operation Redwing - 1956*, Environmental Policy Institute, Washington, D.C., 1985.

Makhijani, A., and R.S. Browne, "Restructuring the International Monetary System," *World Policy Journal*, New York, Winter, 1985-86.

Makhijani, A., R. Alvarez, and B. Blackwelder, *Deadly Crop in the Tank Farm: An Assessment of Management of High-Level Radioactive Wastes in the Savannah River Plant Tank Farm*, Environmental Policy Institute, Washington, D.C., 1986.

Makhijani, A., "Relative Wages and Productivity in International Competition," *College Industry Conference Proceedings*, American Society for Engineering Education, Washington, D.C., 1987.

Makhijani, A., *An Assessment of the Energy Recovery Aspect of the Proposed Mass Burn Facility at Preston, Connecticut*, Institute for Energy and Environmental Research, Takoma Park, 1987.

Makhijani, A., R. Alvarez, and B. Blackwelder, *Evading the Deadly Issues: Corporate Mismanagement of America's Nuclear Weapons Production*, Environmental Policy Institute, Washington, D.C., 1987.

Makhijani, A., *Release Estimates of Radioactive and Non-Radioactive Materials to the Environment by the Feed Materials Production Center, 1951-85*, Institute for Energy and Environmental Research, Takoma Park, 1988.

Alvarez, R. and A. Makhijani, "The Hidden Nuclear Legacy," *Technology Review*, 91, 42,1988.

Makhijani, A., Annie Makhijani, and A. Bickel, *Saving Our Skins: Technical Potential and Policies for the Elimination of Ozone-Depleting Chlorine Compounds*, Environmental Policy Institute and Institute for Energy and Environmental Research, Takoma Park, 1988.

Makhijani, A., Annie Makhijani, and A. Bickel, *Reducing Ozone-Depleting Chlorine and Bromine Accumulations in the Stratosphere: A Critique of the U.S. Environmental Protection Agency's Analysis and Recommendations*, Institute for Energy and Environmental Research and Environmental Policy Institute/Friends of the Earth, Takoma Park, 1989.

Makhijani, A., and B. Franke, *Addendum to Release Estimates of Radioactive and Non-Radioactive Materials to the Environment by the Feed Materials Production Center, 1951-85*, Institute for Energy and Environmental Research, Takoma Park, 1989.

Makhijani, A., *Global Warming and Ozone Depletion: An Action Program for States*, Institute for Energy and Environmental Research, Takoma Park, 1989.

Makhijani, A., *Managing Municipal Solid Wastes in Montgomery County*, Prepared for the Sugarloaf Citizens Association, Institute for Energy and Environmental Research, Takoma Park, 1990.

S. Saleska and A. Makhijani, *To Reprocess or Not to Reprocess: The Purex Question - A Preliminary Assessment of Alternatives for the Management of N-Reactor Irradiated Fuel at the U.S. Department of Energy's Hanford Nuclear Weapons Production Facility*, Institute for Energy and Environmental Research, Takoma Park, 1990.

Makhijani, A., "Common Security is Far Off," *Bulletin of the Atomic Scientists*, May 1990.

Makhijani, A., *Draft Power in South Asian Agriculture: Analysis of the Problem and Suggestions for Policy*, prepared for the Office of Technology Assessment, Institute for Energy and Environmental Research, Takoma Park, 1990.

Mehta, P.S., S.J. Mehta, A.S. Mehta, and A. Makhijani, "Bhopal Tragedy's Health Effects: A Review of Methyl Isocyanate Toxicity," *JAMA 264*, 2781, December 1990.

Special Commission of International Physicians for the Prevention of Nuclear War and the Institute for Energy and Environmental Research, *Radioactive Heaven and Earth: The Health and Environmental Effects of Nuclear Weapons Testing In, On, and Above the Earth*, Apex Press, New York, 1991. One of many co-authors.

Makhijani, A. and S. Saleska, *High Level Dollars Low-Level Sense: A Critique of Present Policy for the Management of Long-Lived Radioactive Waste and Discussion of an Alternative Approach*, Apex Press, New York, 1992.

Makhijani, A., *From Global Capitalism to Economic Justice: An Inquiry into the Elimination of Systemic Poverty, Violence and Environmental Destruction in the World Economy*, Apex Press, New York, 1992.

Special Commission of International Physicians for the Prevention of Nuclear War and the Institute for Energy and Environmental Research, *Plutonium: Deadly Gold of the Nuclear Age*, International Physicians Press, Cambridge, MA, 1992. One of several co-authors.

Makhijani, A., "Energy Enters Guilty Plea," *Bulletin of the Atomic Scientists,* March/April 1994.

Makhijani, A., "Open the Files," *Bulletin of the Atomic Scientists,* Jan./Feb. 1995.

Makhijani, A., " 'Always' the Target?" *Bulletin of the Atomic Scientists*, May/June 1995.

Makhijani, A. and Annie Makhijani, *Fissile Materials in a Glass, Darkly: Technical and Policy Aspects of the Disposition of Plutonium and Highly Enriched Uranium,* IEER Press, Takoma Park, 1995.

Makhijani, A. and K. Gurney, *Mending the Ozone Hole: Science, Technology, and Policy*, MIT Press, Cambridge, MA, 1995.

Makhijani, A., H. Hu, K. Yih, eds., *Nuclear Wastelands: A Global Guide to Nuclear Weapons Production and the Health and Environmental Effects*, MIT Press, Cambridge, MA, 1995.

Zerriffi, H. and A. Makhijani, *The Nuclear Safety Smokescreen- Warhead Safety and Reliability and the Science Based Stockpile Stewardship Program*, Institute for Energy and Environmental Research, Takoma Park, May 1996.

Zerriffi, H. and A. Makhijani, "The Stewardship Smokescreen," *Bulletin of the Atomic Scientists,* September/October 1996.

Makhijani, A. *Energy Efficiency Investments as a Source of Foreign Exchange*, prepared for the International Energy Agency Conference in Chelyabinsk, Russia, 24-26 September 1996.

Makhijani, A. "India's Options," *Bulletin of the Atomic Scientists,* March/April 1997.

Ortmeyer, P. and A. Makhijani, "Worse than We Knew," *Bulletin of the Atomic Scientists,* November/December 1997.

Fioravanti, M. and A. Makhijani, *Containing the Cold War Mess: Restructuring the Environmental Management of the U.S. Nuclear Weapons Complex,* Institute for Energy and Environmental Research, Takoma Park, October 1997.

Principal author of three chapters in Schwartz, S., ed., *Atomic Audit: The Costs and Consequences of U.S. Nuclear Weapons Since 1940*, Brookings Institution, Washington, D.C., 1998.

Fioravanti, M. and A. Makhijani, *Supplement to Containing the Cold War Mess- IEER's Response to the Department of Energy's Review*, Institute for Energy and Environmental Research, Takoma Park, March 1998.

Makhijani, A., "A Legacy Lost," *Bulletin of the Atomic Scientists,* July/August 1998.

Makhijani, A. and Hisham Zerriffi, *Dangerous Thermonuclear Quest: The Potential of Explosive Fusion Research for the Development of Pure Fusion Weapons,* Institute for Energy and Environmental Research, Takoma Park, July 1998.

Makhijani, A. and Scott Saleska, *The Nuclear Power Deception - U.S. Nuclear Mythology from Electricity "Too Cheap to Meter" to "Inherently Safe" Reactors*, Apex Press, New York, 1999

Makhijani, A., "Stepping Back from the Nuclear Cliff," *The Progressive*, vol. 63, no. 8, August 1999.

Makhijani, A., Bernd Franke, and Hisham Zerriffi, *Preliminary Partial Dose Estimates from the Processing of Nuclear Materials at Three Plants during the 1940s and 1950s*, Institute for Energy and Environmental Research, Takoma Park, September 2000. (Prepared under contract to the newspaper *USA Today*.)

Makhijani, A. and Bernd Franke, *Final Report of the Institute for Energy and Environmental Research on the Second Clean Air Act Audit of Los Alamos National Laboratory by the Independent Technical Audit Team,* Institute for Energy and Environmental Research, Takoma Park, December 13, 2000.

Makhijani, A., *Plutonium End-Game: Managing Global Stocks of Separated Weapons-Usable Commercial and Surplus Nuclear Weapons Plutonium*, Institute for Energy and Environmental Research, Takoma Park, January 2001.

Makhijani, Arjun, Hisham Zerriffi, and Annie Makhijani, "Magical Thinking: Another Go at Transmutation,"*Bulletin of the Atomic Scientists,* March/April 2001.

Makhijani, A., *Ecology and Genetics: An Essay on the Nature of Life and the Problem of Genetic Engineering*. New York: Apex Press, 2001.

Makhijani, A. "Burden of Proof," *Bulletin of the Atomic Scientists,* July/August 2001.

Makhijani, A. "Reflections on September 11, 2001," in Kamla Bhasin, Smitu Kothari, and Bindia Thapar, eds., *Voices of Sanity: Reaching Out for Peace*, Lokayan, New Delhi, 2001, pp. 59-64.

Makhijani, A. and Michele Boyd, *Poison in the Vadose Zone: An examination of the threats to the Snake River Plain aquifer from the Idaho National Engineering and Environmental Laboratory* Institute for Energy and Environmental Research, Takoma Park, October 2001.

Makhijani, A. *Securing the Energy Future of the United States: Securing the Energy Future of the United States: Oil, Nuclear, and Electricity Vulnerabilities and a post-September 11, 2001 Roadmap for Action*, Institute for Energy and Environmental Research, Takoma Park, November 2001.

Makhijani, A. and Sriram Gopal, *Setting Cleanup Standards to Protect Future Generations: The Scientific Basis of Subsistence Farmer Scenario and Its Application to the Estimation of Radionuclide Soil Action Levels (RSALs) for Rocky Flats*, Institute for Energy and Environmental Research, Takoma Park, December 2001.

Makhijani, A., "Some Factors in Assessing the Response to September 11, 2001," *Medicine and Global Survival*, International Physicians for the Prevention of Nuclear War, Cambridge, Mass., February 2002.

Deller, N., A. Makhijani, and J. Burroughs, eds., *Rule of Power or Rule of Law? An Assessment of U.S. Policies and Actions Regarding Security-Related Treaties*, Institute for Energy and Environmental Research and Lawyers' Committee on Nuclear Policy, Takoma Park and New York, April 2002.

calculations are provided in the additional information letter (Ref. 5) and RAI response (Ref. 8). Effluent and dose calculation results by release point are provided in Tables 5.1 and 5.2. While some effluents for the proposed action are increasing in relation to current releases, the total annual dose estimate for the maximally exposed individual from all planned effluents is 0.022 mSv (2.2 mrem). This result is well below the annual public dose limit of 1 mSv (100 mrem) in 10 CFR Part 20 and the 0.1 mSv (10 mrem) ALARA constraint. The estimated dose is conservative because no pollution control was assumed for a number of radionuclides (Ref. 5, Attachment 23, Table 2). For the proposed action effluents, BPF liquid effluents are discharged to the WWTF, and BLEU Complex liquid effluents are discharged to the sanitary sewer. Sanitary sewer releases are not included in the dose calculations because the dose receptor used for the calculations (maximally exposed individual) would not be exposed to the sewer effluent exposure pathways.

The documentation of effluent estimates includes detailed radionuclide data for feed material, mass balance and process flow diagrams, bases for release fractions for various processing steps, pollution control removal efficiencies, and tabulation of results. For dose assessment, the effluent estimates were multiplied by unit dose coefficients calculated using pathway dose assessment software for each type of release scenario (i.e., airborne, liquid).

Table 5.1 Comparison of current liquid effluent releases with estimated effluents and dose from the proposed action

Element	Removal Factor[a]	Proposed Action WWTF Effluent (Ci/yr)[b]	Current WWTF Effluent (Ci/yr)	As Percentage of Current WWTF Effluent (%)	Proposed Action Effluent Dose (mrem/yr)[c]
Uranium	0.0024	1.05E-4	6.3E-4	16.6	2.93E-3
Thorium	0.0024	9.10E-3	4.4E-6	2.1E+5	1.01E+0
Plutonium	1.0000	3.09E-2	5.3E-7	5.8E+6	4.36E-1
Americium	1.0000	5.56E-4	—[d]	—[d]	2.72E-2
Neptunium	1.0000	7.67E-3	—[d]	—[d]	4.45E-1
Actinium	1.0000	1.39E-4	—[d]	—[d]	1.16E-1
Cesium	1.0000	6.75E-4	—[d]	—[d]	1.82E-2
Technetium	1.0000	1.75E-4	1.6E-2	1.1	2.98E-4
Strontium	1.0000	3.45E-04	—[d]	—[d]	3.45E-3
Total					2.06E+0

[a] The removal factor represents the assumed fraction of material remaining in effluent following treatment at the WWTF. A factor of one assumes no treatment and this is conservative since treatment is planned.

[b] To convert Ci to Bq, multiply by 3.7E+10.

[c] To convert mrem to mSv, multiply by 0.01.

[d] Not estimated for current releases.

Source: B.M. Moore, Nuclear Fuel Services, Inc., Letter to U.S. Nuclear Regulatory Commission, "Additional Information to Support an Environmental Review for BLEU Project," January 15, 2002. (Ref. 5), Attachment 23.

Table 5.2 Comparison of current airborne effluents with estimated effluents from the proposed action (including the combined dose estimate)

Element	Current Main Stack Average (Ci/yr)[a]	Current Remaining Stack Average (Ci/yr)[a]	Proposed BLEU Prep Facility (Ci/yr)[a]	Proposed BLEU Complex (Ci/yr)[a]	Proposed WWTF (Ci/yr)[a]	Totals
Uranium	2.84E-4	3.1E-5	1.1E-3	2.3E-5	4.7E-5	1.5E-3
Thorium	5.7E-7	7.2E-6	1.7E-5	3.4E-7	2.0E-5	4.5E-5
Plutonium	0.0E+0	4.7E-5	1.4E-7	2.8E-9	1.6E-7	4.7E-5
Americium	0.0E+0	9.4E-7	2.5E-9	5.0E-11	2.9E-9	9.4E-7
Dose (mrem/yr)[b]	2.60E-2	1.50E-2	7.37E-2	8.00E-3	7.90E-2	2.02E-1

[a] To convert Ci to Bq, multiply by 3.7E+10.

[b] To convert mrem to mSv, multiply by 0.01.

Source: B.M. Moore, Nuclear Fuel Services, Inc., Letter to U.S. Nuclear Regulatory Commission, "Additional Information to Support an Environmental Review for BLEU Project," January 15, 2002. (Ref. 5), Attachment 22.

Airborne release unit dose factors were calculated using the CAP–88 PC V2.0 code (Ref. 9). The CAP–88 PC V2.0 code was developed by EPA to demonstrate compliance with National Emissions Standards for Hazardous Air Pollutants. A modified Gaussian plume equation in CAP–88 PC V2.0 estimates the average dispersion of radionuclides released from various sources. Calculations were done using a circular grid to distances up to 80 km (50 mi). Effective dose equivalent calculations (i.e., organs and weighting factors) are consistent with the methods in International Commission on Radiological Protection ICRP 26 (Ref. 10) and 30 (Ref. 11). NFS used the EPA rural food source agricultural data for an agricultural exposure scenario that includes consumption of meat, milk, and crops raised in the plume transport/deposition path (Ref. 8). Meteorological data from the NFS license renewal ER (Ref. 12) were used for plume transport calculations (Ref. 8).

Documentation for the liquid release unit dose factors is provided in Ref. 13. Details of the methods used to calculate these dose factors were clarified in a discussion with NFS technical staff (Ref. 14). Calculations were based on the national Council on Radiation Protection 123 screening methodology (Parts 1 and 2) (Ref. 15). The receptor was located at the nearest point of water use {the Jonesborough Water Plant located 13 km (8 mi) downstream from the WWTF outfall (Ref. 14)}. A few irrigation uses exist closer to the plant; however, NFS has found the doses calculated for the Jonesborough location bound the dose estimates for the irrigation locations.

The dose to the workers at the NFS site has been analyzed in the Renewal EA (Ref. 3). The potential for increase in dose to workers at NFS due to the BLEU project was evaluated. Operation of the BPF, OCB and UNB is not expected to increase the dose to workers at the NFS facility because the types and quantity of material, and the processing, will be similar to what is already licensed at the site. NFS is committed to keeping doses as low as reasonable

Attachment 23
Additional Information to update Table 5.4 of the NRC EA – 1999
Radiological impacts to the maximally exposed individual from liquid releases

Table 1: Radioactive Liquid Effluents - Radioactivity Released[1]

Effluent Stream	Element	Current Averages (Ci/yr)	Estimated BLEU Project Effluents		Effluent Totals (Ci/yr)
			BPF[2] (Ci/yr)	BLEU Complex[3] (Ci/yr)	
WWTF	Uranium	6.3E-04	1.1E-04		7.3E-04
	Radium	1.3E-04	3.7E-01		3.7E-01
	Thorium	4.4E-06	9.1E-03		9.1E-03
	Plutonium	5.3E-07	3.1E-02		3.1E-02
	Technetium	1.6E-02	1.8E-04		1.6E-02
Banner Spring Branch	Uranium	1.4E-02			1.4E-02
	Radium	NM			NM
	Thorium	3.4E-04			3.4E-04
	Plutonium	1.7E-04			1.7E-04
	Technetium	2.6E-03			2.6E-03
Sanitary Sewer	Uranium	2.8E-03		2.0E-04	3.0E-03
	Radium	NM			NM
	Thorium	1.4E-05		1.3E-08	1.4E-05
	Plutonium	1.3E-06		4.3E-09	1.3E-06
	Technetium	2.5E-03		1.1E-03	3.6E-03

Notes:

1 - Current averages are based on release data from 1996 through 2000, which were obtained from the Saftey Department's Semiannual Reports. "NM" - not measured.

2 - BPF liquid effluents are only discharged through the WWTF.

3 - BLEU Complex effluents are only discharged to the sanitary sewer.

Attachment 23 Continued

Table 2: Summary of Estimated BPF Liquid Effluents

Constituent	WWTF's Minimum Removal Factor	NCRP-123 Unit Dose Factors (mrem/Ci)	Summary of Estimated BPF Liquid Effluents: Untreated Effluents (Ci/yr)	Treated Effluents (Ci/yr)	Treated Effluents (%)	Estimated TEDE (mrem/yr)	Estimated TEDE (%)
U-232	0.0024	58	1.85E-04	4.44E-07	0.0000%	2.58E-05	0.0012%
U-233	0.0024	2.1	1.76E-04	4.22E-07	0.0000%	8.86E-07	0.0000%
U-234	0.0024	2	3.50E-02	8.41E-05	0.0032%	1.68E-04	0.0081%
U-235	0.0024	9.5	5.28E-04	1.27E-06	0.0000%	1.20E-05	0.0006%
U-236	0.0024	1.9	7.95E-03	1.91E-05	0.0007%	3.62E-05	0.0018%
U-238	0.0024	4.4	2.37E-05	5.69E-08	0.0000%	2.50E-07	0.0000%
U Subtotal			**4.39E-02**	**1.05E-04**	**0.0040%**	**2.43E-04**	**0.0118%**
Th-228	0.0024	14	9.34E-01	2.24E-03	0.0850%	3.14E-02	1.5202%
Th-230	0.0024	9	2.19E-02	5.26E-05	0.0020%	4.74E-04	0.0230%
Th-231	0.0024	1.0E-02	2.79E+00	6.70E-03	0.2542%	6.70E-05	0.0032%
Th-232	0.0024	220	9.20E-04	2.21E-06	0.0001%	4.86E-04	0.0235%
Th-234	0.0024	3.2E-01	4.53E-02	1.09E-04	0.0041%	3.48E-05	0.0017%
Th Subtotal			**3.79E+00**	**9.10E-03**	**0.3454%**	**3.24E-02**	**1.5716%**
Pu-238	1.0000	36	1.08E-02	1.08E-02	0.4102%	3.89E-01	18.8657%
Pu-239/240	1.0000	41	6.94E-04	6.94E-04	0.0263%	2.85E-02	1.3796%
Pu-241	1.0000	0.92	1.94E-02	1.94E-02	0.7368%	1.79E-02	0.8659%
Pu Subtotal			**3.09E-02**	**3.09E-02**	**1.1734%**	**4.36E-01**	**21.1112%**
Am-241	1.0000	49	5.56E-04	5.56E-04	0.0211%	2.72E-02	1.3201%
Np-237	1.0000	58	7.67E-03	7.67E-03	0.2910%	4.45E-01	21.5598%
Thorium Series							
Ra-228	0.4000	95	7.27E-04	2.91E-04	0.0110%	2.76E-02	1.3391%
Ac-228	1.0000	2.2E-02	7.27E-04	7.27E-04	0.0276%	1.60E-05	0.0008%
Ra-224	0.4000	2.1	9.34E-01	3.73E-01	14.1670%	7.84E-01	38.0042%
Pb-212	1.0000	1.8E-01	9.24E-01	9.24E-01	35.0615%	1.66E-01	8.0619%
Bi-212	1.0000	7.1E-03	5.26E-01	5.26E-01	19.9334%	3.73E-03	0.1808%
Po-212	1.0000	0	3.38E-01	3.38E-01	12.8144%	0.00E+00	0.0000%
Tl-208	1.0000	3.4E-05	2.98E-01	2.98E-01	11.3016%	1.01E-05	0.0005%
Uranium Series							
Pa-234	1.0000	1.8E-02	3.31E-04	3.31E-04	0.0125%	5.95E-06	0.0003%
Pa-234m	1.0000	1.0E-07	1.25E-01	1.25E-01	4.7520%	1.25E-08	0.0000%
Ra-226	0.4000	110	6.10E-05	2.44E-05	0.0009%	2.68E-03	0.1300%
Actinium Series							
Pa-231	1.0000	120	7.70E-04	7.70E-04	0.0292%	9.23E-02	4.4743%
Ac-227	1.0000	170	1.39E-04	1.39E-04	0.0053%	2.37E-02	1.1479%
Th-227	0.0024	2	1.36E-04	3.27E-07	0.0000%	6.53E-07	0.0000%
Ra-223	0.4000	5.4	1.37E-04	5.48E-05	0.0021%	2.96E-04	0.0143%
Fission Products							
Sr/Y-90	1.0000	10	3.45E-04	3.45E-04	0.0131%	3.45E-03	0.1671%
Tc-99	1.0000	1.7	1.75E-04	1.75E-04	0.0066%	2.98E-04	0.0144%
Cs-134	1.0000	27	1.89E-04	1.89E-04	0.0072%	5.10E-03	0.2471%
Cs-137	1.0000	27	4.86E-04	4.86E-04	0.0184%	1.31E-02	0.6353%
Pm-147	1.0000	2.4E-02	2.01E-05	2.01E-05	0.0008%	4.81E-07	0.0000%
Eu-154	1.0000	10	1.53E-05	1.53E-05	0.0006%	1.53E-04	0.0074%
Grand Totals				**2.64E+00**	**100.0000%**	**2.06E+00**	**100.0000%**

Note: The DOE/EIS-0240 reports the estimated dose from liquid effluents resulting from the BLEU Project to be zero. The estimated dose of 2.06 mrem/yr is conservative because removal factors of many of the isotopes were considered to be zero (1.0000 in column 2). The 2.06 mrem/yr is less than the ALARA constraint of 10 mrem/yr.

Attachment 22
Additional Information to update Table 2.3 of the NRC EA – 1999
Estimated annual releases of radiological constituents from process stacks

Table 1:
Radioactive Gaseous Effluents - Radioactivity Released

Element	Current Averages[1]		Estimated BLEU Project Effluents				
	Main Stack (Ci/yr)	Remaining Stacks (Ci/yr)	BPF[2] (Ci/yr)	BLEU Complex (Ci/yr)	NFS WWTF (Ci/yr)	Effluent Totals (Ci/yr)	(uCi/yr)
Uranium	2.8E-04	3.1E-05	1.1E-03	2.3E-05	4.7E-05	1.5E-03	1,492.23
Thorium	5.7E-07	7.2E-06	1.7E-05	3.4E-07	2.0E-05	4.5E-05	44.55
Plutonium	0.0E+00	4.7E-05	1.4E-07	2.8E-09	1.6E-07	4.7E-05	47.13
Americium	0.0E+00	9.4E-07	2.5E-09	5.0E-11	2.9E-09	9.4E-07	0.94

Notes:
1 - Current averages are based on release data from 1996 through 2000, which were obtained from the Safety Department's Semiannual Reports.
2 - The BPF's gaseous effluents will be released through the Main Stack.

Additional Information to update Table 5.2 of the NRC EA – 1999
Radiological impacts to the maximally exposed individual from releases to the atmosphere

Table 2:
Radioactive Gaseous Effluents –TEDE

Current Averages[1]		Estimated BLEU Project Effluents			
Main Stack (mrem/yr)	Remaining Stacks (mrem/yr)	BPF[2] (mrem/yr)	BLEU Complex (mrem/yr)	NFS WWTF (mrem/yr)	Totals[3] (mrem/yr)
0.0260	0.0150	0.0737	0.0080	0.0790	0.2016

Notes:
1 - Current averages are based on release data from 1996 through 2000, which were obtained from the Saftey Department's Semiannual Reports. The portion attributable to the Main Stack was determined from the ECV – fractions in the EDMS' Radioactivity in Effluent Air" report for the period of 1996 through 2000.
2 - The BPF's gaseous effluents will be released through the Main Stack.
3 - The DOE/EIS-0240 estimates the dose to the maximally exposed individual from the atmospheric pathway at 0.17 mrem/yr. The 0.03 mrem/yr difference between the estimates is negligible relative to the ALARA constraint of 10 mrem/yr.

3.0 RADIOACTIVE EFFLUENT ESTIMATES

This section provides a summary of the effluent estimates for gaseous effluents, liquid effluents, and fugitive emissions.

3.1 Gaseous Effluents

Comparisons of NFS' average annual radioactive gaseous effluents and the estimated radioactive gaseous effluents associated with the TVA Project are provided in Table 3-1. A similar comparison of the radioactive gaseous effluents, in terms of total effective dose equivalents (TEDE), is provided in Table 3-2

Table 3-1

Radioactive Gaseous Effluents – Radioactivity Releases

Elements	Current Averages[1]		Estimated TVA Project Effluents			Total Effluents	
	Main Stack (Ci/yr)	Remaining Stacks (Ci/yr)	BPF[2] (Ci/yr)	BLEU Complex (Ci/yr)	WWTF (Ci/yr)	(Ci/yr)	(μCi/yr)
Uranium	2.8E-04	3.1E-05	1.1E-03	2.3E-05	4.8E-05	1.5E-03	1,498.32
Thorium	6.3E-07	7.2E-06	1.7E-05	3.4E-07	1.2E-04	1.5E-04	147.05
Plutonium	0.0E+00	4.7E-05	8.5E-07	1.8E-08	6.2E-06	5.4E-05	53.95
Americium	0.0E+00	9.4E-07	2.3E-08	4.8E-10	1.7E-07	1.1E-06	1.13

Notes:
1 - Current averages are based on release data from 1996 through 2000, which were obtained from the Safety Department's semiannual reports.
2 - The BLEU Preparation Facility's (BPF's) gaseous effluents will be released through the Main Stack.

Table 3-3

Radioactive Liquid Effluents – Radioactivity Released[1]

Effluent Stream	Element	Current Averages (Ci/yr)	Estimated TVA Project Effluents		Effluent Totals Ci/yr)
			BPF[2] (Ci/yr)	BLEU Complex[3] (Ci/yr)	
WWTF	Uranium	6.3E-04	1.3E-04		7.6E-04
	Radium	1.3E-04	3.7E-01	No	3.7E-01
	Thorium	4.4E-06	9.1E-03	Effluents	9.1E-03
	Plutonium	5.3E-07	1.9E-01	Expected	1.9E-01
	Technetium	1.6E-02	1.8E-04		1.6E-02
Banner Spring Branch	Uranium	1.4E-02			1.4E-02
	Radium	NM	No	No	NM
	Thorium	3.4E-04	Effluents	Effluents	3.4E-04
	Plutonium	1.7E-04	Expected	Expected	1.7E-04
	Technetium	2.6E-03			2.6E-03
Sanitary Sewer	Uranium	2.8E-03		2.0E-04	3.0E-03
	Radium	NM	No		NM
	Thorium	1.4E-05	Effluents	1.3E-08	1.4E-05
	Plutonium	1.3E-06	Expected	4.3E-09	1.3E-06
	Technetium	2.5E-03		1.1E-03	3.6E-03

Notes:
1 - Current averages are based on release data from 1996 through 2000, which were obtained from the Safety Department's semiannual reports. "NM" – not measured.
2 - The BPF's liquid effluents will only be discharged through the WWTF.
3 - The BLEU Complex's effluents will only be discharged to the sanitary sewer.

3.3 Fugitive Emissions

Radioactive fugitive emissions are only anticipated during construction of the BLEU Complex. The TEDE attributable to the construction of the BLEU Complex was estimated as 0.0112 mrem.

2.0 ISA SOURCE TERM DATA

The average uranium concentrations for the product stream and the calculated concentrations for the discard streams are provided in Table 2-1. The annual quantity of uranium in the discharge stream was divided by the annual volume discharged, to yield the uranium concentration of the discard stream. All the values used for this calculation are provided in Attachment B. The remaining uranium concentrations will need to be obtained from the process specifications.

Table 2-1

Average Uranium Concentrations in BPF Product & Discard Streams				
LE UN Product (g U/L)	Caustic Discharge (g U/L)	Condensate from SX (g U/L)	Raffinate from SX (g U/L)	Scrubber Solution (g U/L)
1.85E+02	1.27E-03	7.65E-04	8.30E-04	3.15E-04

A summary of the radionuclide concentrations for the various process streams is provided in Table 2-2. The radionuclide concentrations in the discard streams were calculated by dividing the annual quantity of untreated radionuclide processed at the WWTF by the annual average mass of uranium processed in each discard stream.

The concentrations for the caustic discharge stream were calculated assuming that the percentages of uranium and the radioactive impurities going with the caustic discharge stream remain unchanged. The BPF process will use centrifuges to separate the uranium from the caustic discharge stream. These centrifuges may change the radionuclide ratios, causing some of the impurities to be concentrated in the caustic discharge stream. If the radioactive impurities are concentrated to a significant degree, the consequences analyzed using the data in Table 2-2 may be biased low. When a consequence has been evaluated as being just below the next higher consequence level, more accurate source term data may be needed to ensure that the consequence level is not any higher than what was already indicated.

CERTIFICATE OF SERVICE

I certify that on February 6, 2003, copies of SECOND HEARING REQUEST BY FRIENDS OF THE NOLICHUCKY RIVER VALLEY, STATE OF FRANKLIN GROUP/SIERRA CLUB, OAK RIDGE ENVIRONMENTAL PEACE ALLIANCE, AND TENNESSEE ENVIRONMENTAL COUNCIL were served on the following by first-class mail, and by e-mail if so designated:

Alan S. Rosenthal, Presiding Officer Atomic Safety and Licensing Board Mail Stop T-3 F23 U.S. Nuclear Regulatory Commission Washington, D.C. 20555 By e-mail to: rosnthl@aol.com Sam4@nrc.gov	Office of Appellate Adjudication U.S. Nuclear Regulatory Commission Washington, D.C. 20555
Richard F. Cole, Administrative Judge Atomic Safety and Licensing Board Mail Stop T-3 F23 U.S. Nuclear Regulatory Commission Washington, D.C. 20555 By e-mail to: rfc1@nrc.gov	Daryl Shapiro Shaw Pittman, LLP 2300 N Street N.W. Washington, D.C. 20037 By e-mail to: Daryl.Shapiro@shawpittman.com
Rules and Adjudications Branch Office of the Secretary U.S. Nuclear Regulatory Commission Washington, D.C. 20555 By e-mail to: hearingdocket@nrc.gov	C. Todd Chapman, Esq. King, King and Chapman, PLLC 125 South Main Street Greeneville, TN 37743 By e-mail to: chapman@xtn.net

Neil J. Newman, Esq. Nuclear Fuel Services 1205 Banner Hill Road Erwin, TN 37650-9718	Kathy Helms-Hughes P.O. Box 58 Hampton, TN 37658 khelms@mounet.com
Jennifer Euchner, Esq. David Cummings, Esq. Office of General Counsel U.S. Nuclear Regulatory Commission Washington, D.C. 20555 By e-mail to: jme@nrc.gov, dac3@nrc.gov	Louis Zeller Blue Ridge Environmental Defense League P.O. Box 88 Glendale Springs, NC 28629 By e-mail to: BREDL@skybest.com

Diane Curran