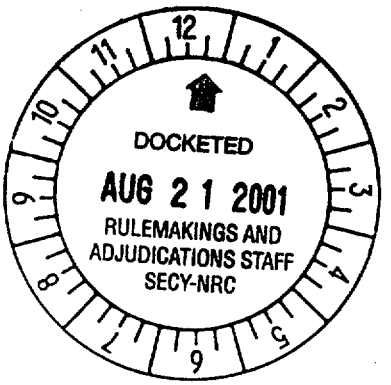
RAS 3328

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:
Thomas S. Moore, Chairman
Charles N. Kelber
Peter S. Lam



In the Matter of DUKE COGEMA STONE & WEBSTER (Savannah River Mixed Oxide Fuel Fabrication Facility)	Docket No. 70-3098-ML ASLBP No. 01-790-01-ML **August 13, 2001**

Blue Ridge Environmental Defense League and Donald Moniak
Submission of Contentions Regarding the Proposed MFFF

Acronyms

ANL	Argonne National Laboratory
BREDL	Blue Ridge Environmental Defense League
CAR	Construction Authorization Request
CFR	Code of Federal Regulations
CEQ	Council on Environmental Quality
DCS	Duke, Cogema, Stone & Webster, LLC
DOE	Department of Energy
EIS	Environmental Impact Statement
ER	Environmental Review
FOIA	Freedom of Information Act
HEPA	High-Efficiency, Particulate Air
INEEL	Idaho National Engineering & Environmental Laboratory
LWR	Light Water Reactor
MFFF	Mixed-Oxide Fuel Fabrication Facility
NEPA	National Environmental Policy Act
NRC	Nuclear Regulatory Commission
NUREG	Nuclear Regulation Guide
OFMD	(DOE) Office of Fissile Material Disposition
PDCF	Plutonium [Pit] Disassembly Conversion Facility
PFF	Plutonium Fuel Factory (synonymous with MFFF)
PIP	Plutonium Immobilization Plant
ROD	Record of Decision

Template = SECY-037

SECY-02

S&DPEIS	Storage & Disposition of Fissile Materials Programmatic Environmnetal Impact Statement
SPDEIS	Surplus Plutonium Disposition Environmental Impact Statement
SREL	Savannah River Ecology Laboratory
SRP (synonymous with NUREG 1718)	Standard Review Plan [for MFFF]
SST	Safe, Secure Transport
TRU Waste	Transuranic waste
WSRC	Westinghouse Savannah River Company

I. Introduction

A. Summary of Submittal. Requirements

1. Pursuant to 10 CFR 2.1203 (a) and 10 CFR 2.1203 (e), I, Don Moniak hereby submit, both as a representative of BREDL and as an individual, and herein referred to as Parties, parties, and Petitioners, hereby submits its formal written contentions to be considered for a hearing by the ASLBP regarding the Construction Authorization Request (CAR) for a Mixed Oxide Fuel Fabrication Facility (MFFF) at the U.S. Department of Energy's (DOE) Savannah River Site (SRS) in South Carolina.

2. Contentions are submitted in accordance with the following:

a. NRC Federal Register Notice 66 FR 19994-19996 of April 18, 2001, in which the NRC announced that "any person who wishes to participate as a party in an NRC hearing pertaining to the CAR must file a written request for hearing" by May 18, 2001. Such request was made by parties and accepted by NRC. In regard to the filing of contentions the NRC wrote:

"Each contention must consist of a specific statement of the issue of law or fact to be raised or controverted. In addition, the petitioner shall provide a brief explanation of the bases of the contention and a concise statement of the alleged facts or expert opinion which support the contention and on which the petitioner intends to rely in proving the contention. The petitioner must also provide references to those specific sources and documents of which the petitioner is aware and on which the petitioner intends to rely to establish those facts or expert opinion. The petitioner must provide sufficient information to show that a genuine dispute exists with DCS on a material issue of law or fact.1 Contentions shall be limited to matters within the scope of the DCS application for authority to construct a MOX fuel fabrication facility. The contention must be one which, if proven, would entitle the petitioner to relief. A petitioner who fails to file at least one contention which satisfies these requirements will not be permitted to participate as a party."

b. NRC Order CLI-01-13 issued on June 14, 2001, establishing the docket and referring petitions for intervention and requests for hearing to ASLBP.

i. ii. The Commission reiterated its April 18, 2001 notice regarding contentions and the scope of the proceeding :

"A. Scope of Proceeding.

To grant the construction authorization request, the Staff must find that the proposed design bases of the MOX fuel fabrication facility's "principal structures, systems, and components," together with the quality assurance program submitted by the Applicant, "provide reasonable assurance of protection against natural phenomena and the consequences of potential accidents." 10 C.F.R. § 70.23(b). Additionally, to meet the NRC's responsibilities under the National Environmental Policy Act (NEPA), the Staff's environmental review must conclude "that the action called for is the issuance of the proposed license." 10 C.F.R. § 70.23(a)(7). The presiding officer shall be guided by these safety and environmental regulations in determining whether proffered contentions are admissible under the 10 C.F.R. § 2.714(b)(2) standards. The petitioners must demonstrate that a genuine dispute exists between it and the Applicant and that the dispute lies within the scope of the proceeding. It is the responsibility of all petitioners to provide the necessary information to show that their contentions satisfy the requirements for admission. If rulings on the admission of contentions or the admitted contentions themselves, raise novel legal or policy questions, the presiding officer should readily refer or certify such rulings or questions to the Commission on an interlocutory basis. The Commission is amenable to such early involvement and will evaluate any matter put before it to ensure that substantive interlocutory review is warranted."

ii. The Commission recommended a timeline wherein Petitioners submit proposed contentions and any additional filings on standing within 45 days of the June 14 Order, interpreted as being July 30, 2001. This schedule was later changed by ASLBP Order ASLBP No. 01-790-01-ML which granted an additional 14 days for filing contention. ASLBP Order of July 17, 2001 further stated that any submission served by email or FAX must be received by members of the Licensing Board by 11:59 p.m. Eastern Time.

iii. The Commission altered the plan outlined in the April 18, 2001 Federal Register notice, in which the NRC required standing to be obtained and then contentions submitted by those with standing. Instead, the Commission put both aspects on the same schedule. There were no formal objections to this.

c. The June 15, 2001 order establishing an Atomic Safety and Licensing Board "to preside over the [MFFF] proceeding and "conduct this proceeding pursuant to an enhanced version of the procedures found in 10 C.F.R. Part 2, Subpart L, of the Commission's Regulations, "Informal Hearing Procedures for Adjudications in Materials and Operator Licensing Proceedings" (CLI-01-13, 53 NRC at __ (slip op. at 1-2))." ASLBP No. 01-790-01-ML. With process continuing to evolve, parties hereby offer a reminder of the footnote in the NRC Federal Register Notice of April 18, 2001 regarding contentions:

"At the contention filing stage, the factual support necessary to show that a genuine dispute exists need not be in affidavit or formal evidentiary form and need not be of the quality necessary to withstand a summary disposition motion."

B. Formal Objection to Final Ruling on Access to Proprietary

1. These proceedings were delayed somewhat by the Panel's decision–fully supported by parties–to resolve the matter of access to proprietary information in a timely manner. Information regarding this process is contained in the "PROTECTIVE ORDER" issued by the Panel on June 29, 2001.

2. The issuance of the order necessitated two conference calls, the second due to misinterpretations of the Applicant in issuing a proposed Protective Order for review, which the Panel described in their Protective Order:

"The Licensing Board has not accepted the proposed protective order and affidavit of nondisclosure submitted by the Applicant at the Boards request because the Applicant apparently misapprehended the guidance provided by the Licensing Board at the June 19, 2001, prehearing conference in constructing such documents."

3. In their objection to the proposed protective order, parties expressed support for the Panel's recommendation that "The proposed order and nondisclosure affidavit should be reasonable and as minimally intrusive as possible upon the Petitioners' ability to speak and write about the license application and underlying issues."

4. In the objection, parties also expressed support in several places for the Carolina Power and Light protective order recommended by the Panel as a model. In hindsight, perhaps the support was not explicit enough or glowing enough to have an impact.

5. Parties objections are as follows:

a. Parties object to the confidentiality agreements/Protective Order of June 29, 2001 because it creates an unfair and damaging precedent inhibiting public participation in licensing processes. Whereas applicant was requested to base its proposed restraining order/confidentiality agreeement on the Carolina Power and Light precedent, we found the final order far more similar to the Applicant's proposed version than to the highly acceptable CP&L version.

b. After much deliberation, parties decided not to view the proprietary information because the nature of the proprietary information was so general and so well known that viewing it placed undue burden of legal risk on parties.

i. Tables 11-1, 11-3, 11-5 and numerous others in the CAR were completely redacted except for the table outlines. There is no doubt that the Applicant is claiming even the words "plutonium", "americium," "uranium 238," and "uranium 235" as proprietary, as well as units of scale and other basic table headings.

ii. Numerous "proprietary figures" are merely "simple" diagrams of processes.

iii. For the applicant to have claimed Table 11-1 as proprietary is particularly disturbing because this information pertains to Government Furnished Property, in this case Plutonium Oxide powder, that was not prepared in any way by the Applicant and must meet the Atomic Energy Act's criteria for declassification in terms of plutonium isotopic composition, plutonium mass per pit, and plutonium pit shape.

6. Parties will act on the recommendation of the Panel to pursue other venues towards declassification of this basic safety information, and wish only to register this objection for the sake of the record.

C. General Comments on Scope of the Proceedings

1. The issues at stake here have been debated for a decade, although earlier debate was more restrictive for public access and participation. These issues clearly fit the description provided by the ASLBP's web site, "hearings often involve difficult, interdisciplinary questions at the cutting edge of science and technology. In addition, NRC hearings air local concerns about the consequences of severe accidents and continue the national debate over the role nuclear power should play in meeting the nation's energy needs."[1]

Parties request that the issues raised in this section, although not formal contentions, be considered by the Panel when deciding on the true scope of the proceedings. Parties also intend to submit a Reply Pleading within two days regarding the latest submissions by NRC staff and Applicant.

2. The fact that these issues are of national concern is illustrated by NRC's recent approach to the NEPA process, and must be viewed as such in this proceeding, while recognizing that local concerns are also well established and becoming more so every day.

a. NRC published its Notice of Intent to prepare an EIS in the Federal Register, in accordance with Section 1506.6.(b).(2) of CEQ NEPA Regulations requiring such action only in case of an action "with effects of national concern;" and parties compliment the NRC on this decision.

b. NRC held meetings in the local area, North Augusta, SC, and heard even from MFFF

---

[1] http://www.nrc.gov/NRC/ASLBP/aboutthe.htm

supporters that reactor impacts and transportation should be evaluated. NRC also held public scoping meetings in more distant locations and should be complimented for doing so, with the caveat that the NRC Staff's continued objection to incorporating impacts outside the local area into the scope seems quite unwarranted since the meeting locations were in areas considered "outside the scope" by NRC staff.

i. The April 18, 2001 scoping meeting was held in Savannah, Georgia, which is approximately 100 miles downriver from the proposed site and which has suffered negative economic impacts from past SRS operations and accidents.

ii. In response to immense public pressure, the NRC finally did what DOE long refused to do, hold a public meeting in affected reactor community, in this case Charlotte, NC. Therefore, NRC properly responded to public opinion by expressly seeking to involve people in reactor communities by soliciting their opinions and input. This historic meeting was the most crowded of all scoping meetings; and with one possible exception the only speakers testifying that reactor impacts and transportation should be excluded from the EIS scope worked directly for Duke Power.

3. The basis for proposed action of licensing a Plutonium/MOX fuel fabrication facility (MFFF) has less to do with science and more to do with evolving national policy, much of it based on actions of the previous Presidential administration and currently under scrutiny by the present administration.

In either case, the entire basis for this proposed action was and continues to be nuclear nonproliferation, and therefore the basis rests on subjective issues of national security and international security[2] that are apparently unquantifiable. Therefore the issue of nonproliferation must be heard at this hearing for the following reasons in addition to those already offered in previous submittals:

a. The Applicant frequently cites nonproliferation policy in the ER as the basis for the need for the facility. Therefore, it is within the scope of the licensing application documents in question, in this case the ER.

i. On Page ES-1 of the ER, the Applicant wrote, "the facility is an integral part of

---

[2]A secondary justification that is emotional in nature--but not one endorsed by the National Academy of Sciences or even the Department of Energy--is the conversion of military plutonium into commercial fuel, the "swords to plowshares" cliche. Parties have endured the irony of watching people of science utilizing this blatantly emotional catch phrase to manipulate public opinion and avoid debate on deeper issues. The fact remains that current U.S. policy and planning is to dispose of the surplus plutonium in an underground repository whether the plutonium is in canisters surrounded by glass or within nuclear fuel. In all cases, the government proposes to "bury" this waste and to use nuclear reactors ONLY to meet an arguably arbitrary and difficult to enforce standard.

the overall U.S. Government's strategy for the disposition of surplus plutonium in accordance with [U.S. Foreign Policy statements]."

ii. On Page ES-6 of the ER, the Applicant wrote, "Although the proposed action does have environmental impacts, the impacts are small and consequently acceptable. The environmental impacts are outweighed by the benefit of enhancing nuclear weapons reductions."

b. The MFFF is the only one of three facilities[3] proposed at SRS and identified as essential in the SPDEIS ROD for the plutonium disposition program. However, it is the only one being fully funded at this time, and funding uncertainties for the other two facilities has raised the probability of design changes and a change in the basis of operations and feedstock.

c. Part F of Section 102 of NEPA clearly states that international issues are within the scope of NEPA, as it directs all federal agencies to "recognize the world-wide and long-range character of environmental problems and, where consistent with the foreign policy of the United States, lend appropriate support to initiatives, resolutions, and programs designed to maximize international cooperation in anticipating and preventing a decline in the quality of mankind's world environment" when implementing NEPA.

d. During NRC scoping meetings, the issue was raised repeatedly as within the scope of the NRC's MFFF EIS.

e. Examination of the nonproliferation issue is the only way the Applicant can conduct the cost-benefit analysis required under 10CFR51.45©, and in fact the NRC staff wrote that "A cost-benefit analysis specific to the MOX FFF needs to be included in, or provided as a reference to, the ER" in its May 3, 2000 review of the SPDEIS.

f. The NRC Commission, in its June 14, 2001 Order wrote, "The Commission believes that this proceeding should be completed in a timely and efficient manner because the applicant is seeking authorization to build a facility that would implement a significant objective of national security and policy: reducing the inventory of plutonium in the nation's nuclear weapons' inventory in accordance with the U.S. -- Russian Federal Plutonium Disposition Agreement."

g. Failure to include nonproliferation impacts/issues in the scope of this document

---

[3] The other two facilities are the Plutonium Pit Disassembly and Conversion Facility (PDCF) and the Plutonium Immobilization Plant (PIP). Note that the Mixed Oxide Fuel Fabrication Facility (MFFF) is the only one of three facilities proposed for construction and operation at Savannah River Site lacking the word "plutonium." Parties view Mixed Oxide as more of a public relations term that functions to mask the hazards of the facility, and prefer to call it simply plutonium fuel or plutonium/MOX fuel. For the sake of this proceeding parties will do their best to call it MOX or plutonium/MOX fuel and use the abbreviation MFFF.

and as a basis for standing would create a bias in this proceeding towards the Applicant, for which consideration of this matter is being considered by the NRC.

4. NRC is on weak legal ground by accepting the Applicant's argument to treat this case like applications from nuclear fuel fabrication facilities making Low Enriched Uranium nuclear fuel. The closest comparisons that can be made involve licensing quasi-governmental entities like USEC and TVA. However, the applicant in this case is entirely funded with U.S. taxpayer dollars which are allocated on an annual basis by Congress and approved of by the President. The applicant has little financial risk in this venture, particularly in the early stages, but can derive tremendous financial benefits. Also, this is the first known case before the ASLBP in which nuclear nonproliferation policy is the basis for the proposed action.

5. Transportation of Special Nuclear Materials must be within the scope of these proceedings asa well. In addition to reasons provided in earlier submittals, the following provide additional rational for this inclusion:

a. The Applicant addressed transportation risks in Appendix E of the ER.

b. Public sentiment during NRC scoping hearings overwhelmingly supported Transportation within the scope of the EIS.

c. Transportation of materials to designated reactor facilities is essential for maintaining operations within the design basis of the MFFF. Without adequate transportation, the applicant will run out of storage space for finished fuel assemblies and be forced to cease operations. Without adequate transportation, the applicant cannot deliver the fuel assemblies to the power plant. It is very simple. Finally, the applicant is responsible for shipping and receiving activities at both the MFFF and the reactor sites, and DOE special agents who are not considered "occupationally exposed" are at increased risk of radiological hazards due to the novel cargo they are being asked to transport and protect.

6. The primary reason for addressing reactor impacts in the scope of this proceeding is repeated here, as well as additional reasons not previously cited:

a. " The Applicant is contractually obligated under the terms of contract[4] with the DOE to provide the following services:

i. Design and Licensing of the MFFF;

ii. Design and Licensing of a new plutonium MOX fuel storage and shipping container; Fuel fabrication, transportation, and is providing all funding for the project; and be

iii. Design and Licensing of Catawba and McGuire NPPs to irradiate plutonium

---

[4] At this time the applicant is only under contractual obligations described as the "base contract," which pertain primarily to design and licensing activities. The DOE has the authority to award, without competitive bidding, additional portions of the contract pertaining to physical construction and operation of the MFFF and plutonium MOX fuel irradiation.

MOX fuel.

Details regarding this contract were provided in the original May 17, 2001 filing, in Items 4.c, 4.f, and 4i."

b. If the Applicant's nuclear reactors are found unsafe and have to be removed from the program, the program will likely cease to exist. Therefore, the current safety status of mission reactors as well as the potential impacts of using plutonium/MOX fuel fabricated at the MFFF must be within the scope of this proceeding.

c. The *MOX Fuel Qualification Plan* was submitted by Framatome Cogema Fuels on behalf of Applicant to the NRC on July 14, 2000; finalized on January 18, 2000 by Applicant, and amended in April 2000 by Applicant. This means that potential reactor impacts are already being evaluated because this document cuts across the entire project and binds all activities.

d. The NRC's scoping process resulted in overwhelming public support for including reactor impacts.

e. The ER "relied on the mission reactor impacts analysis provided in the SPDEIS." Page ES-6 of the ER.

6. Although 2.714(b)(2)(iii) requires all NEPA-related contentions to be based on the applicant's environmental report, the DOE's NEPA process is an issue within the scope of this proceeding for the following reasons in addition to those already provided for in submittals for standing:

a. Applicant has persistently cited DOE NEPA documents to support its case in the ER, and these citations will be discussed as necessary. This pattern could be viewed as following the spirit of NEPA, since NEPA requires or at least encourages "tiering" of similar documents and allows for documents to be combined, but only if they are in compliance with NEPA. However, it is more appropriately viewed as meeting its contractual obligation with the customer, DOE, to avoid duplicative effort:

"The contractor shall use its best efforts to utilize existing information, as well as data, plans, and calculations developed in support of NRC licensing for both the MOX Fuel Fabrication Facility and irradiation services to fulfill the deliverables required in this Statement of Work." Clause H-16. Page H-25. DCS-DOE Contract.

However, to suggest that petitioners cannot address a document that the Applicant has tiered to, usually without solid references, is unfair and unwarranted.

b. Applicant originally argued that NRC could pretty much sign off on the DOE SPDEIS ROD. In this respect, NRC is to be commended for not inviting costly litigation by buckling to this pressure.

c. When the NRC staff reviewed the SPDEIS, it had an obligation, as a federal agency required to meet the letter and spirit of Congressional intentions and NEPA, to review DOE's Record of Decision as well as the supporting document, and offer comments on its legitimacy and its compliance with NEPA. Under Section 1506.4 of CEQ NEPA Regulations, an environmental document has to NEPA compliant to be combined with other NEPA documents.

NRC's already tenuous credibility as an independent agency is at further risk through its refusal to question the decision of another agency, particularly an agency with such a weak record of making sound NEPA decisions; and also leaves the agency equally vulnerable to costly litigation outside of this proceeding. The fact remains that NRC's authority to license this facility derives from Congress and DOE's decision to pursue the MOX facility as part of its SPDEIS ROD, and if the basis for this authority is found to be fatally flawed then the NRC should report appropriately back to Congress to that effect. .

d. NRC Staff has yet to issue a scoping report, so there is no way of knowing at this time to what extent the staff will utilize the SPDEIS in preparing the NRC's EIS. Therefore it is only logical that information in the SPDEIS justifying the decision to use MOX and the impacts of MOX at SRS be part of this proceeding.

e. A root cause of the conflict on this issue is the tendency of the Applicant to follow NRC guidance on NEPA and license application submittals. For example, in its June 15, 2000 letter to NRC, DCS wrote that it intends to "submit an ER in accordance with the guidance in NUREG-1718, Appendix E. We are using NUREG-1555 as additional level of detail guidance, but consider NUREG-1718, Appendix E, to be the primary guidance for the MFFF ER."[5]

D. General Comments Regarding Format of Contentions

1. Parties have written these contentions with readership by the general public, elected officials,

---

[5] June 15, 2000 Letter signed by R.H. Ihde, President and CEO of Applicant, addressed to
Ms. Melanie Galloway of NRC, with attachment of Applicant's Responses to NRC Letter of May 3, 2000. At on time did DCS state that it intended to submit an ER in accordance with 10CFR51

While this may appear to be a matter of semantics, other evidence points to the Applicant's treatment of NRC guidance as the regulatory threshhold. The best example occurred at the July , 2001 NRC staff meeting with the Applicant in North Augusta, SC, where the DCS staff continuously referred to NUREG-1718, the Standard Review Plan (SRP) for reviewing a license application in an organized, disciplined fashion. Unlike NRC's 10CFR regulations, the SRP is not legally binding and is therefore unenforceable. Violations of the guidance do not constitute regulatory violations. merely guidance and a working document for approaching the license application in an organized fashion. Whereas NRC staff referred to the basic provisions in 10CFR70 requiring adequate information to conduct analysis of the application, the Applicant kept referrring to the SRP as its criteria.

and regulatory agencies in mind, while first seeking to fully meet the requirements of 10CFR2.714 regarding proffering of contentions:

"(2) Each contention must consist of a specific statement of the issue of law or fact to be raised or controverted. In addition, the petitioner shall provide the following information with respect to each contention:

(i) A brief explanation of the bases of the contention.

(ii) A concise statement of the alleged facts or expert opinion which support the contention and on which the petitioner intends to rely in proving the contention at the hearing, together with references to those specific sources and documents of which the petitioner is aware and on which the petitioner intends to rely to establish those facts or expert opinion.

(iii) Sufficient information (which may include information pursuant to paragraphs (b)(2)(i) and (ii) of this section) to show that a genuine dispute exists with the applicant on a material issue of law or fact. This showing must include references to the specific portions of the application (including the applicant's environmental report and safety report) that the petitioner disputes and the supporting reasons for each dispute, or, if the petitioner believes that the application fails to contain information on a relevant matter as required by law, the identification of each failure and the supporting reasons for the petitioner's belief. On issues arising under the National Environmental Policy Act, the petitioner shall file contentions based on the applicant's environmental report. The petitioner can amend those contentions or file new contentions if there are data or conclusions in the NRC draft or final environmental impact statement, environmental assessment, or any supplements relating thereto, that differ significantly from the data or conclusions in the applicant's document."

2. Parties also wrote with an eye towards endorsing the NRC's own "plain language policy" because the public is better served and the process is more accessible when documents are easier to read, contain less jargon and acronyms, and minimize the legalese. At the same time, parties have followed the instructions provided in the July 17, 2001 order to the best means possible and offer the following explanation in regard to the formatting of contentions:

a. Contentions are grouped into categories to avoid duplication involved with citing rules as well as redundancy in the facts and narratives discussions. In this manner, contentions are more discrete and easily identified, with related contentions are grouped in a systematic manner. If this is a problem, parties ask to be advised so and are willing to simply number contentions 1-100+.

b. **Contentions** are listed in order in the first paragraph, and designated with a number and letter, and function as the specific statement of the issue of law or fact to be raised or controverted' as called for in the first sentence of section 2.714(b)(2).

c. **Legal Basis** elaborates on the rather cumbersome language of "specific statement of the issue of law or fact to be raised or controverted" as called for in the first sentence of section

2.714(b)(2). At this time, to avoid duplication, please note that all contentions, unless otherwise noted, are based, in whole or in part on the following common laws and regulations:

i. ENERGY REORGANIZATION ACT OF 1974. Section 202. LICENSING AND RELATED REGULATORY FUNCTIONS RESPECTING SELECTED ADMINISTRATION FACILITIES (42 USC 2071-2112. 42 USC 2131-2140. 42 USC 5842. "Notwithstanding the exclusions provided for in section 110 a. or any other provisions of the Atomic Energy Act of 1954, as amended (42 USC 2140(a)), the Nuclear Regulatory Commission shall, except as otherwise specifically provided by section 110 b. of the Atomic Energy Act of 1954, as amended (42 USC 2140(b)), or other law, have licensing and related regulatory authority pursuant to chapters 6, 7, 8, and 10 of the Atomic energy Act of 1954, as amended, as to the following facilities of the Administration...:(5) Any facility under a contract with and for the account of the Department of Energy that is utilized for the express purpose of fabricating mixed plutonium-uranium oxide nuclear reactor fuel for use in a commercial nuclear reactor licensed under such Act [42 USCA § 2011 et seq.], other than any such facility that is utilized for research, development, demonstration, testing, or analysis purposes."

ii. 42 USC 2012. The Atomic Energy Act of 1954, Section 2. Findings of the Congress: (d): "The processing and utilization of source, byproduct, and special nuclear material must be regulated in the national interest and in order to provide for the common defense and security and to protect the health and safety of the public."

iii. 42 USC 2133. The Atomic Energy Act of 1954. Chapter 10. Section 103. Commercial licenses: a. "The Commission is authorized to issue licenses...b. The Commission shall issue such licenses on a nonexclusive basis to persons applying therefor (1) whose proposed activities will serve a useful purpose proportionate to the quantities of special nuclear material or source material to be utilized; (2) who are equipped to observe and who agree to observe such safety standards to protect health and to minimize danger to life or property as the Commission may by rule establish; and (3) who agree to make available to the Commission such technical information and data concerning activities under such licenses as the Commission may determine necessary to promote the common defense and security and to protect the health and safety of the public. All such information may be used by the Commission only for the purposes of the common defense and security and to protect the health and safety of the public."

d. **Experts** addresses the intent of BREDL to obtain experts if contentions are accepted. At this time parties believe that the process of procuring experts in such a complicated case is not a productive use of time when the contentions those experts would address might not be admitted.

e. **Facts and Discussion** = the "second and subsequent paragraphs of each contention [containing] the basis of the contention as called for by section 2.714(b)(2)(i)(ii), and (iii)."

f. Relief Requested is provided in many, but not all cases.

[end Introduction]

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:
Thomas S. Moore, Chairman
Charles N. Kelber
Peter S. Lam

In the Matter of DUKE COGEMA STONE & WEBSTER (Savannah River Mixed Oxide Fuel Fabrication Facility)	Docket No. 70-3098-ML ASLBP No. 01-790-01-ML **August 13, 2001**

Blue Ridge Environmental Defense League and Donald Moniak
Response and Objections to the Proposed MFFF

II.A. Contention Group 1
Gross Violations of Radioactive Waste Management Rules

Contentions

1A The Applicant proposes to transfer radioactive waste from the proposed facility to a contiguous, but unlicensed, facility (the Department of Energy's Savannah River Site F-Tank Area) for processing, storage, and disposal, a violation of basic NRC regulations governing handling and disposal of radioactive waste.

1B The applicant submitted contradictory and therefore inaccurate reports.

1C Applicant failed to identify numerous adverse impacts of radioactive waste generation in the Environmental Review.

1D: DOE committed gross violations of the National Environmental Protection Act during the decision making process by knowingly publishing false, misleading and inaccurate information in legal NEPA documents.

1E. The applicant's analysis and report is dominated by deficiencies.

1. Legal Basis

a. Contention 1A. 10CFR20.2001, General requirements: "a licensee shall dispose of licensed material only -- by transfer to an authorized recipient as provided in §§20.2006 or in the regulations in parts 30, 40, 60, 61, 70, or 72 of this chapter;" (10CFR20.2001.(1)).

b. **Contention 1A**: *10CFR70. , which* defines *Contiguous sites* as "licensee controlled locations, deemed by the Commission to be in close enough proximity to each other, that the special nuclear material must be considered in the aggregate for the purpose of physical protection."

c. **Contention 1B, 1E.** . 10CFR**70.9 Completeness and accuracy of information, requiring,**

"(a) Information provided to the Commission by an applicant for a license or by a licensee or information required by statute or by the Commission's regulations, orders, or license conditions to be maintained by the applicant or the licensee shall be complete and accurate in all material respects.

(b) Each applicant or licensee shall notify the Commission of information identified by the applicant or licensee as having for the regulated activity a significant implication for public health and safety or common defense and security. An applicant or licensee violates this paragraph only if the applicant or licensee fails to notify the Commission of information that the applicant or licensee has identified as having a significant implication for public health and safety or common defense and security. Notification shall be provided to the Administrator of the appropriate Regional Office within two working days of identifying the information. This requirement is not applicable to information which is already required to be provided to the Commission by other reporting or updating requirements."

d. **Contentions 1C, 1D**. 10CFR51.45 Environmental report.

"(b) *Environmental considerations*. The environmental report shall contain a description of the proposed action, a statement of its purposes, a description of the environment affected, and discuss the following considerations:

(1) The impact of the proposed action on the environment. Impacts shall be discussed in proportion to their significance"

(e) *Adverse information*. The information submitted pursuant to paragraphs (b) through (d) of this section should not be confined to information supporting the proposed action but should also include adverse information."

e. **Contention 1D, 1E.** All parts of NEPA.

2. Experts

None are being offered or planned.

3. Facts and Discussion

a. The Applicant wrote in the ER that, "the greatest impact of operations at the Mixed Oxide Fuel Fabrication Facility will be the amount of waste generated. The Mixed Oxide Fuel Fabrication Facility will generate a liquid high alpha activity waste, which is a new waste form for the Savannah River Site. The liquid high alpha activity waste generated by the [MFFF] will be transferred to the F-Area Tank Farm," which is an unlicensed waste treatment and storage facility, an activity that would violate 10CFR20.2001.

b. In the ER the applicant wrote that "the greatest impact of operations at the Mixed Oxide Fuel Fabrication Facility will be the amount of waste generated", but on Page 10-3 of the CAR the applicant wrote this inaccurate, incorrect, and contradictory qualifier: "Very small amount of generated waste that is transferred to SRS." The use of such subjective language also masks the real impacts of this major previously unidentified waste stream, and therefore violates 10CFR70.9.

c. The applicant provided a false baseline to justify the production of a major new waste stream, in essence claiming that since 36 million gallons of liquid waste already exists onsite, there is no harm in another million gallons. This argument is akin to dismissing the effects of a 4 pack a day cigarette smoker adding a few more cigarettes to their habit by citing the 4 packs-a-day as the baseline. The claim that the anticipated radioactive waste stream "represents a small increase in the amount of waste currently in the tank farm" constitutes a patently false approach to assessing environmental impacts and is a gross violation of all aspects of NEPA, 10CFR70.9.

d. The applicant failed to identify numerous adverse impacts of the radiological waste disposal plan, or lack thereof, thereby violating 10CFR51.45.

i. Since 1953 over one hundred million gallons of intensely radioactive liquid waste was generated at SRS. Following "evaporation" of a significant portion of the waste and vitrification in glass of a fraction of the waste since 1996, approximately 36 million gallons remain in the F and H Tank Farm Areas. The HLW classification of this waste is based on its origin--radio chemical facilities a.k.a plutonium reprocessing canyons--and is not comparable to HLW as irradiated fuel.

ii. Notable features of the management system[1], which the applicant failed to describe, include:

---

[1] Described in *Savannah River Site High Level Waste Plan Revision 11.* 2000.

- "volume reduction" through the use of "evaporators,"
- Stratification of waste into two major types: "sludge" which contains the majority of the radioactivity but a fraction of the volume of the total waste, and "saltcake" that constitutes the majority of the volume as well as nearly 50% of the radioactivity, in this case Cesium 137.
- the use of 49 underground/below grade storage tanks of which there are four designs holding anywhere from 0.75 to 1.5 million gallons. Three designs of 1950's and 1960's origin are not compliant with current standards and Federal Facility Act Agreements between DOE/SRS and the with the State of South Carolina. Nearly one quarter of the tanks have had or presently have known leaks.

iii. Management of this waste has not met expectations, a well-known fact the applicant failed to acknowledge and address. The applicant failed to identify the delays that SRS has experienced in reducing the total waste volumes and radioactivity. For example, in 1977 SRS officials believed that "twenty-three waste tanks will be retired at SRP in the next decade, and beginning in 1987, the plan is for waste to be removed from essentially all of the tanks and solidified for storage and shipment."[2] In addition, the volume of waste is greater now than in 1977.

iv. The applicant failed to identify the plethora of failures and financial boondoggles associated with attempts to resolve the problem, such as:

- The Defense Waste Processing Facility (DWPF) did not become operational until 1996–nearly ten years behind schedule and more than a billion dollars over budget–has yet to operate at more than 67% capacity, and is at risk of shutdown due to the fact that more liquid waste is returned to the tank farms than what is received at the DWPF, which in part motivated the DNFSB to issue Recommendation 2001-1.
- The "IN-Tank Precipitation Facility" (ITP), DOE's fatally flawed choice for pretreatment of salt wastes, was cancelled in 1999 after a $500,000,000 (five hundred million dollar) investment. Associated with this massive failure is the $100 million Consolidated Incineration Facility (CIF),. designed primarily to handle ITP benzene wastes and now in a maintenance/standby/closure mode because its primary waste stream will never materialize–a fortunate irony.
- The evaporators have experienced frequent breakdowns and are constantly under repair.

v. The applicant's use of the existing waste volume as an analytical calibration tool is contradicted and undermined by the factual official DOE/SRS goal of ***risk reduction, not risk production***. The goal in the waste areas is to solidify as much of the waste as technologically and economically feasible into a glass (borosilicate matrix) and then close all of the tanks. and reduce

---

[2] Bradley, R.F. and A.J. Hill, Jr. 1977. *Chemical Dissolving of Sludge From a High Level Waste Tank at the Savannah River Plant.* E.I Dupont De Nemours and Company. Savannah River Laboratory. Aiken, South Carolina, 29801. DP-1471. November 1977.

the volume and radioactivity of waste, not to provide these facilities with more waste to manage in an effort to maintain jobs. Because the most recent publicly available planning documents optimistically project completion of waste solidification/vitrification by the year 2028, the correct baseline for comparison of the impacts of the MFFF is zero gallons of liquid waste.

vi. Present and Future activities are legally bound by regulatory agreements and other laws that the *the applicant failed to identify in the ER.* The "most important" regulatory "constraints" include the SRS Federal Facility Agreement (FFA) executed January 15, 1993, made effective in August 1993, and signed and agreed to by DOE, the Environmental Protection Agency (EPA) and the South Carolina Department of Health and Environmental Control (SCDHEC).[3]

vi. The current management of high level liquid radioactive waste at SRS is characterized by uncertainties that the Applicant failed to identify. "Key process issues" identified by SRS include:

- A continual decrease of usable tank space
- Increasing project demands, such as the recent decision to dilute Americium/Curium solutions and transfer to tanks.
- Processing of the salt wastes is not expected to begin until at least 2010. According to SRS, the "only true source of Tank Farm space gain is to operate a Salt Processing Facility, thereby processing the salt and supernate into an acceptable solid waste form (glass or grout)."[4]
- The continuously declining condition of the tank farms: "the material condition of many HLW facilities constructed from the early 1950's to the late 1970's has deteriorated. Routine repairs to service systems in the tank farms have escalated into weeks of unplanned downtime due to poor condition of the service piping and obsolete instrumentation."[5]
- Additional tanks are expected to join the category of leakers, since "at Savannah River Site, several of the 51 tanks are considered leakers. System analyses of the tanks by Tank Waste Remediation predict that a number of the single-shell tanks will leak over the next five

---

[3] are expected to rise in this decade, from a range of 390-409 million dollars to 7-15-745 million dollars in 2010, during times of declining federal budgets for environmental cleanup

[4] Savannah River Site High Level Waste Plan Revision 11. April, 2000. Prepared for the U.S. DOE under contract no. DE-AC09-96SR18500.

[5] See 3. Page 6.

- years."[6]
- Serious problems have been encountered with the Evaporators used to reduce waste volumes.
- There is a 50% planned reduction of the "defense in depth" emergency space allocation in the year 2007, the same year MFFF is proposed to become operational.
- "subtle changes in a few key waste characteristics could dramatically impact HLW process planning and the overall length of the HLW program."[7]
- Failure to start up the salt processing plant in 2010 could result in shutdown of the DWPF.

e. DOE committed gross violations of the National Environmental Protection Act during the decision making process by knowingly publishing false, misleading and inaccurate information in legal NEPA documents.

i. The most egregious example is in the *Surplus Plutonium Disposition Draft Environmental Impact Statement*. Specifically, DOE refused to evaluate "plutonium polishing"--- liquid acid plutonium processing-- as a reasonable alternative for producing plutonium oxide powder suitable for Mixed Oxide (MOX) fuel use in spite of the fact that it had already chosen this process as its *preferred alternative*. DOE's violations and misconduct resulted in a planning and decision process with a clear bias towards pursuing the plutonium/MOX fuel program for surplus plutonium disposition; and caused irreparable harm to the public participation provisions of the NEPA process.

ii. In a presentation to NRC staff on December 12, 2000 Dr. R.N. Morris of Oak Ridge National Laboratory wrote and stated that, "a decision was made in 1997 that the plutonium oxide would be polished to remove impurities and to control the powder characteristics. Thus, gallium concentrations will be below ~ 1 ppm."[8]

iii. In early June 1998, DOE amended its *Request for Proposals for MOX Fuel Fabrication and Irradiation Services* to read: ***"The Offeror shall indicate whether or not its***

---

[6]**U. S. DEPARTMENT OF ENERGY - SAVANNAH RIVER SITE FY 2001 ANNUAL OPERATING PLAN WESTINGHOUSE SAVANNAH RIVER COMPANY SUMMARY TASK DESCRIPTION SHEET** WBS Level 3 Level 3 Title Cognizant Secretarial Office: 1.07.11 SRTC Support - Other DOE EM-1, Environmental Management B&R Code: EW02 **Yellow** Project Baseline Summary No. N/A Date: 10/02/2000

[7] Page 25.

[8] Morris, R.N. 2000. *A Brief Summary of the FMDP Gallium/Cladding Investigation.* Presented at ORNL MOX Fuel Program Research and Development Meeting, Oak Ridge Tennessee. December 12, 2000.

Other documents exist that could be and should be obtained through discovery. For additional information and background on the issue, see the January 2000 Nuclear Examiner.

technical approach incorporates a plutonium oxide polishing step.'"[9] At the same time it published a technical summary of an aqueous polishing document that was obviously prepared months in advance of the change.

iv. In August 1998 DOE knowingly published false information in its legally binding NEPA document that, in regard to plutonium polishing, *"DOE has not proposed implementing this polishing process; it is considered only a contingency at this time subject to inclusion only if scheduled research and development activities demonstrate that the plutonium oxide powder produced in the pit conversion process would not consistently be able to meet specifications for MOX fuel."*[10]

v. In November 1999 DOE reiterated this false claim:

"DOE determined that aqueous processing was not a reasonable alternative for pit conversion under the terms of NEPA because current aqueous processes using existing facilities would produce significant amounts of waste, and aqueous processing would complicate international safeguard regimes."[11]

vi. Appendix N of the SPD Draft EIS discusses the environmental impacts of adding a "small plutonium-polishing process into either the pit conversion or MOX facility as a contingency."

vii. In response to concerns about the liquid radioactive waste stream, the Department stated that no remotely handled transuranic waste would be created and "generation rates for contaminated liquid waste would generally be small." (Page 3-972, SPDEIS).

viii.. DOE also wrote that "on the basis of public comments received on the SPD Draft EIS, and the analysis performed as part of the MOX procurement, DOE has included plutonium polishing as a component of the MOX facility to ensure adequate impurity removal."[12]

ix. In January 2001 BREDL formally requested that DOE conduct a

---

[9]The May 1998 DOE Request for Proposals (RFP) for *MOX Fuel Fabrication and Irradiation services* (Solicitation Number DE-RP0298CH10888 and subsequent amendments)

[10] Draft SPDEIS. Appendix N. Page N-1.

[11] SPDEIS. Page 3-952. Response FD-336-10. The response was to a comment that addressed "reasonable, though undesirable, aqueous processes for pit conversion and MOX fuel fabrication," DOE inappropriately made the distinction between aqueous plutonium oxide polishing in a Plutonium pit Disassembly and Conversion Facility and the MFFF. In either case,

[12] Final SPDEIS. Page 3-950. Response FD-336-6.

supplemental EIS to evaluate the impacts of the unidentified waste stream. DOE declined.

x. When it failed to correctly identify plutonium polishing as the "preferred alternative" for plutonium conversion to MOX, DOE violated NEPA requirements to conduct an accurate analysis of all reasonable alternatives and the statutorily-required "no-action" alternative.

f. The applicant's analysis and report is dominated by deficiencies.

i. On Page 10-3 of the CAR the applicant wrote that "evaporator bottoms contain wastes for disposal," but failed to define the disposal route for the waste.

ii. No provision is made for sampling of the "stripped uranium stream" (CAR, Page 10-5).

iii. Applicant states that "An ALARA goal for radioactive liquid effluents is not provided since the facility design precludes the release of radioactive liquid effluents into the environment." Page 10-1, CAR. Applicant further stated that "Since there are no radioactive liquid effluents, liquid effluent monitoring is not necessary."Page 10-9, CAR. However, 10CFR70 requires licensees to specify the quantity of each of the principal radionuclides released to *unrestricted* areas in liquid and gaseous effluents. The pipeline carrying waste during the previous six months of operation.

iv. The "High Alpha Liquid Transfer Line" is defined as an SSC in Section 10 of the CAR, but no details are available defining the design requirements for this component.

v. (Page 1-3 of ER). Specific to the MFFF, the F-Area Infrastructure Upgrade will include "constructing a liquid waste pipeline from the MFFF to the F-Area Outside Facility." This upgrade has never been analyzed under NEPA, and involves an unlicensed operator being responsible for the design and construction of the Applicant's major SSC for avoiding radioactive waste spills.

4. Relief Requested

Because the decision-making process included information that DOE officials knew was false, the basis for the proposed action is in a state of irreparable noncompliance with NEPA; therefore the NRC is obligated to return the decision back to the responsible agency.

[end Group 1 Contentions]

II.B. Contention Group 2
NRC Violations of NEPA

Contentions

2A. NRC failed to implement NEPA early in the process by issuing a timely notice of intent to prepare an Environmental Impact Statement, and by failing to consult with the DNFSB as an expert agency, resulting in an unfair bias in the scope of the proceedings that benefits the Applicant.

2B. NRC and Applicant collaborated to identify the scope of the Environmental Report outside of NEPA provisions, resulting in segmentation of the NEPA process, which again benefits the Applicant in ways contrary to NEPA.

2C. NRC began a defacto NEPA staff review before any time schedule for such review was published.

2D. NRC changed its criteria for Environmental Justice issues under NEPA without informing the public, which more than anything raises doubts about the NRC staff's independence in this process.

1. Legal Basis

a. National Environmental Policy Act (NEPA) and CEQ NEPA Regulations 1500.

i. **Contention 2A.** CEQ Section 1501.2. mandating early NEPA planning by federal agencies in order to "integrate the NEPA process with other planning at the earliest possible time to insure that planning and decisions reflect environmental values, to avoid delays later in the process, and to head off potential conflicts." Part (b) of this section requires agencies to "Identify environmental effects and values in adequate detail so they can be compared to economic and technical analyses. Environmental documents and appropriate analyses shall be circulated and reviewed at the same time as other planning documents;" and part (d) of this Section requires that agencies "Provide for cases where actions are planned by private applicants or other non-Federal entities before Federal involvement so that:

1. Policies or designated staff are available to advise potential applicants of studies or other information foreseeably required for later Federal action.
2. The Federal agency consults early with appropriate State and local agencies and Indian tribes and with interested private persons and organizations when its own involvement is reasonably foreseeable.
3. The Federal agency commences its NEPA process at the earliest possible time."

ii. **Contention 2B**. Sec. 1501.7 Scoping, requiring that "There shall be an early

and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action." Part (b) of this section allows NRC to "hold an early scoping meeting or meetings which may be integrated with any other early planning meeting the agency has. Such a scoping meeting will often be appropriate when the impacts of a particular action are confined to specific sites."

iii. **Contentions 2A, 2B, and 2C**. Sec. 1502.5 Timing, states that, "An agency shall commence preparation of an environmental impact statement as close as possible to the time the agency is developing or is presented with a proposal (Sec. 1508.23) so that preparation can be completed in time for the final statement to be included in any recommendation or report on the proposal. The statement shall be prepared early enough so that it can serve practically as an important contribution to the decision making process and will not be used to rationalize or justify decisions already made (Secs. 1500.2(c), 1501.2, and 1502.2)."

Whereas part (b) of this section allows the NRC to begin NEPA immediately following receipt of a license application, it also encourages federal agencies to " begin preparation of such assessments or statements earlier, preferably jointly with applicable State or local agencies."

b. 10 CFR 51, Subpart A: National Environmental Policy Act -- NRC Regulations Implementing Section 102(2).

i. **Contention 2A**. 10CFR51.15.(a) requires: "The appropriate NRC staff director may, and upon the request of an applicant for a proposed action or a petitioner for rulemaking shall, establish a time schedule for all or any constituent part of the NRC staff NEPA process. To the maximum extent practicable, the NRC staff will conduct its NEPA review in accordance with any time schedule established under this section."

ii. **Contention 2A, 2B**. "10CFR**51.25 states:** "Before taking a proposed action subject to the provisions of this subpart, the appropriate NRC staff director will determine on the basis of the criteria and classifications of types of actions in §§§§51.20, 51.21 and 51.22 of this subpart whether the proposed action is of the type listed in §§51.22(c) as a categorical exclusion or whether an environmental impact statement or an environmental assessment should be prepared. An environmental assessment is not necessary if it is determined that an environmental impact statement will be prepared."

iii. **Contention 2A.** 10CFR51.26.(a) states: "Whenever the appropriate NRC staff director determines that an environmental impact statement will be prepared by NRC in connection with a proposed action, a notice of intent will be prepared as provided in §§51.27, and will be published in the Federal Register as provided in §§51.116, and an appropriate scoping process (see §§§§51.27, 51.28, and 51.29) will be conducted."

3. Facts and Discussion

a. The NRC was given jurisdiction over licensing the MFFF with the passage of the Strom Thurmond Defense Authorization Bill in October 1998, which included an amendment to Section 202 of the Energy Reorganization Act of 1974, as cited in Item 2.b. Implicit in this legal mandate was that the NRC involvement would be triggered by a DOE decision to build an MFFF and that Congress and the President would agree to fund it. Shortly after passage of this bill, Applicant began meeting with the NRC to discuss issues.[1]

b. The SPDEIS was completed in November 1999 and a Record of Decision (ROD) was signed by then Secretary of Energy Bill Richardson in January 2000. At this point in time, the proposal to construct and operate the MFFF became a federal decision to be implemented--pending adequate federal funding and licensing by the NRC–and therefore a major federal action by the NRC was foreseeable. Given the fact that NRC had already met with the Applicant for a year, it should have been considered hard-to-miss.

c. Although the major federal action requiring an EIS was foreseeable, the NRC delayed the process, certainly violating the spirit of NEPA as defined in Section 1502.5.b. The exact time and date of the NRC decision to conduct an Environmental Impact Statement is unknown and unclear–it is assumed to have occurred after the SPDEIS ROD was issued because if it occurred prior to that it would have prejudiced DOE's decision even more.

The subsequent delay this decision and the notice of intent to prepare an EIS as required by 10CFR51.26.(a), and to consult with individuals, agencies, and tribes as required by Section 1501.2.(d). Thus, we are faced with the specter of NRC going to Los Alamos to obtain on-the-job training regarding plutonium processing when knowledge was for the asking from the DNFSB.

i. During the Question and Answer segment of the April 17, 2001 NRC Scoping Meeting on the MFFF EIS in North Augusta, South Carolina, NRC staff was asked: "When was the decision made to pursue an Environmental Impact Statement,[to] prepare one [made]." NRC staff proceeded to give three different answers, none of which qualified as equally specific to the question, although one staffer indicated that by July 2000 the decision had been made. Eventually the meeting facilitator stated, "I'll put an action item up here that just clarifies this issue for you,

---

[1] The first documented meeting is January 1999 (???), two months before Applicant was awarded the contract from DOE for Plutonium/MOX fuel services, and one year before the SPDEIS ROD was issued. Since these activities were funded by DOE, they can be viewed as prejudicing the NEPA process towards Pu/MOX fuel.

okay,"[2] although the issue has never been clarified.

ii. The NRC mailed its review of the Final SPDEIS to the Applicant on May 3, 2000. In the cover letter NRC indicated that the decision to conduct an EIS for the licensing process had been made, writing: "the review was intended to determine how much of the FEIS might be used to develop an EIS for the MOX FFF license process, and to determine if any areas need more information...These comments are designed to convey to DCS the results of the NRC review as DCS develops an Environmental Report to accompany the MOX FFF license application."[3] The letter also states that a March 23, 2000 meeting between NRC and DCS occurred to discuss the review and that meeting was open to the public.[4] The staff review indicated that transportation and reactor irradiation issues were within the scope of the licensing process, at least as 'indirect impacts," (which is contrary to the present opinion of the staff.)

iii. During the first half of 2000, NRC developed NUREG-1718, *Standard Review Plan for the Review of an Application for a Mixed-Oxide (MOX) Fuel Fabrication Facility (SRP).* Unlike an Environmental Impact Statement, the SRP is not required under NEPA or even for a license application. Like NEPA the SRP process included a public process somewhat equivalent to the Scoping required under NEPA, and in fact the NRC informed the public of its intent to prepare an EIS , and the SRP process is a good example of two ambiguous practices in the NRC:

- It illustrates the highly disciplined and systematic approach taken by the NRC staff in reviewing complicated license applications and preparing safety evaluation reports, and therefore should be encouraged as an example of efficient government;
- It illustrates the disconnect between NEPA and the Safety Evaluation Report processes within the NRC and therefore should be discouraged as an example of inefficient government.

In other words, in order to meet the spirit and letter of NEPA, the NRC should have integrated

---

[2] Official Transcript of Proceedings. NUCLEAR REGULATORY COMMISSION Title: Mixed-Oxide Fuel Scoping Meeting. 42-16 to 47-6. (Parties note here also that the Q and A portions of the scoping meetings were dominated by this style of "non-answer" by NRC staff)

[3] May 3, 2000 Letter Signed by Ms. Melanie A. Galloway, Chief. Enrichment Section. Special Projects Branch. Division of Fuel Safety and Safeguards. Office of Nuclear Material Safety and Safeguards, and addressed to: Mr. Peter Hastings, DCS. Subject: *U.S. Nuclear Regulatory Commission Staff Review of the U.S. Department of Energy Surplus Plutonium Disposition Final Environmental Impact Statement.*

[4] Unknown is whether the public was allowed to comment.

the two processes as encouraged by NEPA; and at a minimum the NRC is obligated to use SRP comments as scoping comments in its belated NEPA process. Instead, the NRC created a redundant dual track approach to licensing that de-emphasizes its legal obligations under NEPA, confuses the public, creates inefficiencies that violate the purpose and law of NEPA, and functions to serve the industry it is mandated to regulate by providing it undue and unfair early access to the process.

If the NRC had integrated these efforts, it would have met NEPA requirements to avoid duplication of effort and reduce paperwork, and prevent unresolved conflicts.

iv. Given these last three facts, it appears evident that the NRC:

- failed to provide a clear record of a decision to prepare an EIS as required by 10CFR51.25;
- failed to issue in a timely manner the Notice of Intent[5] required by 10CFR51.26;
- began a de-facto scoping process that excluded public participation as required under NEPA.
- excluded experts in the field from another independent agency from the consultation process (DNFSB).

d. On June 15, 2000, the Applicant responded to the May 3, 2000 NRC Staff Review, and requested "additional clarification on selected comments provided by the staff."[6]

i. In the cover letter, Applicant wrote, in reference to DOE's decision making process, that "We plan to use the results of this decision making process to the fullest extent in preparing the MFFF ER. We encourage NRC to also make the fullest use of this process including incorporation by reference from the DOE NEPA documents."[7]

ii. Applicant disputed the NRC staff's position that transportation, reactor

---

[5] *"Notice of Intent* means a notice that an environmental impact statement will be prepared and considered." 10CFR51.14.(a).

[6] June 15, 2000 Letter signed by R.H. Ihde, President and CEO of Applicant, addressed to Ms. Melanie Galloway of NRC, with attachment of Applicant's Responses to May 3, 2000 letter and comments cited in Footnote 3.

[7] This statement shows a clear intent by the Applicant to incorporate DOE's NEPA documents to the greatest extent possible in its license application. This is contradictory to the current position of Applicant and NRC staff that DOE's NEPA documents, particularly the SPDEIS are outside the scope of this licensing process.

irradiation activities were indirect impacts, stating that "it is inappropriate for the MFFF ER to provide a discussion of potential indirect impacts at reactor sites when such an evaluation has not been routinely considered in any previous fuel fabrication facility submittals of which we are aware."

Parties contend that the NRC prejudiced the process by failing to respond appropriately. A more fitting response would have included some or all of the following points:

- Other fuel fabrication facilities do not make plutonium fuel, and since plutonium is far more hazardous than low enriched uranium the indirect impacts are far more substantial; i.e. there is no equivalent requirement to the use of Federal Special Agents in unmarked convoys for transportation of MOX fuel.
- Other fuel facilities were constructed by private companies at private risk, whereas the construction of the MFFF is federally funded and therefore is a public risk, not a private financial risk for DCS.
- The requirement to license the MFFF constitutes a legislative exemption to DOE's self-regulation of nuclear weapons complex facilities and therefore is not comparable to private commercial facilities.
- Those fuel facilities were designed and built to conform to the requirements of existing nuclear reactors unlike the MFFF which will produce nuclear fuel for reactors not currently licensed to use such fuel.
- Those applicants sought to construct in order to enter a competitive market to sell LWR fuel, whereas there is no commercial demand in this country for MOX fuel and its use is driven by nuclear nonproliferation concerns and subsidized entirely by federal funding. Therefore the NRC has a greater obligation and a wider audience of stakeholders in this matter.
- DOE's NEPA process failed to adequately include affected public along transportation routes and near nuclear reactors contracted at this time to irradiate MOX fuel, and as such DOE is still legally liable under NEPA for failing to meet public participation provisions.
- The fact that exact transportation routes and reactors for the MFFF product are already known because of DCS' contract with DOE makes such an analysis far less burdensome on the Applicant than for a private commercial enterprise which markets its fuel to a wider and sometimes changing clientele within a competitive market.

iii. Sometime later, though apparently not in writing, the Applicant also asked for clarification on Environmental Justice guidance provided in the NRC's May 3 letter, asking "whether you should follow the environmental justice document we included with our comments, ("Environmental Justice in NEPA Documents," NMSS Policy and Procedures Letter 1-50, Rev. 2, September 1999) or the environmental justice guidance provided in NUREG-1718 ("Standard Review Plan for the Review of an Application for a Mixed Oxide (MOX) Fuel Fabrication

Facility," August 2000). We have addressed this question in the enclosure as well.

e. On December 11, 2000, nearly six months after receiving the June 15, 2000 DCS response–NRC briefly responded to DCS's request for clarification[8] as well as a subsequent request (with unknown date or method of correspondence) to clarify environmental justice analysis issues.[9] Given the belated response time by the NRC to the Applicant's letter (which contains a check mark next to 'response required'), it appears that some concurrence issues arose within the NRC, and these issues should be addressed through discovery and testimony during the Hearing, [10] because the NRC response appears to have defined the scope of the EIS in a manner beneficial to the Applicant, a clear violation of 10CFR51.26 which requires that the scope of an EIS be determined following the NEPA mandated scoping process.

i. In regard to the issue of indirect impacts, the NRC responded, "A general discussion of reactor-use impacts, as part of the indirect effects analysis, is recommended, but not required. The fabrication facility would not be under consideration if there were no market for its product. The discussion does not need to be greatly detailed, particularly if the impacts are determined to be similar to those associated with the use of standard fuel in reactors."

---

[8] December 11, 2000 Letter from M. Galloway (NRC) to P. Ihde (DCS), Subject: SUBJECT: RESPONSE TO DUKE COGEMA STONE & WEBSTER COMMENTS ON THE U.S. NUCLEAR REGULATORY COMMISSION STAFF REVIEW OF THE U.S. DEPARTMENT OF ENERGY SURPLUS PLUTONIUM DISPOSITION FINAL ENVIRONMENTAL IMPACT STATEMENT; with 1 attachment: CLARIFICATION OF SELECTED NRC STAFF COMMENTS ON U.S. DEPARTMENT OF ENERGY SURPLUS PLUTONIUM DISPOSITION FINAL ENVIRONMENTAL IMPACT STATEMENT AND DUKE COGEMA STONE&WEBSTER'S PLANNED ENVIRONMENTAL REPORT

[9] In the December 11, 2000 Letter, NRC wrote that "In addition, we understand that you would like clarification on whether you should follow the environmental justice document we included with our comments, ("Environmental Justice in NEPA Documents," NMSS Policy and Procedures Letter 1-50, Rev. 2, September 1999) or the environmental justice guidance provided in NUREG-1718 ("Standard Review Plan for the Review of an Application for a Mixed Oxide (MOX) Fuel Fabrication Facility," August 2000). We have addressed this question in the enclosure as well."

[10] In addition, the December 11, 2000 date appears to be the date of mailing, not the final date of the document. In the pdf file posted on ADAMS on April xx 2001, the third page of the file contains a one line statement: "This document **should** be made available to the PUBLIC BJD 11/06/00." (Emphasis original). Given that the document was not made public for several months, it appears that the parties responsible for ADAMS either made several procedural errors or the NRC deliberately withheld this document from public purview. **ADAMS Package Accession No.: ML003767597** *See Previous Concurrence

This interpretation should be viewed as invalid because there is no market for plutonium/MOX fuel at this time; and in fact the "market" is defined through a contract between the Applicant and its financial reassurance entity the Department of Energy. In addition, during a May 3, 2001 telephone discussion with Mr. Tim Johnson of NRC regarding this letter, he informed me that the use of the phrase "market for its product" simply referred to Catawba and McGuire NPPs, and no other reactors were being considered for MOX to his knowledge.[11]

Mr. Johnson's statement concurs with the facts contained in amendments between DOE and Applicant, all of which fail to identify a replacement reactor(s) since the alleged withdrawal of Virginia Power Company's North Anna 1 and 2 nuclear reactors from the MOX program. However, NRC staff who prepared this response should testify as to the meaning of the phrase during the hearing because:

- If there is knowledge of a "market" for plutonium fuel, then this information has been illegally withheld from public knowledge;
- If the treatment of nuclear reactors under contract to the DOE as a "market" refers simply to Catawba and McGuire NPP's and Duke Power Company, then the NRC is endorsing federally-subsidized sales of plutonium/MOX fuel, an action with unknown potential impacts on the domestic uranium enrichment industry and other commercial fuel fabricators;
- If the MFFF is being viewed as a commercial facility by NRC staff, then this raises issues of the federal government subsidizing a fuel fabricator–Framatome, a subsidiary of Cogema and a secondary partner with the Applicant's corporate structure-- that already has a monopoly in France, that has merged its U.S. operations with another major domestic fuel fabricator in this country—Siemens–. Federal subsidies to a fuel fabricator could produce a monopoly on fuel fabrication services from a foreign nationally owned corporation.

ii. In regard to Environmental Justice, NRC wrote: "Justice guidance in NUREG-1718 (Standard Review Plan [SRP] for the Guidance: Review of an Application for a Mixed Oxide (MOX) Fuel Fabrication Facility [MOX SRP]), or the guidance provided as an attachment to the NRC letter dated 5/3/00. The SRP states that the Description of the Affected Environment

---

[11] The December 11, 2001 letter referred DCS to Mr. Andrew Persinko if there was a need for any additional questions. However, Mr. Persinko was in France on a work detail related to this project on May 3, 2001, despite the fact that he was identified as the lead contact in the NRC's Federal Register Notice of April 18, 2001. Therefore I spoke with Mr. Johnson, who was identified as the secondary contact in the April 18, 2001 Federal Register notice. Given these facts, the Panel should rule that the phone record of May 3, 2001 and all other phone records detailing discussions with the Applicant, DOE, or other parties regarding this process be made available through discovery.

should include '[s]ocioeconomic information, including that for low-income and minority populations within a 50-mile radius." This dimension is incorrect. DCS should follow the Nuclear Material Safety and Safeguards Policy and Procedures letter 1-50, Rev. 2, which states that 'if the facility is located outside the city limits or in a rural area, a 4 mile radius (50 square miles) should be used [emphasis added].'"

Two issues arise with this unannounced change in policy:

- In the previously mentioned telephone conversation with Mr. Tim Johnson, I was told that changes would not be made to the SRP regarding this issue. How many other changes have been made outside of public purview to the SRP and why has NRC not issued addendums to the SRP?

- At the April 17, 2001 Public Meeting in N. Augusta, the NRC was asked about Environmental Justice issues, and the staff failed to mention this change in the SRP, and even stated that "One thing that we'd be interested to hear your comments on is typically we evaluate a five-square-mile area." (49-14-16.)

Given these facts, the NRC has either deliberately misinformed the public through acts of omission, or has displayed a disturbing level of incompetence. In either case, this hearing should include expanded discovery and deposition of NRC staff to determine the full extent of NRC's NEPA violations.

4. Relief Request

The result of these violations of our national environmental charter includes undue influence by the Applicant in determining the scope of the MFFF EIS, subversion of the public participation provisions of NEPA, undermining of public trust and discouraging public participation, the creation of conflicts, and inefficient and wasteful expenditures of public funds. The minimum relief in this case would entail the Panel to:

a. Order all comments submitted by the Applicant cited in this contention category be regarded as scoping comments outside of NEPA and be stricken as undue influence on the process.

b. Order the NRC's scope of the EIS to include impact analysis on nuclear nonproliferation, reactor irradiation, transportation of nuclear materials, and production of uranium oxide, thus meeting the intent of NEPA as defined in Section 1501.7.(c): "An agency shall revise the determinations made under [scoping requirements] if substantial changes are made later in the proposed action, or if significant new circumstances or information arise which bear on the proposal or its impacts;" and serve to incorporate the overwhelming majority of public comments found in the SRP as well as the SPDEIS that call for a holistic, integrated analysis.

c. Order the Environmental Justice boundary analysis in the SRP to adhere to the SRP guidance of a 50-mile radius around SRS.

d. Provide for discovery of documents and depositions of NRC staffers in pursuing this contention during the hearing.

[End of Contention Group 2]

II.C. Contention Group 3
Conflicts of Interest

Contentions

3A. NRC has a Conflict of Interest in this proceeding because it has received, receives, and pursues receiving DOE funding to support licensing activities for the Russian MOX program---funding pursued even after the Energy ReOrganization Act of 1974 was amended (see Contention Group 2).

3B. NRC hired as its NEPA contractor an organization–Argonne National Laboratory--with obvious conflicts of interest in this proceeding to conduct the EIS.

3C. The Applicant has a clear conflict of interest in terms of being involved with U.S. foreign/nonproliferation policy and also having a vested interest in parallel efforts in Russia that originated prior to U.S. involvement in the Russian plutonium disposition program. See attachment.

1. Legal Basis

a. **Contention 3B**. NEPA CEQ Regulation Section 1506.5.(c). In regard to choosing contractors for developing EIS's, "It is the intent of these regulations that the contractor be chosen solely by the lead agency, or by the lead agency in cooperation with cooperating agencies, or where appropriate by a cooperating agency to avoid any conflict of interest. Contractors shall execute a disclosure statement prepared by the lead agency, or where appropriate the cooperating agency, specifying that they have no financial or other interest in the outcome of the project."

B. **Contention 3B**. Atomic Energy Act of 1954. Section 2. Findings. (g). "Funds of the United Sates may be provided for the development and use of atomic energy under conditions which will provide for the common defense and security and promote the general welfare."

C. **Contention 3A**. Energy Reorganization Act.

2. Experts

If this contention is accepted by the Panel, BREDL intends to find one or more experts to testify on U.S. policy regarding plutonium reprocessing and the Applicant's activities in pursuing a plutonium fuel economy that contradicts U.S. policy.

3. Facts and Discussion

a. The NRC received funding and is negotiating to receive additional funding from DOE to participate in the Regulatory Working Group and assist its colleague agency in the Russian

Federation, Gosatomnadzor (GAN), with developing a regulatorty framework for Plutonium/MOX fuel use in Russia. Since DOE provides the financial assurance for the Applicant and arguably should be the applicant (see Contention Group 5), it is obvious that NRC at a minimum suffers from a perceived conflict of interest for accepting funding that gives it a vested interest in plutonium/MOX fuel fabrication and utilization. In addition, both actions undermine NRC's claim to be an "independent" reviewer of the plutonium/MOX project and its ability to assure public health and safety. Pursuit of this contention would require discovery and depositions in this hearing.

i. "Funding for NRC's nuclear non-proliferation assistance projects (MPC&A and MOX) with GAN is provided by DOE. DOE has shown a much stronger desire to be involved in the development of the technical activities to be conducted by NRC and GAN. In general, DOE will not allow the use of its funds for activities that do not directly support DOE projects in these areas."[1] Therefore, any funding for NRC plutonium disposition assistance to Russia should derive from a federal agency without a mandate to promote nuclear power.

ii. "NRC is actively involved in efforts to plan for the possible manufacture and use of MOX in nuclear power plants in the U.S., consistent with NRC's domestic mandates. Activities in Russia are conducted under the umbrella of the U.S. Russian Agreement on Scientific and Technical Cooperation in Plutonium Disposition...A working group on regulatory issues has been established under the umbrella of this agreement. This regulatory working group is co-chaired by GAN (for the Russian side) and by DOE (for the U.S. side). However, GAN also has requested assistance from NRC directly. NRC hopes to conclude an interagency agreement with DOE shortly that will allow for more active NRC participation in the activities of this working group."[2]

iii. DOE funded NRC attendance at two meetings in Moscow, Russian Federation during the week of January 26, 2001 to February 2, 2001.[3]

iv. In December 1999, NRC agreed to "support" GAN "development of safety regulations for the following stages of plutonium disposition (in coordination with US DOE):

---

[1] December 1, 2000 Memorandum from Janice Dunn Lee, NRC Director of International Programs, to NRC Commisioners. Subject: Visit of Alexander Gutsalov, First Deputy Chairman, Russian Federal Nuclear and Radiation Safety Authority. Attachment 2: Background and Suggested Talking Points. Page 2.

[2] Ibid.

[3] February 28, 2001 Memorandum from Andrew Persinko, MOX Project Manager, NRC, to Daniel M. Gillen, Acting Chief, NRC Enrichment Section. Subject: Summary of Meetings: Quadrilateral Regulatory Collaboration Meeting and Bilateral Meeting on Russian Plutonum Disposition Program (January 26, 2001 to February 2, 2001) *Obtained by BREDL from NRC through the Freedom of Information Act.*

-Plutonium conversion and MOX Fuel Fabrication
-MOX fuel management during its use at nuclear power plants
-Management (storage, conditioning, final disposal) of spent MOX fuel."[4]

However, it must be noted that no funding was forthcoming for Fiscal Year 1999 from DOE for theses tasks.[5]

b. NRC hired a contractor--Argonne National Laboratory–with organizational conflicts of interest in this proceeding to prepare the Environmental Impact Statement.

i. Argonne National Laboratory (ANL) is a DOE-funded and supervised National Laboratory that operates within DOE's Chicago Operations Office, the same office implementing the contract between DOE and the Applicant.

ii. ANL received millions of dollars in funding from DOE-OFMD to support DOE's nonproliferation program.[6]

iii. As a DOE National Laboratory, ANL has a federally approved institutionalized commitment to advancing the cause of nuclear power, and in fact is, in cooperation with INEEL, the lead laboratory for reactor technology for DOE's Office of Nuclear Energy, Science, and Technology.[7] . The Strategic Goals for ANL regarding "Energy and Nuclear Technology" include "perform leading-edge research in nuclear energy science and technology and develop innovative concepts for future nuclear reactors."[8]

Argonne's future is predicated in part on an institutional conviction that, "in the future, nuclear energy must contribute increasingly to the world's energy supply if major

---

[4] *Memorandum of Meeting Between the U.S. NRC and the Federal Nuclear and Radiation Safety Authority of Russia. December 6-10, 1999.* **Obtained through FOIA.**

[5] In the *Memorandum of Meeting Between the U.S. NRC and the Federal Nuclear and Radiation Safety Authority of Russia. December 4-8, 2000,* NRC wrote that *"as a result of NRC budget constraints, no fissile material safty licensing or inspection activities were undertaken during FY2000.* **Obtained through FOIA.**

[6] DOE FY 2002 Congressional Budget Request to Congress. Defense Nuclear NonProliferation Executive Budget Summary. ANL was allocated $1.622 million in FY 2000 and $0.867 million in FY2001.

[7] Argonnne National Laboratory Institutional Plan. Page 51.

[8] Argonnne National Laboratory Institutional Plan. Page 15.

environmental goals are to be met. To meet such goals, DOE and Argonne must play an expanding role in advanced nuclear technology to provide technical leadership and stewardship for the nation's expertise and facilities."[9]

iv. Under environmental strategic goals, ANL identifies supporting "DOE programmatic initiatives by preparing environmental impact statements for major DOE facilities."[10] The fact that ANL views itself as a supporting role for DOE in and of itself should disqualify it from this process.

v. In the *Advanced Fuels Development Initiative* ANL is collaborating with INEEL in the development of "high efficiency light-water reactor (LWR) fuels, the development and testing of ***mixed-oxide fuels***, and the development of advanced research reactor fuels." (Page 52). (emphasis added). The Advanced Fuels Development Initiative budget is proposed at 3 to 6 million dollars a year.

Relief Requested

a. NRC's role in Russia is difficult to resolve because there are clear benefits in having the agency help improve safety and empower the embattled GAN–which is seeing its regulatory authority erode by Minatom. However, for this effort to be dependent upon an agency responsible for promoting nuclear power as well as funding the MOX program seriously compromises NRC's credibility as an agency responsible for insuring health and safety.

b. ANL should be disqualified from the process.

[end Group 6]

[9] Ibid. Page 50.

[10] Ibid. Page 16

II.D
CONTENTION GROUP 4
Qualifications

Contentions

4A: The NRC lacks the necessary expertise in the field of industrial-scale plutonium processing to adequately determine whether public health and safety will be protected and to issue a license assuring this.

4B: Shortages in critical skills threatens to weaken NRC's future ability to protect public health and our environment.

1. Legal Basis

All contentions fall under 10CFR70, Atomic Energy Act, and all other previously cited regulations requiring NRC to protect health and safety.

2. Experts

None.

3. Facts and Discussion

a. NRC documents point to clear deficiencies in its level of expertise and experience in the area of plutonium processing.

i. In May 2001, the NRC's NMSS declined to participate in a safety review of the Russian Special Nuclear Materials Storage Facility at Mayak. The first reason cited by NMSS was that NRC's *"current safety and regulatory oversight mandates do not include fissile materials storage facilities such as the RFMSF. As such, NRC experience and expertise are limited."*[1]

ii. This summer NMSS requested on-the-job training[2] at Los Alamos National Laboratory, a facility with the poorest safety record in working with plutonium largely due to its

---

[1] May 2, 2001 Letter from Michael F. Weber, NRC Director of Division of Fuel Cycle Safety and Safeguards, Office of Nuclear Material Safety and Safeguards; to Paul Mann, U.S. DOE, Albuquerque Operations Office. *Nuclear Regulatory Commission Assistance in the Safety Review of the Russian Fissile Material Storage Facility.*

[2] At the April 17, 2001 Scoping Meeting at North Augusta, SC, Don Moniak scolded NRC for failing to advance their knowledge on the subject, but did not recommend LANL as a good place to learn how to safely deal with plutonium.

"university campus" approach to operations.[3] In its letter to DOE's OFMD, NRC stated, in order to "support our review of" license application documents, "additional training of our staff in plutonium processing environments, especially with weapons-grade plutonium would be beneficial. We believe the best and perhaps the only place to acquire this type of training is at Los Alamos National Laboratory (LANL), a DOE contractor."[4]

iii. In February 2001 the NRC requested a work detail/training opportunity with French regulatory authorities to allow the NMSS MOX Project coordinator, Andrew Persinko, to work a few months[5] in France to examine the French regulatory system.

iv. At the NRC's April 17, 2001 public scoping meeting in North Augusta, SC the NRC staff had difficulty addressing the issue of its qualifications and expertise, an exchange worthy of printing, in part, verbatim from the meeting transcript:

"MR. MONIAK: I'd like to know what experience the Nuclear Regulatory Commission has in reviewing, in licensing, and regulating the Category I plutonium processing facility in this country or anywhere, for that matter?

MR. HARRIS: That big a question is for Tim Johnson to answer. Tim -- (Laughter.)

MR. HARRIS: I'm an environmental guy. Tim is the -- as many of you know, Drew Persinko is the lead Licensing Reviewer. Tim is the backup Licensing Reviewer, so he's been answering all the licensing questions.

MR. CAMERON: And, Tim, I think that it would be instructive for Don and everybody not only to answer the question in terms of experience with specific types of facilities, but you might talk a little bit about what the capability of the NRC staff and/or consultants that we're using to address the types of issues that are raised by this particular facility.

MR. JOHNSON: All right. Well, the use of MOX fuel in the United States isn't really something that's totally new. And during the '60s and '70s, the NRC had licensed eight mixed oxide fuel fabrication facilities around the country. Now, most of these were limited amounts of MOX fuel

---

[3] Occurrence Reports

[4] July 11, 2001 letter from of NRC to Mr. Patrick Rhoads, DOE-OFMD National Nuclear Security Administrator.

[5] A disturbing aspect of this request is that Mr. Persinko's knowledge and expertise on the subject were absent during public scoping meetings, and he failed to hear first hand the concerns of the public regarding plutonium safety. In addition, Mr. Persinko was absent during all or most of the 30-day period for filing Requests for Hearing even though he was identified as the lead contact for the public in the April 18, 2001 Federal Register Notice.

that were produced. Most of the fuel was produced for various research projects. And MOX fuel was used in several reactors at Dresden I, GINNA, San Onofre Unit I, and Big Rock Point." [6]

[6] Transcript from Public Meeting in North Augusta, SC. April 17, 2001.

II.E
CONTENTION GROUP 5
Unresolved Issue of Authority of Applicant to Apply for and Hold License

Contentions

5A. Because DOE functions as the financial assurance entity, will own the MFFF, it should either be the applicant or a co-applicant for the Construction License.

5B. DOE is not an historically reliable source of financing.

5C. The DOE contract with Applicant is a limiting factor in the ability of Applicant to meet NRC license requirements and perform work safely, and therefore is a safety issue to be examined in this proceeding.

5D. The Applicant is financially obligated to pay the costs of deactivation above and beyond DOE's allowance of $10 million, but has yet to provide financial assurance.

5E. The Applicant is presently liable to being held in Breach of Contract, which adds further uncertainty to the project.

1. Legal Basis

a. Understanding that this is an example of a very specific law in NRC's mandate, The Yucca Mountain does provide precedence for direct licensing of DOE.

b. 10CFR70. Financial Assurance provisions.

2. Experts

If this contention is accepted by the Panel, BREDL intends to find one or more experts in the following areas:

a. Person(s) who have analyzed and/or who have extensive experience in the field of high-consequence safety operations, with an emphasis on addressing safety concerns such as configuration management, software reliability, and procurement of critical safety systems that can arise during the implementation of a contract.

b. Person(s) with economic expertise regarding deactivation of high-consequence operations facilities.

c. Person(s) with expertise in Federal Budgeting.

3. Facts and Discussion

a. The Applicant was awarded its contract by DOE in March 1999[1] following a procurement process in which two of the three consortiums bidding for the project were removed from consideration by DOE for not meeting minimal requirements in their proposals.

b. The contract does not guarantee funding for the entire project.

c. The contract provides DOE with "stop-work" authority and other provisions that affect the safety and viability of the MFFF and the rest of the project.

d. The contract consists of a "base contract" of 132 months/11 years with three options for extension of the contract. The Applicant was only awarded the Base Contract, which consists only of design and licensing activities of the MFFF, Plutonium/MOX fuel transportation package, and mission reactors.

i. All options can be "unilaterally extended" by the Government, which is required to provide the Contractor a 180-day notice of intents to exercise to exercise options.[2]

ii. The Secretary of Energy or "his authorized representative" must approve any award of construction work to "the firm that designs the MOX Fuel Fabrication Facility or its subsidiaries or affiliates."[3]

ii. Option 1 involves "construction and cold startup of the MFFF and modifications of mission reactors and site facilities," and therefore is the option most pertinent to this proceeding. For the facility to be constructed and the Applicant to be the licensee, DOE must provide a notice to intent to extend the contract for the performance of Option 1 180 days "prior to initiation" of the Option and then negotiate mutually agreeable terms with the Contractor in that 180 day period. Therefore, the Applicant is not even authorized to construct the facility, has no financial assurance that it can construct the MFFF or modify Catawba and McGuire NPPs, may not even hold the license, and will only hold the license and construct the facility if it maintains adequate performance of its base contract.

Because the licensee's ability to attain financial assurance from DOE is uncertain, this adds a level of risk to the design and licensing process that constitutes a Configuration

---

[1] Contract No. DE-AC02-99CH10888. Page H-24. Section H.15(a). (Contract)

[2] Contract. Clause H-9. Pages H-17 to H-18.

[3] Contract. Clause H-10. Page H-18.

Management and Quality Assurance safety issue to be examined in this proceeding. In addition, because the term of the contract is limited to only 48 months/4 years–which defies DOE's record of long cost overruns and time delays--obvious "cutting corners" safety issues are raised that should be examined in this proceeding.

ii. Option 2 involves hot startup and operation of the MFFF and Reactor Irradiation services. Extending the contract involves a notice of intent from the Government to the Contractor at least 180 days before the expiration of Option 1. Negotiations under this option will encounter additional difficulties due to the need to agree on a plutonium disposition cost sharing formula regarding fuel offsets does involve high financial risks to both the Applicant and the Government.

If these negotiations were to be unsuccessful, the facility could be mothballed like many other DOE facilities of the past or a different contractor with different mission reactors would be required to operate a facility that it had no role in designing, licensing, or constructing. Such a transition would involve enormous uncertainties in time, safety (particularly configuration management issues) and costs. As with Option 1, the time frame–183 months/15.25 years--for Option 2 is unreasonable and constitutes a safety concern (production before safety) because it requires a rate of plutonium processing equivalent to the extreme production rates of the Cold War.

iii. Option 3 involves Deactivation--an issue within the scope of this proceeding. The government can extend the contract for the performance of Deactivation by issuing a notice of intent to the Contractor at least 180 days before the expiration of Option 2. The term of Option 3–27 months/2.25 years–appears slightly more reasonable but a profound difficulty in obtaining financial assurance is likely to emerge. The contract states that DOE's "total liability for the deactivation of the MOX Fuel Fabrication Facility" is a mere $10 million, and the contractor is responsible for additional costs.[4]

This raises a very real safety issue in regards to meeting license requirements because the costs of deactivation apparently assumes nearly flawless operations and a simple deactivation process, an assumption that defies the record of plutonium processing facilities.

e. The likelihood of DOE obtaining necessary funding is questionable even at this time because it is dependent upon parallel efforts in Russia being funded. This high uncertainty is likely to be exacerbated by DOE's ongoing duplicity in the process.

i. Recent reports in nuclear trade journals report that the National Security Council does not favor the MOX option because of increased costs.

ii. In regards to plutonium disposition, DOE continues to treat Congress with arrogance, a sure route to funding cuts. Most recently, DOE withheld from Congress and the

[4] Contract. Clause H-15. Page H-24.

Public a legally required cost-report on plutonium disposition. The report clearly showed that the costs of MOX had risen dramatically, even greater than reported to Congress in DOE's FY2002 Budget request.

The report also provides a clear case of DOE's duplicitous behavior. For example, DOE subtracted 213 million for "HEU Sales" from the cost of MOX for activities performed in the PDCF that are common for either MOX or Immobilization. To make matters worse, DOE subtracted the exact same credit from the cost of HEU disposition, thus "double-dipping" into the public till to the grand scale of half a billion dollars.

iii. The U.S. Russian Agreement mandates that all work proceed in parallel. Russia is severely underfunded for its portion of the work and is likely to be in the foreseeable future because of public opposition to a plutonium fuel economy.

iv. As stated in the Parties May 17, 2001 Request for Hearing, the Applicant could easily be held in breach of contract because of "the lack of a contract modification since the alleged withdrawal of Virginia Electric and Power Company from its role as in providing irradiation services at its North Anna Unit 1 and North Anna Unit 2 nuclear reactors. The existing contract states:

'The Contractor expressly warrants that Duke Power Company and Virginia Electric and Power Company shall, subject to regulatory approval, provide the irradiation services...' (Section H-14, Page H-23)

'The Contractor may only propose to replace a mission reactor if: (1) the reactor has been shutdown for economic reasons; or (2) the NRC or the utility company has required the reactor to be shut down for safety reasons and, in either case, the shutdown will preclude accomplishment of the plutonium disposition mission schedule.", (Section H-14, Page H-23) *"Failure of the Contractor to provide an approved replacement mission reactor sufficient to accomplish the plutonium disposition mission schedule shall be considered a breach of this contract.'* (Section H-14, Page H-24)

Even though DCS is contractually obligated to the U.S. Government to irradiate MOX fuel in Virginia Power and Electric nuclear reactors, it declined to identify this to the NRC in the CAR and associated documents.

II.F
CONTENTION GROUP 6
Compliance Reporting

Contentions

Contention 6A: The applicant failed to identify and describe its environmental and safety compliance record to NRC. The ER submitted by DCS in December 2000 failed to describe the regulatory compliance history of the licensee. Instead, DCS described the regulatory compliance history of the Savannah River Site Operating Contractor Westinghouse Savannah River Site. WSRC has not submitted a license application to the NRC. Duke Cogema Stone and Webster submitted the license application yet failed to define their own compliance history both here and abroad.

Legal Basis: 10€FR51.45.(d). states in regard to the preparation of an Environmental report for an Environmental Impact Statement, that: " The environmental report shall list all Federal permits, licenses, approvals and other entitlements which must be obtained in connection with the proposed action and shall describe the status of compliance with these requirements. The environmental report shall also include a discussion of the status of compliance with applicable environmental quality standards and requirements including, but not limited to, applicable zoning and land-use regulations, and thermal and other water pollution limitations or requirements which have been imposed by Federal, State, regional, and local agencies having responsibility for environmental protection. The discussion of alternatives in the report shall include a discussion of whether the alternatives will comply with such applicable environmental quality standards and requirements."

Relief Requested: Full disclosure of the environmental, safety, and health compliance records of all major and minor partners in DCS.

UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:

Thomas S. Moore, Chairman

Charles N. Kelber

Peter S. Lam

) Docket No. 70-3098-ML

In the Matter of)

) ASLBP No. 01-790-01-ML

DUKE COGEMA STONE & WEBSTER)

Savannah River Mixed Oxide Fuel Fabrication Facility) August 13, 2001

---)

This contention group was prepared by Lou Zeller of Blue Ridge Environmental Defense League and focuses on nuclear reactor safety issues with regards to fuel made from weapons-grade plutonium. MOX fuel, a mixture of the oxides of plutonium and uranium, would be fabricated for use at commercial nuclear power plants. We submit that without the irradiation services provided by these commercial reactors, there would be no reason for the Mixed Oxide Fuel Fabrication Facility (MFFF) to seek a license for construction or operation. Therefore, we contend that it is well within the scope of the Atomic Safety and Licensing Board of the US Nuclear Regulatory Commission to consider the purpose for and, more importantly, the impacts of the material produced at the MFFF. Further, segmentation of the surplus plutonium disposition project into consideration of facilities for fabrication, irradiation, and ultimate disposition is not in accord with the spirit or the letter of the National Environmental Policy Act.

Facts and discussion:

The Department of Energy has selected Duke Cogema Stone & Webster (DCS) for the planned utilization of Duke Power reactors at Catawba and McGuire for irradiation services.

Plutonium fuel derived from dismantled weapons is an experimental program which cannot be compared to European experience with plutonium fuel made from nuclear waste. The mix of isotopes includes 64% higher concentration of Plutonium 239, the element which gives a nuclear weapon its destructive power.

The experimental nature of a weapons-derived fuel project requires a thorough and independent assessment by NRC. Additional information from DOE and DCS is required to fully assess the safety of this program.

Safety hazards in nuclear plants are a combination of human and technical errors. Both types of error are noted in the Nuclear Regulatory Commission"s Plant Performance Reviews of the McGuire and Catawba reactors (see Attachments).

The Catawba and McGuire plants operated by Duke have a radiation containment building which depends on blocks of ice to reduce heat and pressure in case of a reactor accident. Duke"s ice condenser system has inherent weaknesses which have resulted in safety problems and lengthy closures of other utility reactors using the same system.

The planned use of plutonium fuel in the reactors operated by Duke Power would be a dangerous precedent in the domestic nuclear industry, needlessly exposing many people to the risk of additional radiation exposure from a plutonium fuel-powered plant accident. Furthermore, the use of plutonium fuel in commercial reactors is a break with two decades of American non-proliferation policy and opens a door for other nations to exploit for the purpose of plutonium weapons production.

Plutonium Fueled Reactor Hazards

Commercial Nuclear Reactors Were Not Designed for Plutonium Fuel

Atom splitting in a reactor releases neutrons which split other atoms. This chain reaction is what drives the reactor. The chain reaction must be precisely controlled in order to produce power safely. Compared to neutrons from uranium atoms, plutonium releases more neutrons at a higher speed and energy during the fission process.

> ""Technical issues that arise in the analysis of risk at plants using MOX focus on the vulnerability of fuel to neutronically induced core disruption and the different inventory of radionuclides available for release from the fuel during accidents. The differences in neutronics and coupling between neutronics and thermal hydraulics result in different responses of MOX and conventional fuel to reactivity transients.""
>
> May 17, 1999 letter to NRC Chairman from the Chair of the Advisory Committee on Reactor Safeguards

Adding plutonium to the reactor in the form of MOX reduces the ability to control the chain reaction:

> The rate of fission in plutonium increases with temperature, and the problem is greater with MOX fuel made from weapons-grade plutonium. MOX fuel in a reactor attains higher temperatures than uranium fuel because of the higher quantity of transuranic elements produced during irradiation.
>
> The percentage of delayed neutrons emitted seconds to minutes after a plutonium atom splits is just one-third that of uranium (Pu239=0.2%, U235=0.65%). This means plutonium releases a higher amount of its neutrons in a single burst and adds to reactor control problems.
>
> Plutonium captures more neutrons than uranium, increasing fission and making control measures less effective.
>
> ~Institute for Energy and Environmental Research, SDA February 1997

Experience With Plutonium Fuel In The U.S. Is Limited

The MOX program is experimental in that no reactor has ever been operated with fuel derived from weapons-grade plutonium. European experience with MOX includes fuel derived from irradiated nuclear fuel, a waste product. Duke Power propose to use something quite different: fuel made from dismantled plutonium weapons. The fuel made from dismantled plutonium weapons would be comprised of a different mix of radioactive isotopes. For example, the plutonium in MOX fuel planned for Catawba and McGuire would be 92% Pu-239, where European reactor MOX contains just 56% of Pu-239. Duke"s reactors would be fueled with 64% more Plutonium-239; the most dangerous isotope which provides the explosive power of a nuclear weapon.

Reports on Duke Power"s McGuire and Catawba reactors describe human and technical errors which raise questions as to safety and reliability. Without modifications of the plants" containment vessels, inspection schedules, and maintenance procedures, the increased danger of reactor embrittlement may be hidden by outwardly normal appearance. Safety margins would be reduced if commercial power reactors designed for uranium fuel use plutonium fuel. In her May 17, 1999 letter to Nuclear Regulatory Commission Chairman, the Chair of the Advisory Committee on Reactor Safeguards said,

""The U.S. Department of Energy is proposing to dispose of some fraction of the Nation's excess weapons-grade plutonium by converting this plutonium into MOX for use in commercial nuclear power plants. There is, however, rather limited operational or regulatory experience with the use of MOX in the U.S. Even the experience in other countries is not extensive.""

Reactor Embrittlement

Higher energy neutrons from plutonium are more likely to strike reactor parts such as the stainless steel containment vessel. This neutron bombardment degrades the metal parts of the reactor and the metal becomes brittle. An embrittled reactor may look unchanged, but it will not perform as well under extreme conditions. For example, an event causes the water level in the reactor to drop. Normally, the heated water is replaced by cold water from outside the reactor. However, this cold water bath may cause the embrittled metal part to fail and a minor reactor failure becomes a major one. Embrittlement of reactor parts is a well-known phenomenon and has caused premature closing of commercial power reactors. The additional neutron bombardment caused by MOX fuel"s plutonium will increase the tendency of parts to wear out and fail.

Plutonium Fuel is Unstable

French test results suggest that plutonium fuel is more unstable than uranium fuel. In 1997 a MOX fuel rod violently ruptured when subjected to test conditions designed to simulate an accident. The uranium fuel rod in that test did not rupture. The May 17, 1999 Advisory Committee on Reactor Safeguards letter to Nuclear Regulatory Commission Chairman states,

> ""We are aware of experimental studies that show there to be enhanced release of fission gases to the fuel-cladding gap during reactor operations with MOX relative to conventional fuels. This may simply be an effect caused by fuel temperature. We are also aware of anecdotal accounts of the results of VERCOURS tests in France dealing with the release of volatile radionuclides such as cesium from MOX under severe accident conditions. Results of these tests revealed that during the early stages of core degradation, releases of volatile radionuclides from MOX are more extensive than from conventional fuels at similar levels of burnup.""

Safety and Reliability Problems at Catawba and McGuire

Hazards in nuclear plants are a combination of human and technical errors. Both types of error are noted in the Nuclear Regulatory Commission"s Plant Performance Reviews of the McGuire, and Catawba reactors.

The Department of Energy"s Environmental Synopsis contains a Nuclear Regulatory Commission Systematic Assessment of Licensee Performance (SALP) for the Catawba, McGuire, and North Anna nuclear power stations. However, the Nuclear Regulatory Commission suspended the SALP program in favor of Plant Performance Reviews (PPR"s). PPR"s were completed in March 1999 for these reactors and rate all three merely ""acceptable."" The PPR"s note shortcomings in ice condenser maintenance and inspection in McGuire and Catawba reactors and corrosion of service water pipes and auxiliary feedwater pipes (the only source of water for steam generators when the main feedwater system fails), and examples of poor engineering performance at North Anna and Catawba. I include excerpts from the Catawba PPR:

Catawba NRC Plant Performance Review March 25, 1999:

> ""Unit 1 experienced a forced outage of approximately three weeks in duration due to blocked flow channels in portions of the ice condenser.""

> ""Problems in maintenance programs and processes included examples of surveillance deficiencies for ventilation systems and ice condensers.""

> ""The engineering performance decline was the result of deficiencies in auxiliary building ventilation system testing, an overheating event of the upper surge tank, and degraded conditions in the Unit 1 ice condenser. While the issues were ultimately resolved properly, each had roots in poor engineering performance.""

Catawba and McGuire utilize ice condensers which absorb energy and allow smaller physical containment structures to contain accidental radioactive releases from the reactors. Ice condensers must work during a reactor emergency-as an air bag must work during an auto accident. The Donald C. Cook nuclear plant uses similar technology was shut down because of ice condenser problems. No nuclear plant should use MOX until these ice condenser problems are solved.

> ""The NRC has a mandate to protect public health and safety. The findings from D C Cook indicate that both of its units may not have protected the public had there been an accident. The NRC does not know about the adequacy of the other ice condensers. The people living around these plants should be protected by solid designs and functioning safety equipment, not by sheer luck.""

David Lochbaum, Union of Concerned Scientists Backgrounder on Ice Condensers, 5/26/98

Public Health Impacts From Radiation Releases

MOX fuel has a greater quantities of plutonium and other hazardous radioactive isotopes such as Americium 241 and Curium 242--actinide elements which would cause additional harmful radiation exposure to the public during a failure of the reactor containment structure.

> ""Public attention has been drawn to the higher actinide inventories available for release from MOX than from conventional fuels. Significant releases of actinides during reactor accidents would dominate the accident consequences. Models of actinide release now available to the NRC staff indicate very small releases of actinides from conventional fuels under severe accident conditions."" (emphasis added)

~Letter from Advisory Committee on Reactor Safeguards to Nuclear Regulatory Commission Chairman, May 17, 1999

The release of these more toxic radioactive elements would cause more fatalities immediately following the accident, and would cause more cancers in the years following the breach. A recent study by the Nuclear Control Institute estimates that the risk to the public near McGuire or Catawba of contracting a deadly cancer following a severe accident will increase by nearly 40% when the plants start using plutonium fuel.

A study by Dr. Edwin Lyman estimated the number of cancer deaths that could result from an accident at a plant using MOX fuel:

> A reactor using weapons-grade MOX fuel in one-third of its core contains, on average, about three times more plutonium 239, five times more americium 241, and four times more curium 242 than a reactor using only LEU (low enriched uranium) fuel.

Compared to an LEU-fueled reactor, a severe accident at a reactor with a one-third weapons grade MOX core, involving a core meltdown and containment failure or bypass, could cause approximately 30% more cancer fatalities, corresponding to hundreds or even thousands of additional cancer deaths, depending on the type of accident.

The annual risk of contracting a fatal cancer as a result of a severe accident would increase by nearly 40 percent for an average individual living near a nuclear plant if the plant were to load weapons-grade MOX in one-third of its core.

~Nuclear Control Institute MOX Safety Report, March 1999

""Dr. Lyman"s study indicates that the increase in risk associated with the use of weapons-grade MOX in typical U.S. power reactors is so large that, according to NRC staff regulatory guidance, an application for a license amendment to use MOX "would not normally be considered." See Office of Nuclear Energy Research, Regulatory Guide 1.174.""

~Nuclear Control Institute Background Paper January 21, 1999

Plutonium Fuel Transportation Hazards

Emergency response to rail or highway accidents must be well-prepared and rapid. Delays in response to accidents which involve the release of radioactive material would expose unknown numbers of people to negative health effects. In 1996, a DOE Transport and Safeguards Division Safe Secure Transport (SST) trailer carrying nuclear weapons slid off the road and rolled over in rural Nebraska. Four hours elapsed before DOE headquarters were notified, and it was 20 hours before a Radiological Assistance Program team determined there was no release. A similar delay in response to a MOX fuel accident could make effective emergency response dangerous and clean-up impossible. The following comment by the Georgia Environmental Protection Division cites vehicular tests of powdered materials deposited on roadways and takes issue with the DOE"s approach to emergency response to accidental plutonium fuel releases.

""After passage of about 100 cars only a small fraction of the original contamination remained on the road surface. Unless emergency officials promptly close the accident scene to vehicle traffic (an unlikely situation), emergency responders may face an incident scene that is, unknown to them, extremely hazardous due to respirable plutonium. Post emergency actions may also be complicated due to the enhanced spread of contamination by vehicle traffic.""

~Georgia Environmental Protection Division comments on DOE SPD DEIS

Many rural communities in South Carolina, North Carolina, and Virginia resemble Nebraska in that fire departments and emergency first-responders are entirely volunteer. This does not imply a lack of dedication, but limited resources do not allow volunteers to be prepared for every possible emergency. I served as a volunteer fireman in NC for many years and our experience, training, and equipment did not prepare us for radionuclide transport accidents.

Complete Information Has Not Been Made Public

The NRC must make DCS and its subcontractors subject to full public scrutiny. The DOE"s Environmental Synopsis is at least two steps removed from the original data which the DOE required prospective contractors to submit in a Request For Proposal (#DE-RP02-98CH10888). Such third-hand information does not provide a sufficient level of detail required for a thorough independent analysis. We are on record since June 1999 asking that DOE make all information on the MOX project submitted by DCS (Duke Engineering & Services, COGEMA Inc., and Stone & Webster) available for review to members of the affected public. These data include:

DOE"s Environmental Critique

DCS environmental data and analyses for design, licensing, construction, operation, and eventual decontamination and decommissioning of a MOX facility,

DCS environmental data and analyses for irradiation of MOX fuel in existing domestic, commercial reactors,

DOE projections of populations surrounding the proposed reactor sites and evaluations of air dispersal patterns,

Oak Ridge National Laboratory data on the expected radionuclide activities in MOX fuel compared to that in low enriched uranium fuel used in reactor accident analyses, and

DCS data used in computer models for determining radiation doses from normal operations and accident scenarios.

We contend that the NRC must address all the problems outlined above.

Please find attached 23 pages of documents comprised of largely reports on Duke"s Catawba and McGuire operations from 1997 to 2001.

Respectfully submitted,

Louis Zeller

Attachments

NRC Plant Performance Reviews

Shortcomings, problems, errors, and poor engineering performance

McGuire NRC Plant Performance Review, March 25, 1999

These Duke Power plants in North Carolina began operation in 1981 and 1983. The following excerpts are from the NRC"s PPR:

""...shortcomings in oversight of diesel generator vendors were noted.""

""Several human performance errors during routine plant evolutions were identified...""

""Minor program and procedure problems still indicate room for improvement. In addition to core inspections, a regional initiative inspection is planned for ice condenser inspections during the Unit 2 refueling...""

""An area for improvement was engineering programs and processes such as ... procedures and work instructions for maintenance and calibration of instrumentation....""

""... some fire protection system maintenance material conditions weaknesses have been noted...""

""Self-identified problems with fire barrier penetration seals were reported to the NRC and improvements are being made.""

Catawba NRC Plant Performance Review, March 25, 1999

These Duke Power reactors began operation in 1985 and 1986. The following exerpts are from the NRC"s PPR:

""Unit 1 experienced a forced outage of approximately three weeks in duration due to blocked flow channels in portions of the ice condenser.""

""Engineering performance continued to be acceptable but declined since the last assessment as a result of emergent issues rooted in shortcomings in engineering"s performance.""

""Examples of poorly supported or non-conservative operability or root cause determinations were noted.""

""Problems in maintenance programs and processes included examples of surveillance deficiencies for ventilation systems and ice condensers.""

""The engineering performance decline was the result of deficiencies in auxiliary building ventilation system testing, an overheating event of the upper surge tank, and degraded conditions in the Unit 1 ice condenser. While the issues were ultimately resolved properly, each had roots in poor engineering performance.""

Nuclear Regulatory Commission

Office of Public Affairs -- Region II

61 Forsyth Street, Suite 23T85, Atlanta, GA 30303

Ken Clark (Phone: 404/562-4416, E-mail: kmc2@nrc.gov)

Roger Hannah (Phone 404/562-4417, E-mail: rdh1@nrc.gov)

No: II-98-35

May 11, 1998

NRC OFFICIALS SEND INSPECTION TEAM TO CATAWBA

Augmented Inspection Team Will Inspect and Assess Recent Event

Nuclear Regulatory Commission officials today dispatched an Augmented Inspection Team to the two-unit Catawba nuclear power plant, operated by Duke Energy Company near Rock Hill, South Carolina. The team will assess the circumstances of an event on May 7 which left the Catawba Unit 1 auxiliary feedwater system in a condition different from its design. NRC officials said no accident occurred. Duke engineers told the agency the plant suffered no adverse effects. NRC's interest is in learning how a failure in the unit's non safety-related, secondary condensate system resulted in operators declaring inoperable all trains of the safety-related auxiliary feedwater system. Catawba has a primary and secondary water system. The primary system cools the reactor by circulating water directly through the core. It then passes through thousands of tubes into a large cylindrical tank known as a steam generator. The steam generator is filled with water supplied by the secondary system. This secondary system water serves two functions: (1) it absorbs heat from the primary reactor cooling system, and (2) it produces steam which turns turbines to generate electricity. After turning the turbines, this steam is condensed back into water and normally recirculates through the feedwater system to produce more steam. The auxiliary feedwater system serves as a backup to the feedwater system. On May 7, plant operators

determined that, following a planned power reduction, tanks which hold water for use in the auxiliary feedwater system registered a water temperature in excess of system design limits. The operators declared three auxiliary feedwater pumps inoperable due to uncertainty related to their operation under higher water temperatures. Duke attributed the cause to an improper setting on a pump recirculation valve. This erroneous set point, the company believes, resulted in a higher than normal flow of water during the power reduction, diverting some of the hotter water to the auxiliary feedwater system tank. Operators returned water temperatures to normal and declared the auxiliary feedwater system operable. Permanent corrective actions are being evaluated. NRC officials said members of the inspection team will arrive at the site Monday afternoon and Tuesday morning. Team leader Kerry Landis, a branch chief in the NRC Atlanta regional office's Division of Reactor Projects, will be available to discuss preliminary team findings with the public and the press at the conclusion of the inspection.

Nuclear Regulatory Commission

Office of Public Affairs -- Region II

61 Forsyth Street, Suite 23T85, Atlanta, GA 30303

Ken Clark (Phone: 404/562-4416, E-mail: kmc2@nrc.gov)

Roger Hannah (Phone 404/562-4417, E-mail: rdh1@nrc.gov)

No: II-98-47

June 12, 1998

NRC TO MEET WITH DUKE ENERGY ON JULY 8 TO DISCUSS NUCLEAR POWER PLANT ICE CONDENSERS

Status of Systems at McGuire and Catawba to Be Discussed

Officials from the Nuclear Regulatory Commission and Duke Energy Corporation will meet in Atlanta on July 8 to discuss the status of the ice condenser safety system at the McGuire nuclear power plant in North Carolina and the Catawba nuclear power plant in South Carolina. The meeting will be held at 10:00 a.m. (EDT) in NRC offices on the 24th floor of the Atlanta Federal Center, located at 61 Forsyth Street, S.W. The meeting is open to observation by the public and media, and NRC officials will be available at its conclusion to answer questions from observers who attend. Ice condensers are incorporated into some Westinghouse pressurized water reactor containment building designs. They are constructed so that steam released during an accident.wil be directed through borated ice where it is cooled and condensed. This serves to mitigate buildup of pressure on the containment building walls.

Nuclear Regulatory Commission

Office of Public Affairs -- Region II

61 Forsyth Street, Suite 23T85, Atlanta, GA 30303

Ken Clark (Phone: 404/562-4416, E-mail: kmc2@nrc.gov)

Roger Hannah (Phone 404/562-4417, E-mail: rdh1@nrc.gov)

No: II-99-43

July 12, 1999

NRC STAFF SETS ENFORCEMENT CONFERENCE WITH DUKE ENERGY

TO DISCUSS APPARENT VIOLATIONS AT CATAWBA NUCLEAR STATION

The Nuclear Regulatory Commission staff has scheduled a predecisional enforcement conference in Atlanta on Tuesday, July 20, to discuss with Duke Energy Corporation apparent violations of NRC requirements related to the Unit 1 and Unit 2 ice condensers at the Catawba Nuclear Station near York, South Carolina. The meeting will be held at 1:00 p.m. in Bridge Conference Room D of the Sam Nunn Atlanta Federal Center at 61 Forsyth Street. It is open to observation by interested members of the public and news media representatives. NRC officials will be available at its conclusion to answer questions from interested observers.

NRC officials said the apparent violations include the potential inoperability of the Unit 2 ice condenser doors due to ice buildup, the failure to promptly identify and correct ice condenser blockage and damaged ice containers in both units, the failure to perform adequate inspections for foreign debris in the ice condensers, and the failure to properly install ice condenser components as designed.

Ice condensers are incorporated into some Westinghouse pressurized water reactor containment building designs. They are constructed so that steam released during an accident will be directed through borated ice where it is cooled and condensed. This serves to mitigate buildup of pressure on the containment building walls.

The decision to hold a predecisional enforcement conference does not mean that a determination has been made that violations have occurred or that enforcement action will be taken. The purpose is to discuss the apparent violations, their causes and safety significance; to provide the licensee with an opportunity to point out errors that may have been made in NRC inspection reports; and to enable the licensee to outline its proposed corrective actions.

No decision on the apparent violations or any contemplated enforcement action, such as a civil penalty, will be made at the conference. Those decisions will be made by NRC officials at a later time.

Nuclear Regulatory Commission

Office of Public Affairs -- Region II

61 Forsyth Street, Suite 23T85, Atlanta, GA 30303

Ken Clark (Phone: 404/562-4416, E-mail: kmc2@nrc.gov)

Roger Hannah (Phone: 404/562-4417, E-mail: rdh1@nrc.gov)

No: II-97-70

September 23, 1997

NRC STAFF TO HOLD CONFERENCE WITH DUKE POWER COMPANY TO

DISCUSS APPARENT VIOLATIONS AT McGUIRE NUCLEAR PLANT

The Nuclear Regulatory Commission staff will hold a predecisional enforcement conference with Duke Power Company on Wednesday, October 1, to discuss apparent violations of NRC regulations involving ice condenser doors at the McGuire nuclear power plant near Huntersville, North Carolina.

The apparent violations involve the company's failure to ensure that ice condenser inlet doors on Unit 2 would be able to open if needed and a failure to perform adequate corrective actions based on industry experience and operational events at McGuire.

The ice condenser is a passive accident mitigation system containing about two and one-half million pounds of borated ice. If an accident were to occur, the ice condenser system would condense steam and lower pressure in the plant's containment structure. The ice is located behind a number of doors designed to open when the pressure in containment reaches a certain level above the pressure inside in the ice condenser area.

In July, McGuire plant employees determined that 10 of the 48 ice condenser inlet doors in lower containment were incapable of opening with less force than specified in the plant's technical specifications and may not have opened in an accident situation.

The meeting will be held in the NRC Atlanta office, located at 61 Forsyth Street, Room 24T20, at 10:00 a. m. It will be open to observation by the public.

NRC officials said the decision to hold a predecisional enforcement conference does not mean that a determination has been made that a violation has occurred or that enforcement action will be taken.

The purpose is to discuss apparent violations, their causes, and safety significance; to provide the licensee with an opportunity to point out any errors that may have been made in NRC inspection reports; and to enable the company to outline its proposed corrective actions.

No decision on the apparent violations or any contemplated enforcement action, such as a civil penalty, will be made at the conference. Those decisions will be made by NRC officials at a later time.

Nuclear Regulatory Commission

Office of Public Affairs

Washington DC 20555

Telephone: 301/415-8200 -- E-mail: opa@nrc.gov

No. 99-219

October 15, 1999

NRC TO ALLOW DUKE ENERGY TO SUBMIT

EARLY LICENSE RENEWAL APPLICATIONS

The Nuclear Regulatory Commission has granted a request from the Duke Energy Corporation toallow the company to submit applications to renew the licenses for its McGuire Unit 2 and the two Catawba nuclear power plants earlier than usually permitted.

NRC regulations specify that license renewal applications may not be submitted to the Commission earlier than 20 years before the expiration of the current 40-year operating license. This limit is designed to ensure that sufficient operating experience is accumulated to identify any plant-specific aging concerns. However, in amending this license renewal rule in 1995, the Commission indicated it would consider an exemption to this requirement if sufficient information was available on a plant-specific basis to justify it.

By June 2001, the earliest date the NRC said it will accept a license renewal application from Duke, McGuire Unit 1 will have achieved the required 20 years of operation; Unit 2 will have 18.3 years; Catawba Unit 1 will have 16.5 years and 15.3 years for Unit 2. In a safety evaluation, the NRC determined that the operating experience of McGuire Unit 1, in conjunction with the substantial number of years for the other three units, should be sufficient to identify any aging concerns applicable to all four units.

McGuire, 17 miles south of Charlotte, N.C., and Catawba, six miles northwest of Rock Hill, S.C., are two-unit stations utilizing pressurized water reactors with ice-condenser containments having a rated power output of about 1130 megawatts each. The four plants are sufficiently similar in design, operation and maintenance that the operating experience of McGuire Unit 1 should apply to the other three units, according to the NRC staff.

In its request for early license renewal, Duke Energy explained that regular and systematic exchanges of information among its nuclear stations provide a means to continually improve plant programs. Duke Energy plans to submit license renewal requests for all four units simultaneously, to expedite processing and reduce costs.

The current operating license for McGuire Unit 1 expires in 2021, and for McGuire Unit 2, in 2023. The current operating license for Catawba Unit 1 expires in 2024, and for Unit 2, in 2026.

Once submitted, the license renewal applications will have to meet the same requirements NRC is using in evaluating other license renewal applications. If granted, the renewed licenses will have the effect of extending the operating life of each plant by as many as 20 years.

The exemption was published in the *Federal Register* October 8.

Nuclear Regulatory Commission

Office of Public Affairs -- Region II

61 Forsyth Street, Suite 23T85, Atlanta, GA 30303

Ken Clark (Phone: 404/562-4416, E-mail: kmc2@nrc.gov)

Roger Hannah (Phone 404/562-4417, E-mail: rdh1@nrc.gov)

No: II-99-26

April 5, 1999

NRC FINDS PERFORMANCE 'ACCEPTABLE'

AT MCGUIRE IN LATEST REVIEW

The Nuclear Regulatory Commission staff has found that safety performance remains acceptable in the NRC's latest plant performance review at the McGuire nuclear power plant, operated by Duke Power Company near Huntersville, North Carolina. Charlotte In a letter to Duke Power which outlined the results of the review, which ran from March 1997 through January 1999, Charles R. Ogle, an official in the agency's Atlanta regional office, said "overall performance at McGuire was acceptable" and that "strong management involvement resulted in improvements" in the area of plant operations. He said performance also improved in maintenance and plant support and that engineering performance was "consistent."

Ogle said that the NRC plans to conduct inspections from the Atlanta regional office on the plant's ice condensers, fire protection system, and development of an Independent Spent Fuel (Dry Cask) Storage Installation, in addition to its normal inspection program, during the next assessment period at McGuire

The text of the plant performance review letter is available from the NRC Region II Office of Public Affairs and on the NRC web site at: http://www.nrc.gov/OPA/ppr.

NRC reviews safety performance twice a year at every licensed nuclear power plant in the nation. These reviews give the agency staff an integrated assessment of plant performance and provide a basis for planning inspection activities.

Plant performance reviews are being used by the NRC as an interim measure to monitor nuclear power plant safety. The agency began using it for this purpose after suspending the Systematic Assessment of License Performance (SALP) process until a new assessment program is developed. Previously, SALP reports were issued every 12 to 24 months.

The new reactor oversight and assessment program being developed will provide quarterly performance reports, based on a number of performance indicators and on inspection findings. This program will be tested at eight sites beginning in June and will be extended to all plants next January. A full description of the new program is available on the NRC web site at: http://www.nrc.gov/OPA/primer.htm.

NRC Performance Summaries

Catawba 1

Initiating Events

Significance: TBD Feb 16, 2001
Identified By: NRC
Item Type: AV Apparent Violation
Failure to Promptly Identify and Correct the Unit 1 Residual Heat Removal System Water Hammer Condition
An apparent violation of 10 CFR 50, Appendix B, Criterion XVI was identified for the failure to identify a root cause and establish effective corrective actions to prevent repetitive water hammer events in the Unit 1 residual heat removal (ND) system which have caused the repeated failure of snubbers on supports 1-R-ND-0226 and 1-R-ND-0596. (Section 40A2 b.(2).2)
Inspection Report# : 2001003*(pdf)*

Mitigating Systems

Significance: G Mar 30 2001
Identified By: NRC
Item Type: FIN Finding
Failed to Demonstrate Performance of the Station Drinking Water System as Backup Cooling Water to the Unit 1 and 2 A Train Charging Pumps
The licensee failed to demonstrate that the performance or condition of the station drinking water system, a risk-important system that provides backup cooling water to the Unit 1 and 2 A train charging pump motors and bearing oil coolers, was being effectively controlled through the

performance of appropriate preventive maintenance (including surveillance activities). This resulted in a failure to recognize and correct a degraded system pressure condition, until it was identified by the inspectors. The degraded pressure condition was determined to be of very low safety significance because an analysis performed by the licensee demonstrated that the backup function to cool the charging pumps and motors would have been provided at the degraded pressure (Section 1R12.2).
Inspection Report# : 2000006*(pdf)*

Significance: G Mar 30, 2001
Identified By: NRC
Item Type: NCV NonCited Violation
Failure to Adequately Perform TS SR 3.4.9.3 for Pressurizer Heaters
A non-cited violation was identified regarding the licensees failure to properly perform Technical Specification Surveillance Requirement 3.4.9.3, which verifies that pressurizer heaters can be automatically transferred from their normal power supplies to their emergency power supplies. Once identified, the portion of the automatic circuit that had been omitted from the test was properly tested on February 5, 2001, and was verified to be functional. This finding had a credible impact on safety because the licensee had never demonstrated the full automatic capability of the power supply transfer circuitry for the pressurizer heaters, which are important for maintaining pressurizer pressure control during a loss of offsite power event. The finding was also the latest in a number of missed surveillance requirements identified at Catawba over the last two to three years. This finding was of very low safety significance because the circuit was functional when tested and because of provisions in the licensee's emergency procedures for manually aligning the heaters to their emergency power source had the automatic transfer failed during a loss of normal power event (Section 1R22).
Inspection Report# : 2000006*(pdf)*

Significance: G Feb 16, 2001
Identified By: NRC
Item Type: NCV NonCited Violation
Failure to Identify Conditions Adverse to Quality - two examples
The first example of a non-cited violation of 10 CFR 50, Appendix B, Criterion XVI was identified for a failure to identify a condition adverse to quality which contributed to a Unit 1 reactor vessel level instrument system (RVLIS) channel being inoperable. A quality control inspector did not initiate a Problem Investigation Process report after identifying that a RVLIS system terminal board was not reconnected (wired) in accordance with electrical drawings. Because of an electrical drawing error, the terminal board was then wired incorrectly and resulted in a failure to meet Technical Specification 3.3.3. Function 4 requirements for an inoperable RVLIS channel from June 1999 to November 4, 2000. Because other indications would have been available to the operators to mitigate the consequences of an accident, and based on the probability that the operators would have used the conservative indication of decreasing reactor vessel level from the operable RVLIS channel, the inspectors determined that this issue was of very low safety significance. (Section 40A2.a.(2).2) The second example of a non-cited violation of 10 CFR 50, Appendix B, Criterion XVI was identified for a failure to identify a condition

adverse to quality which contributed to not recognizing that four post accident monitoring control room recorders in Unit 1 were inoperable from September 24 through September 29, 2000, and degraded from September 29 through October 19, 2000. Specifically, operators did not review applicable electrical drawings in order to identify which components were supplied from a failed electrical breaker. Consequently, they did not recognize that post accident monitoring control room recorders, which are used in the emergency operating procedures to determine mitigation strategies, were no longer operable. Because other indications would have been available to the operators to use in lieu of these accident monitoring recorders and because the Technical Specification Limiting Condition for Operation requirements were not exceeded, the inspectors determined that this issue was of very low safety significance. (Section 40A2.a.(2).3)
Inspection Report# : 2001003*(pdf)*

Significance:G Feb 16, 2001
Identified By: Licensee
Item Type: NCV NonCited Violation
Failure to Meet 10 CFR 50, Appendix B, Criterion III and XI for Unit 1 RIVLIS
10 CFR 50, Appendix B, Criterion III, requires in part that the design bases is correctly translated into drawings. 10 CFR 50, Appendix B, Criterion XI, requires in part that all testing required to demonstrate that components will perform satisfactorily in service is identified and performed. To the contrary, an error in the electrical drawings for the Unit 1 reactor vessel level indication system (RVLIS) circuitry was introduced during a previous drawing revision on July 1, 1985, which led to the improper wiring of the RVLIS instrumentation in a June 1999 modification. Following the modification activities, the licensee did not develop an adequate post modification testing plan for the RVLIS electrical circuitry, resulting in one channel of RVLIS being inoperable for 18 months. This finding was determined to have very low safety significnace and is captured in the licensee's corrective action program under PIP C-00-05558 (Section 4OA7).
Inspection Report# : 2001003*(pdf)*

Significance: G Jun 24, 2000
Identified By: NRC
Item Type: NCV NonCited Violation
Failure to Scope an Accident Mitigating Function Associated with ECCS Leak Detection in the Maintenance Rule
The licensee failed to include in its maintenance rule scope an accident mitigating function for a control room alarm associated with emergency core cooling system post-accident leak detection capability. The alarm was tied to residual heat removal and containment spray pump room sump levels and was identified in 1998 as a mitigating function, as described in the Catawba Updated Final Safety Analysis Report. As a result, two functional failures were not properly classified in February 2000. This issue was characterized as a non-cited violation of 10 CFR 50.65 (b)(2) and was determined to have very low safety significance because the licensee's scoping and functional failure determination errors did not directly result in additional unavailability of the alarm function (Section 1R12.2).
Inspection Report# : 2000003*(pdf)*

Significance: G Jun 24, 2000
Identified By: Licensee
Item Type: NCV NonCited Violation
Failure to Provide Adequate Procedures for Performing Maintenance on Safety-Related Sump Pump Level Switches
Residual heat removal and containment spray pump room sump level alarm function was lost for several months up to February 2000 due to inadequate maintenance procedures associated with sump level switch calibrations. This issue was characterized as a non-cited violation of Technical Specification 5.4.1 and was determined to be of very low safety significance due to the availability of other emergency core cooling system leak detection methods (Section 4OA3.2).
Inspection Report# : 2000003*(pdf)*

Occupational Radiation Safety

Significance: G Sep 23, 2000
Identified By: Licensee
Item Type: NCV NonCited Violation
Failure to Implement Radiation Control Procedures for Posting Extra High Radiation Areas as Required by TS 5.4.1.a
A single event, resulting in two non-cited violations, involved: (1) a failure to implement radiation control procedures for posting an extra high radiation area as required by TS 5.4.1.a.; and (2) failure to lock or control entrance to an extra high radiation area as required by Technical Specification 5.7.2 and Title 10 CFR Part 20.1601. This event was determined to be of very low safety significance because minimal radiation exposure was received by the workers and inadvertent entry into the area of concern (i.e., containment building in the area near the personnel air lock) would not immediately result in workers being in radiation fields greater than 1000 milliroentgen equivalent man per hour (Section 2OS1).
Inspection Report# : 2000004*(pdf)*

Significance: G Sep 23, 2000
Identified By: NRC
Item Type: NCV NonCited Violation
Failure to Control Access to High Radiation Areas as Required by 10 CFR Part 20.1601 and TS 5.7.2
A single event, resulting in two non-cited violations, involved: (1) a failure to implement radiation control procedures for posting an extra high radiation area as required by TS 5.4.1.a.; and (2) failure to lock or control entrance to an extra high radiation area as required by Technical Specification 5.7.2 and Title 10 CFR Part 20.1601. This event was determined to be of very low safety significance because minimal radiation exposure was received by the workers and inadvertent entry into the area of concern (i.e., containment building in the area near the personnel air lock) would not immediately result in workers being in radiation fields greater than 1000 milliroentgen equivalent man per hour (Section 2OS1).
Inspection Report# : 2000004*(pdf)*

Significance: G Jun 24, 2000
Identified By: Licensee
Item Type: NCV NonCited Violation
Failure to Prevent the Release of Radioactive Byproduct Material from the Radiological Control Area and Plant Site
A non-cited violation was identified for the failure to comply with the requirements of 10 CFR 20.1802. Specifically, on April 7, 2000, the licensee failed to prevent the release of radioactive byproduct material (e.g., a radioactive particle on a contract employee's lanyard) from the radiological control area and plant site. Based on the activity of the particle and the resulting occupational dose assessment for the affected contract employee, this finding was determined to be of very low significance (Sections OS2, 2PS3).
Inspection Report# : 2000003*(pdf)*

Physical Protection

Significance: G Jun 24, 2000
Identified By: Licensee
Item Type: NCV NonCited Violation
Failure to Secure Two Vital Area Openings Exceeding 96 Square Inches in February 1999
A non-cited violation of the Physical Security Plan was identified for the licensee's failure to secure two vital area openings exceeding 96 square inches in February 1999. This issue was determined to have very little significance, given the non-predictable basis of the failures and the fact that there was no evidence that the vulnerabilities had been exploited (Section 3PP2).
Inspection Report# : 2000003*(pdf)*

Miscellaneous

Significance: N/A Feb 16, 2001
Identified By: NRC
Item Type: FIN Finding
Identification and Resolution of Problems
Overall, the licensee's corrective action program was effective at identifying, evaluating, and correcting problems. The threshold for entering problems into the corrective action program was sufficiently low. Reviews of operating experience information were comprehensive. In general, the licensee properly prioritized items (by Action Category) in its corrective action program database, which ensured that timely resolution and appropriate causal factor analyses were employed commensurate with safety significance. Some exceptions were noted in the area of problem identification, where all relevant issues of problems were not identified and equipment performance was adversely affected. The inspection identified three exceptions in the area of prioritization and evaluation of issues, where more comprehensive root cause determinations would have provided more effective evaluations and corrective actions. In the area of effectiveness of corrective actions, it was noted that the corrective action program was not timely in resolving various documentation deficiencies with Technical Specification (TS) surveillances,

Updated Final Safety Analysis Report changes and TS bases changes. Previous non-compliance issues documented as non-cited violations were properly tracked and resolved via the corrective action program. The results of the last comprehensive corrective action program audit conducted by the licensee (September 1999) were properly entered and dispositioned in the corrective action program. Based on discussions with plant personnel and the apparently low threshold for items entered in the corrective action program database, the inspectors concluded that workers at the site generally felt free to raise safety concerns to their management.
Inspection Report# : 2001003*(pdf)*

Significance: N/A Dec 23, 2000
Identified By: Licensee
Item Type: NCV NonCited Violation
Technical Specification 5.4.1 and Regulatory Guide 1.33, Section 7, for failing to have adequate procedures to control the release of radioactive material during a pressurizer gas space venting evolut
Technical Specification 5.4.1 and Regulatory Guide 1.33, Section 7, for failing to have adequate procedures to control the release of radioactive material during a pressurizer gas space venting evolution on October 14, 2000, as described in the licensee's corrective action program. Reference PIPs C-00-04914 and 05241.
Inspection Report# : 2000005*(pdf)*

Last modified : May 03, 2001

Catawba 2

Initiating Events

Significance: G Sep 23, 2000
Identified By: Licensee
Item Type: FIN Finding
Reactor Trip Caused by Moisture Intrusion into Main Feedwater Pump 2B Speed Control Circuitry
Poor workmanship and inadequate oversight of turbine building roof repairs, coupled with inadequately constructed roof drainage systems, resulted in a June 5, 2000, Unit 2 reactor trip. Water from heavy rains that day could not be properly drained from the turbine building roof, partially due to debris and other roofing material that had collected in the drainage system. Water overflowed from the roof and into the turbine building, and leaked into the 2B main feedwater pump turbine speed control cabinet. A secondary plant transient resulted, which ultimately led to a turbine trip/reactor trip. This issue was determined to be of very low safety significance because it did not affect the ability of mitigating systems to perform their safety functions (Section 4OA3.1).
Inspection Report# : 2000004*(pdf)*

Mitigating Systems

Significance: GMar 30, 2001
Identified By: NRC
Item Type: FIN Finding
Failed to Demonstrate Performance of the Station Drinking Water System as Backup Cooling Water to the Unit 1 and 2 A Train Charging Pumps
The licensee failed to demonstrate that the performance or condition of the station drinking water system, a risk-important system that provides backup cooling water to the Unit 1 and 2 A train charging pump motors and bearing oil coolers, was being effectively controlled through the performance of appropriate preventive maintenance (including surveillance activities). This resulted in a failure to recognize and correct a degraded system pressure condition, until it was identified by the inspectors. The degraded pressure condition was determined to be of very low safety significance because an analysis performed by the licensee demonstrated that the backup function to cool the charging pumps and motors would have been provided at the degraded pressure (Section 1R12.2).
Inspection Report# : 2000006*(pdf)*

Significance: N/A Mar 30, 2001
Identified By: NRC
Item Type: FIN Finding
Failure to Identify Two Maintenance Preventable Functional Failures Affecting the Unit 2 Auxiliary Feedwater System
The inspectors identified a failure to identify two maintenance preventable functional failures (MPFFs) affecting the Unit 2 auxiliary feedwater system, one involving the turbine-driven auxiliary feedwater pump, the other involving the A motor-driven pump. Both of these occurred on October 5, 2000, following an inadvertent transfer of pump control to a local control panel. Although the finding did not involve a violation of the maintenance rule, it represented a recurring performance problem in this area as the latest of several missed maintenance preventable functional failure determinations involving different safety systems over the last year and a half. This finding was of very low safety significance because the failure to identify these MPFFs did not directly affect the ability of the auxiliary feedwater system to perform its safety function (Section 1R12.1).
Inspection Report# : 2000006*(pdf)*

Significance: G Mar 30, 2001
Identified By: NRC
Item Type: NCV NonCited Violation
Failure to Adequately Perform TS SR 3.4.9.3 for Pressurizer Heaters
A non-cited violation was identified regarding the licensees failure to properly perform Technical Specification Surveillance Requirement 3.4.9.3, which verifies that pressurizer heaters can be automatically transferred from their normal power supplies to their emergency power supplies. Once identified, the portion of the automatic circuit that had been omitted from the test was properly tested on February 5, 2001, and was verified to be functional. This finding had a credible impact on safety because the licensee had never demonstrated the full automatic capability of the power supply transfer circuitry for the pressurizer heaters, which are important for maintaining

pressurizer pressure control during a loss of offsite power event. The finding was also the latest in a number of missed surveillance requirements identified at Catawba over the last two to three years. This finding was of very low safety significance because the circuit was functional when tested and because of provisions in the licensee's emergency procedures for manually aligning the heaters to their emergency power source had the automatic transfer failed during a loss of normal power event (Section 1R22).
Inspection Report# : 2000006*(pdf)*

Significance: G Jun 24, 2000
Identified By: Licensee
Item Type: FIN Finding
Steam generator power operated relief valve 2SV-19 failed to open on April 15, 2000, due to mispostioned nitrogen pressure regulators
Steam generator power operated relief valve 2SV-19 failed to open on April 15, 2000, due to mispostioned nitrogen pressure regulators, which are required to function during a design basis event involving the loss of normally available instrument air. The licensee determined the mispositioned regulators to be a human performance issue, but were not able to pinpoint when the actual mispositioning took place. This issue was determined to have very low safety significance due to the availability of other steam generator power operated relief valves and diverse means of cooling the secondary plant (Section 1R22.2).
Inspection Report# : 2000003*(pdf)*

Significance: G Jun 24, 2000
Identified By: NRC
Item Type: FIN Finding
Failure to properly classify a maintenace rule functional failure of the Unit 2 A steam generator power operated relief valve (2SV-19)
The licensee failed to properly classify a maintenace rule functional failure of the Unit 2 A steam generator power operated relief valve (2SV-19) when it failed to open on April 15, 2000. The licensee incorrectly assumed that the valve's failure was not a functional failure because other redundant valves were available at the time. This issue was determined to have very low safety significance because the licensee's error did not result in additional equipment unavailability (Section 1R12.1).
Inspection Report# : 2000003*(pdf)*

Significance: G Jun 24, 2000
Identified By: NRC
Item Type: NCV NonCited Violation
Failure to Scope an Accident Mitigating Function Associated with ECCS Leak Detection in the Maintenance Rule
The licensee failed to include in its maintenance rule scope an accident mitigating function for a control room alarm associated with emergency core cooling system post-accident leak detection capability. The alarm was tied to residual heat removal and containment spray pump room sump levels and was identified in 1998 as a mitigating function, as described in the Catawba Updated

Final Safety Analysis Report. As a result, two functional failures were not properly classified in February 2000. This issue was characterized as a non-cited violation of 10 CFR 50.65 (b)(2) and was determined to have very low safety significance because the licensee's scoping and functional failure determination errors did not directly result in additional unavailability of the alarm function (Section 1R12.2).
Inspection Report# : 2000003*(pdf)*

Significance: GJun 24, 2000
Identified By: Licensee
Item Type: NCV NonCited Violation
Failure to Provide Adequate Procedures for Performing Maintenance on Safety-Related Sump Pump Level Switches
Residual heat removal and containment spray pump room sump level alarm function was lost for several months up to February 2000 due to inadequate maintenance procedures associated with sump level switch calibrations. This issue was characterized as a non-cited violation of Technical Specification 5.4.1 and was determined to be of very low safety significance due to the availability of other emergency core cooling system leak detection methods (Section 4OA3.2).
Inspection Report# : 2000003*(pdf)*

Barrier Integrity

Significance: G Jun 24, 2000
Identified By: NRC
Item Type: FIN Finding
Failure to properly evaluate plant risk associated with emergent work for the Unit 2 hydrogen ignition system on April 27, 2000.
The licensee did not properly evaluate plant risk associated with emergent work for the Unit 2 hydrogen ignition system on April 27, 2000. As a result, the unit was in an unevaluated increased risk condition while planned work associated with the containment spray system was ongoing. This condition was allowed by Technical Specifications and plant procedures, but plant procedures required that a written contingency plan be developed prior to the work commencing, which was not done. This issue was of very low safety significance due to the availability of diverse and redundant systems designed to accomplish the hydrogen mitigation and containment pressure control functions (Section 1R13).
Inspection Report# : 2000003*(pdf)*

Occupational Radiation Safety

Significance: G Jun 24, 2000
Identified By: Licensee
Item Type: NCV NonCited Violation
Failure to Prevent the Release of Radioactive Byproduct Material from the Radiological Control Area and Plant Site
A non-cited violation was identified for the failure to comply with the requirements of 10 CFR

20.1802. Specifically, on April 7, 2000, the licensee failed to prevent the release of radioactive byproduct material (e.g., a radioactive particle on a contract employee's lanyard) from the radiological control area and plant site. Based on the activity of the particle and the resulting occupational dose assessment for the affected contract employee, this finding was determined to be of very low significance (Sections OS2, 2PS3).
Inspection Report# : 2000003*(pdf)*

Physical Protection

Significance: G Jun 24, 2000
Identified By: Licensee
Item Type: NCV NonCited Violation
Failure to Secure Two Vital Area Openings Exceeding 96 Square Inches in February 1999
A non-cited violation of the Physical Security Plan was identified for the licensee's failure to secure two vital area openings exceeding 96 square inches in February 1999. This issue was determined to have very little significance, given the non-predictable basis of the failures and the fact that there was no evidence that the vulnerabilities had been exploited (Section 3PP2).
Inspection Report# : 2000003*(pdf)*

Miscellaneous

Significance: N/A Feb 16, 2001
Identified By: NRC
Item Type: FIN Finding
Identification and Resolution of Problems
Overall, the licensee's corrective action program was effective at identifying, evaluating, and correcting problems. The threshold for entering problems into the corrective action program was sufficiently low. Reviews of operating experience information were comprehensive. In general, the licensee properly prioritized items (by Action Category) in its corrective action program database, which ensured that timely resolution and appropriate causal factor analyses were employed commensurate with safety significance. Some exceptions were noted in the area of problem identification, where all relevant issues of problems were not identified and equipment performance was adversely affected. The inspection identified three exceptions in the area of prioritization and evaluation of issues, where more comprehensive root cause determinations would have provided more effective evaluations and corrective actions. In the area of effectiveness of corrective actions, it was noted that the corrective action program was not timely in resolving various documentation deficiencies with Technical Specification (TS) surveillances, Updated Final Safety Analysis Report changes and TS bases changes. Previous non-compliance issues documented as non-cited violations were properly tracked and resolved via the corrective action program. The results of the last comprehensive corrective action program audit conducted by the licensee (September 1999) were properly entered and dispositioned in the corrective action program. Based on discussions with plant personnel and the apparently low threshold for items entered in the corrective action program database, the inspectors concluded that workers at the site generally felt free to raise safety concerns to their management.

Inspection Report# : 2001003*(pdf)*

Significance: N/A Dec 23, 2000
Identified By: Licensee
Item Type: NCV NonCited Violation
Technical Specification 5.4.1 and Regulatory Guide 1.33, Section 7, for failing to have adequate procedures to control the release of radioactive material during a pressurizer gas space venting evolut
Technical Specification 5.4.1 and Regulatory Guide 1.33, Section 7, for failing to have adequate procedures to control the release of radioactive material during a pressurizer gas space venting evolution on October 14, 2000, as described in the licensee's corrective action program. Reference PIPs C-00-04914 and 05241.
Inspection Report# : 2000005*(pdf)*

Last modified : May 03, 2001

McGuire 1

Initiating Events

Significance: G Mar 17, 2001
Identified By: Licensee
Item Type: NCV NonCited Violation
Inadequate Corrective Actions for Recurring Problems with Shutdown Operations Involving Loss of Letdown and/or Inadvertent Reactor Coolant System Cooldown Transients
Inadequate corrective actions (10CFR50, Appendix B, Criterion XVI) for recurring problems with shutdown operations involving loss of letdown and/or inadvertent reactor coolant (NC) system cooldown transients. During a Unit 1 shutdown from Mode 2 to Mode 3 on March 9, 2001, NC system temperature went below minimum temperature for criticality due to overfeed of steam generators. This event occurred because of ineffective corrective actions to address procedural deficiencies and/or equipment problems complicating plant cooldown. This is captured in the licensee's corrective action program under PIP M-01-0986. This finding was determined to have very low safety significance and is being treated as a Non Cited Violation (Section 4OA7).
Inspection Report# : 2000007*(pdf)*

Mitigating Systems

Significance: G Dec 15, 2000
Identified By: NRC
Item Type: FIN Finding
Depth and effectiveness of the licensee's evaluation and corrective actions for failures of the standby shutdown facility (SSF) diesel generator.
A finding was identified associated with the depth and effectiveness of the licensee's evaluation

and corrective actions for failures of the standby shutdown facility (SSF) diesel generator. The licensee's corrective actions for recent SSF-related problems have not been commensurate with the risk significance of the system. A recent Problem Investigation Process report, which documented a jacket water coolant leak and subsequent emptying of the engine's radiator, was not screened to include a root cause evaluation. The licensee did not perform comprehensive corrective actions to evaluate the need for performing additional preventive maintenance on the SSF diesel generator components. The inspectors identified vendor-recommended maintenance practices that were not being implemented and service bulletins authored by the vendor that were not included in the associated controlled vendor manual located on site. This issue was determined to have very low safety significance because it was not directly linked to any specific period of unavailability for the SSF diesel generator. This instance of ineffective corrective action was an isolated example and is not considered indicative of the licensee's overall corrective action program. (Section 4OA2b).
Inspection Report# : 2000010*(pdf)*

Significance: G Jun 17, 2000
Identified By: Self Disclosing
Item Type: NCV NonCited Violation
Failure to Follow Emergency Procedure Concerning Auxiliary Feedwater Suction Supplies
A non-cited violation of Technical Specification 5.4.1.a was identified for two examples of the licensee's failure to follow the emergency procedure generic enclosure used for maintaining auxiliary feedwater (CA) suction sources during reactor trip recovery. This resulted in the inadvertent isolation of the preferred CA suction supply and actuation of the service water system to provide CA to the steam generators. A lack of training and familiarity with the applicable emergency procedure generic enclosure was found to be a contributor to this finding. The safety significance of this violation was very low because the CA system was able to perform its function of steam generator decay heat removal (Section 04.03).
Inspection Report# : 2000008*(pdf)*

Physical Protection

Significance: G Sep 16, 2000
Identified By: NRC
Item Type: NCV NonCited Violation
Failure of the Electronic Switching to Provide the Central Alarm Station Operator with the Capability to Properly Assess Potential Penetrations at the Perimeter Prior to Individuals Gaining Access
A non-cited violation of the Physical Security Plan was identified for the failure of the licensee's electronic switching on September 12, 2000, to provide the central alarm station operator with the capability to properly assess potential penetrations at the perimeter prior to individuals gaining access to the protected area (Section 3PP3.2)
Inspection Report# : 2000005*(pdf)*

Miscellaneous

Significance: N/A Dec 15, 2000
Identified By: NRC
Item Type: FIN Finding
Identification and Resolution of Problems
Overall, the licensee's corrective action program was effective at identifying, evaluating, and correcting problems. The threshold for entering problems into the corrective action program was sufficiently low. Reviews of operating experience information were comprehensive. In general, the licensee properly prioritized items (by Action Category) in its corrective action program database, which ensured that timely resolution and appropriate causal factor analyses were employed commensurate with safety significance. One exception involved a recent condition adverse to quality in which the standby shutdown facility's (SSF) diesel generator was unavailable following the complete draining of radiator coolant because of heater shell pin-hole leaks. The licensee did not perform an in-depth root cause analysis and thorough corrective actions following its discovery of the degraded condition. Also, for potential safety equipment operability issues, the licensee did not always conduct or document thorough evaluations of present or past inoperability. Previous non-compliance issues documented as non-cited violations were properly tracked and resolved via the corrective action program. The results of the last comprehensive corrective action program audit conducted by the licensee (September 1999) were properly entered and dispositioned in the corrective action program. Based on discussions with plant personnel and the apparently low threshold for items entered in the corrective action program database, the inspectors concluded that workers at the site generally felt free to raise safety concerns to their management.
Inspection Report# : 2000010*(pdf)*

Last modified : May 03, 2001

McGuire 2

Mitigating Systems

Significance: G Mar 17, 2001
Identified By: Licensee
Item Type: NCV NonCited Violation
Failure to Follow Procedure PT/2/A/4350/026C, Auxiliary Shutdown Panel Verification
Failure to follow procedure (Technical Specification 5.4.1) for PT/2/A/4350/026C, Auxiliary Shutdown Panel Verification. The procedure indicates that all manipulations of controls at the panel shall be performed by a licensed reactor operator. A non-licensed operator performed the auxiliary shutdown manipulations during the performance of the test, contrary to the requirements of the procedure. This is captured in the licensee's corrective action program under PIP M-00-4140. This finding was determined to have very low safety significance and is being treated as a Non Cited Violation (Section 4OA7).
Inspection Report# : 2000007*(pdf)*

Significance: G Dec 16, 2000

Identified By: Licensee
Item Type: NCV NonCited Violation
Inadequate procedure for removal of 120VAC inverters from service
Inadequate procedure (TS 5.4.1) for removal of Unit 2 120VAC vital inverters from service. During plant solid RCS operation in Mode 5, de-energizing the vital inverters resulted in an inoperable Low Temperature Overpressure Protection (LTOP) system required by Technical Specification 3.4.12. The finding was determined to have very low safety significance (Section 4OA7).
Inspection Report# : 2000006*(pdf)*

Significance: G Dec 15, 2000
Identified By: NRC
Item Type: FIN Finding
Depth and effectiveness of the licensee's evaluation and corrective actions for failures of the standby shutdown facility (SSF) diesel generator.
A finding was identified associated with the depth and effectiveness of the licensee's evaluation and corrective actions for failures of the standby shutdown facility (SSF) diesel generator. The licensee's corrective actions for recent SSF-related problems have not been commensurate with the risk significance of the system. A recent Problem Investigation Process report, which documented a jacket water coolant leak and subsequent emptying of the engine's radiator, was not screened to include a root cause evaluation. The licensee did not perform comprehensive corrective actions to evaluate the need for performing additional preventive maintenance on the SSF diesel generator components. The inspectors identified vendor-recommended maintenance practices that were not being implemented and service bulletins authored by the vendor that were not included in the associated controlled vendor manual located on site. This issue was determined to have very low safety significance because it was not directly linked to any specific period of unavailability for the SSF diesel generator. This instance of ineffective corrective action was an isolated example and is not considered indicative of the licensee's overall corrective action program. (Section 4OA2b).
Inspection Report# : 2000010*(pdf)*

Physical Protection

Significance: G Sep 16, 2000
Identified By: NRC
Item Type: NCV NonCited Violation
Failure of the Electronic Switching to Provide the Central Alarm Station Operator with the Capability to Properly Assess Potential Penetrations at the Perimeter Prior to Individuals Gaining Access
A non-cited violation of the Physical Security Plan was identified for the failure of the licensee's electronic switching on September 12, 2000, to provide the central alarm station operator with the capability to properly assess potential penetrations at the perimeter prior to individuals gaining access to the protected area (Section 3PP3.2)
Inspection Report# : 2000005*(pdf)*

Miscellaneous

Significance: N/A Dec 15, 2000
Identified By: NRC
Item Type: FIN Finding
Identification and Resolution of Problems
Overall, the licensee's corrective action program was effective at identifying, evaluating, and correcting problems. The threshold for entering problems into the corrective action program was sufficiently low. Reviews of operating experience information were comprehensive. In general, the licensee properly prioritized items (by Action Category) in its corrective action program database, which ensured that timely resolution and appropriate causal factor analyses were employed commensurate with safety significance. One exception involved a recent condition adverse to quality in which the standby shutdown facility's (SSF) diesel generator was unavailable following the complete draining of radiator coolant because of heater shell pin-hole leaks. The licensee did not perform an in-depth root cause analysis and thorough corrective actions following its discovery of the degraded condition. Also, for potential safety equipment operability issues, the licensee did not always conduct or document thorough evaluations of present or past inoperability. Previous non-compliance issues documented as non-cited violations were properly tracked and resolved via the corrective action program. The results of the last comprehensive corrective action program audit conducted by the licensee (September 1999) were properly entered and dispositioned in the corrective action program. Based on discussions with plant personnel and the apparently low threshold for items entered in the corrective action program database, the inspectors concluded that workers at the site generally felt free to raise safety concerns to their management.
Inspection Report# : 2000010*(pdf)*

Last modified : May 03, 2001

This item appeared in The Times & Free Press on Wednesday, December 29, 1999.

NRC Urges TVA Develop Better Plan For Ice Backup System at 2 N-Plants

By DAVE FLESSNER
Business Editor

Federal regulators have given a cold shoulder to TVA's plan to verify the amount of ice in an emergency backup system at the Sequoyah and Watts Bar nuclear power plants.

The Nuclear Regulatory Commission has asked TVA to come up with a better method of weighing the 3 million pounds of ice in the containment walls at each plant. The NRC's rejection this month of the initial plan prolongs a troubling issue for TVA and the other operators of the nine Westinghouse-designed reactors that use ice condensers as part of their safety systems.

Debris problems in the condenser system at the Donald C. Cook nuclear plant in Michigan helped

force a 2-year repair outage at that plant. A TVA whistleblower made similar claims in 1995 at the Watts Bar Nuclear Plant. Last year, a federal judge ordered TVA to rehire Curtis Overall, who claimed he lost his job for reporting that he found 200 screws and fragments in the ice condensers at Watts Bar.

"Here we are nearly five years after this issue surfaced at Watts Bar and more than two years after the D.C. Cook plant was shut down because of condenser problems and TVA has still been unable to fix this problem," said Jim Riccio, an attorney for the Public Citizen's Critical Mass Energy Project in Washington. "TVA is not meeting plant regulations and even the NRC, which I think has largely been taken over by the nuclear industry, recognizes that."

TVA officials insist that the ice condenser system is still reliable in the unlikely event of an accident at one of its reactors.

"We're going to supply the NRC more information about what we propose to be a part of the technical specifications to monitor the performance of the ice condensers," TVA spokeswoman Barbara Martocci said.

Robert Martin, the NRC project manager overseeing the review of the ice condenser issue, said TVA and NRC officials should meet next month to discuss the issue.

"We certainly haven't found anything that calls us to shut down any of these plants (with the ice condensers)," he said.

The ice condenser systems are designed to relieve pressure, temperature and the possibility of a radioactive release if a steam pipe breaks in a reactor containment building. When the system works, the steam hits the condenser ice and is turned to water. The water is captured and never leaves the building.

The ice condensers allowed Westinghouse to design a smaller and less expensive reactor containment building at its pressurized water reactors.

TVA, Duke Power Co. and Michigan Power Co. are the utilities that own Westinghouse reactors that use ice condensers. The utilities have formed an Ice Condenser Mini Group to address concerns about the reliability of the condensers. TVA is responsible for developing technical specifications to weigh the ice in the plants.

In a recent letter to TVA, NRC project manager Ronald W. Hernan rejected TVA's initial plan, claiming that nearly half of the 1,994 ice baskets at Sequoyah can't be adequately weighed under the proposed surveillance plan.

The NRC continues to give TVA high marks for the operation of its nuclear plants overall, however. The Sequoyah plant is part of a new pilot reporting system the NRC launched this year and the plant is rated in the top "green" category of all areas of plant performance monitored by the NRC.

"TVA continues to maintain all the systems in top working order and we will work to address this

ice condenser issue," Ms. Martocci said. "We are very comfortable in saying that we believe our plants will operate as designed."

II.H. Contention Group 8
Department of Energy NEPA Violations (outside of Waste Management at MFFF)

Contentions

8A. DOE has failed to implement most of the decisions in the ROD for the November 1996 *Storage and Disposition of Weapons-Usable Fissile Materials Final Programmatic Environmental Impact Statement* (S&D PEIS). Specifically, DOE has failed to upgrade plutonium pit storage facilities at Pantex Nuclear Weapons Plant, and more immediately to this issue, has failed to provide for long-term storage of non-pit plutonium at SRS.

8B. DOE irreparably biased the SPDEIS towards MOX through the premature solicitation of a MOX contractor. The 1998 DOE Request for Proposals (RFP) for *MOX Fuel Fabrication and Irradiation services* (Solicitation Number DE-RP0298CH10888 and subsequent amendments) in which DOE requested consortiums of fuel fabricators, engineering firms, and nuclear reactor operators to submit proposals for *"design, licensing, construction, operation, and eventually decontamination and decommissioning of a MOX [fuel fabrication] facility as well as irradiation of the MOX fuel in existing domestic, commercial reactors should the decision be made by DOE in the SPD EIS ROD to go forward with the MOX program."*

8C. DOE has abandoned its Record of Decision for the SPDEIS and has failed to issue a supplemental EIS to evaluate the impacts of major changes in addition to the liquid radwaste stream at the MFFF:

- feedstock requirements for the MFFF caused by delays in the PDCF;
- impacts on U.S. ability to meet agreements with Russia due to suspension of the PIP;
- Failure to implement long-term plutonium storage alternatives at SRS;
- increased requirements at the PDCF resulting from MFFF acceptance criteria

8D: The Plutonium fuel/MOX option greatly increases the risk of plutonium theft, diversion, and reuse and DOE greatly underestimated the risk of nuclear explosives being developed from reactor plutonium. in its NEPA process.

8E: DOE failed to identify the dual-use nature of both the PDCF and the MFFF, and both facilities have the potential to be converted into use for plutonium pit fabrication.

8F: DOE's analysis failed to identify or greatly understated the real hazards of plutonium processing.

2. Legal Basis.

The entirety of NEPA, but particularly those sections involving adequate analysis, supplemental environmental impact statements, use of accurate information, public participation requirements,

limited actions before a decision, prejudicial behavior, and triggering mechanisms for NEPA analysis.

3. Experts.

None are being offered.

4. Facts and Discussion.

a. Contention 8A is discussed in item 4.b. of the May 18, 2001 request for hearing and on the following pages of the attachment: *Plutonium: The Last Five Years*, Page iv, v., 2.24, 3.44, and 3.45.

b. Contention 8C is addressed in *Plutonium: The Last Five Years*, Pages iii, iv, 2.19, 2.25, 2.28, 3.37-3.46.

c. Contention 8D is addressed in *Plutonium: The Last Five Years*, Page 8.

d. Contention 8E is addressed in *Plutonium: The Last Five Years*, Pages 3.46 to 3.50.

e. Contention 8F is addressed in *Plutonium: The Last Five Years*, Part I.

[end of Group 8]

II.C. Contention Group 9
Inadequate Radiological Protection of Public

Contentions

Contention 9A: Applicant used inappropriate control area boundaries and therefore mischaracterized members of the public as occupationally exposed workers.

Contention 9B: The applicant failed to submit an Emergency Management Plan for the MFFF because of the inappropriate definition of a control area.

1. Legal Basis

a. 10CFR20.1003
b. 10CFR 70.61.(f)

2. Experts

None Submitted

3. Facts and Discussion

a. Controlled area as defined in 10CFR70.61 means an area, outside of a restricted area but inside the site boundary, access to which can be limited by the licensee for any reason.

b. The applicant incorrectly defined its control area as the entire SRS, which even DOE has difficulty securing from trespass and which has two public roads passing through.

c. The control area includes areas that are open to the public with minimal restrictions, and include places like:

- Road 1 through the SRS site which is open to the public.
- State Highway 125 which passes within 4 miles of the proposed MFFF site, has a newly installed Historic Site–The Ellenton Memorial--with a small parking lot including handicapped parking that functions as a rest-stop and area attraction, and is the primary hurricane evacuation route for large parts of SE South Carolina.
- A public meeting was held at the A/M building on July 23, 2001 by the SC Governor's Council on Nuclear Issues.
- Public tours of the site are common in which no radiation briefings are provided
- The CSX railroad runs roughly parallel to SH 125.

- The Three-Rivers Regional Landfill and Recycling Center[1]

d. People who travel on Highway 125, attend meetings in A/M area, visit the SREL Library, go on public tours, do not receive occupation doses and will not be exposed to "educational programs" that the Applicant offers as insufficient mitigation measure.

e. A comparison of public dose vs. occupational dose shows that the differences are simple to interpret and therefore the Applicant either intentionally tried to evade the regulation, which shows ill-intent, or has deficient knowledge of its own proposed control area[2], when used in Subpart H of this Part, means an individual who receives an occupational dose as defined in 10 CFR 20.1003.

"*Public dose* means the dose received by a member of the public from exposure to radiation or radioactive material released by a licensee, or to any other source of radiation under the control of a licensee. Public dose does not include occupational dose or doses received from background radiation, from any medical administration the individual has received, from exposure to individuals administered radioactive material and released in accordance with §§35.75, or from voluntary participation in medical research programs.". Public Dose will be received by people traveling in an area where only occupational doses are allowed.

Occupational dose means the dose received by an individual in the course of employment in which the individual's assigned duties involve exposure to radiation or to radioactive material from licensed and unlicenced sources of radiation, whether in the possession of the licensee or other person. Occupational dose does not include dose received from background radiation, from any medical administration the individual has received, from exposure to individuals administered radioactive material and released in accordance with §§35.75, from voluntary participation in medical research programs, or as a member of the public.

f. The CAR does not contain an Emergency Management Plan for the MFFF. DCS claims one is not necessary because it intends to prove that off-site doses in the case of an accident will be less than 1 rem. However, according to *Site Selection for Surplus Plutonium Disposition Facilities at the Savannah River Site*, the radiological consequences of a "design basis" earthquake at the MFFF would result in a 4.0 gram release of plutonium to the environment and a subsequent does of 9 to 178 rems to the nearest SRS worker in a nearby building; and a 770 millirem dose to the maximally exposed individual offsite.

[end part 9]

---

[1] Please note that although Don Moniak's ability to dispose of household trash is dependent upon the 3-Rivers Landfill at this time, he is not claiming standing based on this interest.

[2] At the July 26, 2001 staff/applicant meeting in North Augusta, SC, a DCS employee asked "Are there people out there who aren't employed by SRS?"

II.J. Contention Group 10

Lack of Complete and Accurate Information

Contention 10A. Applicant failed to submit detailed information sufficient for fact checking and analysis of the proposal.

Contention 10B. Applicant's Construction Authorization Request is filled with "dead-end" references.

Contention 10C. Applicant has displayed a clear intent to minimally cooperate with NRC.

1. Legal Basis

10CFR70.9 a. Information must be "shall be complete and accurate in all material respects."

2. Experts

None submitted.

3. Facts and Discussion

a. The Applicant is contractually obligated to DOE to minimize the amount of new information for the process and optimize use of old information. This creates an undue limitation on the ability of the Applicant to answer questions from NRC staff.

b. The Applicant submitted a CAR characterized primarily by lack of detail. This is illustrated by the fact that the NRC staff submitted an 86-page Request for Further Information involving 239 questions, or about one question per 8 pages of the report. Considering that the design of the facility is based on allegedly proven and mature technology, it is difficult to understand why the contractor is reluctant to provide detailed information that can be verified.

c. In preparation for the North Augusta staff/applicant meeting regarding the CAR RFAI, DCS management issued a memorandum detailing a policy of giving "terse" answers at the meeting and providing only enough details to satisfy the request while withholding documents that contained information more responsive to the request.[1]

d. In addition to the issues raised in the RFAI (which have not been thoroughly reviewed by parties), the following lack of incomplete information is cited:

---

[1] The memo was signed by Earl Friend of DCS and was mailed to the BREDL PO BOX by an anonymous party.

i. The requirements of the MFFF are inadequately defined because DCS, in documents submitted to NRC, assumes that all plutonium oxide feedstock will derive from the Plutonium Pit Disassembly and Conversion Facility, in spite of the following facts:

- The U.S.-Russian agreement identified at least 0.5 MT of plutonium presently in oxide as scheduled for MOX option.

- Approximately 3.7 metric tonnes of plutonium metal that is not in plutonium pit form is targeted for the MOX option.[2] (For more information see Section 2 of *Plutonium, the Last Five Years, submitted as an attachment to Group 8.*)
- DOE is actively reviewing potential MOX feedstock options to compensate for the delay in the PDCF.[3].
- The lack of a disposition path for 8-17 MT of plutonium originally in the Plutonium Immobilization disposition path is likely to provoke major design changes at the MFFF to facilitate processing of these more difficult, impure materials in the MFFF.

b. The "design bases" for the MFFF will inevitably change due to changing requirements in the plutonium disposition program. Since 1997 the facility footprint has more than tripled in size. (See Attachment, MOX Costs Fact Sheet).

c. The MFFF design is in conflict with the DOE's Technical Standard for the Long-Term Stabilization and Storage of Plutonium Oxides and Metal, known as the 3013 Standard. DOE's standard for long-term plutonium stabilization and storage requires "high-firing" of plutonium at 950 degrees Celsius to remove moisture and corrosive impurities. However, the "plutonium polishing" step is far more difficult with high- fired plutonium oxide powder than with plutonium oxide that has not been high- fired. (*See Pages 1.6 to 1.7 of Plutonium, the Last Five Years*)

d. The proposed location of the MFFF in F-Area at SRS was not selected through a site-specific NEPA process, and even if it was, the selection was poor from a seismic and ecological standpoint–proximity to major stream course. According to the SRS Site Selection document, the site is located on fill from past F-Area excavations as well as

e. Design and Certification of the MOX Fuel transport cask is driven by concerns over weight limits in DOE SSTs and transportation costs, which has forced a first-of-its-kind

---

[2] Pantex was identified as having 21.2 MT of Surplus Plutonium in 1996, and all of this material was in Pit Form. Since there is 25.0 MT of "clean metal" in the disposition agreement with Russia going into MOX, that leaves 3.8 MT of non pit plutonium, mostly from Rocky Flats, as going to MOX.

[3] Information provided by SRS NNSA Administrator Sterling Franks during a July 9, 2001 Tour of SRS.

design with a high technical risk factor.

f. Applicant failed to identify the historic deep boreholes in the area.

g. Applicant failed to identify whether a buried "Super Control and Relay Cable" that was mapped as running parallel to the 115 KV Power Line in the SRS USGS of 1987[4] is still in the area and whether this is an issue. The failure to identify this, coupled with the applicant's apparent lack of site knowledge, indicates a trend towards inadequate configuration management, a quality control issue.

h. Applicant failed to identify the increased difference in environmental impacts between the Immobilization option and the MOX option revealed since the SPDEIS was published. In addition to information identified in Contention Group 1, other risks not found in the immobilization option are:

- substantial risks of plutonium contamination from accidental explosions,
- leaks of plutonium and americium contaminated liquids
- higher risks of nuclear criticality due to liquid acid processing
- higher risks from fires due to use of polycarbonate glove box windows that are not flame resistant;
- large scale americium production from plutonium purification
- increased proliferation risks due to higher attractiveness of purified weapons-grade plutonium from liquid acid process
- risks of Russian Minatom pursuing an export economy involving plutonium fuel[5], possibly to nations on the U.S. Export Control List;
- Increased risk of failing to meet commitments with Russia to dispose of even 34 MT of weapons plutonium, since the mission reactors can only handle 25.5.
- Increased risks of plutonium contamination and/or accidental criticality during the unnecessary transportation of Plutonium/MOX fuel assemblies to mission reactors;
- Increased and unnecessary risk to the Charlotte, NC and Rock Hill, SC areas from irradiating more dangerous and technically risky plutonium/MOX fuel in Catawba and McGuire NPP;
- Increased risk of terrorist attack on SST's because MOX shipments are planned in conjunction with refueling, a fact that reveals a much smaller window for shipments to take place and therefore heightens security risks.

g. Applicant used an inflated background radiation value for the Aiken County Area.

---

[4] Map is available on the wall at the SRS Administration Building.

[5] Parties intend to introduce a videotape of a presentation by a Minatom official in Krasnoyarsk, Siberia in June 2000 in which he clearly stated the long-term goal of the Krasnoyarsk plutonium program is to export MOX fuel.

Aiken County has some of the lowest Radon levels in the region and few homes have basements due to the sandy soils. Therefore, it is entirely inappropriate to use a U.S. average of 200 millirem per year radon dose in this area.

h. Applicant failed to address beryllium hazards in spite of proposals to use beryllium as a criticality control element. In fact, Applicant failed to identify beryllium as a hazardous substance at the site.

i. The applicant is taking excessive credit for the mitigation of accident impacts with HEPA filters. Applicant failed to address extensive literature and debate about quality control and maintenance problems with HEPA filters in plutonium facilities.

j. Applicant did not conduct a thorough review of area tornado history, focusing instead on the SRS site.

k. Applicant failed to identify that americium buildups will be peaking in the weapons plutonium it will be processing as the MFFF ages, thus increasing radiation risks. (See *Plutonium, the Last Five years* Page 1-8).

l. Applicant failed to adequately identify SSC's for Crane Operations.

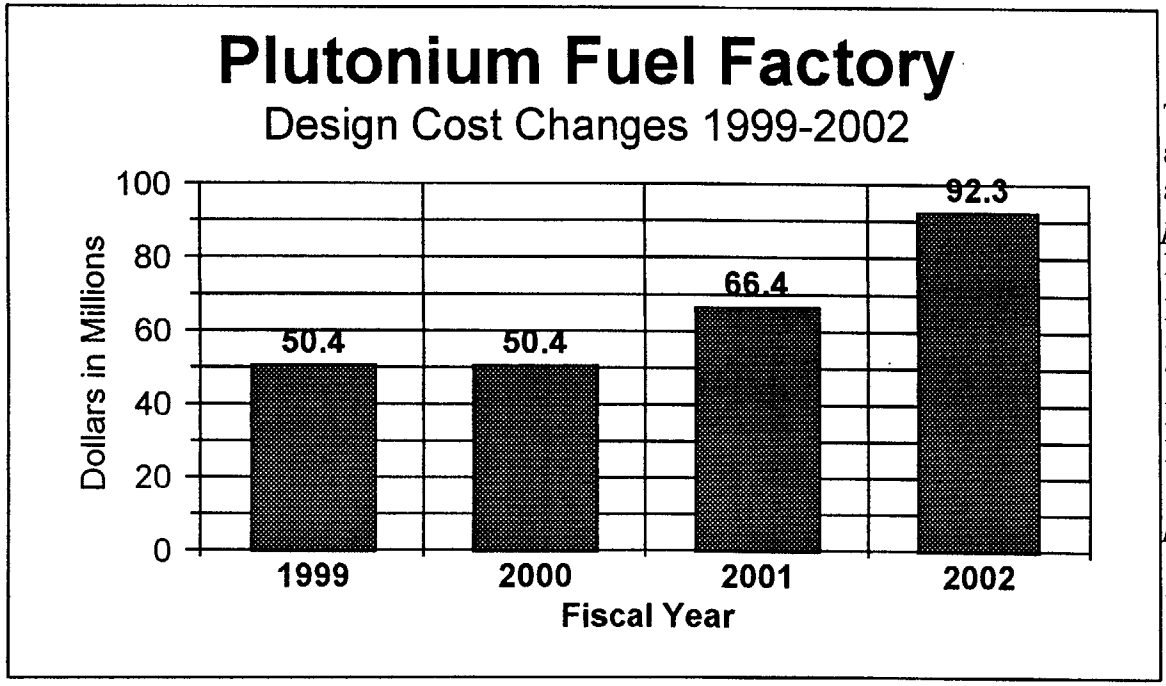
[end of Group 10 and August 13, 2001 submittal]

Design Cost Increases for the Plutonium Fuel Factory 1999-2002

Project: Mixed Oxide Fuel Fabrication Facility - Title I & II Design 2a. Project No. 99- D- 143[1]

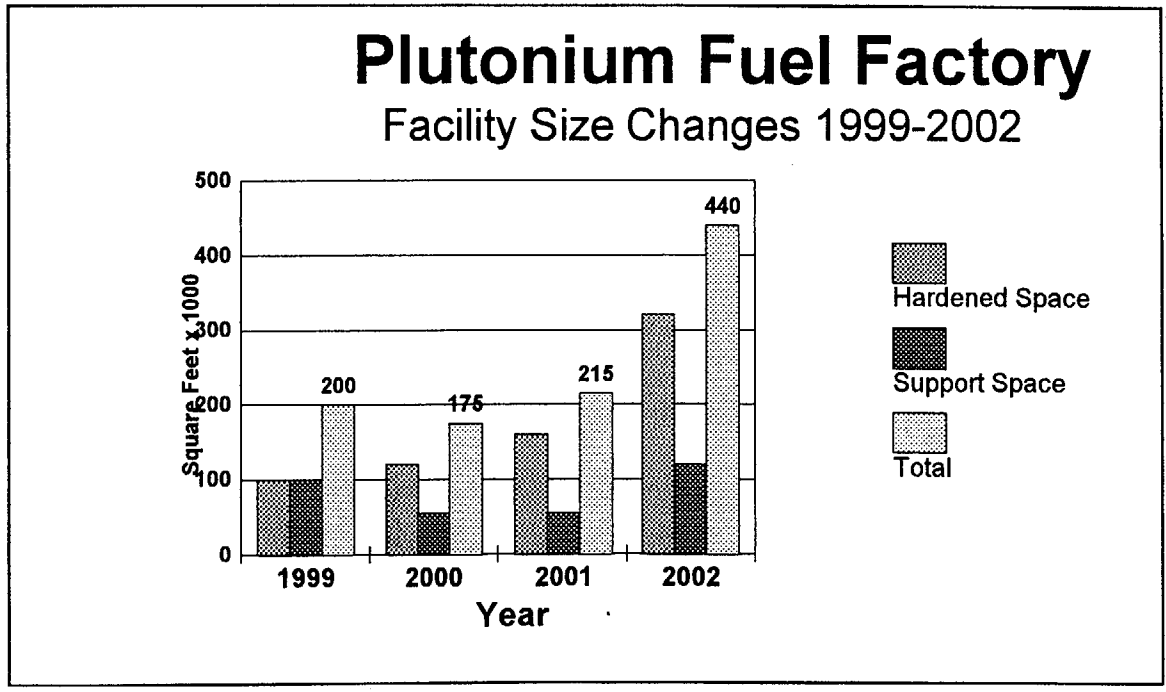
Fiscal Year	Design Cost Estimate, Title I and II Design	Size Estimates (in Square Feet)	
		Hardened Space	**Support Space**
1999	**$50,375,000**. (50.4 Million Dollars). First Year of Funding	100,000	100,000
2000	**$50,375,000**. (50.4 Million Dollars)	120,000	55,000
2001	**65,375,000** (60.4 Million Dollars). Reason for Increase: "*The addition of anaqueous processing step prior to fabricating mixed-oxide fuel.*"	160,000	55,000
2002	**$92,318,000** (92.3 Million Dollars) Reason for Increase: "*The recharacterization of a portion of project operating costs as Total Estimated Cost (TEC) components, adjustment of DOE contingency, cost growth related to physical security design requirements, and schedule slips resulting from late issuance of the January 1997 Surplus Plutonium Disposition Record of Decision (ROD).*"	320,000	120,000
		Reasons for doubling of size: *"full automation, an increased storage area, and a laboratory...enhanced seismic, life safety, and physical security features are included in the current sign to meet U.S. requirements.* "	

[1]Sources: Department of Energy Budget Request Justifications, Fiscal Years 1999 to 2002.



Why Have Costs doubled?

The Department of Energy (DOE) cites the addition of "aqueous polishing"; more accurately termed *liquid acid plutonium processing.* DOE originally claimed that low-waste producing, "dry" plutonium processing would be used and refused to analyze liquid acid processing as a "reasonable alternative" until 1999. Oak Ridge National Laboratory reported in December, 2000 that: "*A Decision was made in 1997 that the plutonium oxide wouuld be polished to remove impurities and to control the powder characteristics.*" DOE withheld this information from Congress and the public.



Why Has Size More Than Doubled?

The change from dry to liquid acid plutonium processing accounts for part of the size change. Other factors more recently reported include:

- *full automation (*meaning fewer jobs)
- *an increased storage area* (meaning higher risks from an accident);
- *"enhanced seismic, life safety, and physical security features to meet to meet U.S. requirements,"* (meaning that the original proposal from Duke Cogema Stone and Webster did not adequately account for U.S. laws and regulations).

BLUE RIDGE ENVIRONMENTAL DEFENSE LEAGUE

PO Box 3487 Aiken, South Carolina 29802 Phone (803) 644-6953 Fax (803) 644-7369
Email: donmoniak@earthlink.net Website: www.bredl.org

January 10, 2001

Secretary of Energy Bill Richardson
Forrestal Building
1000 Independence Avenue
Washington, DC 20037

Re: Request for Supplemental Environmental Impact Statement on Surplus Plutonium Disposition and Mixed Oxide Fuel Fabrication Facility

Dear Secretary Richardson:

I write on behalf of the Board of Directors of the Blue Ridge Environmental Defense League, Inc. to request that you take immediate action to halt design, construction, and licensing work on the proposed Mixed Oxide (MOX) Fuel Fabrication Facility (MFFF) at the Department's Savannah River Site in South Carolina. A year ago you signed the *Record of Decision* (ROD) for the *Surplus Plutonium Disposition Environmental Impact Statement* (SPDEIS), which approved the use of surplus military plutonium as nuclear reactor fuel in commercial nuclear power plants. Because recent revelations about this program prove that the document you signed was based on incomplete and incorrect information, we ask that you order a Supplemental Environmental Impact Statement before resuming work on the MFFF.

When you signed the *Record of Decision* allowing for the design and construction of this plutonium fuel factory, the Department claimed that it could handle and manage the liquid radioactive wastes generated by plutonium purification using liquid acid processing--a necessity for making plutonium fuel. For example, in response to concerns about the liquid radioactive waste stream, the Department stated that no remotely handled transuranic waste would be created and "generation rates for contaminated liquid waste would generally be small." (Page 3-972, SPDEIS). Quite frankly, today's estimates makes the Department's final analysis--based largely on the contractor's proposal--look like fiction.

The new numbers prove this and other similar statements in the Department's analysis to be untrue. Instead of generating 680 cubic meters of transuranic waste today the estimate is 3,200 cubic meters. Instead of 570 gallons of liquid low level radioactive waste, today the estimate is 4,280,000 gallons. Without explanation, facility operations have been extended from 10 to 20 years.

Most notable is the fact that more than one million gallons of a *new liquid radioactive waste stream* at Savannah River Site--called "liquid high alpha activity waste"--will be produced during the operating life of the plant. At the present time, the Department and its contractor only have plans for where to store this waste at the already filled-to-capacity F-Area Tank Farm at Savannah River Site. Neither the Department nor the contractor has a plan for what to do with this new waste, a clear indication that the plutonium fuel program is a throwback to the disastrous era of the "produce first, worry later" operations of the Cold War.

The table below illustrates the stark differences between what the Department predicted in its final analysis one year ago and the reality reported in the *Environmental Report (ER) for the Duke Cogema Stone and Webster (DCS) Mixed Oxide (MOX) Fuel Fabrication Facility* submitted to the Nuclear Regulatory Commission (NRC) on December 20, 2000. These changes are aggravated by the fact that whereas the Department claimed ten years of operation, the contractor is now claiming twenty years of operation.

Changes in estimates of annual radioactive waste generated at MOX Fuel Fabrication Facility

Waste Stream	SPDEIS November 1999	DCS ER December 2000
Liquid High Alpha Activity Waste	DOE anticipated 130 gallons of contact-handled transuranic waste	81,300 gallons
Liquid Low-level Waste	57 gallons	214,000 gallons
Solid Transuranic Waste	68 cubic meters	160 cubic meters

In essence, this program continues to represent the worst kind of bait-and-switch. The Department's estimates reported in the final SPDEIS were based on earlier estimates from Duke Cogema Stone and Webster and published by DOE in the *Environmental Synopsis of Proposal for MOX Fuel Fabrication And Reactor Irradiation Services* in April 1999. Before that, the Department claimed in its Draft SPDEIS in July 1998 that a plutonium fuel plant would generate less than 1 gallon of contact-handled TRU waste and that liquid acid plutonium processing--quaintly called plutonium oxide polishing in official reports--was an "unreasonable alternative." In reality, the Department decided in September 1997 to abandon its experimental "dry" plutonium pyroprocessing scheme it claimed would work for MOX, but never told the public.

The Department of Energy is obligated under the National Environmental Policy Act to provide accurate and complete information before embarking on projects on federal land. The Department failed in this fundamental duty. While we believe this level of misinformation calls for the Department to abandon the plutonium fuel program, we will accept as a minimum a Supplemental Environmental Impact Statement to be completed prior to the expenditure of additional funds. We at BREDL recognize that you have only a few days in office; therefore, we urge you to act now to right this wrong.

We look forward to hearing your reply to this request.

Respectfully submitted,

Don Moniak

BLUE RIDGE ENVIRONMENTAL DEFENSE LEAGUE

PO Box 3487 Aiken, South Carolina 29802 Phone (803) 644-6953 Fax (803) 644-7369
Email: donmoniak@earthlink.net Website: www.bredl.org

March 23, 2001

Chairman Richard Meserve
Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738

Re: Request for NRC denial of MFFF Construction Authorization Request

Dear Chairman Meserve:

I write on behalf of the Board of Directors of the Blue Ridge Environmental Defense League, Inc.(BREDL), and hereby request that the Nuclear Regulatory Commission reject the Construction Authorization Request (CAR) for a Mixed Oxide Fuel Fabrication Facility (MFFF) submitted on 2/28/01 by Duke Cogema Stone and Webster (DCS). The MFFF is a proposed plutonium fuel factory that would be constructed and operated on the Department of Energy's (DOE) Savannah River Site (SRS). The NRC should reject the review for the following reasons:

1. The MFFF proposed in the CAR and Environmental Review (ER) of December 20, 2000 bears little resemblance to the MFFF proposed by DOE in its January 2000 Record of Decision (ROD) for the Surplus Plutonium Disposition Environmental Impact Statement (SPDEIS). The "plutonium polishing" portion of the facility is much larger now than what was proposed a year ago, and the liquid radioactive waste stream are orders of magnitude greater:

Changes in estimates of annual radioactive waste generated at MFFF

Waste Stream	SPDEIS November 1999	DCS ER December 2000
Liquid High Alpha Activity Waste	DOE anticipated 130 gallons of contact-handled transuranic waste	81,300 gallons
Liquid Low-level Waste	57 gallons	214,000 gallons
Solid Transuranic Waste	68 cubic meters	160 cubic meters

As a result, the NRC's Standard Review Plan (SRP) for the MFFF (NUREG-1718) failed to adequately define how more than 80,000 gallons of "high-alpha" activity liquid waste generated annually at the plutonium fuel factory will be handled, stored, and treated to prevent a major radioactive waste spill at the Savannah River Site and subsequent contamination of groundwater.

The CAR and ER only minimally addressed the treatment and final disposition of more than 80,000 gallons of "high-alpha" activity liquid waste generated through aqueous plutonium processing. The proposal at this time is to send the liquid waste through a pipe to the F-Area at SRS for storage, treatment, and ultimate disposition. This approach to waste management functions to evade NRC oversight.

2. The MFFF involves the expenditure of hundreds of millions of dollars of federal funds for a facility that has no licensed customers at the present time.

3. The MFFF design employs HEPA Air Filters instead of more robust and fire-resistant sand filters. The Savannah River Site employs sand filters at its plutonium facilities and sand filters are proposed for the Pit Disassembly and Conversion Facility (PDCF) and Plutonium Immobilization Plant (PIP). The lack of commitment to the safest technology by the licensee illustrates its marginal commitment to real safety.

4. The financial status of the project must be accurately reported for two reasons:

a. The MFFF is a federally funded project with funding deriving from the Department of Energy. Not only is the DOE budget is facing major cutbacks, but the MFFF is dependent upon an agreement with Russia that was made by the last administration. It is unclear whether U.S. commitment to funding plutonium disposition in Russia will continue.

b. The DCS financial status is unclear. There have been numerous modifications of its contract with DOE (personal communication with DOE-Chicago office) and Stone and Webster's parent company, the Shaw Group, presently has a $2.1 billion project backlog--much of it inherited when it acquired Stone and Webster. In addition, DCS submitted an FY1999 financial statement (DCS-NRC-00037, February 28, 2001) but has failed to submit to NRC its FY2000 financial statement, calling into question its present financial situation.

5. DCS has failed to identify and describe its environmental and safety compliance record to NRC. The ER submitted by DCS in December 2000 failed to describe the regulatory compliance history of the licensee. Instead, DCS described the regulatory compliance history of the Savannah River Site Operating Contractor Westinghouse Savannah River Site. WSRC has not submitted a license application to the NRC. Duke Cogema Stone and Webster submitted the license application yet failed to define their own compliance history both here and abroad.

6. The CAR does not contain an Emergency Management Plan for the MFFF. DCS claims one is not necessary because it intends to prove that off-site doses in the case of an accident will be less than 1 rem. However, according to *Site Selection for Surplus Plutonium Disposition Facilities at the Savannah River Site*, the radiological consequences of a "design basis" earthquake at the MFFF would result in a 4.0 gram release of plutonium to the environment and a subsequent does of 9 to 178 rems to the nearest SRS worker in a nearby building; and a 770 millirem dose to the maximally exposed individual offsite. *However, because hunting and trapping occur at SRS the MEI should not be an offsite member of the public but an onsite hunter or trapper. Therefore, DCS must submit an emergency management plan.*

We look forward to hearing your reply to this request.

Respectfully submitted,

Don Moniak

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

April 11, 2001

Mr. Don Moniak
Blue Ridge Environmental Defense League
P.O. Box 3487
Aiken, SC 29802

SUBJECT: REQUEST FOR DENIAL OF MIXED OXIDE FUEL FABRICATION FACILITY CONSTRUCTION AUTHORIZATION REQUEST

Dear Mr. Moniak:

I am responding to your letter dated March 23, 2001, to Chairman Meserve. Since the Chairman could later be called upon to review a decision by a presiding officer if a hearing is conducted in regard to the construction of a Mixed Oxide (MOX) Fuel Fabrication Facility, it is more appropriate for me to respond to your letter.

In your letter, you requested that the U.S. Nuclear Regulatory Commission (NRC) reject the February 28, 2001, Construction Authorization Request (CAR) for a MOX fabrication facility submitted by Duke Cogema Stone & Webster (DCS). The Office of Nuclear Material Safety and Safeguards (NMSS) recently completed its initial acceptance review of the CAR and the associated environmental report submitted by DCS in December 2000, and is now beginning its detailed technical review of these documents. This review will be conducted consistent with NRC's responsibility to ensure that the construction of any MOX fabrication facility is performed in a manner that protects public health and safety, and the environment. Our review of the DCS request for construction authority will include consideration of the concerns raised in items 1, 3, 4b, and 6 of your letter, as well as other safety and environmental issues that may be identified as the review proceeds. Your other concerns are addressed below. NRC will publish the results of its technical review in a safety evaluation report. The funding and national policy issues raised in items 2 and 4a of your letter are outside of NRC's regulatory responsibility.

To meet the NRC's environmental responsibilities under the National Environmental Policy Act regarding the proposed MOX fabrication facility, the NRC will prepare an environmental impact statement (EIS). As part of NRC's process to support development of its EIS for the MOX fuel fabrication facility, NRC will hold public scoping meetings April 17-18 in North Augusta, South Carolina, and in Savannah, Georgia, and on May 8 in Charlotte, North Carolina. These meetings will enable the public to become involved in determining the scope, or bounds of the EIS for the proposed MOX facility. You are welcome to attend these meetings and express your views as part of the scoping process. In this regard, item 5 of your letter states that the environmental report and CAR submitted by DCS did not adequately describe the compliance history of DCS regarding environmental and safety matters. As noted above, the DCS request is now pending before the NRC for authority to construct a MOX fabrication facility, and relevant environmental and safety issues will be addressed in the NMSS reviews.

In addition to the technical review of the DCS request for authority to construct a MOX fabrication facility, and the related EIS process, an opportunity for a hearing with respect to the

CAR will be provided. In this regard, NRC will soon be publishing in the Federal Register a notice of opportunity for hearing on the CAR. This notice will describe the requirements applicable to requesting a hearing on the CAR.

I hope this letter responds to the concerns you raised. For your information, we have posted our review schedule on the MOX website. If you have any questions or comments, I encourage you to contact NRC's Project Manager for the MOX fuel fabrication facility, Andrew Persinko at (301) 415-6522 or axp1@nrc.gov or NRC's Backup Project Manager, Tim Johnson at (301) 415-7299 or tcj@nrc.gov .

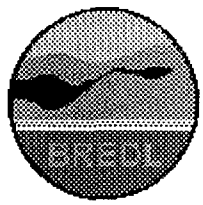
Sincerely,

Eric J. Leeds, Branch Chief
Special Projects Branch
Division of Fuel Cycle Safety and Safeguards
Office of Nuclear Material Safety
and Safeguards

Docket: 70-3098

cc:
James Johnson, DOE
Henry Potter, SC Dept of Health
& Environmental Control
John T. Conway, DNFSB

BLUE RIDGE ENVIRONMENTAL DEFENSE LEAGUE



SOUTHERN ANTI-PLUTONIUM CAMPAIGN

PLUTONIUM: THE LAST FIVE YEARS

February 6, 2001. Version 1.

Don Moniak
BREDL
P.O. Box 3487
Aiken, SC 29802
(803) 644-6953
(803) 644-7369 (FAX)
donmoniak@earthlink.net
http://www.bredl.org

Executive Summary

On February 6, 1996 former Secretary of Energy Hazel O'Leary held her last media conference to announce her departments latest openness initiative. The era of openness following four decades of secrecy in the U.S. Nuclear Weapons Complex peaked on that day. The past five years has been marked by backlashes across the Department of Energy's (DOE) weapons complex against the concepts of right-to-know and open and honest government. The one notable exception is the admission by Secretary of Energy Bill Richardson that nuclear weapons workers were poisoned on the job, and Assistant Secretary David Michaels' national town-meetings involving thousands of current and former nuclear weapons workers.

This report focuses on DOE's plutonium management program, where DOE has earned an F for openness and honesty after five years of

- frequent and persistent usage of misleading and incorrect information in Environmental Impact Statements;
- a lack of updates from the out-dated 1993-1996 declassification of plutonium and highly enriched uranium;
- a growing propensity to quietly renege on major decisions that were made with great fanfare;
- A hostile attitude towards meaningful public involvement;
- An apathetic approach towards reducing the inherent dangers of plutonium stored in unsafe and highly unstable forms;
- Incompetence bordering on negligence in caring for more than 12,000 plutonium pits;
- Misleading statements about the intentions of the Ministry of Atomic Energy of the Russian Federation;
- Secretly developing new capabilities for plutonium pit production while touting dual-use plutonium processing facilities as "nonproliferation missions;"
- a refusal to acknowledge the health impacts of beryllium processing associated with plutonium work at the same time billions of dollars are allocated to compensate beryllium victims.

Secrecy Was Wrong Then.

"The problems have resulted from a 40 year culture cloaked in secrecy and imbued with a dedication to the production of nuclear weapons without a real senstitivity to protecting the environment."

Admiral James Watkins, Secretary of Energy, October 5, 1989.

While DOE has continued to declassify information and more information is available than ever, this is not the true mark of openness. Openness and honesty is characterized by up-front revelations about the real hazards, uncertainties, and economics of new projects; and not by facades of unwarranted optimism and a flippant disregard for the public trust. When people are engaged in a process like Environmental Impact Statements that lead to a Record of Decision signed by top-level officials, they have an expectation that a small group of bureaucrats will discard the decision at the earliest convenience. Nowhere is this more true than in the plutonium program, where DOE has made numerous claims during the public debate that are contradicted by internal memos, obscure reports, and even public documents available on various Departmental Internet sites.

One fact that has become increasingly clear is that the plutonium hazard has more depth and breadth. Not only is plutonium useable in nuclear weapons at the scale of kilograms and acutely toxic at the scale of milligrams, it is also has the most complex chemistry in the Periodic Table of the Elements (Pages 1.3 to 1.6). DOE officials who have told the public countless times that alpha radiation can be blocked by a piece of paper have failed to inform people that alpha radiation from the decay of plutonium 239 causes, over the course of decades to centuries, damage to plutonium metal, any metal in contact or near contact with plutonium, and adverse chemical reactions with our most common elements, oxygen and hydrogen. All these things also make keeping track of plutonium much more difficult.

If the alpha particles from the decay of plutonium 239 can damage the densest metal on earth, the impacts of alpha radiation from plutonium ingested or inhaled n the human body is obviously detrimental. Plutonium is often said to be "harmless" if ingested as a metal, but this is an obvious fallacy since it turns out that plutonium metal has a microscopic layer of plutonium oxide present at all times. The chemical reactions with common materials that worry metallurgists and weapons designers are certainly a concern inside the human body. (Page 1.6).

Plutonium is most hazardous in an oxide powder form., with inhalation of only 20 milligrams enough to kill someone quickly (Page 1.6) and 30 to 60 micrograms easily enough to greatly raise the risk of cancer. Yet, DOE is planning to truck 3 metric tonnes of plutonium oxide from Rocky Flats to Savannah River Site this year in its politically motivated rush to close Rocky Flats as soon as possible.

Although the revelations about plutonium complexity has forced DOE to finally establish a long term plutonium storage standard, it is pursuing projects at odds with its own standards. The best example is DOE's zealous pursuit of a plutonium MOX fuel factory that utilizes surplus weapon-grade plutonium found in plutonium pits.

To make this fuel requires nitric acid based plutonium processing that has generated tremendous radioactive waste problems in the past, a process that greatly increases the likelihood of explosions, spills, and accidental criticality. Yet, the plutonium storage standard requires plutonium oxide to be heated to temperatures that make nitric acid processing even more dangerous. (Page 1.7). Instead of recognizing that plutonium fuel production from weapons plutonium is incompatible with its own storage standard, DOE seems intent on neglecting its commitment to safe storage in favor of its devotion to plutonium fuel.

In the past five years, DOE has reneged on nearly every one of its plutonium management decisions (see sidebar on Page iii) that did not involve spreading the liability at Rocky Flats around the country as quickly as possible or pursuing the dream of stuffing aging nuclear reactors one-third full of plutonium fuel. While underfunding the most fundamental mission—safe and secure storage—it has spent millions of dollars on unnecessary projects like gallium removal experiments and an irrelevant MOX fuel test in Canada.

DOE has not released updated plutonium inventory figures in five years and has even silently carved away bits and pieces of the declared surplus:

---In November 1999, DOE removed 3.8 (MT) of surplus plutonium found in unirradiated nuclear fuel in Idaho (Page 2.9) which forced the planning team for the plutonium immobilization plant at SRS to issue its third design; and another 0.6 to 0.8 MT of unirradiated nuclear fuel at Hanford was removed for "possible programmatic use."

---In 1998 an undisclosed number of surplus plutonium pits were recategorized as "national security assets;" (Page 3.3)

---In 1998 the nuclear weapons program at Los Alamos received "permission from the politicians" to divert some "nickel-sized" pieces of plutonium from its pit disassembly and conversion demonstration project for plutonium aging studies in support of nuclear weapons stockpile stewardship;
(Page 2-12).

DOE matched this failure to be up-front with its numbers with an aversion to being up-front about the hazards of its proposals. During the Surplus Plutonium Disposition Environmental Impact Statement process, DOE attempted to hide the fact that plutonium pit disassembly and conversion involved tritium and beryllium processing that would have meant a 10,000 fold increase in radioactive air pollutants at Pantex and will mean that SRS will become a certifiable beryllium site.

Broken Promises, Abandoned Decisions

The Department of Energy has proven adept at canceling major projects that formed the foundation of its plutonium program and were included in major Records of Decision by the Secretary of Energy:

In 1997 DOE canceled its effort to repackage 12,000 plutonium pits in "state-of-the-art" AT-400A shipping and storage containers at Pantex. After spending $50 million on research and development, the plug was pulled after a mere 20 plutonium pits were repackaged. (Page 3.14)

In December 1997 DOE abandoned its efforts to upgrade Building 12-66 at Pantex for surplus plutonium pit storage after completing the preconceptual design work. (Page 3.15)

In 1999 DOE abruptly canceled construction of a new plutonium storage and stabilization facility at Savannah River Site after spending $70 million on its design and nearly completing excavation work. Two years later, DOE still does not have a long-term storage plan for non-pit plutonium at SRS, but still plans to truck about 9 metric tonnes from Rocky Flats to SRS. (Page 2.).

In fiscal year 2000 DOE quietly stopped funding the plutonium pit reuse project at Pantex, a program designed to avoid costly and environmentally damaging plutonium pit fabrication. (Page 3-12).

In 1997 DOE ceased plutonium stabilization efforts at Los Alamos in favor of pursuing the ARIES project, which has turned out to be an essential precursor to plutonium pit production.

In 1999 DOE began shipping plutonium residues called "sands, slags, and crucibles" from Rocky Flats to SRS, then abruptly quit and decided to send the material to WIPP.

Higher on the list was DOE's selection of a nitric-acid based plutonium conversion process for making Mixed Oxide (MOX) plutonium fuel in 1997. Unfortunately, DOE did not inform the public of its decision until late in 1999 and then grossly underestimated the impacts of the operations.

But the most egregious example of dishonesty was the public presentation of plutonium disposition facilities as nonproliferation missions while DOE officials, at the urging of the Pentagon and Congress, secretly crafted a parallel plan to produce new plutonium warheads. The possibility of SRS dismantling plutonium pits for a few years and then putting new ones together is very real. (Pages 3.15 to 3.19).

The list includes internal stonewalling, drastic funding cuts on fundamental programs, constant redesign and "rebaselining," and a plethora of contradictions:

- In spite of repeated requests, the National Laboratories have not provided Pantex with a list of plutonium pits called "National Security Assets" in nearly two years. The labs' inabilities to provide consistent storage criteria has contributed to the unease about plutonium pit conditions.
- (Page 3.3)

- After five years of inventory and the introduction of new technologies, DOE still cannot say whether or not it still has 2.8 metric tonnes of unaccounted-for plutonium; (Page 2.3)

- While the Office of Fissile Materials Disposition tells the country that it must accept the plutonium fuel option because Russia will not accept the U.S. burying its weapons-grade plutonium, the Office of Environmental Management keeps proposing to bury more plutonium residues containing weapon-grade plutonium in the Waste Isolation Pilot Plant in New Mexico
- (Page 2.).

- During five years of Environmental Impact Statements, DOE never informed the public that declassification of pits included declassifying the isotopic composition. One month after the January 2000 Record of Decision to build a PDCF at SRS was signed, the "blending" of plutonium oxides from two or more pit types was required to declassify the isotopic composition of the powder, adding yet another complication to an already confusing program.. (Page 3.8)

- DOE has spent two years "studying" options for long-term storage of plutonium at SRS, while hiding its planning process under the rubric of "predecisional."

- The plutonium pit program continues to languish from a lack of funding, as DOE refuses to honor its commitments to repackage the pits at a rate of 200 per month, insure that "dirty" pits are cleaned prior to storage, procure thousands of new containers for its "national security assets," decide on a facility storage plan, and design a shipping container. (Pages 3-12 to 3-13)

As a result of this investigation, BREDL is making the following recommendations to the new administration in the hopes that health and safety will take precedent over political expediency, that the fundamental issue of safe and secure storage receives the highest priority, and that no more huge sums of money are squandered:

1. There must be a renewed attitude towards increased openness and honesty in the U.S. nuclear weapons complex and a reversal of the current trend against openness.

2. DOE must publish its latest inventories of plutonium, uranium, and other special nuclear materials and disclose any information suggesting that diversion of materials has occurred. BREDL is making the following estimates based on DOE's figures in various reports, showing the sheer volume of plutonium "items," requiring individual handling at some point in time:

Plutonium Inventory			
Plutonium Form		# Items	Plutonium Content, MT
Non-Pit Plutonium	Solutions	43,000 Liters	0.5
	Metals	6361	8.6
	Oxides	12537	6.35
	Residues	29530	6.35
	Unirradiated Fuel	52,000	4.4
Plutonium Pits		20,000	66.1
Irradiated Fuel			7.5
Total		120,528	99.8 to 100.0

3. Insure that DOE lives up to its promises and commitments made in Environmental Impact Statements and in implementation Plans to the Defense Nuclear Facilities Safety Board.

4. Make safe and secure storage of plutonium the number one priority in the weapons complex.

5. Cease all efforts to pursue full-scale plutonium pit production and a plutonium fuel economy and focus on reducing the plutonium hazard.

6. The inherent chemical instability of plutonium should be an added incentive to make drastic cuts in the nuclear weapons arsenal.

Part I: The Trouble With Plutonium

A Review of Plutonium Destructiveness, Complexity, and Hazards [1]

Plutonium will be with us for a long time, and not only because it has a radioactive half-life of 24,000 years and therefore is dangerous for more than 200,000 years. Plutonium will be with us because nuclear weapon states are deeply devoted to having it as a military presence, the global nuclear power establishment is deeply devoted to pushing it as the fuel of the future, and the personal and political opinions of scientists often carry more weight than their scientific opinions.

A passage from the most recent issue of *Los Alamos Science, No. 26*–which is must reading for plutonium foes and friends alike–illustrates this reality:

> *"Regardless of popular or political opinions about the uses of plutonium, plutonium processing will continue globally at least for many decades. In the United States, plutonium plays a central role in national defense; it is routinely formed into samples for experiments, cast or machined into nuclear weapon pits, and extracted from retired nuclear weapons or weapon components and prepared for disposal. All of these activities require that plutonium be chemically or mechanically processed."*[2]

This emphasis on the military use of plutonium suggests that without the military applications, support for "peaceful uses" of plutonium 239 would be meager. Plutonium may be a nuclear weapons physicists' dream (see sidebar), but the dreams of physicists do not always come true, as is evident in the case of the now defunct Superconducting Super Collider project of the 1980's.

So while the pro-plutonium inertia is powerful, it is not omnipotent and the future of this element and other special nuclear weapons materials is not set in stone. As the debate continues to unfurl, it is important for people to know that this most secret of elements is the most complex metal in the periodic table; and its presence in deployed nuclear weapons threatens life as we know it.

Nightmare or Dream?

"Plutonium is a physicist's dream but an engineer's nightmare. With little provocation, the metal changes its density by as much as 25 percent. It can be brittle as glass or as malleable as aluminum; it expands when it solidifies, much like water freezing to ice...it is highly reactive in air...plutonium damages materials on contact and is therefore difficult to handle, store, or transport. Only physicists would ever dream of making and using such a material. And they did make it–in order to take advantage of the extraordinary nuclear properties of plutonium-239." *Plutonium, An Element at Odds with Itself.* Los Alamos Science. 2000. Number 26.

Plutonium in Nuclear Explosives

Plutonium-239 is a fissile material well-known for its use as the primary trigger in most nuclear explosives (Figure 1-1). All grades of plutonium (see Table 2-1) are considered useable in nuclear explosives, but weapon-grade plutonium--which contains more than 92% plutonium-239--is preferred for nuclear weapon arsenals because lower amounts of plutonium-239 found in fuel and reactor grade pose a much higher risk of "pre-initiation" of the trigger due to corresponding higher amounts of plutonium-240. Use of lower grades also makes fabrication of the plutonium trigger, or pit, more difficult.[3] Because of its use in weapons of mass destruction, plutonium accounting is conducted to the level of grams, and large security forces are necessary to guard it.

However, the use of fuel or reactor grade plutonium is considered an easier path for a nonweapons state or a terrorist group because: easiest way to make a nuclear weapon is with reactor-grade plutonium because:

- there is much more of it in the world, approximately 1300 metric tonnes in irradiated nuclear fuel, and another xx MT separated and awaiting use as reactor fuel.
- it does not require the use of a "neutron generator." As the Department of Defense puts it, " a nuclear device used for terrorism need not be constructed to survive a complex stockpile-to-target sequence, need not have a predictable and reliable yield, and need not be efficient in its use of nuclear material."[4]

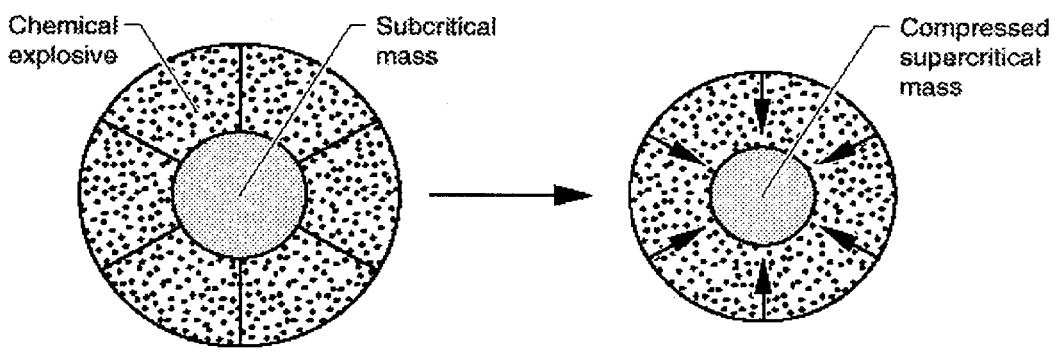


Figure 1-1. A simplified illustration of how a precise detonation of chemical high explosives surrounding a subcritical mass of fissile materials generates enough force to initiate, or trigger, the nuclear detonation. Source: Los Alamos Science. Number 23. 1993. Page 55.

Plutonium Chemical Complexity

If anything contributes to plutonium's demise as a military tool it will be its inherent chemical instability. The future of the plutonium triggers in the U.S. nuclear weapons stockpile is the focus of intense debate both internally and externally to the weapons labs and in the Pentagon. In particular, the lack of understanding of how plutonium ages is driving calls for renewed large-scale pit production. Lawrence Livermore National Laboratory spins it this way, "predicting kinetics is crucial to avoiding surprise requirements for large-scale refurbishment and remanufacture of weapons components."[5]

Plutonium is cited by the nuclear weapons labs as the most complex metal in the periodic table and continues to baffle people who best understand it (see sidebar). U.S. and Russian weapons scientists do not even agree on the "phase diagram" for the easily machinable delta-phase plutonium that dominates nuclear weapons stockpiles.[6] Its traits are commonly described as unstable, unpredictable, anomalous, and dramatically variable in the open literature. The litany of difficulties includes:

- an inherent instability marked by adverse reactivity as a metal or an oxide powder with common items like air, water, and oils, which also "makes it difficult to keep track of plutonium inventories."[7]
- corrosion from hydrides and oxides from the outside-in and from radioactive decay from the inside-out;
- runaway corrosion reactions;
- an ability to cling "tenaciously" to anything and everything;[8] resulting in buildups of plutonium in ductwork, piping, and ventilation systems;
- ultra-sensitivity to temperature and pressure changes, with marked increases in density with phase changes (Figure 1-3);
- an "anomalously low melting point;"
- **pyrophoricity:** spontaneous ignition at certain temperatures and certain particle sizes.

Baffled Scientists

"We conclude that the present understanding of plutonium chemistry is inadequate and that the new evidence presents an immediate challenge to the scientific community."
Hascke, Allen, and Morales. *Surface and Corrosion Chemistry of Plutonium.*

"The bad news is that plutonium is very complicated...we actually don't know how aged plutonium."
Dr. Bruce Tarter, Director of Lawrence Livermore National Laboratory.

Delta-phase plutonium-gallium alloy is the "most useful and familiar phase [but] the least understood theoretically." Sig Hecker, Los Alamos National Laboratory.

"Seaborg had the choice of picking the symbol Pl or Pu for plutonium. He remarked that it is really kind of a stinky element (complicated chemistry and unusual metallurgical properties) so it became Pu."
R.H. Condit. *Plutonium. An Introduction.*

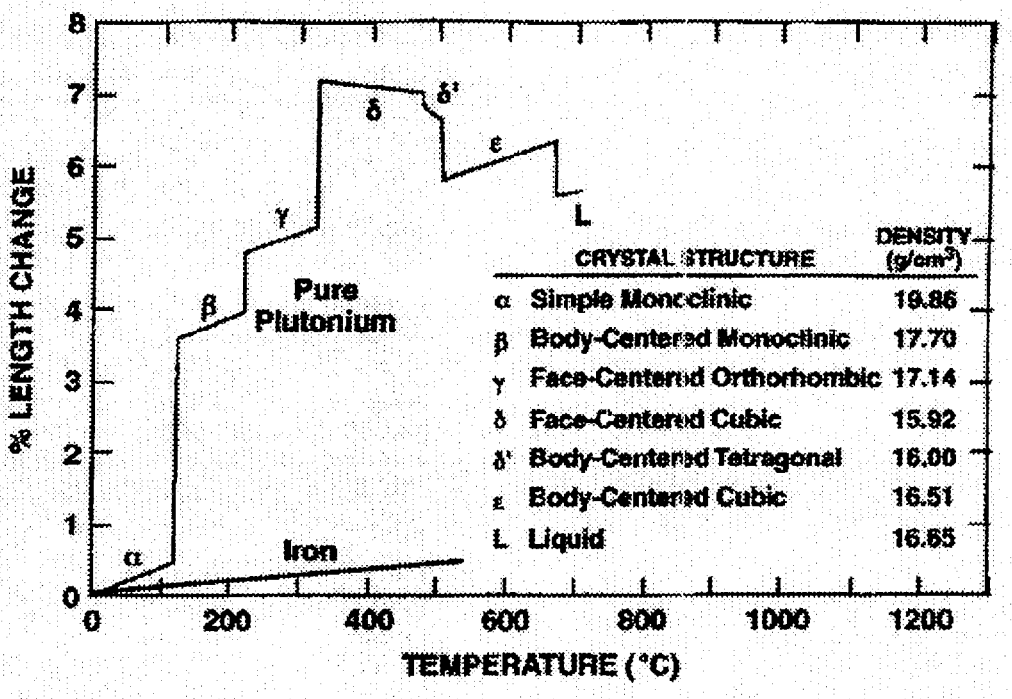


Figure 1. **Length change, crystal structures, and densities in pure plutonium during heating.**

Figure 1-2. This diagram is commonly used to illustrate plutonium complexity, showing the contrasts between the dramatic and abrupt six phase changes of plutonium as it is heated compared to the stability of iron. Some of the key traits of the different phrases include:

- Alpha-phrase plutonium is brittle and difficult to machine, like cast iron.
- Small amounts of aluminum alloyed with delta-phase plutonium stabilize the plutonium and produces a metal as machinable as aluminum. However, because aluminum emits neutrons upon absorbing alpha particles from the decay of plutonium, it raises the risk of pre-initiation, or early criticality, of the plutonium trigger.
- Gallium alloyed with delta-phase plutonium retains the benefit of a product nearly machinable as aluminum and far less prone to plutonium oxidation without raising the risk of pre-initiation, and therefore the plutonium-gallium alloy is the most common in plutonium pits.

To make plutonium fuel, DOE intends to destabilize plutonium by removing gallium during purification.

Plutonium Hazards

The combination of radioactivity and chemical instability makes plutonium
in the workplace an inherently unsafe enterprise even after it is produced and separated. Add to this the need for precise accounting to the gram level and large protective forces to guard vaults and other storage areas, and the costs of dealing with plutonium become exorbitant

> **"Many opportunities exist for mistakes in working with plutonium chemistry...The penalties for mistakes include spills of radioactive materials and possibly criticality experiments."**
> R.H. Condit, *Introduction to Plutonium.*

Primary among the numerous aspects of the plutonium radiation hazard is the fact that it takes 24,400 years for it to lose one half of its radioactivity, meaning that it will remain dangerous for hundreds of thousands of years and react adversely when exposed to common environments.

Alpha Radiation and Decay

Plutonium-239 emits high levels of alpha radiation (Figure 1-3). Although alpha radiation can be stopped with paper, it causes damage in many ways and from several phenomenon.

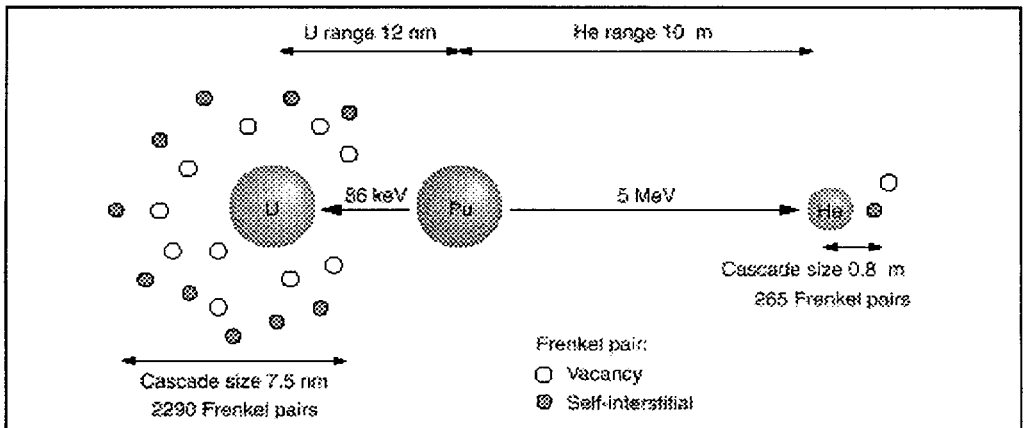


Figure 1-3. The first part of the plutonium-239 decay chain. Plutonium decays to Uranium 238 by emitting an alpha particle, in this case a helium nucleus. The energy from this process drives several reactions that are poorly understood.
Source: Los Alamos Science. Number 26. 2000.

1. **Damage to the plutonium over time**. The recoil energy from the decay generates 85 kilo-electron-volts of kinetic energy in the uranium nucleus, of which 60 keV remains when the nucleus collides within

the matrix and displaces plutonium atoms in the metal.[9] Over the course of decades, this action can damage plutonium enough to keep weapons designers leery of the "reliability" of the plutonium triggers.

The helium nucleus has far more energy when released, 5 million-electron-volts, but this is said to lose all but 0.1 percent of its energy through collisions with electrons before capturing a few electrons and "settling in" as a helium atom[10]. Over the course of decades, helium atoms accumulate to the point of creating bubbles, another grave concern of weapons designers. Helium buildup also poses a health and safety risk. For example, in 1963 a plutonium pit tube broke during a weapon disassembly process at Pantex and contaminated workers and the facility with plutonium contaminated helium gas.

2. **Damage to other metals over time.** Plutonium decay basically damages everything in its path, and this impact is most measurable on elements that experience "void swelling" from radiation, meaning they swell in size over time.[11] The effects of this over the course of decades is poorly understood because plutonium has never been allowed to age for decades, but some implications are obvious:

- Beryllium, which is used as a neutron tamper within pits and as cladding on many plutonium pits (see Part III) serving to protect the plutonium from oxidizing, experiences "gas-driven" swelling;.
- Aluminum, which is used in cladding on some pits, suffers from void swelling.
- Iron, Chromium, and Nickel, the key ingredients in stainless steel used for plutonium storage cans, experiences void swelling;
- Zirconium, used to clad nuclear fuel, experiences void swelling.

3. **Damage to live tissues**. If the uranium nuclei from decay damages metal as dense as plutonium, the impacts on living tissue are quite obvious. Plutonium is said to be "harmless" if ingested as a metal, but this is an obvious fallacy since even plutonium metal has a layer of plutonium oxide present at all times,[12] oxides are always present to some degree on metals, and the chemical reactions with common materials that worry metallurgists and weapons designers are certainly a concern inside the human body.

Plutonium is most hazardous in a powder form. Much debate has occurred over how much plutonium oxide can cause lung cancer within a few decades, with estimates ranging from a few micrograms to 30-60 micrograms to 2 milligrams. There seems to be little debate over how much will kill a person:

- Ingestion of 500 milligrams, or one half of a gram, is considered the acute lethal dose;
- Inhalation of 20 milligrams is considered the acute lethal dose;[13]

A good scale for reference is a typical Sweet N' Low packet which contains one million micrograms of sugar substitute.

4. Radiolysis of common materials. Alpha particles react with materials such as air and water to cause "radiolysis" of common materials (Figure 1-4). Plutonium metal oxidizes readily in air and plutonium oxide generates gases that can rupture storage containers. Plutonium is most hazardous in a powder form.

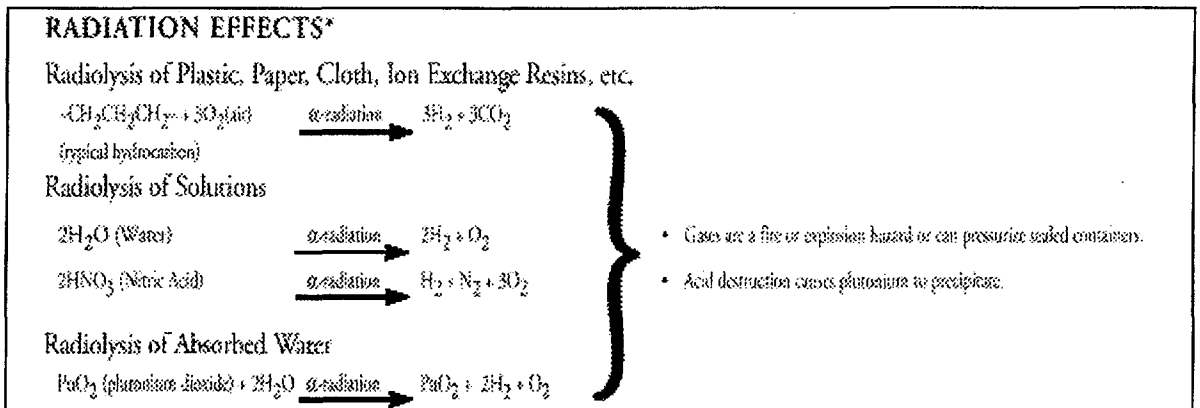


Figure 1-4. Simplified illustration showing various reactions brought about by alpha decay. Source: Los Alamos Science. Number 26.

The literature is filled with reports about ruptured containers and massive oxidation of entire metal pieces. For example, in 1983 Los Alamos reported the formation of a black powdered suboxide in "casting skulls" left over from plutonium pit fabrication, and when containers of skulls were opened, the plutonium suboxide would ignite "almost explosively."[14]

To avoid these undesirable reactions, DOE finally established a long-term storage standard for plutonium in 1994, but has had trouble meeting that standard (see Part II, Section B.) Called the 3013 standard, it requires that plutonium metals and oxides be stored in two sealed metal containers free of organic materials. Reaching this standard requires heating of oxides to temperatures greater than 900 degrees Celsius. A few near-term implications of this chemical fact include:

1. Nitric acid processing, which DOE plans to use to purify plutonium oxide as the first step towards making plutonium MOX, greatly increases the likelihood of explosions, spills, and criticality events. The plutonium pit disassembly and conversion facility is planned as the main source of plutonium oxide for a plutonium fuel (MOX) factory. Early plans for the PDCF require the plutonium oxide product to meet the long term plutonium storage (3013) standard.[15]

2. The dangers of nitric acid plutonium processing are aggravated if the plutonium oxide was produced or treated at temperatures greater than 600 degrees Celsius. Oxides heated to temperatures between 600 and 1000 C "require somewhat more stringent procedures" when dissolving in acids, and plutonium oxide powder heated to temperatures over 1000 Celsius "require extreme measures."[16] **Since the long-term storage standard requires plutonium to be heated at temperatures well above 600 degrees C,[17] it is incompatible with the needs of plutonium fuel production.**

Aging Plutonium and Americium-241

Plutonium-241, which is present in all grades of plutonium, decays into the more radioactive and dangerous americium-241, an intense gamma ray emitter that is 100 times more toxic than plutonium 239. Weapons plutonium was routinely purified to eliminate americium, which of course produced stockpiles of americium. If plutonium decay is allowed to run its course, radiation levels in U.S. plutonium will peak in the next 38 to 60 years (Figure 1-4).

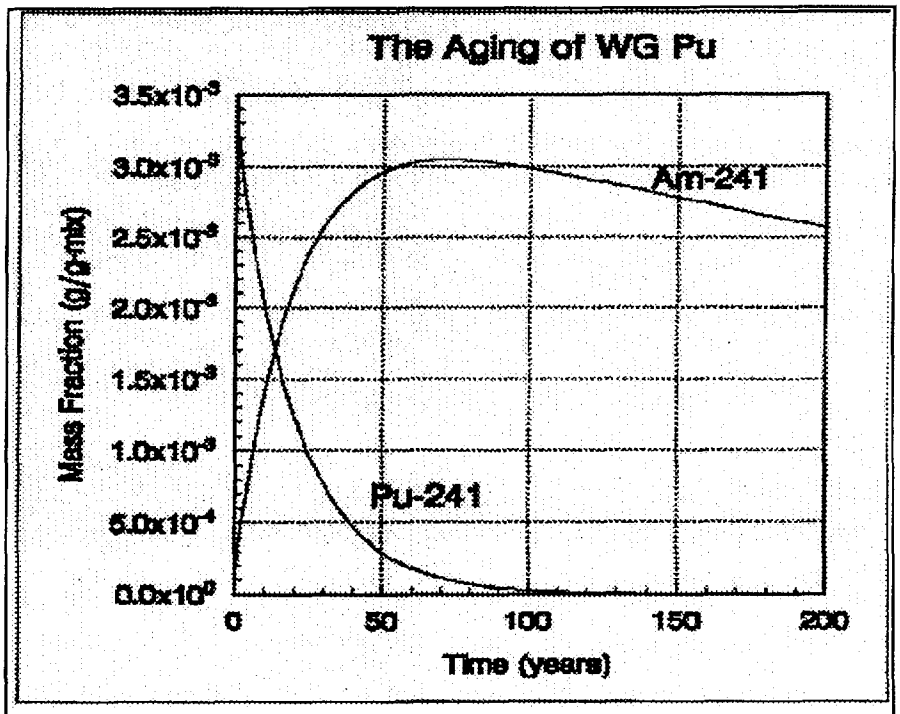


Figure 1-4. As plutonium-241 decays to Americium-241, weapon grade plutonium becomes more hazardous and radioactive. Americium levels peak after 70 years. Source: Peterson, 1993. RFP-4910.

Endnotes

1. For in-depth overviews of plutonium and other special nuclear materials, see:

International Physicians for the Prevention of Nuclear War. 1992. *Plutonium, Deadly Gold of the Nuclear Age.* (Second Printing with Corrections in 1995).

Nuclear Wastelands.

2. Avens, Larry R. and P. Gary Eller. 2000. *A Vision for Environmentally Conscious Plutonium Processing.* Los Alamos National Laboratory. In: *Challenges in Plutonium Science.* Los Alamos Science. Number 26. 2000. Page 436.

3. *Minutes of the Plutonium Information Meeting.* Rocky Flats Plant. January 29-30, 1959. Sanitized version from DOE Archives.

> Dow's opinion is that the increase in Pu-240 and Pu-241 inherently increases the gamma hazard. The short half-life of the Pu-241 (13 years) gives rise to an early radiation hazard due to the daughter products. The Pu-241 decays to Am-241 (beta 100%) and U-237 (alpha .004%). For periods of a

This excerpt from the "Minutes of the Plutonium Information Meeting" shows that Rocky Flats contractor and plutonium pit fabricator Dow Chemical voiced concerns to the introduction of fuel and reactor grade plutonium to the nuclear weapons stockpile. The purpose of the meeting was to discuss the impacts of Lawrence Livermore National Laboratory's weapon designs using reactor fuel.

4. DoD Militarily Critical Technologies list. Nuclear Weapons Technology. Section 5.

5. Lawrence Livermore National Laboratory. *Stockpile Stewardship Program.* UCRL-LR-129261.

6. Hecker, Sigfried. 2000. Los Alamos Science. Number 26, and *Plutonium Aging: From Mystery to Enigma.* LA-UR-99-5821. 1999.

7.Condit, R.H. 1993. *Plutonium: An Introduction.* Lawrence Livermore National Laboratory. UCRL-JC-115357. Prepared for submittal to the Plutonium Primer Workshop. DOE Office of Arms Control and Proliferation in Washington, D.C. on September 29, 1993.

8. U.S. DOE. *Plutonium, the First Fifty Years*; 1996; and *Declassification of Plutonium Inventory at Rocky Flats*, Colorado, 1994.

9.*Radiation Effects in Plutonium.* Los Alamos Science. Number 26.

10.Ibid.

11.Ibid.

12. Haschke, John. 2000. *The Surface Corrosion of Plutonium.* Los Alamos Science. No. 26.

13. Condit, R.H. 1993. *Plutonium: An Introduction*; and *Plutonium Storage* by John M. Haschke and Joseph C. Martz.

14.LA-3542. *Plutonium Processing at LANL.* 1983.

15.Westinghouse Savannah River Company. 2000. *Facility Design Description for Pit Disassembly and Conversion Facility.* . February 24, 2000. Page 55.

16.Plutonium Processing at LANL . 1983.

17. DOE Standard 3013.

Part II: The U.S. Plutonium Stockpile
An Update on the Numbers

In 1996 the Department of Energy (DOE) released "Plutonium, The First 50 Years," in which the U.S. declared it had acquired 111.4 metric tonnes (MT) from four sources:

- 103.4 MT from government-owned plutonium production reactors (36.1 MT at Savannah River Site (SRS) and 67.3 MT at Hanford);
- 0.6 MT from government-owned nonproduction reactions;
- 1.7 MT from commercial U.S. nuclear reactors that was primarily received from West Valley, N.Y. reprocessing plant;
- 5.7 MT from foreign countries.

The active military plutonium inventory held by DOE and the Department of Defense (DoD) was declared to be 99.6 metric tonnes (MT), broken down into 3 categories.[1] (Table 1-1).

Table 2-1. Declared Inventory, 1996.

Grade	% Plutonium-240	Total Pu, Metric Tonnes
Weapons Grade	< 7%	85.1
Fuel Grade	7-19%	13.2
Reactor Grade	>19%	1.3
Total Plutonium		99.6 MT

This 99.6MT can be further broken down into three major categories: the plutonium in nuclear weapons triggers called plutonium pits, within irradiated nuclear fuel, or in non-pit form..

Table 2-2. Plutonium Inventory.

Category	Weapon Grade	Fuel Grade	Reactor Grade	Total
Pits	66.1	0	0	66.1
Irradiated Fuel	0.6	6.6	0.3	7.5
Non-pit	18.4	7.6	0	26.0
Total	85.1	14.5	0.3	99.6

Nonpit plutonium breakdown is based on these three assumptions
(1) Assumes all plutonium in pits are weapon-grade, since U.S. is not known to have developed plutonium weapons from non-weapon grade plutonium (although it did test such weapons).
(2) Assumes that there is no non-surplus plutonium in irradiated fuel.

(3) DOE Plutonium vulnerability report cited 26.0 MT of non-pit Pu in DOE complex.

Noting that due to "rounding" its figures did not always match up, DOE claimed that 12.0 MT of plutonium has been "lost" or sent abroad, so the active inventory is the acquired plutonium minus the following (note that DOE admitted that due to rounding its figures did not always add up):

- 3.4 MT "expended" in wartime and nuclear weapons testing;
- 2.8 MT of plutonium DOE cannot account for called "inventory differences;"[2]
- 3.4 MT of plutonium in waste forms described as "normal operating losses."
- 1.2 MT of plutonium lost during nuclear reactor operations described as "fission" and "transmutation";
- 0.4 MT of plutonium that decayed to Americium 241 and uranium 237.
- 0.1 MT of plutonium now in the hands of the U.S. civilian industry;
- 0.7 MT of plutonium sent to foreign countries under "agreements for cooperation," i.e. the Atoms-For-Peace program;

Changes Since 1996

Last year DOE submitted a report to Congress called the *Integrated Nuclear Materials Management Plan*. The active inventory declared was the same as that of 1996. This is unlikely to be the case for the following reasons:

1. Contractors operating DOE plutonium sites are required to conduct inventories on all Special Nuclear Materials (SNM) and report updated inventory differences. For example, at Savannah River Site (SRS), the Materials Controls and Accounting (MC&A) department is directed to "reconcile SRS nuclear material records with NMMSS (U.S. Nuclear Materials Management Safeguard System) semiannually" and "provide to OSS (Office of Security and Safeguards) semi-annual reports on statistical analyses of inventory differences."[3] Therefore the Department has updated figures on material-unaccounted-for (MUF), now known as "inventory differences."
The question that remains is: **Does DOE still have 2.8 MT of unaccounted-for plutonium?**

2. In response to an investigation by the Institute for Energy and Environmental Research (IEER), DOE acknowledged there is more buried plutonium waste at Idaho, SRS, RFETS, and Hanford.[4] Therefore, the amount of plutonium in waste is also likely to be higher, which would mean lower inventory differences.

3. DOE has changed how it classifies waste vs. non-waste plutonium,[5] and now appears intent on trying to send as much plutonium as waste to the Waste Isolation Pilot Plant (WIPP) in New Mexico as possible.

4. Plutonium has done nothing but decay the last five years, so more has been lost.

5. Stabilization efforts of non-pit plutonium should have led to better estimates, especially considering the advances in technology for materials accounting.

6. DOE opened a new plutonium storage site, the Waste Isolation Pilot Plant, in New Mexico; where it intends to bury more than ten metric tonnes of plutonium as waste.

Non-Pit Plutonium

The amount of non-pit plutonium is complicated by several factors:

- the inherent difficulty of measuring and accounting for plutonium;
- the fact that many materials with 10-30% plutonium content are poorly characterized;
- the changes in U.S. policy regarding waste vs. recoverable materials;
- whether plutonium in pits was a part of the declassified inventory at Rocky Flats and SRS
- The ownership of the plutonium within the DOE bureaucracy and the lack of final decisions regarding the fate of numerous materials.

When Production Stopped

Prior to 1990, when nuclear weapons production was in high gear, "the vast majority of fissile material scrap and materials from retired weapons was recycled. It was less costly to recover fissile materials from high assay scrap and retired weapons than to produce new material. As a result, very little scrap containing fissile material was considered surplus. Consequently, these materials were designated, handled, and packaged for short-term storage."

Confusion about Nuclear Materials

The flow and storage of SNM [Special Nuclear Material], including tritium, throughout the DOE complex [prior to 1990] was fairly complicated and could be somewhat confusing to the unitiated observer. In fact, it could be somewhat confusing to an experienced observer as well."
Albert Abey, Lawrence Livermore National Laboratory. UCRL-ID-111061. 1992.

In 1989, when the U.S. stopped producing special nuclear materials and numerous facilities were shut down, there was no long-term standard for storing plutonium. In fact, not much thought was even given to storage until it became a problem:

> *"the halt in weapons production that began in 1989 froze the manufacturing pipeline, leaving it in a state that posed significant risks. High quantities of fissile materials (approximately 13 tons of plutonium metals and oxides, 400,000 liters of plutonium solutions, 130 tons of plutonium residues, HEU, and special isotopes) needed attention."*[6]

By 1994 DOE had finally developed a standard for long-term storage–up to 50 years–of non-pit plutonium metals and oxides, commonly called the 3013 Standard. However, between 1989 and 1994 DOE made insignificant progress resolving the actual problem.

Change began in April 1994 when the Defense Nuclear Facilities Safety Board (DNFSB) issued its first Technical Report. *Plutonium Storage Safety at Major Department of Energy Facilities*

addressed all unencapsulated, separated plutonium., leaving out plutonium in pits, unirradiated nuclear fuel, and sealed sources. The report chastised the DOE for not clearly recognizing many of the hazards associated with plutonium storage, such as potential fires, explosions, and pressurization of containers.[7] (Three years later a major chemical explosion forced Hanford to shut down its Plutonium Finishing Plant.)

A month later the Board issued Recommendation 94-1 for this plutonium and other special nuclear materials. At the top of the list of nine recommendations encompassed within 94-1 was the recommendation to:

> *"convert within two to three years the materials...to forms or conditions suitable for safe interim storage. The plan should include a provision that, within a reasonable period of time (such as eight years), all storage of plutonium metal and oxide should be in conformance with the draft DOE Standard on storage of plutonium now being made final."*[8]

Also in 1994 the DOE conducted a detailed plutonium vulnerability investigation and published a landmark document of the results, including the detailing of plutonium holdings down to the gram level at numerous "small holding" sites documenting approximately 26.0 MT of non-pit separated plutonium.. In February 1995, a few months after publishing the vulnerability report, the Department sent its first plan with new plutonium estimates (Table 1-3) for implementing Recommendation 94-1 to the Defense Board, and acknowledged the urgency of the issue:

> *"The Department acknowledges and shares the Board's concerns and has developed this integrated program plan to address these urgent problems."*[9]

Table 2-3: Differences in separated, unencapsulated Plutonium Inventory between DOE's Implementation Plan for Recommendation 94-1 and DOE's Plutonium Vulnerability Report

Plutonium Form	MT of Pu 94-1 Implementation	MT of Pu Vulnerability Report
Oxide	6.21	3.3 (1)
Metal	8.95	13.0 (1)
Scrap/Residues	6.34 (2)	8.7
Solutions	0.49 (2)	0.7
Sealed Sources	not reported	0.05
Other Forms	not reported (3)	0.24
Total	21.7	26.0

(1) These figures included plutonium in unirradiated nuclear fuel.

(2) The actual amount of plutonium by form at SRS was classified in the first 94-1 implementation plan, although DOE reported 2.1 MT at SRS in 1994. Since then DOE has reported 0.490 MT in metals, and DNFSB reported approximately 0.8 MT in oxides and 0.4 MT of in residues at SRS in January, 2001. The estimate for Pu in solutions remains classified, the number in this table is an estimate based on the various numbers reported for SRS and the complex.
(3) Other forms may be encompassed within 94.1, but are not reported.

Not included in DOE's 94-1 implementation plan were 4.4 to 4.6 MT of plutonium in unirradiated fuel:

- 0.6 MT of plutonium in unused FFTF mixed oxxide fuel clad in 17,000 MOX fuel pins at Hanford;
- 0.2 MT to 0.4 MT of plutonium in unclad FFTF fuel pellets at Hanford;
- 0.3 MT of unused ZPPR fuel in 21,000 pins of mixed oxide fuel in Idaho (Figure 2-2)
- 3.5 MT of unused ZPPR plates within 29,000 plates of metal alloy fuel (Figure 2-3);

This provides more evidence that the 26.0 MT in the vulnerability report at sites other than Pantex was non-pit plutonium and did not include plutonium in pits, meaning that the original inventory at Rocky Flats was closer to 16.0 MT.

Implementation of DOE's nuclear materials stabilization plan has been hindered by several factors, many of them political:

- The political decision to "accelerate closure"at Rocky Flats, with an artificial deadline for closing all plutonium facilities by 2006;
- The political decision to pursue disposition of surplus plutonium through the "dual-strategy" of both plutonium fuel use and immobilization;
- The lack of commitment to safe and secure storage within the Department of Energy;
- The issue of who "owns" this plutonium, as it is managed by four DOE departments Offices of Nuclear Energy, Defense Programs, Environmental Management, and Fissile Materials Disposition.
- DOE's hopelessly fragmented approach to implementing the National Environmental Policy Act (NEPA), with the total plutonium program being addressed in several environmental impact statements.
- The 3013 standard has changed three times (3013-96, 30-13-99, and 3013-00).
- The nature of the materials, especially since the amount of plutonium contained in the complex was minor compared to the total quantities of materials that contained plutonium. (Figure 1-x_) .
- In 1999 DOE stopped construction of a cornerstone of its implementation plan, the Actinide Packaging and Stabilization Facility (APSF), leaving a gaping hole in the ground at Savannah River Site where excavation work was almost complete.

The fate of most of these materials remains unclear. One option is to dispose more plutonium as a waste at the Waste Isolation Pilot Plant (WIPP) in New Mexico. A more recent scheme proposed by the National Laboratories is to truck hundreds of tonnes of residues to SRS and separate and purify the

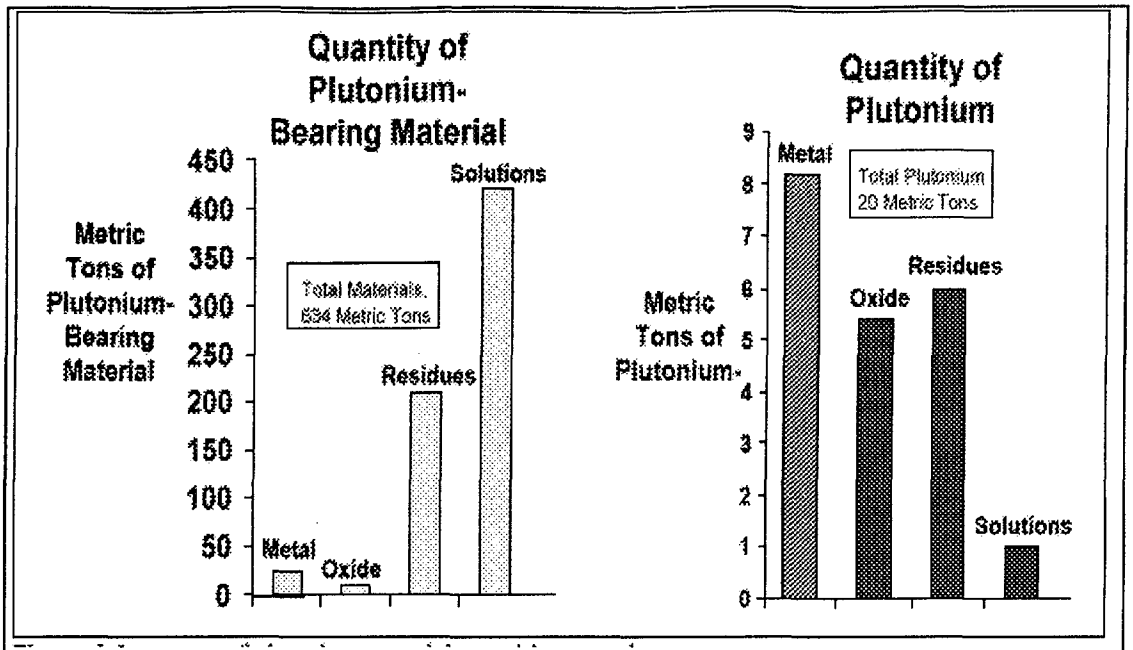


Figure 2-1. This graphic illustrates the quantity of materials compared to the plutonium in those materials. Much of the non-pit plutonium is not weapons-usable, yet the necessity to stabilize these materials from a health and safety standpoint results in weapons-usable plutonium. Source: DOE/ID-10631, Plutonium Focus Area. 1995.

plutonium. in the SRS canyons. The goal would be to increase–by 6-7 tonnes–:the amount of weapons grade plutonium and improve our negotiating stance with Russia."[10]

Because of the variations in DOE reporting, the actual inventory remains murky. Following are BREDL's estimates for the total number of items containing plutonium, and the plutonium content within those items.

Plutonium in Solutions

In the plutonium vulnerability report, DOE estimated a total of 700 kilograms (0.7 MT) of plutonium contained in various concentrations within 400,000 liters of solutions with high risks of criticality, explosions, and leaks:

- 143 kilograms at Rocky Flats
- 360 kilograms at Hanford
- a classified amount--estimated at approximately 200 kilograms--at Savannah River Site;

DOE's contractors have stabilized 90% of the plutonium solutions in terms of total volume, *but only about 30 % of the solutions in terms of plutonium content*:

- 43 kilograms of plutonium remains at Rocky Flats in 2,000 liters of solution in piping in 6 facilities;
- An estimated 110 kilograms of plutonium remains in H-Canyon at SRS in 34,000 liters of solution;*
- 341 kilograms of plutonium remains at Hanford's Plutonium Finishing Plant in 4,270 liters of solution
- A total of 494 kilograms, or approximately 0.5 MT, of plutonium in 40,270 liters of solutions.

Plutonium Metal

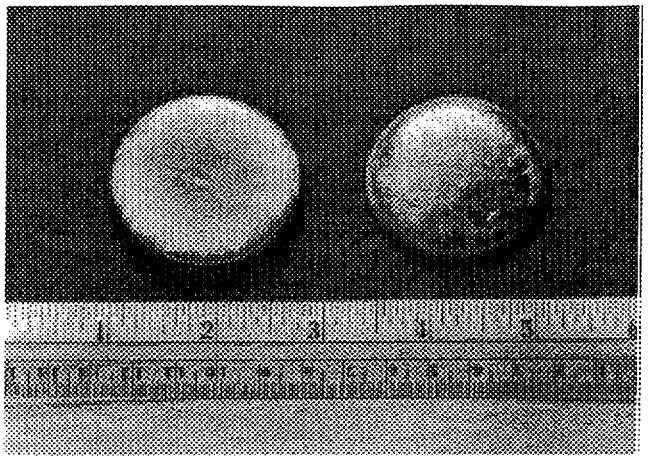


Figure 2-2. Plutonium Ingots.

As of June 2000, DOE reported 8,951.3 kilograms (8.951 MT) of plutonium metal contained in 6,361 items at 9 different sites:

- 6600 kilograms (6.6 MT) in 3403 containers at Rocky Flats;
- 700 kilograms (0.7 MT) in 475 containers in Hanford's Plutonium Finishing Plant
- 1133 kilograms (1.133 MT) in 2060 containers at Los Alamos
- 490 kilograms (0.49 MT) in 230 containers at SRS
- 0.45 kilograms (0.00045 MT) in 210 containers at Argonne East National Laboratory in Chicago;
- 20 kilograms (0.020 MT) in 50 containers at LLNL.
- 0.855 kilograms (0.00085 MT) in 20 containers at the Mound Plant in Ohio
- 0.3013 KG (0.0003 MT) in 30 containers at Oak Ridge;
- 6.7 kg (0.0067 MT) in 5 containers at Sandia National Laboratory. .

About 7.6 MT of this material is considered surplus, based on 28.9 MT of metals declared surplus minus the 21.3 MT of surplus plutonium in pits at Pantex.

1.0 MT of this material is categorized as fuel-grade plutonium. In all likelihood this includes the the 275 plutonium-aluminum alloy items at Hanford.

Table 2.4. Plutonium in Metals

Site	Pu Content in Metals, KG	# of Pu Metal Items
Rocky Flats	6600.00	3403
Hanford	700.00	339
Los Alamos	1133.00	2060
SRS	490.00	203
Argonne-East	0.45	210
Livermore	20.00	91
Mound	0.86	20
Oak Ridge	0.30	30
Sandia	6.70	5
Total	8591	6361

Plutonium Oxide

Figure 2-3. A can of plutonium oxide powder at Rocky Flats.

DOE has approximately 12,540 items of plutonium oxides with greater than 50% plutonium content, for a total of 6.35 MT of plutonium. Virtually none of this plutonium meets the long-term 3013 storage standard:

- 3,200 kilograms (3.2 MT) of plutonium within 3,296 items content at Rocky Flats;
- 1,500 kilograms (1.5 MT) of plutonium in 2,800 Pu oxide items and 2,300 plutonium-uranium oxide items at Hanford
- 800 kilograms (0.8 MT) of plutonium in 800 containers of Pu oxide at SRS;
- 721 kilograms (0.721 MT) of plutonium in more than 2,000 Pu oxide containers at Los Alamos;
- 102 kilograms (0.102 MT) in 92 containers at LLNL;
- 28.1 kilograms (0.0028 MT) in 107 containers at Mound;
- 1.706 kilograms (0.0017 MT) in 83 containers at Oak Ridge;
- 1.4 kilograms (0.0014 MT) in 10 containers at Sandia National Laboratory; and
- 0.014 kilograms in 354 items at Lawrence Berkeley Laboratory.

Table 2.5 Plutonium in Oxides

Site	Pu Content, KG	# of Items
Rocky Flats	3200	3296
Hanford	1500	5100
Los Alamos	721	2000
SRS	800	800
Argonne-East	0.48	695
Livermore	102	92
Mound	28	107
Oak Ridge	1.7	83
Sandia	1.4	10
Lawrence-Berkeley	0.014	354
Total	6355	12537

Plutonium in Unirradiated Nuclear Fuel

As of June 2000, DOE had more than 50,000 items of clad, unused, unirradiated fuel containing a total of 4.4 to 4.6 MT of plutonium.

DOE's Office of Nuclear Energy retains control this plutonium. Until November 1999, the ZPPR fuels (Figures 2-4, 2-5) and FFTF Mixed Oxide (MOX) fuel (not pictured) were scheduled to be processed at the Plutonium Immobilization Plant at Savannah River Site. This idea was withdrawn in November 1999.

Processing 50,000 pieces of old unused fuel with high concentrations of americium-241 necessitated planning for remotely controlled processing of these materials. Plans for dealing with such highly radioactive materials greatly contributed to increased costs of a plutonium immobilization plant.

The cost of abandoning this path has not been determined. DOE is now considering calling the ZPPR fuel a "national asset material" but has yet to determine a future use.[11]

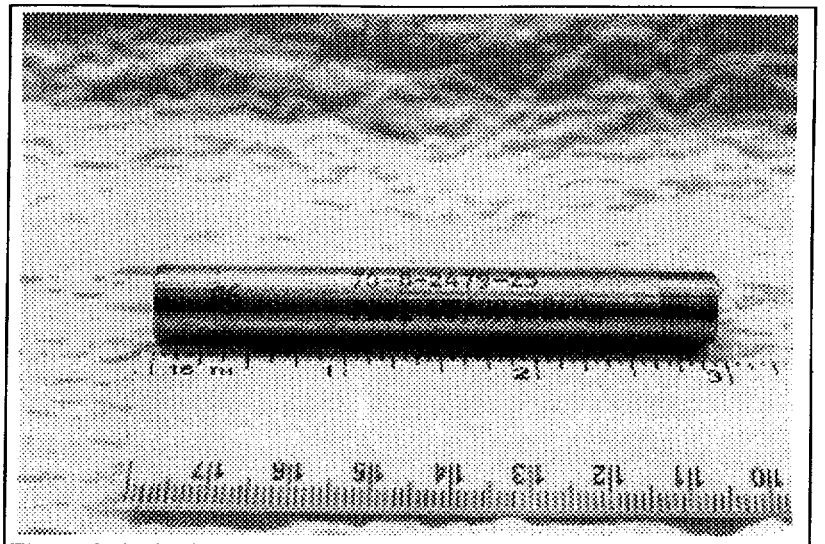


Figure 2-4. 21,000 ZPPR Fuel Pins like the one pictured here are stored at Argonne National Laboratory West, Idaho and contain a reported 0.3 MT of fuel-grade plutonium mixed with uranium oxide to make Mixed Oxide (MOX) fuel.

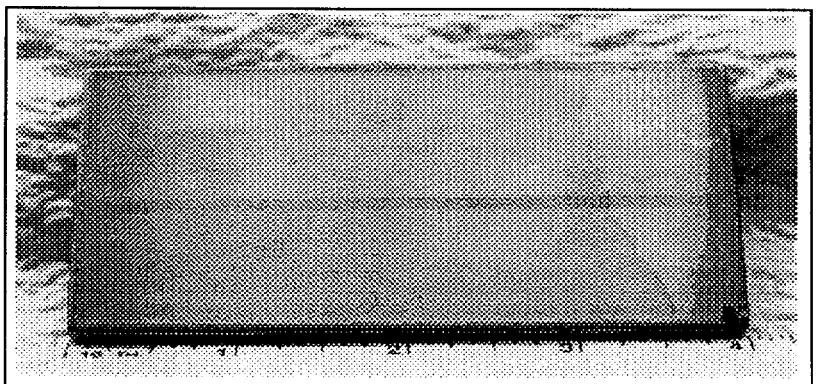


Figure 2-5. **ZPPR Fuel Plates**. 22,000 of these plates containing a reported 3.5 MT of plutonium are presently stored at Argonne National Laboratory-West within the Idaho National Engineering and Environmental Laboratory. The ZPPR fuel contains varying percentages of uranium and plutonium alloyed with either aluminum or molybdenum to make a material that is resistant to oxidation. Some plates are coated with nickel to increase the resistance to oxidation. Source: UCRL-ID-131608, Rev. 3, PIP-00-035

Plutonium Residues

Residues is a catch all phrase for "material containing plutonium that was generated during the separation and purification of plutonium or during the manufacture of plutonium-bearing components for nuclear weapons."[12] In 1990 these materials were assumed to have enough plutonium remaining to be recoverable for future operations. Today, the plutonium cannot be used in weapons without substantial processing and purification and it is mostly being treated as waste.

Residues currently consist of an estimated 6.350 MT of plutonium in 29,530 items:

- 3000 kilograms (3.0 MT) in 20,532 items totaling more than 100 metric tonnes of materials in Buildings 371 and 707 at Rocky Flats, of which nearly 10,000 items remain to be stabilized;
- 1,500 MT in 1300 containers at Hanford;
- 1,400 kg in nearly 6,000 items at LANL;
- 400 kilograms of plutonium in 1306 items of miscellaneous residues in the F-Area at the Savannah River Site;[13]
- 35 kilograms in 202 items at LLNL;(114 cans of ash)
- 3 kilograms in 39 items at Mound;
- less than 1 kilogram in 12 items at Argonne East;
- 0.1 kg in 12 items at Oak Ridge;
- less than 1 kg in 250 items at Lawrence Berkeley;

This is the least certain and most poorly defined of all categories for the following reasons:

1. With a few exceptions, this should be categorized as plutonium waste by U.S. standards, since DOE intends to "dilute" most of the residues to attain less than 10% plutonium by weight and therefore meet WIPP acceptance criteria. The desire to "bury" nearly 7 MT of plutonium that would be recycled under Russian policy clearly undermines claims made by U.S. plutonium fuel advocates that Russia opposes the U.S. burying plutonium, and therefore the U.S. must pursue the MOX plutonium fuel option.

2. Decommissioning of plutonium facilities across the nuclear weapons complex will result in more plutonium wastes. This is because the category called "holdup"–plutonium in pipes, glove boxes, ductwork, etc–has never been quantified and is considered part of the unaccounted-for plutonium.

3. A recent proposal by DOE and its labs, called the 2025 vision, holds open the prospects of processing much of the residues at the canyons at SRS in order to increase weapons grade plutonium inventories.

Table 2-6. Plutonium in Residues
Plutonium in Residues

Site	Pu Content, KG	# Items
Rocky Flats	3000	20532
Hanford	1500	1313
Los Alamos	1400	5900
SRS	400	1270
Argonne-East	0	12
Livermore	35	202
Mound	3	39
Oak Ridge	12	12
Sandia	0	0
Lawrence-Berkeley	0	250
Total	6350	29530

Plutonium in Waste:

In 1996 DOE estimated 3.4 MT of plutonium as "lost" through normal operations and categorized as plutonium wastes (not including plutonium released through smokestacks or in wastewater either routinely or by accident) that are buried or stored at 8 sites:

- 1.522 MT buried or stored at Hanford;
- 1.108 MT buried or stored at Idaho National Engineering Laboratory; with 0.002 MT of this credited to ANLW;
- 0.610 MT buried or stored at Los Alamos;
- 0.575 MT buried or stored at SRS;
- 0.047 MT buried or stored at Rocky Flats;
- 0.016 MT stored at Nevada Test Site from past nuclear weapons accidents;

U.S. Surplus Plutonium

U.S. surplus plutonium figures have changed substantially, although these changes are obscured by unclear management plans. In 1996 the U.S. declared 38.2 MT of weapon-grade plutonium to be surplus. The common belief is that the U.S. has 50 metric tonnes of surplus plutonium, but at no time did the U.S. declare an active inventory of 50 metric tonnes of weapons-usable plutonium.

2.1 MT of the non-pit weapon-grade plutonium is estimated to be nonsurplus based on the following:

- DOE declared 21.3 MT of plutonium at Pantex to be surplus, leaving 44.8 MT of plutonium in pit form as stockpile plutonium;
- DOE declared 38.2 MT of weapon-grade plutonium to be surplus, leaving 46.9 MT of weapon-grade plutonium as nonsurplus;

The Nominal 50 MT

This confusion is a function of DOE planning efforts. The Office of Fissile Materials Disposition spent five years conducting environmental impact statements (EIS) on the plutonium disposition options. The EIS processes consistently used 50.0 metric tonnes of surplus plutonium as a "nominal planning figure,"[14] broken down as:

- 31.8 MT of "clean metal," mostly plutonium contained in weapon components (pits), designated to the MOX route;
- 18.2 MT of plutonium contained in an array of forms considered physically unsuitable or economically unfeasible to separate and purify for use in MOX and designated for the immobilization disposition route.

Several assumptions lie within the "nominal planning figures (figure 2-6):

- materials will be pre-processed before the disposition steps begin. In other words, the planning figures are based on expected conditions, not real conditions.
- included was 7.0 MT of metals "anticipated" to be surplus if START II induced more weapons dismantlement;
- not included was the 7.5 MT of plutonium in irradiated fuel.

Feed Projection Categories	Plutonium Mass (MT)
Clean Metal (including pits)	31.8
Impure Metal	3.4
Plutonium Alloys	1.0
Clean Oxides	1.7
Impure Oxides	6.4
Uranium/Plutonium Oxides	0.9
Alloy Reactor Fuel	3.5
Oxide Reactor Fuel	1.3
Total	50.0

Figure 2-6. Projected Feed for Plutonium Disposition.

The Real Surplus

DOE did report approximately 52.5 metric tonnes (MT) of surplus plutonium (see Table 1-5) that included:

- 38.2 MT of weapons-grade plutonium and 14.3 MT of fuel-grade plutonium.
- A net amount of surplus weapons-usable plutonium in the existing inventory of 43.0 MT.[15]

The 9.5 MT of plutonium not weapons-usable in its present state, broken down as:

- 7.5 MT of plutonium contained in irradiated mixed-oxide (MOX) and metal alloy fuel that already met the spent fuel standard.
- 2.0 MT of material commonly known as "residues" with low concentrations of plutonium for "which extraction of plutonium would not be practical and which is expected to be processed and repackaged for disposal as TRU [transuranic] waste" at the Waste Isolation Pilot Plant in New Mexico.

The Changing Surplus

The following changes have occurred since the surplus inventory was announced:

1. There is now 3.0 MT of plutonium in residues scheduled for disposal at WIPP and this material is identified as weapon-grade plutonium.. The addition of 1.0 MT to this route occurred when DOE rescinded its decision to send 1.0 MT of plutonium in Rocky Flats "Sands, Slags, and Crucibles" to the reprocessing canyons at SRS.

2. In 1997 Lawrence Livermore National Laboratory reported only 51.3 MT as the "latest estimate"[16] of surplus plutonium within a table identical to one in 1997,[17] with the difference being the removal of 1.2 MT of plutonium in the following forms:

- 0.8 tonnes of fuel-grade plutonium in irradiated fuel;
- 0.2 MT tonnes of fuel-grade plutonium in unirradiated reactor fuel;
- 0.1 MT of fuel-grade plutonium oxide;
- **0.1 MT of weapon-grade plutonium metal;**

The reasons for this change are unknown and have not been explained by DOE. However, in 1998 plutonium pits were reclassified (see Part 3) and some surplus pits were reidentified as "national assets." Also, in 1998 Los Alamos received "permission from the politicians" to divert some "nickel-sized" pieces of plutonium from its pit disassembly and conversion "disposition" demonstration project to its nuclear weapons program for plutonium aging studies.[18]

3. In November 1999, prior to issuing a Record of Decision on the SPDEIS in January 2000, but after finishing the final SPDEIS, DOE removed the unirradiated ZPPR fuel plates and oxides pins from the surplus inventory and declared it "Programmatic Use material."[19] DOE failed to mention this change in its Record of Decision and apparently did not inform the designers of the Immobilization Facility until after January 1, 2000. [20]

In June 2000 DOE submitted its Integrated Nuclear Materials to Congress in which they described an active surplus plutonium inventory of 52.5 MT but added the disclaimer that "a majority of the excess, approximately 48 MT, has no programmatic use." DOE then described how it removed more than 4 MT from the surplus inventory:

"*A small portion of the 52.5 MT supports programmatic uses such as basic scientific research, criticality research, and production of medical isotopes. Most of this is in the form of fuel for the Zero Power Physics Reactor (ZPPR) and Fast Flux Test Facility (FFTF).*"

"The Department is now considering retaining the ZPPR fuel as a national resource at ANL–W. The Department is currently preparing a Programmatic Environmental Impact Statement (PEIS) (DOE, 1999i) to consider the potential impacts of expanded nuclear facilities to accommodate new civilian nuclear energy research and development efforts and isotope production missions, including the role of the FFTF." [21]

Table 2-3 of this document identifies the ZPPR fuel as "in storage pending future use."

The U.S. Russian Agreement

Adding to the confusion is the U.S./Russian bilateral plutonium disposition agreement signed on September 1, 2000. Plutonium "disposition" is a catchphrase for putting plutonium in a highly irradiated storage environment. Instead of 50 MT to be "disposed," the agreement calls for only disposing 34.5 MT. DOE has continued to incorrectly declare 52.5 MT of surplus plutonium in the active inventory (see Figures 2-7 and 2-8 on following page).

One unfortunate consistency in plutonium management has been overlapping and poorly integrated bureaucracies. DOE's Office of Fissile Materials Disposition (OFMD) and the Office of Environmental Management (EM) have never presented a cohesive plan for managing non-pit plutonium to the public, and they can't seem to agree on the numbers:

- EM incorrectly described the 14.3 MT of non-weapon grade plutonium as "non-weapon-capable" even though DOE defines weapons-usable as *"all plutonium except that present in spent [irradiated] fuel and plutonium which contains greater than 10% plutonium 238."*[22]
- Although WIPP was never said to be part of the fissile materials disposition program in terms of surplus plutonium, both parties show 3.1 MT of weapons-grade plutonium being disposed of at WIPP. OFMD's chart states the material will be "diluted in waste" and sent to WIPP; whereas the EM chart simply shows this waste being sent to WIPP;
- EM inaccurately claimed that 4.8 MT of reactor fuel was surplus.

Table 2.7. Non-pit Plutonium Inventory

Plutonium Form	# Items	Plutonium Content, MT
Metals	6361	8.59
Oxides	12537	6.35
Residues	29530	6.35
Unirradiated Fuel	52,000	4.6
Total	100,528	25.9

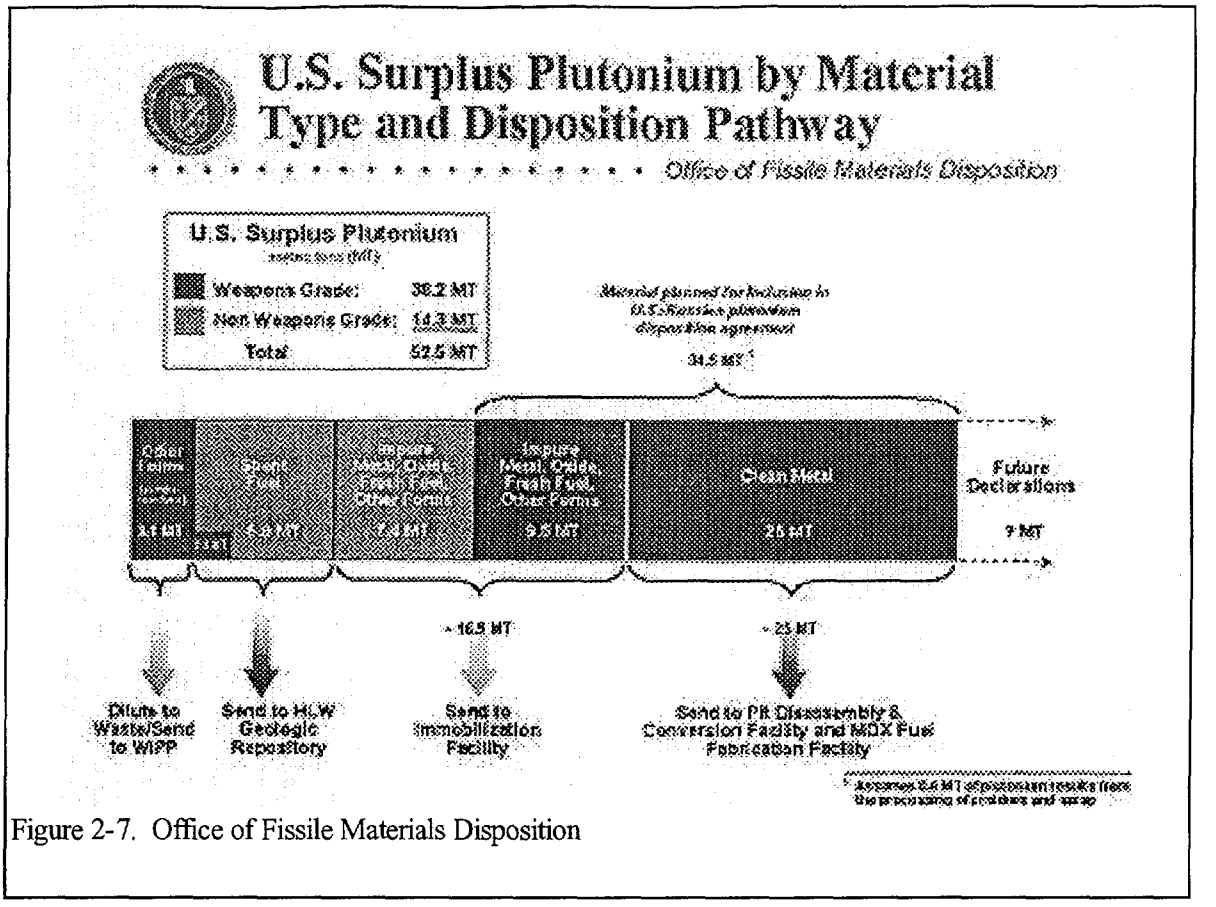


Figure 2-7. Office of Fissile Materials Disposition

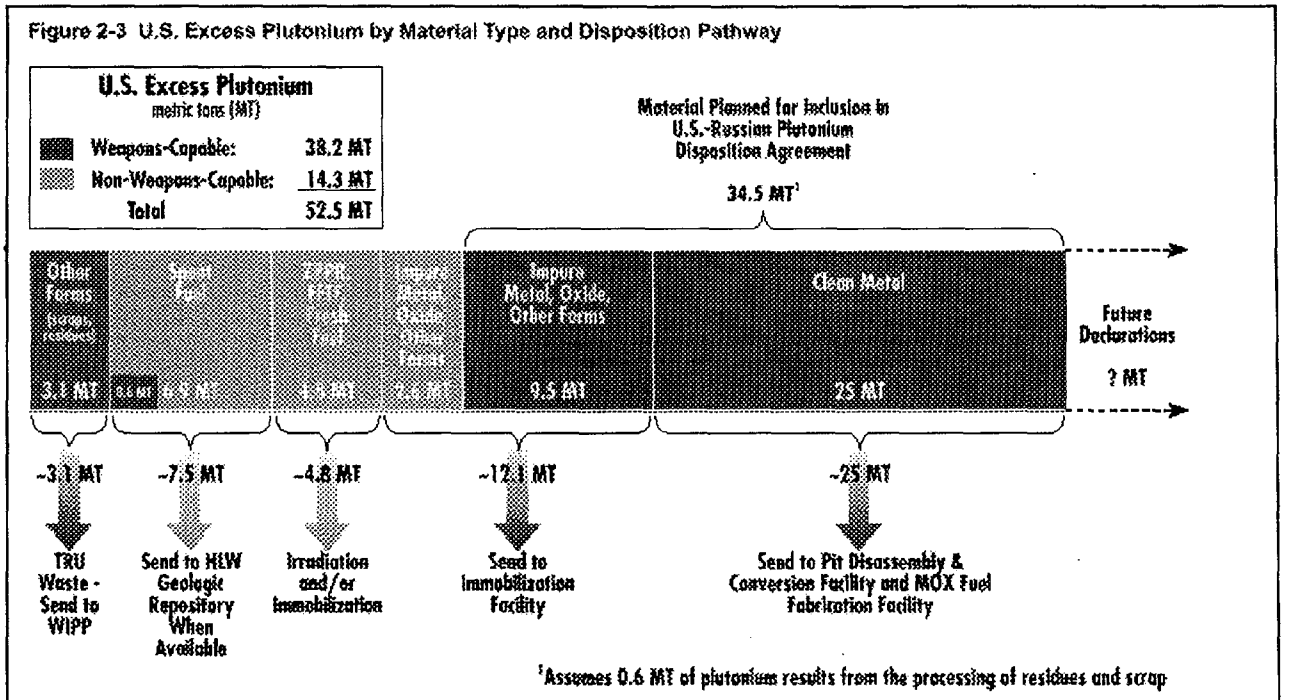


Figure 2-8. Office of Environmental Management.

Table 2-8. DOE's Variety of Surplus Plutonium Numbers					
Form	DOE's Official Estimate of Surplus Pu			"Planning" Estimate of Surplus Pu Total**	Amount for Disposition under U.S./Russia Agreement
	Weapon-Grade	Fuel-Grade	Total*		
Metal	27.8	1.0	28.9	(1) 36.2	27.8
Oxide	3.1	1.3	4.4	9.0	3.1
Reactor Fuel	0.2	4.4	4.6	4.8	0.0
Irradiated Fuel	0.6	6.9	7.5	0	0.0
Other Forms	6.4	0.7	7.1	0	4.6
Totals	38.2	14.3	52.5	50.0	34.5

*Metal includes plutonium in pits, ingots, and buttons; Oxide refers to plutonium oxide, reactor fuel refers to prepared but unused MOX fuel, metal-alloy fuel elements, pellets, and MOX powder; and "other forms" refers to uranium/plutonium oxides and "residues" from the fabrication of weapon components.

(1) This includes 7.0 MT "that may be declared surplus in the future."
(2) In 1997 DOE reported that 0.223 MT of plutonium/uranium fuel material that had not been fabricated into finished fuel components is part of the 4.8 MT total of unirradiated fuel and therefore **accounted for an additional 0.2 MT of reactor fuel in the planned category;**[23]

Table 2-9. BREDL's Estimate of Active U.S. Plutonium Stockpile							
Form	BREDL's Current Estimate of Surplus Pu			Stockpile Pu			Amount for Disposition under U.S./Russia Agreement
	Weapon-Grade	Fuel-Grade	Total*	wg	fg		
Metal in Pits	21.2	0	21.2	44.9	0	44.9	21.2
Clean Metal	3.7	0	3.7	2.1	0	2.1	3.7
Oxide	3.1	1.6	4.7		0		4.7
Impure Metal	2.8	1.0	3.87	0	0	0	2.8
Reactor Fuel	0	0.0	0.0	0.2	4.2	4.4	0.0
Irradiated Fuel	0.6	6.1	6.7	0	0.8	0.8	0.0
Residues	6.5	0.7	7.2	0	0	0	0.4
Totals	37.9	9.4	47.3	47.2	5.0	52.2	31.8

Nuclear Site	Total Plutonium Inventory, in Metric Tonnes (1.1 English Ton = 1.0 metric tonne) and by material						
	Metal	Oxide	Residues	Solutions	Reactor Fuel	Irradiated Fuel	Total
Hanford (1)	0.7	1.5	1.5	0.343	0.6	6.6	11.243
ANLW	0.1	0	0	0	3.8	0.1	4.0
INEEL	0	0	0	0	0	0.5	0.5
SRS (2)	0.490	0.800	0.400	0.110	0	0.3	2.1
PANTEX (3)	66.1	0	0	0	0	0	66.1
LANL (4)	1.1	0.7	1.4	0	0	0	3.2
LLNL (5)	0.020	0.102	0.035	0	0	0	0.4
RFETS (6)	6.6	3.2	3.0	0.043	0	0	12.9
Totals (7)	75.13	6.35	6.35	0.496	4.4	7.5	100.2

(1) DOE reported 11.0 MT in 1996. The plutonium in solutions may be double counted.
(2) Does not reflect plutonium received from Rocky Flats, which could bring total as high as 2.5 MT.
(3) This is total plutonium at Pantex plus in weapons stored or deployed. There are 12,000+ plutonium pits presently in storage, with approximate on-site inventory of 35 to 40 MT. The total inventory of plutonium in pits has probably been reduced by up to 0.5 MT due to stockpile surveillance and pit disassembly and conversation demonstration project at Los Alamos.
(4) Does not reflect the plutonium Los Alamos has from Rocky Flats and from Pantex.
(5) Probably reflects plutonium shipped from Rocky Flats.
(6) 1,200 plutonium pits were transferred to Pantex with no decrease in inventory means that plutonium in pits were not part of declassified inventory at RFETS. 0.1 MT of Pu in solutions were converted to oxides, not reflected here.
(7) Higher total may mean that plutonium in solutions is double counted and reported as oxide or metal by DOE.
Other sites include Sandia, Oak Ridge, Mound, Argonne-East, and Lawrence Berkeley Laboratory, and amount to <0.1 MT.

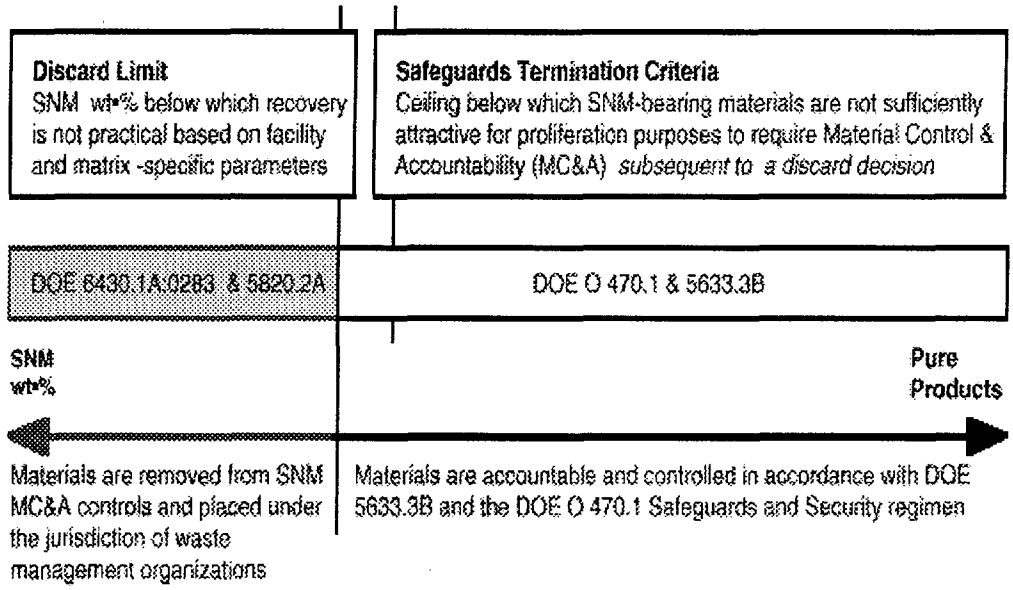
1. U.S. Department of Energy. *Plutonium. The First 50 Years.* DOE actually declared 99.5 MT but this did not include 0.1 MT of "classified transactions."

2. Inventory Differences used to be called "Materials Unaccounted For"

3.Savannah River Site FY 2001 Annual Operating Plan. *Summary Task Description Sheet.* SOXX. MC&A.

4. http://www.ieer.org

5. This graphic illustrates the fine line between "waste" and "residues." Historically much of what is now called "residues" would have been recovered by purifying the plutonium. Russia's policy is to recover plutonium from all forms until there is less than 200 ppm of plutonium remaining. Only then does it become a waste.



6.DOE/ID-10631. Revision 0 October 1998 **Plutonium Focus Area**

7. Defense Nuclear Facilities Safety Board. Technical Report 1. *Plutonium Storage Safety at Defense Nuclear Facilities.* April 1994.

8. Defense Nuclear Facilities Safety Board. Recommendation 94-1. May 26, 1994.

9. U.S. DOE. Implementation Plan for DNFSB Recommendation 94-1. February, 1995.

10. Christenson, et al. 2000. Managing the Nation's Nuclear Materials. The 2025 Vision for the Department of Energy. LA-UR-00-3489. http://lib-www.lanl.gov/la-pubs/00393665.pdf.

11.U.S. DOE. 2000. *Integrated Nuclear Materials Management Plan.* Submitted to Congress, June 2000.

12.DOE 94-1 Implemnetation Plan. Revision 3.

13.DNFSB. Recommendation 2000-1.

14.U.S. DOE. Office of Fissile Materials Disposition. *Draft and Final Surplus Plutonium Disposition Environmental Impact Statements (SPDEIS)*, 1997-1999.

15. U.S. DOE. Office of Fissile Materials Disposition. 1997. *Feed Materials Planning Basis for Surplus Weapons-Usable Plutonium Disposition.* April 1997.

16.

Table 1: *Current Surplus Plutonium*

Category	Weapons-Grade Plutonium	Non-Weapons-Grade Plutonium	Total Surplus Plutonium
Metal	27.9	1	28.9
Oxide	3.1	1.3	4.4
Reactor Fuel	0.2	4.4	4.6
Irradiated Fuel	0.6	6.9	7.5
Other Forms	6.4	0.7	7.1
Total	38.2	14.3	52.5

Table 1. Composition of United States Surplus Plutonium by Form and Grade

Form	Weapon-Grade[1]	Fuel-Grade[2]	Total
Metal[3]	27.8	1.0	28.8
Oxide[4]	3.1	1.2	4.3
Reactor Fuel[5]	0.2	4.2	4.4
Irradiated Fuel[6]	0.6	6.1	6.7
Other Forms[7]	6.4	0.7	7.1
Totals	38.2	13.2	51.3

Footnote 16: Feed Materials Planning Basis. 1999. Note that only 38.1 MT of weapon grade is considered, although the author inserted 38.2 in the bottom column.

18. Olivas. Plutonium Aging.

19.Letter, William D. Magwood, DOE, Office of Nuclear Energy, to Laura S. H. Holgate, DOE, Office of Fissile Materials Disposition, "Zero Power Physics Reactor (ZPPR) Plutonium Fuel," November 12, 1999.Referred to in the November 2000 SRS Pu Storage Plan.

20. *Design Only Conceptual Design Report for Plutonium Immobilization Plant.* February 2000. Revision 1.

21.*Integrated Materials Plan.* Page 2-4.

22. Gray, L.W. et al. 1999. *The Blending Strategy for the Plutonium Immobilization Program.* Paper prepared for submittal to the Waste Management '99 Symposium, Tuscon, Arizona. February 28-March 4, 1999. UCRL-JC-133279. Lawrence Livermore National Laboratory.

Part III
Plutonium in Pits

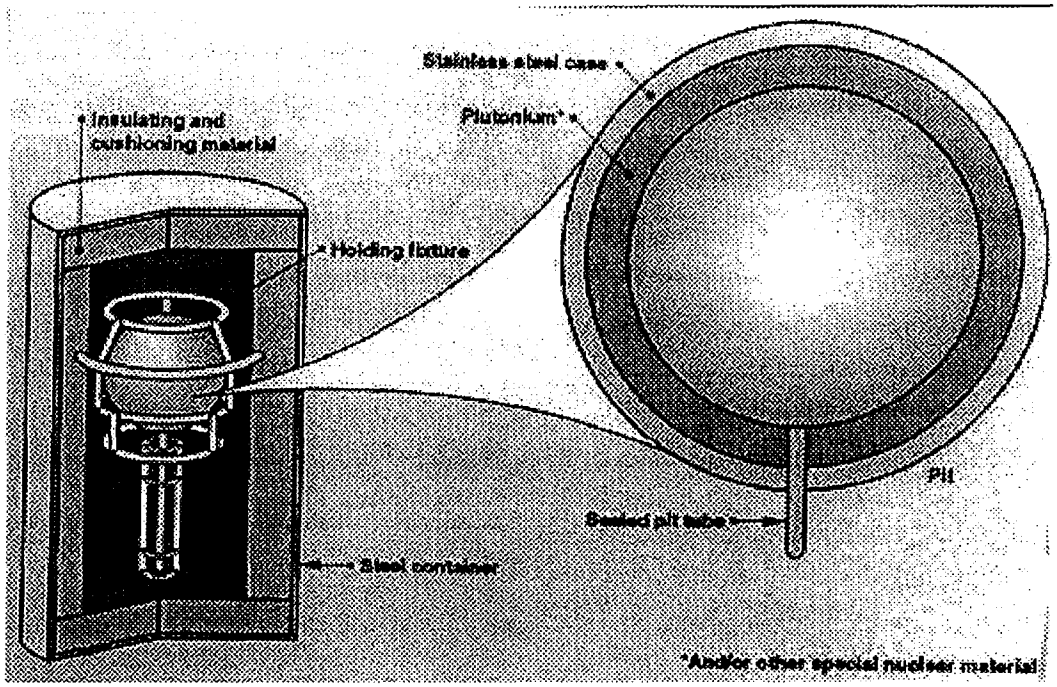


Figure 3-1. Simplified illustration of a plutonium trigger, or "pit", with storage "AL-R8" storage container. Source: U.S. Department of Energy (DOE), Office of Fissile Materials Disposition (OFMD). http://www.md.doe.gov

Plutonium pits are finished weapon components and comprised of numerous parts, including metal cladding, welds, a pit tube, neutron tamper(s), and plutonium hemispheres (usually hollow-cored). The sealed pit tube carries deuterium-tritium gas into hollow-core pits in order to boost the nuclear explosive power of weapons.

This illustration shows stainless steel as the outer cladding, but some pit types are also clad with beryllium, aluminum, and possibly vanadium; and there are experimental designs called "not war-reserve like" pits stored at Rocky Flats in Colorado.

There are more than 12,000 plutonium pits stored at the Pantex Nuclear Weapons Plant near Amarillo, Texas - - of which 7,000 to 8,000 are "surplus"- - and another 8-10,000 stored in nuclear weapons, both deployed and stored.

Plutonium Pit Basics

Plutonium pits are the triggers in most nuclear explosives. Pits are sealed weapon components containing plutonium and other materials and came into being in 1956, replacing the plutonium "capsule" trigger design.[1] Pits are surrounded by carefully machined high explosive spheres. When the high explosives are detonated the plutonium is compressed and imploded, thus triggering the nuclear detonation (see Figure 1-1).

Describing Pits, No. 1

"Pits can generally be characterized as nested shells of materials in different configurations and constructed by different methods."
Los Alamos National Laboratory. ARIES Fact Sheet. 1997.

Pits were fabricated at the Rocky Flats plant in Colorado from about 1954 to 1989, when safety and environmental problems forced a production shutdown. Rocky Flats is infamous for thirty five years of unsafe operations and costly accidents resulting in massive radiological contamination, but in the nuclear weapons complex it is equally known for producing high quality, "diamond-stamped" plutonium pits considered the most durable and resilient parts of nuclear weapons.

Describing Pits, No. 2

Rocky Flats described pits as a "pressure vessel designed to withstand, without yielding, the boost gas or other operational pressures which vary from weapon to weapon but are in the range of hundreds of psi."
Pits are also "designed to provide containment of the radioactive materials to prevent the release of contamination or other unsafe conditions." Other features of pits include:

- all metal construction generally using three joint welds at the "equator," the tube pinch-off, and the tube to shell brazed joint;
- an absence of o-rings, seals, or other non-metallic components which are sensitive to either heat or cold.

Source: *Safety Analysis Report for the AL-R8 Container*. Rocky Flats Plant. 1990.

There are about 48 different types of pits (see Table 3-1), each designed for use in specific nuclear weapon systems and to be stored for 20 years or more inside a weapon environment. Long-term storage (more than five years) of pits outside of weapons is a program filled with uncertainties. Designers and weaponeers within DOE refer to the variety of designs in terms of "pit families,"with some more important variations including:

- shape and mass of the plutonium within the pit;
- the presence or absence of highly enriched uranium;
- the presence or absence of tritium;
- the type of metal cladding;
- bonded vs. nonbonded.

Pit numbers and DOE management terminology

Normal operations coupled with START I treaty between the U.S. and Russia turned the Pantex nuclear weapons plant into a disassembly facility in the 1990's (Figure 3-2). 11, 875 weapons were dismantled, with most of the plutonium pits being sent to "Zone 4" for "interim" storage.[2] More than 11,000 plutonium pits accumulated at Pantex during this time, (Figure 3-2).

About 1200 pits were shipped to Pantex between 1997 and 1999 from Rocky Flats, and another 60 pits were shipped from SRS to Pantex in 1998. Pantex in turn shipped about 20 pits/year to Los Alamos for its surveillance/inspection program, and an undisclosed amount (but less than 100) to Los Alamos for plutonium pit disassembly and conversion demonstration program, leaving more than 12,000 pits at Pantex today.[3]

DOE now categorizes pits as surplus to military needs or as "national security assets" (NSA), the latter a category concocted in 1998 and composed of:

- strategic reserve pits, including surplus pits considered defense program "assets;"
- "enduring stockpile" pits that belong to existing weapon systems;
- "enhanced surveillance" pits that may include surplus pits.[4]

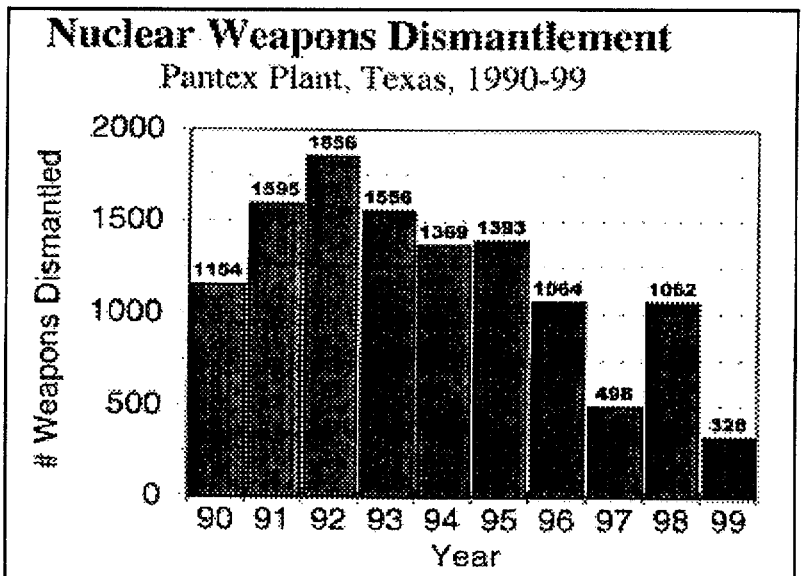


Figure 3-2. Weapons Dismantlement at Pantex, 1990's. (427 dismantlements were scheduled for Year 2000).

National Asset pits are scheduled to be stored indefinitely at Pantex in retrofitted Building 2-116, possibly the most robust facility at Pantex but not one without problems. At least one "national security asset" pit, the problematic W-48, is not allowed in 12-116 because of heat concerns; and there is no funding to move the national asset pits into 12-116 this fiscal year.[5]

The list of NSA pits is not constant, and the "design agencies"–Lawrence Livermore and Los Alamos National Laboratories--have failed to update their list of *national security assets* since February 1999, leaving Pantex in the dark:

> *"an updated list has been requested by letter, in briefings, and verbally to the person in charge of the list. To date, an update has not been received. This is an open issue."* [6]

The total amount of plutonium in surplus pits was declared to be 21.3 MT in 1996. DOE maintains this number is current, but the reclassification of some surplus pits as "national assets" leaves this questionable. If START II arms reductions are implemented, another 7.0 MT of surplus plutonium in about 2,000 to 2,500 pits is likely to be declared.

Surplus pits are scheduled to remain in Zone 4 at Pantex (see Pit Storage at Pantex, page 3.) until they are sent to a Plutonium Pit Disassembly and Conversion Facility (PDCF) scheduled to open later this decade at Savannah River Site. (SRS). Plutonium pit disassembly and conversion refers to "the removal of the plutonium from the nuclear weapon pit and conversion [of the plutonium and other parts] to an unclassified form that is verifiable in the sense that, containing no classified information, the form can be examined by inspectors from other nations."[7] Size, shape, mass and isotopic composition of the plutonium and other parts are considered traits in need of declassification at the PDCF.

Table 3.1 Plutonium Pit Types in U.S. Nuclear Weapons "Enduring Stockpile."

Designer Laboratory	Warhead	Pit Type (# ID[89]	Container	Unique Properties and/or Safety Issues
Los Alamos National Laboratory	B61-3,4,10	123	2040	Present container unsuitable for long-term storage. (See Pit Storage, Page 3). B61-4 also reported as Pit Type 118
	B61-7,11	125	2040	
	W76	116	2030	Most heat sensitive LANL design
	W78	117	2030	
	W80	124	2030	Responsibility being transferred to LLNL
	W80	119	2030	
	W88	126	2030	
Lawrence Livermore National Laboratory	B83	MC3350	MODF	Heaviest Pit[10] , Fire Resistant Pit
	W62	MC2406	2030	
	W84	(1)	unknown	Fire Resistant Pit
	W87	MC3737	2040	Fire Resistant Pit. Unsuitable container.

Container refers to the AL-R8 Subtype[11]. There are no replacements for the 2040 at this time.
Pit type ID's were determined from 1990 Rocky Flats Safety Analysis Report for AL-R8's and from Dow and Salazar. Re: *Storage Facility Environmental Requirements for Pits and CSA's.* August 22, 1995.
(1) One high numbered LLNL pit, the MC 3650, was reported by Rocky Flats to have the highest heat load of any pit, including surplus pits. This could be the W84.

Table 3.1.B: Plutonium Pit types from retired weapon systems.				
Design Lab	Warhead	Pit Type	Container	Unique Properties and/or Safety Issues
Los Alamos	B28	83	2030	
	B28-0	93	2030	minimum decay heat load[12]
	B43	79	unknown	Beryllium cladding
	B43-1	101	2030	Beryllium cladding
	W33	Unknown		
	W44	74	2030	Beryllium cladding
	W44-1	100	2030	Beryllium cladding
	W50	92	unknown	
	W-50-1	103	2030	
	B54	81	2030	Pits require cleaning[13]
	B54-1	96	2030	Pits require cleaning
	B57	104	2030	
	W59	90	unknown	
	B61-0	110	2030	
	B61-2,5	114	2040	Unsuitable container, no replacement yet
	W66	112	unknown	
	W69	111	2030	
	W85	128	2030	
Lawrence Livermore National Laboratory	W48	MC1397	2030	Beryllium clad pits, require cleaning prior to LTS
	W55	MC1324	2030	Suspected to be beryllium clad
	W56	MC1801	2040	High radiation pits, require cleaning prior to LTS
	W68	MC1978	2030	
	W70-0	MC2381	2030	
	W70-1	MC2381a	2030	
	W70-2	MC2381b	2040	Unsuitable container with no replacement yet
	W70-3	MC2381c	2060	Suitability of container
	W71	Unknown		Pits require cleaning
	W79	MC2574	2030	Suspected to be beryllium clad

Plutonium Mass, Beryllium, and HEU

The amount, or mass, of plutonium that is inside of a pit varies and even the average amount remains classified. But enough evidence exists to declare a range of 1 to 6 kilograms (2.2 to 13.2 pounds) of plutonium mass in pits. Only one kilogram of plutonium is necessary for a 1 kiloton explosion,[14] and Los Alamos defined a maximum material weight of 6 kilograms in pit shipping containers.[15] Considering there is 66.1 MT of plutonium in approximately 20,000 plutonium pits, the average plutonium content is just over 3.0 kilograms per pit, or 6.6. pounds.

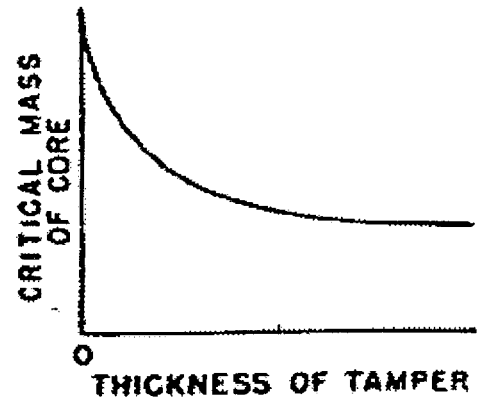


Figure 3-3. Plutonium mass in pits is reduced through the use of neutron tampers. Source: *An Introduction to Nuclear Weapons*. 1972.

Two design variations can be used to decrease the plutonium mass:

1. Neutron tampers (Figure 3-3) are used to scatter escaping neutrons back into the plutonium or HEU core after the nuclear chain reaction starts.[16] One of the more common neutron tampers is beryllium, a highly toxic light metal. Because classified nonnuclear pit parts will be "declassified" at a PDCF by using furnaces to melt down the classified shapes,[17] this operation poses extreme workplace hazards when the tamper is high-purity beryllium (Figure 3-4).

Figure 3-4. How Toxic is Beryllium?
According to the Lawrence Livermore National Laboratory Health and Safety Internet Site, "some people are very susceptible to getting Chronic Beryllium Disease" when inhaling small amounts of beryllium dust. Acute Beryllium Disease can "cause toxic reaction to the whole body " if large amounts are inhaled.
(http://www-training.llnl.gov/wbt/hc/Be/Hazards.html)

2. The use of Highly Enriched Uranium (HEU), also known as "Oralloy, in pits creates what are referred to as "composite cores" and were a "major advance" in weapons design that reduced the probability of pre-initiation of the nuclear explosive, and allowed for a reduction in the amount of plutonium in the pit.[18] As a result, "the pits in the US stockpile can be generally grouped into two types: (1) those containing weapons-grade plutonium and (2) those containing weapons-grade plutonium and highly enriched uranium."[19]

The presence of HEU in pits poses accounting, handling, and classification problems at a PDCF. In 1998 the ability to perform adequate materials control and accounting measurements on

incoming pits was found to pose a technically high risk at the planned PDCF.[20] This risk is higher with HEU pits since there are no "proven techniques for measurement" of this type.[21]

Having HEU parts in plutonium pits also necessitates decontamination of the HEU to levels that meet strict acceptance criteria at the Y-12 plant at Oak Ridge, Tennessee. The Y-12 plant is responsible for all storing all military HEU, it is not a plutonium processing site, and designation as such would meet stiff and justifiable resistance from the state and local communities.

Los Alamos encountered difficulties meeting the previous criteria of 20 disintegrations per minute of plutonium 239 in HEU metal, "with 30% of the shipped parts presently being returned." However, the new limit for plutonium contamination in HEU-oxide form has changed to 2.7 parts-per-million, allowing plutonium levels "several orders of magnitude" higher than the metal standard.[22]

Because of this issue, the final form of the HEU at a pit disassembly and conversion plant was undecided as of a year ago. The decontamination methods under consideration include:

- electrolytic etching, the current method at LANL that has achieved marginal success at meeting metal acceptance criteria at Y-12 but generates less waste;
- Acid spray-leach; the historical process that involves spraying parts with acid and then soaking in a diluted acid solution for up to three hours, producing large volumes of liquid waste; or
- brushing of parts with a wire brush or blasting parts with "some medium," both of which "are not expected to achieve the Y-12 acceptance criteria."[23]

Plutonium Shape

Because the critical mass for a spherical shape is "less than for any other geometrical form of the given material,"[24] most pits are reported said to be spherical in shape. It is unlikely that plutonium in pits are only spherical:

- Passive NMIS measurement systems are in development to estimate the shape of plutonium assemblies inside of containers.[25]
- DOE continues to censor the discussion of shape of critical masses in the sanitized version of *Introduction to Nuclear Weapons* (Section 1.22).[26]
- Criticality experiments at Rocky Flats in the 1960's included cylindrical shapes of plutonium..[27]

Isotopic Composition

The amount of Plutonium-240 is the key isotopic variable in weapon-grade plutonium because its high rate of spontaneous fission poses a higher risk of "pre-initiation," or an early chain reaction, of the fissile material. Higher quantities of plutonium-240 mean increases in critical mass requirements, and therefore costs more to design, develop, and produce the warhead.[28] Early weapons had plutonium-240 content as low to 1.5% but more commonly 4-7%; and in 1972 the Pu-240 content in most stockpile weapons was said to be about 6%.[29] The isotopic composition varied slightly according to the source of the plutonium (Figure 3-5) and the design of the pit.

Table 1.5 COMPOSITION OF WEAPONS-GRADE PLUTONIUM IN WEIGHT PERCENT

	Hanford	Savannah River
Plutonium-238	<0.05	<0.05
Plutonium-239	93.17	92.99
Plutonium-240	6.28	6.13
Plutonium-241	0.54	0.86
Plutonium-242	<0.05	<0.05

Figure 3-5. Variation in average isotopic composition by source.
From: *An Introduction to Nuclear Weapons*. 1972.

During five years of Environmental Impact Statements, DOE never informed the public that declassification of pits included declassifying the isotopic composition. One month after the January 2000 Record of Decision to build a PDCF at SRS was signed, the "blending" of plutonium oxides from two or more pit types was required to declassify the isotopic composition of the powder.[30] It is unclear whether this requirement is an artifact of the Atomic Energy Act or a requirement for the plutonium fuel factory.

Cladding and Beryllium Problems

Plutonium pits have an outer cladding of beryllium, aluminum, or stainless steel. Vanadium is another cladding element, but it is unknown whether it is just experimental or in use. Vanadium was used in 1993 during the W89 pit re-use program at Pantex as a fire resistant cladding on W68 pits being converted for use as W89 pits,[31] and the classified plutonium part inventory at RFETS presently includes six Pu/Vanadium hemishells.[32]

At least seven pit types are known or suspected to be clad with beryllium. (Table 3.1.B),[33] posing the most significant problems with storage and dismantlement of pits:

The W-48

The pit for the W-48 nuclear artillery shell is a clad with beryllium, and has created great problems at Pantex. In 1992 a W48 pit cracked during a Pantex weapon disassembly operation that required rapid cooling followed by rapid heating during removal of the high explosives. The crack of 0.025 inch wide and 8.0 long in the outer beryllium shell resulted in airborne plutonium contamination and was one of the rare accidents involving pits. Afterward, a summer temperature limit of 150 degrees was established for W-48's. In spite of these problems, DOE is retaining an undisclosed number of W-48 pits as National Security Assets.

- pit disassembly can expose workers to highly toxic beryllium dust and fumes;
- beryllium clad pits appear to be more likely to require cleaning (see Table 3.1.B to remove any potentially corrosive organic materials, and pit cleaning can expose workers to airborne beryllium;
- higher sensitivity to temperature fluctuations;
- increased risk of corrosion from chlorides and moisture which are found in storage containers;
- pits clad with beryllium "are more vulnerable to fracture under impact loading."[34]

Pits as a Heat Source

Many pits are sensitive to temperatures, particularly those clad with beryllium. Los Alamos and Lawrence Livermore have expressed major concerns over heating of pits since early this decade.[35] In 1995 Lawrence Livermore and Los Alamos National Laboratories recommended temperatures between 65 and 75 degrees Fahrenheit for storage buildings with strategic reserve pits, and less stringent recommendations for "surplus" plutonium pits.[36]

In August 1998 an estimated thirty plutonium "W76" pits were moved from one Pantex Zone 4 "bunker" to another "due to potential temperature concerns during the recent heat wave."[37] The W76 pits are part of the large "strategic reserve"of pits scheduled to be stored indefinitely at Pantex.

Pits that Heat Up

"Because of natural radioactive decay, each plutonium pit is an intrinsic heat source, producing as much as roughly 18 watts in heat load. Currently, magazine heat loads at Pantex can reach as high as a few kilowatts-an amount sufficient to raise internal magazine temperatures well above ambient. Elevated magazine temperatures are a cause of concern because of corresponding elevations in pit temperatures. Because the AL-R8 containers are primarily designed to keep heat from external sources from entering the pit and to protect the pit in the event of a fire, their design also serves to prevent heat produced by the pit from escaping. Thus, depending on pit wattage, relatively high differences in temperature (ATs) from pit to can can occur. Some high-wattage pits, with average temperatures greater than 50 degrees C, are known to have reached temperatures near 150 C while stored in Zone 4." Source. **Pit Storage Monitoring**. 1995.

Tritium in Pits

In 1998 Los Alamos released a fact sheet that stated:

"A significant number of pits processed by the ARIES facility will contain tritium." [38]

The "fact that tritium is associated with some unspecified pits" was declassified in 1992.[39] During the Environmental Impact Statements for plutonium disposition, DOE vaguely admitted that some plutonium pits were "contaminated" with tritium and that these pits would have to be decontaminated; but finally acknowledged that some pits contain tritium by writing:

"DOE knows how many pits contain tritium."[40]

The reason for having tritium in pits by design is unknown but the impacts of this design on the disassembly of plutonium pits are now more open.

Pits that contain tritium must be processed up-front in a highly secretive "Special Recovery Line" where plutonium "is separated from highly enriched uranium (HEU) and other parts and then processed in a vacuum furnace that drives off tritium and produces a metal ingot. The tritium is captured and packaged as a low level waste. The resulting plutonium ingot is assayed and then reprocessed if it still contains tritium."[41] This process was sufficiently difficult enough to dissuade Los Alamos from processing pits containing tritium in its original ARIES demonstration project when only 40 pits were planned for disassembly and conversion.[42]

The major environmental impact of this process is tritium air pollutants. In the June 1998 Environmental Assessment for the plutonium pit demonstration project at Los Alamos involving 250 plutonium pits over a four year period, DOE reported air emissions of "up to 69 curies of tritium each year." In the 1998 Draft SPDEIS, DOE buried the impacts in a source document by choosing to omit a small table occupying less than a half-page reporting that 1100 curies of tritium will be emitted annually at a PDCF.[43]

Tritium Contamination vs. Pits that contain tritium

Pits could become contaminated if they contain tritium by design, or if they become contaminated with tritium by accident. In any case, any kind of hydrogen-plutonium reaction is undesirable because it could induce hydride corrosion of the plutonium metal, causing pitting and a growth of hydride film along the surface,"[44] as well as producing a pyrophoric plutonium hydride compound.

> "Hydride corrosion of uranium and plutonium may have significant implications for the lifetime of uranium [and plutonium] in nuclear weapons."
>
> *A Model for the Initiation and Growth of Metal Hydride Corrosion.* LA-UR-00-5496.

Bonded vs. NonBonded Pits

DOE had declassified information about bonded weapon components prior to 1996.[45] A 1998 Technical Risk Assessment of the Plutonium Pit Disassembly and Conversion Facility identified the implications of this distinct design variable when it identified an option with the least technical risk for disassembly and conversion of most plutonium pit types. The *Metal-Only Option* was suggested to process only "nonproblem pits" to produce only a metal plutonium product and no plutonium oxide. This was because "many of the pits, perhaps as many as 80%, can bypass the hydride/dehydride (conversion to metal) module as the plutonium metal can be mechanically separated from the pits."[46]

The pit types where plutonium metal can be mechanically separated using a lathe are called "non-bonded" pits; whereas the pits that require chemical processing–either pyrochemical or liquid–to separate the plutonium in the pit from other pit parts are called "Bonded" pits. In bonded pits, the the plutonium is bonded to other metals in the pit, such as stainless steel, beryllium, and/or

uranium..[47] At least one Los Alamos source reports that all Russian plutonium pits are nonbonded.[48]

Bonding and Pit Disassembly and Conversion Issues

To avoid liquid acid "aqueous" processing of pits, Lawrence Livermore National Laboratory developed the ARIES system that included a pit "bisector" for cutting plutonium pits in half (Figure 3-6) -- which suggests that most or all bonded pits are of Livermore design.[49] The bisector is the front end the Advanced Resource Integrated Extraction System (ARIES) that DOE chose as a major part of the pit disassembly and conversion process while it was still in the design and experimental phase.

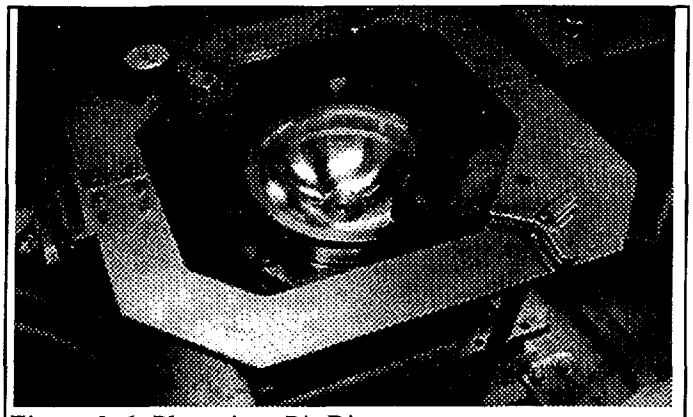


Figure 3-6. Plutonium Pit Bisector.
"The prototype bisector was designed and tested at Livermore. Using a chipless cutting wheel, it can separate weapon pits into two half-shells in less than 30 minutes so that the plutonium in them can be recovered for disposition." *Science and Technology Review*. April 1997. Lawrence Livermore National Laboratory.

Following the pit bisection, the plutonium must the be chemically separated from the pit cladding and other pit parts. The two experimental technologies proposed are hydride-dehydride, which recasts the plutonium as a metal, and HYDOX, which utilizes the reaction of plutonium with hydrogen to produce a plutonium oxide powder.

Do Bonded Pits Lack Tritium?

It is evident that bonded pits are "problem pits" since the metals-only option would defer processing these pits and simplify the plutonium disposition process; although considerable evidence also points to an absence of tritium in bonded pits:

a. Pits containing tritium were not "*selected as part of the ARIES pilot demonstration because of the difficulties associated with handling tritium;*"
b. The original ARIES demonstration line involved only 40 pits and 7 pit types, and the Special Recovery Line was not required for these pit types;
c. The pit bisector in the ARIES process was specially designed to take "into account the dimensions, encapsulation methods, construction materials, and manufacturing techniques of these pits in order to incorporate the representative configurations that will be processed through ARIES." (Gray, 1995. Lawrence Livermore National Laboratory).
d. Chemical processing is unnecessary to separate plutonium from other pit parts in nonbonded pits, so HYDOX was designed for bonded pits as well.

Pit Tubes and Pit Re-Use at Pantex

While DOE pursues plutonium pit fabrication at Los Alamos and possibly SRS, it has abandoned, at least for now, the plutonium pit re-use project planned for Pantex. A pit-re-use project occurred at Pantex in the early 1990's when Rocky Flats was shut down. This project allowed DOE to proceed to complete the W-89 weapon program by re-using W68 pits and converting them to fire-resistant pits by cladding them with vanadium. Heralded then as an innovative approach that avoided messy pit fabrication, the latest plan for pit-re-use went unfunded in fiscal year 2000,[50] and there is no indication that DOE plans to pursue this work, indicating a preference for new pit production at SRS.

One of the sticking points regarding pit-re-use involves pit tubes. Plutonium pit tubes are designed to carry the booster tritium gas from the tritium reservoir to the hollow core of the pit at the time of detonation. According to pit-tube fabrication experts, pit tubes:

- are constructed of annealed type 304 stainless steel that is "very ductile" and able to take severe deformation without cracking or leaking;
- are placed at assembly within tightly fitting slots in the high explosive and must be straight and within true position within 0.02 in 1 inch.
- are usually of 0.12 inch diameter, for pressure testing, evacuation and filling.
- are attached to stainless steel shell by TIG welding or electron beam welding and to beryllium and aluminum shells by high temperature braze[51]

Pit re-use was always described as "non-intrusive" during the Environmental Impact Statement process. After Pantex was selected for the pit re-use mission, the mission was renamed "pit requalification" and changed from non-intrusive to intrusive because it included pit tube replacement and refurbishment:

"SNM Requalification at PANTEX for FY 98 has been as continuation of the original effort and has included an increase in scope to address pre-screening, tube replacement and reacceptance...tube replacement is a capability that was utilized at Rocky Flats. A similar capability is being supported as a part of the Pit Rebuild program at LANL"[52]

Pit tube replacement was being advocated by Los Alamos prior to the funding cutoff for this program. Because pit tubes are bent to very specific configurations and there is no record of the number of times they have been bent, Los Alamos wanted to replace all pit tubes. However, a LLNL report discussing the stainless steel used in W87 pits reported that the tube would need to be bent at least ten times to pose a great risk of failing (Figure 3-7).[53]

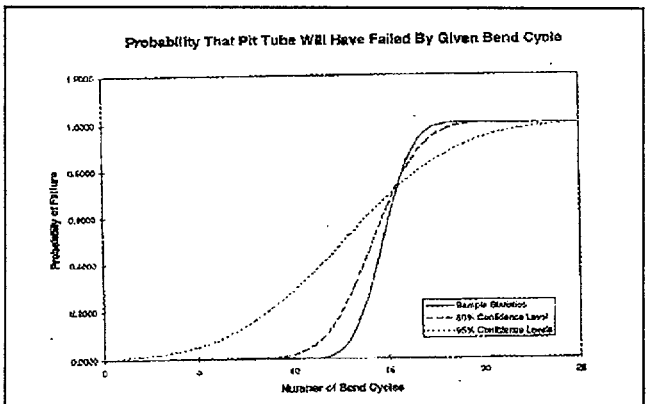


Figure 3-7. Sun-Woo, *Characterization of Stainless Steel 304 Tubing.*

PLUTONIUM STORAGE AT PANTEX: Stockpile Negligence?

Plutonium pits are multimillion dollar weapon components being stored in substandard conditions.

Most pits are stored in the AL-R8 container (Figure 3-11) which is unsuitable for long-term storage. Designed by Dow Chemical in the 1960's. AL-R8's are unsealed and pits stored in them:

- require extra humidity and temperature controls
- are prone to corrosion because the internal celotex packing–sugar cane, paper, starch, and wax--is a source of chlorides and moisture that can lead to corrosion of the pit cladding.
- do not meet all safety criteria–specifically the 1100 pound dynamic crush test.
- provide poor radiation shielding.

There are about 2,000 corroded AL-R8's at Pantex because they were procured without the corrosion resistant liner.

Figure 3-8. AL-R8.

THE AT-400A Fiasco

DOE spent $50,000,000 designing and developing the AT-400-A (Figure 3-9) dual-use shipping and storage container for plutonium pits. Its advantages included:

- a sealed, inert gas environment that would prevent corrosion and other degradation of pits
- better radioactive shielding;
- a 50-year design life.

It's disadvantages included cost ($8,000/unit) and problems associated with the weld–possible burn through of the containment vessel.

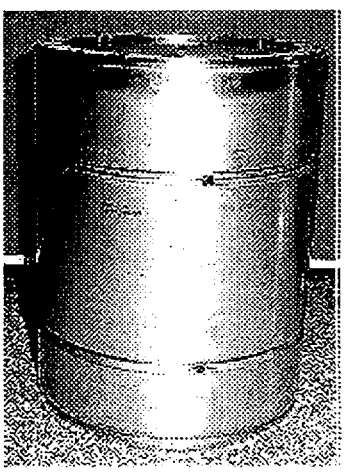


Figure 3-9. AT-400A

DOE estimated that 2,000 plutonium pits per year could be repackaged in the AT-400A, leaving pits in the safest container within a five year period. After the repackaging startup was delayed by more than a year, 20 pits were repackaged in a pilot run before DOE pulled the plug on the entire program. Twenty W-48 pits remain in AT-400A's.

The Sealed Insert

DOE replaced the AT-400A with the AL-R8 Sealed Insert (Figure 3-10). It is a significant improvement over the AL-R8 because of the sealed, bolted, stainless steel inner container, but is still not considered worthy of shipping certification. Problems now plaguing this program include[54]:

- a lack of funding to buy new containers at a cost of $2800/unit.
- the need to certify larger "2040-type"AL-R8 sealed inserts for about several pit types ome pits, including most stockpile pits;
- the lack of a pit cleaning station for 1500 pits too dirty for long term storage, so Pantex is having to double-handle some pits;
- a lack of funding for labor, so Pantex is not able to run two shifts;
- a lack of funding for monitoring;
- limited funds for dealing with another cracked pit.
- DOE has only 300 shipping containers called FL's, the certification for the FL's expires in 2002, and more than 200 of these were recently found to not match design drawings;
- DOE has made no reported progress developing a new shipping container (Figure 3-11) to replace the FL and AT-400A.;
- a planned upgrade to Building 12-66 at Pantex was abandoned after the design work was complete, leaving decades-old bunkers as the main storage buildings. (Figure 3-12) These facilities were not supposed to be used after the Year 2000, but will be used indefinitely.

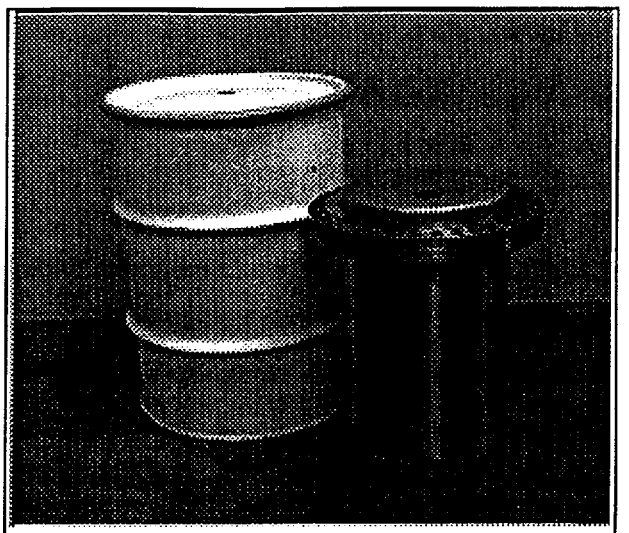


Figure 3-10. AL-R8 with Sealed Insert, 2030 model. There is still a need for 2040 models for several pit types, including national asset pits

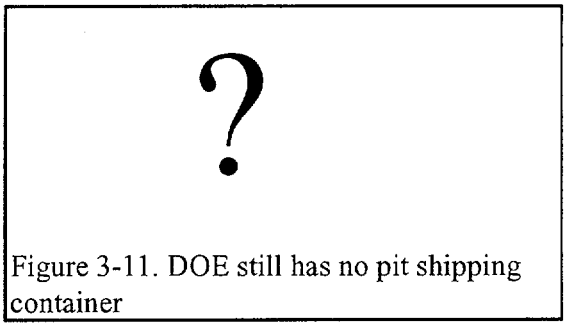


Figure 3-11. DOE still has no pit shipping container

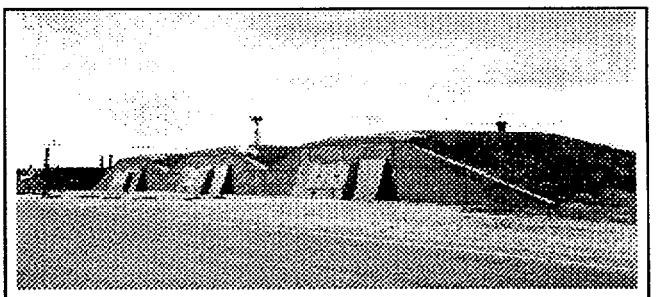


Figure 3-12. Zone 4 Bunkers at Pantex. Plutonium pits are literally stacked to the ceilings in these WWII and 1960's vintage bunkers. All but a few of these facilities lack required humidity or temperature controls, and are unlikely to withstand an aircraft crash – a serious issue due to the proximity of Amarillo International Airport. Pantex has little space for additional pits.

DOE's Dirty Plutonium Secret
Plutonium Pit Production at Savannah River Site

In the newly downsized U.S. Nuclear Weapons Production Complex, Savannah River Site is the only remaining major plutonium processing site in the country and is in line for three new facilities promoted as "nonproliferation" missions:

a Plutonium Pit Disassembly and Conversion Facility that will process surplus plutonium pits and convert the plutonium in those pits to an unclassified plutonium oxide powder.
b Mixed Oxide (MOX) Fuel Fabrication Facility where "pure" or nearly pure surplus plutonium will be purified using liquid acid processing and then mixed with uranium to make MOX plutonium fuel for nuclear reactors;
c. A Plutonium Immobilization Plant (PIP) where impure and very difficult to purify surplus plutonium will be mixed with uranium and a "titanate" ceramic to make ceramic "pucks." (See below for explanation of can in canister)

Tritium production and recycling is said to be the only nuclear weapons production mission at SRS. However, because Rocky Flats no longer produces nuclear weapons triggers called plutonium pits, new pit production is slated for SRS, and this would inevitably involve the PDCF, making it a dual-use facility:

Plutonium Aging and ARIES as a Weapon Program

In 1998 the Government Accounting Office reported that:

"DOD was concerned that the aging of pits was not clearly identified in our report as a driving force of pit-production requirements. DOD said that it could not give detailed pit-manufacturing requirements until the lifetime of pits is specified more clearly by DOE."

DOE plans to spend over $1.1 billion through fiscal year 2007 to establish a 20-pits-per-year capacity. But this budget does not include disassembly work[55] which is clearly being funded by OFMD under the ARIES development. In addition, plutonium pit enhanced surveillance program, a SSM program, ARIES was identified as a "pertinent task" for the "Pit Focus Program."
material property data from pits dismantled in the ARIES process in order to expand the age-correlated database of applied plutonium properties.[56]

Chairman Spence and the Foster Panel

In 1996 Chairman of the House National Security Committee Floyd Spence (R-South Carolina) issued a report titled *"The Clinton Administration and Stockpile Stewardship: Erosion by Design,"* in which he wrote that,"Unprecedented reductions and disruptive reorganizations in the nuclear weapons scientific and industrial base have compromised the ability to maintain a safe and reliable nuclear stockpile...unlike Russia or China, the United States no longer retains the capacity for large-scale plutonium "pit" production and DOE's plans to reconstitute such a capacity may be inadequate."

In December 1999 a congressional panel called the Foster Panel published *"FY 1999 Report of the Panel to Assess the Reliability, Safety, and Security of the United States Nuclear Stockpile,"* recommending that DOE:

"immediately begin the conceptual design phase of a pit production facility adequate to meet national security needs."[57]

The Chiles Commission

Another vote for pit production was cast by the Chiles Commission, which was established to review the nuclear weapons workforce and determine needs and priorities. The Commission concluded in 1998 report that, "large numbers of workers are reaching retirement and a new generation of workers must be hired and trained in order to preserve essential skills." One of these essential skills is the machining of "materials unique to nuclear weapons," such as plutonium, highly enriched uranium, and beryllium. Their recommendations called for a renewed emphasis on plutonium pit production:

> *"DOE needs to give a much higher priority to detailed planning for the production of replacement weapons components. In the absence of such planning, the sizing of the nuclear weapons workforce at the production facilities is left unnecessarily uncertain"*[58]

The SRS Strategic Plan

The Savannah River Site is very explicit about its potential pit production mission within some documents but does not publicize its intentions in an up-front manner. The *Savannah River Site Strategic Plan: A Strategic Plan for 2000 and Beyond*[59] lists three focus areas for SRS:

- Nuclear Weapons Stockpile Stewardship
- Nuclear Materials Stewardship
- Environmental Stewardship

The plan states that Nuclear Weapons Stockpile Stewardship "emphasizes science-based maintenance of the nuclear weapons stockpile. SRS supports the stockpile by ensuring the safe and reliable recycle, delivery, and management of tritium resources; by contributing to the stockpile surveillance program; and by our ability to assist in the development of alternatives for large-scale pit production capability, if required. associated with products and services essential to achieving the Department of Energy's (DOE) goals."[60] Under Goals, Objectives, and Strategies, the strategic plan states as a goal:

> *"Consolidate existing facilities and plan, design, and construct new facilities to support current and future stockpile requirements."*

Within this goal is the objective to:

> *"Support the development of contingency plans for a new pit production facility to meet future stockpile requirements as national needs emerge."*

Within this objective is the strategy to:

"Develop partnerships with the national weapons laboratories and Oak Ridge Y-12 Plant to outline roles for each organization in a large- scale pit manufacturing project."

The Los Alamos Perspective

Stephen Younger in 1996 (Los Alamos Science NO. 19).

Stephen Younger, the Associate Laboratory Director for Nuclear Weapons at Los Alamos National Laboratory, which is operated by the University of California under contract to DOE. recently wrote, in *Nuclear Weapons in the Twenty-First Century* that

"Plutonium pit production can be maintained at a small rate at Los Alamos, but any stockpile above about one thousand weapons will require the construction of a new large production plant to replace the Rocky Flats facility, which ceased production in 1989."
"In the case of DOE, an extensive infrastructure of laboratories and plants is required for the Stockpile Stewardship program, including a new manufacturing capability for plutonium pits"

Yet, even under START III conditions, "the U.S. has offered to begin negotiations on ceilings of 2,000 to 2,500 weapons immediately upon Russian ratification of the START II treaty" Obviously, as long as the U.S. intends to maintain more than 1,000 nuclear warheads, then demands for large-scale pit production will be made.

Preparing for Pit Production at SRS?

Several operations at SRS suggest that the site is quietly and surreptitiously implementing its strategic plan as it relates to large-scale plutonium pit production:

1. **Developing Plutonium Casting Capability**. An essential part of plutonium pit fabrication is "casting plutonium metal feed ingots after adding gallium to the plutonium metal and shape-casting the feed ingots into hemishells."

In 1998 SRS developed the capability to recast plutonium metal in the FB-Line "using an M-18 reduction furnace with a new casting chamber." Plutonium metal is recast by charging a standard FB-Line magnesia crucible and placing the charge in the casting chamber. In October 1998, "a *[plutonium] button was produced by combining plutonium and gallium metals to produce an alloy in which the plutonium is stabilized in the d phase. Delta (d) phase metal is not susceptible to low temperature induced phase changes like a phase metal."*[61]

This effort was portrayed by SRS only as a contingency for plutonium metal storage and not as a dual-purpose program that integrated storage goals with pit production goals:

> *The capability to produce d stabilized metal in FB-Line would provide a contingency for plutonium metal storage at the SRS in the event that experimental programs show that the a to b phase transition (and resulting decrease in density) has the potential to create harmful mechanical stresses in storage containers. The continued use of the casting process for the declassification and consolidation of plutonium from weapons components also provides a disposition path for classified metal parts and alloys currently stored at the RFETS."*[62]

2. Measuring Plutonium Density in Pits. Another capability SRS has developed is a new measurement system for determining plutonium density in finished plutonium pits. The Savannah River Technology Center (SRTC) and Los Alamos undertook a collaborative research project in which SRTC designed, fabricated, and tested a gas pycnometer "to be used to measure densities of surrogate [plutonium pit] parts." The project's objective was to find a more environmentally friendly method for measuring the density of plutonium hemishells in pits.[63]

The plutonium density project is not a dual-use program, and is only necessary for plutonium pit fabrication. Although the project occurred prior to the issuance of the SRS strategic plan, it clearly is an example of collaborating with the national laboratories to define roles for pit production.

3. The Plutonium Pit Disassembly and Conversion Facility. Every analysis of plutonium pit production lists pit disassembly as the first step in the process. For example, a joint paper issued by Lawrence Livermore and Los Alamos National Laboratories specified the first two steps of pit fabrication as:

- dismantlement of the pit;
- conversion of the metal through hydride and oxidize to plutonium oxide (HYDOX) or hydride and reduce to metallic plutonium (HYDEC);[64]

4. The Plutonium MOX Fuel Factory. The capability to purify plutonium for pit fabrication is the missing ingredient in the current version of the PDCF is plutonium purification processing. However, the planned plutonium fuel factory will have the capability to purify plutonium oxide powder.

Endnotes

1. U.S. Atomic Energy Commission Nuclear Safety Working Group. 1956. *A Preliminary Consideration of the Hazards of Sealed Pit Weapons.* Sanitized Version from DOE Archives.

2. Pantex was selected as the long-term storage (up to 50 years) facility for plutonium pits in the January 1997 Record of Decision for the *Programmatic Environmental Impact Statement for Storage and Disposition of Weapons-Usable Fissile Materials*; and under the Pantex Plant Sitewide Environmental Impact Statement (January 1997), up to 20,000 plutonium pits can be

stored there.

3. Pantex now claims that total pit numbers are classified.

4. Mason and Hanger Corporation. 2000. *Pantex Pit Management Plan.* Final Revision 3. October 27, 2000. Pantex Nuclear Materials Department. Page 38.

5. Ibid. Page 42.

6. Ibid. Page 43.

7. Toevs, 1997. LA-UR-97-4113. *Surplus Weapons Plutonium: Technologies for Pit Disassembly and Conversion and MOX fuel Fabrication.*

8.

9. Ibid. All pit type ID's obtained from this source or otherwise noted.

10. *Rocky Flats Safety Analysis Report for the AL-R8 Container.* 1990.

11.Ibid.

12. Ibid.

13. Mason and Hanger Corporation. 2000. *Pantex Pit Management Plan.*

14.Institute for Energy and Environmental Research. *Plutonium Fact Sheet.*

15.Data Call for Stockpile Stewardship Management Programmatic Environmental Impact Statement. Los Alamos Plutonium Pit Production. 1995.

16. Glasstone and Redman. *An Introduction to Nuclear Weapons.* June 1972. Atomic Energy Agency. Sanitized Version from DOE Archives.

17. Westinghouse Savannah River Company. 2000. *Facility Design Description for Pit Disassembly and Conversion Facility.* . February 24, 2000. Page 55.

18. Glasstone and Redman. *An Introduction to Nuclear Weapons.*

19.LA-UR-00-504 *January 2000 Safeguards and Security Program Quarterly Activity Summary* October 1–December 31, 1999.

20. Ibid.

21. Ibid.

22. Wedman, Douglas E. and Steven D. McKee. *Uranium Disposition Options for a Pit Disassembly Facility.* LA-UR-00-128. February 200.

23. Ibid.

24. Glasstone and Redman. *An Introduction to Nuclear Weapons.*

25. Mattingly, et al. 1998. *Passive NMIS Measurements to Estimate the Shape of Plutonium Assemblies* (Slide Presentation.) Y-12 Oak Ridge Plant. November 25, 1998. Y/LB-15,998.

26. Glasstone and Redman. *An Introduction to Nuclear Weapons.*

27. *Minutes of Plutonium Information Meeting.* Rocky Flats Plant. June 29-30, 1959. Issued August 7, 1959. DOE Archives. Sanitized Version.

28. Glasstone and Redman. *An Introduction to Nuclear Weapons.*

29. Glasstone and Redman. *An Introduction to Nuclear Weapons*

30. Westinghouse Savannah River Company. 2000. *Facility Design Description for Pit Disassembly and Conversion Facility.* . February 24, 2000. Page 55.

31. Pit Resuse Station. 1993.

32. 3/26/99 letter from DOE to DNFSB: Classified Plutonium at Rocky Flats.

33. Pits are "suspected to be clad with beryllium" in this report if they were separated from the high explosives using similar technologies as the W-48.

34. Rocky Flats Safety Analysis Report for the AL-R8 Container. 1990.

35. Buntain, G., et al 1995. *Pit Storage Monitoring.* LA-12907 UC-721 April 1995.

36.Dow, Jerry (LLNL) and Lou Salazar (LANL). Letter to Department of Energy. Re: *Storage Facility Environmental Requirements for Pits and CSA's.* August 22, 1995.

37. Defense Nuclear Facilities Safety Board. *Pantex Plant Activity Report for Week Ending July 10, 1998.*

38.*ARIES Source Term Fact Sheet* (LALP-97-24, Rev. 3, April 24, 1998).

39.http://www.osti.gov/html/osti/opennet/document/rdd-1/drwcrtf3.html#ZZ1

40.SPDEIS. Page 3-923.

41. Los Alamos National Laboratory and Fluor Daniel, Inc. 1997. *Design-Only Conceptual Design Report for the Pit Disassembly and Conversion Facility.* Project No. 99-D-141. Prepared for the DOE Office of Fissile Materials Disposition. December 12, 1997.

42. *ARIES Source Term Fact Sheet* (LALP-97-24, Rev. 3, April 24, 1998).

43. The tritium data was contained in *Pit Disassembly and Conversion Facility EIS Data Report.* LA-UR-97-2909. The Draft SPDEIS referred to this document on Page 3-4.

44.Tanksi, John A. 2000. *A Model for the Initiation and Growth of Metal Hydride Corrosion.* LA-UR-00-5496. 23rd DOE Aging, Compatibility, and Stockpile Stewardship Conference. November 14-16, 2000.

45.http://www.osti.gov/html/osti/opennet/document/rdd-1/drwcrtf3.html#ZZ1
1) Fact that bonding of plutonium or enriched uranium to materials other than themselves is a weapon production process. (93-2)

(2) Fact that such bonding occurs or may occur to specific unclassified tamper, alpha-barrier or fire resistant materials in unspecified pits or weapons. (93-2)

(3) Fact that plutonium and uranium may be bonded to each other in unspecified pits or weapons. (93-2)

(4) Fact that such bonding may be diffusion bonding accomplished in an autoclave or may be accomplished by sputtering. (93-2)

(5) Fact that pit bonding/sputtering is done to ensure a more robust weapon or pit. . (93-2) (6) The use of autoclaves in pit production. (93-2)

(7) The fact that plutonium is processed in autoclaves. (93-2)

(8) The fact that sputtering of fissile materials is done at or for any Department of Energy facility as a
production process. (93-2)

(9) The fact of a weapons interest in producing a metallurgical bond between beryllium and plutonium. (93-2)

(10) The fact that beryllium and plutonium are bonded together in unspecified pits or weapons. (93-2)

(11) Routine data concerning concentrations of beryllium in plutonium higher than 100 ppm. (93-2)

46. Kidinger, John, ARES Corporation, John Darby and Desmond Stack, Los Alamos National Laboratory. 1997. Technical Risk Assessment for the Department of Energy Pit Disassembly and Conversion Facility Final Report. September, 1997. LA-UR-97-2236. (TRA or Technical Assessment)

47. Toevs, 1997. LA-UR-97-4113. Surplus Weapons Plutonium: Technologies for Pit Disassembly and Conversion and MOX fuel Fabrication

48. Ibid.

49.The list of problem pits, like the list of weapons with disassembly problems, seems to be dominated by LLNL designs. Three of the four pit types requiring cleaning are LLNL designs, as is the most problematic pit, the W-48. The only remaining weapons systems to dismantle under START I are LLNL designs–the W79, the W56, which have both been problematic programs.

50. *Pantex Work Authorization Directives.* Fiscal Year 2000.

51. Rocky Flats Safety Analysis Report for the AL-R8. 1990.

52.Khalil, Nazir, Bill Bish, and Ken Franklin. 1998. *Process development implementation plan for pits*, LA-UR-98-5047. Page 2.

53. Sun-Woo, A.J., M.A. Brooks, and J.E. Kervin. 1995. *Characterization of Stainless Steel 304 Tubing*. UCRL-ID-122234. October 16, 1995.

54.Mason and Hanger Corporation. 2000. *Pantex Pit Management Plan.*

55. Khail, et al. *Process development implementation plan for pits.*

56. *Stockpile Stewardship Enhanced Surveillance Program.* 1998.

57. The unclassified version of the report can be downloaded in the "Public Documents" section at http://www.dp.doe.gov.

58.Commission on Maintaining United States Nuclear Weapons Expertise. *Report to the Congress and Secretary of Energy* Pursuant to the National Defense Authorization Acts of 1997 and 1998. March 1, 1999

59. Savannah River Site Strategic Plan. http://www.srs.gov

60. Ibid.

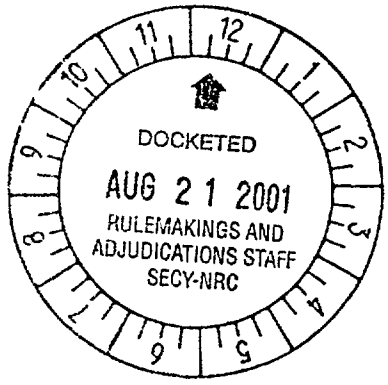
61.Rudisill, T.S. and M.L. Crowder. 1999. *Characterization of d Phase Plutonium Metal* WSRC-TR-99-00448. Westinghouse Savannah River Company

62.Ibid.

63. Collins, Susan, and Henry Randolph. 1997. *Gas Pycnometry for Density Determination of Plutonium Parts.* Westinghouse Savannah River Company. WSRC-MS-97-00636. Document prepared for the 21st Aging, Compatibility, and Stockpile Stewardship Conference, Albuquerque, NM. 9/30/97 to 10/2/97.

64.Hart, Mark. M, Warren Wood, and J. David Olivas. *Plutonioum Pit Manufacturing and Unit Process Separation Options for Rapid Reconstitution.* A Joint Position Paper of LLNL and LANL. September 6, 1996. .

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION



In the Matter of	)	
	)	
DUKE COGEMA STONE & WEBSTER	)	Docket No. 70-3098-ML
	)	ASLBP No. 01-790-01-ML
(Savannah River Mixed Oxide Fuel Fabrication Facility)	)	**August 13, 2001**

CERTIFICATE OF SERVICE

I hereby certify that copies of the following documents have been served by email and first class mail to the persons listed on Page 2, with exception of Ruth Thomas of EI who is being served same day hand-delivery:

1. Introduction to Contentions in WP format, (with conversions to WORD ongoing for GANE). Please note that this also contains a formal objection to the Protective Order that requires no response.
2. Contention Groups 1-10, with Group 7 submitted in html and wp format, (with conversions to WORD ongoing for GANE)
3. The attachment Plutonium, the Last Five Years, in pdf format
4. Certificate of Service

In addition, I am serving the Secretary's Office with additional submittals of parties Support for Request for Extension of Time and Objection to Protective Order.

Signed,

Donald J. Moniak
Dated at Aiken, South Carolina
this 14th day of August 2001, 2:30 a.m.

Secretary of the Commission*
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001
Attn: Rulemakings and Adjudications Staff
(E-mail: HEARINGDOCKET@nrc.gov)

Administrative Judge
Thomas S. Moore, Chairman
Atomic Safety and Licensing Board Panel
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001
(E-mail: tsm2@nrc.gov)

Administrative Judge Charles N. Kelber
Atomic Safety and Licensing Board Panel
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001
(E-mail: cnk@nrc.gov)

Administrative Judge Peter S. Lam
Atomic Safety and Licensing Board Panel
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001
(E-mail: psl@nrc.gov)

John T. Hull, Esq.
Office of the General Counsel
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001
(E-mail: jth@nrc.gov)

Dennis C. Dambly, Esq.
Office of the General Counsel
Mail Stop - O-15 D21
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
(E-mail: dcd@nrc.gov)

Chief Administrative Judge
G. Paul Bollwerk, III**
Atomic Safety and Licensing Board Panel
Mail Stop - T-3 F23
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001
(E-mail: gpb@nrc.gov)

Donald J. Silverman, Esq.*
Marjan Mashhadi, Esq.*
Alex S. Polonsky, Esq.*
Morgan, Lewis & Bockius, LLP
1800 M Street, NW
Washington, DC 20036-5869
(E-mail: dsilverman@morganlewis.com;
mmashhadi@morganlewis.com;
apolonsky@morganlewis.com)

Glenn Carroll
Georgians Against Nuclear Energy
P.O. Box 8574
Atlanta, Georgia 30306
(E-mail: atom.girl@mindspring.com)

Ruth Thomas, President*
Environmentalists, Inc.
1339 Sinkler Road
Columbia, SC 29206
(E-mail: lminerd@hotmail.com)

Edna Foster*
120 Balsam Lane
Highlands, NC 28741
(Fax: 828-526-5314)

Donald J. Moniak*
Blue Ridge Environmental Defense League
P.O. Box 3487
Aiken, SC 29802
(E-mail: donmoniak@earthlink.net)