DOE/EA-1148

ENVIRONMENTAL ASSESSMENT

ELECTROMETALLURGICAL TREATMENT RESEARCH AND DEMONSTRATION PROJECT IN THE FUEL CONDITIONING FACILITY AT ARGONNE NATIONAL LABORATORY - WEST

U. S. DEPARTMENT OF ENERGY

OFFICE OF NUCLEAR ENERGY, SCIENCE AND TECHNOLOGY

May 15, 1996

ACRONYMS

ALARA	As Low As Reasonably Achievable
ANL-W	Argonne National Laboratory-West
CAP88	Clean Air Act Assessment Package (computer program)
CFR	Code of Federal Regulations
DOE	Department of Energy
EA	Environmental Assessment
EBR-II	Experimental Breeder Reactor-II
EIS	Environmental Impact Statement
FCF	Fuel Conditioning Facility (formerly called Fuel Cycle Facility)
FSAR	Final Safety Analysis Report
GR	Geologic Repository
GTCC	Greater Than Class C (low-level waste)
HEPA	High-Efficiency Particulate Air (filter)
HFEF	Hot Fuel Examination Facility
HLW	High-Level Waste
IBC	Interbuilding Cask
ICPP	Idaho Chemical Processing Plant
INEL	Idaho National Engineering Laboratory
LLW	Low-Level Waste (radioactive)
MEI	Maximally Exposed Individual
MTHM	Metric Tons of Heavy Metal
MW	Mixed Waste
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
RCRA	Resource Conservation and Recovery Act
RSWF	Radioactive Scrap and Waste Facility
RWMC	Radioactive Waste Management Complex
SAR	Safety Analysis Report
SNF	Spent Nuclear Fuel
TAN	Test Area North
TRU	Transuranic

VAD	Vertical Assembler/Disassembler
WIPP	Waste Isolation Pilot Plant

FORMAT NOTES

Footnotes are marked with an asterisk and are shown at the bottom of the corresponding page.

References are numbered consecutively and are listed in Section 9.0.

GLOSSARY OF TERMS*

Actinide: Any element in a series of elements of increasing atomic numbers beginning with actinium (89) or thorium (90) and ending with lawrencium (103).

Adsorption: The assimilation of gas, vapor, or dissolved matter by the surface of a solid or liquid.

As Low As Reasonably Achievable (ALARA): An approach to radiation protection to control or manage exposures (both individual and collective to the work force and the general public) and releases of radioactive material to the environment as low as social, technical, economic, practical, and public policy considerations permit.

Background Radiation: The energy field produced by the decay of all naturally occurring and some artificially produced radioactive materials and by the nuclear reactions taking place in the sun and all other stars. Background radiation varies with location and time; it can never be reduced to zero.

Blanket Assembly: Depleted uranium fuel located in the outer core regions of the EBR-II reactor. The blanket fuel is not used for power production.

Burnup: The percentage of heavy metal atoms fissioned or the thermal energy produced per mass of fuel (usually measured in Megawatt days per tonne, MWd/t).

Cladding: The material which encases the nuclear fuel, reducing the risk of radioactive materials leaking from the fuel.

Committed Effective Dose Equivalent (CEDE): The sum of the products of absorbed radiation dose and appropriate factors to account for differences in biological effects caused by the quality of radiation and its distribution in the body of a reference human being. The unit of the effective dose equivalent is the roentgen equivalent man (rem).

Criticality: A self sustained nuclear chain reaction resulting from fissionable material of sufficient mass in a particular geometry.

Curie: The basic unit used to describe the radioactivity in any material.

---

* The definitions for the "Glossary of Terms" were taken in part from: (1) U.S. Department of Energy "Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement," DOE/EIS-0203-F, April 1995; (2) The American Heritage Dictionary; (3) The Health Physics and Radiological Health Handbook (by Shleien); (4) Basic Radiation Protection Technology (2nd Edition by Daniel A. Gollnick); and (5) Nuclear Waste Policy Act, as appropriate.

Design Basis Accident: Accidents that are postulated for the purpose of establishing requirements for safety of significant structures, systems, components, and equipment.

Depleted Uranium: Uranium with a smaller percentage of uranium-235 than the 0.7 percent found in natural uranium. It is a byproduct of the uranium enrichment process, during which uranium-235 is collected from one batch of uranium, thereby depleting it, and added to another batch to increase its concentration of uranium-235.

Driver Assembly: Enriched uranium metal fuel used for power production in the EBR-II reactor.

Electrometallurgical Treatment: A technique to collect, concentrate, and immobilize fission products and transuranic elements from metallic spent nuclear fuel by removing the uranium in the spent fuel with an electrochemical cell. The treatment alters the chemical and physical nature of spent nuclear fuel to reduce its toxicity, volume, and mobility to render it amendable to transport, storage, or disposal.

Enriched Uranium: Uranium that has greater amounts of the fissionable isotope uranium-235 than occurs naturally. Naturally occurring uranium is 0.7% uranium-235 and 99.3% uranium-238.

Environmental Monitoring: The process of sampling and analysis of environmental media (air, water, plants) in and around a facility being monitored for the purpose of a) confirming compliance with performance objectives, and b) early detection of any contamination entering the environment to facilitate timely remedial action.

Fertile Material: A fissionable material capable of undergoing nuclear transformation to become a fissile material. For example, uranium-238 is a fertile material for plutonium-239 production.

Fissile Material: Any material readily fissionable by thermal (slow) neutrons. The three primary fissile materials are uranium-233, uranium-235, and plutonium-239.

Fission: The splitting of the nucleus into at least two other nuclei and the release of a relatively large amount of energy. Two or three neutrons are usually released during this type of transformation.

Fission Gases: Those fission products that exist in a gaseous state. Primarily noble (inactive or inert) gases (krypton and xenon).

Fission Products: The nuclei (fission fragments) formed by the fission of fissionable material, plus the nuclides formed by the fission fragments' radioactive decay. Fission products include a wide range of common elements (such as iodine, cesium, and strontium).

Fissionable Material: Any material capable of undergoing nuclear fission.

Glass Frit: A sand-like material from which glass is made.

Greater Than Class C Waste (DOE Special Class Waste): Low-level waste containing radionuclide concentrations that exceed Nuclear Regulatory Commission limits for Class C low-level radioactive waste as defined in 10 CFR 61.55.

Groundwater: Generally, all water contained in the ground; water below the water table available to freely enter wells.

High-Efficiency Particulate-Air (HEPA) Filter: A disposable filter having a minimum removal efficiency of 99.97% for 0.3 micron particles, used to limit the potential release of radioactive particles to the atmosphere.

High-Enriched Uranium (HEU): Uranium with an isotopic content of U-235 of 20% or greater.

High-Level Radioactive Waste: High-level radioactive waste is highly radioactive material resulting from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations; and other highly radioactive material that the U.S. Nuclear Regulatory Commission, consistent with existing law, determines by rule requires permanent isolation.

Hot Cell/Hot Cell Facility: A heavily shielded enclosure for handling and processing (by remote means or automatically) or storing highly radioactive materials.

Isotope: One of two or more atoms with the same number of protons, but different numbers of neutrons, in their nuclei. Thus, carbon-12, carbon-13, and carbon-14 are isotopes of the element carbon; the numbers denote the approximate atomic weights. Isotopes have very nearly the same chemical properties, but often different physical properties (for example, carbon-12 and -13 are stable; carbon-14 is radioactive).

Low-Enriched Uranium: Uranium in which the percentage of uranium-235 nuclei has been increased from the natural level of 0.7 percent up to 20 percent, usually 3 to 5 percent. With the increased level of fissile material, low-enriched uranium can sustain a chain reaction when immersed in light water and is used as fuel in light-water reactors.

Low-Level Waste: Waste that contains radioactivity and is not classified as high-level waste, transuranic waste, spent nuclear fuel, or byproduct material.

Maximally Exposed Individual (MEI): A hypothetical individual defined to allow dose or dosage comparison with numerical criteria for the public. For this assessment, a hypothetical individual located at the INEL site boundary nearest the affected facility was selected for this person.

Metric Tons of Heavy Metal (MTHM): Quantities of nuclear fuel are traditionally expressed in terms of metric tons of heavy metal (typically uranium), without the inclusion of other materials, such as cladding, alloy materials, and structural materials. (A metric ton is 1000 kilograms, which is equal to about 2200 pounds).

Mixed Waste: Radioactive waste, as defined by the Atomic Energy Act, that contains material listed as hazardous waste or that exhibits any of the hazardous waste characteristics as defined by the Resource Conservation and Recovery Act (RCRA).

Nanocuries: A unit equal to 0.000000001 (10^{-9}) curies.

Normal Operation: All normal conditions and those abnormal conditions that are estimated to occur with a frequency greater than 0.1 events per year.

Nuclear Criticality Accident: An uncontrolled nuclear chain reaction.

Order of Magnitude: An estimate of size or magnitude expressed as a power of ten.

Processing (of Spent Nuclear Fuel): Applying a chemical or physical process designed to alter the characteristics of the spent nuclear fuel matrix.

PUREX (Plutonium Uranium Extraction): A chemical separation process that has been used for recovering uranium and plutonium from irradiated fuel in a form usable as reactor fuel or for weapons. The process uses aqueous solvent extraction to perform the separation. This technology can also be used to treat spent nuclear fuel for disposal.

Pyrophoric: Susceptible to spontaneous ignition and continuous combustion.

Radioactive Waste: Material for which there is no longer a useful purpose and contains radioactive materials, thus requiring special procedures for management, storage and disposal.

Radioactivity: The property or characteristic of material to spontaneously "disintegrate" with the emission of energy in the form of radiation. The unit of radioactivity is the curie.

Radioisotope: An unstable isotope of an element that decays or disintegrates spontaneously, emitting radiation. Approximately 5000 natural and artificial radioisotopes have been identified.

Reprocessing (of spent nuclear fuel): Processing of reactor-irradiated nuclear material (primarily spent nuclear fuel) to recover fissile and fertile material, in order to recycle such materials primarily for defense programs. Historically, reprocessing has involved aqueous chemical separations of elements (typically uranium or plutonium) from undesired elements in the fuel.

Roentgen (R): A unit of exposure of ionizing radiation.

Roentgen Equivalent Man (rem): The dosage of ionizing radiation that will cause the same biological effect as one roentgen of x-ray or gamma-ray exposure.

- **person-rem** a unit of collective radiological dose or the collective total dose to a population and is calculated by summing the individual doses to each member of the given population. For instance, if a population of 100 people receive 0.1 rem, then the collective dose would be 10 person-rem (100 persons x 0.1 rem).

Spent Nuclear Fuel: Nuclear reactor fuel composed of fissile material that has reached the end of its useful life as a result of reactor operation.

Transuranic (TRU) Waste: Waste containing alpha-emitting radionuclides with an atomic number greater than 92 and half-lives greater than 20 years, at concentrations greater than 100 nCi/g, without regard to source or form. Some examples of transuranic elements are plutonium, americium and curium.

Zeolite: Any group of approximately 30 hydrous aluminum silicate minerals or their corresponding synthetic compounds, used chiefly as molecular filters and ion-exchange agents such as is used in a water softener. It is used in electrometallurgical treatment to collect and contain fission products from process salt.

This page intentionally left blank.

TABLE OF CONTENTS

1.0 PURPOSE AND NEED FOR AGENCY ACTION 1

2.0 PROPOSED ACTION AND ALTERNATIVES 3
2.1 Alternatives Considered But Not Analyzed In This Environmental Assessment 4
2.2 Background 9
2.3 Description of Proposed Action 31
2.4 Equipment Performance Verification Alternative 58
2.5 Demonstration at an Alternative Facility and Location 59
2.6 The No-Action Alternative 62

3.0 THE AFFECTED ENVIRONMENT 65
3.1 Site Description 65
3.2 Air Quality and Meteorology 68
3.3 Surface/Ground Water Quality 69
3.4 Soils/Geology 70
3.5 Off-Site Monitoring 71

4.0. ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION 75
4.1 Environmental Impacts of Facility Operations 75
4.1.1 Air Quality Impacts 76
4.1.1.1 Non-Radioactive Emissions 76
4.1.1.2 Radioactive Emissions 76
4.1.2 Radiation Exposure to Workers 79
4.1.3 Transportation Impacts 82
4.1.4 Socioeconomic Impacts 82
4.2 Potential Environmental Impacts of Facility Accidents 83
4.2.1 Accidents 83
4.2.1.1 Consequences of Design-Basis Facility Accidents 89
4.2.1.2 Consequences of Beyond-Design-Basis Accidents 91
4.2.1.3 Transportation Accidents 94
4.2.2 Natural Hazards 95
4.3 Cumulative Impacts 97
4.3.1 Land Use 97
4.3.2 Socioeconomics 97
4.3.3 Cultural Resources 97
4.3.4 Air Quality 98
4.3.5 Water Quality 98
4.3.6 Ecology 98
4.3.7 Transportation 99
4.3.8 Health and Safety 99
4.3.9 Spent Nuclear Fuel, Uranium By-Product and Waste Management 99
4.4 Regulatory Framework 100
4.4.1 Air Permits 100

4.4.2 RCRA Permit Applications 100
4.4.3 Pollution Prevention Act of 1990 102
4.5 Spent Nuclear Fuel, Uranium By-Products and Waste Management Impacts 102
4.6 Environmental Justice 113
4.7 Consistency with U.S. Nonproliferation Policy 117

5.0 ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVES 125

6.0 RELATIONSHIP TO OTHER NATIONAL ENVIRONMENTAL POLICY ACT DOCUMENTS 137

7.0 RELATIONSHIP OF THE PROPOSED ACTION TO ANY OTHER APPLICABLE FEDERAL, STATE, REGIONAL OR LOCAL LAND USE PLANS AND POLICIES 141

8.0 LISTING OF AGENCIES AND PERSONS CONSULTED 143

9.0 REFERENCES 145

APPENDIX -- Comment Response Document

1.0 PURPOSE AND NEED FOR AGENCY ACTION

The Department of Energy (DOE) is responsible for managing spent nuclear fuel (SNF) in its inventory, including SNF from the Experimental Breeder Reactor-II (EBR-II). DOE manages 25.5 metric tons (heavy metal) of EBR-II fuel at Argonne National Laboratory-West (ANL-W) and the Idaho Chemical Processing Plant (ICPP), both located at the Idaho National Engineering Laboratory (INEL).* DOE has a legally binding commitment to remove SNF from the State of Idaho by the year 2035, including that from EBR-II.[1] Without some form of treatment, EBR-II fuel is unlikely to be suitable for disposal in a geologic repository because the fuel is saturated with sodium, a reactive material.

DOE has identified electrometallurgical treatment as a promising technology to treat EBR-II SNF, but an appropriate demonstration is needed to provide DOE with sufficient information to evaluate its technical feasibility. At DOE's request, the National Research Council provided an independent assessment[2] of the potential application of electrometallurgical technology to treat DOE SNF. In its report, the National Research Council recommended that DOE proceed to demonstrate the feasibility of electrometallurgical technology using EBR-II SNF. A successful demonstration of the electrometallurgical technology on a sufficient sample of the EBR-II SNF inventory, combined with research and testing of the resulting waste forms, would provide the information DOE needs to determine whether to propose applying this technology to the remainder of the EBR-II SNF or other SNF.

* Seventeen metric tons of disassembled EBR-II blanket spent nuclear fuel are in storage at the Savannah River Site.

This page intentionally left blank.

2.0 PROPOSED ACTION AND ALTERNATIVES

The Proposed Action is to demonstrate the technical feasibility of electrometallurgical technology for treating EBR-II SNF. This research and demonstration project would involve the electrometallurgical treatment of up to 100 EBR-II spent driver assemblies and 25 spent blanket assemblies in the Fuel Conditioning Facility (FCF) at ANL-W. This Environmental Assessment (EA) considers and analyzes the potential environmental impacts associated with the Proposed Action and the following alternatives:

1. Conducting the research and demonstration project in a facility at an alternative location;

2. Conducting an equipment performance verification project by treating 50 driver assemblies and 10 blanket assemblies in FCF; and,

3. Taking no action, placing all the EBR-II SNF in interim storage, and not demonstrating the electrometallurgical treatment technology.

All alternatives assume continued removal of the SNF from EBR-II and disassembly of the assemblies as necessary for temporary storage. All alternatives also assume that DOE will continue to perform research on potential processes for treatment of SNF for long term storage or disposal.

Table 2-1 compares the amount of EBR-II SNF involved in the Proposed Action, the Alternative Location Alternative, and the Equipment Performance Verification Alternative with the amount of EBR-II SNF presently in storage in Idaho at ANL-W, 23.5 metric tons (26 tons), and the ICPP, 2.0 metric tons (2.2 tons). The demonstration project, conducted either at ANL-W or another location, would treat 13% of the EBR-II driver assemblies and 5% of the EBR-II blanket assemblies stored in Idaho. The Equipment Performance Verification Alternative would treat 6.5% of the EBR-II driver assemblies and 2% of the blanket assemblies stored in Idaho. In

addition to the EBR-II fuel, there are another 39 metric tons (43 tons) of similar SNF stored in Idaho that was shipped from the Fermi-1 liquid metal reactor in Michigan.

Table 2-1. Metal Spent Nuclear Fuel Inventory Stored in Idaho (metric tons of uranium)

Fuel Type	EBR-II Fuel in Proposed Demonstration*	EBR-II Fuel in Equipment Performance Demonstration	Total EBR-II Spent Fuel**at INEL	Total Liquid Metal Reactor*** Spent Fuel at INEL
Driver	0.4	0.2	3.1	7.0
Blanket	1.2	0.5	22.4	56.5

* The amount of EBR-II fuel used in the Alternative Location and Facility Alternative would equal that used in the proposed demonstration.

** A typical spent EBR-II driver assembly contains 4.1 kilograms uranium and an EBR-II blanket assembly contains 47 kilograms uranium. The totals indicated here do not include other types of EBR-II experimental fuel or fuel from other reactors at the ANL-W site.

*** EBR-II spent fuel plus spent fuel from the Fermi-1 power plant in Michigan. All the Fermi-1 fuel is metallic. The Fermi-1 driver fuel is highly enriched, but only the depleted uranium blanket fuel is sodium-bonded.

The proposed demonstration would supply necessary data for DOE to decide whether to propose continued development of electrometallurgical treatment technology for potential application to the remainder of the EBR-II SNF or Fermi-1 SNF. The data obtained from this demonstration would also be useful in assessing the potential application of electrometallurgical technology to other SNF in the DOE inventory.

2.1 Alternatives Considered But Not Analyzed In This Environmental Assessment

Demonstration of an alternative technology has not been analyzed because there are no other SNF treatment technologies being developed that have reached a stage of development to warrant testing by DOE with irradiated fuel. Alternative technologies are discussed in the following:

PUREX Reprocessing Technology: Before EBR-II switched, in 1988, to the use of experimental driver fuel made of uranium-zirconium metal alloy, EBR-II SNF was reprocessed using the PUREX technology at the ICPP, which is located at the INEL some 32 kilometers (20 miles) from EBR-II. Modifying this reprocessing plant to dissolve the modern EBR-II SNF would require changes in the dissolution process. These changes would be necessary because the zirconium in the modern EBR-II fuel alloy inside a stainless steel cladding would require chemical additives to control the dissolution reaction safely. The PUREX processing of fuel not already in process at ICPP was stopped in 1992 and there is no plan to restart the facility. PUREX processing of EBR-II spent nuclear fuel at ICPP is not a reasonable alternative to the proposed limited demonstration of electrometallurgical treatment technology.

Mechanical Processing: A mechanical process has been used on some EBR-II blanket fuel assemblies to strip away the layer of metallic sodium between the cladding and the uranium.[3] The process used a powerful laser to cut away the cladding. An alcohol wash was used to remove the exposed sodium. Considerable contamination was spread throughout the hot cell, apparently by metal vaporization during the cutting operations. The uranium rods recovered from this process are in storage at the Receiving Basin for Offsite Fuel at the Savannah River site, where they have been awaiting reprocessing or other means of treatment or disposal. One of the containers in which the rods are stored underwater is leaking, and those rods are apparently reacting with the water. The Record of Decision for the *Interim Management of Nuclear Materials at the Savannah River Site Environmental Impact Statement* (DOE/EIS-0220D) has identified processing in a Savannah River reprocessing facility as DOE's chosen method for stabilizing the EBR-II blanket fuel in the leaking canister (60 FR 65302).

There are several problems with the cladding removal and storage of spent EBR-II blanket fuel rods. While the cladding can be separated from the fuel, the necessary equipment is not available and bond sodium will cling to both the uranium rod and the stainless-steel cladding pieces. At room temperature, the bond sodium has the consistency of taffy and is not easily removed from surfaces it has been in contact with when in molten form. The sodium could be removed from the cladding and fuel pins by washing with a solvent or by vacuum evaporation and collection.

However, neither of these processes is now available for sodium which is highly radioactive.* To have either mechanical stripping or solvent wash functions in a hot cell environment, equipment would have to be designed, analyzed, fabricated, assembled, tested, qualified for remote operation, disassembled, transferred into the hot cell, reassembled, and put through final checkout and qualification. To go through this process would take from one to five years, depending on the complexity of the equipment and the safety issues involved. Both processes would require further development for use in a radioactive hot cell operation. Moreover, each of these processes would result in waste streams that would have to be further processed or treated for storage and disposal.

Acceptable waste forms have been developed for nonradioactive sodium and for sodium to be disposed as low-level waste. However, for sodium saturated with cesium-137, a long-lived fission product with a high-energy gamma ray, a high-level waste form would be required to be developed. Such a form could possibly be developed as a variation of the ceramic waste form, but an additional process step would be required to convert the cesium to a cesium chloride. These processes have not been developed for remote operation in a shielded hot cell. The equipment would have to be designed to operate for long periods of time in an intensely radioactive environment in a dry argon atmosphere. Extensive safety analysis would have to be performed in order to meet seismic and criticality criteria for FCF operations. The alcohol wash would be a particular problem because of the requirement for exclusion from the process cell, to the extent possible, of neutron moderating materials. Specific design, or ancillary equipment, to prevent the spread of radioactive contamination would also be required.

After removal from the cladding, the uranium blanket pins, which would still contain the majority of the radioactive fission products, would have to be protected from oxide and hydride formation through storage in a shielded, remote facility. These pins would require additional treatment or stabilization prior to final disposition.

---

* The bond sodium of 330 EBR-II blanket assemblies being unloaded from EBR-II contains about 9000 curies of radioactive cesium-137.

For the spent driver fuel that has been in the EBR-II core for longer than a few months (i.e., all EBR-II spent driver fuel assemblies), mechanical processing to remove the sodium is not possible because 20 to 40% of the sodium has been absorbed within the fuel. An alternative based on a mechanical process was therefore not analyzed for EBR-II driver assemblies because it would not lead to an acceptable configuration for disposal of the fuel in a geologic repository.

Because it is not possible to apply mechanical processing to the spent EBR-II driver fuel, and because of the substantial technical problems associated with its application to spent EBR-II blanket fuel, mechanical processing is not a reasonable alternative technology for treatment of EBR-II SNF.

Other Technologies: Four advanced treatment technologies other than the electrometallurgical technique are being considered in DOE's National Spent Fuel Program: chloride volatility, glass material oxidation and dissolution, the plasma arc process, and the dissolution and vitrification process. Chloride volatility is a very high temperature process that would convert SNF to chloride compounds in a gaseous state, from which the constituents could be separated into appropriate streams for further treatment. Glass material oxidation and dissolution is a treatment concept that would dissolve SNF using a system of lead and lead oxide with the intent of incorporating most SNF constituents in a glass waste form. The plasma arc process would use an extremely high temperature electric arc to melt SNF, allowing the constituents to go into glass and metal phases.

The dissolution and vitrification process is a variation of existing processes at the Savannah River Site. Stainless steel clad fuel would be dissolved in an electrolytic dissolver containing nitric acid saturated with boric acid similar to those in the Savannah River Site H-Company. Since the electrolytic dissolver is currently not operating, either major modification would be required or a new fuel chopping and bench facility would be required. For EBR-II driver fuel, the zirconium constituent of the fuel alloy would require chemical additive to control the dissolution reaction safely. These changes could increase the resultant waste volumes. Another major drawback of demonstrating this option with EBR-II SNF is that the fuel would have to be

transported from Idaho to South Carolina, with the attendant environmental impacts of packaging and transportation.

In contrast with electrometallurgical technology these technologies are at a relatively immature state of development and would require preparation of a facility and equipment before a demonstration with actual SNF could be carried out. To date, there has been no specific development of these processes for treatment of the EBR-II SNF, which requires removal of reactive sodium metal from inside the fuel matrix. Because of the early and theoretical nature of the information available on these technologies, any attempt to describe and analyze the environmental impacts associated with demonstrating these technologies using EBR-II SNF would be based on speculation and conjecture.

Treatment at a location outside of the INEL is not a reasonable alternative for two reasons. First, pursuant to the Record of Decision (60 FR 28680) for the *Department of Energy Programmatic Spent Nuclear Fuel and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programmatic Impact Statement,* all the sodium bonded fuel in the DOE inventory, with the exception of six assemblies located at the Hanford Reservation in Washington, is located at the INEL. The six assemblies currently located at Hanford, Washington, are scheduled to be transported to the INEL. Second, for a limited demonstration, the removal, decontamination and relocation of the existing equipment to another location and construction of a new hot cell facility is an unreasonable alternative.

Consideration was given to treating the fuel with hot, water-saturated carbon dioxide or rinsing with alcohol/water mixtures. However, these processes would have significant technical problems and would require extensive development before implementation. Based on extensive experience with reacting sodium to form sodium carbonate, these reactions have to be controlled very closely. Exposure of the hot uranium fuel to oxygen and water vapor is similar to metal fire accident conditions described in Section 4.2. Also, the use of water for highly enriched fuel treatment would require stringent criticality hazards control measures because aqueous processes have lower fissile material limits than metallic processes. The products from the proposed

process may include pyrophoric uranium hydride in addition to the compounds cited in the comment. Additional process steps would, therefore, be required to stabilize the pyrophoric nature of the product.

Low-temperature vacuum distillation was also considered. However, the distillation technique would be an incomplete process. The cesium and the sodium would need to be stabilized into a waste form. In any event, such a technique would only be applicable to blanket elements since the metallic sodium has not been infused into the fuel as it has in the drivers. The fuel-encapsulated sodium would not be removed by a vacuum distillation process operated at sodium vaporization temperatures, so the remaining fuel would remain reactive due to the porous metal nature. If the fuel were melted at 1300-1400°C to release traped sodium, many different radioactive elements would be volatilized and would have to be captured. These volatile elements would need to be immobilized in one or more waste forms.

2.2 Background

In order to assist the reader in understanding the Proposed Action and alternatives, the following discussion provides background on: ANL-W, the FCF in which the Proposed Action would be conducted, EBR-II SNF, DOE's national SNF program, electrometallurgical technology, and recommendations by the National Research Council.

Argonne National Laboratory-West (ANL-W): The ANL-W site is a center of nuclear technology development and testing. Figure 2-1 shows the ANL-W facilities used to carry out research, development, and demonstration of nuclear technologies. Five nuclear test reactors

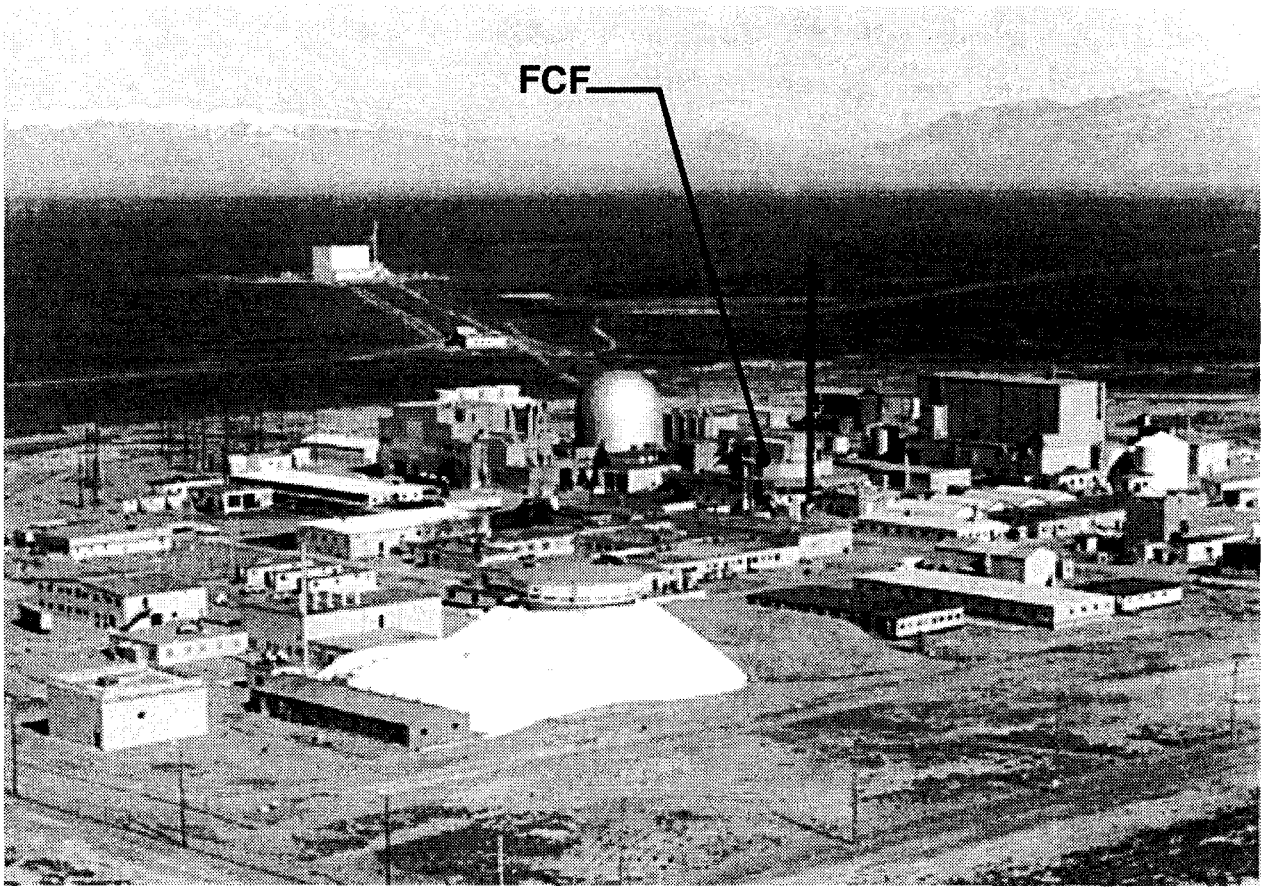


Figure 2-1. Photograph of the Argonne National Laboratory-West Site

have operated on the site, although the only one currently active is a small reactor used for radiography examination of experiments, waste containers, and SNF. Work on highly radioactive materials is conducted in FCF and Hot Fuel Examination Facility (HFEF), both heavily shielded hot cell facilities. Inventories of nuclear materials are maintained on-site for conducting research, as well as for storage, pending decisions on further disposition.

The Radioactive Scrap and Waste Facility (RSWF), occupying about 1.6 hectares (4 acres), provides safe interim storage for SNF and waste generated from experiments. Located underground and 0.8 kilometers (0.5 miles) northeast of ANL-W, RSWF looks somewhat like a large parking lot on the surface, as shown in Figure 2-2. The facility has a permit issued by the State of Idaho for interim storage of mixed waste regulated under the RCRA. A major upgrade of RSWF (more than 50% complete) is in progress to provide active electrical protection against corrosion for the more than 1000 underground steel liners available for waste storage of materials handled at ANL-W. This project is being conducted with the concurrence and oversight of the State of Idaho.

Fuel Conditioning Facility (FCF): The FCF has been operating for more than 30 years and has had four name changes to reflect changes in the type of work performed. Between 1964 and 1969, the facility was call the Fuel Cycle Facility and a demonstration of a technology for recycling fuel into the adjacent EBR-II was conducted in the FCF. In all, about 700 SNF assemblies were recycled using a pyrometallurgical (melt refining) process. This is more than five times the amount that would be treated by the electrometallurgical process in the proposed demonstration. Following this demonstration the facility was renamed the Hot Fuel Examination Facility-South, to reflect its new mission to examine irradiated components from EBR-II. During the past seven years, FCF has undergone major reconstruction and refurbishment to make it one of DOE's most modern facilities, meeting current safety and environmental requirements. A formal DOE Operational Readiness Review [4] was conducted and approval was recently granted to store SNF removed from the EBR-II. During this period the facility name was changed back to the Fuel Cycle Facility in anticipation of the IFR program which included

Figure 2-2. Photograph of the Radioactive Scrap and Waste Facility at ANL-W

refabrication of fuel for reirradiation in EBR-II. Following termination of the IFR Program in 1994 and removal of the equipment for fuel refabrication, the name was changed to the Fuel Conditioning Facility.

A schematic diagram of the floor plan of FCF (Figure 2-3) shows the two operating cells, one with an air atmosphere for handling intact fuel, and the other with an inert argon atmosphere for conducting operations, including electrorefining, with exposed nuclear materials. FCF was issued a Permit to Construct, Pursuant to Idaho Code Section 39-118B, that allows treatment of up to 90 EBR-II spent fuel assemblies per year.[5]

EBR-II Spent Nuclear Fuel: EBR-II was a research and test reactor that operated for more than 30 years until operations ceased in September 1994. EBR-II had two generic types of nuclear fuel assemblies: drivers and blankets. The driver fuel contains highly enriched uranium. In other words, the fuel contains a high fraction of readily fissionable (fissile) material (uranium-235) which produced the reactor's power by nuclear fission. When the fuel was 'spent', the enrichment (ratio of uranium-235 to total uranium) was still about 65%.

The blanket assemblies were made from 'depleted' uranium, a type of uranium in which most of the fissile uranium-235 has been removed, leaving 99.7% uranium-238. This type of uranium will fission, but not readily, and cannot be used alone to power a nuclear reactor. Early in EBR-II's history, the blanket assemblies surrounded or "blanketed" the reactor core to demonstrate the breeding of plutonium-239, another fissile material. However, in 1967 the breeding experiment was completed and the job of reconfiguring the reactor for its role as an irradiation test facility began. By 1972 the final blanket assemblies had been moved well away from the core and replaced by a thick ring of stainless-steel reflector assemblies. In this configuration, the blanket assemblies provided shielding to protect structural materials from radiation emanating from the core. The final reactor operating configuration is shown in Figure 2-4.

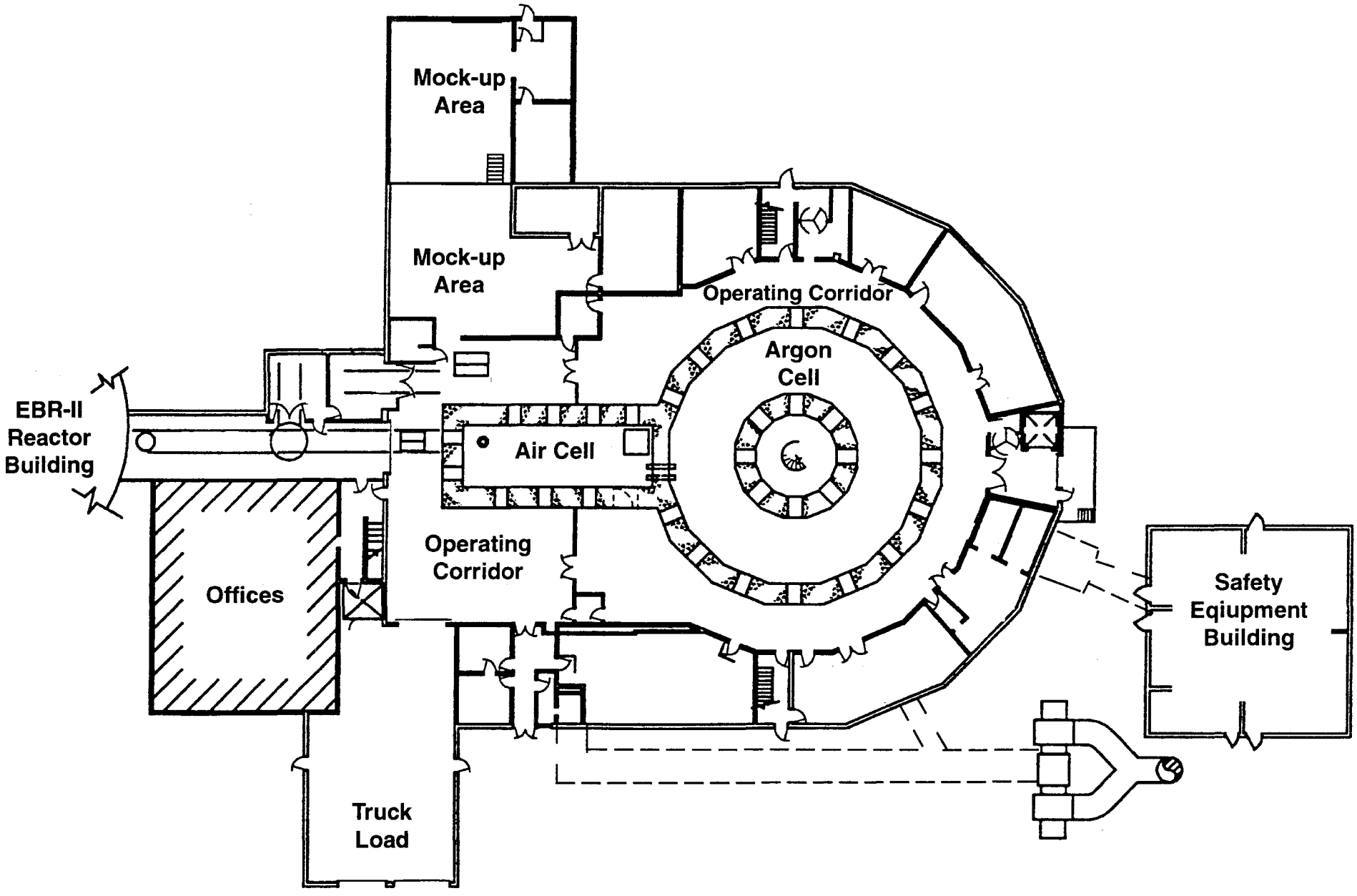


Figure 2-3. Schematic plan of main floor of the Fuel Conditioning Facility

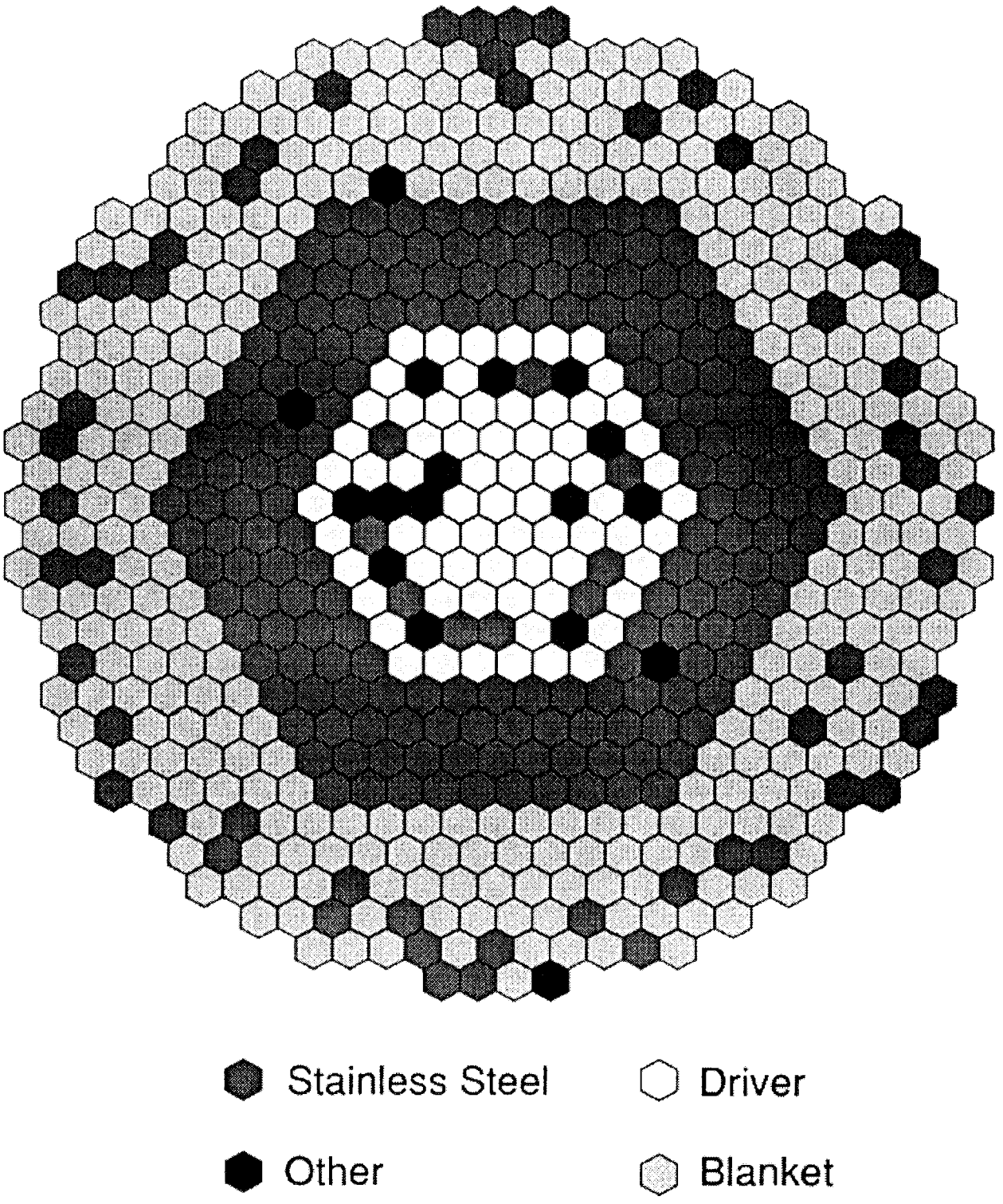


Figure 2-4. Map of EBR-II Reactor loading showing location of driver, blanket, stainless steel, and other (experiments, control rods) assemblies

Each driver fuel element has a metal rod (called a fuel pin) about 33 centimeters (13 inches) long and less than 0.5 centimeters (0.2 inches) in diameter. The typical EBR-II driver fuel pin is a metal alloy of 90% uranium and 10% zirconium. This fuel pin and a small amount of metallic sodium were loaded into a 29-inch long stainless-steel tube (cladding) and welded shut, as shown schematically in Figure 2-5. This unit of fuel is called an "element," although in practice "fuel pin" is often used to refer to the whole fuel element. Sixty-one fuel elements were put together in a stainless-steel hexagonal "can" to make a fuel assembly approximately 2.3 meters (92 inches) long and 5.8 centimeters (2.3 inches) across. A fresh (unirradiated) driver fuel assembly contained 4.5 kilograms (9.9 pounds) of uranium, of which typically 4.1 kilograms (9.0 pounds) remained in spent fuel assemblies.

Blanket assemblies are the same size as driver assemblies except that the individual blanket pins are larger. The blanket pins, made entirely from depleted uranium, are 1.1 centimeters (0.4 inches) in diameter, with from three to five pins placed end-to-end to make a sodium-bonded blanket element 140 centimeters (55 inches) long. Since the blanket pins are a larger diameter and longer length, 19 blanket elements comprise a blanket assembly containing approximately 47 kilograms (103 pounds) of uranium. On average, about 99% of the uranium remains in the spent blanket assemblies with the remaining 1% having been converted to fission products and transuranic elements. The principal isotopes contributing to the activity of both blanket and driver fuel and the total activity of material to be processed through FCF under the Proposed Action are given in Table 2-2.

The sodium inside driver fuel and blanket elements improves the heat transfer from the fuel to the reactor coolant through stainless steel cladding. The driver fuel was designed such that once it had been irradiated in the reactor for some period of time, the metallic pin swelled until it reached the cladding wall. Pores formed throughout the fuel pin as it swelled under pressure from the gaseous fission products. As these pores expanded and connected to one another, the fission gases escaped to a plenum in the fuel element just above the metallic fuel pin. As the gas escaped, the liquid sodium flowed into these tiny pores, much like a sponge. As more pores

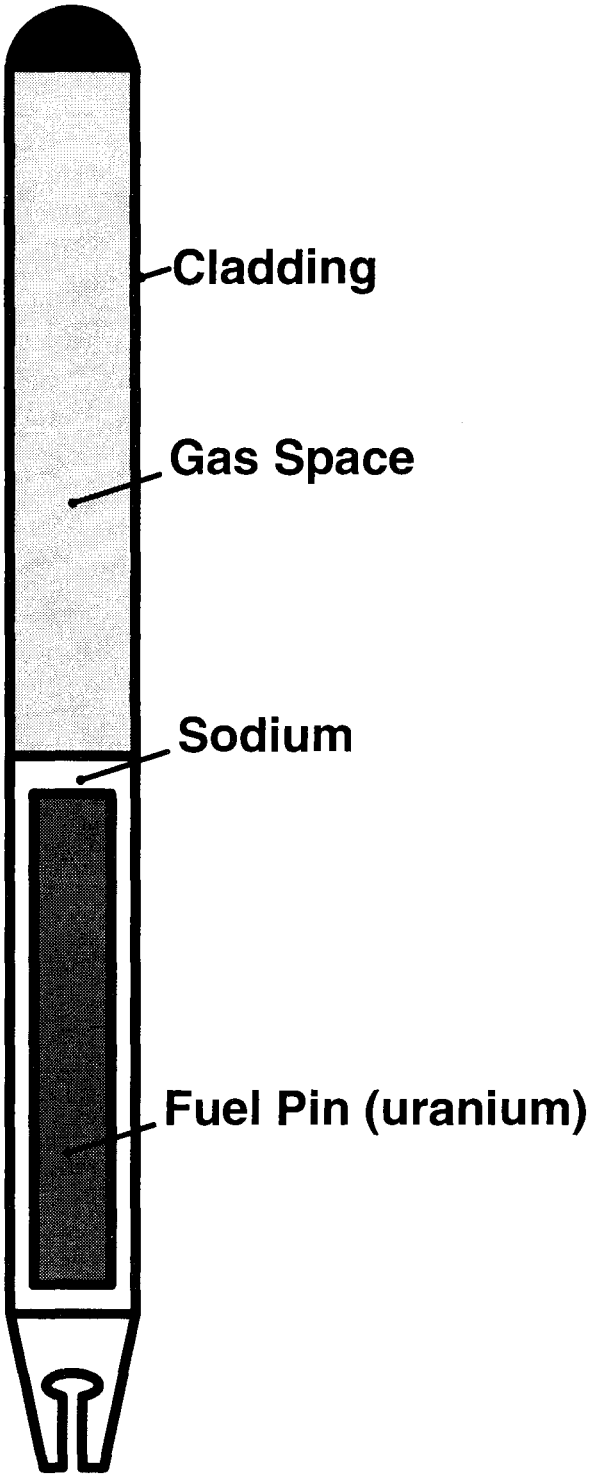


Figure 2-5 Schematic drawing of EBR-II fuel element

Table 2-2. Principal Isotopes* Contributing to the Driver and Blanket Activity

Nuclide		Activity in Curies**	
		1 Driver Assembly	1 Blanket Assembly
1.	Ce-144	7,850	198
2.	Pr-144	7,850	198
3.	Pm-147	3,090	253
4.	Co-60	1,662	5
5.	Cs-137	1,370	712
6.	Ba-137M	1,290	673
7.	Sr-90	1,220	357
8.	Y-90	1,220	358
9.	Rh-106	1,110	180
10.	Ru-106	1,110	180
11.	Fe-55	938	38
12.	Nb-95	595	12
13.	Mn-54	381	17
14.	Zr-95	.269	6
15.	Kr-85	160	19
16.	Y-91	147	2
17.	Cs-134	133	14
18.	Sb-125	103	9
19.	Pr-144M	94	2
20.	Eu-155	62	18
21.	Sm-151	29	61
22.	Eu-154	6	5
23.	Pu-239	1	55
24.	Pu-238	1	12
Sum of Listed Nuclides:		30,691	3,383

*Listed isotopes constitute greater than 90% of total activity, 15 months after reactor shutdown.

**The curie content of the EBR-II SNF would be the same for each alternative.

formed and grew, others were closed off from the fuel pin surface, including those containing sodium. Between 20 and 40 percent of the available sodium was treated in the fuel and was then inseparable from the uranium except by dissolving or melting the fuel. Further, during reactor operations, cesium-137 (an abundant radioactive fission product) dissolved in the sodium. Cesium, a reactive metal with chemical properties similar to sodium, remains with the sodium until the spent fuel is treated.

Some of the EBR-II blanket assemblies have been in the reactor since it began operation more than 30 years ago. With the shutdown of EBR-II, these assemblies are being unloaded from the reactor. In preparation for interim storage in RSWF, they are cleaned to remove the few grams of sodium coolant that adheres to the external surface as they are pulled out of the reactor. Water from the rinse cycle is collected and subsequently evaporated, leaving a solid low-level waste residue.

Most of the fuel from the last seven years of operation is presently stored in three different facilities at ANL-W: EBR-II (fuel not yet unloaded), HFEF, and RSWF. A photograph of short-term storage is shown in Figure 2-6. Previously, the spent fuel was shipped to the ICPP for reprocessing. However, ICPP ceased accepting the fuel in 1991 when a new uranium-zirconium alloy fuel, which could not be dissolved with ICPP's existing PUREX reprocessing system, went into full use at EBR-II. Approximately 6 metric tons (6.6 tons) of EBR-II fuel was processed at ICPP. When DOE stopped processing at ICPP in 1992, elements from some 500 EBR-II spent driver fuel assemblies of earlier design were left in storage pools (CPP-603 and CPP-666) located at the ICPP. A photograph of the storage containers is shown in Figure 2-7; it takes eight of these "bottles" to hold the elements from one EBR-II driver fuel assembly. Some of the storage containers in the CPP-603 storage pool have been observed to be leaking, and the EBR-II fuel inside is believed to be reacting with the water. This problem is one of the reasons DOE is planning to remove all the spent fuel from the CPP-603 storage pool and place it in dry storage within the next five years.

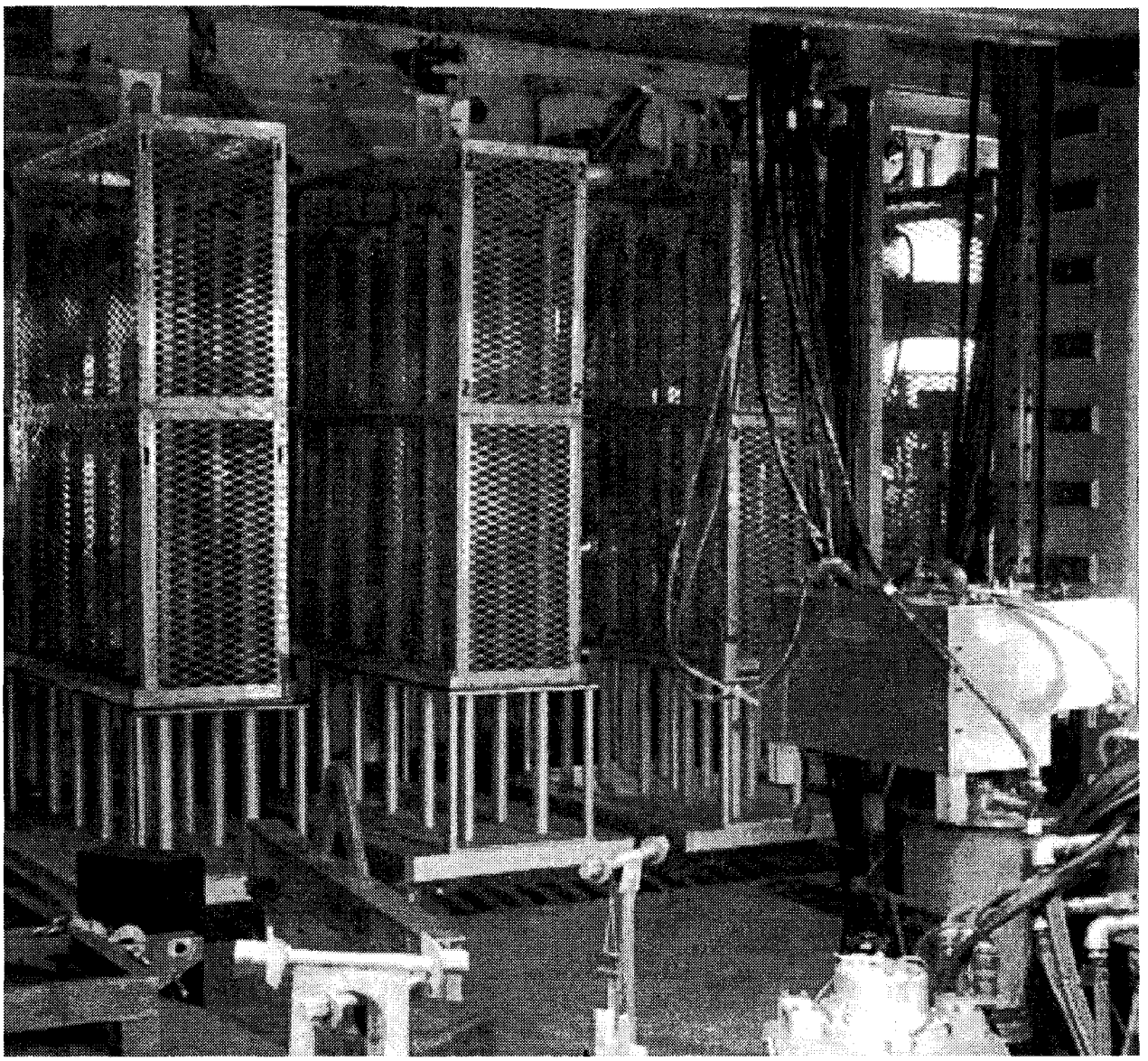


Figure 2-6. Racks of EBR-II fuel assemblies stored in the Hot Fuel Examination Facility

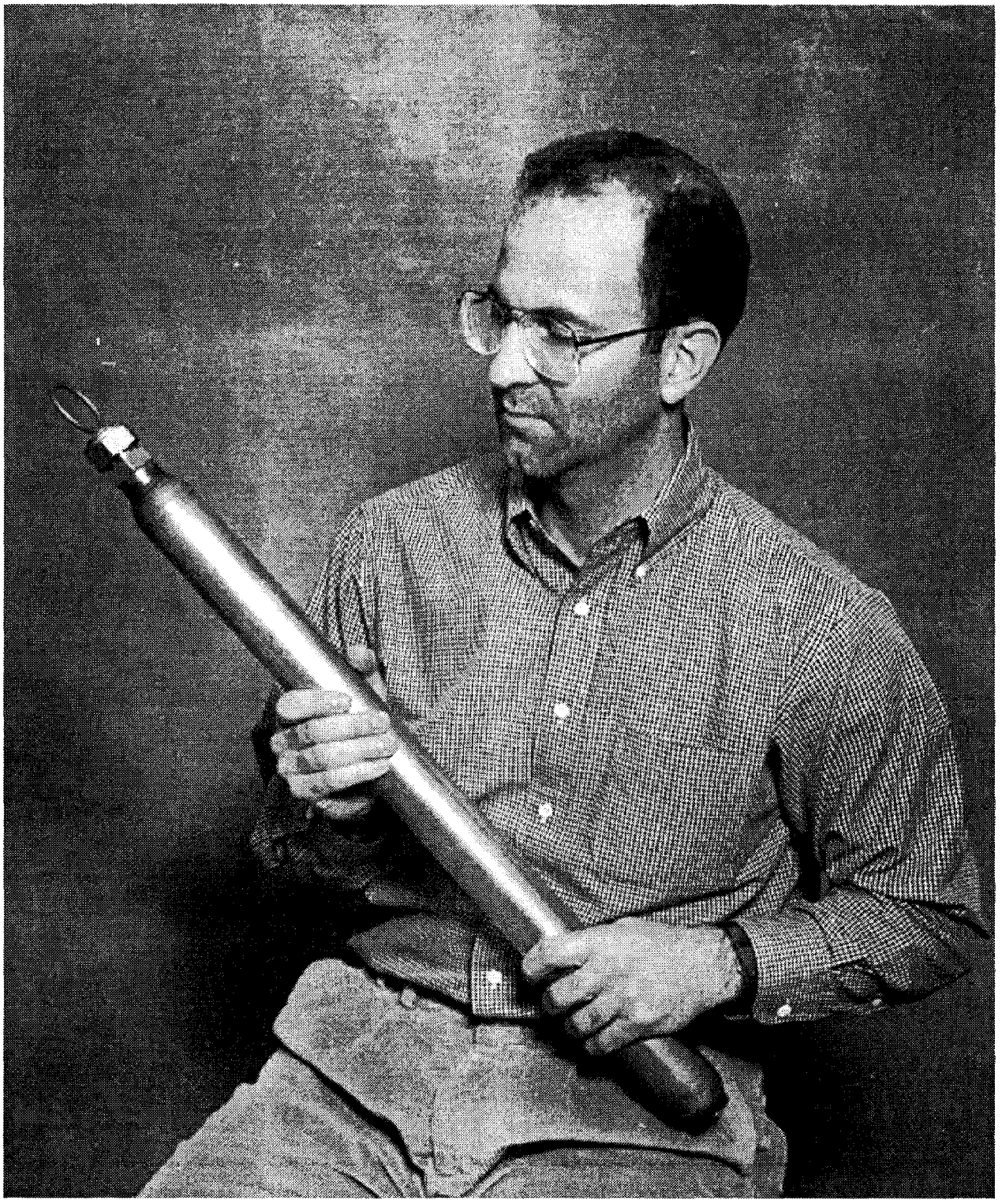


Figure 2-7. Container for EBR-II fuel elements stored in the CPP-603 and CPP-666 wet storage basins

DOE National Spent Fuel Program: DOE's National Spent Fuel Program is a complex-wide program to coordinate DOE's spent fuel management activities. One ongoing element of this program is the development of a technology integration plan. As a part of this activity, the SNF Program Technology Prioritization Working Group, composed of DOE and national laboratory experts from across the country, screens new technologies and ranks them based on mission, compliance with legal requirements, probability of success, timeliness, technical significance based on merit and ties to other technologies, and cost avoidance. Electrometallurgical technology has been considered as part of this activity . The other technologies reviewed by the working group are glass material oxidation and dissolution, plasma arc process, and chloride volatility. The purpose of developing advanced process technologies is to create and maintain a path forward for disposition of SNF that may be unsuitable for direct emplacement in a geologic repository. The proposed demonstration project will provide important data about the feasibility and practicality of electrometallurgical treatment.

Electrometallurgical Technology: Electrometallurgical technology embraces several established industrial processes that have been modified for application to SNF. These processes include metal refining in an electrochemical cell, metal ingot casting, and ion-exchange of chemicals in zeolite. Electrometallurgical treatment technology has been under development at Argonne National Laboratory for more than a decade. The Argonne research and development project was originally focused on the development of a closed fuel cycle for the contemplated Integral Fast Reactor (IFR) advanced reactor technology program. The Integral Fast Reactor program, however, was terminated in 1994 after extensive debate in both houses of Congress. The issues raised during debate were varied and complex. Congress has been clear, however, that it intends the Department of Energy to continue development of electrometallurgical technology. In the Conference Report for the FY-95 Energy and Water Appropriations, the Department of Energy was instructed "to maximize the research on actinide recycle, and, as proposed by the Administration, should also retain such facilities as necessary, especially the pyroprocessing facilities." The following year, in the Conference Report for the FY-96 Energy and Water Appropriations, Congress gave the Department of Energy the following instruction: "As recommended by the National Academy of Sciences' assessment of the electrometallurgical

approach for treating spent nuclear fuel, the conferees expect the Department of Energy to develop a plan to support the EBRFF09II demonstration using this technology. If this is successful, the Department of Energy should review the program for application to other types of spent fuel and waste management issues." In response, DOE, with support from Congress, has funded Argonne's expertise in electrometallurgical technology to the development of a potential management option for DOE's SNF.

The key to electrometallurgical technology is a technique called electrorefining, a process commonly used in industry to produce pure metals from impure metal feedstock. Most nuclear fuel is primarily uranium. In SNF, a small percentage of this uranium has been used to produce power within the reactor by nuclear fission, which leaves a highly radioactive residue called fission products. SNF also contains small quantities of plutonium and other transuranic elements (heavier than uranium) that are created in the reactor from nuclear transformation of a small percentage of the uranium. It is expected that electrorefining EBR-II SNF would stabilize the reactive metallic sodium by converting it to sodium chloride (i.e.,common table salt) and allowing the fission products to be collected, concentrated, and stabilized together with the transuranic elements for disposal. The uranium would be stored alongside other uranium metal in existing authorized storage facilities.

A simplified drawing of the existing electrorefiner that would be used in the Proposed Action is shown in Figure 2-8. This machine is made of steel, stands approximately 3 meters (9 feet) high and 1 meter (3 feet) across. The vessel contains fluids up to a height of approximately 45 centimeters (18 inches), with a space above containing argon, an inert gas. At an operating temperature of 500°C (932°F), the primary fluid is a molten mixture of two salts — lithium chloride and potassium chloride. The salt mixture floats on a 10 centimeter (4 inch) layer of molten cadmium that is the second fluid. The cadmium protects the vessel from corrosion and captures any uranium metal that falls through the salt layer.

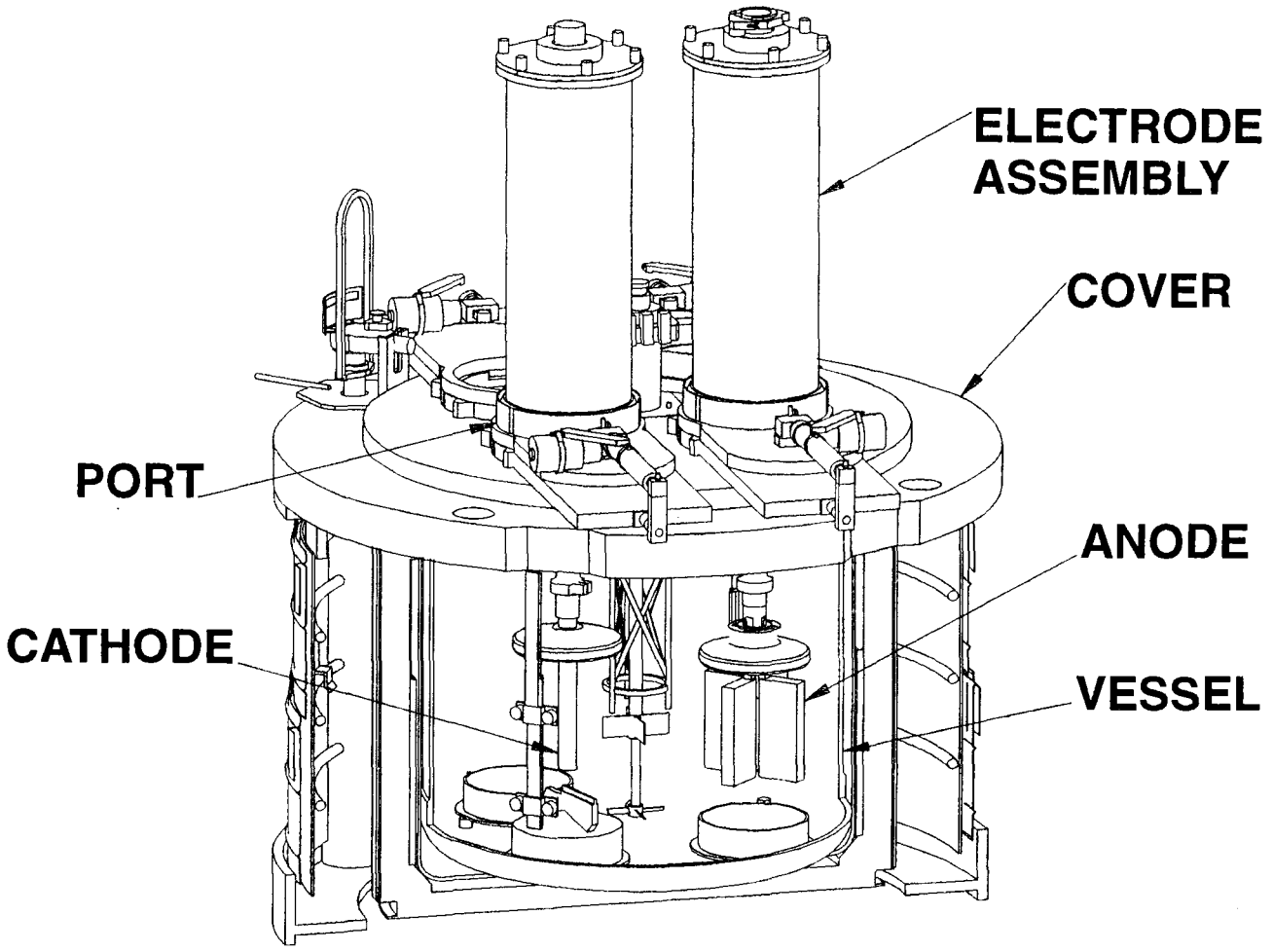


Figure 2-8. Line drawing of the electrorefiner in the Fuel Conditioning Facility at ANL-W

This electrorefiner currently exists in FCF. It has four electrodes: two cathodes (negative electrodes) and two anodes (positive electrodes). Each anode has four rectangular baskets to hold the spent fuel pieces. The bare steel rod on the left side is the cathode, where, during the electrorefining process, refined uranium is deposited as long clumps of crystals. The two tall cylinders on top allow the electrodes to be inserted and removed while isolating the electrorefiner from the external atmosphere. A photograph of uranium deposited on a cathode removed from an electrorefiner performing research with unirradiated depleted uranium is shown in Figure 2-9. This existing electrofiner will be used to treat driver fuel from EBR-II. As part of the Proposed Action, a high-efficiency electrorefiner would also be installed in FCF to treat EBR-II blanket assemblies.

In an electrorefiner, externally-applied electric current flows through an electrolyte — much in the way it does in a charging automobile battery — from the anode to the cathode. In the case of the FCF electrorefiner, the electrolyte is the mixture of lithium and potassium salts discussed earlier. When appropriate voltages are set, materials located at the anode in a special basket are dissolved and transported through the process salt to be collected at the cathode. In the Proposed Action, EBR-II SNF would be placed in the anode basket and the voltages would be set to optimize the collection of uranium at the cathode.

Uranium is a stable metal that can be easily and safely stored as metal ingots at ambient temperatures. More than 200 metric tons (221 tons) of uranium metal are currently stored at ANL-W. About 5.6 metric tons (6.1 tons) of this material is highly enriched uranium. The primary storage facilities for uranium metal are the Fuel Manufacturing Facility, the Zero Power Physics Reactor, and the Fuel Assembly and Storage Building. Uranium removed from the electrorefiner would be stored in the same way, at the same facilities, until DOE determines its ultimate disposition.

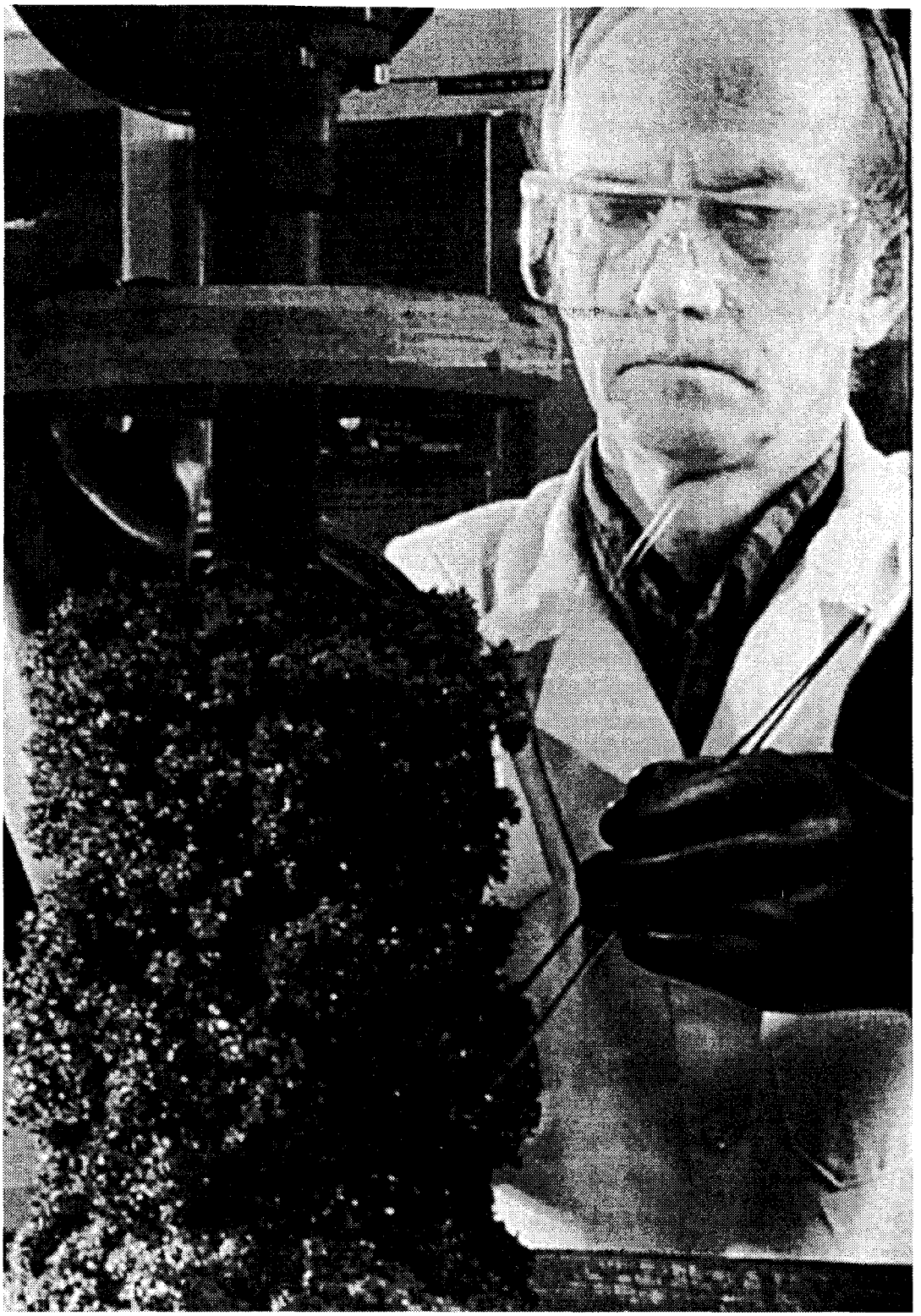


Figure 2-9. Uranium deposit being examined after removal from an electrorefiner

Once the highly enriched uranium is removed from the driver fuel, the fission products can be stabilized. The fission products remain dissolved in the molten salt after the uranium-bearing cathode is removed. As SNF assemblies are treated, an increasing concentration of the fission products would accumulate in the salt. After a sufficient number of SNF assemblies are processed, the salt would be treated to remove the fission products, including the transuranic elements. The electrorefiner salt would then be pumped through a material called zeolite. Zeolite crystals would exchange potassium, already a normal constituent of the salt, for fission products and transuranic elements contained in the process salt of the electrorefiner. This is an ion exchange process much like that of a common water softener. In other words, the zeolite releases potassium and bonds with the fission products from the electrorefiner. Once the fission products and transuranics are adsorbed by the zeolite, which is in the form of a crystalline powder, it is mixed with a glass powder and hot-pressed to produce a ceramic cylinder as the final waste form. The salt, now cleaned of fission products and transuranics, is returned to the electrorefiner to be used again. Ultimately the salt would be disposed of during decommissioning transuranic waste (Table 4-4).

Zeolites are a class of naturally occurring and synthetic chemical compounds that have the property of selectively adsorbing or excluding specific molecules. Chemists have been able to adapt this property to hundreds of commercial applications for drying and purifying liquids and gases, for recovery of materials, and as catalysts to promote specific chemical reactions. Water softening is one common application of these versatile materials.

In order to get the SNF into the electrorefiner, the individual fuel elements containing the uranium would be chopped into small pieces and placed into the anode baskets. In the electrorefiner, the spent fuel and sodium dissolve out of the cladding, leaving the empty stainless-steel hulls of the cladding in the anode basket. A small fraction of fission products that do not chemically react with the salt (i.e., noble metals such as zirconium and molybdenum) stay with the hulls in the basket. The rest of the fission products dissolve into the salt. The contents of the withdrawn anode basket and some additional stainless steel collected during the spent fuel chopping process become a separate waste stream.

The stainless steel is combined with 15 weight percent zirconium and melted to form a stable metal ingot. (Stainless steel or zirconium are the metals used for most fuel cladding and assembly hardware, and stainless steel is used for construction of waste canisters.) Stainless steel and zirconium are corrosion-resistant metals that are expected to be common constituents of waste packages destined for geologic disposal. Initial testing has shown the alloy to have exceptional corrosion resistance and fission product retention. The selection of 15 weight percent zirconium was based on several technical considerations, including a melting temperature of the stainless-steel/zirconium alloy that is 200°C (392°F) lower than the melting temperature of stainless steel without zirconium. This greatly simplifies the design requirements for the casting equipment.

The National Research Council's Committee on Electrometallurgical Techniques for DOE Spent Fuel Treatment identified the development of final waste forms as key items for investigation.[6] To date, no waste forms have been officially qualified for geologic disposal, because the acceptance criteria for geologic disposal have not been established. Nevertheless, two waste forms are commonly thought to be suitable for geologic disposal — undamaged spent commercial nuclear fuel from light water reactors and a matrix of borosilicate glass containing defense high-level radioactive waste. The waste forms (ceramic cylinders and metal alloy ingots) resulting from electrometallurgical treatment are expected to be at least as durable as those made with borosilicate glass.[7]

Independent Assessment of Electrometallurgical Technology: DOE requested the National Research Council to perform an independent evaluation of electrometallurgical treatment using a broad-based review committee without any specific ties to the technology. The National Research Council's Committee on Electrometallurgical Techniques for DOE Spent Fuel Treatment issued its report in June 1995,[8] but would continue to advise DOE on the potential application of the technology, and would observe Argonne's research and demonstration activities to provide DOE with an independent evaluation of any technical progress resulting from the proposed demonstration project.

The Committee's report was based on the assumption that DOE intended to begin immediate treatment of 270 EBR-II spent driver fuel assemblies and 326 spent blanket fuel assemblies stored at ANL-W. The report, therefore, does not discuss the current Proposed Action directly. However, the report emphasizes the importance of a demonstration with EBR-II fuel in order to assess potential application of the technology to other SNF. The Committee made the following overall recommendation:

> ANL should proceed with its development plan in support of the EBR-II demonstration . . . If the EBR-II demonstration is not accomplished successfully, the ANL program on electrometallurgical processing should be terminated. On the other hand, if the EBR-II demonstration is successful, the DOE should revisit the ANL program at that time in the context of a larger, "global" waste management plan to make a determination for possible continuance.

The report cited a number of perceived disadvantages, primarily relating to electrometallurgical treatment technology's incomplete state of development, as follows:

- Waste forms are not yet developed, qualified, certified, or accepted.
- An inert atmosphere is required, with related operating and maintenance drawbacks.
- The process has not been proven or demonstrated to be operable remotely in a radiation environment.

Relative to the demonstration of the technology (with an assumed 596 spent EBR-II blanket and driver fuel assemblies), the Committee stated:

> Monitoring and oversight of the progress of the EBR-II spent fuel program are critical to assessing the feasibility of the electrometallurgical technique. (However, the committee was not asked to, nor did it, investigate in depth this phase of the overall electrometallurgical treatment program.) To assist the DOE in evaluating the progress and success of this project, the committee recommends the following accomplishments as a minimum definition of 'successful application':

- Demonstration of batch operation of an electrorefiner and a cathode processor with a capacity of approximately 200 kg/day of radioactive EBR-II spent fuel without failure for about 30 days.

- Quantification (for both composition and mass) of recycle, waste, and product streams that demonstrate projected material balance with no significant deviations.

- Demonstration of an overall dependable and predictable process, considering uptime, repair and maintenance, and operability of linked process steps.

- Demonstration that releases of radioactivity remain at or below those levels anticipated and specified in equipment design and operating plans. Exposure of operating personnel to radiation must be minimal and must in all cases remain below limits set by the U.S. Nuclear Regulatory Commission.

Since the National Research Council's report was issued, DOE has decided that it would be more prudent to conduct a feasibility demonstration with concurrent research before considering electrometallurgical treatment of the entire inventory of more than 500 EBR-II spent fuel assemblies. The Proposed Action is commensurate with available funding and would not commit DOE to application of this technology to any additional quantity of SNF until such a proposal is made and further review under the National Environmental Policy Act (NEPA) has been completed. The scope of the Proposed Action is limited to treatment of just a sufficient number of EBR-II spent fuel assemblies to address the issues raised by the National Research Council and to demonstrate the feasibility of electrometallurgical technology for treatment of sodium-bonded SNF.

2.3 Description of Proposed Action

The Proposed Action is to conduct a research and demonstration project involving electrometallurgical treatment of up to 100 EBR-II driver assemblies and 25 EBR-II blanket assemblies in the FCF at Argonne National Laboratory-West. The driver fuel will be processed in the existing FCF electrorefiner. This number of driver fuel assemblies would provide the minimum fission product loading (3%) necessary to evaluate the effectiveness of the removal of fission products from the electrorefiner salt and their concentration in the ceramic waste form. The 25 blanket assemblies would be treated using a high through-put electrorefiner to be installed in the FCF in order to evaluate higher efficiency electrorefining. The State of Idaho has issued an air permit allowing treatment of up to 90 EBR-II fuel assemblies per year in FCF.[9] The Proposed Action would operate within this limit, requiring approximately three years to complete. The Proposed Action would address the key demonstration issues raised in the National Research Council's report.

One hundred driver assemblies would require multiple batch operations of the treatment equipment in a remote, radioactive hot cell with an inert argon atmosphere. These operations would be sufficient to demonstrate an overall dependable and predictable process, considering uptime, repair and maintenance, and operability of linked process steps. In addition, processing 100 driver fuel assemblies is expected to produce enough waste form samples with representative radioactive waste loadings for testing. While it is expected that the wastes will be repository suitable, testing of these samples will assist in the development, qualification, certification, and acceptance of the two process waste forms (ceramic and metal) produced by the electrometallurgical treatment technique. The facility and equipment, including the planned high efficiency electrorefiner, are adequate for the proposed demonstration. They would not, however, be adequate for integrated, high-throughput production operations because the FCF's materials transfer and handling equipment, supporting equipment and in-cell storage space are inadequate to support production scale activities.

National Research Council questions related to quantification of both composition and mass of process streams and material accountability balances would also be addressed. DOE requires ANL-W to perform nuclear material accountability balances, with periodic audits performed by DOE. Each waste and product stream would be quantitatively sampled when generated. Completion of the project would provide sufficient data on process nuclear material composition and mass demonstrate achievement of the projected material accountability balance with no significant deviations.

To address questions of radioactive releases and personnel exposure, data from operations would be obtained. As described in the FCF Final Safety Analysis Report (FSAR), FCF employs continuous air monitoring equipment capable of detecting releases of radioactive materials. ANL-W requires implementation of ALARA (as low as reasonably achievable) control of radiation doses to workers. For workers in nuclear facilities such as FCF, radiation doses are monitored as often as warranted by working conditions, but at least monthly. Operations involving treatment of 100 EBR-II driver assemblies would provide sufficient data to demonstrate that releases of radioactivity remain at or below those levels anticipated and specified in equipment designs and controlling facility documents. Records of personnel radiation exposure during the period of the project would be used to demonstrate compliance with the limits set by the U.S. Nuclear Regulatory Commission.

In order to evaluate higher efficiency electrorefining, blanket elements would be treated in a second electrorefiner to be installed in the FCF hot cell. Testing of this electrorefining concept and construction of the second FCF electrorefiner is currently underway at Argonne National Laboratory-East near Chicago, Illinois. Under the Proposed Action this electrorefiner would be transported to ANL-W, installed in the FCF hot cell, and used to treat 25 blanket assemblies. Treatment of 25 EBR-II blanket assemblies would require about seven batch operations in the high efficiency electrorefiner. These operations would demonstrate a one-day throughput of approximately 160 kilograms (353 pounds) per batch. Because FCF is a small research facility, preparation of enough chopped fuel for one operation in high-efficiency electrorefiner anodes would take approximately one month. Even though not production scale, this demonstration

would show the feasibility of batch operation of electrorefining with a capacity approaching 200 kilogram per day (441 pounds per day) of radioactive EBR-II SNF. Seven batch operations would be sufficient to evaluate the reliability of the equipment. The sum of the large batch demonstration and the equipment experience would meet the intent of the National Research Council's recommendation regarding high-efficiency electrorefining.

It is anticipated that the demonstration project would yield the following results:

- The reactive bond sodium would be neutralized.
- The uranium from the driver assemblies would be reduced in enrichment from 65% to less than 20% and would be cast into stable storage ingots.
- The fission products and transuranic elements would be immobilized in stable waste forms.
- The waste forms would be characterized to provide data for their future qualification for geologic disposal.
- The storage volume requirements would be reduced for all waste and byproduct uranium compared to the storage volume required for the untreated spent fuel.

Figure 2-10 illustrates the steps that would be used in electrometallurgical treatment of the EBR-II spent fuel selected for the demonstration project. Well-instrumented research equipment would be used in batch-by-batch, independent operations for each treatment step. Each treatment step would be computer controlled in order to record all treatment data which would be integrated into one database. The spent fuel assemblies to be treated would, to the extent possible, come directly from EBR-II and, therefore, would involve only one cask handling operation rather than three. This would reduce worker radiation exposures due to cask handling operations. The Proposed Action, however, could utilize driver and blanket assemblies from past reactor operations stored at various facilities on the ANL-W site. Waste forms and byproduct uranium resulting from the demonstration would be stored on-site in existing facilities until

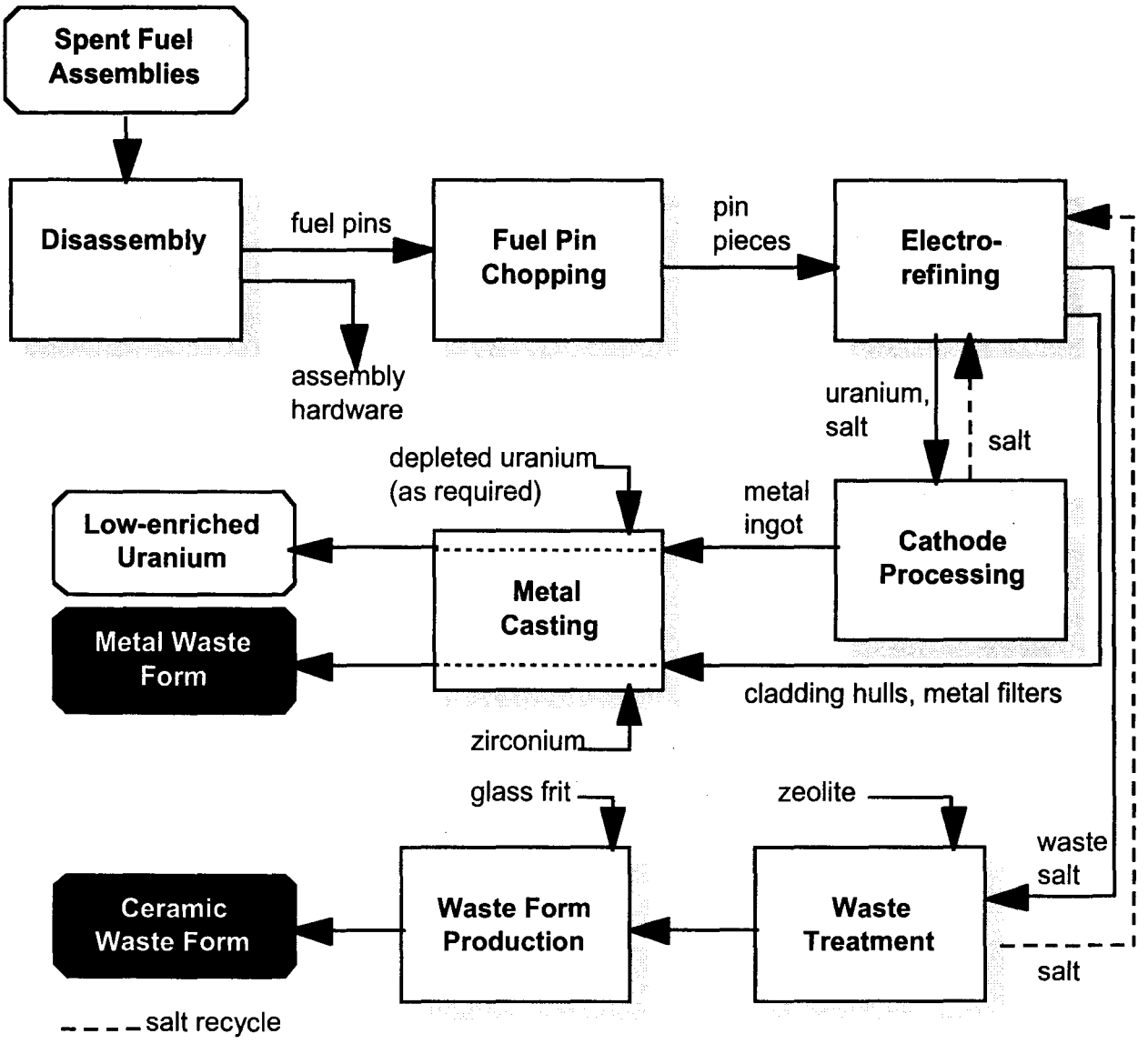


Figure 2-10. Flowsheet for electrometallurgical treatment of EBR-II spent nuclear fuel

further disposition. Spent fuel would continue to be removed from EBR-II and would be stored in FCF, HFEF, and RSWF. Uranium ingots would be stored in the Fuel Assembly and Storage Building ault (low-enriched uranium) and the Zero Power Physics Reactor Material Storage Building (depleted uranium). Ceramic waste forms and metal waste forms would be stored in RSWF. No transportation of spent nuclear fuel or high-level radioactive waste to or from ANL-W would be required for the Proposed Action.

A brief description of each of the treatment steps under the Proposed Action is given below.

Disassembly: A spent EBR-II driver assembly temporarily stored in the air cell of the FCF would be moved into the vertical assembler/disassembler (VAD), shown in Figure 2-11. The VAD is a 30-year-old machine that performs mechanical operations to put fuel assemblies together or to take them apart. Under the proposed action , the function of the VAD would be to separate the fuel assembly hardware from the fuel pins that contain uranium and fission products. This would be accomplished by cutting the assembly and physically separating the fuel elements. The fuel elements would be placed into a container for transfer to the argon cell for the remaining treatment steps. The stainless-steel hardware consists primarily of a long tube of hexagonal cross section and two end pieces. An EBR-II assembly with part of the hardware cut away to expose the fuel elements is shown in Figure 2-12. At 16 kilograms (35 pounds), the assembly hardware comprises about 60% of the mass of the entire fuel assembly. The assembly hardware would be stored in the RSWF at ANL-W. This is a normal waste stream for ANL-W operations, and the hardware separated for this demonstration would be handled in accordance with normal site practices. Most of the spent EBR-II fuel in storage at the INEL has been separated from the assembly hardware by the VAD in HFEF, which is identical to the VAD in FCF.

Fuel Pin Chopping: The fuel pin chopper, shown in Figure 2-13, is a specialty machine suited only for small scale demonstrations. It has been in operation in the FCF cell for more than three years, although it has not yet been used for highly radioactive fuel. The section of the fuel element containing the fuel and the sodium would be sheared into short segments of

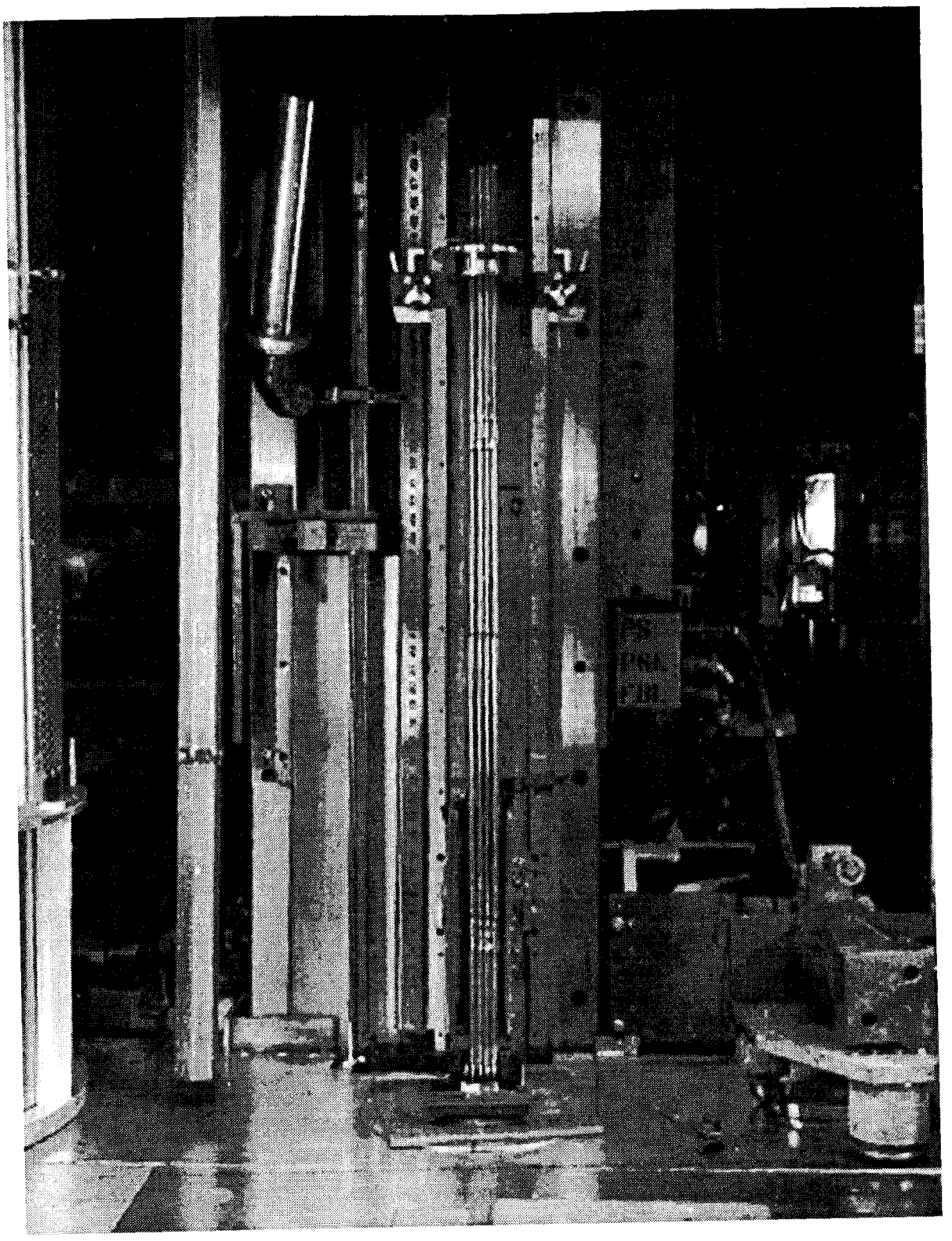


Figure 2-11. Vertical Assembler/Disassembler

Figure 2-12. Mock EBR-II driver assembly cut away to show fuel element

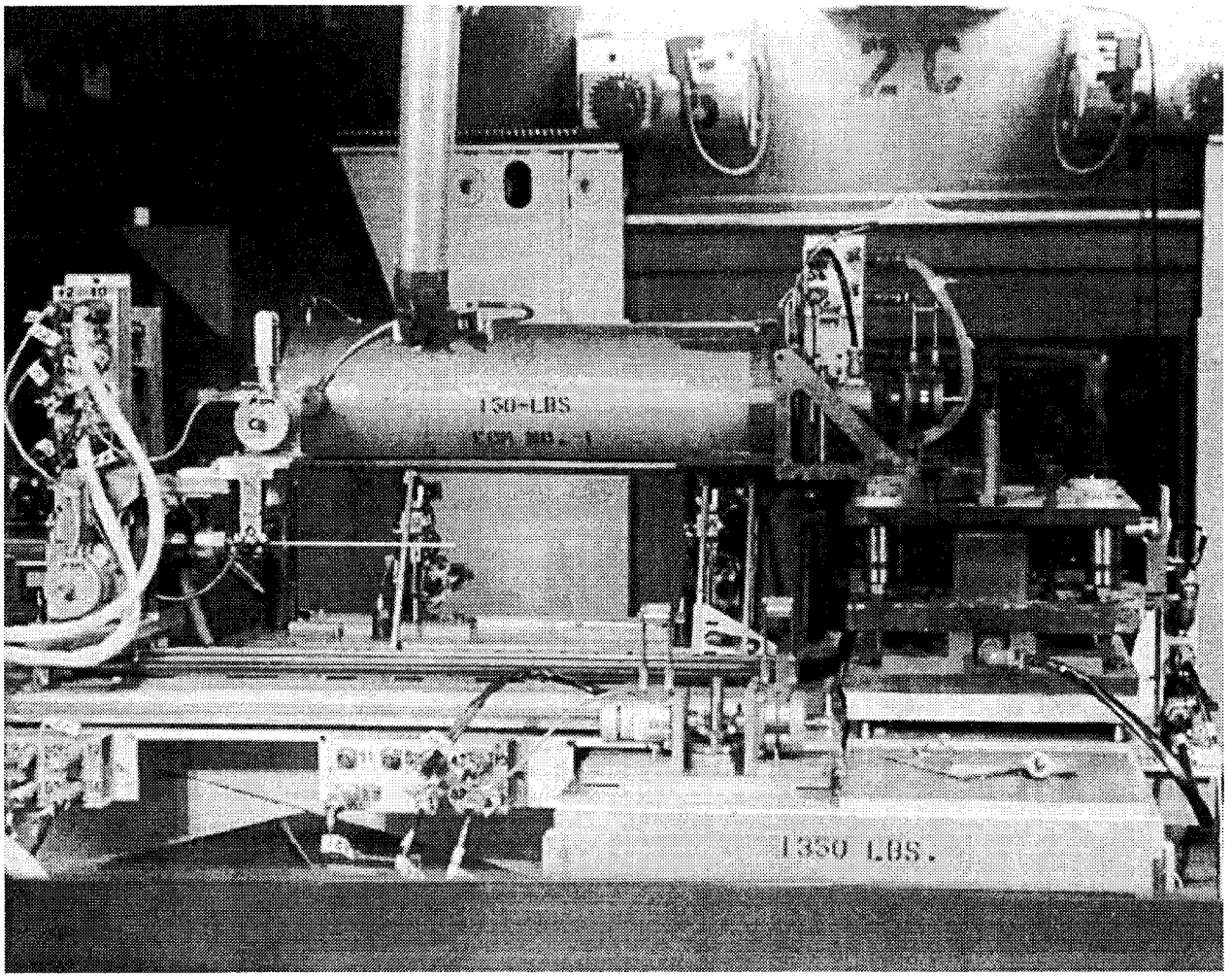


Figure 2-13. Fuel element chopper in FCF

approximately 1/4 inch long. The section of the element containing the gas space would be left intact. This section of the fuel pin cladding and the spacer wire would go into the metal waste stream. The sheared fuel segments would be collected in a perforated stainless-steel basket. Four of these baskets of fuel would be assembled with other hardware to form an anode for the electrorefiner as shown in Figure 2-14. Approximately 10 kilograms (22 pounds) of uranium would be contained in these four baskets of sheared fuel pins.

When the hollow end (plenum) of the fuel pin is sheared, some fission product gases (primarily tritium and krypton) would be released to the argon cell atmosphere. Eventually all these gases would pass through HEPA filters and be released up the emissions stack to the environment. All air emissions from FCF are thoroughly monitored and recorded. The radiation dose to workers or to the public from these gases would not be expected to be measurable above the normal minor variations in the natural background radiation.

Electrorefining: The electrorefiner is the machine in which the electrometallurgical fuel treatment would take place. The FCF electrorefiner system, shown in Figures 2-15 and 2-16, has been operating in a test mode with unirradiated depleted uranium since mid-1995.

The sheared EBR-II driver fuel elements would be loaded into anode baskets in batches of approximately 10 kilograms (22 pounds). (The basic principles of electrorefiner operation were described in the previous section, 2.1 Background). The chopped fuel elements would be lowered into the molten process salt, which is maintained at about 500°C (932°F). Upon application of an electric voltage between the anodes and cathodes, the uranium, the transuranics, most of the fission products, and the bond sodium would dissolve into the salt, forming chlorides of the various elements. Uranium would be deposited by the current at the cathodes, which are metal rods. Crystalline deposits of uranium metal would grow for 24 to 72 hours until about 10 kilograms (22 pounds) had been collected at each cathode. The uranium-bearing cathodes would be raised into the gas space in the electrorefiner to allow some of the molten salt to drain away, although from 1 to 2 kilograms (2.2 to 4.4 pounds) of salt would adhere to each cathode.

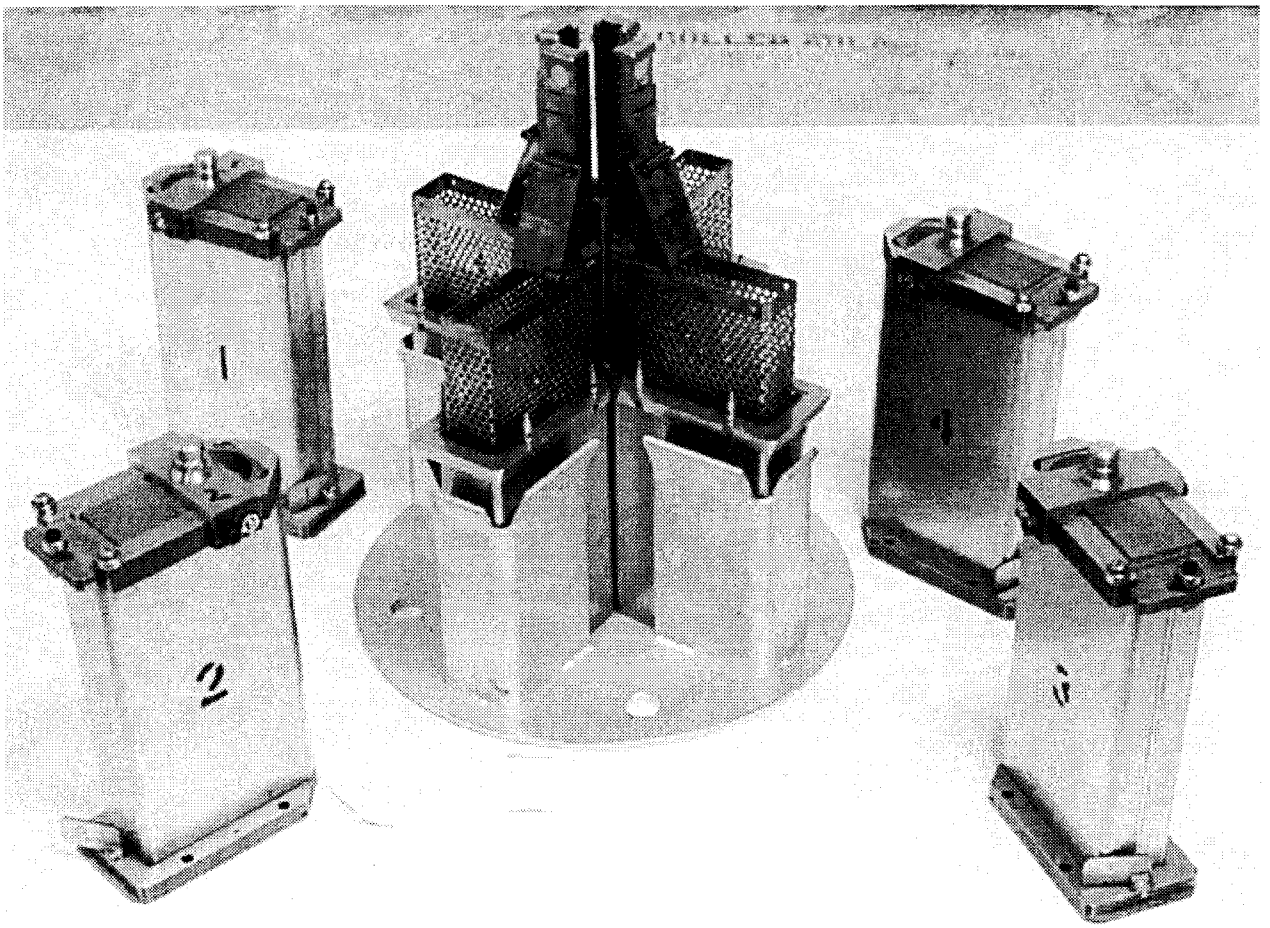


Figure 2-14. Electrorefiner anode made from 4 fuel pin baskets

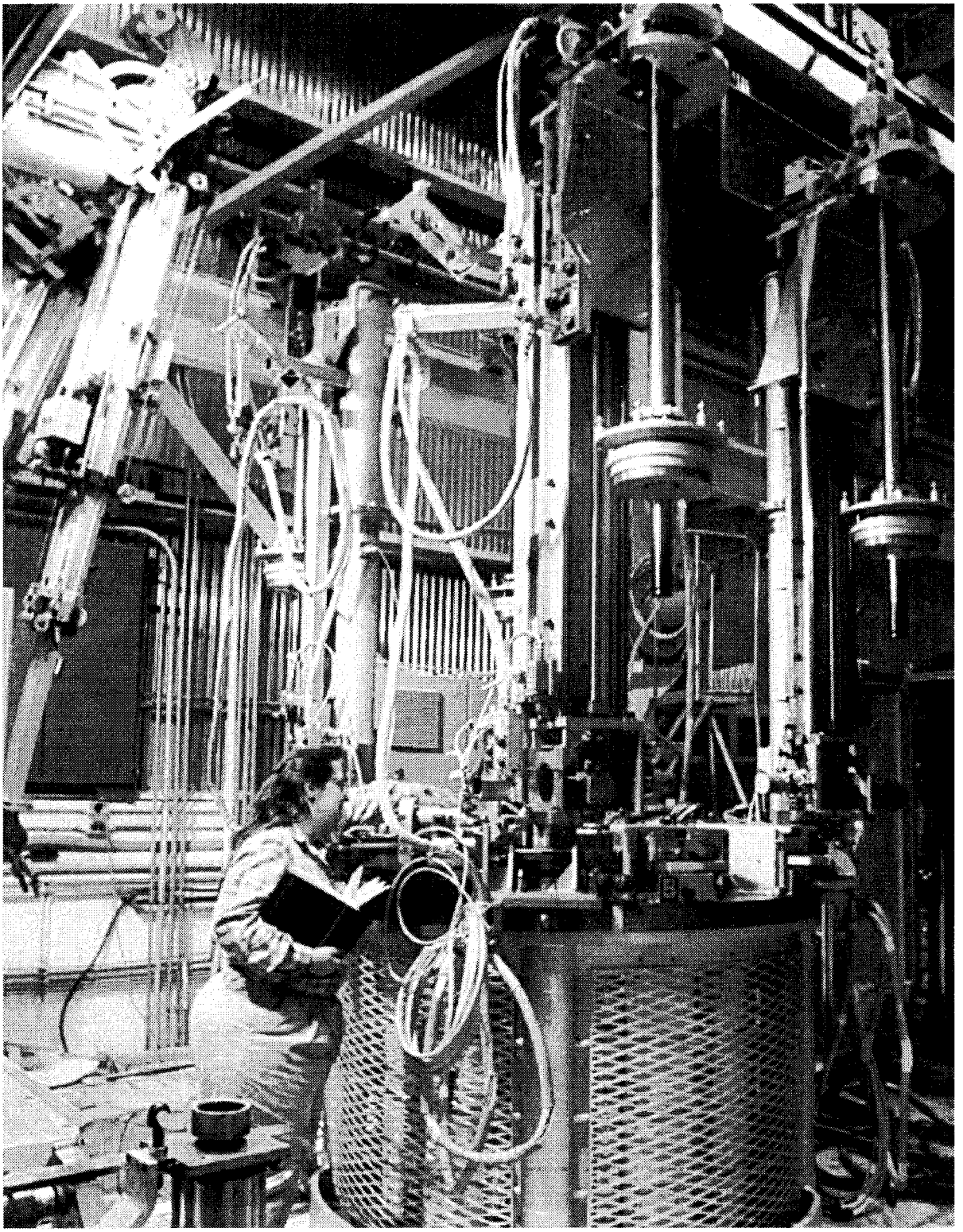


Figure 2-15. The FCF electrorefiner during out-of-cell testing by systems engineer

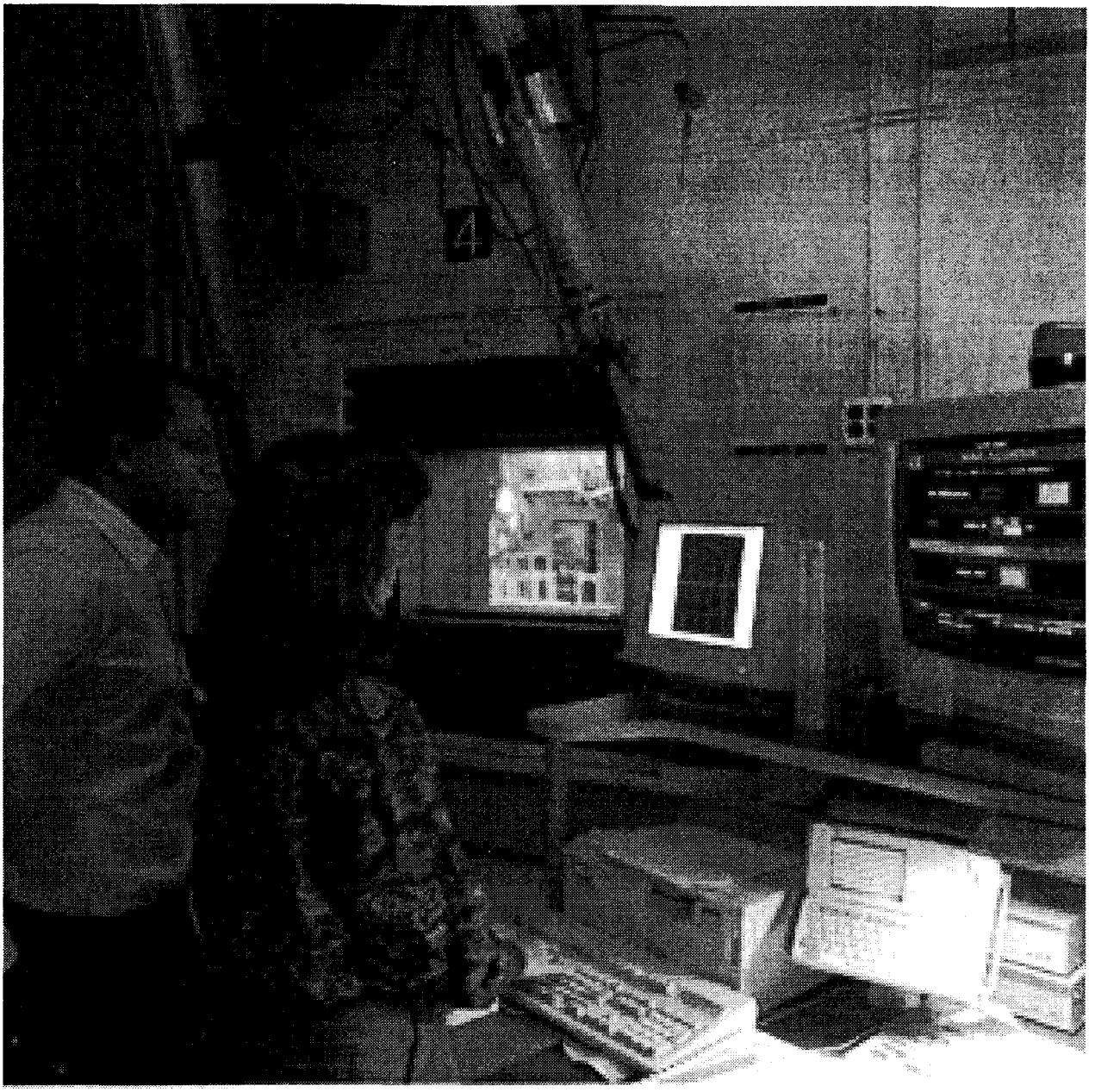


Figure 2-16. FCF electrorefiner control and data station in FCF

Each cathode would then be removed from the electrorefiner. The uranium deposit would be mechanically stripped from the cathode and stored for a few days in the argon cell in a canister until it is processed in the cathode processor.

The stainless-steel cladding hulls and some of the less reactive metal fission products would remain undissolved in the anode basket. They would be removed from the electrorefiner and temporarily stored prior to melting into metal waste-form ingots. The reactive fission products and transuranics would remain in the electrorefiner salt. The sodium would be in the form of sodium chloride (common table salt) as a part of the molten salt mixture. The amount of fission products in the 100 driver assemblies that would be treated in the Proposed Action is relatively small, and if they were not used to test the acceptability of the ceramic waste form, the fission products could be left in the salt indefinitely without any expected effect on the electrorefiner operations. In fact, all the EBR-II driver assemblies at ANL-W could be treated in the FCF electrorefiner without ever having to treat the salt to remove the fission products. In the proposed demonstration, a total of approximately 17 kilograms (38 pounds) of fission products would be dissolved in the approximately 500 kilograms (1,100 pounds) of salt contained in the electrorefiner vessel.

Cathode Processing: Uranium deposits removed from the electrorefiner would be treated to remove the adhering salt (approximately 15% by weight) from the uranium metal in the FCF cathode processor, shown in Figure 2-17. This machine, basically a furnace with a vacuum system, has been in operation in the FCF argon cell since mid-1995 undergoing testing with various depleted uranium samples. The cathode product would be heated to approximately 1300°C (2372°F), melting both the uranium and the salt. Under vacuum conditions, the salt, which is more volatile than the uranium, would distill off the uranium and be condensed in a receiver crucible for later recycling to the electrorefiner. The uranium would be melted in the furnace crucible and then solidified into an interim product ingot, which would be briefly stored before final treatment in the casting furnace.

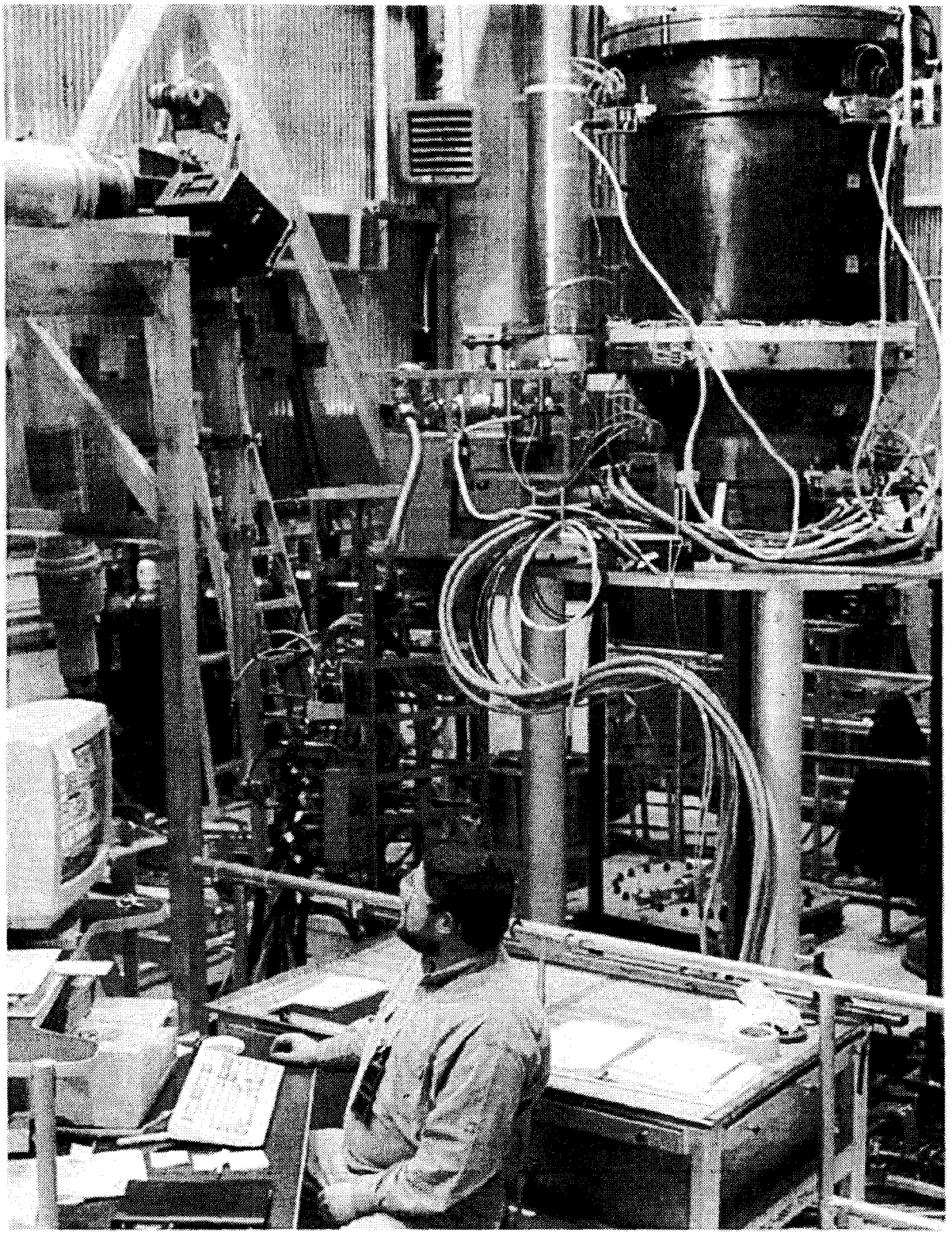


Figure 2-17. Cathode processor during out-of-cell testing in FCF mockup shop

Metal Casting: The casting furnace, which is shown in Figure 2-18, would serve a dual role in the demonstration. It would be used to produce low-enriched uranium ingots for storage and to produce the metal waste form from stainless steel cladding hulls. The casting furnace is an existing piece of equipment that has been operating with surrogate materials and depleted uranium in the FCF argon cell for more than two years. In the case of driver fuel, which contains highly-enriched uranium, the uranium from the cathode processor would be melted together with a separate stream of depleted uranium, electromagnetically stirred, and allowed to solidify. In this manner, enriched uranium from the treatment of the EBR-II driver assemblies would be blended with depleted uranium in the casting furnace to form low-enriched metal ingots. The ingots would be held in the FCF pending removal for storage in the Fuel Assembly and Storage Building, a controlled storage facility, until decisions regarding their final disposition are made. The depleted uranium used for blending could be added at the electrorefiner, the cathode processor, or the casting furnace stage. However, for efficiency and waste minimization, adding depleted uranium at the casting furnace stage is preferred.

Sale of the low-enriched uranium metal for use as commercial fuel is an option. However, carryover of zirconium with the uranium at the cathode may result in a product that would not meet commercial uranium specifications. Further, contamination of the uranium with fission products as a result of the treatment process may make the normal non-shielded fabrication process for commercial fuel impossible. The fission products could be present either internally as part of the uranium alloy or externally as a result of cell "drag out" that would be difficult to remove from the surface. The extent of contamination can only be determined by conducting this demonstration.

The total weight of the low-enriched (19% uranium-235) uranium ingot would be about 3.5 times the weight of the uranium yielded by the cathode processor. From approximately 410 kilograms (904 pounds) of highly enriched uranium in the 100 driver assemblies, about 1400 kilograms (3100 pounds) of blended-down, low-enriched uranium storage ingots would be produced. For

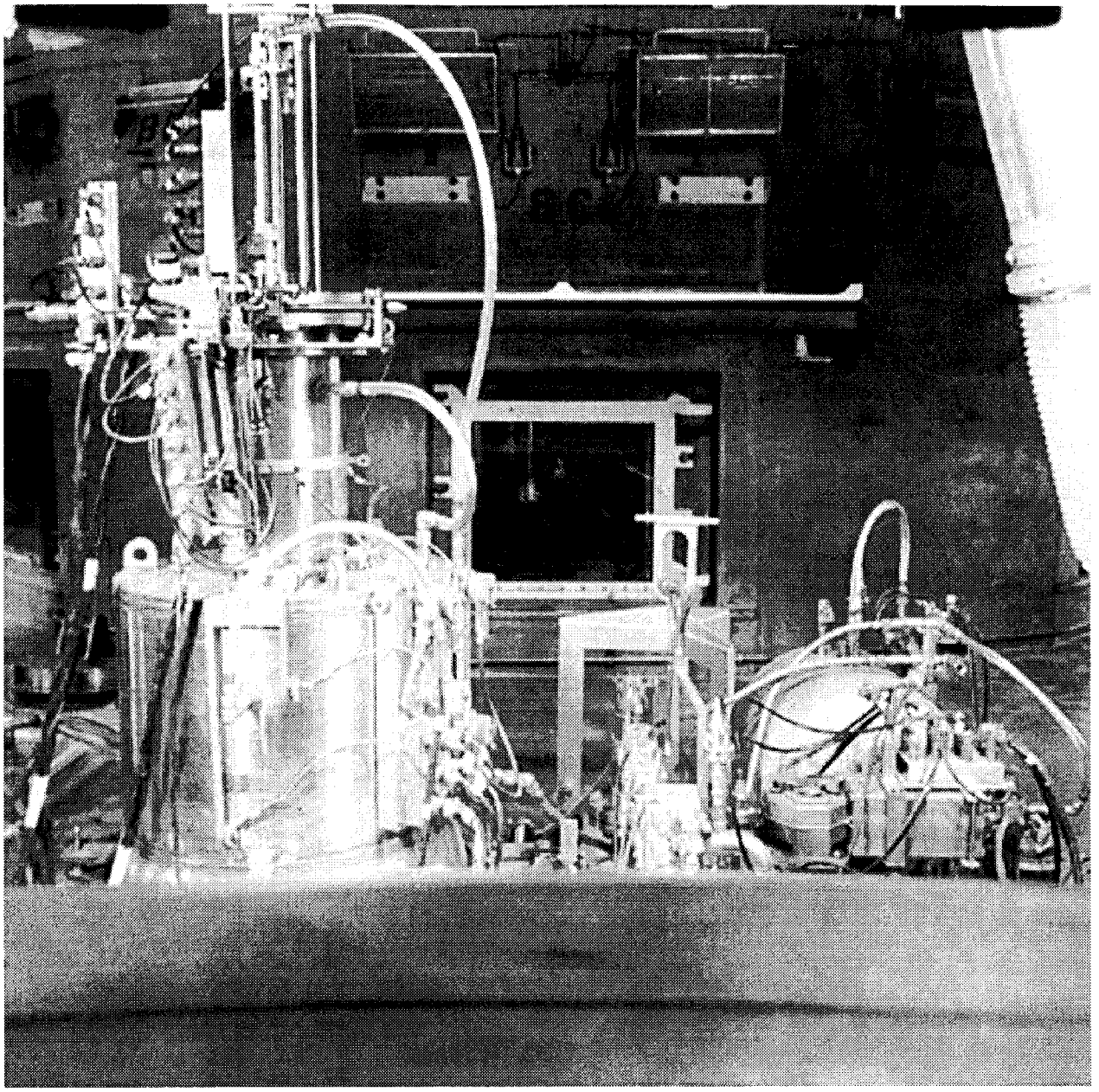


Figure 2-18. The FCF casting furnace in cell

perspective, in Figure 2-19 a technician is shown holding a 6 kilogram (13 pound) depleted uranium ingot. The single layer of uranium ingots in the storage container below his hand weighs about 90 kilograms (200 pounds). Fifteen such layers would equal about 1350 kilograms (3000 pounds). The low-enriched uranium from the proposed demonstration would be stored in containers holding about 140 kilograms (310 pounds) of metal ingots, so 10 containers would be required. The containers would be separated by about 0.4 meters (15 inches) center-to-center for safety, requiring approximately 1.5 square meters (16 square feet) of floor space. [After being transferred out of FCF, the uranium would be stored in the Fuel Assembly and Storage Building vault at ANL-W to await the completion of an appropriate environmental analysis and a decision by the DOE on the disposition of its surplus uranium materials.]

If the Department decides to discard the low-enriched uranium, it would be blended down to less than one percent enrichment and calcined to form uranium oxide for disposal as low-level waste. The uranium from the electrometallurgical technology demonstration would amount to approximately two percent of the minimum amount considered for disposal by the Department in the *Disposition of Surplus Highly-Enriched Uranium Draft Environmental Impact Statement* (DOE EIS 0240D), October 1995. Similarly, the amount of low-enriched uranium resulting from the proposed demonstration project would be approximately one percent of the minimum amount considered for sale to commercial interests of the low-enriched uranium analyzed in that draft environmental impact statement.

The FCF casting furnace would also be used to cast metal waste-form samples. Stainless steel waste cladding hulls from the electrorefiner would be melted in the casting furnace. A small amount of zirconium (15% by weight) would be added to the steel to form a durable metal alloy. All together, the metal waste ingots produced in the proposed demonstration of EBR-II driver fuel treatment would take up about two cubic feet of volume. These ingots would be stored in FCF until they were transferred for testing or for interim storage in the RSWF at ANL-W. Ultimately, the metal waste form may be eligible for disposal in a geologic repository.

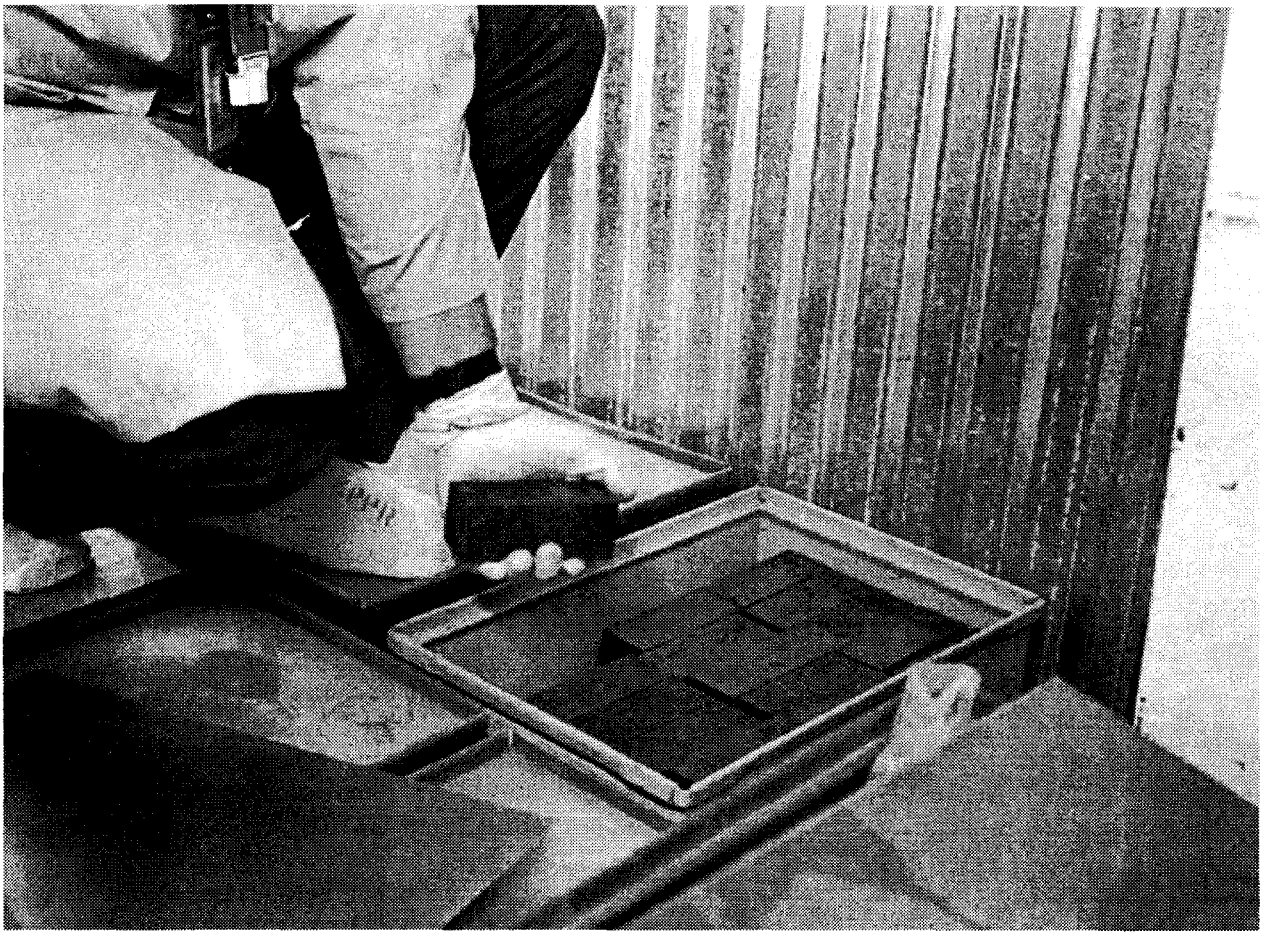


Figure 2-19. Blocks of unirradiated depleted uranium in storage at ANL-W

If, after the waste acceptance criteria are established for the geologic repository, the metal waste ingots were determined not to be acceptable, they would be processed into an acceptable form. For example, the ingots could be calcined (oxidized), and the resultant metallic oxide powder then dissolved in an acceptable borosilicate waste form.

Treatment of Electrorefiner Wastes: After most of the driver assemblies have been treated, some of the molten salt in the electrorefiner would be pumped out by a bulk fluid handling system through a filter to separate out any insoluble particles that might be suspended in the salt. The liquid cadmium layer at the bottom of the electrorefiner would also be pumped out, filtered, and returned to the electrorefiner. Filters from this bulk fluid handling system would become part of the metal waste stream. The liquid salt would be put in the top of a series of columns of zeolite pellets, a material that would exchange potassium for the fission products and transuranics in the salt. The bulk fluid handling system and the zeolite columns would be installed in the FCF argon cell. This equipment would not be needed until near the end of the proposed project but is required under all alternatives.

As the salt, bearing the fission product chlorides, passes through the zeolite columns, the zeolite would adsorb the fission products and transuranics and release potassium to form potassium chloride, one of the two basic constituents of the electrorefiner salt. The salt would then be ready for return to the electrorefiner and the fission products would be tightly bound in the zeolite pellets. After becoming sufficiently saturated with fission products, the zeolite pellets would be removed from the columns and prepared for waste form production.

Ceramic Waste Form Production: Glass frit (a sand-like material from which glass is made) would be mixed in approximately equal weight with the waste-bearing zeolite and placed in a special metal canister that is designed to be compressed to a desired and predictable shape. This canister would be put into a type of furnace called a hot isostatic press, where it would be subjected to a temperature of 700°C (1292°F) and a pressure of 30,000 pounds per square inch. This action would compress the canister and transform the material inside into a single cylinder of glass-bonded zeolite, which is referred to as the ceramic waste form. Waste-form cylinders

would be packaged and stored in the RSWF. The Proposed Action would produce approximately one-quarter of a cubic meter of ceramic waste-form cylinders.

The ANL-W hot isostatic press, shown in Figure 2-20, is a commercially available machine. Its only unique feature is that it has been modified for remote operation. The machine was purchased in 1994 to perform general research on waste stabilization. The machine would be used for testing with non-radioactive materials and containers prior to being installed in a hot cell. In the Proposed Action, the hot isostatic press would produce ceramic waste-form cylinders. The size of the ceramic cylinders would be determined after results from initial testing with nonradioactive materials have been evaluated. The expected size would be approximately 11 centimeters (4.5 inches) in diameter by 23 centimeters (9 inches) in height. The Proposed Action would produce on the order of 118 such ceramic waste form cylinders, each with a volume of about 2.3 liters (2.4 quarts) of ceramic waste. Ultimately, the ceramic waste form is expected to be acceptable for disposal in a geologic repository. Interim storage of the waste form cylinders would be in the Radioactive Scrap and Waste Facility where similar highly radioactive materials are currently safely stored.

Waste Form Qualification: To characterize the ceramic and metal waste forms for future qualification for repository disposition, both the forms will have to undergo further development and testing similar to that being done for the borosilicate glass containing defense high-level waste. While much of the testing can be done with non-radioactive materials, some testing with actual radioactive materials from SNF will be essential. The Waste Acceptance System Requirements Document (WA-SRD), DOE/RW-0351P, defines the general criteria for physical characteristics and consistency of a waste form. The product consistency test (PCT) is currently the only required test for homogeneous glasses or glasses containing less than 0.5% of crystalline phases. For the ceramic waste form, the appropriateness of the PCT would be demonstrated. Since the metal waste form is not a glass, a different consistency test might be needed. Because acceptable waste form performance in the repository is the overall objective, a variety of tests

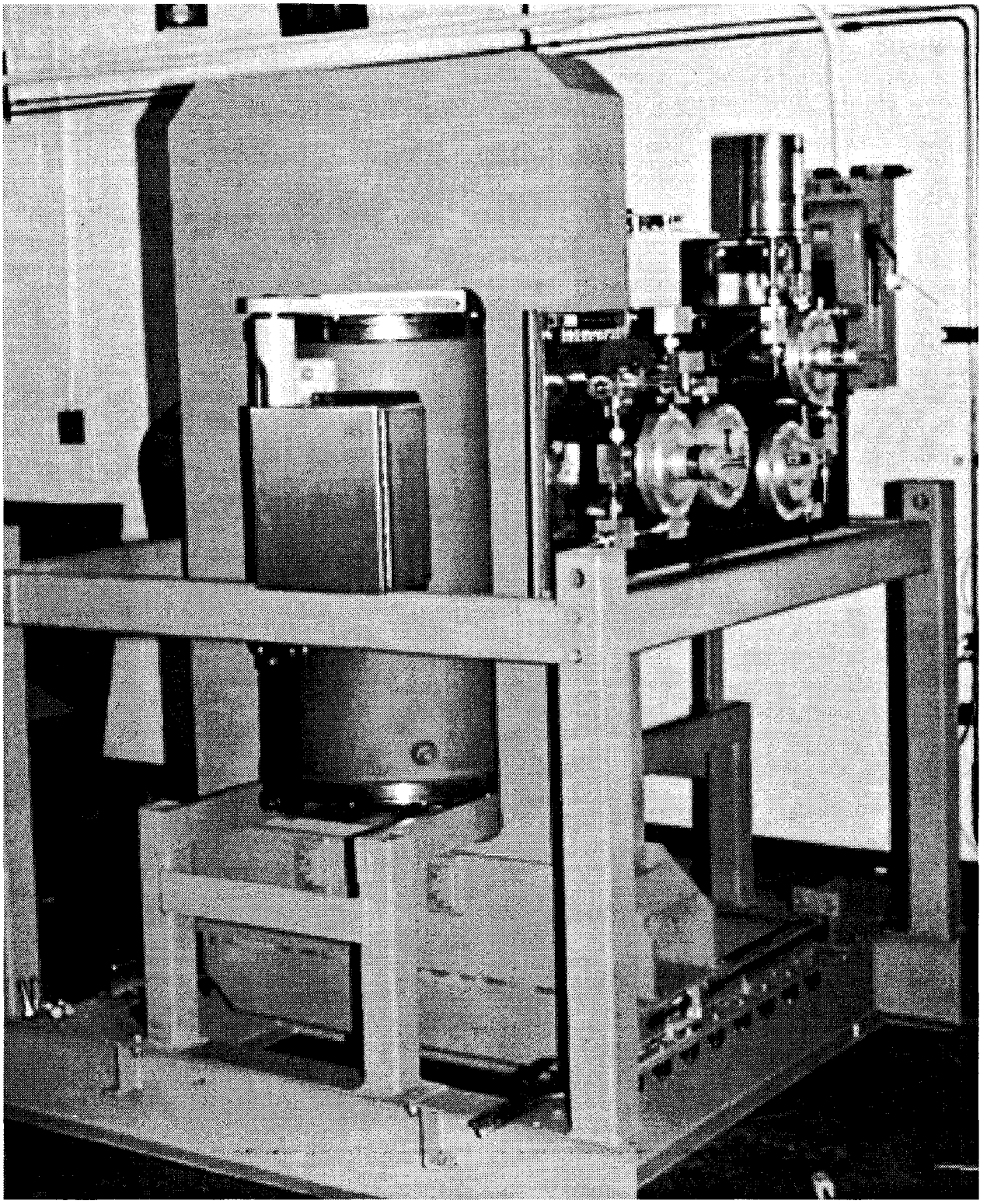


Figure 2-20. Hot isostatic press (HIP) for EBR-II fuel treatment demonstration

would determine the boundary release rates from the two waste forms. The waste performance data would be used to support waste qualification. Evaluation of the ceramic and metal waste forms would be conducted as a separate research program as a part of ongoing waste form development activities. The Proposed Action would supply radioactive waste form samples for the test program. In addition, the Proposed Action would provide process performance and operational experience with fission products and transuranics in prototypic size waste form equipment. These data, combined with the waste form performance data, would support the evaluation of the electrometallurgical treatment process.

If, after the waste acceptance criteria are established for the geologic repository, the ceramic waste cylinders were determined not to be acceptable, they would be processed into an acceptable form. The initial step would be to grind the glass-bonded zeolite (ceramic) into a powder which could be processed to the final waste form which may be borosilicate glass.

High-Efficiency Electrorefining: Twenty-five blanket assemblies would be treated to demonstrate high-efficiency electrorefining using a concentric arrangement of electrode pairs. This approach is preferred for treating low-enriched fuel such as the EBR-II blankets because of the relatively low concentration of fission products in a high volume of SNF. (A test of high efficiency electrorefining would not be possible using the EBR-II driver fuel because of criticality safety requirements to limit the concentration and total amount of highly enriched uranium in the electrorefiner.)

A second electrorefiner would be placed in FCF for use in the blanket electrorefining demonstration. This second electrorefiner would be made from spare parts for the current FCF electrorefiner and newly fabricated parts. A spare vessel has been in storage for some time, and other parts are currently being fabricated. Some spare parts for treatment equipment would be used during startup and qualification testing as needed modifications are identified. (A complete spare cathode processor has been used for out-of-cell testing for two years.) Minor components of the FCF electrorefiner, such as a stirrer for the cadmium pool, have been replaced by modified spare parts as needed for new experiments or repairs during the current testing with depleted

uranium. Four high-efficiency electrode pairs, similar to the prototype concentric anode/cathode pair shown in Figure 2-21, are currently being designed. Fitted with these electrodes, the electrorefiner would be able to treat 160 kilogram (353 pounds) batches of spent blanket fuel.

This second electrorefiner would be loaded with the same type of salt mixture (lithium chloride and potassium chloride) as the current electrorefiner, but it would not require a cadmium layer below the salt. The cadmium is not needed because the high-efficiency electrodes would collect the uranium in place, so that having the cadmium available to capture uranium that falls through the salt layer would not be necessary. Twenty-five blanket assemblies would be used, providing at least seven full batches for high-efficiency electrorefining. Up to 160 kilograms (353 pounds) of spent fuel would be treated in each batch. While this is approximately one-fifth of a full production-scale machine, it would be adequate to demonstrate the principle of high-efficiency spent fuel treatment.

Other than the second electrorefiner, the treatment and material handling equipment in the FCF are not designed to accommodate high throughput. Some equipment, such as the fuel pin chopper, would be modified to accommodate the larger blanket pins. However, for the purpose of a limited demonstration, a complete set of matched-size and integrated equipment is not required and would not be part of the Proposed Action. The batches of chopped fuel treated in the electrorefiner would be staged to accommodate the limited capability of the other treatment equipment. The treatment steps for the blanket assemblies would be essentially the same as for the driver assemblies. The notable exception is that there would be no "down-blending" required of the uranium because these assemblies are made with depleted uranium rather than the highly enriched uranium used for the driver assemblies. Approximately 1.2 metric tons (1.3 tons) of depleted uranium ingots would be produced during the proposed demonstration and placed in interim storage. These ingots would be stored in containers at ANL-W in the Zero Power Physics Reactor Materials Storage Building, shown in Figure 2-22. More than 150 metric tons

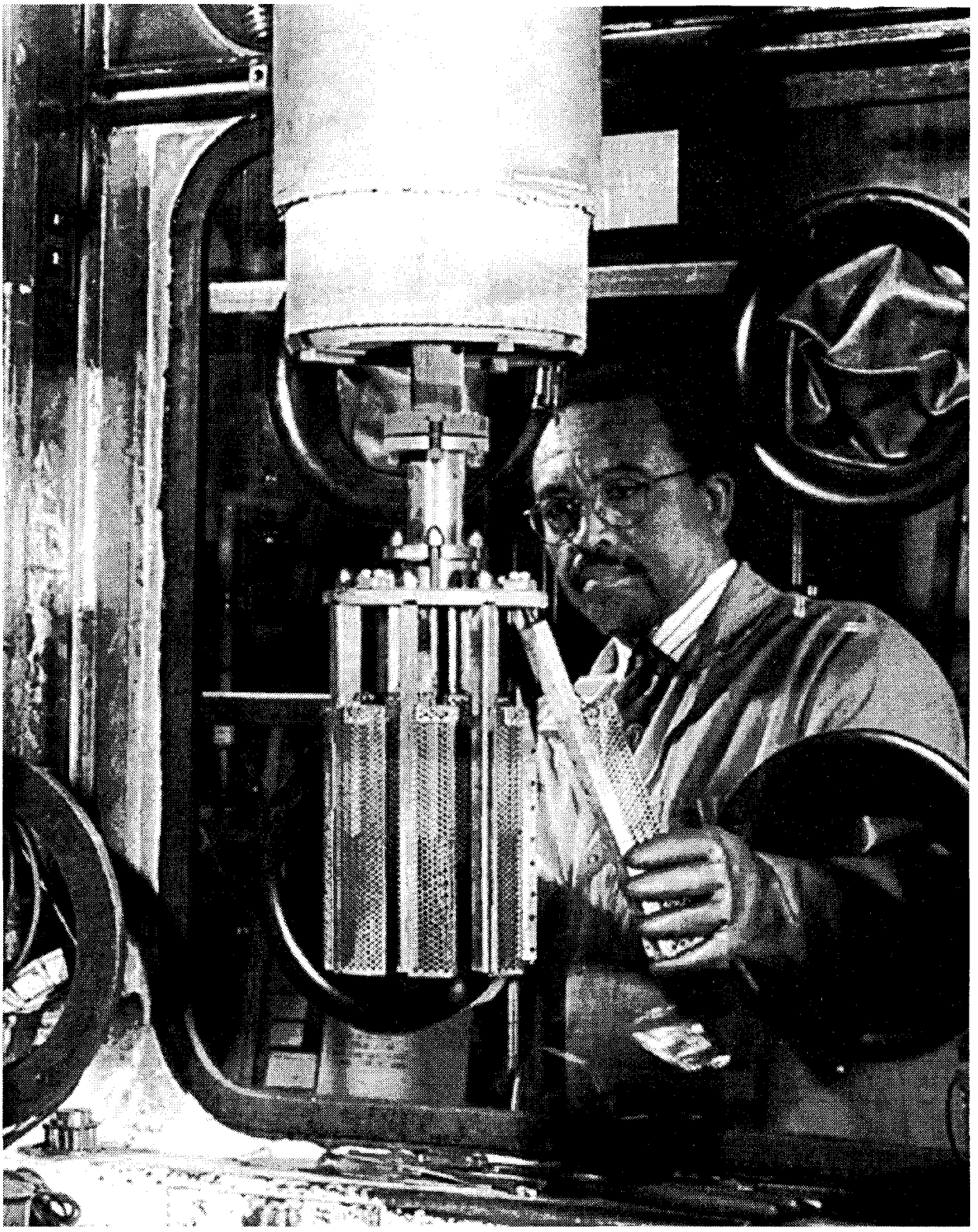


Figure 2-21. A high-efficiency electrode being prepared for a research electrorefiner by its developer

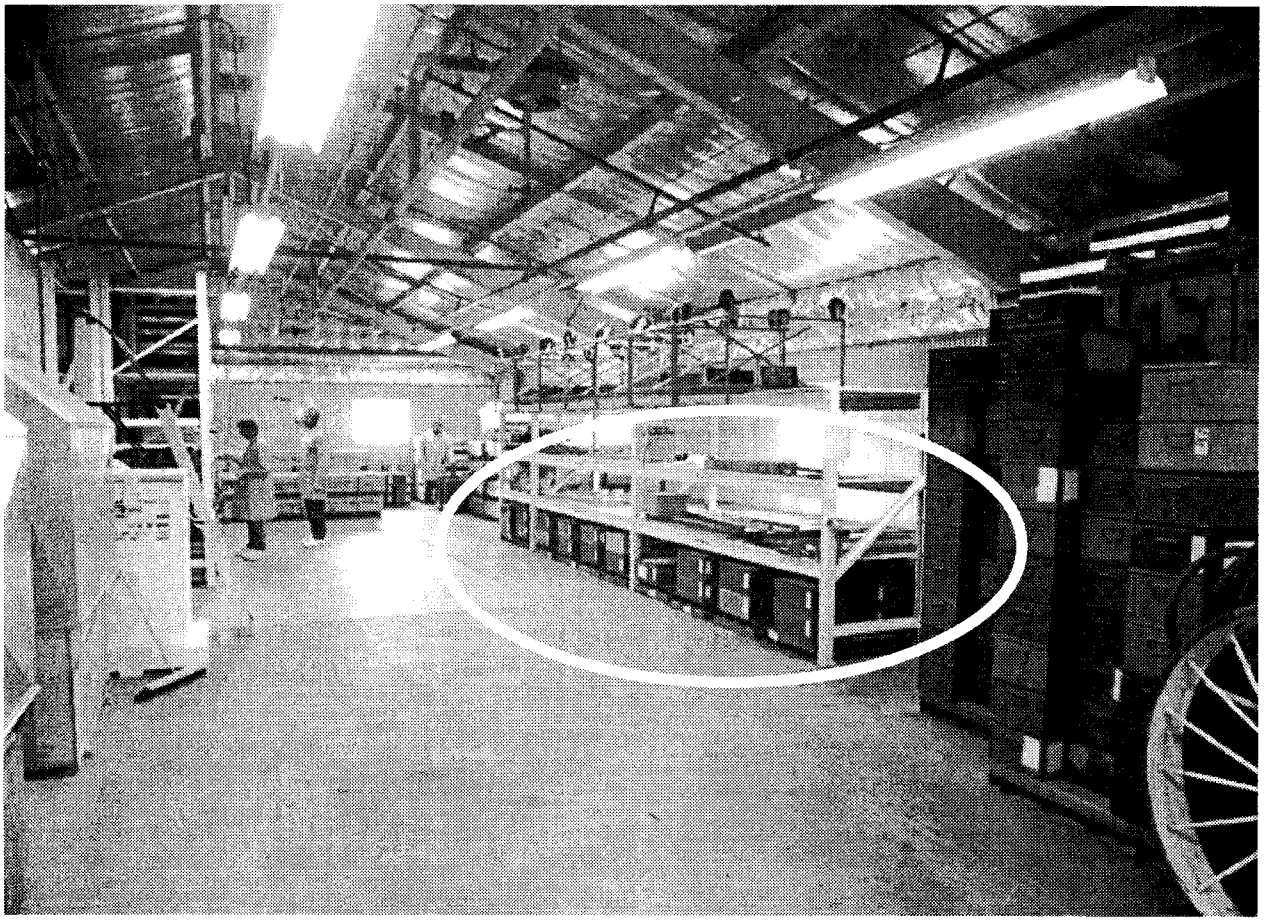


Figure 2-22. Approximately 150 metric tons of uranium metal stored along one wall in the ZPPR materials storage building

(165 tons) of depleted uranium metal is already being stored in this building, and a total of more than 200 metric tons (221 tons) are presently stored at the ANL-W site.

There is a relatively low concentration of fission products in the 25 spent EBR-II blanket assemblies, which also contain approximately 10 kilograms (22 pounds) of plutonium and other transuranic elements. For the proposed demonstration, approximately 230 kilograms (510 pounds) of assembly hardware, removed from the blanket assemblies before the electrorefining state, would be stored as low-level waste. Some 110 kilograms (243 pounds) of metallic waste would be produced [0.01 cubic meters (0.35 cubic feet)] from the cladding hulls of the blanket elements. Treating the working fluid (salt) to remove the fission products and plutonium after the treatment of blanket elements would produce approximately 0.09 cubic meters (3.2 cubic feet) of high-level radioactive ceramic waste. The salt from both electrorefiners would be treated in the same zeolite column to ensure mixing of the greater quantity of fission products from driver fuel treatment with the larger quantity of transuranic elements from the blanket fuel treatment.

Safety and Environmental Data: Air emissions from the FCF would continue to be measured with modern equipment that has been installed and is currently operating, as shown in Figure 2-23. Continuous air monitoring is conducted for the radioactive isotopes Strontium-90, Ruthenium-106, Cesium-134, Plutonium-240, Zirconium-95, Rhodium-106, Barium-137m, Plutonium-241, Xenon-133, Niobium-95, Cesium-137, Plutonium-239, Krypton-85, and Iodine-131. There is also a detector for measuring the gross radiation from particulates collected from the facility exhaust and a detector for measuring the gross radiation from gases. Radiation monitoring of operations personnel would continue according to current practice of at least monthly recording of radiation exposure data; deviations in exposure would be recorded and correlated with particular operations. Quantitative data would be reported for all uranium and waste removed from the facility. Data for nuclear material accounting would be generated from mass measurements, quantitative chemical analysis of samples, and computer calculations of spent fuel constituents based on the history of the fuel in the reactor.

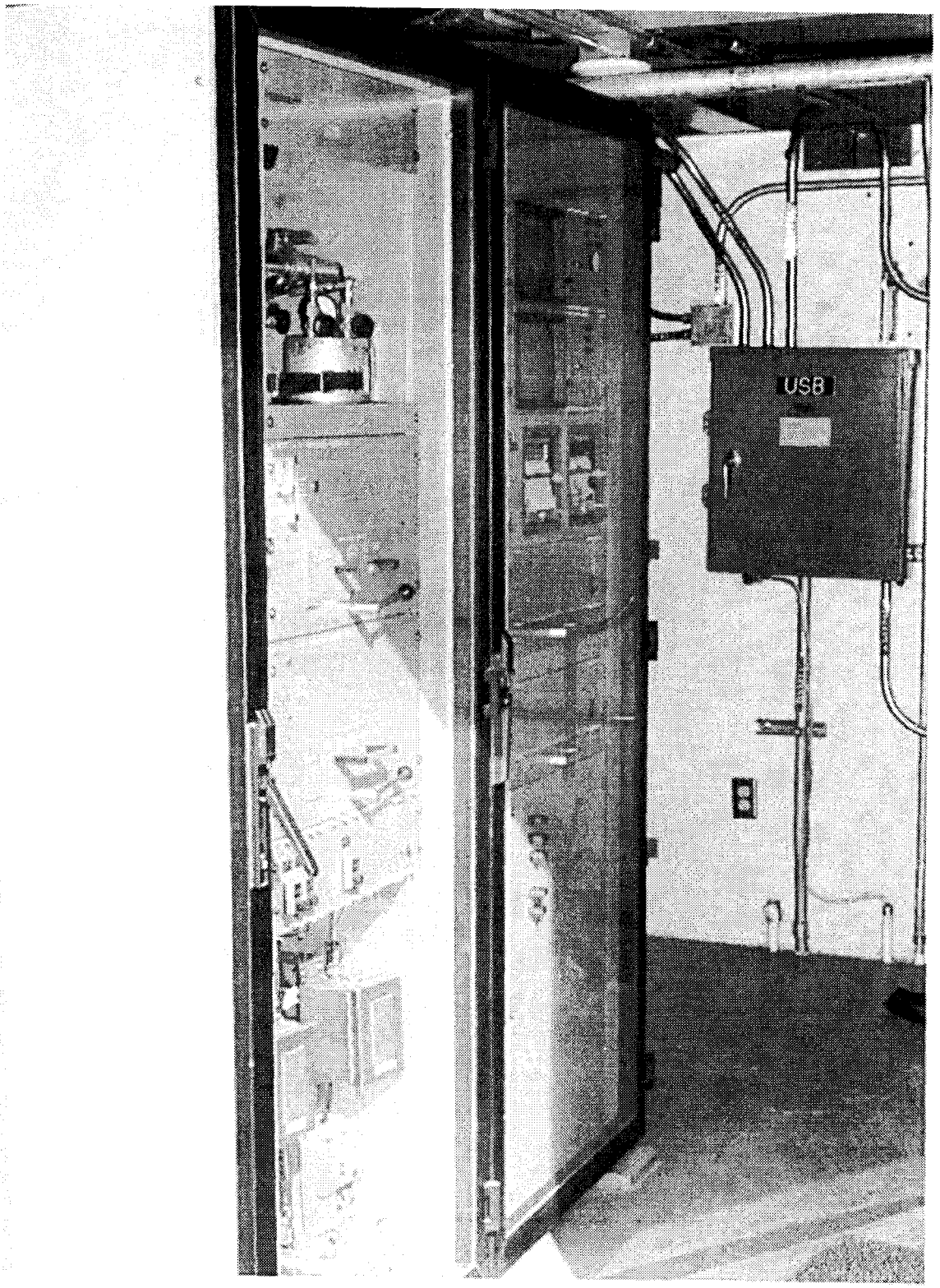


Figure 2-23. FCF environmental monitor

2.4 Equipment Performance Verification Alternative

Under the Equipment Performance Verification Alternative, DOE would limit the demonstration to treatment of 50 EBR-II driver assemblies and 10 EBR-II blanket assemblies. The treatment steps would be identical to the Proposed Action. With fewer batches of fuel to be treated, this alternative would require approximately two and one-half years to complete.

This alternative would be used to confirm that the electrometallurgical technique is an overall dependable and predictable treatment process, evaluating operational durability, repair and maintenance, and operability of linked process steps. It would demonstrate operations of treatment equipment in FCF to perform each of the process steps described in the Proposed Action (see Section 2.3).

The treatment of 50 driver assemblies and 10 blanket assemblies could be completed sooner than the Proposed Action, but would not satisfy DOE's need to demonstrate several aspects of the technology. First, less operational data would be provided than with the Proposed Action. Since DOE does not have experience in operating electrometallurgical equipment in a remote radioactive environment to treat SNF, gaining more operational experience during the demonstration would be prudent. One reason for conducting demonstrations, such as the demonstration of electrometallurgical technology in FCF, is to study process and equipment adjustments in an environment specifically designed for just this purpose. Fifty driver assemblies would provide as few as ten batches of test fuel for the treatment demonstration. Ten blanket assemblies would provide as few as three batches of fuel for the test of high-efficiency electrorefining. While the treatment of these assemblies would provide some limited data on the operational performance of the equipment, it would not provide the same assurance that would be obtained by treating a greater number of assemblies.

The second disadvantage of this alternative is that it would not provide for an adequate technical demonstration of the process steps, in particular the waste treatment of the electrorefiner salt. An important element of the electrometallurgical technology demonstration is the immobilization of

the fission products in a ceramic waste form. Ideally, a demonstration would process SNF through the electrorefiner until the concentration of fission products, transuranic elements, and sodium chloride reached a level that verged on impeding the performance of the electrorefiner salt, a concentration estimated to be 15%. Such a test would help determine the required frequency of waste treatment of the salt, which in turn would affect the economics of the technology. (More frequent waste treatment would reduce the throughput of the treatment equipment.) A high impurity loading in the salt would also test the efficiency of the zeolite for adsorbing fission products and transuranic elements. Under the Proposed Action, the fission product loading in the salt would reach 3%, which is the estimated minimum concentration needed to verify the performance of the electrorefiner salt and the waste treatment equipment. Under the Equipment Verification Alternative Alternative, treatment of 50 driver assemblies could only produce a fission product concentration of about 1.5%, much less than that necessary for an adequate technical evaluation of the performance of the electrorefiner salt and the waste treatment operations.

2.5 Demonstration at an Alternative Facility and Location

This alternative involves conducting the electrometallurgical treatment technology demonstration on EBR-II fuel at a different, but existing, DOE owned facility. DOE selected the Test Area North (TAN) Hot Shop for consideration as the best potential alternative facility because it is situated on the INEL about 67 kilometers (42 miles) by road north of the storage location of the fuel at ANL-W. Construction of a new facility for a demonstration project was not considered because of the high cost of constructing an acceptable new facility for such a small-scale demonstration. Alternative sites off the INEL were not considered because of extended transportation required and DOE's decision to consolidate stainless steel clad SNF in Idaho.[10] As noted earlier, DOE's sodium-bonded metal fuel, with the exception of few assemblies at the Hanford Reservation, is already stored at the INEL. The six sodium-bonded spent fuel assemblies at Hanford would not be sufficient for the proposed demonstration. The EBR-II spent blanket material at Savannah River has already had the cladding and most of the sodium

removed, and does not contain a sufficient inventory of fission products for an adequate technical demonstration.

In May 1995, DOE commissioned a study for the purpose of comparing INEL facilities that could potentially meet the facility requirements for conducting treatment operations on highly radioactive mixed waste presently stored at ANL-W and other locations at the INEL.[11] Because the physical requirements for a mixed waste treatment facility are very similar to the requirements for demonstration of a treatment technology for the EBR-II spent fuel, the results of this study are considered relevant to the analysis of this alternative. The mixed waste treatment operations require essentially the same size facility as the FCF, with about the same number of remote work stations, equal radiation shielding, similar environmental protection and contamination confinement features, and an inert atmosphere processing cell with remote handling equipment.

Under this alternative, the equipment described earlier (and now being tested in the FCF for the Proposed Action) would be decontaminated, modified, shipped to the Hot Shop and installed as necessary. One hundred driver assemblies and 25 blanket assemblies would then be shipped from ANL-W and treated at the TAN Hot Shop. It would also be possible to ship some EBR-II fuel from ICPP approximately 32 kilometers (20 miles) to the TAN Hot Shop (as well as to ANL-W). Shipments between ICPP and TAN over a public highway would require a Department of Transportation approved shipping cask specifically licensed for EBR-II spent fuel and capable of interfacing with both facilities. EBR-II spent fuel storage bottles removed from ICPP would have to be inspected to select only those that have not leaked or have otherwise damaged fuel inside. Metallic EBR-II spent fuel that has oxidized or hydrided would require pretreatment prior to introduction to the electrorefiner.

The treatment steps, waste forms and byproducts would be the same as described for the Proposed Action. The demonstration byproducts, including the uranium and waste forms would then be shipped back to ANL-W for storage at the same facilities as described in the Proposed Action. There are no appropriate storage capabilities at TAN.

Conducting the proposed demonstration at the TAN Hot Shop has several disadvantages: it would result in a cost increase of more than $76 million to duplicate existing capabilities at FCF and there would be a 5 to 8 year delay in performing the demonstration project. The additional cost and delay result from the fact that the TAN Hot Shop does not meet the current safety and environmental requirements necessary for the proposed demonstration. Also, the potential environmental impact associated with conducting the demonstration at TAN would be greater because major decontamination, demolition and reconstruction would be necessary to refurbish the hot cells, the additional transportation of radioactive materials over public highways, and the equipment and radioactive materials presently stored there would need to be relocated. Moreover, the delay in conducting the proposed research and demonstration project could result in loss of crucial infrastructure needed to conduct the project.

The TAN Hot Shop was constructed in the early 1950s to support the Aircraft Nuclear Propulsion Program. Some modification and improvement has been completed recently to meet the needs of the current mission of the facility. However, additional major improvements would be required to meet the needs of the proposed electrometallurgical demonstration. For example, operator window workstations equipped with lead/follow manipulators would have to be added and the cell would have to be modified for inert atmosphere operations. Also, the facility support systems would have to be replaced or upgraded to meet all of the current DOE safety regulations and criteria. These would be essentially the same modifications that were estimated in the Merrick[12] study at a cost of approximately $88 million, of which about $14 million was for equipment specific to the remote waste treatment program. Therefore, $74 million was used as a reasonable estimate for the facility modifications needed to prepare the TAN Hot Shop for the proposed electrometallurgical treatment research and demonstration project. Assuming that the facility modifications would be designed so that most of the equipment currently installed in the FCF would be useable in the refurbished TAN Hot Shop with little modification, it is estimated that the removal, decontamination, minimal modification, packaging, shipping and reinstallation would require an additional $2 million. The additional cost of transportation and other incidental costs (such as safety analysis and permitting costs) were not included in the comparison.

The most significant factor leading to the increased environmental impact of this option would be the major construction project required. The Merrick study estimates that this project would require about 30,000 labor hours for decontamination and demolition work necessary to allow modification to the facility in a similar manner to that done at the FCF. Assuming that the workers were exposed to average radiation fields of 0.01 rem per hour during this work, a total worker dose of 300 rem would be expected. The Merrick[13] study also estimates that 1000 cubic meters (1310 cubic yards) of contaminated materials and concrete would be removed for disposal during the project and 6390 square meters (71,000 square feet) of floors and walls would have to be steam cleaned. The contaminated wastes from this cleaning operation would be collected and evaporated to produce a solid low-level waste product for disposal.

Transportation of the fuel from the ANL-W site or ICPP* to the TAN site and the return trips for the byproducts and wastes would require an estimated 150 to 200 shipments over public Highways 20 and 33. The TAN site is located essentially adjacent to Idaho Highway 33 to the south and east, and about 10 kilometers (6 miles) from Idaho Highway 28 to the northeast, while ANL-W is about 6 kilometers (4 miles) north of U.S. Highway 20.

2.6 The No-Action Alternative

The basis of the No-Action Alternative is to continue to use the Fuel Conditioning Facility as a multipurpose hot cell facility, as directed by DOE. Under the No-Action Alternative the electrometallurgical treatment research and demonstration project would not occur, and all EBR-II spent fuel would be placed in dry storage at the RSWF until other treatment technologies were available or the spent fuel is shipped to another interim storage site. However, Step 1 (disassembly) in the treatment flow diagram (Figure 2-10) would occur because disassembly is required to prepare EBR-II SNF for storage in RSWF.

---

* EBR-II SNF could be transferred from ICPP, as well as ANL-W, but the same number of shipments would be required over the public highways. The products from treatment would be returned to ANL-W.

This alternative would not satisfy DOE's need to evaluate the technical feasibility of applying this technology to EBR-II SNF, nor would it be responsive to the recommendations of the National Research Council. The No-Action Alternative would have an advantage in that the negligible release of fission product gases under the Proposed Action would not occur. However, the No-Action Alternative could result in a risk of losing crucial infrastructure — experienced personnel and functioning hot cells. Moreover, delaying treatment could potentially increase the percentage of stored fuel that could degrade following cladding failure due to stress corrosion cracking. While failed fuel would be safely confined by the redundant storage canisters for a limited time, it could pose a potential hazard to personnel who open the canisters after retrieving them from storage for eventual transportation or treatment. Eventual failure of the canisters due to corrosion following the failure of RSWF liners after an extended period of storage should be assumed. Failed fuel would complicate whatever operations followed retrieval of the fuel.

Under the No-Action Alternative, 43 more RSWF storage liners would be required than would be needed for the Proposed Action, because of the volume reduction of stored materials achieved under the Proposed Action. If the No-Action Alternative is selected, DOE's ability to meet its commitment to the State of Idaho for removal of DOE spent fuel by 2035 may be diminished.

This page intentionally left blank.

3.0 THE AFFECTED ENVIRONMENT

3.1 Site Description

Information about the environmental setting around ANL-W and the INEL is presented below. This information has been thoroughly described within *DOE Programmatic SNF Management and INEL Environmental Restoration and Waste Management Programs Final Environmental Impact Statement (DOE/EIS-0203-F), April 1995 (referred to hereafter as the "SNF and INEL EIS").* That reference may be consulted for additional detailed information.

Figure 3-1 illustrates the location of the INEL and the ANL-W site. ANL-W is accessible by a single paved road, approximately 5 kilometers (3 miles) long. This road is open only for official business travel. The intersection of the road and U.S. Highway 20 approximately marks the site boundary. The INEL occupies 2300 square kilometers (890 square miles) of land in southeastern Idaho on the edge of the Eastern Snake River Plain. The INEL's eastern boundary is approximately 47 kilometers (29 miles) west of Idaho Falls, Idaho. ANL-W is located in the southeastern portion of the INEL. Approximately 95% of the INEL land area has been reserved for use by DOE. The remaining 5% of the area includes public highways (U.S. Highways 20 and 26, and Idaho Highways 22, 28, and 33) and the Experimental Breeder Reactor-I National Historic Landmark. Public access is limited to highways and the Experimental Breeder Reactor-I facility. Most of the INEL is unfenced, but security fences and guard posts are located around facilities (including ANL-W) to preclude public access to those facilities.

ANL-W has administrative control over a rectangular area, encompassing approximately 328 hectares (810 acres). The site facilities cover only a small portion of this administrative area approximately 20 hectares (50 acres) which accounts for 6% of the site. Site facilities are within a topographically closed drainage basin.

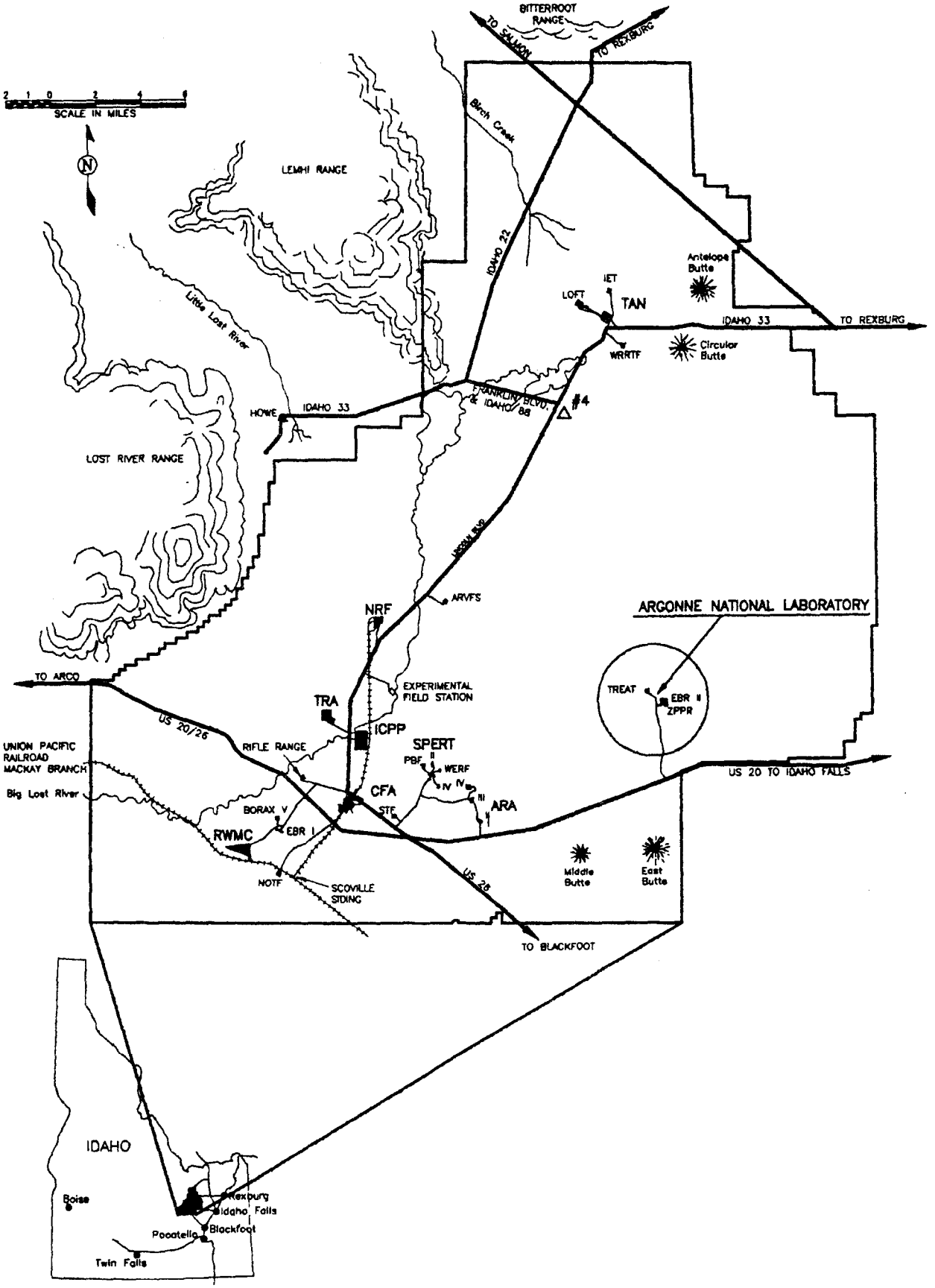


Figure 3-1. Idaho National Engineering Laboratory

The region of influence for the INEL is a seven-county area comprising Bingham, Butte, Bonneville, Clark, Jefferson, Bannock, and Madison counties. This region had a 1990 population of 219,713.

Historically, the regional economy has relied predominantly on farming and ranching. Mining is also an important component of the regional economy.

The populated area nearest to ANL-W is Atomic City, Idaho (population 25), located about 29 kilometers (18 miles) to the southwest. Idaho Falls, Idaho, with a population of approximately 45,000, lies 63 kilometers (39 miles) to the east and is the closest major population area to the ANL-W site. At a distance of 58 kilometers (36 miles) to the south-southeast, the 1,000 residents of the town of Fort Hall, Idaho, constitute the nearest minority population center. With a predominating Native American population, the Fort Hall Indian Reservation (1990 U.S. census population of 2681, which includes the town of Fort Hall) is administered by the Shoshone-Bannock Nation. It is also the current home of the Lemhi Indian Nation.

The population within an 80 kilometer (50 mile) circle centered at ANL-W has been characterized for the purposes of identifying whether any disproportionately high and adverse impacts exist to minority and low-income communities (see Section 4.6). The population surrounding the INEL is 7% minority and 14% low-income, based on U.S. Bureau of Census information. The definition of minority and low-income populations and impacts are discussed in Section 4.6 of this EA.

The INEL has a semi-arid climate typical of high valleys in the mountains west of the Continental Divide. The average annual precipitation is 230 millimeters (9.1 inches). Snowfall averages 660 millimeters (26.0 inches) per year. The winters are characteristically cold with snow cover often lasting from December through March. Summers are very warm with temperatures that occasionally reach 38°C (100° F) or more. The average annual temperature is approximately 5.4°C (41.7° F).

Endangered animal species (peregrine falcon) and the threatened animal species (bald eagle) have been occasionally sighted on lands within the boundaries of the INEL. Neither species is known to nest on-site, and neither is commonly observed near facilities. No Federal- or State-listed plant species that are endangered occur at the INEL.

Activities at the ANL-W site do not result in surface or groundwater discharges to navigable waterways or recreational fisheries. Therefore, the Proposed Action would not impact recreational fisheries and would be in compliance with Executive Order 12962 of June 7, 1995 titled Recreational Fisheries.

Prehistoric and historic archaeological resources have been identified in the INEL area, mostly at surveyed sites near major facilities. The Experimental Breeder Reactor-I (which is not located at the ANL-W site) is listed on the National Register of Historic Places. EBR-II has been designated as an American Nuclear Society Historical Landmark. The Shoshone-Bannock Tribes consider the land occupied by the INEL to be culturally important. In 1992, a memorandum of agreement (MOA) was signed between the Tribes and DOE-Idaho Operations Office granting access to the Middle Butte area and other areas within the boundaries of the INEL for the performance of sacred or religious ceremonies or other cultural or educational activities in accordance with safety, health, and national security considerations. The ANL-W site has not been affected.

3.2 Air Quality and Meteorology

The INEL is not located in a nonattainment area (an area which cannot meet standards for designated pollutants) with respect to any of the National Ambient Air Quality Standards. The INEL is located in a Class II area. Portions of nearby Bannock and Power counties [within 80 kilometers (50 miles) of the INEL] are nonattainment areas. Three "preventions of significant deterioration Class I ambient (surrounding) air quality" areas have been designated in the vicinity of ANL-W. These are: Craters of the Moon Wilderness Area, 53 kilometers (33 miles) west-southwest from the center of ANL-W; Yellowstone National Park, 133 kilometers (83 miles)

east-northeast from the center of ANL-W; and Grand Teton National Park, approximately 153 kilometers (95 miles) east from the center of the ANL-W.

The types and amounts of nonradiological emissions from the INEL are similar to those of other industrial complexes of similar size. Baseline concentrations of hazardous air pollutants are below applicable standards and guidelines.

Although the INEL is in a belt of prevailing westerlies, these winds are normally channeled by the adjacent mountain ranges into a southwest wind. The annual average windspeed measured at the 6.1 meter (20-foot) level at the INEL Central Facilities Area weather station is 12.1 kilometers per hour (7.5 miles per hour). Monthly average values range from 8.2 kilometers per hour (5.1 miles per hour) in December to 15 kilometers per hour (9.3 miles per hour) in April and May. The highest hourly average near-ground windspeed measured at the INEL is 82 kilometers per hour (51 miles per hour).

Severe weather, other than thunderstorms, is uncommon. Ten funnel clouds (that is, tornadoes not touching the ground) and 2 low-intensity tornadoes were reported on the INEL between 1950 and 1988.

3.3 Surface/Ground Water Quality

Local creeks and streams originate in the mountains and much of their water is diverted for irrigation before reaching the INEL. There is little flow of water onsite, and no surface water runs off the INEL. All rivers and streams are intermittent. Streams entering the INEL include the Big Lost River, Little Lost River, and Birch Creek. ANL-W is located approximately 18 kilometers (11 miles) from the Big Lost River which is the nearest of these streams. The only surface waters at ANL-W are from stormwater runoff, discharge from the cooling tower system to wastewater ditches and the Industrial Waste Pond, and discharges from the site sanitary systems to the membrane-lined Sanitary Lagoons.

The Snake River Plain Aquifer underlies the INEL and ANL-W and has been designated as a sole source aquifer.[14] Depths to the water table at the INEL range from 61 meters (200 feet) in the north to 274 meters (900 feet) in the south. At ANL-W, the depth to the aquifer is approximately 180-210 meters (600-700 feet). Aquifer recharge sources include irrigation diversions, valley underflow, river seepage, precipitation, and to a much lesser extent, INEL percolation ponds. Flows in the largely unconfined Snake River Plain Aquifer are generally to the southwest. Groundwater flows at speeds ranging from 1.5 to 6.1 meters per day (5 to 20 feet per day). The water quality of the aquifer is generally good. Small concentrations of tritium and strontium-90 from the ICPP and Test Reactor Area have been found in the aquifer and have exceeded maximum contaminant levels onsite.[15] Extremely low concentrations of iodine-129 and tritium have migrated off the INEL site, but the concentrations of both the iodine-129 and tritium at the site boundary were orders of magnitude below maximum contaminant levels for drinking water.[16] Water samples from monitoring and production wells at and around the ANL-W site indicate that there are no contaminants in the aquifer resulting from ANL-W operations or activities.[17]

3.4 Soils/Geology

The ANL-W site is situated on the Eastern Snake River Plain at an elevation of 1562 meters (5125 feet) above sea level. The Eastern Snake River Plain is a physiographic depression that extends from near Twin Falls, Idaho to the Island Park Caldera north of Ashton, Idaho. The surface of the Eastern Snake River Plain is a combination of basaltic lava outcrops and alluvial sedimentary deposits. The sediments range from gravel and sand deposited by streams (as alluvial fans, channel fillings, and deltas) to silt and clay deposited in playas. The subsurface of the plain is principally composed of basalt flows interbedded with lacustrine and alluvial sedimentary deposits to a depth of about 760 meters (2500 feet). The most recent volcanic flow, occurring about 2100 years ago, is evident in the scenic basalt flows at Craters of the Moon National Monument, about 64 kilometers (40 miles) southwest of ANL-W.[18,19,20,21]

The Eastern Snake River Plain is on an area of low seismicity that is adjacent to the seismically active Intermountain Seismic Belt and Centennial Tectonic Belt, and lies in Uniform Building Code Seismic Risk Zones 2B and 3. An earthquake with a magnitude of 7.3 occurred near Borah Peak, Idaho on October 28, 1983. The epicenter (part of the earth's surface directly above the earthquake) was about 64 kilometers (40 miles) from the INEL. Although the shock was felt at the INEL, no structural or safety related damage occurred to INEL structures. On August 17, 1959, a magnitude 7.1 earthquake occurred near Hebgen Lake, Montana; the epicenter was about 160 kilometers (100 miles) northeast of the INEL and was felt at the INEL but caused no damage. These earthquakes are included in a total of 29 earthquakes greater than magnitude 5.5 that have occurred within 322 kilometers (200 miles) of the INEL since 1884.[22,23,24] More detailed information and graphic representations of the geology and historical earthquakes can be found in the SNF and INEL EIS, Volume 2, Part A, Section 4.6, Geology.

3.5 Off-Site Monitoring

ANL-W conducts a site surveillance program and publishes an annual Environmental Surveillance Report.[25] Surveillance activities conducted by ANL-W include measurement of radionuclides in airborne particulate and potable water. In addition, the Radiological and Environmental Sciences Laboratory of the INEL places 12 thermoluminescent dosimeters at various locations around the ANL-W perimeter to measure levels of penetrating radiation. As described in the 1994 Environmental Surveillance Report, airborne particulate gross beta and actinide concentrations were detected at ANL-W, however, the concentrations were not different than those measured in communities surrounding the INEL. Potable water from the two site production wells is analyzed monthly for alpha, beta-gamma, and tritium activity. No radioactivity due to operations at ANL-W has been found. Similarly, thermoluminescent dosimeters posted along the site security perimeter routinely register exposures only slightly higher than background levels measured in distant communities. The annual doses measured ranged from 0.008 rem less than the distant background measurement of 0.063 rem, to 0.048 rem higher than the background level. The higher doses correlate with nearby storage of radioactive

materials. These analytical results indicate that site boundary or offsite impacts associated with current ANL-W operations are minimal.

This page intentionally left blank.

This page intentionally left blank.

4.0. ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION

4.1 Environmental Impacts of Facility Operations

Surface Water Impacts: The only surface waters at ANL-W are the Industrial Waste Pond, wastewater ditches, the Sanitary Lagoons, and intermittent stormwater runoff. The Proposed Action would not produce liquid effluents, so there would not be any impacts to surface waters or groundwater from effluents. During fuel treatment and associated activities, some hazardous materials may be used inside buildings. To prevent potential releases to surface or subsurface waters resulting from spills of hazardous materials used in buildings, FCF and other buildings are designed, constructed and maintained to contain these materials. The use of double contained pipe, leak detection, and secondary containment of tanks are some of the features to prevent hazardous material release to the environment. Following existing written procedures, spill containment and cleanup equipment is present in areas where hazardous materials are stored or used.[26,27]

Land Impacts: Land use at ANL-W has been dedicated to nuclear reactor and spent fuel research since 1955. All activities associated with the Proposed Action would take place on previously disturbed land.

Threatened or Endangered Species: There are no known threatened or endangered species or sensitive habitats that would be affected by the Proposed Action. The SNF and INEL EIS Volume 1, Appendix B contains the latest Fish and Wildlife Service listing (dated January 26, 1994) of endangered and threatened species on and around the INEL. The peregrine falcon and the bald eagle have been occasionally sighted on lands within the boundaries of the INEL. Neither species is known to nest onsite, and neither is commonly observed near facilities. No Federal- or State-listed plant species occur at the INEL.

4.1.1 Air Quality Impacts

4.1.1.1 Non-Radioactive Emissions

Potential impacts from non-radioactive releases associated with the Proposed Action are very limited. A small amount of refrigerant gas (freon R-22) may escape from the argon cell cooling system at the FCF and electrical equipment cleaning will also contribute a small amount. The estimated total refrigerant gas release of about 90 kilograms (200 pounds) per year is small (400 times less) compared with the Idaho regulatory threshold for "significant" release of volatile organic compounds of 36,000 kilograms per year (40 tons per year). Only small amounts of solvents are used in the facilities for cleaning purposes, so other volatile organic compound emissions would be negligible. The FCF Permit-to-Construct allows use of up to 90 kilograms (200 pounds) of volatile organic compounds per year. The Proposed Action would not result in an increase in vehicle trips compared with the no action alternative.

4.1.1.2 Radioactive Emissions

Potential offsite doses from operations during this Proposed Action are quite small. The Proposed Action would take place in shielded facilities at some distance from the INEL boundary. No increased radiation levels above background would be detectable at the ANL-W site or at the INEL site boundary.

The FCF and EBR-II share the ANL-W Main Exhaust Stack, which is equipped with continuous compliance air monitoring equipment meeting the monitoring requirements of 40 CFR Part 61, Subpart H, "National Emission Standards for Emissions of Radionuclides Other Than Radon from Department of Energy Facilities." Also, in accordance with the National Emission Standards for Hazardous Air Pollutants (NESHAP) program, emissions from this and other sources at ANL-W are reported annually as required by the NESHAP regulations (ANL-W data are part of the INEL annual report). The annual INEL NESHAP[28] report includes offsite dose calculations which are prepared using the mandated CAP88 (Clean Air Act Assessment Package)

computer program. The report is available annually for public review. The CAP88 code predicts the offsite dose to the Maximally Exposed Individual (MEI).

ANL-W has used the CAP88 code to estimate the offsite dose from projected FCF operations to the MEI and to the population within the 80 kilometer (50 mile) radius. The hypothetical MEI for this calculation is conservatively located at the point on the DOE site boundary [5 kilometers (3.1 miles) south-southeast of the ANL-W site] which has the highest CAP88 calculated dose. This point is near the intersection of the ANL-W access road and U.S. Highway 20.

Estimated FCF emissions are based on treating 90 driver assemblies in a year. This fuel is conservatively estimated to have 10% burnup and 15 months of cooling. In the calculation, 100% release of fission product gases (principally tritium and krypton) is assumed. Particulate releases are estimated based on conservative assumptions (less filtration than expected) for the FCF particulate filtration systems. The calculated offsite MEI dose rate from annual FCF emissions is 1.1×10^{-6} rem per year committed effective dose equivalent. This dose rate is a factor of about 9,000 below the annual NESHAP offsite dose limit of 0.01 rem per year for a maximally exposed member of the public. It is approximately a factor of 300,000 less than the annual dose rate due to natural background radiation on the Eastern Snake River Plain (about 0.35 rem per year). A graphic representation of a comparison of the natural background radiation dose, the NESHAP limit and the calculated annual MEI dose is shown in Figure 4-1. The increase in risk of latent cancer fatality to the MEI per year of exposure to FCF emissions in the Proposed Action is estimated to be 5.3×10^{-10}, or approximately one chance in 1.8 billion. So, if a person lived at the MEI location and was continually exposed to the projected FCF annual emissions for 72 years (although the project duration is expected to be approximately 3 years), that person's risk of death by cancer is estimated to increase by a factor of 4.0×10^{-8}, or approximately one chance in 25 million. This compares to the U.S. average fatal cancer incidence of approximately 0.25 (one chance in four). The potential increase in nonfatal cancer risk[29] to the hypothetical MEI is 1.1×10^{-10} (one chance in 9 billion) per year of exposure. The

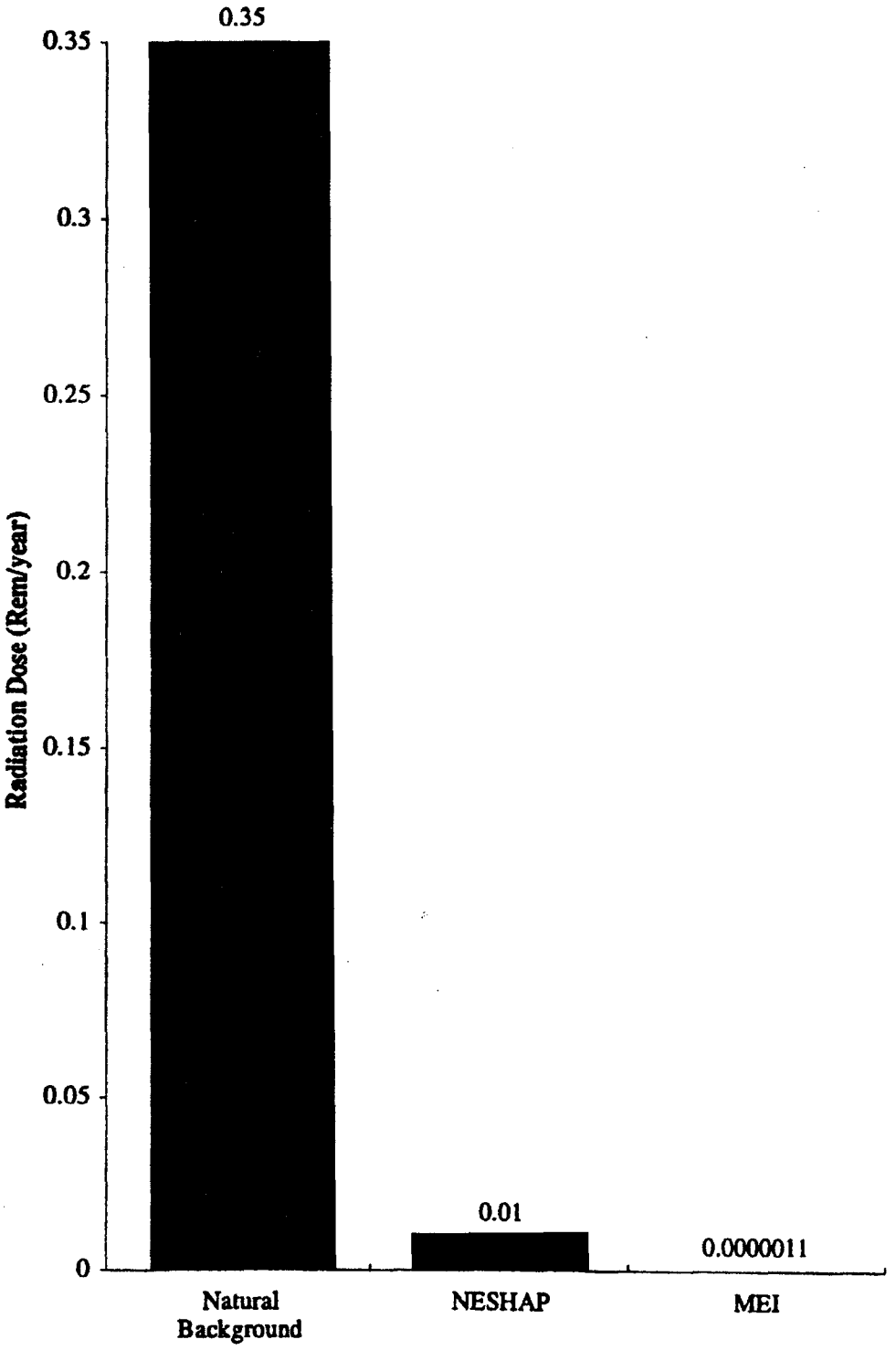


Figure 4-1. Comparison of MEI radiation dose to background radiation and NESHAP limit.

calculated offsite population dose rate from annual FCF emissions to the 80 kilometer (50 mile) radius exposed population is 1.8×10^{-2} person-rem per year. The estimated increase in latent cancer fatalities per year is 9.0×10^{-6} (one chance in 100,000) for the 80 kilometer (50 mile) radius exposed population. The estimated increase in the number of nonfatal cancers within the 80 kilometer (50 mile) radius exposed population is 1.8×10^{-6} (one chance in 500,000) per year of exposure.

The FCF design includes several systems to minimize the release of radioactive particulate material. Methods include ventilation systems that are designed such that air flow moves from cleaner areas toward areas with higher potential for radioactive contamination. The latter areas are provided with inlet High Efficiency Particulate Air (HEPA) filters to minimize the spread of contamination and to prevent backward migration of contamination in the event of a flow upset. All exhaust ventilation from contaminated areas is subject to at least two stages of HEPA filtration prior to release. The air exhausted from normally clean areas by the building exhaust system is filtered by a single stage HEPA filter. HEPA filters are tested for effectiveness on a periodic basis using standard techniques and well-established procedures.

4.1.2 Radiation Exposure to Workers

During the Proposed Action, all normal operational surveillance and environmental monitoring would continue at ANL-W. A staff of health physics, industrial hygiene, and industrial safety personnel would be present. The INEL Fire/Rescue Station located at ANL-W, and approximately 46 meters (50 yards) from the FCF, maintains staffing for emergency readiness. The ANL-W Emergency Management Plan describes the measures that would be taken to deal with hazardous waste/material emergencies.[30] These personnel and plans would help to ensure that exposures to both radiological and nonradiological hazards would be minimized and monitored. All actions would be conducted in full compliance with DOE Regulations found in 10 CFR 834, "Environmental Radiation Protection," and 10 CFR Part 835, "Occupational Radiation Protection" and with DOE Order 5400.5, "Radiation Protection of the Public and the Environment."

Facility and operational modifications to FCF were made in a manner designed to ensure that worker doses would be in accordance with ALARA goals and DOE requirements. These facility and operations modifications incorporate: a) shielding, b) ventilation systems, c) decontamination procedures, d) radiation monitoring (both personnel and area), and e) training to ensure that goals and requirements are met. The general design goals at FCF were to maintain radiation fields below 0.0005 rem/hr at all workstations. Hence, the annual exposure for an individual working for 8 hours per day, 5 days per week, 50 weeks per year would be expected to be less then 1 rem. Areas where measured fields are higher than the goal, and where shielding cannot be provided, would have administrative controls imposed to minimize time (and thus exposure) in those areas.

Besides the ventilation system, other design features are incorporated to limit the spread of contamination and to increase the effectiveness and efficiency of decontamination operations. For example, bag-in/bag-out ports are used for the transfer of materials, equipment, or wastes in or out of cells or other areas. (Bag in/bag out ports are openings onto which a plastic bag is attached for transfer of an item into or out of the cell, without allowing a movement of air into or out of the cell during the transfer, thereby limiting the spread of radioactive contamination).

Integral to the shielding, ventilation, and decontamination design features of the facility is radiation monitoring equipment. Radiation monitoring measures alpha, beta, and gamma radiation fields and levels of airborne and surface contamination in the facility. This instrumentation, with associated alarms, warns personnel of increases in radiation levels, helps to determine the integrity of barriers, to detect the spread of contamination, and to assess potential consequences of abnormal conditions or accidents. The location, number and type of radiation monitors are described in the Final Safety Analysis Report for the FCF.[31]

ANL-W employees receive training in the fundamentals of radiation protection as part of their initial and annual retraining. A radiation protection program, detailed in both the ANL-W Environment, Safety, and Health Manual and the ANL-W Radiological Control Manual (which is based on the DOE Radiological Control Manual), is in effect during operations. This program

specifies maximum radiation doses which workers may receive under normal and abnormal conditions, and also specifies protective equipment requirements for working in contaminated areas. Written rules of this type help ensure that radiation doses, both external and internal, are within ALARA limits.

Standard operating procedures for the FCF ensure that individual doses are kept within ALARA limits, and the DOE limit of 5 rem per year whole body dose (internal and external) is in effect. As stated in DOE Order N441.1, a DOE Administrative Control Level of 2 rem per year per person is established for all DOE activities. ANL-W has established a more conservative administrative goal of 1.5 rem per year to any individual.

A review of several years of past records from the ANL-W personnel radiation exposure database was used to estimate potential radiation doses to workers under the Proposed Action. The average exposures estimated to be received by the "involved worker" (a worker in FCF directly involved in the Proposed Action) and the "uninvolved worker" (a worker on the ANL-W site not directly involved in the Proposed Action) would be 0.06 rem per year and 0.03 rem per year, respectively. These annual radiation exposures extrapolate to an estimated increase in latent cancer fatalities of 0.001 for the 40 involved workers (1 chance in 1000) of an additional fatality and 0.006 for the 560 uninvolved workers (1 chance in 160). Under the Proposed Action, the average exposure to the "involved" and "uninvolved" workers is not expected to increase to levels above those of the No-Action Alternative. The handling of SNF outside of the hot cells, more of which would occur under the No-Action Alternative, is the largest contributor to personnel exposure.

4.1.3 Transportation Impacts

The radiological consequences of routine transportation under all alternatives would be extremely small; no adverse health effects among workers or members of the public would be expected.

The ANL-W workers travel over public highways to reach work. Also, waste shipments to the Radioactive Waste Management Complex travel over Highway 20. High-level waste and spent nuclear fuel transfers between ANL-W facilities do not use any public highways and travel a maximum distance of 0.8 kilometers (0.5 miles) to the Radioactive Scrap and Waste Facility. Since the Proposed Action does not require an increase in the total number of employees or increases in shipments to Radioactive Waste Management Complex, the proposed action would not change public highway traffic or transportation activities from the No-Action Alternative.

4.1.4 Socioeconomic Impacts

It is not anticipated that the Proposed Action would have any measurable socioeconomic impacts on the area surrounding the INEL. Any additional research personnel hired to help plan, conduct and interpret the experiments would be more than offset by a reduction in force due to shutdown of EBR-II. No net additional personnel would be hired as a result of the Proposed Action.

Procurements of materials or services required for the Proposed Action would be minimal, and would be very small compared to the overall INEL budget.

4.2 Potential Environmental Impacts of Facility Accidents

4.2.1 Accidents

All significant processes and operations in FCF would take place behind heavily shielded walls in confined hot cells. Both the air and the inert atmosphere that would be released from highly contaminated process areas of the facility pass through two stages of testable HEPA filters. The quantity of potentially hazardous particles passing through these filters would be reduced by a factor of approximately one million. However, to provide a conservative and bounding estimate, a factor of 10,000 was used in the analyses. Therefore, it is to be expected that many types of upset conditions or accidents could occur with little or no effect on the public, the on-site personnel, or the environment.

The Final Safety Analysis Report (FSAR) for the FCF[32] evaluated the consequences of a broad range of potential facility accidents which could possibly release radioactivity into the environment. The following five classes of accidents have been analyzed.

1. Argon cell over pressurization (no breach of cell integrity)

   This accident category is assumed to be caused primarily by failures in facility systems that regulate pressure of the atmosphere in the process (argon) cell, and consequently result in a release of part of the fission product gases that have accumulated in this atmosphere. These accidents do not result in breach of the process cell confinement. Such accidents may result from a loss of cell atmosphere cooling, failure of the facility's normal power supply, and sudden failure of the argon supply to the cell to an "on" condition. (The “on” condition means that fresh argon gas is being pumped into the cell, which increases the pressure of the cell's atmosphere.) No mitigation of the released fission product gases is assumed.

2. Argon cell under-pressurization (no breach of cell integrity)

This category of accident is assumed to be caused by failures in systems that regulate the pressure of the inert gas atmosphere of the process cell. Like the first category of accidents, they do not result in a breach of the process (argon) cell confinement. They include such events as failure of the controls associated with the vacuum pump for the equipment transfer lock(s) and failure of the cell cooling controls. No mitigation of the released fission product gases is assumed. The particulate releases from this accident are mitigated by the safety exhaust system with its two stages of HEPA filtration.

3. Breach of argon cell confinement

This category of accident is assumed to result from a breach, e.g., a "hole," in the argon cell boundary. This accident was assumed to be caused by an earthquake that ruptures all of the nonseismically qualified penetrations (such as specific piping appurtenances) of the argon process cell, i.e., those that were not formally qualified as being "earthquake-resistant" for one reason or another. The particulate releases from this accident are mitigated by the safety exhaust system, with its two stages of HEPA filtration. The safety exhaust system is an independent system that was designed to operate during and after an earthquake.

4. Material handling and storage accidents

This class of accident is assumed to occur when transferring or storing materials. It includes dropping and rupture of a can containing waste materials, a fire occurring in a wooden box containing waste materials, a dropped fuel assembly during transfer within the air cell, failure of a fuel element while the adherent reactor coolant sodium is being washed from the assembly, and rupture of an evaporator used to concentrate the liquid waste that results from wash-down of contaminated equipment. The particulate releases from these accidents are assumed to be abated by the two stages of HEPA filtration in the

air cell exhaust system. The estimated accident consequences for each of these accidents are shown in Table 4-1.

5. Air cell exhaust system flow reversal

This accident is assumed to occur due to pressurization of the inlet plenum of the air cell exhaust blowers and results in partial release from the cell into the building of contamination previously collected on contaminated area outlet filters. The particulate release is assumed to be only partially mitigated by the HEPA filters installed at the inlets to the contaminated air cell and hot repair facility. Ten percent of the reversed flow is assumed to bypass these filters.

In addition, two beyond-design basis accidents were analyzed.

1. Breach of argon cell confinement with loss of HEPA filtration efficiency

As in the design-basis accident (No. 3, above), this accident assumes that the argon cell confinement boundary is breached by a large earthquake and that the safety exhaust system operates as designed. For this accident, however, it is assumed that neither stage of filters provides any filtration.

2. Airplane crash into facility

This accident assumes an aircraft crashes into the FCF building with a resulting breach of the hot cell boundary and subsequent fire involving aviation fuel. It is the same accident that was analyzed[33] for FCF in the technical support document (DOE/ID-10471) for the SNF and INEL EIS.

Table 4-1. Summary of the Design Basis Accidents and Consequences

Accident	Classification	Accident Consequence					
		Uninvolved Workers		MEI		Increment for Involved Workers	
		Dose (rem)	LCF[e]	Dose (rem)	LCF[e]	Dose (rem)	LCF[e]
Argon Cell Cooling Fails Off	Unlikely	2×10^{-6} [a]	8×10^{-10}	5×10^{-7} [a]	2.5×10^{-10}	1.4×10^{-6} [a][b]	5.6×10^{-10}
Argon Cell Cooling Fails On (Both Loops)	Unlikely	0	0	0	0	0	0
Transfer Lock Vacuum Pump Fails On	Extremely Unlikely	3×10^{-7} [a]	1.2×10^{-10}	7×10^{-8} [a]	3.5×10^{-11}	0	0
Argon Supply Fails On	Anticipated	3×10^{-6} [a]	1.2×10^{-9}	1×10^{-6} [a]	5×10^{-10}	0	0
Normal Power Fails	Anticipated	4×10^{-5} [a]	1.6×10^{-8}	5×10^{-7} [a]	2.5×10^{-10}	2.4×10^{-6} [a][b]	9.6×10^{-10}
Breach in Argon Cell (Design-Basis Metal Fire as a Result of a Design-Basis Earthquake)	Extremely Unlikely	1.3×10^{-3}	5.2×10^{-7}	7×10^{-5}	3.5×10^{-8}	0	0
Loss of Fuel Subassembly Grapple Cooling in Air Cell	Unlikely	1.3×10^{-6} [c]	5.2×10^{-10}	6×10^{-7} [c]	3×10^{-10}	0	0
Dropped Subassembly in Air Cell	Anticipated	5.7×10^{-7} [a]	2.3×10^{-10}	2.5×10^{-7} [a]	1.3×10^{-10}	0	0
Subassembly Stuck in Transfer Port (during transfer into the Air Cell)	Extremely Unlikely	1.3×10^{-6} [c]	5.2×10^{-10}	6×10^{-7} [c]	3×10^{-10}	0	0
Waste Can Drop (Nonearthquake Induced)	Extremely Unlikely	4.4×10^{-6}	1.8×10^{-9}	1.9×10^{-6}	9.5×10^{-10}	0	0
Waste Box Fire	Unlikely	1.5×10^{-8}	6×10^{-12}	6.6×10^{-9}	3.3×10^{-12}	0	0
Waste Evaporator Rupture	Extremely Unlikely	1.2×10^{-5}	4.8×10^{-9}	5.3×10^{-6}	2.7×10^{-9}	0	0
Air Cell Exhaust System Flow Reversal (Existing Equipment)	Extremely Unlikely	6.3×10^{-3}[d]	2.5×10^{-6}	9×10^{-5}	4.5×10^{-8}	1	4×10^{-4}
Fuel Element Failure during Washdown (Existing Equipment, Not Upgraded)	Anticipated	5.7×10^{-7} [a]	2.3×10^{-10}	2.5×10^{-7} [a]	1.3×10^{-10}	0	0

(a) Effective submersion dose (direct radiation from being submerged in the radioactive plume).
(b) Assumes workers remain in place for one hour.
(c) Includes effective submersion dose and effective 50-year committed inhalation dose.
(d) Dose not calculated in FCF FSAR, but an estimated value has been calculated for this Environmental Assessment.
(e) Latent cancer fatality (LCF) estimates were based on, 0.0004 latent cancer fatality per rem for workers, 0.0005 latent cancer fatality per rem for the public (ICRP Publication 60).

A description and analysis of potential transportation accidents can be found in Section 4.2.1.3.

In order to evaluate the risk associated with an accident scenario (defined as likelihood multiplied by consequence), accidents have been assigned to likelihood categories, based primarily, but not exclusively, on the number of independent events required for initiation of the accident, engineering judgments regarding the relative likelihood of each event, and operating experience. Facility events are classified according to the likelihood of occurrence: anticipated, unlikely, extremely unlikely, or beyond design basis. The "anticipated" class embraces those events that can reasonably be expected to occur during the life of the facility. The other three classes include events that may occur, but are not expected to. "Unlikely" is the classification for events where, for any given year that the facility operates, there is between 1 chance in 100 and 1 chance in 10,000 that the event will occur. "Extremely unlikely" is the classification for events that would have between 1 chance in 10,000 and 1 chance in 1 million of occurring during any year that the facility operates. "Beyond design basis" is the classification given to events that have between 1 chance in one million and 1 chance in 10 million of occurring during any year that the facility operates. This fourth and least probable class of events establishes an upper bound for reasonably foreseeable accident consequences.

The FSAR assumptions were based on treatment of the driver fuel which has a significantly higher source term (radioactivity) than the blanket elements and therefore may be considered a bounding (upper limit) safety analysis. FSAR accident consequences were calculated using accident-type meteorology assumptions (i.e., worst case) as given in NRC Regulatory Guide 1.145. However, for this EA, analyses were based on more realistic exposure conditions (see for example NRC Reg. Guide 4.2 and DOE "Recommendations for the Preparation of Environmental Assessments and Environmental Impact Statements," May 1993.) For this assessment, therefore, the accident-related radiological doses have been calculated using "50th percentile" (typical) meteorological conditions.

Uninvolved worker radiological doses are evaluated at the bus staging area used for loading evacuation buses, 230 meters (250 yards) southwest of the facility. Because most accidents

involve a release from the 61 meter (200 foot) exhaust stack and would not involve a release into the FCF building, the radiation dose to involved and uninvolved workers would be the same in most cases. This is a conservative approach because it represents the highest concentration of workers which may be exposed to the plume of released radioactive gases or particulates. Offsite doses to the MEI were evaluated at the location of closest public approach to the site. The latter location corresponds approximately to the junction of U.S. Highway 20 with the INEL Site boundary, about 5000 meters (5500 yards) southeast from the facility.

For design basis accidents, doses reported at the Bus Staging Area and Site Boundary were calculated based upon pathways for prompt exposure only, i.e., inhalation and submersion where applicable and significant. The analyses assume the receptor is at the bus staging area for 15 minutes and the individual at the site boundary is evacuated within two hours from the beginning of the accident. Inhalation doses were calculated as effective 50-year committed doses. In most cases, the submersion dose is negligible compared to the inhalation dose.

The increase in health effects, i.e., latent cancer fatalities and nonfatal cancer occurrences, have been estimated using the same risk factors per unit of radiation dose as were used for the SNF and INEL EIS (DOE/EIS-0203-F, Table 5-1 of Volume I).

The demographics for the public within an 80 kilometer (50 mile) radius used for calculations of accident consequences are the same as used for the ANL-W site in the SNF and INEL EIS. The population is assumed to be exposed for the entire duration of each accident sequence calculated, i.e., there is no credit taken for transport time of the radiation plume or evacuation of any of the population.

Activities that are estimated to increase the chance of death by cancer by one in a million include spending 2 months in Denver on vacation from New York (due to higher natural radiation background), eating 40 tablespoons of peanut butter (due to aflatoxin B content), having one chest x-ray taken in a good hospital, or smoking 1.4 cigarettes. The largest radiological risk to an individual worker from any of the potential accidents analyzed for this environmental assessment

would be an increase of three chances in a million of death by cancer due to radiation exposure following an accidental spent fuel transfer cask drop outside the facility. Since this accident would involve untreated spent fuel, it would apply to all the alternatives, including the No-Action Alternative. This accident also represents the largest risk to the maximally exposed (public) individual, with an increase of three chances in a billion of developing a fatal cancer. The largest radiological risk to an individual worker from an accident not also applicable to the No-Action Alternative would be a one chance in 25 million risk of death by cancer as a result of an air cell exhaust system flow reversal accident.

4.2.1.1 Consequences of Design-Basis Facility Accidents

For the accident scenarios, meteorological dispersion factors were calculated using average meteorological conditions at the site [category D stability and a windspeed of 4 meters per second (13.1 feet per second)]. A stack height of 61 meters (200 feet) was used where the stack could be clearly credited for providing an elevated release. No credit was taken for plume rise due to effluent momentum. Because of a rise in terrain near the site boundary, no credit was taken for the stack elevation in calculating doses at the site boundary. Where appropriate, receptor exposure time was reduced to account for plume travel time.

The FSAR accident consequences were recalculated using the foregoing modeling assumptions. ORIGEN II and RSAC 5 (Version 5.2) were used in the analysis. The results for the accidents analyzed in the FSAR are given in Table 4-1. Only the more significant potential accidents are discussed below. In addition to the calculated doses at the site boundary and at the bus-staging area, which were also reported in the FSAR for more conservative meteorological assumptions, Table 4-1 gives the estimated impact of the listed accidents on the workers located within the FCF (involved workers) as well as uninvolved workers at the bus staging area. Only three accidents result in any facility worker dose. Human health effects, in terms of estimated latent cancer fatalities, were not reported in the FSAR but are provided in Table 4-1.

The accident situation that would result in the highest onsite dose was the Air Cell Exhaust System Flow-Reversal. This event, considered extremely unlikely, would result in a dose of 6.3×10^{-3} rem to an individual at the bus-staging area. An individual receiving this dose would have an increased lifetime probability of 2.5×10^{-6} (about one in four-hundred thousand) of contracting a fatal cancer. The greatest public dose (MEI at the site boundary) would also result from an Air Cell Exhaust System Flow Reversal. The resultant dose to an individual at the site boundary dose from this event was calculated to be 9.0×10^{-5} rem. An individual receiving this dose would have an increased lifetime probability of 4.5×10^{-8} (about one in twenty million) of contracting a fatal cancer.

It is therefore most likely that no member of the public would incur a fatal cancer if this accident occurred. The lifetime increase in probability of a nonfatal cancer would be one chance in 2 million for the worker and one chance in 100 million for the MEI.

The radiation doses to the involved workers, the uninvolved workers and the population within 80 kilometers (50 miles) from the Air Cell Exhaust System Flow Reversal accident are estimated to be 40 person-rem, 3.5 person-rem, and 0.024 person-rem, respectively. These radiation doses would result in an estimated increase in latent cancer fatalities of 0.004 (one chance in 250 of an additional cancer fatality) for the involved workers,* 0.0014 (approximately one chance in 700) for the uninvolved workers, and 0.000012 (approximately one chance in 83,000) for the 80 kilometer (50 mile) population. This accident would result in an estimated increase in nonfatal cancers of 0.0008 (approximately one chance in 1250) among the involved workers, 0.0003 (approximately one chance in 3500) among the uninvolved workers, and 0.0000024 (approximately one chance in 400,000) among the 80 kilometer (50 mile) population.

For the design basis accident involving a breach in the argon cell, the radiation doses would be 0.78 person-rem for the involved and uninvolved workers and 0.0074 for the 80 kilometer (50 mile) population. These radiation doses would result in an estimated increase in latent

* Assuming 40 involved workers in FCF in a total site population of 600 (560 uninvolved).

fatalities of 0.00031 (approximately one chance in 3200 of an additional cancer fatality) among the workers and 0.0000037 (approximately one chance in 270,000) among the 80 kilometer (50 mile) population. This accident would result in an estimated increase in nonfatal cancers of 0.00006 (approximately one chance in 16,000 of one additional cancer) among the workers and 0.00000074 (approximately one chance in 1.3 million) among the 80 kilometer (50 mile) radius population.

The other design basis accidents summarized in Table 4-1 would have lesser effects, regardless of the probability of their occurrence.

4.2.1.2 Consequences of Beyond-Design-Basis Accidents

Two beyond-design-basis accidents, one an airplane crash into the facility and the other a metal fire in the cell with breach of containment, have been evaluated for the FCF. These accidents are estimated to have less than one chance in a million of occurring; their consequences are summarized in Table 4-2. The radiation dose estimate for the airplane crash accident is based on the methodology used in the SNF and INEL EIS. The estimate for the metal fire accident is based upon the methodology stated in the FCF FSAR, but with normalization to the same meteorological conditions used for the airplane crash. The metal fire accident is assumed to occur simultaneously with small breaches in the argon cell confinement and with concurrent failure of abatement by the two separate stages of HEPA filtration provided by the safety exhaust system. The second accident, an aircraft crash into the facility is described in detail in DOE/ID-10471, "Accident Assessments for Idaho National Engineering Laboratory Facilities."

Table 4-2. Summary of Beyond-Design-Basis Accidents

Postulated Accident	Radiological Dose,[a,c] rem				Mitigating Features Credited	Other Available Features Not Credited	Basic Assumptions
	MEI		Involved and Uninvolved Worker				
	Dose (rem)	LCF[d]	Dose (rem)	LCF[d]			
Airplane Crash into Facility	0.67	3.4×10^{-4}	9.7[b]	3.9×10^{-3}	None	NA	Assumes airplane penetrates the building and argon cell resulting in facility fire.
Metal Fire due to earthquake induced breach in argon cell concurrent with unfiltered release (HEPA Filter Failures-2 stages)	0.7	3.5×10^{-4}	13	5.2×10^{-3}	None	Safety Exhaust System HEPA filtration	Assumes accident caused by large earthquake resulting in failure of nonqualified penetrations of argon cell boundary and ensuing metal fire in material-at-risk.

[a] Doses are normalized to 50th percentile meteorological dispersion in accordance with NRC Regulatory Guide 4.2, approximated by stability category D with windspeed of 4 m/s.
[b] Worker is assumed to be located at the bus staging area.
[c] Inhalation and submersion dose.
[d] Latent cancer fatality, 0.0004 latent cancer fatality per rem for workers, 0.0005 latent cancer fatality per rem for the public, factors double for doses greater than 20 rem (ICRP Publication 60). Results may be interpreted as the probability that the maximally exposed individual would incur a fatal cancer.

The airplane crash accident assumes that a large commercial jet crashes into the FCF, resulting in penetration of the Argon Cell and a fire in the facility involving aviation fuel. Based on the analysis of bounding material inventories in the final Safety Analysis Report (SAR), the Argon Cell was assumed to contain the following radioactive materials: 1) 45 kilograms (about 100 pounds) of pyrophoric fuel material; 2) one waste canister containing about 200,000 curies of fission products; and 3) 1000 curies of transuranic radionuclides solidified into a salt block, and about 1800 curies of krypton-85 in the argon cell atmosphere. Due to the large breaches of the building and the argon cell caused by the aircraft impact, an unmitigated release of radioactivity to the environment was assumed to occur. By conservatively assuming that each of the 600 involved and uninvolved workers receives the 9.7 rem radiological dose, the increase in latent cancer fatalities is estimated to correspond to 2.3 latent cancer deaths. The increase in nonfatal cancers due to this accident would result in an estimated 0.5 cancers among the 600

workers. The direct effect of the airplane crash and subsequent damage to the facility would be expected to cause a significantly larger number of deaths. This accident would result in a radiation dose of 250 person-rem among the population within an 80 kilometer (50 mile) radius. The estimated increase in latent cancer fatalities is 0.13, or approximately one chance in eight of an additional cancer fatality. The corresponding increase in nonfatal cancers is estimated to be 0.025, or one chance in forty of an additional nonfatal cancer.

In the metal fire accident, a large earthquake is assumed to result in breaches to the argon cell and a fire in the hot process metal is assumed to start after sufficient oxygen enters the argon cell. The maximum amount of pyrophoric* heavy metal allowed outside individual confinements at one time is assumed to be involved in the fire. The two stages of HEPA filters in the safety exhaust system, which would begin to operate in this event, are assumed to have failed even though they are designed to withstand a large earthquake. Therefore, the gas-borne products of combustion from the metal fire are assumed to be pushed into the environment without mitigation. In other respects, this metal fire accident has been analyzed under the same assumptions that were used in the analysis of the design-basis metal fire that was mitigated by the safety exhaust system and its HEPA filters. It is estimated that each of the 600 involved and uninvolved workers would receive the 13.0 rem radiological dose which is estimated to result in an increase of three latent cancer deaths. It is estimated that the accident would result in one additional nonfatal cancer among the 600 workers. The direct effect of an earthquake of this magnitude would be expected to be much larger due to damage to the facility and office buildings.

This accident would result in a radiation dose of 74 person-rem among the population within an 80 kilometer (50 mile) radius. The estimated increase in latent cancer fatalities is 0.037, or approximately one chance in twenty-five of an additional cancer fatality. The corresponding

* In this context, "pyrophoric" means "susceptible to spontaneous ignition and continued combustion in its condition at the time of the accident."

increase in nonfatal cancers is estimated to be 0.0074, or one chance in 135 of an additional nonfatal cancer.

The estimated consequences of these accidents are conservative (i.e., tend to overestimate consequences) because it is unlikely that all persons exposed would receive the dose calculated for their location. The average dose to exposed individuals would likely be less because some would be in buildings rather than outside, and because some interdiction of the local (contaminated) food supply could be expected. Taking account of both the probability and consequences, the overall accident risks associated with the Proposed Action are small.

4.2.1.3 Transportation Accidents

The Proposed Action and alternatives include transportation between the following facilities: FCF, HFEF, and RSWF. They would also include the lifting of casks onto transportation vehicles. Two bounding transportation accidents which were evaluated were based on accidentally dropping the interbuilding cask (IBC) used to transfer fuel subassemblies and are described in the FSAR as "subassembly ruptures within the IBC." These accidents have been judged to bound any similar accidents including waste casks because of the very conservative cooling time and release fractions assumed for the IBC accident analyzed in the FSAR. In the first accident, the IBC is assumed to be dropped from the transport trailer outside the facility,* causing the spent fuel inside to overheat, melt, and burn, which would release radioactive particulates and gases into the atmosphere. For the Proposed Action and alternatives, this accident is classified as "unlikely." At the bus staging area and the site boundary, respectively, the estimated doses would be 0.75 and 0.01 rem. These doses correspond to an increase in latent cancer fatalities for each worker of 3×10^{-4} and 5×10^{-6} for the MEI at the site boundary.

The radiation dose to the 600-person involved and uninvolved worker population is estimated to be 450 person-rem. (Both type workers are assumed to be the same because of the delay time

* The analysis accounted for the absence of HEPA filtration outside the FCF.

between dropping the cask and the beginning of radiation release.) The radiation dose to the 80 kilometer (50 mile) radius population is estimated to be six person-rem. These radiation exposures would be expected to result in an increase of 0.18 latent cancer fatalities among the workers (1 chance in 5 of an additional cancer fatality), and 0.003 latent fatalities in the population within an 80 kilometer (50 mile) radius (one chance in 330 of an additional cancer fatality). The corresponding nonfatal cancers are estimated to be 0.04 (one chance in 25) and 0.0006 (1 chance in 1650) in the 600-worker and the 80 kilometer (50 mile) population, respectively.

In the second accident, classified as "unlikely" for the Proposed Action and alternatives, the IBC is assumed to be dropped inside the building. The radiation doses are calculated to be 0.00024 for the worker and 0.00010 rem for the MEI, crediting the stack height in providing an elevated release, and the single stage of HEPA filtration provided in the FCF building exhaust system. These doses correspond to one chance in 10 million that the worker will develop a fatal cancer and one chance in 20 million that the MEI would develop a fatal cancer as a consequence of this accident. The consequences of these two accidents are summarized in Table 4-3.

4.2.2 Natural Hazards

The FCF FSAR provides a discussion of natural phenomena hazards that could affect the FCF (or other facilities). One potential hazard is snow loading; the expected snow loads [less than 947 kilograms per square meter (40 pounds per square foot)] are well known and roof designs easily meet the criteria.[34] Tornado risk is sufficiently low at the INEL that wind-loading considerations are controlled by straight winds; the design basis wind is 150 kilometers per hour (95 miles per hour)[35]. The low precipitation at the site, the permeable soils, and the distance of ANL-W from streams on the INEL result in little or no concern for external hazards from flooding. The principal potential natural hazard is earthquakes. The approach to natural phenomena hazards is based on "Design and Evaluation Guidelines for Department of Energy Facilities Subjected to Natural Phenomena Hazards, UCRL 15910," as required by DOE Order 6430.1A. Although the FCF is classified as a "moderate hazard" facility, a performance goal that

is the same as that recommended for a "high hazard" facility was chosen for use. The FCF, as a moderate hazard facility[36], was only required to use as an earthquake with a zero-period, ground-surface acceleration of 0.14 times the acceleration of gravity in the horizontal direction as a basis for structural assessment. The more conservative project goal used a seismic loading for FCF structural analysis based on a zero-period ground-surface acceleration of 0.21 times the acceleration of gravity in the horizontal direction. The analysis showed that the facility will meet this higher performance goal. The air cell, argon cell, and general building were analyzed to verify structural integrity during and after the design-basis earthquake. The stresses were found to be well within the ANSI/AISC N690 and the ACI allowable stresses. The small horizontal deflections ensure that the stress reversals will be small.[37]

Table 4-3. Summary of Transportation Accidents

Postulated Accident	Radiological Dose,[a,b] rem				Mitigating Features Credited	Other Available Features Not Credited	Basic Assumptions
	INEL Boundary		Worker				
	Dose (rem)	LCF[c]	Dose (rem)	LCF[c]			
Interbuilding Cask Drop Outside Facility	0.01	5×10^{-6}	0.75	3×10^{-4}	None	NA	Assumes IBC is dropped outside facility.
Interbuilding Cask Drop Inside Facility	1.0×10^{-4}	5×10^{-8}	2.4×10^{-4}	9.6×10^{-8}	One stage HEPA filtration	None	Assumes IBC accident occurs inside the facility.

[a] Doses are normalized to 50th percentile meteorological dispersion in accordance with NRC Regulatory Guide 4.2, approximated by stability category D with windspeed of 4 m/s.

[b] Inhalation and submersion dose, as applicable and significant.

[c] Latent cancer fatality, 0.0004 latent cancer fatality per rem for workers, 0.0005 latent cancer fatality per rem for the public, factors double for doses greater than 20 rem (ICRP Publication 60) and assumes the accident occurred.

4.3 Cumulative Impacts

A cumulative impact is the result of the incremental impact of the Proposed Action added to all other past, present, and reasonably foreseeable future actions. Cumulative impacts associated with INEL SNF, environmental restoration, and waste management activities would be small and have been described and analyzed in Volume 2, Section 5.15 of the SNF and INEL EIS. Because this proposed demonstration would be conducted concurrently with other INEL SNF work, the incremental impacts of the Proposed Action are discussed in comparison to the cumulative impacts previously described in the SNF and INEL EIS.

4.3.1 Land Use

Implementation of the Proposed Action would not contribute to the cumulative loss of open-spaced land. As discussed in Section 2.3, all activities associated with the Proposed Action would be conducted within existing facilities, and no additional land area would be disturbed.

4.3.2 Socioeconomics

As discussed in Section 4.1.4, any additional research personnel hired to help plan, conduct, and interpret the experiments would be more than offset by the reduction in force due to the shutdown of EBR-II. No net additional personnel would be hired.

4.3.3 Cultural Resources

As discussed in Section 2.3, all activities associated with the Proposed Action would be conducted within existing facilities. Therefore, no archeological or historic sites and structures would be affected.

4.3.4 Air Quality

The incremental impacts of nonradioactive air emissions would be well below occupational standards, consistent with experience with operations at ANL-W. At site boundary locations, concentrations of criteria pollutants would remain well below applicable air quality standards. Cumulative impacts related to ozone formation and stratospheric ozone depletion would be well below the levels considered "significant" by State or Federal standards.

For radioactive air emissions, all impacts at onsite and offsite locations would be well below applicable standards and would be a small fraction of the dose received from natural background sources. They would introduce negligible cumulative impact. The highest dose to an offsite individual would be about 0.0000011 rem per year which is a factor of 9000 below the limit of 0.01 rem per year, specified in the NESHAP and approximately a factor of 300,000 less than the dose due to natural background radiation on the Eastern Snake River Plain which results in an estimated dose of approximately 0.35 rem per year.

4.3.5 Water Quality

Implementation of the Proposed Action would have no incremental impact on regional water quality because no liquid effluents would be discharged to surface waters or groundwater. Water usage from the Proposed Action would add a negligible increment to the water usage from all INEL.[38]

4.3.6 Ecology

Implementation of the Proposed Action would not contribute to the cumulative loss of habitat and vegetation in nearby communities. As discussed in Section 2.3, all activities associated with the Proposed Action would be conducted within existing facilities. Therefore, no additional land area or habitat would be disturbed.

4.3.7 Transportation

mplementation of the Proposed Action would have no incremental impact to the cumulative npacts of transportation described in the SNF and INEL EIS. As discussed in Section 4.1.3, the oad traffic related to facility operations would remain at or below current levels as expected under the No-Action Alternative.

4.3.8 Health and Safety

Implementation of the Proposed Action would not result in any observable increase in human health effects within the worker population or the general public. As discussed in Section 4.1.2, the average radiation exposure to workers involved in the Proposed Action would be virtually the same as the average exposure expected under the No-Action Alternative. As discussed in Section 4.1.2, because levels are so low, planned activities associated with the Proposed Action would not cause additional radiological releases of any consequence to human health or the environment.

4.3.9 Spent Nuclear Fuel, Uranium By-Product and Waste Management

As discussed in Section 4.5, using a common comparison basis for estimating waste volumes for each alternative implementation of the Proposed Action would result in a net decrease in the combined volume of high-level waste and SNF at ANL-W. For the volume of high level wastes generated by the process, adequate storage capacity currently exists on-site. As noted in Section 4.5, the Proposed Action would increase the volume of depleted uranium and high-level radioactive waste stored at the ANL-W site. The increased volumes, however, would occupy a small percentage of the available storage space.

Compared to the No-Action Alternative, the Proposed Action would also result in a net decrease in the amount of low-level waste generated and shipped to the INEL Radioactive Waste Management Complex (RWMC) (see Figure 4-2). The reduction in low-level waste volumes is

offset by a net increase in the amount of transuranic waste. ANL-W and INEL (RWMC) has adequate interim storage capacity for the transuranic waste.

The amounts of mixed waste and nonradioactive waste generated under the Proposed Action are the same as would be expected under the No-Action Alternative.

4.4 Regulatory Framework

In order to maintain compliance with environmental regulations, the actions described in the following sections must be taken as a result of this Proposed Action.

The status of compliance with environmental regulations applicable to the Proposed Action is described below.

4.4.1 Air Permits

The Proposed Action would not require new or modified air permits for facilities at ANL-W.

4.4.2 RCRA Permit Applications

The treatment, storage, or disposal of hazardous and nonhazardous solid waste is regulated under the Solid Waste Disposal Act as amended by the Resource Conservation and Recovery Act and the Hazardous and Solid Waste Amendments of 1984.

World events have resulted in significant changes in DOE's direction and operations. In particular, in April 1992 DOE announced the phase-out of reprocessing for the recovery of special nuclear materials. With these changes, DOE's focus has changed from reprocessing and recovery of materials to storage and ultimate disposition. This in turn has created uncertainty regarding the regulatory status of some nuclear materials in relation to the Resource Conservation and Recovery Act.

DOE has initiated discussion with the Environmental Protection Agency on the potential applicability of the Resource Conservation and Recovery Act to SNF. Further discussions with the Environmental Protection Agency Headquarters and regional offices and State regulators are ongoing to develop a strategy for meeting any Resource Conservation and Recovery Act requirements that might apply.

One function of DOE's national spent fuel program has been to consider which DOE SNF might be subject to regulation under the RCRA if DOE SNF were determined to be a solid waste. The working group in charge of researching this issue has issued an interim report,[39] which draws the following preliminary conclusions:

> For evaluation of both regulatory applicability and management technologies, the various types of DOE-owned SNF have been divided into 55 categories based on fuel type, matrix type and material, cladding type, uranium-235 enrichment, burnup, potential hazardous materials and characteristics, and actinide content. Current preliminary process knowledge and analyses indicate that 47 of the categories would not be subject to RCRA regulation if SNF if determined to be a solid waste. Only sodium-bonded and disrupted fuels, representing 8 SNF categories, require further evaluation before a more definitive position regarding RCRA applicability can be established.
>
> Extensive evaluation of the sodium-bonded SNF concern is required. Evaluation will involve determination of the extent of reactivity of the metallic sodium bonding. The sodium-bonded SNF is present in six categories representing approximately 3% of DOE-owned SNF by mass in MTHM (metric tons of heavy metal (uranium) or 19% by volume. The metallic sodium bonded fuels appear to be the most likely to exhibit a RCRA characteristic.

It is considered probable by the DOE Office of Civilian Radioactive Waste Management that only spent nuclear fuel and high-level radioactive wastes that do not include components regulated as hazardous wastes under the Resource Conservation and Recovery Act would be accepted for disposal in a repository. The reactivity of sodium is well known. Sodium is listed as a reactive metal under 40 CFR 261.23. Therefore, some treatment of spent fuels, such as the EBR-II driver and blanket, that contain these materials may be necessary prior to disposal in a geologic repository.

The mixed waste (see Table 4-5, Section 4.5) from the Proposed Action has been identified in the INEL Site Treatment Plan and would be treated under a Generator Treatment Plan according to 40 CFR Part 268.7(a)(4) and IDAPA Section 16.01.5011 before the material is shipped off the ANL-W site. The INEL Site Treatment Plan was developed to meet the requirements of the Federal Facility Compliance Act of 1992. The Proposed Action will not require additional RCRA permits.

4.4.3 Pollution Prevention Act of 1990

The Pollution Prevention Act of 1990 establishes a national policy for waste management and pollution control that focuses first on source reduction, followed sequentially by environmentally safe recycling, treatment, and disposal. Disposal or releases to the environment should occur only as a last resort. In response, DOE has committed to participation in the Superfund Amendments and Reauthorization Act Section 313, U.S. Environmental Protection Agency 33/50 Pollution Prevention Program. The goal for facilities already involved in Section 313, such as ANL-W, is to achieve by 1997 a 33-percent reduction in the release of 17 priority chemicals from a 1993 baseline. DOE has developed and implemented the ANL-W Pollution Prevention/Waste Minimization Plan[40], dated June 1995, to achieve these goals.

4.5 Spent Nuclear Fuel, Uranium By-Products and Waste Management Impacts

The Proposed Action generates process wastes from the treatment operations and incidental wastes from the normal support operations of a hot cell facility. The process wastes include the fuel assembly hardware, metal waste form and ceramic waste form which have been described in Section 2.3. The incidental wastes include operational wastes such as broken equipment, rags, packaging materials and other miscellaneous items. The decommissioning wastes include the disposal of the process equipment and process fluids such as the electrorefiner salt and cadmium. These materials would be categorized and disposed of according to the existing DOE Orders and the Argonne radioactive waste management procedures. Table 4-4 summarizes the expected categorization of these process streams and their proposed interim storage and proposed final

disposal locations. The streams have also been included as a portion of the foreseeable proposed projects that were analyzed in DOE's SNF and INEL EIS.

The fuel assembly hardware waste stream is produced when the fuel elements are removed from the structural components of the fuel assembly. These components are primarily stainless steel materials which contain short-lived radionuclides. Some radionuclides will be present at levels that exceed the quantitative Class C limits presented in Title 10, Code of Federal Regulations, Part 61 (10 CFR 61), entitled "Licensing Requirements for Land Disposal of Radioactive Waste." In accordance with the "Low-Level Radioactive Waste Policy Amendments Act of 1985" (Public Law 99-240), the federal government is responsible for setting standards for disposal of Greater Than Class C Low Level Waste (GTCC LLW). The Nuclear Regulatory Commission has indicated that GTCC LLW requires more stringent disposal methods than Class C LLW, and such materials must be disposed of in a geologic repository, unless proposals for disposal of such waste in a disposal site licensed pursuant to 10 CFR Part 61 are approved by the NRC [10 CFR § 61.55(a)(2)(iv)]. DOE is currently developing a strategy for management and disposal of GTCC LLW (DOE Special Case Waste). The fuel assembly hardware has been a byproduct of EBR-II operations since the early 1960s. It is created, handled and stored under the Proposed Action and all alternatives because the fuel assembly hardware is removed from the elements before the elements are placed in storage. Fuel assembly hardware interim storage would be provided at the ANL-W RSWF and a geologic repository is shown as the anticipated disposal option. This waste stream has been included in the assessment of the GTCC disposal strategy.[41]

Table 4-4. Summary of Process Material Categories

Prcoess Streams	Category	Interim Storage	Final Disposal*
	Process Wastes		
Fuel Assembly Hardware	GTCC	RSWF	GR
Metal Waste Form	HLW	RSWF	GR
Ceramic Waste Form	HLW	RSWF	GR
Spent Fuel Elements	SNF	RSWF	GR
	Incidental Wastes		
<100nCi/g	LLW	NONE	RWMC
>100nCi/g	TRU	RWMC	WIPP
Cd contaminated	MW	RSWF	WIPP or RWMC
Nonradioactive	SW	NONE	LF
	Decommissioning Wastes		
Spent Process Chemicals			
Electrorefiner Salt	TRU	RSWF	WIPP
Electrorefiner Cadmium	MW	RSWF	WIPP
Equipment			
<100nCi/g	LLW	NONE	RWMC
>100nCi/g	TRU	RWMC	WIPP
Cd contaminated	MW	RSWF	WIPP or RWMC

GTCC - Low Level Waste (greater than class C)
TRU - Transuranic Waste
HLW - High Level Waste
LLW - Low Level Waste
MW - Mixed Waste
SW - Sanitary Waste
FCF - Fuel Conditioning Facility
RSWF - Radioactive Scrap and Waste Facility
RWMC - Radioactive Waste Management Complex
WIPP - Waste Isolation Pilot Plant
LF - INEL Landfill
GR - Geologic Repository
SNF - Spent Nuclear Fuel

*Current planning basis.

The metal waste form would be produced from the stainless steel cladding which remains after the fuel alloy and sodium are dissolved in the electrorefiner. The elements from each driver fuel assembly and blanket assembly contain approximately 2.9 and 3.7 kilograms (6.4 and 8.2 pounds) of cladding. This cladding and some radionuclides are mixed with zirconium to produce a stainless steel zirconium (approximately 15 weight percent zirconium) alloy. Since this material will contain, respectively, significant concentrations of fission products, the metal waste form is considered high-level waste (HLW). The radioactive components will also be at levels that will require remote handling, and geologic disposal is the anticipated disposal option. Prior to disposal, this material will be stored at the RSWF. For alternatives that involve no treatment, the stainless steel is included in the spent fuel assembly.

The ceramic waste form (zeolite) would contain the majority of fission products and transuranics which have accumulated in the electrorefiner salt. The fission products would be incorporated into a zeolite which is mixed with glass frit to produce a ceramic material containing approximately 5.5 weight percent fission products and transuranics. This highly radioactive waste material would be categorized as high-level waste which requires long-term isolation. Extensive characterization would be performed to determine its qualification for disposal in a geologic repository. Since this demonstration is a research and development project, this material could also be classified as remote handled TRU waste and potentially be disposed of at WIPP. The production of the ceramic waste form in this demonstration has the purpose of assisting in the development of the necessary data to support a determination of compliance with waste acceptance criteria for geologic disposal of this material. For interim storage, the ceramic waste would be retrievably stored in RSWF.

Under the No-Action Alternative, irradiated fuel would not be processed, and under the Equipment Demonstration Alternative, a reduced number of fuel assemblies would be processed compared to the Proposed Action. Spent fuel assemblies that are not processed would be packaged and stored until a decision regarding their disposal is made. Fuel elements would be removed from the fuel assembly hardware and placed into storage cans. These cans hold the elements from either two driver fuel assemblies or six blanket assemblies. Each can would then

be transferred to RSWF for interim storage. RSWF is currently permitted to store reactive sodium bearing materials. In Table 4-4, this waste stream is classified as spent fuel elements.

For all alternatives, incidental wastes would be generated throughout the FCF, especially in the Hot Repair Facility where equipment would be decontaminated and repaired. This material includes rags, latex gloves, personnel protective clothing, and plastics from decontamination operations. Tools, conduit, piping, broken equipment, HEPA filters, analytical laboratory mechanical manipulators and other equipment require disposal, and are also considered incidental wastes. These wastes have been produced in ANL-W hot cell operations and shipped to the RWMC during the past thirty years. Before shipment, the materials would be stored and packaged according to the INEL radioactive waste acceptance criteria.[42]

Eventually, under any of the alternatives, the equipment would be decommissioned and removed from the FCF. Wastes from this step include disposal of the equipment, used chemicals, and items that are used to decontaminate and place the facility in a safe industrial configuration. Except for the used process chemicals, the decommissioning wastes would be handled in the same manner as the incidental wastes.

The incidental and decommissioning wastes would be sorted into the following waste categories: sanitary, hazardous, low-level, transuranic, and mixed. The sanitary wastes are nonradioactive and nonhazardous wastes that are typical of industrial operations. Sanitary solid wastes are disposed of at the INEL's landfill. The estimated generation rate of sanitary solid waste in FCF is 310 cubic meters per year (11,000 cubic feet per year). This value is 0.5% of the INEL generation rate.

The hazardous wastes are expected to be minimal. The ANL site has shipped an average 30 cubic meters per year (1100 cubic feet) of hazardous waste over the past three years to commercial disposal facilities. In accordance with past practices, hazardous wastes would be shipped to licensed commercial facilities for disposal, which would be used for all hazardous

waste under all alternatives. The Proposed Action would be expected to generate little hazardous waste.

The low level and transuranic wastes would be the same kind of materials that are being produced in other ANL-W facilities' operations such as the activities in HFEF and the activities resulting from the shutdown of EBR-II. These wastes have been routinely handled, packaged and shipped to the RWMC during the past thirty years. Quantitative information for the Proposed Action and alternatives is estimated from current hot cell operations in FCF and HFEF. HFEF has produced approximately 28 cubic meters per year (990 cubic feet per year) of LLW and 1 cubic meter per year (35 cubic feet per year) of TRU during the past three years. FCF, which is currently supporting reactor defueling operations and testing the process equipment with depleted uranium, produced 150 cubic meters of LLW (5300 cubic feet) during 1995. These amounts were used to estimate the waste quantities of the different alternatives.

The No-Action Alternative assumes continued operation of FCF as directed by DOE in support of programs other than the Proposed Action. However, it is assumed that these operations would not produce TRU wastes. For alternatives involving fuel treatment, operations in the argon cell would tend to produce TRU wastes. Air cell operations and most hot repair facility operations would produce LLW because contamination control programs would minimize contamination by transuranic isotopes. For decommissioning waste, previous experience with FCF decontamination for facility modifications was used for the estimate.

The mixed wastes are generated principally from the disposal of any cadmium contaminated equipment. This equipment is very similar to the cadmium plated bolts and tools that were sold in hardware stores for uses where a protective coating was required. This waste stream would be minimized by washing the equipment and stabilizing the wash residue, if needed. Also, cadmium wastes would be produced from the analysis of cadmium samples in the Analytical Laboratory. The quantities have been estimated from experience with decontamination of cadmium plated equipment and operation of a small electrorefiner unit which is located in the HFEF. For decommissioning operations, disposal of the used process chemicals produces a

potentially mixed-waste stream. The cadmium currently used in the electrorefiner process would have to be disposed of. These mixed wastes have been identified in the INEL Site Treatment Plan[43] and would be treated under a Generator Treatment Plan according to 40 CFR Part 268.7(a)(4) and IDAPA Section 16.01.5011 before the material is shipped off the ANL-W site. The RSWF has been permitted by the State of Idaho[44] as a mixed waste storage facility for these materials until the treatment is completed. The FCF potential mixed waste streams that are in the INEL site treatment plan are shown in Table 4-5. The actual quantities produced plus a five-year projection is updated into the mixed waste inventory report at least annually so an accurate planning base is available for waste management activities.

Table 4-5. The INEL Site Treatment Plan's List of FCF Potential Mixed Waste Streams

URANIUM/CADMIUM FROM IFR EXPERIMENTS
ICP WASTE SOLUTIONS W/HEAVY METALS
SPENT HEPA FILTERS AND PRE-FILTERS
Cd CONTAMINATED CLEANUP WASTE
ELECTROREFINER STRIPPED SALT - Ba AND Cd
TRU-CD-HOT CELL WASTE
ELEMENT HARDWARE FCF WASTE
ELECTROREFINER STRIPPED CADMIUM
ELECTROREFINER INSOLUBLES W/CADMIUM
TRU WASTE USED PRE-FILTERS

Table 4-6 uses a common comparison basis for estimating waste volumes of each alternative and summarizes the estimated waste generation quantities for the Proposed Action and the three alternatives. Figure 4-2 shows the process quantities and storage location for each output stream.

Table 4-6. Quantities of Waste Generated

Waste* Streams	Proposed Action m^3 (kg)	Equipment Demonstration Alternative m^3 (kg)	No-Action alternative m^3 (kg)	Alternative Facility m^3 (kg)
Direct Process Wastes				
Fuel Assembly	1.4	1.4	1.4	1.4
Hardware	(1,900)	(1,900)	(1,900)	(1,900)
Metal Waste Form	0.10	0.05	0	0.10
	(460)	(220)	(0)	(460)
Ceramic Waste Form	0.52	0.25	0	0.52
	(640)	(300)	(0)	(640)
Spent Fuel Elements	0	2.3	4.4	0
(not waste)	(0)	(1,200)	(2,100)	(0)
Operational Wastes				
Incidental Low Level	20	20	70	20
Wastes	(4,100)	(4,100)	(14,000)[1]	(4,100)
Incidental TRU	50	50	0	50
Wastes	(10,000)	(10,000)	(0)	(10,000)
Mixed Wastes	1.0	1.0	1.0	1.0
	(2,000)	(2,000)	(2,000)	(2,000)
Sanitary Wastes	780	780	780	780
	(270,000)	(270,000)	(270,000)	(270,000)
Decommissioning Wastes				
Spent Process Chemicals				
Electrorefiner Salt	10	10	3.9[2]	14
	(12,000)	(12,000)	(4,700)	(17,000)
Electrorefiner	0.11	0.11	0.11	0.21
Cadmium	(590)	(570)	(550)	(1200)
Equipment and Incidentals				
Low Level Wastes	87	87	150[2]	240
	(77,000)	(77,000)	(130,000)	(210,000)
TRU Wastes	77	77	0	77
	(68,000)	(68,000)	(0)	(68,000)
Mixed Wastes	18	18	18	36
	(3,800)	(3,800)	(3,800)	(7,600)
Construction Wastes				
Low Level Wastes	0	0	0	1,000 m^3

* Uranium recovered as part of the Proposed Action is not waste and is not shown in the table. Spent fuel elements have been included because, although they are not categorized as waste, they require interim storage and eventual treatment or disposal. Estimated waste storage volumes include any additional volume necessary for packaging requirements associated with radiation protection and heat generation. The volume comparison basis is the same for all alternatives.

(1) Assumes continued FCF operations as a multipurpose hot cell as directed in support of DOE programs. For consistency, a three-year period of operation is assumed.

(2) It is assumed that a high-efficiency electrorefiner is not installed in FCF for the No-Action Alternative.

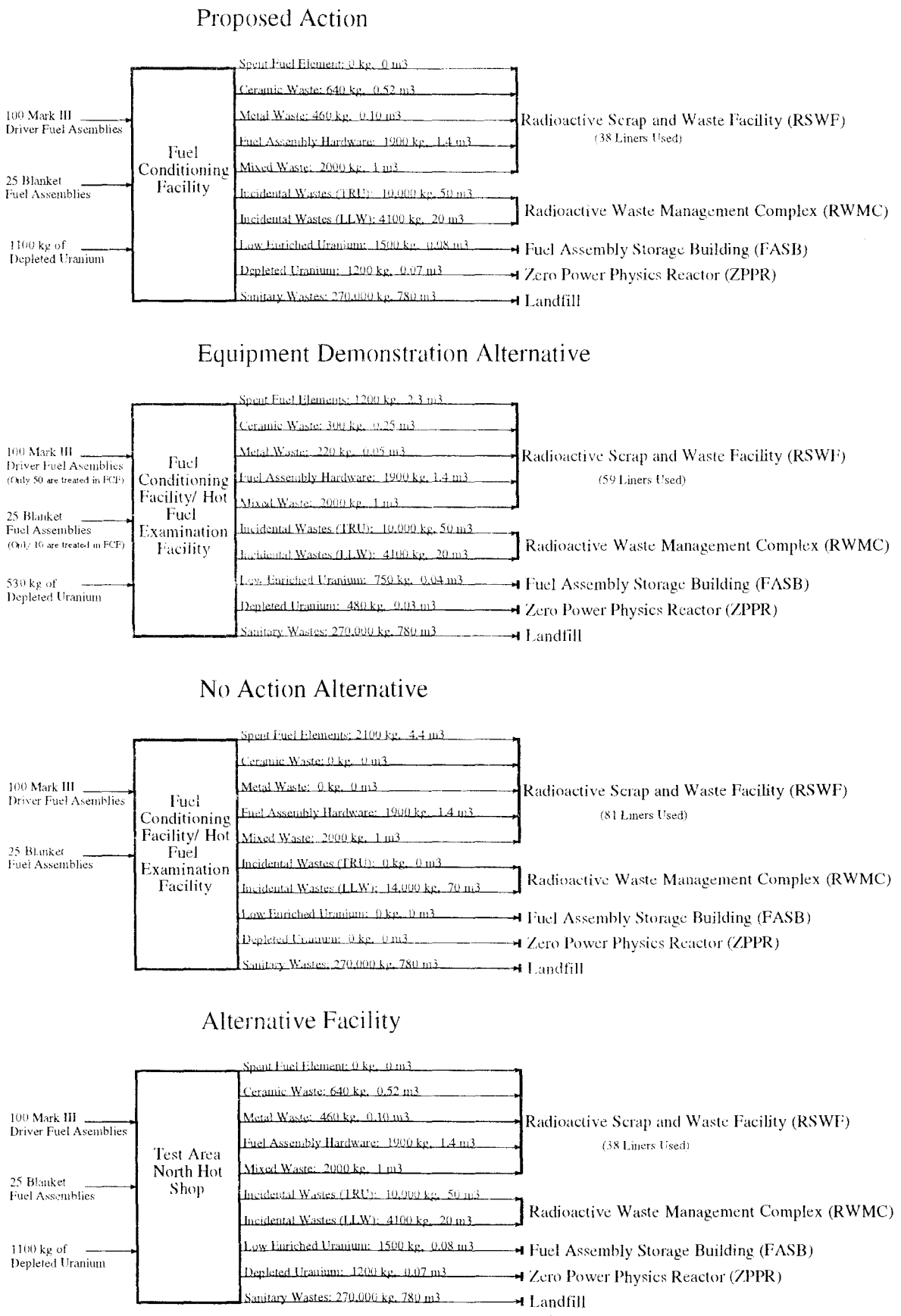


Figure 4-2. Waste flowsheets for the four alternatives

For process streams, the principal difference is that the ceramic and metal waste stream production decrease in the absence of treatment. The process waste streams would be stored at RSWF and the number of storage liners required would be 38, 59, 81, and 38 for the Proposed Action, Equipment Performance Verification Alternative, No-Action Alternative, and the Alternative Facility and Location Alternative, respectively.

The construction wastes are materials that are generated from the preparation of the TAN hot cells for the demonstration. The current equipment in the TAN hot cells would have to be removed to prepare for electrometallurgical treatment process equipment. Construction wastes would be produced for this alternative but would not be produced under the alternative involving the demonstration of electrometallurgical treatment technology at the ANL-W site.

For incidental and decommissioning wastes, the total quantities are similar for all alternatives; however, the No-Action Alternative will produce minimal transuranic waste and less decommissioning wastes since it was assumed that the high efficiency electrorefiner would not be installed.

Since HFEF and FCF are operating facilities and process equipment has been installed, no construction wastes would be produced. For the alternative facility option, the hot cells would have to be cleaned and prepared for operations, and an estimated 1000 cubic meters (35,000 cubic feet) waste would be produced.

Table 4-7 shows a comparison between quantity of wastes from the Proposed Action and the current DOE inventory and INEL inventory. The current INEL and DOE inventories are from "Integration of EM Activities at the INEL."[45] The LLW and TRU radioactive waste volumes from the Proposed Action are approximately 0.2% and 0.09% of the current inventory, respectively.

Table 4-7. Comparisons of Waste Generated Under the Proposed Action

Waste Streams	Proposed Action (m^3)	DOE Inventory (m^3)	DOE/INEL Inventory (m^3)	Percent of INEL Inventory (%)
High Level Waste	0.52	330,000	10,000	0.0052
TRU Waste	50	100,000	65,000	0.092
Low Level Waste	20	120,000	9,500	0.21
Mixed Waste	1	110,000	1,100	0.10
Greater than Class C Waste	1.4	Unknown	9,100	0.015
Environmental Restoration Waste	192	1,300,000	320,000	0.06

For additional information, the total activity for the ceramic waste forms produced under the Proposed Action and the volumetric activity of this waste form are provided in Table 4-8. This same information for the metal waste form is provided in Table 4-9.

4.6 Environmental Justice

On February 11, 1994, Executive Order 12898, "Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations," was published in the Federal Register (59 FR 7629). The Executive Order requires each Federal agency to identify and address disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income communities. The Department is in the process of finalizing procedures for implementing the Executive Order. The extent to which environmental justice analysis should be included in an EA is not clear. At this time the Department is not intimating any views on this question, and the inclusion of the following discussion on environmental justice is not intended to establish for DOE the direction of future procedures implementing the Executive Order.

In the SNF and INEL EIS, minority and low-income population distribution maps were prepared and analyzed using the ANL-W site as the center point. The maps were prepared using 1990 census data available from the U.S. Bureau of the Census. These maps are based on an analysis of the 1990 United States Bureau of the Census. Tiger Line files, which contain political boundaries and geographical features, and Summary Tape Files 3A (as processed by the U.S. Environmental Protection Agency), which contain demographic information (USBC1992) data were resolved to the census tract group level.

A "minority population" is defined as: A group of people and/or a community experiencing common conditions of exposure or impact that consists of citizens of the United States classified by the U.S. Bureau of Census as Negro/Black/African-American, Hispanic, Asian and Pacific Islander, American Indian, Eskimo, Aleut, and other nonwhite persons, based on

Table 4-8. Principal Isotopes* Contributing to Ceramic Waste Form Activity

Nuclide	Total Activity for the Ceramic Waste Form (Ci)	Total Volumetric Activity for the Ceramic Waste Form (Ci/cm^3)
1. Ce-144	789,950	2.86
2. Pr-144	789,950	2.86
3. Pm-147	315,325	1.14
4. Cs-137	154,800	0.56
5. Ba-137M	145,825	0.53
6. Y-90	130,950	0.47
7. Sr-90	130,925	0.47
8. Y-91	14,754	0.05
9. Cs-134	13,648	0.05
10. Pr-144M	9,480	0.03
11. Eu-155	6,628	0.02
12. Sr-89	4,901	0.02
13. Sm-151	4,463	0.02
14. Pu-239	1,499	0.01
Sum of listed nuclides:	2,513,095	9.11

*Listed isotopes constitute greater than 99.9% of total activity, 15 months after reactor shutdown.

Table 4-9. Principal Isotopes* Contributing to Metal Waste Form Activity

Nuclide	Total Activity for the Metal Waste Form (Ci)	Total Volumetric Activity for the Metal Waste Form (Ci/cm^3)
1. Co-60	166,291	2.80
2. Rh-106	115,500	1.95
3. Ru-106	115,500	1.95
4. Fe-55	94,708	1.60
5. Nb-95	59,780	1.01
6. Mn-54	38,543	0.65
7. Zr-95	27,049	0.46
8. Sb-125	10,519	0.18
9. Co-58	4,460	0.08
10. Te-125M	2,574	0.04
11. Te-127M	1,447	0.02
12. Te-127	1,417	0.02
13. Sn-123	1,127	0.02
14. Ni-63	698	0.01
15. Rh-103M	674	0.01
16. Ru-103	673	0.01
Sum of listed nuclides:	640,960	10.81

*Listed isotopes constitute greater than 99.9% of total activity, 15 months after reactor shutdown.

self-classification by the people according to the race with which they most closely identify. For purposes of analysis, minority populations are further defined as those census tracts within the zone of impact [80 kilometers (50 miles) of the ANL-W site] for which the percent minority population exceeds the average of all census tracts within the zone of impact by at least 20 percentage points or where the percent minority population exceeds 50% for any given census tract. In the case of migrant or dispersed populations, a minority population consists of a group that is greater than 50% minority.

Low-income population is defined as: A group of people and/or a community experiencing common conditions of exposure or impact, in which 25% or more of the population is characterized as living in poverty. The U.S. Bureau of Census characterizes persons in poverty as those whose income is less than a "statistical poverty threshold." The threshold for the 1990 census was a 1989 income of $12,674.00 for a family of four. This threshold is a weighted average based on family size and the age of the persons in the family.

Approximately 172,000 people reside within the 80 kilometer (50 mile) radius of the ANL-W site. This distance was chosen to allow for comparison with population doses resulting from similar projects which were analyzed in the SNF and INEL EIS. Of that total population, only 7% (11,700 people) are classified as minority individuals. These individuals reside primarily to the southeast of the ANL-W site. The minority population composition is primarily Hispanic, Native American, and Asian. Most of the Fort Hall Indian Reservation of the Shoshone-Bannock Tribes lies largely within 80 kilometers (50 miles) of the ANL-W site. Of the total nearby population of approximately 172,000 people, 14% or approximately 23,000 people fall within the definition of "low-income." Census tracts containing low-income populations also lie largely southeast of the ANL-W site.

As stated in the previous sections of this EA, the potential environmental impacts calculated for activities associated with the Proposed Action due to planned operations or accident conditions present little, if any risk, and do not constitute a disproportionately high adverse impact to any of

the surrounding population. Therefore, the impacts also do not constitute a disproportionately high and adverse impact on any minority or low-income populations.

4.7 Consistency with U.S. Nonproliferation Policy

The United States' policy on nonproliferation is contained in Presidential Decision Directive 13 (PDD 13), a classified document. On September 27, 1993, at the time the Presidential Decision Directive 13 was signed, an unclassfied press release [46] summarizing its contents was issued. Regarding fissile materials, the fact sheet contains the following statements:

> The U.S. will undertake a comprehensive approach to the growing accumulation of fissile material from dismantled nuclear weapons and within civil nuclear programs. Under this approach, the U.S. will:
>
> -- Seek to eliminate where possible the accumulation of stockpiles of highly-enriched uranium or plutonium, and to ensure that where these materials already exist they are subject to the highest standards of safety, security, and international accountability.
>
> -- Propose a multilateral convention prohibiting the production of highly-enriched uranium or plutonium for nuclear explosives purposes or outside of international safeguards.
>
> -- Encourage more restrictive regional arrangements to constrain fissile material production in regions of instability and high proliferation risk.
>
> -- Submit U.S. fissile material no longer needed for our deterrent to inspection by the International Atomic Energy Agency.
>
> -- Pursue the purchase of highly-enriched uranium from the former Soviet Union and other countries and its conversion to peaceful use as reactor fuel.
>
> -- Explore means to limit the stockpiling of plutonium from civil nuclear programs, and seek to minimize the civil use of highly-enriched uranium.

-- Initiate a comprehensive review of long-term options for plutonium disposition, taking into account technical, nonproliferation, environmental, budgetary and economic considerations. Russia and other nations with relevant interests and experience will be invited to participate in this study.

The United States does not encourage the civil use of plutonium and, according, does not itself engage in plutonium reprocessing for either nuclear power or nuclear explosive purposes. The United States, however, will maintain its existing commitments regarding the use of plutonium in civil nuclear programs in Western Europe and Japan.

DOE has analyzed the Proposed Action for compliance with U.S. nonproliferation policy, focusing on three specific areas of concern -- plutonium, highly enriched uranium and reprocessing.

Part of the impetus for electrometallurgical technology research and development was to create an alternative to aqueous reprocessing in response to proliferation concerns raised during the late 1970's.[47] Electrometallurgical technology was developed for use in the Department's advanced liquid metal reactor development program. Following the cancellation of the Integral Fast Reactor development program, the electrometallurgical process has been modified for potential use in treating EBR-II SNF for interim storage and ultimate disposition.

The electrometallurgical technique is incapable of yielding a pure separated plutonium stream. During the Integral Fast Reactor (IFR) project, which was canceled in 1994, the Department attempted to develop an electrorefiner that included a liquid cadmium cathode to collect and concentrate plutonium and all other transuranic elements present in the spent nuclear fuel. This process would have resulted in a plutonium product contaminated or mixed with uranium, other transuranic elements, and rare earth fission products. Development of the cathode progressed only to the point where the technical feasibility of the concept was established. No prototype or working model was ever commissioned for the Fuel Conditioning Facility. In the proposed demonstration, plutonium would stay mixed with the fission products and both would be immobilized in the ceramic waste form.

As conceived, however, the liquid cadmium cathode would have produced a metal alloy product containing up to 70% plutonium which could only have been obtained after subsequent processing in a high-temperature vacuum furnace. The balance of materials (30% of the alloy) would be those elements most difficult to separate from plutonium by any chemical means: uranium, americium, neptunium, curium, and the rare earth fission products. This plutonium metal-alloy product would have high fission product and transuranic content (HITRU), a high heat source, a high neutron radiation source, and a high gamma radiation source, any one of which would make design of a weapon extremely difficult. Neutron and gamma radiation would be three to four orders of magnitude higher than weapons grade or reactor grade material. These levels of radiation are lethal and would prohibit any handling of the material or weapon by other than remote means. As a result of high heat, neutron and gamma radiation sources and transuranic contamination, any attempt to use plutonium in this form for weapons purposes would add significant difficulties to any potential proliferant's efforts.

The Department of Energy requested a study by the Defense Technologies Engineering Division of Lawrence Livermore National Laboratory (LLNL) to determine the feasibility of misusing electrometallurgical technology in order to produce plutonium that could be used in a proliferant nuclear weapon program. While the report from that study is classified, an unclassified presentation on the conclusions from the report was given to DOE by LLNL in March 1994. According to the presentation, the study concluded that significant new process inventions, remote fabrication and new weapons designs would be required before material resulting from this process could be used in a nuclear weapons program. The major problems for prospective weapons designers would be: (a) HITRU plutonium heat output would complicate and might even preclude the design of even a simple nuclear device, due to the heat effect on high explosives and plutonium components; (b) radiation levels from the material would be incapacitating and lethal to individuals and would preclude close exposure for more than brief periods during weapons fabrication; (c) designing processes to deal with the radiation levels would significantly complicate a proliferant's development and deployment programs and production activities; and (d) over time, high radiation fields would negatively impact materials properties and electronic behavior.

The electrometallurgical technique is not capable of increasing the level of enrichment of uranium contained in spent nuclear fuel being treated. Therefore, this technology is not useful to a nation seeking to enrich uranium. Unlike spent fuel from typical commercial power reactors which would contain only low-enriched uranium in their fuel alloy, spent driver fuel from EBR-II contains a high concentration of highly enriched uranium.* The EBR-II driver fuel is initially at 67% enrichment; weapons grade HEU is 93% or higher. While it is correct that the technology would separate the highly enriched uranium from the driver spent nuclear fuel under the proposed demonstration, the highly enriched uranium in the EBR-II driver fuel would be melted in the casting furnace and combined with depleted uranium to produce low-enriched uranium without ever leaving the argon cell.

Blending down the highly enriched uranium is consistent with the United States nonproliferation policy to seek to eliminate where possible the accumulation of stock piles of highly enriched uranium or plutonium. Blending down to low-enriched uranium would also make the material easier to handle and to store, without precluding any future disposition option that might be selected. It would also support the Department's commitment to reduce unnecessary stockpiles of highly enriched uranium. The blended down uranium would be easier to handle and store than HEU because special nuclear materials are categorized for security according to a number of physical and chemical characteristics. Materials more easily used for weapons are more expensive to manage than those that are less easily used for weapons. If the uranium were left as relatively pure highly enriched uranium, security upgrades costing on the order of half a million dollars would be required for FCF. Annual costs for increased security personnel would be on the order of several hundred thousand dollars. By comparison, the blended-down uranium falls into one of the lowest special materials categories. There is comparatively little cost to manage this material. No additional handling of the electrorefiner cathode product is required.

---

* Highly enriched uranium is defined as having greater than 20% uranium-235. The spent EBR-II fuel on average contains approximately 65% uranium-235.

The Department has provided the following definition of reprocessing in its Programmatic Spent Nuclear Fuel Environmental Impact Statement:[48]

> Reprocessing (of spent nuclear fuel): Processing of reactor irradiated nuclear material (primarily spent nuclear fuel) to recover fissile and fertile material, in order to recycle such materials primarily for defense programs. Historically, reprocessing has involved aqueous chemical separations of elements (typically uranium or plutonium) from undesired elements in the fuel.

As noted in Section 2.3 of the environmental assessment, this technology does separate spent nuclear fuel constituents into certain groups. For driver spent nuclear fuel, these groups are (1) highly-enriched uranium (which would immediately be blended with depleted uranium to form low-enriched uranium), (2) a mixture of fission products and plutonium, and (3) cladding metal. For the blankets, these groups are (1) low-enriched uranium, (2) a mixture of fission products and plutonium, and (3) cladding metal.

The Department of Energy does not regard the proposed treatment process as "reprocessing" as that term has been used historically and is used in the Department of Energy National Environmental Policy Act regulations. The purpose of the Department of Energy's reprocessing activities was to recover plutonium and highly-enriched uranium from spent nuclear fuel for reuse in defense-related activities, including weapons production. These activities required large production-scale buildings and ancillary facilities. The Department of Energy regulations implementing the National Environmental Policy Act were drafted with these reprocessing activities in mind. In contrast, the much smaller-scale proposed demonstration of electrometallurgical technology would not involve the separation of plutonium from fission products or the reuse or recycling of any separated materials for defense-related purposes.

DOE's former reprocessing facilities at its Savannah River, Hanford, and INEL sites range in size from 19,000 square meters (200,000 square feet) to 54,000 square meters (600,000 square feet). They produced pure fissile material for defense programs. By comparison, FCF, a research facility for technology development and demonstration and not a production facility, has a footprint of only 1,500 square meters (16,000 square feet).

With regard to the potential reuse of separated materials, the treatment of the 100 driver assemblies would result, after blending, in approximately 1400 kilograms of low-enriched uranium. As described in Section 2.3 of the environmental assessment, this low-enriched uranium would be stored at Argonne National Laboratory-West until a decision is made regarding its ultimate disposition. The disposition of this material would be consistent with future departmental decisions regarding other similar materials, but it would not involve reuse for defense-related purposes. Potential disposition options for this material include its sale to the commercial nuclear industry for use as power reactor spent nuclear fuel.

For all of these reasons, the Department of Energy does not believe that the proposed demonstration of electrometallurgical technology constitutes "reprocessing" within the meaning of 10 CFR Part 1021, Appendix D to Subpart D. Even if the proposed demonstration were regarded as "reprocessing," it is important to note that preparation of an environmental impact statement is not automatically required by Appendix D, which is entitled "Classes of Actions That *Normally* Require EISs" (emphasis added). At most, the inclusion of a class of actions in Appendix D establishes a presumption that activities generally falling within that class are "major" activities requiring the preparation of an environmental impact statement. That presumption is overcome when an evaluation of a specific proposal indicates that it is not a "major" activity and would not produce any significant environmental impacts.

This page intentionally left blank.

This page intentionally left blank.

5.0 ENVIRONMENTAL CONSEQUENCES OF ALTERNATIVES

The environmental impacts for the Proposed Action and the three alternatives are small. The differences in near-term environmental consequences are also small, but the third alternative (Demonstration at an Alternative Facility and location), would generate some 1000 cubic meters (35,000 cubic yards) of construction waste and 300 person-rem of additional radiation dose to workers involved in decontamination and demolition. All alternatives assume the continued defueling of EBR-II and disassembly of the spent nuclear fuel assemblies as required to package them for temporary storage. All alternatives also assume that DOE will continue to perform research on potential processes for treatment of spent nuclear fuel for long-term storage or disposal.

One notable difference in consequences among the alternatives is in the storage requirement for waste and SNF, as shown graphically in Figure 5-1. Because treatment of the assemblies would result in waste forms more compact than the spent fuel, less storage volume would be required for the waste forms and byproducts of the treated assemblies than for the untreated SNF assemblies. Under the Proposed Action, the RSWF storage requirement would be 38 liners. Byproduct uranium ingots would total 0.15 cubic meters (5.3 cubic feet) in volume (equivalent to two RSWF canisters). The Equipment Performance Verification alternative would require 59 RSWF storage liners and storage space for 0.07 cubic meters (2.5 cubic feet) of uranium byproduct ingots (equivalent to one RSWF canister). The No-Action alternative would require 81 RSWF storage liners. The number of storage liners required under the Demonstration in Alternative Facility at TAN is the same as the Proposed Action because only the location of the treatment process is different.

The process waste streams and byproducts for the Proposed Action and alternatives are summarized in Tables 5-1 through 5-4. The treatment process itself is compact and would produce compact waste forms and byproducts. These would be stored in existing facilities. Most incidental waste generation in FCF occurs external to the hot cells, somewhat independent

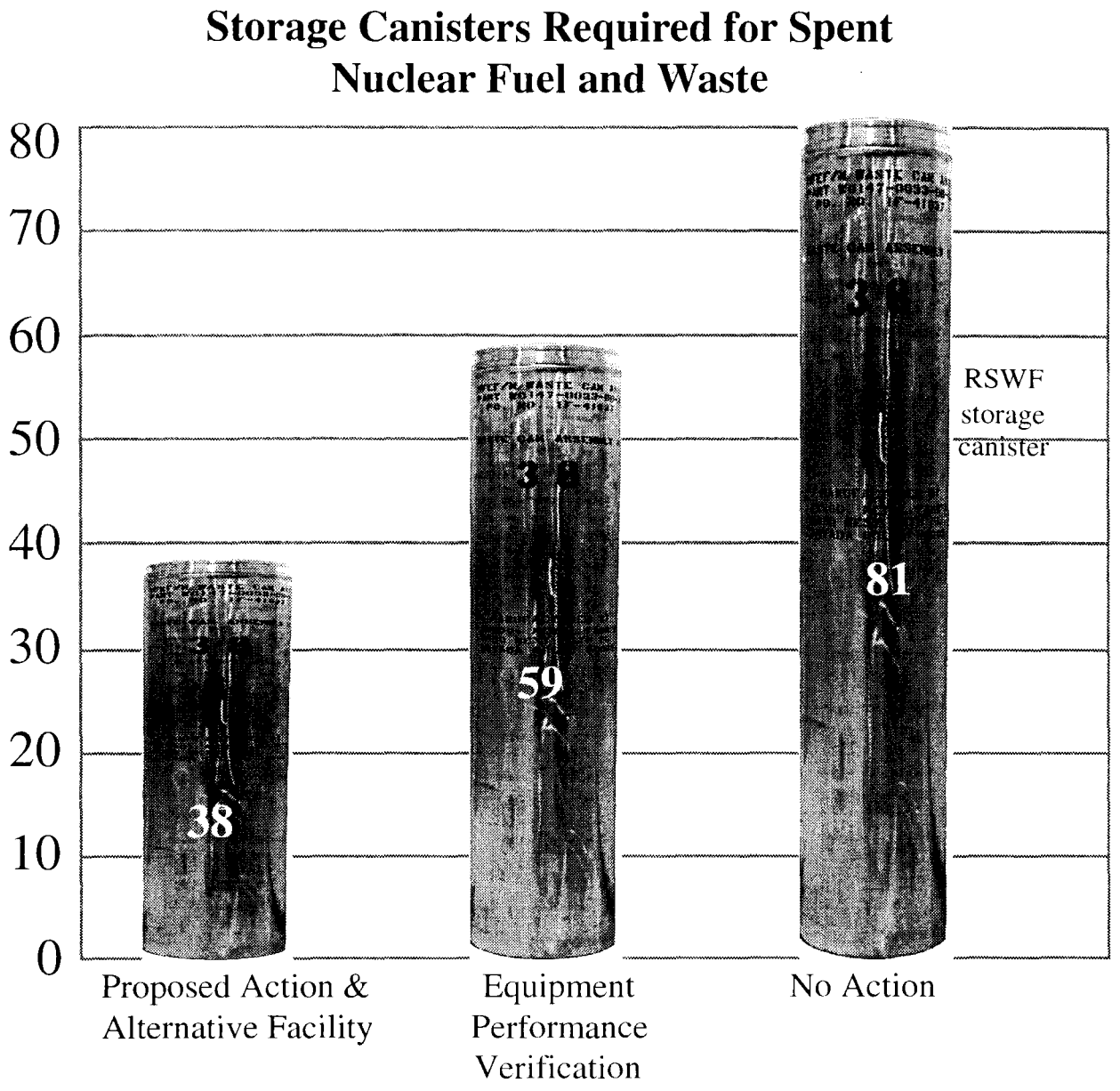


Figure 5-1. RSWF storage volumes for the alternatives

Table 5-1. Summary of Potential Environmental Impacts of the Proposed Action

Environmental Attribute	Potential impact [a]	Explanation
Geology and soil, acres disturbed	None (no disturbed acreage)	Project would be in existing facility
Water resources	No increase	Process water not required
Wildlife and habitat	None	Project would be in existing facility
Historic, archaeological, or cultural resources	None	Project would be in existing facility
Air resources	Radiological operational emissions 1.1×10^{-4} of NESHAP dose limit Toxic Air Pollutants (TAPs) None Prevention of Significant Deterioration (PSD) Clean Air Act Permit No. 0140-0022	Facility design, waste acceptance criteria, safety analysis, inspection and surveillance; and annual reporting control emissions.
Human health	Radiation exposures and cancer risk Maximally exposed offsite individual: 1.1×10^{-6} rem/yr 5.3×10^{-10} increase in latent cancer fatalities per year 80 km (50 mile) population: 1.8×10^{-2} person-rem/yr 9×10^{-6} increase in latent cancer fatalities per year Nonradiological effects - No emissions	Access control, facility design, safety analysis, inspection and surveillance; and annual reporting control radiation exposure.
Transportation	Construction: None Operation (offsite truck trips per year): Radiological - Ongoing	Use of approved transport vehicles and containers, qualified equipment operators, and shipment manifesting procedure control transportation operations
Waste management[c]	Construction: None Operation: HLW[b] - 0.52 m^3 total GTCC[b] - 1.4 m^3 total TRU[b] Waste - 50 m^3 total LLW[b] - 20 m^3 total MW[b] - 1 m^3 total Sanitary - 780 m^3 total Decommissioning - 192 m^3 total	Waste procedures, waste minimization and recycling programs in place at INEL control waste management.
Socioeconomic conditions	Construction: None Operation: Existing workers	No additional workers required

a. Definition of Acronym: NESHAP - National Emission Standards for Hazardous Air Pollutants.
b. Definition of Acronyms: (HLW) - High-level waste, (GTCC) - Greater than Class C, (TRU) - Transuranic, (LLW) - Low-level waste, (MW) - Mixed Waste
c. Uranium recovered as part of the Proposed Action is not waste and is not shown in the table. Spent fuel elements have been included because, although they are not categorized as waste, they require interim storage and eventual treatment or disposal. Estimated waste storage volumes include any additional volume necessary for packaging requirements associated with radiation protection and heat generation. The volume comparison basis is the same for all alternatives.

Table 5-2. Summary of Potential Environmental Impacts of the Equipment Performance Verification Alternative

Environmental Attribute	Potential impact [a]	Explanation
Geology and soil, acres disturbed	None (no disturbed acreage)	Project would be in existing facility
Water resources	No increase	Process water not required
Wildlife and habitat	None	Project would be in existing facility
Historic, archaeological, or cultural resources	None	Project would be in existing facility
Air resources	Radiological operational emissions 5.8×10^{-5} of NESHAP dose limit Toxic Air Pollutants (TAPs) None Prevention of Significant Deterioration (PSD) Clean Air Act Permit No. 0140-0022	Facility design, waste acceptance criteria, safety analysis, inspection and surveillance; annual reporting control emissions.
Human health	Radiation exposures and cancer risk Maximally exposed offsite individual: 5.8×10^{-7} rem/yr 2.9×10^{-10} increase in latent cancer fatalities per year 80 km (50 mile) population: 1.5×10^{-2} person-rem/yr 7.5×10^{-6} increase in latent cancer fatalities per year Nonradiological effects - No emissions	Access control, facility design, safety analysis, inspection and surveillance;, annual reporting control radiation exposure.
Transportation	Construction: None Operation (offsite truck trips per year): Radiological - Ongoing	Use of approved transport vehicles and containers, qualified equipment operators, and shipment manifesting procedure control transportation operations
Waste management[c]	Construction: None Operation: HLW[b] - 0.25 m^3 total Spent fuel elements - 2.3 m^3 total GTCC[b] - 1.4 m^3 total TRU[b] Waste - 50 m^3 total LLW[b] - 20 m^3 total MW[b] - 1 m^3 total Sanitary - 780 m^3 total Decommissioning - 192 m^3 total	Waste procedures, waste minimization and recycling programs in place at INEL control waste management.
Socioeconomic conditions	Construction: None Operation: Existing workers	Additional workers not required

a. Definition of Acronym: NESHAP - National Emission Standards for Hazardous Air Pollutants.
b. Definition of Acronyms: (HLW) - High-level waste, (GTCC) - Greater than Class C, (TRU) - Transuranic, (LLW) - Low-level waste, (MW) - Mixed Waste
c. Uranium recovered as part of the Proposed Action is not waste and is not shown in the table. Spent fuel elements have been included because, although they are not categorized as waste, they require interim storage and eventual treatment or disposal. Estimated waste storage volumes include any additional volume necessary for packaging requirements associated with radiation protection and heat generation. The volume comparison basis is the same for all alternatives.

Table 5-3. Summary of Potential Environmental Impacts of the Demonstration in Alternative Facility at TAN

Environmental Attribute	Potential impact [a]		Explanation
Geology and soil, acres disturbed	Minimal previously disturbed soil and in an existing facility		Previously disturbed soil; projects would be within major facility areas
Water resources	Construction: water usage		Storm water pollution prevention plan in place at INEL
Wildlife and habitat	None		Project would be in existing facility
Historic, archaeological, or cultural resources	None		Project would be in existing facility
Air resources	Radiological operational emissions 4.9×10^{-5} of NESHAP dose limit Toxic Air Pollutants (TAPs) None Prevention of Significant Deterioration (PSD) Clean Air Act Permit needed		Facility design, waste acceptance criteria, safety analysis, inspection and surveillance; and annual reporting control emissions.
Human health	Radiation exposures and cancer risk Maximally exposed offsite individual: 4.9×10^{-7} rem/yr 2.5×10^{-10} increase in latent cancer fatalities per year 80 km (50 mile) population: 1.4×10^{-2} person-rem/yr 7.0×10^{-6} increase in latent cancer fatalities per year Nonradiological effects - No emissions		Access control, facility design, safety analysis, inspection and surveillance; and annual reporting control radiation exposure.
Transportation	Construction: None Operation (offsite truck trips per year): Radiological -150-200 plus ongoing		Use of approved transport vehicles and containers, qualified equipment operators, and shipment manifesting procedure control transportation operations.
Waste management[c]	Construction: Operation:	1041 m^3 HLW[b] - 0.52 m^3 total GTCC[b] - 1.4 m^3 total TRU[b] Waste - 50 m^3 total LLW[b] - 20 m^3 total MW[b] - 1 m^3 total Sanitary - 780 m^3 total Decommissiioning - 367 m^3 total	Waste procedures, waste minimization and recycling programs in place at INEL control waste management.
Socioeconomic conditions	Construction: Operation:	100 peak subcontractor personnel 30 existing workers	

a. Definition of Acronym: NESHAP - National Emission Standards for Hazardous Air Pollutants.
b. Definition of Acronyms: (HLW) - High-level waste, (GTCC) - Greater than Class C, (TRU) - Transuranic, (LLW) - Low-level waste, (MW) - Mixed Waste
c. Uranium recovered as part of the Proposed Action is not waste and is not shown in the table. Spent fuel elements have been included because, although they are not categorized as waste, they require interim storage and eventual treatment or disposal. Estimated waste storage volumes include any additional volume necessary for packaging requirements associated with radiation protection and heat generation. The volume comparison basis is the same for all alternatives.

Table 5-4. Summary of Potential Environmental Impacts of the No-Action Alternative

Environmental Attribute	Potential impact [a]		Explanation
Geology and soil, acres disturbed	None (no disturbed acreage)		Project would be in existing facility
Water resources	No increase		Process water not required
Wildlife and habitat	None		Project would be in existing facility
Historic, archaeological, or cultural resources	None		Project would be in existing facility
Air resources	Radiological operational emissions No Emissions Toxic Air Pollutants (TAPs) None Prevention of Significant Deterioration (PSD) None		Facility design, waste acceptance criteria, safety analysis, inspection and surveillance; and annual reporting control emissions.
Human health	Radiation exposures and cancer risk Maximally exposed offsite individual: No Emissions 80 km (50 mile) population: No Emissions Nonradiological effects - No emissions		Access control, facility design, safety analysis, inspection and surveillance; and annual reporting control radiation exposure.
Transportation	Construction: None Operation (offsite truck trips per year): Radiological - Ongoing		Use of approved transport vehicles and containers, qualified equipment operators, and shipment manifesting procedure control transportation operations
Waste management[c]	Construction: Operation:	None HLW[b] - 0 m^3 total GTCC[b] - 1.4 m^3 total TRU[b] Waste - 0 m^3 total LLW[b] - 70 m^3 total MW[b] - 1 m^3 total Sanitary - 780 m^3 total Decommissioning - 172 m^3 total	Waste procedures, waste minimization and recycling programs in place at INEL control waste management.
Socioeconomic conditions	Construction: Operation:	None Existing workers	Additional workers not required

a. Definition of Acronym: NESHAP - National Emission Standards for Hazardous Air Pollutants.
b. Definition of Acronyms: (HLW) - High-level waste, (GTCC) - Greater than Class C, (TRU) - Transuranic, (LLW) - Low-level waste, (MW) - Mixed Waste
c. Uranium recovered as part of the Proposed Action is not waste and is not shown in the table. Spent fuel elements have been included because, although they are not categorized as waste, they require interim storage and eventual treatment or disposal. Estimated waste storage volumes include any additional volume necessary for packaging requirements associated with radiation protection and heat generation. The volume comparison basis is the same for all alternatives.

of the facility's activities. The wastes generated from the remote maintenance and repair of in-cell equipment have been included in the operational incidental waste. Remote maintenance and repair would be performed without any direct contact between the equipment and workers, therefore decontamination would be unnecessary and little or no waste would be generated by this type of activity. No liquid wastes would be generated. Under the Proposed Action, the waste forms and the uranium byproducts would amount to less than 0.8 cubic meters (28 cubic feet), a volume that would fit under a small table. Adding in the fuel assembly hardware would increase the volume to approximately 2 cubic meters (71 cubic feet). Under the No-Action Alternative, the spent fuel would occupy a storage volume of 4.4 cubic meters (155 cubic feet), with another 1.2 cubic meters (42.4 cubic feet) required for the fuel assembly hardware.

Compared alternatives would have the same impact on wildlife and habitat (because they would use an existing facility), and historical, archaeological, or cultural resources (existing facility). The Demonstration at an Alternative Facility Alternative would have a larger impact on geology and soil and water resources due to the required construction. The action alternatives would result in a very small increase in air emissions compared to the No-Action Alternative. The action alternatives would result in slightly larger but negligible health effects compared to the No-Action Alternative. Worker radiation exposure for the Demonstration at an Alternative Facility and Location Alternative would be greater due to decontamination, demolition, construction, and transportation requirements.

Under the Demonstration at an Alternative Facility and Location Alternative, there would be extensive waste generated from required facility modifications and relocation of the nuclear materials presently stored in the TAN Hot Shop. This is the only alternative that would require offsite transportation of SNF, with 150 to 200 shipments needed to move the 125 spent fuel assemblies from ANL-W or ICPP to TAN and return the waste forms and byproducts to ANL-W for storage.

The Equipment Performance Verification Alternative is very similar to the Proposed Action in terms of environmental impact. There is a small difference in that this alternative would require

more waste storage locations in RSWF since it would treat fewer SNF assemblies and would have slightly lower radioactive air emissions than the Proposed Action. The Equipment Performance Verification Alternative, however, does not fully satisfy the purpose and need for DOE action because this alternative would not provide sufficient fission product, transuranic, and sodium impurities to test the electrorefiner under near-prototypic conditions.

The No-Action Alternative is also very similar to the Proposed Action in terms of short-term environmental impact. Because no fuel assemblies would be treated in the No-Action Alternative, twice as much volume would be required for storage. However, because most of the EBR-II spent fuel will go into storage in RSWF under all four options, the effective difference is relatively minor. Under the No-Action Alternative, however, the potential longer-term impacts from not demonstrating the technology to treat the EBR-II spent fuel for disposition may result in a loss of crucial infrastructure including personnel and facilities needed for any future disposition of the spent fuel and may potentially impact DOE's obligation to remove DOE SNF from the State of Idaho by 2035. In addition, without a demonstration of this treatment technology, DOE will not have sufficient information and data to decide whether to further explore this technology as a management option for its SNF.

During the 30 year operating history of the reactor, EBR-II spent fuel has typically been stored for a few years prior to reprocessing at ICPP. Most of the experience with storage has been good, although some fuel failures during storage have occurred. Current procedures use multiple containment and dry storage within RSWF at ANL-W. This configuration is expected to provide a stable, secure storage environment that would minimize fuel deterioration, as well as any potential short-term effects of the deterioration. However, there are few data available upon which to base an evaluation of longer-term storage of the modern EBR-II SNF.

Most of the storage experience with EBR-II SNF is based on storage in the CPP-603 basin at ICPP on the INEL and with a few fuel elements that have been kept in the HFEF argon cell for more than 20 years. In the pristine inert atmosphere of HFEF, the fuel elements, which do not comprise a statistically significant sample, have held up well. However, the majority of these

elements have a different type of cladding from the modern EBR-II fuel, and have not been subjected to the high burnup and operational transient experiments (i.e., much more severe service conditions) of the modern fuel. The EBR-II SNF in CPP-603 has experienced several known failures, both before secondary containment (stainless steel bottles) was used and subsequently when it was found that some of the bottles leaked and displaced the argon gas with basin water. The cause of the failures is probably intergranular stress corrosion cracking, also likely influenced by basin water composition. An early EBR-II fuel assembly that failed after a year of inadequate wet storage is shown as an example in Figure 5-2. When microscopic cracks penetrate the cladding, the uranium reacts chemically with any available moisture that passes through them. The reaction products (uranium oxide and uranium hydride) will expand the fuel and split the cladding open. The uranium hydride can flake off as a powder which will burn when exposed to air. Because all SNF removed from EBR-II has the external sodium removed by a water wash, there is an open question about whether the residual moisture in the microscopic cladding cracks is sufficient to result in gross cladding failure. Chemical reaction of water with residual sodium could provide sufficient conditions for stress corrosion cracking. Monitoring of stored EBR-II SNF would be required independent of the Proposed Action and all alternatives.

In summary, with the exception of the Demonstration in an Alternative Facility at TAN, near-term environmental impacts of the Proposed Action and the alternatives are negligible. The environmental impacts of the Proposed Action differ only slightly from the impacts of No Action. The Proposed Action, however, offers the potential advantage of developing a feasible path forward for the geological disposal of the EBR-II sodium-bonded SNF.

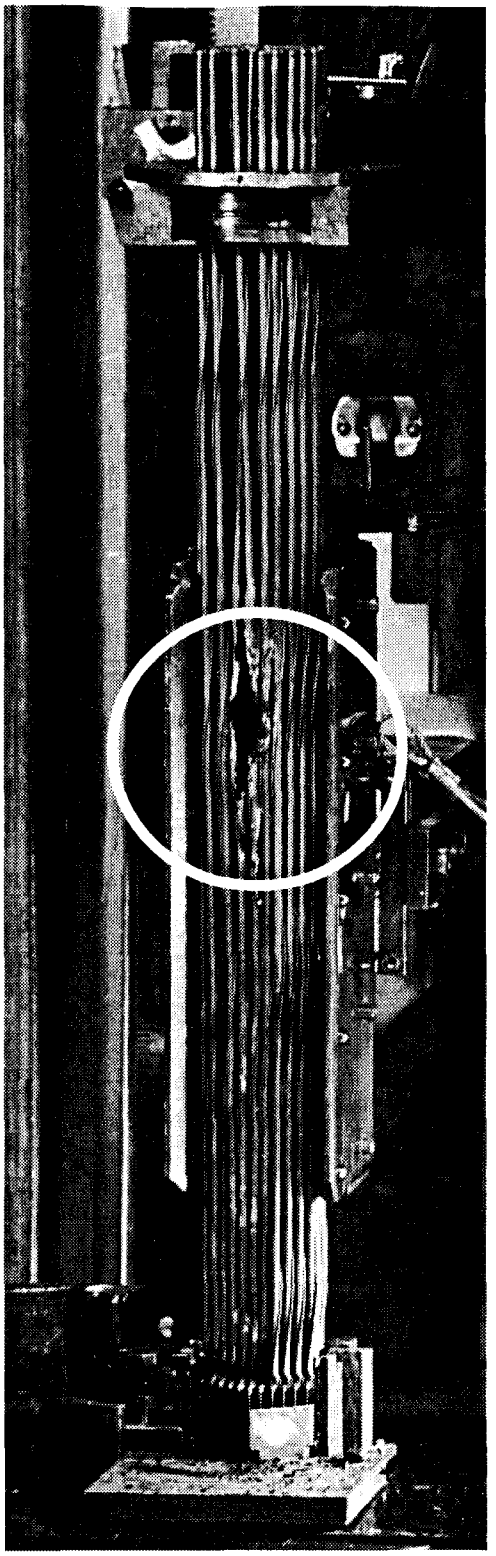


Figure 5-2. EBR-II fuel assembly that catastrophically failed while in wet storage. Stress corrosion cracking allowed water to react with the bond sodium and fuel.

This page intentionally left blank.

This page intentionally left blank.

6.0 RELATIONSHIP TO OTHER NATIONAL ENVIRONMENTAL POLICY ACT DOCUMENTS

The level of National Environmental Policy Act analysis was determined in accordance with 10 CFR Part 1021, the Department of Energy prepared this environmental assessment for the electrometallurgical treatment demonstration project to assist with agency planning and decision making. On the basis of the environmental assessment, the Department of Energy will decide whether to prepare a Finding of No Significant Impact, or an environmental impact statement. If the environmental impacts of the electrometallurgical treatment demonstration project are found to be insignificant, then a Finding of No Significant Impact will be prepared; if not, then an environmental impact statement will be prepared.

The proposed demonstration involving the sodium bonded spent nuclear fuel is independent of other previous, ongoing or proposed future actions, including those related to Experimental Breeder Reactor-II or other spent nuclear fuel. Although the proposed demonstration would provide intrinsically useful information on conditioning spent nuclear fuel, the proposal does not derive justification from any larger proposed action. The proposed action is not similar to or connected with the other existing or planned Department of Energy actions to a degree that would require a broader National Environmental Policy Act review.

Should the Department of Energy decide to proceed with the proposed demonstration and should this demonstration prove successful, it would not automatically trigger any further action related to the treatment of Experimental Breeder Reactor-II spent nuclear fuel or other broader application. The Department of Energy would conduct appropriate further National Environmental Policy Act review before making decisions on any such future proposal for broader application of the technology.

Related DOE National Environmental Policy Act documents and review actions include the following.

This Environmental Assessment is related to an earlier Environmental Assessment published in May 1990 which considered and analyzed the potential environmental impacts associated with modification of the FCF building in support of operations for the Integral Fast Reactor Program (Ref. DOE/EA-0377).

Volume 2 of the SNF and INEL EIS provided INEL site-specific NEPA evaluation of reasonably foreseeable impacts of SNF program activities at the INEL including 1) EBR-II Blanket Treatment, and 2) Electrometallurgical Process Demonstration. In the case of these projects, DOE subsequently determined that additional NEPA evaluation was needed. The Proposed Action has a more limited scope than these previously analyzed proposals. The EA summarizes pertinent issues discussed in the SNF and INEL EIS, and, in certain cases, incorporates discussions from that EIS by reference.

DOE NEPA reviews that also relate to the subject Environmental Assessment include the EIS and supplement for the Waste Isolation Pilot Plant and the EIS for a Proposed Repository at Yucca Mountain, Nevada. Under the Proposed Action, TRU waste would be produced and eligible for disposal in WIPP. Under the Proposed Action, two high-level waste forms would be produced which it is hoped would be eligible for disposal in a geologic repository.

The Storage and Disposition of Weapons-Usable Fissile Materials Programmatic EIS analyzes DOE alternatives for the management and disposition of excess fissile materials (primarily separated plutonium and highly enriched uranium) that are no longer required for military purposes. Electrometallurgical treatment technology is being evaluated as a potential alternative technology for disposition of excess plutonium in this programmatic EIS.[49,50]

This page intentionally left blank.

This page intentionally left blank.

7.0 RELATIONSHIP OF THE PROPOSED ACTION TO ANY OTHER APPLICABLE FEDERAL, STATE, REGIONAL OR LOCAL LAND USE PLANS AND POLICIES

There are no other known Federal, State, or local land use plans or policies to which this Proposed Action would be related.

This page intentionally left blank.

8.0 LISTING OF AGENCIES AND PERSONS CONSULTED

No federal or state agencies outside the Department of Energy or its contractors were consulted during preparation of the initial draft Environmental Assessment. However, following initial preparation the draft Environmental Assessment was distributed to interested members of the public, affected states and Native American Tribes. All comments received have been considered and the document has been revised as appropriate.

This page intentionally left blank.

9.0 REFERENCES

1. Settlement Agreement resolving Public Service Co. of Colorado v. Batt, No. CV 91-0035-S-EJL (D. Id.) and United States v. Batt, No. CV-91-0054-S-EJL (D. Id.), October 17, 1995.

2. National Research Council, "An Assessment of Continued R&D into an Electrometallurgical Approach for Treating DOE Spent Nuclear Fuel," Committee on Electrometallurgical Techniques for DOE Spent Fuel Treatment, Washington, D.C., 1995.

3. Frazier, R. S., and Campbell, D. C., "Production Decladding of Irradiated Fuel Assemblies Using a YAG Laser," Proceedings of 35th Conference on Remote Systems Technology, 1987.

4. Lash, T. R., Memorandum to E. J. Hughes, "Approval of Fuel Conditioning Facility (FCF) Safety Basis and Limited Operations," November 22, 1995.

5. State of Idaho, Permit to Construct an Air Pollution Emitting Source, No. 0140-0022, U.S. Department of Energy, Idaho Operations Office, "Hot Fuel Examination Facility/South at ANL-W PSD for Radionuclide Emissions," December 5, 1989.

6. National Research Council, op. cit., p. 38.

7. Laidler, J. J., "Pyrochemical Processing of DOE Spent Nuclear Fuels," Proceedings of DOE Spent Nuclear Fuel -- Challenges and Initiatives, Salt Lake City, Utah, December 13-16, 1994, pp. 188-195.

8. National Research Council, loc. cit.

9. State of Idaho, Permit to Construct..., loc. cit.

10. U.S. Department of Energy, "Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs; Final Environmental Impact Statement," DOE/EIS-0203-F, April 1995.

11. Merrick Engineers and Architects, "Engineering Study for the Remote Treatment Facility," May 12, 1995.

12. Ibid.

13. Ibid.

14. Environmental Protection Agency, 56 FR 50634, October 7, 1991.

15. Idaho National Engineering Laboratory, "Groundwater Monitoring Plan," DOE/ID-10441, June 1993.

16. Ibid.

17. Argonne National Laboratory-West, "Argonne National Laboratory-West 1994 Environmental Surveillance Report," July 1994.

18. Ibid.

19. Kuntz, M. A., Covington, H. R., Schorr, L. J., "An Overview of Basaltic Volcanism of the Eastern Snake River Plain, Idaho," Regional Geology of Eastern Idaho and Western Wyoming, Link, P. K., Kuntz, M. A., Platt, L. B., (eds.), Memoir 179, Geological Society of America, Denver, Colorado, pp. 227-267, 1992.

20. Idaho National Engineering Laboratory (Bowman, A. L., Downs, W. F., Moor, K. S., and Russell, B. F.), "INEL Site Characterization," EGG-NPR-6688, September 1984.

21. Hackett, W. R. and Smith, R. P., "Quaternary Volcanism, Tectonics, and Sedimentation in the Idaho National Engineering Laboratory Area," Field Guide to Geologic Excursions in Utah and Adjacent Areas of Nevada, Idaho and Wyoming, Wilson, J. R. (editor), 1992

22. Kuntz, M. A., loc. cit.

23. Idaho National Engineering Laboratory (Bowman, A. L., Downs, W. F., Moor, K. S., and Russsell, B. F.) loc. cit.

24. Hackett, W. R., loc. cit.

25. Argonne National Laboratory-West, July 1994, loc. cit.

26. Argonne National Laboratory-West, "Argonne National Laboratory-West Emergency Plan," October 24, 1994.

27. Argonne National Laboratory-West, "Environment, Safety, and Health Manual," May 26, 1995.

28. U.S. Department of Energy, "1994 INEL National Emission Standard for Hazardous Air Pollutants-Radionuclides; Annual Report," DOE/ID-10342(94), June 1995.

29. U.S. Department of Energy, DOE/EIS-0203-F, April 1995.

30. Argonne National Laboratory-West, October 24, 1994, loc. cit.

31. Argonne National Laboratory-West, "Fuel Cycle Facility Final Safety Analysis Report," Doc. No. F0000-0018-AK, 1993, Rev. 0, May 1, 1995.

32. Ibid.

33. U.S. Department of Energy, "Accident Assessments for Idaho National Engineering Laboratory Facilities," DOE/ID-10471, prepared by Science Applications International Corporation, March 1995.

34. Argonne National Laboratory-West, Document No. F0000-0018-AK, op. cit. p. 55.

35. Ibid, p. 56.

36. U.S. Department of Energy, "Natural Phenomena Hazards Mitigation, Screening Program," Document No. J500-103-G-T004, January 1995.

37. Argonne National Laboratory-West, Document No. F0000-0018-AK, loc. cit.

38. U. S. Department of Energy, DOE/EIS-0203-F, loc. cit.

39. U.S. Department of Energy, "National Spent Fuel Program Preliminary Report RCRA Characteristics of DOE-Owned Spent Nuclear Fuel," DOE-SNF-REP-002, Revision 3, July 1995.

40. Argonne National Laboratory-West, "Argonne National Laboratory-West Pollution Prevention/Waste Minimization Plan," Document No. W0001-1005-OP-01, Rev. 1, June 1995.

41. Idaho National Engineering Laboratory, Winberg, M. R. and Allred, W. E., "DOE Special Case Waste and Potential Commercial DOE-Held Greater-Than-Class C Low-Level Radioactive Waste at the INEL," Lockheed Idaho Technologies Company, INEL/94-0065, Vol. 1, October 1994.

42. Idaho National Engineering Laboratory, "INEL Reusable Property, Recyclable Materials, and Waste Acceptance Criteria," U.S. Department of Energy, Idaho Operations Office, DOE/ID-10381, Rev. 5, October 10, 1995.

43. Idaho National Engineering Laboratory, "INEL Site Treatment Plan," October 31, 1995 (reissued November 30, 1995).

44. U.S. Department of Energy, "RCRA Part B Permit Application for INEL," DOE/ID-10131 Vol. 4 (INEL Partial Permit, ID4890008952), January 1994.

45. Lockheed Martin Idaho Technologies Company, "Integration of EM Activities at the INEL," March 31, 1995.

46. Fact Sheet, "Nonproliferation and Export Control Policy," The White House, Office of the Press Secretary, September 27, 1993.

47. International Atomic Energy Agency, "International Nuclear Fuel Cycle Evaluation," Vienna, 1980.

48. U.S. Department of Energy, DOE/EIS-0203-F, loc. cit.

49. U.S. Department of Energy, "Fissile Materials Disposition Program Long Range R&D Plan," FMDPTI S95-02, Rev. 0, 1995.

50. U.S. Department of Energy, "Long Range Storage and Disposition of Weapons Usable Fissile Materials Programmatic EIS Implementation Plan," March 1995.

APPENDIX

COMMENTS AND RESPONSES

ELECTROMETALLURGICAL TREATMENT RESEARCH AND DEMONSTRATION PROJECT IN THE FUEL CONDITIONING FACILITY AT ARGONNE NATIONAL LABORATORY - WEST

U. S. DEPARTMENT OF ENERGY

OFFICE OF NUCLEAR ENERGY, SCIENCE AND TECHNOLOGY

May 15, 1996

APPENDIX

COMMENTS AND RESPONSES

ELECTROMETALLURGICAL TREATMENT RESEARCH AND DEMONSTRATION PROJECT IN THE FUEL CONDITIONING FACILITY AT ARGONNE NATIONAL LABORATORY - WEST

U. S. DEPARTMENT OF ENERGY

OFFICE OF NUCLEAR ENERGY, SCIENCE AND TECHNOLOGY

May 15, 1996

Table of Contents

Introduction

Chapter One: Discussion of Frequently Raised Issues

- Reprocessing
- Nonproliferation
- Appropriate Level of National Environmental Policy Act Review
- Public Comment Period

Chapter Two: Comments and Responses

Commentor	Document Response
Representative Michael Crapo	D001
B. Brailsford	D002
M. Huebner	D003
L. Harrison	D004
Senator Dirk Kempthorne	D005
R. Kaiser	D006
H. Lawroski	D007
D. Hirsch	D008
B. Ramberg	D009
J. Warf	D010
J. Commander	D011
Senator Larry Craig	D012
D. Kenney	D013
B. Weida	D014
S. Herring	D015
J. Tanner	D016
D. Knecht	D017
L. Bendixsen	D018
P. Bacca	D019
C. Rice	D020
F. Sica	D021
Senator Paul Simon	D022
J. Horan	D023
J. Courtney	D024
J. Myers	D025
B. Brailsford	D026
D. Hirsch	D027
B. Ramberg	D028
J. Warf	D029
C. Owen	D030

P. Dirkmaat	D031
J. Boland	D032
R. Skinner	D033
J. Ochi	D034
C. Solbrig	D035
A. Allen	D036
Representative Michael Crapo	D037
Senator Dirk Kempthorne	D038
Senator Paul Simon	D039
J. Commander	D040
R. McLaughlin	D041
C. Rice	D042
S. Ploger	D043
R. Crawford	D044
J. Wallin	D045
E. Schuman	D046
E. Stanger	D047
C. Nelson	D048
F. Wallin	D049
M. Masterson	D050
R. Schuman	D051
C. Brady	D052
H. Delaney	D053
C. Cox	D054
C. White, Jr.	D055
M. Neil	D056
M. Bragg	D057
J. Jones	D058
R. Barnes	D059
R. Nadauld	D060
Representative Michael Crapo	D061
M. Olson	D062
A. Aurilio	D063
D. Horner	D064
Senator Larry Craig	D065
G. Tait	D066
C. Marshall	D067
State of Idaho Oversight Program	D068
K. Davies	D069
W. Behnke	D070
P. Clausen	D071
L. Koch	D072
V. Aquino / H. Gallagher	D073

W. Poenitz	D074
G. Darnell	D075
L. Jobe	D076
R. Martell	D077
N. Hancock	D078
J. Herring	D079
M. Huebner	D080
R. Rice	D081
J. Warf	D082
W. Johnson	D083
C. Broscious	D084
A. Aurilio	D085
D. Hirsch, et al.	D086
B. Magavern	D087
B. Brailsford	D088
Senator Carol Moseley-Braun	D089
D. Hirsch	D090
D. Wilcox	D091
D. Hirsch	D092
D. Horner	D093
T. Clements / D. Horner	D094
J. Adams, et al.	D095
D. Gudgell	D096
A. Aurilio	D097
D. Horner	D098
B. Brailsford	D099
D. Hirsch	D100

Introduction

In conducting the National Environmental Policy Act review of the proposed demonstration of electrometallurgical treatment technology, the Department of Energy sought public participation on the project. Public comments were extensive and varied. They reflect both support and opposition and are based on both technical and policy reasons. The public comment period ran from February 5, 1996, to May 3, 1996, a total of eighty-nine days.

Interested parties could convey their views to the Department of Energy in a number of ways. Public meetings were held in Idaho Falls, Idaho on February 21, 1996, and in Washington, D.C. on February 27, 1996. Comments were also received in writing, via electronic mail, facsimile transmission, and over the telephone. The comment documents were reviewed, and individual comments were identified to facilitate preparation of responses. In all, nearly 700 comments were received from about 100 commentors. All comments received, regardless of their origin or method of transmittal, were given equal consideration.

An individual response was prepared for each comment. In Chapter Two, the comment documents appear in the order they were received. Responses follow each comment document.

Many of the commentors expressed opinions on a small group of key topics. These common topics were: (a) the assertion that electrometallurgical technology is a fuel reprocessing technology, (b) the assertion that this demonstration is not consistent with United States' nonproliferation policy, (c) the assertion that preparation of an environmental assessment is not appropriate and that the proposed action is larger than the proposed demonstration, and (d) the assertion that the public comment period should be extended because not all references cited in the draft environmental assessment were available in the public reading rooms. Rather than repeat detailed individual responses for each of the commentors, the Department of Energy's responses to these comments are found in Chapter One of this Comment Response Document under the headings: (a) Reprocessing, (b) Nonproliferation, (c) Appropriate Level of National Environmental Policy Act Review, and (d) Public Comment Period. Individual responses refer to Chapter One where appropriate.

The reader is encouraged to review Chapter One of this Appendix as part of reading and understanding the responses to comments dealing with these topics.

Chapter One:

Discussion of Frequently Raised Issues

Reprocessing

Some commentors suggested that the proposed demonstration of electrometallurgical treatment technology is "reprocessing" because it involves the separation of spent nuclear fuel constituents, could involve the future reuse of the separated materials, and/or has evolved from a technology that was originally intended to support the now-terminated Integral Fast Reactor project. As a result, some commentors suggested that the Department's National Environmental Policy Act regulation (10 CFR Part 1021, Appendix D to Subpart D) requires the preparation of an environmental impact statement for the proposed demonstration program.

It is important to note that preparation of an environmental impact statement is not automatically required by Appendix D, which is entitled "Classes of Actions That *Normally* Require Environmental Impact Statements" (emphasis added). At most, the inclusion of a class of actions in Appendix D establishes a presumption that activities falling within that class are generally "major" activities requiring the preparation of an environmental impact statement. That presumption is overcome when an evaluation of a specific proposal indicates that it is not a "major" activity and would not produce any significant environmental impacts.

The particular provision of Appendix D at issue originated in 1990, when the Department issued a Notice of Proposed Rulemaking (55 Federal Register 46444, November 2, 1990) that eventually was promulgated in 1992 as 10 CFR Part 1021. Among the new classes of actions proposed as "normally requiring Environmental Impact Statements" was the "siting, construction, operation, and decommissioning of reprocessing facilities." The preamble to the proposed rule described this provision's intended scope as one of several new classes of activity "related to the siting, construction and operation of *major nuclear facilities*" (emphasis added). It is apparent from this preamble language that the Department regarded the scale of the proposed activity and its potential for significant impacts, not the designation of an activity as "reprocessing," as the important factor in establishing the need for an environmental impact statement.

Unlike the large reprocessing facilities existing at the time the regulations were promulgated, the proposed demonstration project does not generate large volumes of liquid high-level waste or have other significant impacts. The Proposed Action is simply a *demonstration* of

electrometallurgical treatment technology involving equipment whose size and configuration cannot accommodate full-scale treatment activities. As demonstrated in the environmental assessment, the demonstration project would generate 640 kilograms (0.52 cubic meters, or approximately the size of a three-drawer file cabinet) of solid high-level waste in metal or ceramic form, but no liquid high-level waste. In light of these minimal impacts, it was appropriate for the Department to prepare an environmental assessment to assist in determining whether to prepare an environmental impact statement.

Indeed, the Department does not regard the proposed treatment process as "reprocessing" as that term has been used historically and is used in the Department's National Environmental Policy Act regulations. The purpose of the Department's historical reprocessing activities was to recover plutonium and highly-enriched uranium from spent nuclear fuel for reuse in defense-related activities, including weapons production. These activities required large production-scale buildings and ancillary facilities. The Department of Energy regulations implementing the National Environmental Policy Act were drafted with these reprocessing activities in mind. In contrast, the much smaller-scale proposed demonstration of electrometallurgical technology would not involve the separation of plutonium from fission products or the reuse or recycling of any separated materials for defense-related purposes.

As noted in Section 2.3 of the environmental assessment, this technology does separate spent nuclear fuel constituents into certain groups. For driver spent nuclear fuel, these groups are (1) highly-enriched uranium (which would promptly be blended with depleted uranium to form low-enriched uranium), (2) a mixture of fission products and plutonium, and (3) cladding metal. For the blanket fuel, these groups are (1) low-enriched uranium, (2) a mixture of fission products and plutonium, and (3) cladding metal.

With regard to the potential reuse of separated materials, the treatment of the 100 driver assemblies would result, after blending, in approximately 1400 kilograms (3080 pounds) of low-enriched uranium. As described in Section 2.3 of the environmental assessment, this low-enriched uranium would be stored at Argonne National Laboratory-West until a decision is made regarding its ultimate disposition. The disposition of this material would be consistent with future departmental decisions regarding other similar materials, but it would not involve reuse for defense-related purposes. Potential disposition options for this material include its sale to the commercial nuclear industry for use as power reactor fuel.

For all of these reasons, the Department of Energy does not believe that the proposed demonstration of electrometallurgical technology constitutes "reprocessing" within the meaning of 10 CFR Part 1021, Appendix D to Subpart D, even if it does fall within some broader definitions of "reprocessing" that are used in other contexts.

Nonproliferation

Some commentors suggested that the proposed demonstration project is contrary to the nonproliferation policy of the United States regarding materials that could be used by other countries or groups to construct nuclear weapons. The United States policy on nonproliferation is contained in Presidential Decision Directive 13, a classified document. On September 27, 1993, at the time Presidential Decision Directive-13 was signed, an unclassified press release summarizing its contents was issued. Among other things, the summary states that the United States does not encourage the civil use of plutonium, and accordingly the United States does not itself engage in plutonium reprocessing for either nuclear weapons or nuclear power purposes. As described in Section 4.7 of the environmental assessment, the electrorefining equipment that would be a part of the proposed demonstration project is not capable of separating plutonium from spent nuclear fuel. The plutonium contained in the spent nuclear fuel, along with other actinides and most constituent fission products, would be immobilized in the zeolite ceramic waste form. Thus, because it does not separate plutonium, the proposed demonstration is consistent with the nonproliferation policy of the United States.

Some of the commentors suggested, however, that with adjustment to or refinements of either of the electrorefiners that would be a part of the Proposed Action, this technology could be made to separate plutonium for weapons use. During the Integral Fast Reactor Program, which was canceled in 1994, the Department attempted to develop an electrorefiner that included a liquid cadmium cathode to collect and concentrate plutonium and all other transuranic elements present in the spent nuclear fuel. Successful application of this process would have resulted in a plutonium product contaminated or mixed with uranium, other transuranic elements, and rare earth fission products. Development of the cathode progressed only to the point where the technical feasibility of the concept was established. No prototype or working model was ever commissioned for the Fuel Conditioning Facility.

As conceived, however, the liquid cadmium cathode would have produced a metal-alloy product containing up to 70 percent plutonium; this plutonium alloy could have been obtained only after subsequent processing in a high-temperature vacuum furnace. The balance of materials remaining in the plutonium product after electrorefining, but prior to subsequent processing, would be those most difficult to separate from plutonium by any chemical means: uranium,

americium, neptunium, curium, and the rare earth fission products. This plutonium metal-alloy product would have high transuranic content, a high heat source, a high neutron radiation source, and a high gamma radiation source, any one of which would make design of a weapon extremely difficult. Neutron and gamma radiation sources would be three to four orders of magnitude higher than weapons-grade or reactor-grade material. These levels of radiation are lethal and would require handling of the material by remote means. As a result of the high heat, neutron, and gamma radiation sources, and the transuranic contamination, any attempt to use plutonium in this form for weapons purposes would add significant difficulties to any potential proliferant's efforts.

The Department requested a study by the Defense Technologies Engineering Division of Lawrence Livermore National Laboratory to determine the feasibility of misusing electrometallurgical technology in order to produce plutonium that could be used in a proliferant nuclear weapons program. While the report from that study is classified, an unclassified presentation on the conclusions from the report was given to the Department by Lawrence Livermore National Laboratory in March 1994 and is summarized in Section 4.7 of the environmental assessment. The unclassified presentation stated that the report concluded that significant new process inventions and new weapons designs would be required before material resulting from the process could be used in a nuclear weapons program. The major problems for prospective weapons designers would be:

(a) the actinides collected with the fission products would result in a very high heat output, which would complicate and might even preclude the design of even a simple nuclear device due to the heat output's effect on high explosive and plutonium components; (b) radiation levels from the material would be incapacitating and lethal to individuals coming in contact with the material for the purpose of weapons fabrication; (c) designing processes to deal with these radiation levels would significantly complicate a proliferant's development and deployment programs and production activities; and (d) over time, high radiation fields would negatively impact material behavior and electronic circuitry.

Some of the commentors also suggested that, because this technology separates highly-enriched uranium from the Experimental Breeder Reactor-II driver spent nuclear fuel, use of the technology would violate United States policy on nonproliferation. While it is correct that the technology would separate the highly-enriched uranium from the driver spent nuclear fuel, under

the proposed demonstration project the highly-enriched uranium would be melted in the casting furnace and combined with depleted uranium to produce low-enriched uranium (less than 20 percent enrichment) without ever leaving the argon cell. This blending-down activity would, in fact, be part of the spent nuclear fuel treatment process. Blending down would be done to reduce costs associated with the higher levels of security required for safeguarding highly-enriched uranium. Also, it should be noted that this technology is incapable of increasing the level of enrichment of uranium contained in spent nuclear fuel being treated. Therefore, this technology would not be useful to a nation seeking to enrich uranium to weapons-grade level. However, because the technology permits the separation of highly-enriched uranium, which could, in the wrong hands, pose a proliferation risk, the Department would exercise its authority to prevent proliferation sensitive information and technology advances resulting from the proposed demonstration from becoming available to potential proliferant-risk countries, including exercising its authority under the Atomic Energy Act, the Nuclear Nonproliferation Act of 1978 and the Department's implementing regulations. Separating the highly-enriched uranium from Experimental Breeder Reactor-II spent nuclear fuel and blending it down to less than 20 percent enrichment is consistent with United States nonproliferation policy.

Appropriate Level of National Environmental Policy Act Review

Several commentors suggested that the proposed action is part of a larger program and that the Department of Energy must prepare an environmental impact statement that analyzes the larger program, including full-scale implementation of electrometallurgical treatment. Commentors further expressed concern that the proposed action would prejudice the Department of Energy's choice of options under a larger program, either because of the commitment of resources that would be invested in studying the electrometallurgical technology, or because the proposed demonstration would set a precedent for the technology's further, broader application.

The Department of Energy does not agree with these assertions. The Department has no current proposal to apply the technology more broadly. The Department prepared this environmental assessment to assess the environmental impacts of a proposal to apply electrometallurgical treatment technology only to a limited number of Experimental Breeder Reactor-II spent nuclear fuel assemblies sufficient for the purpose of further research and development as recommended by the National Research Council. The Department needs the information from the proposed demonstration to determine whether electrometallurgical treatment is a feasible technology for treating the remainder of the Experimental Breeder Reactor-II spent nuclear fuel or other spent nuclear fuel requiring treatment for disposal. Only after such a demonstration is completed and the resulting data analyzed can the Department assess whether to propose a broader application of the technology. At the present time, the Department does not propose to apply electrometallurgical treatment beyond the proposed demonstration. In the absence of a proposal for broader application, no "program" or broader activity exists to be analyzed.

Should the Department decide to proceed with the proposed demonstration and should this demonstration prove successful, it would not automatically trigger any further action related to the treatment of Experimental Breeder Reactor-II spent nuclear fuel or other broader application. The Department would conduct appropriate further National Environmental Policy Act review, including consideration of reasonable alternatives, before making decisions on any such future proposal for broader application of the technology.

Moreover, the proposed demonstration involving the sodium bonded spent nuclear fuel is independent of other previous, ongoing, or proposed future actions, including those related to Experimental Breeder Reactor-II or other spent nuclear fuel. The proposed demonstration would provide intrinsically useful information on conditioning spent nuclear fuel. The proposal does not derive justification from any larger proposed action. The proposed action is not similar to or connected with other existing or planned Department of Energy actions to a degree that would require a broader National Environmental Policy Act review.

Public Comment Period

Several commentors suggested that the Department did not allow the public proper and timely access to the documents referenced in the draft environmental assessment. The draft environmental assessment was transmitted for public review and comment on January 29, 1996, with an initial comment period from February 5 to March 22. References cited in the draft environmental assessment originally were not sent to the public reading rooms, but were available upon request from the Department of Energy document manager in Idaho.

In the course of public hearings in Idaho Falls, Idaho, on February 21, 1996, a commentor requested that the documents referenced in the draft environmental assessment be made available in the Department's public reading rooms and that the public comment period be extended by another two months. The Department agreed to place the references in the public reading rooms but deferred the decision on extending the comment period. A member of the Department of Energy panel stated that he would "...try to have them (the references) in the public reading rooms within the next week." Thirty-seven of the 48 references were reproduced and sent to each of the nine public reading rooms by March 8. The Department believed the remaining 11 references were already in the reading rooms as references to the *Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Environmental Impact Statement* (DOE/EIS-0203-F). On March 25, another commentor brought to the Department's attention the fact that not all documents were in the public reading rooms in Washington, D.C. and in Idaho Falls. In response, the missing documents were sent directly to the commentor, and duplicates were placed in the reading rooms. The comment response period was extended to April 5.

In response to additional comments that not all documents had been found in the public reading rooms, an inventory of each of the reading rooms was taken by Department of Energy or Argonne National Laboratory personnel on April 6. Missing documents were provided, and all documents were personally verified by Department of Energy or Argonne National Laboratory personnel to be in place in the reading rooms on April 8. Further, an additional document and reference location was established in the main library of the University of California at Irvine. On April 15, 1996, the public comment period was reopened until May 3. The Department believes that making the reference documents available to the public and reopening the comment

period have allowed an adequate opportunity to review and comment on the environmental assessment and to consult the reference documents.

Chapter Two:

Comments and Responses

Read into the record for Representative Michael Crapo

1 And I quote: "I appreciate the opportunity to comment on this important subject and commend the Department of Energy for pursuing this project. Since the beginning of my service in the Congress, I have been involved in seeking solutions to our nation's problems associated with nuclear waste.

"As a member of the Nuclear Waste Task Force, I have been able to confer with my colleagues from around the nation about nuclear waste issues. While we in Idaho have distinct and extensive experience with these issues, they truly are both national and international in scope.

"I also am a cosponsor of HR-1020, which seeks to accelerate the schedule by which we deal with these problems and to define some solutions. And lastly, but certainly foremost in my experience with this issue, I have conferred frequently and often with the great scientists here in Idaho about what the science says can and cannot be done.

2 "It is because of the work of these scientists that we are here today. Electrometallurgical treatment is proposed for Argonne National Laboratory. We have a firm, concrete opportunity to make real progress.

"This project has come to where it is ready to answer difficult questions and show true results. It should go forward as proposed.

3 "I would ask everyone to keep in mind two important considerations. First, by treating the fuel from Experimental Breeder Reactor-II to remove the sodium and by preparing a leach- resistance ceramic waste form, the spent nuclear fuel will be made to be less of an environmental problem.

"Second, and very importantly, this action is necessary to meet the provisions of the Waste Removal Agreement between Governor Batt and the Department of Energy. In order for EBR-II fuel to be able to leave the state, it must be treated and prepared for permanent disposal.

4 "Electrometallurgical treatment is necessary for this. And I'm sure we all can agree that we want to see this waste material leave our borders. Again, I commend the Department for taking positive steps towards finding" -- I consider that very rude. (Microphone difficulties.)

5 MR. LAWSON: The last paragraph, again, is: "I, again, commend the Department for taking positive steps for finding real solutions to difficult problems. I support the proposed action and encourage its timely completion." Again, that's a statement from Representative Michael Crapo.

Responses to Document D001

1,2,3,5 The Department of Energy actively seeks and considers public comments and incorporates the views of stakeholders in making decisions. This demonstration will provide concrete information for future decisions for the treatment of Experimental Breeder Reactor-II and other types of spent nuclear fuel.

4 It is hoped that the information resulting from this demonstration project will assist the Department of Energy in keeping the commitments it made in the October 17, 1995, settlement agreement and consent order in the case of Public Service Co. v. Batt, No. CV 91-0035-S-EJL (D. Id.) and United States v. Batt, No. CV 91-0054-S-EJL (D. Id.).

Under the terms of the settlement agreement, the Department of Energy is legally obligated to remove spent nuclear fuel (including Experimental Breeder Reactor-II spent nuclear fuel) from the State of Idaho by the year 2035. Electrometallurgical treatment is a promising technology for treating Experimental Breeder Reactor-II spent nuclear fuel and blanket assemblies.

My name is Beatrice Brailsford. I'm program director for the Snake River Alliance. I had not prepared formal comments for today because I thought the entire hearing was the question-answer interactive conversation.

But I would like to note for the record that Mr. Crapo's letter, I think, highlights one of the key
1 confusions about what this environmental assessment is about. Is this environmental assessment about 100 drivers and 25 blankets, or is it about treating the EBR-II fuel?

I would very much appreciate a copy of Mr. Crapo's letter, because I think there's a lot of confusion about the scope of this project. And I would say that there is a good deal of support -- or confusion about the need for this project.

Sometimes we hear that this technology is well-known, well-understood, and then the EA is based on the
2 need outlined by the National Academy of Science to figure out what in the world the waste products will be from this process.

The United States, for a couple of decades, has been trying to pull back from reprocessing as a way to treat spent fuel, manage that fuel, because of its proliferation risks. Reprocessing separates out bond material. And we have strengthened our commitment for two decades to avoiding that process.
3

Now, what we're seeing -- what we're watching the Department of Energy do is try to mask reprocessing with many other names. And, frankly, this is a reprocessing technology that we're looking at today. There is no question about that. Reprocessing imperils this country's nonproliferation goals and it creates environmental impacts that are either unacceptable or unknown.

The Snake River Alliance's commitment to peace is as abiding as our commitment to the protection of
4 our land and people. The Alliance therefore advocates the development of the pyroprocessing technology be halted because of its dubious environmental benefits and its clear proliferation risks.

5 The funding now going to the project should be redirected to address genuine environmental threats. For
6 the interim, it is more prudent in every sense to store the spent fuel slated for pyroprocessing as safely as possible. Thank you.

Responses to Document D002

1 This environmental assessment describes the environmental impacts of a limited demonstration of eletrometallurgical treatment of 100 Experimental Breeder Reactor-II driver assemblies and 25 blanket assemblies. This demonstration project would provide data that could be used to help make a decision about whether to use this technology to treat the balance of Experimental Breeder Reactor-II spent nuclear fuel or other types of spent nuclear fuel.

2 While the electrorefining technology in general is well-known and well-understood, questions remain concerning the characteristics of the waste forms resulting from the application of this technology to Experimental Breeder Reactor-II spent nuclear fuel. An important reason for conducting the demonstration is to provide data on the waste forms and their characteristics.

3,4 Unlike reprocessing plants, this project does not separate plutonium, is of small scale, and produces no liquid wastes. Moreover, the technology employed is not capable of separating plutonium. It is consistent with the nonproliferation policy of the United States, which does not encourage the civil use of plutonium. Accordingly, the United States does not engage in plutonium reprocessing. Further, by removing and then blending down the highly-enriched uranium, the project supports the goal of the United States to seek to eliminate, where possible, the accumulation of stockpiles of highly-enriched uranium or plutonium. As a result, the proposed demonstration project is consistent with the policy of the United States on nonproliferation. An additional response to comments regarding nonproliferation concerns is provided in Chapter One of this Appendix.

5 Funding ultimately provided for Department of Energy projects is determined by Congress and the President through processes that are outside the scope of this environmental assessment. However, the Department has supported funding for this project because it believes the technology is a promising one for dealing with the Department's spent nuclear fuel problems.

6 The environmental assessment analyzed three alternatives in detail, including storage of the spent nuclear fuel, and considered several other process alternatives which were eliminated from detailed evaluation. As described in the environmental assessment, the environmental impacts of the proposed action and the alternatives were found to be small.

MARTIN HUEBNER: I'm Marty Huebner, and I suspect I'll take longer than five minutes. I've been unable to time my remarks because I came here to be informed and to see what kind of follow-up knowledge I got from -- after reading the EA.

I'm representing the Federation of Western Outdoor Clubs, which most of you folks haven't heard of. I'll be glad to give you a membership application if you care to. Now, if you -- I've given Mr. -- this gentleman here, Mr. --

MR. LAWSON: Lawson.

MR. HUEBNER: Lawson. -- Mr. Lawson a copy of some of the documents I'm referring to. The first one is a -- as I say, a well-known application form. We have a list of member clubs, which include a sportsmen's club, three or four Alpine clubs, several climbing clubs and trails clubs, three chapters of the Audubon Society, five chapters of the Sierra Club, plus environmental wilderness groups. The reason you haven't heard about it here is because about 40 of those organizations are in California, Oregon and Washington. There's only two in Idaho. And there's a couple in Montana, a couple in Colorado.

The Federation is also a member of the National Resource Councils of America, which includes some groups as the American Farm and Trust, Appalachian Mountain Club, Humane Society of the United States, Soil and Water Conservation Society, about 60 to 65 well-known national or regional conservation and environmental organizations, and the Federation is a member of that.

Our functions are twofold. And how I'm going to address this issue of EA is this way. First, I'm going to tell you about the Federation and what we came out of after a two-year discussion on global warming, which basically suggests -- or very well recommends that -- I'll read you the statement in a minute. But, anyway, it has to do with nuclear policy and our nuclear policy.

The major functions of the organization are this: We believe in the promotion of the appropriate use of enjoyment and protection of scenic wilderness and outdoor recreation places in Western American, the cohesive coordination of member clubs to further these objectives, etc., etc., the establishment of communication and the dissemination of information among member clubs.

And then we -- between World War I, World War II, there were a lot of outdoor clubs formed. And in 1932, in response to the growing need for the cooperation and coordination of these clubs, the Federation of Western Outdoor Clubs was founded and continues until this day.

Now, our -- we have about three major functions. One is we have an annual meeting, where it is a two- or three-day program, depending on how we arrange it, that deals with environmental, conservation, wildlife, wilderness and preservation, etc., issues.

Each member -- each of these 40 members clubs is invited to send a -- send at least one proposed resolution in -- in that will -- the board of directors will discuss and make a formal recommendation on behalf of the Federation on certain issues.

Now, the -- I should mention early on that this is an all -- we're kind of an old-fashioned environmental group. We don't have any name page on the Internet. We don't have any E-mail addresses. Everybody's a strict volunteer and pay your own way. We don't have any -- we have one non-paid representative in Washington. Everybody's volunteer.

And we communicate with our legislatures the old-fashioned way. We write them or we call them on the phone and register our feelings that way. We tend to shun publicity. I don't know anybody in the organization right now that's ever been interviewed publicly, and, frankly, none of us care to, because we're concerned about the environment, strictly, solely.

Now, as I said, we put together resolutions. In the last year, we had -- for the meeting we had in Oregon, we had some 30 resolutions, two of which involved nuclear issues.

One had to do with the coming out not in favor of the -- a nuclear repository in California; one had to do with preserving the Hanford Reach, which is the wildlands, the unspoiled tundra and so forth, that's around the Hanford Reservation; and then one had to do with global warming.

Now, bear in mind, when we send these resolutions out to the member clubs as the official recommendation of the Federation, that we recommend to these member clubs, write your congressman -- and we have lists of names and addresses -- write your governor or write your Forest Service supervisor, whoever, and tell them your feelings as a club or as an individual.

MR. LAWSON: Mr. Huebner, I want to interrupt you for a second. You say that you're not known for publicity, but you're closing in on that today. I --3

MR. HUEBNER: Well, that's inadvertent, I'll tell you.

MR. LAWSON: Well, I appreciate the background, but you've already taken five minutes to describe. I would like to have you focus your comments.

MR. HUEBNER: Okay. Well, I'm getting to that. Our last recommendation, or our recommendation on global warming, has -- is basically a two-page recommendation that was derived very painfully, because a lot of people didn't quite agree with it.

I should mention that our oldest member, who is still active in putting out our publication called Outdoors West is what I call an environmentalist environmentalist. She's 98 years old. She's not really pronuclear. But I'll tell you, she does a heck of a job.

Now, we came out -- and after two years of painful discussion, we came out and had a resolution on global warming, which I gave you a copy of there. And let me just give you some excerpts from it.

"As of now, the only large-scale, safe, reliable sources are carbon-based fuels, with now completely unacceptable effects of global warming; hydroelectric power, which has often unacceptable effects on rivering and agricultural environments and recreation, and nuclear power. The latter is the most environmentally benign of the three large-scale power sources, but is often a focus of public fear and concern."

And I'll read you one more excerpt. They go through a rationale of suggesting how environmental groups ought to address the situation when new large-scale electrical generation sources are called for. And I can't give you all the logic, because I don't have the time, but --

"In light of the above logic, the Federation of Western Outdoor Clubs suggests that all member club affiliates objectively reevaluate their policies regarding nuclear power, nuclear fuel reprocessing in the

U.S., which we're not directing -- addressing specifically, and consider changes to these policies that reflect that this nations 110 nuclear power plants are already safely providing nearly one-fourth of this country's electricity."

Now, obviously this organization meets a couple times a year. We're going to meet in March, and we're going to address this EA specifically. But we also had a small local study group go over the EA, and we have some recommendations.

1 It's our best judgment, based on logic and technical knowledge, that the project you're proposing, which is not a reprocessing by any definition that I know of -- and I've been a chemical engineer for a long time. I know whereof I speak. This is not reprocessing. It's a fuel conditioning.

They're taking stuff, processing it once, and then it's done. It's not a reprocessing, where the stuff's going to be cycled back in. So, I think you're incorrect, lady, whoever you are, that's speaking on this thing.

2 Now, in just summing up, there don't appear to be any proliferation concerns here. Your waste streams seem to be well-characterized and defined. The PU and transuranics are disposed of safely, waste is reduced.

And, to me, any other policy is either a waste of the taxpayers' money or is what I call ostrich engineering, where you put your head in the sand and you do nothing. And that is just burying the problem for future generations.

3 You have a unique fuel here with sodium. It has to be disposed of. You're addressing it technically and with a great deal of -- and, to me, there is no other option, other than your recommended full-action option.

Now, as far as the academy -- the Federation's concern, I'm going to make this recommendation to the Federation formally March 9. I suspect they will reiterate my words in a longer way, and you'll see the results.

Also in that packet I gave you -- and this will address this gentleman's concerns -- is a letter to Hazel O'Leary, where we convey this -- this resolution on global warming, convey to her our concerns about the Hanford Reach, and also, as an ancillary thing, our concerns about how the N Reactor fuel is being handled and what we think of it, and it's not very complimentary. Thank you.

Responses to Document D003

1 The commentor's statements that the proposed action is not spent nuclear fuel reprocessing are noted. More detailed information concerning reprocessing is provided in Chapter One of this Appendix.

2,3 The commentor correctly notes that this demonstration is consistent with the policy of the United States on nuclear nonproliferation and states that the treatment is necessary to stabilize the spent nuclear fuel for storage and disposal. More detailed information concerning nonproliferation is provided in Chapter One of this Appendix.

LAWRENCE HARRISON: I live in Idaho Falls. I am -- after 39 years of nuclear engineering work, I am retired. I spent that entire time working primarily on the safe operation of nuclear facilities, a large variety, many different aspects of it, and I consider myself -- and I think others would agree that I'm very knowledgeable in the safe operation facilities.

In the last 32 years I was with Argonne. I had no direct responsibility for design, construction, operation, fuel cycle for the fuel conditioning facility. But I did have the assignment two years part-time, one year full-time, of evaluating that facility for operation.

And I think the facility personnel, the engineering personnel, responsible for it will agree that I was independent of many of their actions, and they were responsive to many of our recommendations.

1 And I feel that, based upon a very detailed and thorough study of the procedures which that facility has, the training of the people, the qualifications of the people at that facility, and the equipment that's there, that this environmental assessment can be met.

2 A key element in the conclusion of this environmental assessment is that the facility does indeed perform with the releases as advertised. And I feel personally, from an independent, in-depth, long-term view, that this is a very sound facility and that the environmental releases, even under accident conditions, will be as benign as presented in the document.

I support the program, the full 100 assembly processes. I know from engineering development work in the nuclear field that the longer you work on something, the more you learn.

3

This technology will be very beneficial in this country and around the world. And I think it has an excellent possibility of contributing to the well-being of future generations in the entire world.

Responses to Document D004

1,2 As noted in Section 2.2 of the environmental assessment, the Fuel Conditioning Facility underwent extensive review by Argonne National Laboratory and the Department of Energy. Such reviews are required in order to protect the health and safety of the worker, the public, and the environment. The facility has been upgraded to modern, stringent safety standards, and operating personnel are fully qualified for operations only after extensive training, all of which was verified by these reviews. It was established that the facility could be operated within the safety and environmental constraints defined in the Safety Analysis Report.

3 The Department acknowledges the commentor's expectation that a successful demonstration of this technology will be beneficial. A more detailed description of what would constitute a successful demonstration is included in Chapter One of this Appendix.

I am representing Senator Dirk Kempthorne, and I have his comments that I would like to read for you, please.

"I very much want to thank the Department of Energy for this opportunity to set the record straight on the electrometallurgical treatment technology program currently being demonstrated at Argonne National Laboratory.

1 "I also want to congratulate the Department of Energy and the employees of Argonne National Lab for their timely completion of a very thorough environmental assessment of the electrometallurgical research and demonstration project.

2 "This assessment supports and further documents the environmental benefits of this exciting new technology. A similar conclusion was drawn from a 1990 DOE environmental assessment and the 1995 INEL sitewide environmental impact statement, both of which analyzed most ambitious applications of electrometallurgical technology.

"By moving ahead with electrometallurgical technology treatments, DOE is taking positive action towards resolving one key facet of the spent nuclear fuel problem in Idaho.

3 "Just as significantly, at the national level, DOE is addressing one of the major criticisms of the Galvin report, the need to apply more innovative technical solutions to its own waste management and environmental problems.

4 "I, for one, am very pleased to see DOE initiate a more forward-looking approach to spent fuel management. Needless to say, I wholeheartedly support the DOE effort to investigate new spent fuel
5 treatment technologies, and I strongly endorse development of the electrometallurgical treatment technology at Argonne National Lab

"The Department of Energy has taken very positive steps to meet its commitment to remove all spent
6 nuclear fuel from the State of Idaho by 2035. New technologies are needed to implement this court-enforceable obligation, and this is why this demonstration project is so important.

"To the critics of the electrometallurgical technology, I would ask: If not this technology, how do you propose to prepare EBR-II spent nuclear fuel for final disposition? I have not seen the critics offer a solution
7 that would allow this fuel to leave Idaho. This is why this technology demonstration program is so important to our state.

"Unfortunately, all this is not to say that the U.S. is finally moving ahead with progress in a nuclear technology without controversy. Individuals representing groups with an interest in blocking any progress in nuclear disposal technology have challenged even this modest demonstration.

8 "You will notice that the critics do not really challenge the environmental impacts, because there are none. Instead, the critics assert that this technology demonstration would constitute operation of a reprocessing facility, and, therefore, DOE's procedures require preparation of a full environmental impact statement.

9 "Never mind that there are no negative environmental impacts, which is supposed to be the focus of an environmental assessment, opponents of this project want DOE to needlessly spend millions of taxpayer dollars and delay any real work for a year or so.

10 "Further, as they have said, the project cannot go forward without reprocessing because it would violate U.S. nuclear nonproliferation policy. DOE is to be commended for standing up to these hollow objections and setting the record straight.

11 "According to the DOE Office of Nonproliferation and National Security, as well as the DOE General Counsel's Office, this new technology is not reprocessing; it is representing an advanced alternative approach for the Department of Energy to manage its nuclear fuel responsibility.

"The United States cannot provide effective international leadership if it does not demonstrate sound, constructive alternatives. No country in the world is yet operating a geologic repository.

"Indefinite storage of spent fuel is not an option that we want to accept in Idaho. Likewise, this is not an option we should push on other countries without so much as showing that we are trying to find a better solution.

12 "Conducting this advanced spent fuel treatment demonstration will show that this Congress, this administration and this DOE are committed to appropriate progress in nuclear disposal technology.

"Such action can only strengthen our national position in attempting to influence the course of other sovereign countries who are attempting to deal with their own legitimate spent nuclear fuel issues.

13 "This demonstration of advanced nuclear technology not only supports our nonproliferation objectives, it may some day be recognized as an important building block in our efforts to help curb the accumulation of separated plutonium in the international civilian nuclear fuel cycle.

14 "Lofty international policy issues aside, the electrometallurgical treatment project is good for Idaho. The EBR-II spent fuel, and perhaps other fuel that wasn't designed for long-term unsupervised storage, isn't going to leave our state without treatment.

"DOE's willingness to face this issue and deal with it constructively has earned my commendation, and it deserves the support of Idaho citizens. I strongly support continued development of this important technology." Thank you very much.

Responses to Document D005

1,2,5,14 The commentor's support for the proposed demonstration and completion of the environmental assessment is acknowledged.

3,4 Although the general topic of technology development is not within the scope of this environmental assessment, the Department of Energy is committed to pursue the research and development of technologies to assist it in the management and eventual disposal of its spent nuclear fuel. The demonstration of the electrometallurgical technology in treating Experimental Breeder Reactor-II spent nuclear fuel could be a crucial step in providing options to solve some of the problems associated with spent nuclear fuel management.

6,7 Under the terms of the settlement agreement, the Department of Energy is legally obligated to remove spent nuclear fuel (including Experimental Breeder Reactor-II spent nuclear fuel) from the State of Idaho by the year 2035. Electrometallurgical treatment is a promising technology for treating Experimental Breeder Reactor-II spent nuclear fuel and blanket assemblies. If the demonstration were successful, application of the technology could assist the Department of Energy to meet this obligation.

8,9 The potential environmental impacts associated with the proposed demonstration project are detailed in Section 4.0 of the environmental assessment. As detailed in the environmental assessment, these potential impacts are small.

10,13 As discussed in the environmental assessment (Section 4.7), the Department of Energy has reviewed the proposed action and the alternatives for compliance with the nonproliferation policy of the United States and has concluded that the proposed action and alternatives are consistent with that policy. Consistent with the nuclear nonproliferation goals of the United States, plutonium is not separated and highly-enriched uranium is blended with depleted uranium. More detailed information concerning nonproliferation is provided in Chapter One of this Appendix.

11,12 The demonstration of the electrometallurgical technology could provide an important option for the Department's management and eventual disposal of spent nuclear fuel.

My name is Dick Kaiser. I go by my nickname, as well. I live in Idaho Falls. I'm retired from the INEL. I worked there for about 28 years.

This is the first one of these type of meetings that I have ever attended, and I am fascinated by the amount of discussion going on that is not really relevant to the issue at hand.

We've discussed political consideration of whether this is reprocessing or processing or conditioning or whatever. And I would respectively submit that it doesn't matter.

The goal was stated specifically in Senator Kempthorne's -- and we've got all this spent fuel at EBR-II, and some of it is CCP, as was referred to earlier, which is degrading, and we have to do something with it. There is even more spent fuel at nuclear power plants around the country and around the world, and we've got to do something with it.

As a private citizen, I asked myself, What is it I should be most concerned about, the consequences of degraded spent fuel in some inadequate storage or the radiation from contamination emissions from a facility such as the fuel conditioning facility?

1 And when I look through the document and review the -- the slides that we were presented with earlier, I don't see much of a threat from the facility. I've gotten more than that from an X-ray series in a hospital in about 20 minutes.

I heard some reaction earlier when someone asked about the dose level from these spent fuel elements. Well, I've seen them in -- published in books, and I know. And the LMR elements are slightly more active, because they're more concentrated than most of the spent fuel around the world.

However, none of them are very low, and all of them would generate oohs and ahhs of the kind I heard in the background when that number was mentioned.

These are the things that we must be concerned about for environmental safety and public safety. And it is my concern that something like this, a project like this, that would at least begin the process of getting rid
2 of this threat would be shunted aside because of political considerations.

3 Are we afraid of proliferations? That was addressed very specifically in the early presentations. There is no bomb material coming out of this. Sure, if we wanted to, we could modify it perhaps to get some bombs out of it, but that's not the goal and that's not the way it's going to be done.

The problem that we have is that we are allowing other concerns, concerns about proliferation, concerns about whether nuclear power will continue to be a viable reality in the world, to divert us from a specific problem.

4 We're here today to address the fuel conditioning facility, and does it present a problem to us that is worse than leaving the stuff where it is. And, frankly, ladies and gentlemen, I would say absolutely not. Thank you.

Responses to Document D006

1,2 The commentor's statements that the operation of the facility is safe and that the environmental risks could be reduced by the treatment of spent nuclear fuel following the proposed demonstration are acknowledged. It is the Department of Energy's intent to gather data on the technology with the ultimate goal to reduce potential risks to the environment.

3 As discussed in the environmental assessment, the Department of Energy has reviewed the proposed action and the alternatives for compliance with the nonproliferation policy of the United States and has concluded that the proposed action and alternatives are consistent with that policy.

4 The Department acknowledges the comment that the proposed demonstration is not worse than the No Action alternative.

Thank you. I'd rather be skiing, really. I know a lot of the people here, but you probably would like to know a little bit about my background. I also am a chemical engineer. I spent 18 years out at the site. The last 18 years I've been spending earning my money by working for private industry. I don't do any government contracts.

While I was at the site, though, I was the technical manager for the design and construction of ZPPR, which has 4,000 kilograms of plutonium. It's the fourth power in the world. So, I know a little bit about plutonium and its behavior. I did some burning experiments in the TREAT reactor which shows just what happens when you burn it. And you get very small particles. I know a little bit about all of the things that are going on.

The point I would like to make here, however, is there always appears to be a great fear of finding out something new that will work. And it appears like we found something here which is relatively new and it will work.

And so there is always an attempt to stop progress. And I think that's something that we all should really remember. There are always a small group of people who will not like progress.

They're afraid of finding knowledge. They're afraid that by finding knowledge you will be able to answer questions. And so, therefore, they don't want you to do those things which will forward the formation of knowledge throughout the whole world.

1 This project is a demonstration. Make no mistake about it. There isn't anybody that I know of in their right minds would consider this as a reprocessing process. It is not that.

I'd like to also make a couple of comments about some of the comments that are made here. Jim McClure said very nicely to a farmer one day in one of his meetings here with the public after this farmer went on to great lengths of explaining something which really didn't make a lot of sense -- and he said to him very nicely -- he said, Sir, you could grow an awful lot of hay with the comments that you just made.

And it also relates to some of the comments that were made here. Like one comment was. Curies kill. That's BS. That's pure baloney. Curies don't kill. You have to be exposed to radiation in order to have any function of anything with radiation.

I'd like to also point out that there -- the United States itself may have a policy of so-called nonproliferation, but that policy does not say that we should not advance science and use the right sources of energy to produce electricity for our people. And that's where nuclear energy comes into play.

There is a very small activist group who would like to stop the forward progress of the use of nuclear energy. And I would say also, in this particular group, which I think represents a lot of different aspects -- Marty Huebner, who was here a little earlier, talked about environmentalists. Well, I have a little bit of a different term about some people who call themselves environmentalists.

If you take the middle portion of environmentalists out, that's the word "mental." You have an environist. Now, there are environmentalists and there are environists. There are a great deal of environists who call themselves environmentalists.

2 This is a project that we all should really support and go forward with it. It's a good project. It's good for Idaho. It's good for the nation. It's a good advancement of knowledge. Thank you.

Responses to Document D007

1 The proposed project is a limited demonstration of a potential treatment technology for Experimental Breeder Reactor-II spent nuclear fuel. A successful demonstration will provide data by which a decision can be made for its application to the remainder of Experimental Breeder Reactor-II spent nuclear fuel and possibly other spent nuclear fuel types. Any such proposal will be considered within all applicable laws and regulations, including appropriate National Environmental Policy Act analysis.

2 The commentor's support for the project is acknowledged.

Cut me off when you need to. I know there are many speakers. My name is Dan Hirsch. I'm president of the Committee to Bridge the Gap, a public policy organization based the California.

I am also the former director of the Adlai Stevenson Program on Nuclear Policy and Reaching, a teaching institution at the University of California and, thereafter, was an environment and energy fellow at the Federation of American Scientists in Washington.

I'm going to try as much as I can -- and I know that this is an emotional issue for many of you who live here and for whom this is, in part, an economic matter. But I am going to try to focus on the issues addressed in the environmental assessment and in the NEPA review. I'm only going to be able to make a few of my points. I will then try the rest in writing.

First is a process point. There are large numbers of documents that are included in the environmental assessment by reference. The documents are not in the EA itself, but are included by reference, incorporated by reference.

Unfortunately, those documents are not publicly available. The public reading room here in Idaho Falls indicates they do not have them. The technical library says they do not have them. And even if they did, since October you've now closed off the technical library to members of the public.

So, there is no way for the public in a public hearing, or in a comment process, to be able to meaningfully respond to the substance of this environmental assessment, because the underlying
1 documentation that's been incorporated by reference has been closed off to them. I believe this is a violation of NEPA. It's also a violation of the openness policies of the secretary of energy.

And I make a formal request here on the record that you now make available all of the documents included in the references to the EA and that are included by reference in the text, make those available and extend the public comment period by two months from the time that you publicly announced that those documents are available.

I think this is necessary both for compliance for the law and also for the process. There's no way to respond if we only have conclusions and do not have the material from which those conclusions are based.

Secondly, if this is an environmental assessment, its primary purpose is to say that no environmental impact statement is needed. I want to go on record strongly disagreeing with that assertion. An EIS is required when there's a major federal action.

This is a project involving real spent fuel. There's going to be more than a ton of spent fuel. It is material which, as was indicated, is highly radioactive, a dose rate sufficient at three feet to cause Hiroshima-type acute illness and death within about an hour.

2 It involves large quantities of this material, metallic form, flammable, so that if there is a loss of inerting, the potential for the material to burn and release large amounts of material into the environment.

There is also -- and I'll deal with this a bit more in a moment -- clearly a reprocessing technology, despite the statements by many who wish that somehow that were not the case. It is clearly reprocessing by any academic, scholarly or scientific definition. And, in fact, its origins are clearly out of the reprocessing program.

(2) For all those reasons, the EIS is legally required. And I'm surprised that the Department on such an important matter, a matter of such controversy, has chosen to skirt NEPA and try to get away with environmental assessment and a negative declaration.

3 Now, there are three elements that are at the core of NEPA compliance and what should be in any environmental documentation. The first is an accurate and adequate project description. This second is a hard look at alternatives. And the third is a clear and honest examination of the environmental impacts.

This environmental assessment fails on each count. It is clearly an inaccurate and inadequate project description. All of us in this room know where this project came from. It was the reprocessing program for the IFR, for the breeder program.

4 The breeder program was killed off by Congress last year largely for proliferation concerns. And we all know that in order to try to keep part of this program going, the fuel cycle facility had its name changed to the fuel conditioning facility. And the rationale for operating this reprocessing technology was changed from recycle in the breeder to treatment of the sodium.

5 And I think that most of you in the room, and certainly the DOE officials involved, know that if the true purpose were the removal of the sodium, there are a large number of other ways in which that could be done much more simply, without the problem of doing separation. And that is what you're doing here.

6 And there is no rationale whatsoever for separating out that bomb-grade uranium from this material, except that you're trying to get your foot in the door, your foot in the water, the nose of the camel under the tent, and artificially segment the environmental review so you don't have to do an EIS when you're plunging into full-scale reprocessing and reversing 20 years of American nonproliferation policy.

I know you want me to finish. The last two points. A hard look at alternatives. You will hear from Professor Warf one such method. You have other methods that are very clear that are discussed -- not discussed -- but are chosen not to be discussed in the EA.

7 Sodium, if you're concerned about it being a reactive material, you can remove that sodium without having to do reprocessing, without having to do separation. And I ask you, in fact, why -- even if you want to use this technology to convert into a chloride and then to a zeolite and then into a ceramic, why then not just do that and forget about this reprocessing?

Now, in terms of the project description, is reprocessing -- you come out with highly-enriched uranium, bomb-grade uranium. There's no question. You then try to get around that by saying you will downblend it to about 20 percent.

8 I want to remind you -- and all of you who know the critical mass tables know this to be true -- that even at 20 percent you can make a weapon out of it. You're going to do it at 19 or 20. It's not clear in the EA. But this is clearly trying to create a legal fiction, when it is still material which can have a fast critical reaction when assembled.

And it is easily enriched back up. The separate work units, as you know, to get it back up to a little higher enrichment are very minimal compared to the SWUs required to get it to 20 percent.

(8) And if your real purpose is to dispose of it as waste, there's no reason to stop at 20. And if your real purpose was to make it available economically for the power industry, then, again, 20 makes no sense.

Now, lastly, on the environmental impact's analysis. I'm sorry, but even without seeing the supporting documentation -- which I want to see and will comment more further if you ever make it available -- it is childish to use a release fraction of .05 percent for plutonium fire. These are pyrophoric materials.

9 And in order to get your doses down to these vast quantities of curies of high-level waste that you're going to be treating in a high-temperature operation, manipulating to all sorts of contortions -- to get those doses down on paper to look like they're acceptable, you had to use tiny release fractions, people of far distances away, when there are people far closer and a lot of other contortions.

If there's going to be an environmental assessment, one needs to do it honestly. And that's particularly true at this facility, which has had its share of contamination problems and accidents. Now, it has often been said in the discussion -- I'm not -- you've lost some of your colleagues. I'm not trying to say anything here that

10 you all don't know. To say that the risks here are small compared with the overall risks at this facility is a nonsequitur. The risks at this facility are substantial. The environmental impacts have already been large. One needs to prevent adding to that, and particularly to prevent adding to it, in order to keep a program alive, the rationale for which has now been forbidden by the Congress.

So, we will respond in much more detail in the comment period. I hope that you will let us have access to the documents and make this an open process.

But I mostly hope that you will follow the law, do a full EIS, describe this project for what it is and its

11 true origins, analyze the alternatives that can do this -- you've said basically do electrorefining or nothing else. That's silly under NEPA, and you know it. -- and lastly, to be very, very cautious about crossing that nonproliferation barrier that this country has had in place for 20 years. That is a major, major step.

It was -- this project was described in Scientific America this month as nuclear poor. If you want the jobs, there are lots of other ways of having those jobs without crossing a 20-year reprocessing barrier. Thank you.

Responses to Document D008

1 The references cited in the environmental assessment have been placed in the Department of Energy public reading rooms. Additional information on this issue is provided in Chapter One of this Appendix.

2 The environmental assessment has been prepared to determine whether the proposed demonstration is a major Federal action significantly affecting the quality of the human environment, and as a result, whether an environmental impact statement should be prepared. The actions taken are consistent with National Environmental Policy Act requirements. For further discussion related to reprocessing, see Chapter One of this Appendix.

3 The environmental assessment adequately addresses each of the three elements listed in the comment: Section 2.3 is an accurate description of the proposed action; Section 2.0 describes the reasonable alternatives to the proposed action; and Sections 4.0 and 5.0 describe the environmental consequences of the proposed action and alternatives. Where appropriate, clarifying information has been added to the environmental assessment in response to questions raised during the course of public review.

4 Based in part upon the urging of the Secretary of Energy, the Integral Fast Reactor Program was terminated in 1994 after extensive debate in both houses of Congress. The issues raised during debate were varied, complex, and did not focus solely on the issue of proliferation. Congress has been clear, however, that it intends the Department of Energy to continue researching electrometallurgical technology. In the *Conference Report for the Fiscal Year 1995 Energy and Water Appropriation,* the Department of Energy was instructed "to maximize the research on actinide recycle, and, as proposed by the Administration, should also retain such facilities as necessary, especially the pyroprocessing facilities." The following year, in the Conference Report for the Fiscal Year 1996 Energy and Water Appropriation, Congress gave the Department of Energy the following instruction: "As recommended by the National Academy of Sciences' assessment of the electrometallurgical approach for treating spent nuclear fuel, the conferees expect the Department of Energy to develop a plan to support the EBRFF09II

demonstration using this technology. If this is successful, the Department of Energy should review the program for application to other types of spent nuclear fuel and waste management issues." The proposed action in the environmental assessment would carry out congressional intent and instruction given to the Department of Energy.

5 The Department does not agree with the commentor's assertion that there are a large number of other ways in which sodium may be more simply removed from the Experimental Breeder Reactor-II spent nuclear fuel. The environmental assessment analyzed three alternatives in detail and considered several other process alternatives which were eliminated from detailed evaluation. In general, the excluded alternatives had not reached a level of development that would allow a detailed evaluation. Evaluation of alternative processes that were identified in the public comment period have been added to the environmental assessment, Section 2.1. The potential environmental impacts that would result from implementing a conceptual treatment process cannot be analyzed in equal detail relative to the impacts that can be quantified for a process that has reached an adequate level of technical maturity.

6 The Department of Energy does not agree with the commentor's statement that it has artificially segmented its National Environmental Policy Act review of the demonstration project. The proposed action includes only research on electrometallurgical technology, development of operating data for test equipment, and a limited application demonstration specifically for treatment of Experimental Breeder Reactor-II spent nuclear fuel for disposal. As summarized in the National Research Council's report on this technology, without this demonstration and the data to be gained from it, there can be no meaningful analysis of the technology's use or application. If the demonstration project is successful, the Department of Energy will review the data and decide whether to propose future applications of the technology. That decision will be made in accordance with all applicable laws and regulations, and will include appropriate National Environmental Policy Act analysis. For additional information on the appropriate level of National Environmental Policy Act review see Chapter One of this Appendix.

The commentor suggests that the proposed demonstration project is contrary to the current policy of the United States regarding reprocessing and nonproliferation. A

detailed discussion of the issues of reprocessing and nonproliferation is found in Chapter One of this Appendix.

7 Available processes, other than the proposed action for removal of sodium from the spent nuclear fuel, would be incomplete or create other technical problems. The distillation technique would be an incomplete process, since the resulting cesium and the sodium would need to be stabilized into a waste form. In any event, such a technique would only be applicable to blanket assemblies since the metallic sodium has not been infused into the fuel as it has in the drivers. As explained in the environmental assessment in Section 2.1, sodium is inseparable from the irradiated driver fuel unless the fuel is melted or dissolved. The fuel-encapsulated sodium would not be removed by a vacuum distillation process operated at the suggested temperature, so the remaining spent nuclear fuel would remain reactive due to the porous nature of the metal. If the spent nuclear fuel were melted at 1300-1400°C, many different radioactive elements would be volatilized. A system has not been developed to efficiently capture and collect these volatile elements or to immobilize them in one or more waste forms.

The commentor also suggests that electrometallurgical technology could be used with the goal of simply disposing the uranium along with the fission products and plutonium in the ceramic waste stream. The Department of Energy does not support this approach, in part because the low-enriched uranium by-product of the proposed action is not a waste. Further, the suggested approach would significantly increase the cost of processing and the volume of waste generated. Considerably more salt and cadmium would be required because the suggested approach would involve chemical oxidation rather than electrotransport of the uranium. Leaving the uranium in the waste stream to be adsorbed in the zeolite, with subsequent conversion to the ceramic waste form, would increase the waste volume by at least a factor of 25. However, the uranium would have to be blended down to a low enrichment to control nuclear criticality. If the uranium were blended down to less than 1% enrichment for disposal, the increase in waste volume would be on the order of 1000. By removing the uranium, the storage volume for both uranium and high-level waste can be kept low.

The commentor suggests that the proposed demonstration project is contrary to the current policy of the United States regarding reprocessing and nonproliferation. A detailed discussion of these issues is found in Chapter One of this Appendix.

8 The objectives of the proposed action are to demonstrate the economic feasibility of the process and to characterize the waste products for potential future acceptance for repository disposal. The developmental work is directed primarily at the waste forms. Additional information on the nonproliferation aspects of the electrometallurgical process is given in Chapter One of this Appendix.

As stated in the environmental assessment, highly-enriched uranium is separated. However, this technology cannot enrich uranium; what is available in the spent nuclear fuel is what is obtained. There are more attractive means than the proposed demonstration technology for separating uranium, if that is the intent.

9 The available data on plutonium combustion products support a release fraction of 0.05% or less. This is discussed in more detail in the Argonne National Laboratory *Fuel Cycle Facility Final Safety Analysis Report* (F0000-00180AK, 1993; revised April 1995).

10 The commentor states, without reference to supporting documentation, that operational "risks at this facility are substantial. The environmental impacts have already been large." There have been no accidents involving loss of life, serious injury, or significant environmental consequence at the Fuel Conditioning Facility. There have been no deaths as a result of operations or accidents associated with operations at Argonne National Laboratory-West. Risks and environmental impact of the proposed action are discussed quantitatively in Sections 4 and 5 of the environmental assessment.

11 The process being followed is in compliance with the regulations implementing the National Environmental Policy Act (49 CFR Parts 1500 - 1508) and the Department of Energy regulations located at 10 CFR Part 1021. See Chapter One of this Appendix for more discussion on this point.

I'm glad to be here today. My name is Bennett Ramberg. I'm associated with the Committee to Bridge the Gap. Several years ago I served in the Bush administration and dealt with a variety of arms control issues, and for a number of years served as an academic at Princeton and UCLA, dealing with arms control, and authored a numbered of books dealing with nuclear issues, as well as arms control issues.

MR. LAWSON: Mr. Ramberg, I'm going to ask you to speak up a little more clearly, because she's having a little bit of trouble picking it up.

BENNETT RAMBERG: I would like to address today the proliferation issues that this particular project poses. I'd like to put it into some historic perspective.

The United States historically has tried to halt proliferation of nuclear weapons in three fashions. The first method focused on the non-export of nuclear weapons themselves. The second method that we used over the years was the elimination of weapons usable material in our export policy. And the third method by which we attempted to halt the proliferation of nuclear weapons was to try to prevent the export of nuclear usable weapons usable technology.

During the Persian Gulf War, questions arose whether the three methods that we have used were comprehensive, whether they are adequate. In particular, the United States uncovered in its review of the experience we had in the Persian Gulf that the Iraqis had scoured the nuclear literature to determine whether there were a variety of methods which they could rely upon to require the technology to ascertain and build the nuclear weapons program they were bent on developing.

As a result of their efforts, they required several different methodologies which they attempted to
1 implement. And the critical question that we confront with regard to the ANL technology is: Will this provide in the literature yet another technology which future Iraqis could utilize, could turn to, in the development of new technologies to acquire nuclear weapons?

The technology will illustrate how to precipitate out HEU. And its significant in a variety of research reactors around the world, high-enriched uranium is used. And so this technology may facilitate in that regard.

It will not segregate, as has been pointed out, plutonium. But it will illustrate the direction by which countries can turn to to reprocess material to require plutonium. In some, it will put into the literature new technologies, which countries such as -- as future Iraqis can utilize to require weapons usable material.

The White House and the document you have on the table over there stipulates that the U.S. does not
2 encourage the civil use of plutonium. However, the technology which you're proposing here, in my view, could help encourage quite the contrary.

3 The question should be, Is there an alternative to the Idaho technology that's being proposed? This is a matter which Professor Warf is going to address at this conference. Thank you very much.

Responses to Document D009

1, 2 The commentor's concern about the potential misapplication of this technology by the Iraqis is noted. The proposed demonstration project does not separate plutonium. Moreover, the technology employed is not capable of separating plutonium. It is consistent with the nonproliferation policy of the United States, which does not encourage the civil use of plutonium. Accordingly, the United States does not engage in plutonium reprocessing. Further, by removing and then blending down the highly-enriched uranium, the project supports the goal of the United States to seek to eliminate where possible the accumulation of stockpiles of highly-enriched uranium or plutonium. As a result, the proposed demonstration project is consistent with the policy of the United States on nonproliferation. An additional response to comments regarding nonproliferation concerns is provided in Chapter One of this Appendix.

The Department of Energy acknowledges the commentor's concerns regarding sensitive nuclear technology. During the Integral Fast Reactor Program, the Department of Energy conducted appropriate reviews of related technologies for recycling spent nuclear fuel in fast reactors before entering into a technology exchange agreement with Japan. Any nuclear technology which is a candidate for export is subject to sensitive nuclear technology review in accordance with 10 CFR Part 810. The Department of Energy has been designated to implement this regulation by an interagency task force representing the Department of State, the Arms Control and Disarmament Agency, the Nuclear Regulatory Commission, and the Department of Energy. The Department of Energy has established an Export Control Working Group to make sensitive nuclear technology determinations according to specific guidelines. Any future consideration of exporting electrometallurgical spent nuclear fuel treatment technology would be reviewed according to the Department of Energy's export control procedure.

3 The National Environmental Policy Act policy requires evaluation of reasonable alternatives to the proposed action. Alternatives are evaluated in Section 2.0 of the environmental assessment. The environmental assessment analyzed three alternatives in detail and considered several other process alternatives which were eliminated from detailed evaluation. In general, the excluded alternatives had not reached a level of

development that would allow a detailed evaluation. Evaluation of alternative processes that were identified in the public comment period have been added to the environmental assessment, Section 2.1. The potential environmental impacts that would result from implementing a conceptual treatment process cannot be analyzed in equal detail relative to the impacts that can be quantified for a process that has reached an adequate level of technical maturity.

Thank you. I am James Warf. I am professor of chemistry, University of Southern California. I've been there for 47 years, now Professor Emeritus. I'm a veteran of the Manhattan Project starting at its beginning, 1942, and continuing throughout the war.

Incidentally, during that time, one of my contributions was the first use of butalphosphate as a solvent extraction for nuclear materials, a process which was later developed into the PUREX process.

It seems to me that it's clear that the spent fuel from the EBR certainly has to be addressed in some way. And all kinds of ideas have been suggested here, some of which I think are pretty far out, such as the vapor phase chloride method. That one apparently, though, is not being developed.

1 In addition to this, I see no objection to doing research on better ways of disposing and conditioning of the old waste from nuclear reactors in the military program all during the years of the Cold War.

Now, looking over this pyroprocessing procedure, I have some misgivings about it. But I would like really to make a suggestion for an alternative, a method that does not involve high-temperature electrolysis. This method, like all others, has some disadvantages. It sounded simple and perhaps has already been considered, although I have never seen any literature on it at all.

In this procedure which I would like to suggest, one would take the pins from the EBR-II, chop them up as usual, and then treat them in a designed and appropriate apparatus with a stream of carbon dioxide containing moisture. This moisture, of course, reacts with the sodium, first forming sodium hydroxide.

It's moist. It's wet. Temperature is not too high. The carbon dioxide converts this into sodium carbonate and bicarbonate. And the cesium in it -- the cesium-137 goes -- undergoes the same chemical reactions.

2 When this process is done, or nearly done -- it will taper off exponentially. But when it's mostly done, we then raise the temperature and pass steam over this uranium fuel. It's mostly uranium metal.

Steam converts uranium at a slightly elevated temperature into uranium dioxide. Now, under these conditions, the fission products, like a little bit of zirconium, lots of strontium,, and the rare earth element -- these are converted into oxides. The strontium is converted into carbonate later on.

So, what we end up with now is a uranium dioxide containing fission products which strongly resemble spent commercial fuel from reactors, the normal water reactor, water-cooled reactors. This substance then can be packaged properly and disposed of in the same way that commercial fuel is.

It avoids the molten salt process. The main disadvantage is that the volume of the waste is increased, and it would be a little more expensive than I suppose to -- to dispose of.

I want to make another suggestion here. The process of making aluminum metal is an electrometallurgical one, high-temperature electrolysis of uranium oxide dissolved in the solvent which is called cridolite, sodium hexafluoral aluminate, a well-known chemical substance. This dissolves aluminum oxide -- electrolysis, using direct-light electrodes, carbon monoxide and aluminum result

Maybe a similar process could be developed using uranium oxides. It would be required, as all -- and the molten mixture sodium or potassium fluoride with uranium tetrafluoride and subjecting it to electrolysis.

Finally, I want to address one other little matter that I think might improve the process conceivably. They use a lot of lithium. Now, lithium is an expensive metal. Calcium and lithium have about the same charge of density and, therefore, somewhat similar chemical properties.

3 How about using potassium chloride, not with lithium -- or lithium chloride, but rather with calcium chloride or magnesium chloride, or the two to give a eutectic, binary or ternary eutectic, perhaps equally low melting and much cheaper.

In any case, I think that these at least deserve some investigation, and I'd be happy to discuss them with -- further on with anybody who is interested. Thank you.

Responses to Document D010

1 This demonstration is part of the Department of Energy's efforts to better manage and eventually dispose of its spent nuclear fuel. As indicated in the environmental assessment (Section 2.1), research into and development of other technologies is also occurring.

2 The proposed process of treating the spent nuclear fuel with hot, water-saturated carbon dioxide would have the following technical problems and would require extensive development before implementation. Because of the high radiation level of the spent nuclear fuel, any processing would have to be carried out in a shielded, inert atmosphere cell, not in a simple reaction chamber as described in the comment. Based on extensive experience with reacting sodium to form sodium carbonate, these reactions would have to be controlled very closely. History has shown that the potential for accidents involving reacting sodium is very high. Exposure of the hot uranium fuel to oxygen and water vapor is similar to metal fire accident conditions described in the environmental assessment (Section 4.2). Also, the use of water for treatment of highly-enriched spent nuclear fuel would require stringent criticality hazards control measures because aqueous processes have lower fissile material limits than metallic processes. The products from the proposed process may include pyrophoric uranium hydride in addition to the compounds cited in the comment. Additional process steps would, therefore, be required to stabilize the pyrophoric nature of the product.

3 Several eutectic salt mixtures have been investigated in the course of electrometallurgical development. Lithium chloride/potassium chloride has been selected on the basis of lower operating temperature for the electrorefiner. The alternative salt mixture proposed in the comment would require higher operating temperatures, with adverse affects on equipment design and reliability. Because the lithium chloride/potassium chloride salt is recycled, cost is not a significant consideration.

Good afternoon. My name is John Commander. I'm the chair-elect of the Idaho Section of the American Nuclear Society. I represent some 900 members, most of whom are located in the Southeast Idaho area.

1 On behalf of this section, I would like to make a statement concerning our endorsement of the Draft and Environmental Assessment for the Electrometallurgical Treatment Research and Demonstration Project proposed for the Argonne National Laboratory-West.

2 This project has been primarily designed to deal with the spent nuclear fuel from the Experimental Breeder Reactor-II at the ANL-West. The proposed action will comply with the National Research Council recommendations which were: To demonstrate the feasibility of electrometallurgical treatment technology by treating a limited quantity of the EBR-II spent fuel assemblies.

The Draft EA describes the process, which is a new application of an established technology. The process has been proven with unirradiated material at the ANL-West fuel conditioning facility, where extensive renovation has been recently completed.

3 The FCF now complies completely with applicable standards for safety, including seismic standards, and has passed all the technical and safety reviews since those upgrades.

The potential environmental consequences of the proposed action has been studied extensively, and the Draft EA concludes --

4 (Microphone difficulties.)

The draft EA concludes that there would be no significant impacts from the operation of the impact of the process equipment in the FCF, and, therefore, the NEPA process has been more than adequately addressed.

5 The goal will achieve several significant results from completing the proposed action. And these include removal of reactive sodium from the EBR-II spent nuclear fuel; the recovery of uranium product at the end of the process which can be considered low-level waste, if that's the case; the immobilization of fission products and transuranic elements into a waste form acceptable for disposal in a geological repository, and the reduction in the storage volume on the waste as compared to the volume required of untreated spent nuclear fuel.

6 The proposed action is consistent with the United States' nonproliferation policy, since the ETR&D process yields waste as a mix of transuranic actinides --

MR. LAWSON: Mr. Commander, I'm going to have to interrupt, because the court reporter's not hearing the words that you're saying.

MR. LAWSON: I can give her this.

MR. LAWSON: Okay. Fine. I'm going to just try this. We've moved my microphone a little further away from yours. Let's see if that makes -- (Off the record while the microphones were being fixed.)

MR. COMMANDER: I believe I was -- the Department of Energy has committed to remove spent nuclear fuel from Idaho by the year 2035. Without treatment, the EBR-II spent nuclear fuel cannot be acceptable for geologic disposal. 7

Therefore, the DOE should move ahead with this proposed action to demonstrate the capability to treat the problem of spent nuclear fuels while the Argonne National Laboratory-West and the EBR-II facility and personnel infrastructure still exists. 8

In summary, IANS believes that the ETR&D project should be supported for demonstration of the FCF at the Argonne National Laboratory-West. The use of the existing infrastructure at ANL-West will be the most cost-effective option for the demonstration of valuable spent nuclear fuel treatment technology. 9

In addition, the proposed action is necessary for compliance with DOE's nuclear waste agreement with the State of Idaho. Thank you. 10

Responses to Document D011

1,2,3 The National Research Council Recommendations highlighted important uncertainties that would be addressed by the proposed demonstration project. An extensive Operational Readiness Review has been completed, establishing readiness of the facility to operate within safety and environmental constraints. Copies of this review are available upon request. The review followed renovations to the Fuel Conditioning Facility, including addition or upgrading of atmospheric and pressure controls, addition of a repair area for contaminated equipment, seismic improvements, and other modifications to meet current Department of Energy guidelines.

4,5 The analysis of potential environmental impacts contained in the environmental assessment indicates that the impacts associated with the proposed demonstration project are small. There may be many benefits of electrometallurgical treatment of spent nuclear fuel. However, the scope of this environmental assessment is the electrometallurgical treatment of 100 Experimental Breeder Reactor-II spent nuclear fuel assemblies and 25 blanket assemblies; other benefits realized through electrometallurgical treatment are beyond the scope of the environmental assessment. The data obtained from the demonstration will be useful in deciding whether the remainder of Experimental Breeder Reactor-II spent nuclear fuel and possibly other types of spent nuclear fuel may be treated with this technology.

6 The proposed action has been reviewed by the Department of Energy to ensure its consistency with the nonproliferation policy of the United States. Chapter 1 of the Appendix has detailed information on the topic of nonproliferation.

8 The Department views Argonne National Laboratory, its personnel, and its facilities as vital ingredients in our nation's technology research and development programs. The continued existence of the infrastructure at Argonne, however, is outside the scope of this environmental assessment.

9 Of the alternatives considered, the proposed demonstration project was chosen in part because it would be the most cost-effective treatment option. It also would have smaller impacts on the environment than performing the project at another location.

7, 10 Under the terms of the settlement agreement, the Department of Energy is legally obligated to remove spent nuclear fuel (including Experimental Breeder Reactor-II spent nuclear fuel) from the State of Idaho by the year 2035. Electrometallurgical treatment is a promising technology for treating Experimental Breeder Reactor-II spent nuclear fuel and blanket assemblies. If the demonstration were successful, application of the technology could help the Department of Energy to meet this obligation.

I'm Georgia Dixon, and I'm the district assistant to Unites States Senator Larry Craig. And I'm going to read his statement this afternoon. I would like to express my support with the Department's proposed -- (Microphone difficulties.)

To continue, I would like to read the Senator's statement. He says: "I would like to express my support for the Department's proposed action to demonstrate electrometallurgical treatment technology for spent
1 nuclear fuel from Experimental Breeder Reactor-II.

"In the past, I have been at odds with the Department of Energy over some of its actions and designs. But in this case, I am in full agreement. Our country has a serious problem with its spent nuclear fuel.

"It is a problem that will not go away by itself. It needs creative, innovative thinking and new
2 approaches. This is exactly what is found at Argonne National Laboratory in the electrometallurgical treatment program.

"In my work on the Energy Research and Development Subcommittee, I am faced with oversight of nuclear fuel and cycle policy and research and development of new technologies. The committee works directly with the questions and problems Argonne's program is trying to answer.

"It is clear that in the early days of the nuclear era not enough consideration was given to the tail end of the fuel cycle, what to do with the waste. It is equally clear that the need for sound alternatives for treatment and disposition of spent nuclear fuel is growing daily. This program shows great promise that it will provide such an alternative. It should be pursued vigorously and expeditiously.

"This is especially important to the people of Idaho. In the agreement between Governor Batt and the Department of Energy strict dates are established for removing spent fuel and other nuclear wastes from the state.

3 "Fuel from EBR-II contains elemental sodium and is not suitable for disposal without treatment. Electrometallurgical treatment of EBR-II fuel is necessary in order for it to leave the State of Idaho and allow the Department to meet its obligation to Governor Batt. Completing this project, therefore, would be a significant step if fulfilling the agreement and getting nuclear waste out of Idaho.

"If there were legitimate concerns about the electrometallurgical treatment posing a threat to the
4 environment, I would not support it. However, there is clearly no significant impact on the environment from the treatment. As the purpose of an environmental assessment, these questions have been examined thoroughly and found not to pose a problem.

5 "I think it is very important that the Department of Energy continue with research and development to allow for treatment of the numerous fuels that will require disposal and are currently within DOE's charge.

6 "It is also vitally important that we move forward with the final disposal facility for all these fuels. That is why I have introduced legislation providing for both interim and final disposal of these nuclear fuels and materials.

"Again, I would like to commend the Department on its proposal to move forward with this important work. It is exactly the kind of progress I hope for and expect from the Department of Energy, and I look forward to seeing the results of this work by Argonne. Thank you."

Responses to Document D012

1,2,7 The commentor's statements concerning the demonstration is acknowledged. This demonstration takes advantage of previous research to apply the electrometallurgical technologies in an innovative way for the treatment of Experimental Breeder Reactor-II spent nuclear fuel. Successful demonstration will provide the Department of Energy with important options for dealing with the remaining Experimental Breeder Reactor-II spent nuclear fuel and possibly other types of spent nuclear fuel.

3 Under the terms of the settlement agreement, the Department of Energy is legally obligated to remove spent nuclear fuel (including Experimental Breeder Reactor-II spent nuclear fuel) from the State of Idaho by the year 2035. Without treatment, it is unlikely that Experimental Breeder Reactor-II spent nuclear fuel would be suitable for permanent geologic disposal because it contains sodium, a reactive metal. Electrometallurgical treatment is a promising technology for treating Experimental Breeder Reactor-II spent nuclear fuel. If the demonstration were successful, application of the technology could help the Department of Energy to meet this obligation.

4 The environmental assessment analyzed the potential impacts on the environment from completing the proposed demonstration project and found them to be minimal.

5,6 The proposed demonstration project is for 100 driver spent nuclear fuel assemblies and 25 blanket assemblies. Use of the technology for other spent nuclear fuels is beyond the scope of this environmental assessment. If this demonstration is successful, however, it will give the Department the data necessary to decide whether to propose additional application of the technology. Of course, any proposed use of electrometallurgical treatment would be subject to all applicable laws and regulations, including appropriate National Environmental Policy Act review. If successful, the proposed action could demonstrate the treatment of Experimental Breeder Reactor-II spent nuclear fuel to make it likely to be suitable for a geologic repository.

Good afternoon. I'm Dick Kenney. I live in Idaho Falls. I am retired from IBM. I spent most of my life as a downwinder, first from the Nevada test site and then from Hanford, and now here in Idaho Falls.

I've attended many of these meetings, types of meetings, and I want to congratulate the Department of Energy for their intent on finding solutions to some of the problems that are out there. I strongly support the
1 -- this process, and the investigation of it in determining its ability to solve some of the spent nuclear fuel problems that we have.

In attending many of these meetings, it's become apparent to me that there's an awful lot of people who just want to stop anything. They get their reputations, or even earn their income, by stopping things. And it's -- even providing some parallel actions, which basically are diversions rather than solutions. They're not intent on solutions.

And I really strongly support the Department on trying to find solutions and putting their timely energies into that effort and not just sticking their heads in the sand. Thank you.

Responses to Document D013

1 The commentor's statement concerning this demonstration is acknowledged. It is the Department of Energy's intent with this demonstration to provide an important option for dealing with spent nuclear fuel and protecting the environment.

I'm Bill Weida. I'm a professor of economics at the Colorado College. I was born and raised in the community. In fact, my mother's here with me right now. She still lives here.

I would like to address, as opposed to most of the other comments, some specific comments directed at the EA itself. And specifically, the socioeconomic and what purports to be an environmental justice section.

1

I'm not sure who prepared this EA. The document itself is rather unclear on that. It needs to be redone in these areas, and I suggest you get some serious help. If you want to see a reference for a fairly descent socioeconomic section, you might refer to the March '95 Spent Nuclear Fuel EIS.

The problems are as follows: First of all, that the socioeconomic impacts are compared with the shutdown of EBR-II, which is totally irrelevant. NEPA requires that a no-action alternative be investigated in every one of these procedures. The implication from that requirement is that the no-action alternative is to serve as the base line for comparison.

The writers of EAs are not allowed to shop for favorable comparisons. Putting this as not a comparison
2 with the shutdown at EBR-II is a totally arbitrary solution. Are you having trouble getting that, sir, or do you want me to repeat it? It's a totally arbitrary solution.

One of the problems with it is that if we are allowed to do that and to choose any program at any time in the past to compare the alternatives with, then we can also, from the other side, say we would like to compare it with the situation that existed before the site was built. Neither alternative has any rationale.

I suggest you select the no-action alternative. I would point out that, strangely enough, the no-action alternative was chosen for comparison when you looked at transportation issues, because, strangely enough, the no-action alternative shows a more favorable comparison under those circumstances.

On page 117 and 78, you assert that only existing workers will be used for the proposed action
3 alternative. On page 78 and 93, you assert, quote, additional research personnel will be hired to help plan, conduct and interpret the experiments. The question is which.

You compare the regional economic impact of the materials purchases -- and I would remind you that the EA's purpose is to look at the regional impacts of the issues involved. You compare those with the proposed action alternative with the total INEL site budget, which is spent nationally.

4

Now, if your issue is to open up the EA process for national comparisons, then I would suggest that it's incumbent on you to prepare an EA which looks at all the national comparisons for all the uses of resources that you have chosen in the EA. If you're going to do it on a regional basis, then do it the way that it's supposed to be done and compare it to regional spending.

The proposed action alternative cannot result in a successful application, as defined by the National Research Council's Committee on electrometallurgical techniques because that committee specifies that for a
5 successful application you have to show six tons of processing over 30 days of continuous operation.

This proposal is for 1.6 tons spread over seven days over what appears to be almost a three-years period. Therefore, it would appear that the proposed action, the EA, is not justified. So, the question is: Why has the EA been submitted?

(5) Well, on page 122, we get the answer. And that is that it's jobs. We're trying to preserve the skills of the people who are associated with the unit. Well, that's fine. But an economic solution to that, which makes far more sense than blowing off a lot of money on a project which can't provide a successful application, would be to simply pay the people to stay in position and pay the plant to stay open.

On the environmental justice section, you kind of kiss that off with a statement that, well, we don't really know what we ought to do here, something I'm paraphrasing.

6

Strangely enough, the rules on that are very unambiguous. And I would refer you to Executive Order 12898, which says, essentially, prepare an environmental justice section.

7 The EA provides no evidence that the 50-mile radius that they use to look at impacts has any basis in terms of wind flows, aquifer flows, or anything else that would affect minority populations.

8 On page 63 of the EA, you referred to the 1,000 residents of Fort Hall, which, by the way, were 5,100 in the 1990 census, and one must presume are probably slightly more than that at this point in time.

9 The no-action alternative generates 70 cubic meters of low-level waste and no TRU. The alternative you have proposed generates 50 cubic meters of TRU and 20 cubic meters of low-level waste, and yet there appear to be no additional costs with that TRU. That's impossible. Even if it amounts to re-labeling it as TRU, there are additional costs, and they are required to be included in the EA.

The EA does accurately reflect the economic costs of downblending. And this is really a strange one. You state on page 112 that there is, quote, highly-enriched uranium in the EBR-II driver fuel would be blended down to low-enriched uranium with no additional process steps and no additional costs using depleted uranium already in storage.

10 Now, when an economist hears that you can do something with no additional cost -- well, I was very interested. It reminds us of perpetual-motion machines. The zero cost claim is contradicted on page 23, which designates an additional multi-step process for downblending. It's contradicted on your chart over there, which shows an additional feed line coming in.

And I would say to Mr. Hughes that it would be irresponsible for the DOE to reimburse Argonne for any of the costs involved with downblending fuel until they have clarified what the cost stream is that's involved in this process.

The final thing is that the EA goes from the presumption that highly-enriched uranium, and then uranium as it is downblended, is not a waste. If that presumption is to be made in the EA, then it is incumbent on the writers of the EA to demonstrate how that could be sold for a profit. The fact that you could give it away to a

11 research reactor is not the answer here. The answer is show me some hard economic facts.

And you might want to take into the account in doing this that the Portsmouth plant, which is currently involved in HEU downblending -- rumors are it's going to meet an untimely fate at some point in the very near future, because they can't do it economically. So, it would be of a great deal of interest if you think you can.

Responses to Document D014

1,6 Executive Order 12898 requires Federal agencies to identify and address "disproportionately high and adverse human health or environmental effects" of programs, policies, and activities on minority or low-income communities. The analysis in the environmental assessment, which incorporates the analysis prepared for the *Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Environmental Impact Statement* (DOE/EIS-0203-F), indicates that the potential environmental impacts of the proposed action to any segment of the public or the environment are very small. As a result, the potential environmental impacts on minority or low-income populations do not appear to be disproportionally high and adverse within the meaning of Executive Order 12898. The analysis contained in the environmental assessment is consistent with the Council on Environmental Quality's *Draft Guidance for Addressing Environmental Justice Under the National Environmental Policy Act*, dated April 15, 1996. Implementation of the Order by the Department of Energy may change subject to the issuance of future guidance from the Council on Environmental Quality, the Environmental Protection Agency, or the final Department of Energy Guidance. Section 4.6 of the environmental assessment has been reviewed for clarification.

2 Congress instructed the Department of Energy to terminate the Integral Fast Reactor Program in 1994. This included shutting down Experimental Breeder Reactor-II. Because this policy decision has been made, the no action baseline assumes continued operation of the Fuel Conditioning Facility as a multipurpose hot cell as directed by the Department of Energy. It also assumes storage of Experimental Breeder Reactor-II spent nuclear fuel. This activity is the basis of the no action alternative described in the environmental assessment. Section 4.1.3 states the transportation impacts are the same in the proposed action and the no action alternative.

3 The total Argonne National Laboratory workforce has declined following completion of certain construction activities. Some departing Argonne National Laboratory employees have been replaced by research and development personnel. The mix of skills at Argonne

National Laboratory will continue to be adjusted as required, with negligible net effect on the total workforce. The environmental assessment has been changed to reflect this point.

4 The majority of the Idaho National Engineering Laboratory site budget is spent regionally, mostly in the form of salary and benefits for the employees. Of the approximately $322 million spent by the Idaho National Engineering Laboratory for procurement of goods and services in Fiscal Year 1995, 34.6% was awarded in Idaho, 17.6% was awarded for the clean up of Pit 9, 37% was awarded out-of-state, and 10.8% was awarded to firms based out-of-state but with local offices.

5 As stated in Section 2.2 of the environmental assessment, the National Research Council's recommendation was based on the assumption that all the Experimental Breeder Reactor-II spent nuclear fuel would be treated. The proposed demonstration is to treat a limited number of spent nuclear fuel assemblies. Because of this, the Department acknowledges that the "production" goals established by the National Academy of Science cannot be met by the proposed demonstration project. However, sufficient data will be generated to meet the National Research Council requirements on which to base a potential future decision to apply the technology more broadly. The number of spent nuclear fuel assemblies for the demonstration project was chosen because it will provide a sufficient amount of material to determine whether the process will perform as expected and to develop the waste form.

7 The 50-mile radius used in the environmental assessment for calculating impacts on minority and low-income populations was incorporated from the definitions and methodologies used in the *Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Environmental Impact Statement* (DOE/EIS-0203-F). This radius was selected because it was judged to encompass the measurable impacts that may occur based on air impact modeling.

8 The environmental assessment has been changed to reflect the correct population of Fort Hall based on the 1990 census.

9 All radioactive waste, including low-level wastes, must be sampled, characterized, appropriately packaged, labeled, and managed. These activities are undertaken with the same personnel in the same facilities. Differences in cost for managing different categories of waste are so small that additional detailed analysis is not warranted.

10 Special nuclear materials are categorized for security purposes according to a number of physical and chemical characteristics. Some materials are more expensive to manage than others. If the uranium were left as relatively pure, highly-enriched uranium, security upgrades costing on the order of half a million dollars would be required. Annual costs for increased security personnel would be on the order of several hundred thousand dollars. By comparison, the blended-down low-enriched uranium is much less expensive to manage. No additional handling of the electrorefiner cathode product would be required. The cost of scheduling operations to accommodate the depleted uranium addition is negligible.

11 As stated in Section 2.3 of the environmental assessment, the low-enriched uranium by-product will be stored at Argonne National Laboratory until future decisions are made regarding its disposition. Disposition may take the form of disposal or sale to commercial interests. Any proposal regarding the disposition of this material will be the subject of an appropriate level of National Environmental Policy Act documentation.

My name is Steve Herring. I am a nuclear engineer here in Idaho Falls, although I should say that neither I, nor any members of my family, work for the Argonne National Laboratory.

1 I would however like to speak in favor of the proposed electrometallurgical treatment project at Argonne-West. And although I have several points here that I will give you for the record, I think two very important points need to be made. Number one, that it is necessary in some way to remove the sodium that is in the existing EBR-II fuel and before that fuel can be removed to a permanent repository.

2 Now, there are many different possible processes. There are several different possible processes. This is one process that has been demonstrated, has been shown to work. Further processes that might work should be perhaps considered.

3 But it is important that we use proven technology, that we be able to dispose of that fuel, that we be able to get it out of the state as is agreed to in the 2035 agreement with the State of Idaho and the Department of Energy.

This electrometallurgical treatment process has been proven using tests, using chemically similar, though isotopically different, materials. These tests have show that the volume of the highly radioactive waste has been reduced by a factor of about two and, more importantly, that the chemical stability of the waste form has been markedly improved through that treatment.

4 And, therefore, I urge the Department of Energy to follow the recommendation of the National Science Council and use this process in preparing spent fuel for ultimate disposal. Thank you.

Responses to Document D015

1 The commentor's statement concerning the demonstration is acknowledged.

2 A number of other processes described in Section 2.1 of the environmental assessment have been suggested for removing sodium, but none have been found to be acceptable on safety or technical grounds.

3 The commentor's statement concerning spent nuclear fuel shipments from the State of Idaho by 2035 is acknowledged by the Department of Energy. Under the terms of the settlement agreement, the Department of Energy is legally obligated to remove spent nuclear fuel (including Experimental Breeder Reactor-II spent nuclear fuel) from the State of Idaho by the year 2035. Electrometallurgical treatment is a promising technology for treating Experimental Breeder Reactor-II spent nuclear fuel. If the demonstration were successful, application of the technology to the remainder of Experimental Breeder Reactor-II spent nuclear fuel, and potentially other types of spent nuclear fuel, would help the Department of Energy to meet this obligation.

4 The proposed demonstration would address recommendations of the National Research Council.

I'm John Tanner. I am an INEL employee. I have never been connected with Argonne National Laboratory, however. I am glad that this process is being developed. 1

Some have pointed out possible nonproliferation disadvantages, in that one more process for separating plutonium would be demonstrated. Others, though, have said that it's not demonstrated unless 30 tons are produced, which is not what's in mind. I leave it to you to decide on that.

But there are some definite nonproliferation advantages of this process which have not been mentioned so far. This is a process which, when fully developed, could be used on the same site as an ordinary commercial power reactor, and the fissile material from the power reactor could be fed through the cycle and fed back into the reactor as fuel.

And there are two advances to that. In the first place, it would be a much simpler process than present liquid reprocessing because of the simplicity of fabricating metal fuel. Secondly, the -- the radioactive by-products of the fission need not be separated so thoroughly, but what -- one would have to always handle the fissile material remotely. 2

Both -- now, the advantage of keeping it on site, of course, is preventing theft, and the advantage of keeping it hot, radioactively hot, is also preventing theft. These are both very strong nonproliferation advantages over the liquid recycling that's already catching on in much of the world, particularly Europe and Japan.

If we are just talking about dealing with the sodium alone, it's undoubtedly true there are other processes which could be developed. And in the future maybe, if there's a need for them, we can go ahead with that. But the electrorefining process is one that's ready now. The basic research has been done. It's time for the demonstration. Let's do it while we're set up. 3

And as -- say it has an advantage over the sodium process -- I mean, over possible other processes for dealing just with the sodium, in that it reduces the volume of highly radioactive material by quite a bit. 4

I realize that the process neither creates nor destroys curies. But if it puts it into a more manageable form, that's an economic advantage. Therefore, the sale of the recovered fuel at market prices need not bear the full cost of the process.

I hope the DOE will vigorously defend its decision to move ahead with this process and not delay by means of a full environmental impact statement. 5

Responses to Document D016

1 The commentor's statement concerning the demonstration is acknowledged.

2 The Department of Energy acknowledges that there are many potential benefits of the electrometallurgical treatment of spent nuclear fuel. The Department of Energy is appreciative of the opinions expressed by the members of the public and other stakeholders during this National Environmental Policy Act process. However, it is beyond the scope of this environmental assessment to address issues that are not directly related to the research and demonstration project described in the environmental assessment.

3,4 A number of other processes for treating sodium in spent nuclear fuel have been suggested, as described in Section 2.1 of the environmental assessment, but none have been found to be acceptable on safety or technical grounds.

5 This environmental assessment is the basis for a decision by the Department of Energy to either prepare an environmental impact statement or to issue a Finding of No Significant Impact.

Thank you. I'm Dieter Knecht. I'm trained as a chemist. I've been working in Idaho at the INEL at the chemical processing plant for 21 years. I'm not affiliated with Argonne directly.

These are my comments just as my own personal views and don't reflect the views of any other entity. As far as the EA is concerned, I would recommend that it does cover a pilot scale-type demonstration and that an EA, I think, is an adequate way of addressing that. 1

It is not a major action like a new facility. It might develop technology that could lead to major new actions. But this particular process does not. It has a potential to convert the unstable fuels to a much more stable configuration. I think that's something that is glossed over. 2

Somebody mentioned a Scientific American article. It was actually a report by a news part of the Scientific American without, in my view, much critical evaluation about this project and about a possibility of reprocessing foreign reactor fuels. It completely glossed over the fact that these fuels are not stable.

The people who now advocate keeping the uranium and the plutonium in these fuels are going to be the people who are going to be most concerned when those fuels eventually come to a repository for disposal.

As a scientist, I'm not very happy about that process myself. I think we need to convert these fuels into stable materials that can be safely disposed or reused. 3

The other strong point about this process is that it does reduce the inventory of high enriched uranium fissile materials. Right now we have fuel that contains bomb -- weapon-grade material, and we have a choice of leaving it in that fuel and having our children's children have to worry about it.

And in that way I can -- I'd like to compare this to our way we've been treating the national debt. We've been deferring it. We haven't done anything really on reducing it.

Our nonproliferation policy, I think, in this country, has been geared to that -- that I could almost see it as a paranoia in some cases. And I sympathize with people, and I personally am also very concerned about proliferation. I really am worried about a weapon getting into the wrong hands. 4

The longer route is dangerous, but I don't think that's quite the same risk as some other risks that we have now. And if we really want to control proliferation -- and it's really for -- not just for us; it's for us, our children, our children's children.

I don't really want to see a place that's going to be a plutonium mine or a high-enriched uranium mine at some point that we have to worry about, that people can get at it.

So, I think this process leads to a possibility to addressing that. I would like to see it demonstrated. I think it can be done safely, and we'll reduce proliferation even on a small scale. And if it is successful, I urge that this be considered for other fuels, DOE fuels. There are a lot of unstable fuels that we would rather not see go into a repository. 5

Responses to Document D017

1,2 The environmental assessment has been prepared to determine whether the proposed demonstration is a major Federal action significantly affecting the quality of the human environment, and as a result, whether an environmental impact statement should be prepared.

4 The proposed demonstration project does not separate plutonium. Moreover, the technology employed is not capable of separating plutonium. It is consistent with the nonproliferation policy of the United States, which does not encourage the civil use of plutonium. Accordingly, the United States does not engage in plutonium reprocessing. Further, by removing and then blending down the highly-enriched uranium, the project supports the goal of the United States to seek to eliminate where possible the accumulation of stockpiles of highly-enriched uranium or plutonium. As a result, the proposed demonstration project is consistent with the policy of the United States on nonproliferation. An additional response to comments regarding nonproliferation concerns is provided in Chapter One of this Appendix.

3,5 Although the general topic of technology development is not within the scope of this environmental assessment, the Department of Energy emphasizes ongoing programs for technology development, especially to solve national problems, such as the treatment of all spent nuclear fuel. If successful, the demonstration of the electrometallurgical technology could be a crucial step in solving some of the difficult problems of spent nuclear fuel management.

It would appear that you have heard enough, haven't you? My comments will be kept short, too. My name is Lee Bendixsen, resident -- and speaking for myself, a resident of Blackfoot, Idaho, although I have had some more than 30 years of employment here at the INEL.

And believe it or not, I'm one of those hated reprocessors. My expertise has been in the nature of fuel reprocessing a variety of fuels at the Idaho Chemical Processing Plant for almost the entire time. It's too bad that I feel that we have lost that technology.

And the subject of nonproliferation is that being similar to a red herring, since we have four other major nations in this -- in this world of ours who are proceeding with reprocessing and have done so for over 15 years, regardless of the policies of the United States of America. And they willfully, willingly in international meetings laugh at our policies and our procedures. Controlling proliferation of HEU or plutonium strictly
1 through denying reprocessing of fuel inside the United States is not and will not work.

2 Relative to this particular project, I do support it, because I feel that it does solve a situation which is an unwarranted one. My other comments, however, have to do with the specific EA. I have had the opportunity of reading a lot of EAs and a lot of EISs as a matter of course in my occupation.

I find one deficiency in every one that I have read, with the exception of only one, and this is one which the Navy is recently beginning to prepare for the continuation of their fuel at the INEL.

For the first time, they -- and certainly not included in this EA -- they have -- we have the terminology used of latent cancer risks or fatalities, and certain numbers are displayed, numbers which are in the 10 to the minus sixth, and one chance in a million, one chance in a billion, and so on.

And yet consistently no one ever bothers to put into the reports some measures of those risks against the risks that I and my children -- which I have five daughters and a son -- face in everyday life.

I would suggest to those who write the EA that they take the time to -- on each table, to put a commencer of risk that is comparable to you and I, that we can see with our lives, that even members of the Snake River Alliance can measure the risks of what they propose or object to in comparison.

3 And let me give you a couple that you might suggest. It is noted in there that you have approximately 160,000 people in this area that are affected by this, by your own statement. Approximately 20 percent of that 160,000 people are going to die of cancer at some point during an average lifetime of 75 years.

If I were to assume an 80-year lifetime, that's an average of 400 cancer deaths per year every year for the next 75 years. Yet, the risks that are associated for latent cancer fatalities in this report would come to less than one individual during the three-year lifetime of this project. And that would compare to some 1,200 cancer death that would occur whether or not this project is done.

Let me point out that those who traveled 100 miles to and from this meeting, a 50-mile round trip from Pocatello, had a risk of some 15 times higher in just that one trip than is stated in this particular report.

And I might point out that that's just to the individual who dies. And every time you make that trip, you are 15 times higher. And we travel approximately a million year -- a million miles in our lifetime.

You have a one chance in 40,000 from dying from a lightning strike. Again, much, much higher than the less chance in one in a million cancer death among all of the 20 percent of the 160,000.

(3)

May I again suggest that each of the tables on latent cancer deaths in EAs and EISs ought to have some basis by which we as a public, and certainly those who are non nuclear-oriented, have to measure the real risks and not again some ephemeral risk about some man-made radiation which is somehow different than everything else. Thank you for your attention.

Responses to Document D018

1,2 The commentor's statement concerning the demonstration and the commentor's position on nonproliferation are noted. The proposed demonstration project does not separate plutonium. Moreover, the technology employed is not capable of separating plutonium. It is consistent with the nonproliferation policy of the United States, which does not encourage the civil use of plutonium. Accordingly, the United States does not engage in plutonium reprocessing. Further, by removing and then blending down the highly-enriched uranium, the project supports the goal of the United States to seek to eliminate where possible the accumulation of stockpiles of highly-enriched uranium or plutonium. As a result, the proposed demonstration project is consistent with the policy of the United States on nonproliferation. An additional response to comments regarding nonproliferation concerns is provided in Chapter One of this Appendix.

3 Information has been added to the environmental assessment to provide a better perspective on relative risk of the proposed action compared with those risks more commonly encountered.

My name is Paul Bacca. I'm a retired person, Argonne National Laboratory. My position at the laboratory was that of manager of this particular fuel cycle facility now called the fuel conditioning facility. I was that manager for some 14 years, in addition to another facility, a sister facility. My experience over some 39 years developing the basics at the Rocky Flats Plant, moving on to the Naval Reactor Facility, and then finally to the EBR-II facility, I think, gives me a little bit of confidence that I know with what I speak.

From 1964 to 1968 in this very facility, the fuel conditioning facility, Argonne National Laboratory, under DOE's direction, did in fact process, as was indicated by Ernie Hughes, some 550 driver fuel assemblies. It was in those days that the blanket assemblies that we are also talking about were stored in ground. Let me tell you that the driver fuel then, after no interest was made of the enriched uranium because of economics and difficulty in processing, was shipped to the Idaho Chemical Processing Plant.

And bare assemblies were stored under water with considerable success over a large number of years until eventually, because of bad water chemistry at the ICPP, degradation occurred and we were forced to retrieve those interimally stored assemblies and bring them back to the EBR-II, where we consequently upgraded their containment in stainless-steel packages.

Now we have the assemblies with their fuel elements, without the hexagonal can that you see over there, contained -- doubly contained in stainless steel. They are contained in inert gas within the initial barrier where the sodium is, and then they are in fact contained again in the secondary containment.

And I suspect the gentleman who commented -- talked about degradation -- I would challenge that, because those assemblies that were not double contained have long since been removed, and what you might have is remnants -- unless there's something I don't know -- are doubly contained and the risk is negligible.

The blanket assemblies were packaged, stored properly, and sent to the storage ground at the -- or at the Argonne-West site. We conducted in this same facility, under circumstances of the process called pyrometallurgical processing, as opposed to electroreprocessing -- we conducted safely over the course of four years all the things that were much more hazardous, in terms of personnel, environment, etc., than what the process that we're talking about now is concerning itself with.

So, I say to the environmental- assessment side of this thing, having a knowledge of what has been done since my relief from that organization, there have been great strides made to bring those facilities, those operations, those actions, up to meet the federal guidelines, the federal requirements, that we did not have to live with in those early days. 1

So, I can -- I can, based on my knowledge of what was done -- and I have a fairly comprehensive knowledge of that -- the conditions of the environmental assessment can easily be satisfied by -- by the people doing the work. Whether or not the referencing and the dose rates, etc., match with others, that's something to say.

What I would like to suggest here, however, even though I'm an advocate of this, I think that a demonstration such as this -- it is not a proven demonstration -- it should in fact be a pilot and an engineering demonstration. 2

And one should consider taking the smallest quantity of driver fuel and the smallest quantity of blanket assemblies to carry out the experiment, if you will -- it is an experiment -- and thereby reduce the risk. And

so be it that I think our challengers from outside of the nuclear area would be more comfortable with, say, 10 driver assemblies and two or three blanket assemblies, an engineering pilot demonstration.

I think that this -- if we go that direction, we are more than qualified to say that our environmental assessment has -- because it's assessed 125 assemblies, blanket and driver, that we can do the job.

(2)

Now, I'm going from there to the logic of why are we doing this. And I think I'm somewhat challenging why we want to do this process at all. And I think that's within the guidelines of this discussion.

We did in fact store at Argonne-West some 400 blanket assemblies for some great number of years, "great" being the order of anywhere from eight to 15 years. Never any problem in ground storage in stainless-steel containment, monitoring that is not nearly so quality that the monitoring is today, cathodic protection of the containers, radiation safety assessment, etc., and never had a problem.

I maintain that we should do something like this. We should continue to discard most of the blanket assemblies to that kind of storage, upgrade it to today's standards, and carry out our small pilot experiment in the fuel conditioning facility. Granted, that doesn't save jobs. And I know that's the political side of it.

The second thing I say is if there is a need to go to this permanent repository, there isn't such a thing now. There may be one in 2035, there may not. The criteria for that facility accepting any of this spent fuel -- let me tell you, in 2035 -- or if it's the WIPP, which supposedly 1998, after 12 years, or the 2000 time date when they talk about -- that criteria will have changed many fold from the criteria that we have today. It is not known what that criteria.

As knowledge gets more adept, we are going to see more criteria, more requirements that this process -- smaller volumes, yes, maybe smaller volumes. But the total waste, maybe not. -- will not meet. I am convinced however, though, because of our experience with the WIPP, that is transuranic waste in drums at the waste disposal site of the INEL.

The criteria in my experience specifically has changed for receipt of WIPP -- I don't know -- maybe ten times technical criteria. It ranges from packages to masses to what's the finest transuranic waste, or what have you.

So, I think what we should do is carry out a program that is minimum in mass -- or in nature, scientifically advance the technology so that in 37 or 38 years we will at least have gone through the process, and carry out that.

If we're not willing to just store the stuff in the ground, I say go back to a thermal conditioning program; that is, a pyrometallurgical program, which is a very simplified program. It would carry out the actions necessary to react the sodium inherent in the fuel pins. It would be able to handle that sodium in, again, cybrofax, or whatever the zeolites are that contain this stuff, getting rid of the sodium and putting the EBR-II metal fuel, either as is or by introducing to the project air or oxygen, or what have you, an ability to stabilize the fuel such that it is not so reactive as straight metal fuel. It can be very similar then, if you will, to the uranium found in power reactor fuels. Okay. So, my proposal suggests --

3

MR. LAWSON: And briefly.

MR. BACCA: Yeah.

MR. LAWSON: And briefly, also.

MR. BACCA: Okay. One last word. In simplification, I would say that would be a thing to do, if anything. If one were not willing to do that, he could follow the pattern that exists at power reactors all over the United States, and soon throughout the world, where above-ground storage in casts will in fact, with monitoring, give us this ability to carry out this very small scale electrorefining experiment, but not challenge the 100 assemblies or the 125 or the 700 blanket assemblies in EBR-II that need this reprocessing. Put them in storage until we get the knowledge and someday we'll get at them, not 35 years later, but maybe within a few years when at least the criteria is sorted out.

4

Let me say that you say put the plutonium and the fission products in something that's ready to go to the permanent repository -- let me tell you, you define that for me. Today, you can't do it. You define it for me two years before the permanent repository opens, you can't do that. And then when you get to the opening the repository, they will say laboratory experiments are no good because they do not simulate correctly the conditions that exist in that hole in the ground out at Yucca Mountain or wherever it might be. So, that's my two cents' worth. Thanks.

Responses to Document D019

1 The Department of Energy acknowledges the commentor's comment that significant improvements have been made to the Fuel Conditioning Facility. The Department of Energy's independent Operational Readiness Review confirmed that the facility safety requirements have been satisfied.

2 The Department of Energy acknowledges the commentor's comment on the demonstration and agrees that the scope should include treatment only of sufficient quantities of material to provide the necessary data.

3 The early pyroprocess carried out in Fuel Conditioning Facility from 1965 until 1969 was an incomplete treatment process and would not have potential applicability to a broad range of spent nuclear fuel types. Residues from that early spent nuclear fuel recycling demonstration, stored in the Radioactive Scrap and Waste Facility, require further treatment before they can be disposed. Stabilization of these residual mixed wastes has been addressed in the *Idaho National Engineering Laboratory Site Treatment Plan.*

4 As stated in Section 5.0 of the environmental assessment, most of the Experimental Breeder Reactor-II spent nuclear fuel will be put into storage until a decision is made on its ultimate disposition.

Since it is getting late, and I'm sure that many of the things that I have written here prepared to say, I can give a copy to you and to the board. So, I've just got a few things that I want to make sure get out.

The first thing is that although I am a member of the INEL citizen's advisory board, I am not speaking here as a member of that board. On the other hand, what this has forced me to do over the last couple of years is to become much more aware of what the Department of Energy is doing and not doing and how it is doing it.

I have been extremely critical on numerous occasions of DOE because of the continuation of the proliferation of paper studies, characterizations of waste, and all sorts of things that don't put the waste into -- into a form that is stable and can be store for long periods of time.

I have been critical of the fact that they -- most of their activities related to waste is dig it up over here and bury it over there and -- and not process it to a -- to a stable form.

1 This process that is presently being proposed and talked about here is a specific process to treat a specific fuel and put it into a more stable form to reduce the volume of radioactivity over radioactive materials. And I think it's the kind of thing that I've been wanting the DOE to do for a long time.

2 I have reviewed the Draft Environmental Statement Assessment, and I'm convinced that the environmental problems and the impacts of this project are insignificant.

3 I think, regardless of opposition by some people to any treatment of spent fuel, it is obvious that INEL and this nation must put spent nuclear fuel into as stable a condition as possible. If this demonstration is successful, DOE will have another potentially powerful technology option for dealing with much larger spent fuel problems that exist.

4 Paul Bacca talked quite a bit about the process itself, so I won't go -- won't go into that. I think most of you have probably read the report and can make up your own mind about whether it is environmentally benign or not. As far as I'm concerned, it is.

5 The major things that are important here is that this results in decreased volumes of highly radioactive waste, it reduces the enrichment from 65 percent to 20 percent, which is an enrichment level that is considered within the nonproliferation treaty, and all of the weapons capabilities that we know about to be safe to put into research reactors or other reactors around the world. It doesn't involve bringing new spent fuel into the -- into the area.

And, finally, I think it's time to stop talking about reducing the hazards of spent nuclear fuel and start doing something about them. It should be clear to everyone that this project is a sound step in that direction, and I say to DOE and Argonne, Let's get on with it. Thank you.

Responses to Document D020

1,2,3,4 The commentor's statements on the proposed demonstration are noted. Although the general topic of technology development is not within the scope of this environmental assessment, the Department of Energy emphasizes ongoing programs for technology development, especially to solve national problems, such as the treatment of spent nuclear fuel. The demonstration of the electrometallurgical technology could be a crucial step in solving some of the difficult problems of spent nuclear fuel management.

5 By removing and then blending down the highly-enriched uranium, the project supports the goal of the United States to seek to eliminate where possible the accumulation of stockpiles of highly-enriched uranium or plutonium. As a result, the proposed demonstration project is consistent with the policy of the United States on nonproliferation. An additional response to comments regarding nonproliferation concerns is provided in Chapter One of this Appendix.

Good afternoon. I'm Fred Sica. I'm the president and chief executive officer of the Greater Idaho Falls Chamber of Commerce. Folks, the DOE and Argonne, Mr. Moderator, friends from the Snake River Alliance, I'm the chamber guy, so I can welcome everybody and say glad for you all to be here.

Folks from California -- by the way, I'm from California. It may interest you to know, some of you -- and I was sort of prodding old George Fruend over there on the way to Boise the other day to testify on behalf of the governor's agreement, that I'm one of these guys that stood in front of Diablo Canyon to keep that thing from getting open. And George beat me up all the way to Boise.

In any case, the reason for those things, because those days in my youth had some very serious concerns, as we all do here. Somebody mentioned today that we have an emotional issue that has to do with economics. Well, you're doggone right we do. And I can talk about that because I'm the chamber of commerce director.

I've got 928 businesses that are concerned about the economics of this area. Yeah, we're concerned about it. And I would venture to say that if your job's butt was on the line, you'd be interested to. You're doggone right. These things happen that way.

Let me tell you what we've done here at the Chamber of Commerce in Idaho Falls. We have an INEL committee that is compromised of at least six Ph.Ds, probably four or five economists, superintendents of school districts and CEOs of many businesses. We have a economic development committee that virtues just about the same. And over the past year we have each met, each of those committees, 52 times. That's 104 committee meetings that went from an hour to an hour and a half each.

They're represented by a wide spectrum of people. And over that wide spectrum of discussion, the Greater Idaho Falls Chamber of Commerce have come up with some conclusions. And those conclusions are, when you need the microphone fixed, you don't ask a nuclear scientist; you ask the guy who knows how to do it. Thank you very much.

The other issue is that we all have vested interests here. Yes, we do. And those vested interests are from our heart, each one of us here, that we need to respect each one of us that have those vested interest from our heart. I'm unabashed to say that my interests have to do with the economic stability of Eastern Idaho, which thus affects everybody in Idaho itself.

I would also venture to say that when people talk about what is happening here in Eastern Idaho and at INEL and at Argonne, and they say, well, of course, because those guys have a vested interest, I would bet my bottom dollar that when Micron was wanting to expand in the Boise area and they couldn't because they couldn't find water, we've got every guy in that chamber of commerce wanting to be a well digger. You can bet they can. That's because they had vested interest. Yes, that's true. Absolutely. Because we're talking about human beings and their lives. And everybody here is talking about that.

The official position, after a 102 meetings, after taking commentary, not in an hour or two, but in over 400 hours that we sit down and discuss issues at INEL, we find this process to be safe, sensible, and being conducted by the finest minds in the country today. 1

The Greater Idaho Falls Chamber of Commerce endorses the program wholeheartedly. Thank you.

Responses to Document D021

1 The commentor's statement from the Greater Idaho Falls Chamber of Commerce is noted. It is the Department of Energy's intent with this demonstration to provide an important option for dealing with spent nuclear fuel and protecting the environment.

I am the state assistant to Senator Dirk Kempthorne. And United States Senator Paul Simon of Illinois has asked that I might read his statement, also. It was just faxed in.

"I endorse the Department of Energy's proposed demonstration of an advanced spent nuclear fuel
1 management technology in Idaho. This research project will treat 125 spent nuclear fuel assemblies from the Experimental Breeder Reactor-II for safe, long-term storage and eventually geological disposal.

"The extensive analysis in DOE's recently published draft confirms that the project can be conducted
2 without negative environmental impact. Moving forward will help cut the eventual cost of cleanup and waste
3 management for at least one DOE site and holds promise that the Department is serious about examining better, cheaper, faster ways to deal with its nuclear waste issues.

"Electrometallurgical technology for the treatment of spent nuclear fuel was invented in Illinois and was recognized in 1991 with the prestigious R & D award as one of the best 100 technology developments in the nation for that year.

"Scientists at Argonne National Laboratory's main site near Chicago are carrying out research to
4 determine how this technology can be adopted to solve spent nuclear fuel problems. Application of this technology in the Idaho project will allow them to demonstrate the viability of the waste reduction and stabilization process that potentially will be used for all types of spent nuclear fuel.

5 "Our nation faces a waste disposal problem that has reached crisis portions. This process may provide the answer to what has been an unsolvable problem. The Department of Energy and Argonne are to be congratulated for taking a big step toward dealing with the nuclear waste issue."

Thank you very much.

Responses to Document D022

1,2,3 The commentor's statements concerning the proposed demonstration are noted. The comments that there are no significant environmental impacts are noted. It is the Department of Energy's intent with this demonstration to provide an important option for dealing with spent nuclear fuel and protecting the environment.

4,5 Although the general topic of technology development is not within the scope of this environmental assessment, the Department of Energy emphasizes ongoing programs for technology development, especially to solve national problems, such as the treatment of spent nuclear fuel. The demonstration of the electrometallurgical technology could be a crucial step in solving some of the difficult problems of spent nuclear fuel management.

My comments are further abbreviated from what I had intended to present when I signed up at one o'clock today. First of all, I'm John Horan. I'm a semi-retired scientist.

I am a certified health physicist, and I do freelance consulting work in protecting workers and the environment from unnecessary exposure to radioactive material. I am also an adjunct professor of health physics at Idaho State University in Pocatello. But I appear today as a private citizen.

1 I fully endorse the proposed action to demonstrate. And, again, like some other speakers, I want to emphasize this is a demonstration, the technical feasibility for treating sodium-saturated spent nuclear fuel at ANL-West in Idaho.

2 There are many reasons for my endorsing this proposed action -- and I endorse it without reservation -- but I will highlight a few of these. It is an unusually cost-effective approach by using existing and unique facilities, as well as existing highly-qualified and motivated workers to focus on work that they do best; namely, a highly technical demonstration of advanced technology.

3 It's also a positive step in implementing the tri-party agreement between Governor Batt to the State of Idaho, the Department of Energy and the Navy to research in Idaho new ways to immobilize spent fuel.

4 When successfully accomplished, this technique could also be used for other sodium-saturated spent nuclear fuel in Idaho; namely, 71 metric tons of spent fuel.

5 This proposed action is environmentally safe in every aspect. Air quality impact is insignificant, a factor of several thousand below the specifications of ten millirem per year. The liquid waste impact is zero. There is no discharge.

6 The environmental assessment approach is the most appropriate approach for a demonstration where there will be negligible environmental impact. Also, a final safety analysis report already exists, which has been approved for the facility being utilized.

7 As a scientist, I must support -- and in fact it's not that I must support -- I freely support the 1995 report of the National Research Council, recommending that DOE go ahead with this demonstration. This endorsement is by the leading scientists in our nation. This puts the blue ribbon and the gold seal of approval on this proposal. It's a peer review document and not the opinion of a single scientific writer on a magazine such as Scientific America.

Mr. Chairman, I see no reason or no need for any uncompromising delays or obstructions to this program proceeding. Such delays only increase the costs and tie up the system of trying to get work accomplished. Thank you.

Responses to Document D023

1 The commentor's comment concerning the demonstration is noted. An objective of the proposed project would be to produce data sufficient to allow the Department to determine the technical feasibility of the electrorefining technology for Experimental Breeder Reactor-II or other spent nuclear fuel for safe long-term storage or disposal. It is necessary to address questions raised by the National Research Council review of this technology before any proposal can be made for its application. The existing and high efficiency electrorefiners are needed to provide these data. The equipment associated with the proposed demonstration is not of adequate size or configuration for Department of Energy or commercial production-scale activities. Also, there are several steps in the process primarily associated with material handling systems in the Fuel Conditioning Facility, that would limit the total output of the facility. If the demonstration project is successful, the Department of Energy would review the data and decide whether to propose future applications of the technology. Such a proposal would be made in accordance with all applicable laws and regulations and will include appropriate National Environmental Policy Act analysis, including alternatives to electrometallurgical treatment.

2, 3 Under the terms of the settlement agreement, the Department of Energy is legally obligated to remove spent nuclear fuel (including Experimental Breeder Reactor-II spent nuclear fuel) from the State of Idaho by the year 2035. Electrometallurgical treatment is a promising technology for treating Experimental Breeder Reactor-II spent nuclear fuel and blanket assemblies. If the demonstration were successful, application of the technology could help the Department of Energy to meet this obligation.

4,7 Although the general topic of technology development is not within the scope of this environmental assessment, the Department of Energy emphasizes ongoing programs for technology development, especially to solve national problems, such as the treatment of spent nuclear fuel. If successful, the demonstration of the electrometallurgical technology could be a crucial step in solving some of the difficult problems of spent nuclear fuel management.

5 The comment that the environmental risks associated with the demonstration are minimal is noted.

6 In accordance with 10 CFR Part 1021, the Department of Energy prepared an environmental assessment for the electrometallurgical treatment demonstration project to assist with agency planning and decision making. On the basis of the environmental assessment, the Department of Energy will decide whether to prepare a Finding of No Significant Impact or an environmental impact statement. If the environmental impacts of the electrometallurgical treatment demonstration project are found to be insignificant, then a Finding of No Significant Impact will be prepared; if not, then an environmental impact statement will be prepared.

My name is Jack Courtney. And I'm a professor of nuclear engineering at Louisiana State University in Baton Rouge, Louisiana. My address is 10723 Oakline Drive in Baton Rouge, 70809. I speak not for the University, nor for Argonne National Laboratory, but for myself.

1 | I would first of all like to comment that the environmental assessment is remarkably clearly written for government document. It seems to be complete. It is technically accurate. And I further agree with it's
2 | conclusion that a full-blown environmental assessment of the proposed operation would be an unnecessary waste of the taxpayers' money.

The first comment has to do with the radiation exposure on the proposed normal operation of the facility.
3 | In a word, these exposures are trivial, absolutely trivial. But I guess that's two words or maybe three.

It is a very small fraction of the naturally occurring radiation background and exposure that we receive in this part of the country. In addition to that, the analysis for the potential accidents was conducted under an extremely conservative manner.
4 |

If I have any beef about that analysis, it would be that the assumptions for the release fractions of the radioactive material are unnecessarily conservative; that is, they are too high. I think more realistic fractions would reduce the projected exposures for both on-site and off-site personnel by perhaps an order of magnitude or maybe even a factor of 100. The accidents, I might note, are below probability, and they are of minor consequence.

The next point is the waste form. Spent nuclear fuel is a tremendous national problem. We must -- we
5 | absolutely must address the volume of nuclear fuel we have and put it in the most environmentally acceptable fashion for long-term storage or disposal.

I think the output materials of this process have the best chance of standing up under many, many years. Also, the materials are in a form where they would be unattracted to theft, for diversion or for terrorism. Perhaps the most important aspect of the proposed method of treatment of the fuels, that it addresses a clear and present danger, the security not only of the United States, but of all the family of nations; that is, the proliferation of heavy elements that could be diverted to the use of nuclear weaponry.

6 | The materials that are the output of this process are absolutely useless for the use in nuclear explosives. That is a point that should be made often and in every forum possible.

7 | The action -- this action, the demonstration of the electrochemical -- or, rather, the electrometallurgical process is also in accordance with the recommendations of the National Academy of Sciences.

Based on my personal knowledge of the processes, the equipment, the facilities, and most of all the people
8 | who would be involved, I urge the Department of Energy to approve the environmental assessment and direct Argonne National Laboratory to proceed with all deliberate speed the demonstration process.

Thank you very much for the opportunity to comment.

Responses to Document D024

1, 2 The commentor's comment on the quality of the environmental assessment is acknowledged. The environmental assessment was prepared using the *Recommendations for the Preparation of Environmental Assessments and Environmental Impact Statements,* which was written to improve the clarity of the Department of Energy's National Environmental Policy Act documents.

The level of National Environmental Policy Act analysis was determined in accordance with 10 CFR Part 1021. The Department of Energy prepared an environmental assessment for the electrometallurgical treatment demonstration project to assist with agency planning and decision making. On the basis of the environmental assessment, the Department of Energy will decide whether to prepare a Finding of No Significant Impact or an environmental impact statement. If the environmental impacts of the electrometallurgical treatment demonstration project are found to be insignificant, then a Finding of No Significant Impact will be prepared; if not, then an environmental impact statement will be prepared.

3 As discussed in the environmental assessment, the radiation doses associated with the electrometallurgical treatment demonstration project are extremely low.

4 As required in an environmental assessment, accidents were evaluated based on the *Recommendations for the Preparation of Environmental Assessments and Environmental Impact Statements*, using conservative assumptions, in order to bound potential environmental impacts.

5 Although the general topic of technology development is not within the scope of this environmental assessment, the Department of Energy emphasizes ongoing programs for technology development, especially to solve national problems, such as the treatment of spent nuclear fuel. If successful, the demonstration of the electrometallurgical technology could be a crucial step in solving some of the difficult problems of spent nuclear fuel management.

6 The Department of Energy acknowledges the commentor's statement that the material from the demonstration is useless for nuclear explosives. The proposed demonstration project does not separate plutonium. Moreover, the technology employed is not capable of separating plutonium. It is consistent with the nonproliferation policy of the United States, which does not encourage the civil use of plutonium. Accordingly, the United States does not engage in plutonium reprocessing. Further, by removing and then blending down the highly-enriched uranium, the project supports the goal of the United States to seek to eliminate where possible the accumulation of stockpiles of highly-enriched uranium or plutonium. As a result, the proposed demonstration project is consistent with the policy of the United States on nonproliferation. An additional response to comments regarding nonproliferation concerns is provided in Chapter One of this Appendix.

7, 8 The commentor's statement that the demonstration is in accordance with the recommendations of the National Academy of Sciences is noted. Although the general topic of technology development is not within the scope of this environmental assessment, the Department of Energy emphasizes ongoing programs for technology development, especially to solve national problems, such as the treatment of spent nuclear fuel. If successful, the demonstration of the electrometallurgical technology could be a crucial step in solving some of the difficult problems of spent nuclear fuel management.

My name is Joy Myers, and we live in Spencer in Clark County. The address is HC-62 Box 41, Dubois 83423. I'm also chairman of the site specific advisory board for the INEL. Our board has toured Argonne. And at our January meeting, we received a comprehensive briefing on the electrometallurgical -- I wish you would get an acronym for this one as well as for everything else -- treatment research and demonstration project. Due to time and scheduling constraints however, the board has not issued a recommendation concerning the project. Therefore, I'd like to emphasize that I'm speaking as a private Idaho citizen, a member of the public, and not as a representative of the board or any member of the board.

1 | Before my specific comments, I would like to compliment DOE also on the environmental assessment.
2 | It's clearly written and understandable, attributes which are frequently missing in DOE documents. It's clearly -- it clearly and in detail lays out the case for adoption of the preferred alternative. And I also unreservedly urge DOE to proceed with this carefully crafted demonstration project.

While the reasons why the preferred alternative should be undertaken are well-articulated in the EA, let me focus on just a couple of reasons why I support the project. First, I realize that treating sodium-saturated spent fuel is an obstacle in the total management of spent fuel.

3 | Utilizing the expertise at Argonne to develop a process to effectively treat this fuel, reduce its volume
4 | and put it in a safe form for storage, transportation and disposal is an opportunity which should not be denied, especially considering that almost all of the sodium-bonded fuel in the DOE inventory is at the INEL. It's a positive step toward implementation of the governor's agreement.

5 | Second, in spite of comments to the contrary, the nonproliferation aspects of the project are positive. HEU would be blended down to LEU in a controlled environment, reducing the stockpile of HEU. This is consistent with U.S. policy and our efforts throughout the world.

Furthermore, plutonium and other by-products would be immobilized in a nonproliferation waste form unsuitable for weapons use. While as a layman it's impossible for me to comment intelligently on the technology, it's my understanding that an EA relates to the environmental impacts, not the process itself.

6 | The purpose of the demonstration, it seems to me, would either prove or disprove the process. In any event, the National Research Council's recommendation that DOE proceed to demonstrate the feasibility of the technology should make such action reasonable.

7 | In fact, it's incomprehensible to me why anyone with a genuine interest in safe spent-fuel management at the INEL, and ultimate disposal outside of Idaho, would oppose the preferred alternative or the project. Its potential is great, the risks are well within acceptable boundaries.

8 | If I may, just one more comment regarding NEPA and the need for an EIS. It appears to me that the EA is complete and all that is needed in relationship to this project. It's been my observation that when all else fails, when there's no rational specific argument left, attack the administrative process and create endless delay and unproductive and costly mountains of paper. It's time to get on with it. Thank you.

Responses to Document D025

1,2,3 The commentor's statement on the clarity of the environmental assessment is acknowledged. The environmental assessment was prepared using the *Recommendations for the Preparation of Environmental Assessments and Environmental Impact Statements*, which was written to improve the clarity of the Department of Energy's National Environmental Policy Act documents.

The National Environmental Policy Act regulations require evaluation of reasonable alternatives to the proposed action. Alternatives are evaluated in Section 2.0 of the environmental assessment. The environmental assessment analyzed three alternatives in detail and considered several other process alternatives which were eliminated from detailed evaluation. In general, the excluded alternatives had not reached a level of development that would allow a detailed evaluation. Evaluation of alternative processes that were identified in the public comment period have been added to the environmental assessment, Section 2.1. The potential environmental impacts that would result from implementing a conceptual treatment process cannot be analyzed in equal detail relative to the impacts that can be quantified for a process that has reached an adequate level of technical maturity.

As described in the environmental assessment, the impacts of the proposed action and the alternatives were found to be extremely small. It is the Department of Energy's intent to reduce risks to the environment by this action, and the results will establish whether that can be achieved.

4 The Department of Energy is determined to meet its commitments with the State of Idaho to remove spent nuclear fuel from the State by the year 2035. Under the terms of the settlement agreement, the Department of Energy is legally obligated to remove spent nuclear fuel (including Experimental Breeder Reactor-II spent nuclear fuel) from the State of Idaho by the year 2035. Electrometallurgical treatment is a promising technology for treating Experimental Breeder Reactor-II spent nuclear fuel and blanket assemblies. Application of the technology could help the Department of Energy to meet this obligation.

5 The Department of Energy acknowledges the commentor's support of the nonproliferation aspects of the demonstration. The proposed demonstration project does not separate plutonium. Moreover, the technology employed is not capable of separating plutonium. It is consistent with the nonproliferation policy of the United States, which does not encourage the civil use of plutonium. Accordingly, the United States does not engage in plutonium reprocessing. Further, by removing and then blending down the highly-enriched uranium, the project supports the goal of the United States to seek to eliminate where possible the accumulation of stockpiles of highly-enriched uranium or plutonium. As a result, the proposed demonstration project is consistent with the policy of the United States on nonproliferation. An additional response to comments regarding nonproliferation concerns is provided in Chapter One of this Appendix.

6 The commentor's statement concerning the National Research Council's recommendations to proceed with the demonstration is acknowledged. Although the general topic of technology development is not within the scope of this environmental assessment, the Department of Energy emphasizes ongoing programs for technology development, especially to solve national problems, such as the treatment of spent nuclear fuel. If successful, the demonstration of the electrometallurgical technology could be a crucial step in solving some of the difficult problems of spent nuclear fuel management.

7, 8 The commentor's statement that the risks associated with the demonstration are acceptable is noted. The Department of Energy prepared an environmental assessment for the electrometallurgical treatment demonstration project to assist with agency planning and decision making, in accordance with 10 CFR Part 1021. On the basis of the environmental assessment, the Department of Energy will decide whether to prepare a Finding of No Significant Impact or an environmental impact statement.

My names is Beatrice Brailsford. I'm the program director of the Snake River Alliance, and I'm very tired. I commented very briefly this afternoon about the Snake River Alliance's position on this project.

1 3 2 This project is a reprocessing -- is to develop a reprocessing technology. The project has dubious environmental benefits, and it has clear proliferation risks. We will be commenting extensively later on on the specifics of both the project and this EA.

4 5 I did want to note, though, Mr. Hughes, I had asked if the administrative record -- if the references supporting the environmental assessment were available in the reading room quite some time ago. And I would also like to ask you if you all could make the transcripts of these two hearings available earlier than your comment summary.

MR. HUGHES: Yes.

BEATRICE BRAILSFORD: Thank you.

Responses to Document D026

1,3 Unlike reprocessing as the Department historically has used that term, this project does not separate plutonium, is of small scale, and produces no liquid waste. The proposed demonstration project does not separate plutonium. Moreover, the technology employed is not capable of separating plutonium. It is consistent with the nonproliferation policy of the United States, which does not encourage the civil use of plutonium. Accordingly, the United States does not engage in plutonium reprocessing. Further, by removing and then blending down the highly-enriched uranium, the project supports the goal of the United States to seek to eliminate where possible the accumulation of stockpiles of highly-enriched uranium or plutonium. As a result, the proposed demonstration project is consistent with the policy of the United States on nonproliferation. An additional response to comments regarding nonproliferation concerns is provided in Chapter One of this Appendix.

2 The potential environmental impacts associated with the proposed demonstration project are detailed in Section 4.0 of the environmental assessment. As detailed in the environmental assessment, these potential impacts are small.

4, 5 The references cited in the environmental assessment were placed in Department of Energy Public Reading Rooms. The comment period for the environmental assessment was reopened and extended to May 3, 1996. A copy of the transcript was sent to the commentor on March 13, 1996. Additional information on this issue is provided in Chapter One of this Appendix.

Before I begin, if I could take care of two business matters. Apparently, while I was out of the room, you indicated that you were granting my request to make the documents available. I'm sorry I was gone when that happened. I understand that they'll be made available in about a week; is that correct?

MR. HUGHES: I'm sorry, Mr. Hirsch?

DAN HIRSCH: I was apparently out of the room when you made an announcement that my requests were being granted about the documents that were not available.

MR. HUGHES: We're going to try to have them in all the public reading rooms within the next week.

DAN HIRSCH: When you say "all," what do you mean?

MR. HUGHES: We sent the document to eight public reading rooms. That's where they are. And we will send the references to those eight public reading rooms.

DAN HIRSCH: And the other part of my request, to extend the comment period accordingly so people will be able to review them?

MR. HUGHES: We understand your request, and that will be -- that will be reviewed. I'm not in a position to respond to that.

DAN HIRSCH: And the other thing is, Mr. Laidler and I had a conversation outside. And there were a couple matters that you thought you might want to clarify. Do you want to do that now?

MR. LAIDLER: I can. The discussion that we had related to the process for recovery of transuranic elements. That is not a part of the project that is going to be demonstrated and that is the subject of this environmental assessment, because we don't use the type of equipment that would be necessary to recover the transuranic elements.

However, when the process was initially developed for use with the -- with the liquid metal reactor, there was intention to recover transuranics and recycle them as fuel and burn them. And that's done in a special type of cathode. It's a very complicated device which requires the deposition of the transuranics in a cadmium pool suspended in the salt phase.

When that collection of transuranics is made, the transuranics are recovered, all of them, they cannot be separated one from the other. So, plutonium, neptunium, americium and curium are co-deposited, along with uranium and with rare earth fission products. The composition of a typical deposit is around 60, 65 percent transuranics, 30 percent uranium and the balance of rare earth fission products. So, it is possible to do it, but is not a part of this demonstration.

The other matter had to do with -- with the release of information pertaining to this technology. And I made a statement that it was those elements that pertained to the economics of the process that were not being released.

In fact, what I meant to say is that the information not being released is that which would make the process economically feasible. And that has largely to do with the high throughput electrorefining device. Were there any questions on it?

MR. LAWSON: I appreciate your clarification. Okay. Thank you. You now have 30 seconds.

MR. HIRSCH: I thought we stopped the clock. My name's Dan Hirsch. I'm president of the Committee to Bridge the Gap, former director at the Adlai Stephenson Program on Nuclear Policy at the University of California. I want to make a few points. I'll try not to repeat too directly what I said earlier this afternoon.

1 I appreciate the clarification by Mr. Laidler. Clearly, this a technology that grew out of the reprocessing program for the breeder reactor. With a modification, it is designed now to produce a pure bomb-grade high uranium stream which they will later then blend down. But it is modified from the previous technology that was designed to take out the plutonium and the other transuranics.

2 We believe -- and Professor Warf will discuss this a bit more in a moment -- that even with that technology, one can tune the voltage potential so as to get pure plutonium streams if one wishes. One doesn't need to do that. The transuranics that will get out are usable in weapons anyway.

3 The basic point is this is a reprocessing technology. That's where it came from. That's what it is. This country has had a policy for 20 years not to do this, particularly not to do this with fuel from the civilian reactor side.

This is coming from the IFR, which is part of the civilian reactor development program. And so we are now crossing a very dangerous threshold that we will regret tremendously.

4 Mr. Laidler has always clarified that there are parts of this technology that are so sensitive that they are not to be released because they would assist other countries in economically using this technology.

The very fact that it is sensitive nuclear technology, and we have great question as to where that line is being drawn as to what is shared and what is not, indicates the substantial danger of moving into that world.

Professor Warf, who you will hear from in a moment, helped design the PUREX process that has been used to separate plutonium for the weapons program in many countries. And I think it's a development that many of us have come to regret.

5 Any development for additional reprocessing technology is extremely dangerous. This one is particularly dangerous because it is so compact. It is boasted that it can be done in something the size of a bathtub. It would therefore make it very difficult to detect for other countries to be using that technology.

6 We are told that it is designed to get the sodium out of the fuel. There is no reason, if your intention is to get the sodium out, to also then separate out the highly-enriched uranium.

It is clear that this is solely designed to get one's foot in the water for that reprocessing technology, in part in hopes that the IFR will be revived, in part in hopes that one can get one's foot deeper into that water in the next steps.

There's a claim that this is designed for volume reduction. We had a clarification earlier today that, in fact, there's no real change in that volume, and certainly no change in the radioactivity.

7

Even if there were a change of the sort identified for volume of moving from 5 cubic meters to 2.5 cubic meters, I can't believe that there's some tremendous environmental deficiency of 2.5 cubic meters of storage space.

8

This is all simply a transparent rationale change for trying to keep alive a program that the Congress has shut down for very sensible reasons.

It has been mentioned that the National Academy Study has made certain recommendations that a -- a program to try to demonstrate in a certain way this technology might be useful, certainly different than what was proposed, but I remind you that there were other National Academy studies that were extraordinarily critical of this technology.

9

10

It is one of grave concern to the nonproliferation community as major environmental risks. If you want to get the sodium out, there are clear alternatives that are far safer to do it that don't involve separation and proliferation problems.

11

In summary, this is a very controversial issue, and that is exactly what NEPA was designed to make sure was dealt with in a full process. And that is why an environmental impact statement is needed. We should not reverse 20 years of nonproliferation policy based on a negative declaration of FONSI environmental assessment. This simply doesn't make sense.

12

We will live to regret it if we go forward with this technology. There are other ways far more useful to use the talent of this laboratory than something that can provide a technology that if other countries get their hands on it they will have additional means to obtain weapons usable material. Thank you.

Responses to Document D027

1 The commentor is correct that this technology grew out of the Integral Fast Reactor Program, which would have included a closed-loop fuel cycle. Additional information relevant to reprocessing and nonproliferation is included in Chapter One of this Appendix.

2 The commentor is incorrect that adjustment of voltage potential in the electrorefiner would allow separation of a pure plutonium stream. Chapter One of this Appendix discusses this issue in more detail.

3 The Department of Energy does not agree with the commentor's opinion that this is a reprocessing technology. This issue is covered in detail in Chapter One of this Appendix.

4 The Department of Energy acknowledges the commentor's concerns regarding sensitive nuclear technology. During the Integral Fast Reactor Program, the Department of Energy conducted appropriate reviews of related technologies for recycling spent nuclear fuel in fast reactors before entering into a technology exchange agreement with Japan. Any nuclear technology which is a candidate for export is subject to sensitive nuclear technology review in accordance with 10 CFR Part 810. The Department of Energy has been designated to implement this regulation by an interagency task force representing the Department of State, the Arms Control and Disarmament Agency, the Nuclear Regulatory Commission, and the Department of Energy. The Department of Energy has established an Export Control Working Group to make sensitive nuclear technology determinations according to specific guidelines. Any future consideration of exporting electrometallurgical spent nuclear fuel treatment technology would be reviewed according to the Department of Energy's export control procedure.

5 The Department of Energy does not consider the proposed action to involve reprocessing technology or to be inconsistent with national nonproliferation policy (see Chapter One of this Appendix). Because of the high levels of radioactivity associated with spent nuclear fuel, a specially designed hot cell facility, such as the Fuel Conditioning Facility, is required even though the process is compact.

6 The commentor is correct that the process is designed to remove the sodium, a reactive material, from the spent nuclear fuel. The process is also designed to produce waste streams more suitable for disposal than the irradiated spent nuclear fuel. Although the primary purpose is not to extract the highly-enriched uranium, extracting uranium is very beneficial in reducing the high-level waste volumes.

The commentor also suggests that electrometallurgical technology could be used with the goal of simply disposing the uranium along with the fission products and plutonium in the ceramic waste stream. The Department of Energy does not support this approach, in part because the low-enriched uranium by-product of the proposed action is not a waste. Further, the suggested approach would significantly increase both the cost of processing and the volume of waste generated. Considerably more salt and cadmium would be required because the suggested approach would involve chemical oxidation rather than electrotransport of the uranium. Leaving the uranium in the waste stream to be adsorbed in the zeolite, with subsequent conversion to the ceramic waste form, would increase the waste volume by at least a factor of 25. However, the uranium would have to be blended down to a low enrichment to control nuclear criticality. If the uranium were blended down to less than 1% enrichment for disposal, the increase in waste volume would be on the order of 1000. By removing the uranium, the storage volume for both uranium and high-level waste can be kept low.

7 As stated in Sections 4.5 and 5.0 of the environmental assessment, the impact of the reduction in waste volume is relatively minor for the small amount of spent nuclear fuel that would be treated in the demonstration. However, any volume reduction would be unique to the electrometallurgical treatment technology relative to previously used spent nuclear fuel management technologies, such as reprocessing. An important reason is that there are no liquid waste streams. Also, see Response 6 above. Radioactivity of the material is not changed, an impossibility because of the physics which apply.

8 Based in part upon the urging of the Secretary of Energy, the Integral Fast Reactor Program was terminated in 1994 after extensive debate in both houses of Congress. The issues raised during the debate were varied, complex, and did not focus solely on the issue of proliferation. Congress has been clear, however, that it intends the Department

of Energy to continue development of electrometallurgical technology. In the Conference Report for the Fiscal Year 1995 Energy and Water Appropriation, the Department of Energy was instructed "to maximize the research on actinide recycle, and, as proposed by the Administration, should also retain such facilities as necessary, especially the pyroprocessing facilities." The following year, in the Conference Report for the Fiscal Year 1996 Energy and Water Appropriation, Congress gave the Department of Energy the following instruction: "As recommended by the National Academy of Sciences' assessment of the electrometallurgical approach for treating spent nuclear fuel, the conferees expect the Department of Energy to develop a plan to support the EBRFF09II demonstration using this technology. If this is successful, the Department of Energy should review the program for application to other types of spent nuclear fuel and waste management issues." The proposed demonstration project analyzed in the environmental assessment would carry out that congressional intent.

9 The demonstration project defined for the proposed action has been proposed to address the uncertainties and concerns expressed by the National Research Council. The criticism directed at this technology from other National Research Council studies has consistently raised questions that this demonstration is intended to address.

10 The environmental assessment directly addresses the issue of environmental risk, and the analysis (Section 4.0) supports a conclusion that environmental impact and risk are minimal. Chapter One of this Appendix discusses the nonproliferation issue.

11 The National Environmental Policy Act regulations require evaluation of reasonable alternatives to the proposed action. Alternatives are evaluated in Section 2.0 of the environmental assessment. The environmental assessment analyzed three alternatives in detail and considered several other process alternatives which were eliminated from detailed evaluation. In general, the excluded alternatives had not reached a level of development that would allow a detailed evaluation. Evaluation of alternative processes that were identified in the public comment period have been added to the environmental assessment, Section 2.1. The potential environmental impacts that would result from implementing a conceptual treatment process cannot be analyzed in equal detail relative

to the impacts that can be quantified for a process that has reached an adequate level of technical maturity.

The proposed process of treating the spent nuclear fuel with hot, water-saturated carbon dioxide would have the following technical problems and would require extensive development before implementation. Because of the high radiation level of the spent nuclear fuel, any processing would have to be carried out in a shielded, inert atmosphere cell, not in a simple reaction chamber as described in the comment. Based on extensive experience with reacting sodium to form sodium carbonate, these reactions would have to be controlled very closely. History has shown that the potential for accidents involving reacting sodium is very high. Exposure of the hot uranium fuel to oxygen and water vapor is similar to metal fire accident conditions described in the environmental assessment (Section 4.2). Also, the use of water for treatment of highly-enriched spent nuclear fuel would require stringent criticality hazards control measures because aqueous processes have lower fissile material limits than metallic processes. The products from the proposed process may include pyrophoric uranium hydride in addition to the compounds cited in the comment. Additional process steps would, therefore, be required to stabilize the pyrophoric nature of the product.

12 The Department of Energy has prepared this environmental assessment for the electrometallurgical treatment demonstration project to assist with agency planning and decision making. In doing so, public participation has been encouraged. On the basis of the environmental assessment, the Department of Energy will decide whether to prepare a Finding of No Significant Impact or an environmental impact statement.

My name is Bennett Ramberg. I'm with the Committee to Bridge the Gap. And during the Bush administration, I was an official in the State Department, dealing with arms control issues. And I was asked by a member of the audience to reiterate some of the points I made this afternoon concerning the proliferation issue, which, in the minds of some, has been pooh-poohed. I indicated this afternoon, and I wish to repeat, that historically the United States has pursued basically three policies to try to diminish the proliferation of nuclear weapons. The initial policy, the first policy we pursued, was not to export nuclear weapons.

The second policy pursued over the years was to eliminate the export of weapons usable material, such as HEU and plutonium. And the third element we pursued in our nonproliferation policy was not to export usable technology to adversaries around the world.

In the aftermath of the Persian Gulf War, the United States and public officials began to reexamine the policy and tried to focus on some other lacuna in our nonproliferation efforts. And one of the things we focused on in the aftermath of the Persian Gulf War is the publication of documentation, which bore on the proliferation of nuclear weapons technology was not the export of the technology, per se, but it was the publication of certain documentation and new technologies.

And we found that the Iraqis scoured the libraries of the International Atomic Energy Agency and even attended a variety of conferences in this country and other countries to better ascertain what technologies they could use in their efforts to develop nuclear weapons. Mind you, economics was not within the minds of the Iraqis as they scoured this literature.

1 The critical question I think that we confront today as we examine this particular technology and the possible publication of the technology is whether or not this technology, that is, the publication of it, will be of assistance to future Iraqis.

2 Now, we have been told that the technology will provide for the precipitation of high-enriched uranium. There is some debate within this audience here, within maybe the community at large, whether or not fine-tuning of the technology will provide additional access to plutonium.

3 These are open questions, but need to be examined further in an environmental impact review. And the review that has taken place to date has failed to do so.

4 We have a document which you will find on the table over there, concerning -- which concerns the White House's assessment of what we ought to deal -- what our nonproliferation policy is at this time. And what it stipulates at one point is that it seeks to eliminate the possible accumulation of stockpiles of highly-enriched uranium or plutonium. While it may do so in this country on the basis of this technology, publication of the technology will provide the wherewithal for other countries to pursue a new avenue, and that this is something which we're trying to defer and deter.

5 So, are there alternatives? Professor Warf illuminated some of the alternatives, at least one alternative, in his presentation this afternoon. It's something he may with to examine further in his follow-on to my remarks today. I thank you.

Responses to Document D028

1,4 The commentor's concern about the potential misapplication of this technology by the Iraqis is noted. The proposed demonstration project does not separate plutonium. Moreover, the technology employed is not capable of separating plutonium. It is consistent with the nonproliferation policy of the United States, which does not encourage the civil use of plutonium. Accordingly, the United States does not engage in plutonium reprocessing. Further, by removing and then blending down the highly-enriched uranium, the project supports the goal of the United States to seek to eliminate where possible the accumulation of stockpiles of highly-enriched uranium or plutonium. As a result, the proposed demonstration project is consistent with the policy of the United States on nonproliferation. An additional response to comments regarding nonproliferation concerns is provided in Chapter One of this Appendix.

The Department of Energy acknowledges the commentor's concerns regarding sensitive nuclear technology. During the Integral Fast Reactor Program, the Department of Energy conducted appropriate reviews of related technologies for recycling spent nuclear fuel in fast reactors before entering into a technology exchange agreement with Japan. Any nuclear technology which is a candidate for export is subject to sensitive nuclear technology review in accordance with 10 CFR Part 810. The Department of Energy has been designated to implement this regulation by an interagency task force representing the Department of State, the Arms Control and Disarmament Agency, the Nuclear Regulatory Commission, and the Department of Energy. The Department of Energy has established an Export Control Working Group to make sensitive nuclear technology determinations according to specific guidelines. Any future consideration of exporting electrometallurgical spent nuclear fuel treatment technology would be reviewed according to the Department of Energy's export control procedure.

2 There is no capability for separating plutonium in this demonstration, even with fine tuning. All plutonium is directed to the ceramic waste form without separation from fission products. Additional information regarding the nonproliferation issue is found in Chapter One of this Appendix.

3 In accordance with 10 CFR Part 1021, the Department of Energy prepared an environmental assessment for the electrometallurgical treatment demonstration project to assist with agency planning and decision making. On the basis of the environmental assessment, the Department of Energy will decide whether to prepare a Finding of No Significant Impact or an environmental impact statement

5 The environmental assessment analyzes the reasonable alternatives to the proposed demonstration project. The environmental assessment analyzed three alternatives in detail and considered several other alternative process options which were eliminated from detailed evaluation. Consideration of alternative technologies which were identified during the public comment period have been added to the environmental assessment in Section 2.1.

Well, thank you. I'm James Warf, professor of chemistry at the University of Southern California. I want to thank Mr. Laidler here, Dr. Laidler -- or Laidler it is -- for clarifying the previous matter concerning the possible separation of the transuranium elements as a group from the spent fuel by these techniques.

1 We agreed that under certain conditions; namely, by the use of a molten metal electrode -- metal being either cadmium or bismuth, perhaps other choices -- that it is possible, indeed, to separate the transuranium elements and that this then could pose some sort of a threat in the future. This is, again, an extremely involved and complicated matter and we just don't have the time to go into it.

2 I want to spend the few remaining minutes I have, though, on just some comments about breeder reactors which I think will be of interest to all of us. It was here in the United States that the first breeder reactor began to operate. This was in the 1950s in California. And as a publicity stunt, its electricity was used to serve -- to provide all power for the city of Moorpark, not far from Los Angeles.

Now, the French, they're keen on nuclear power. They get 90 -- no -- 80 percent of their electricity from nuclear reactors. In this country we get 23 percent approximately.

The French have several breeders, the most famous or infamous, depending on your viewpoint, is the Super Phoenix. It worked beautifully for two months and then began to leak sodium, and has been shut down since for repairs and modification.

Another country that has a breeder reactor operating is Kazakhstan. This is one of the republics of the former Soviet Union, now independent. It has a small breeder reactor to generate electricity. The excess heat is used to distill brackish water for the local citizens as drinking water.

I was visiting Kazakhstan just a short while back. And my purpose there was to investigate the old Soviet nuclear bomb craters and related matters. So, I asked, May I see this reactor? I would like to go. And they were enthusiastic. Yes, by all means, go.

But then I looked at the map. That country, why, it's four times as big as Texas. I didn't possibly have time to go there and see it. But at least they were willing. The reactor is destined to be shut down, but they're making their own breeder reactors, again for much the same purpose in a more modernized form.

The last one is in Japan, the Monju. That's on the west coast of Japan, eloquent, tastefully decorated on the outside, very, very modern, now running at low power. It's already had one sodium leak.

The name, that strange name, Monju, comes from the Buddhist folklore. A Buddhist -- Buddhivista it is called -- sits on the back of a tiger and rules the kingdom through pure wisdom. Now, whether that name is appropriate or not, that remains to be seen. Thank you.

Responses to Document D029

1 The commentor's concern about the possible use of a liquid-metal cathode, which was called a liquid cadmium cathode in the Integral Fast Reactor Program, is discussed in the Nonproliferation section of Chapter One of this Appendix.

2 The commentor's statements concerning breeder reactors are noted. However, it is beyond the scope of this environmental assessment to address issues that are not directly related to the research and demonstration project described in the environmental assessment.

1 My comments are addressed to the representatives of the DOE. The process you are proposing appears to be nearly the same reprocessing program that you had for the breeder reactor which Jim Warf just described.

2 3 This process is dangerous because it requires high temperatures and manipulation of flammable, high-level waste. This project seems important enough in scope to warrant an EIS.

I understand that the uranium resulting from this process is still 65 percent enriched and, therefore, is weapons grade, and can be made into bombs, and only thereafter would be blended down.

4

Just because it falls within guidelines doesn't mean it can't be used for weapons. It is clearly a technology that can separate weapons-grade material and is therefore dangerous.

Whatever your intentions in planning to use this process, others may have less honorable intentions, and, therefore, this is a sensitive nuclear technology which should not go forward and should not get into the public domain where other nations may apply it in a way that worsens proliferation problems. Thank you for giving me the opportunity to comment.

5

Responses to Document D030

1 The commentor's concerns about the demonstration are acknowledged. The process employed for this demonstration would be different in several important aspects from what was proposed for the Integral Fast Reactor Program. First, it would not employ a liquid cadmium cathode, eliminating the capability of separating transuranic elements. Second, the transuranic elements would be converted to a waste form expected to be suitable for disposal, not recycled as spent nuclear fuel.

2 There are hazards associated with spent nuclear fuel management, including any treatment option. Concern over potential fires involving the spent nuclear fuel materials is one reason that the proposed electrometallurgical process operations would be carried out in an inert (fire suppressant) atmosphere, and any potentially pyrophoric materials not in use would be stored in fire-safe containers. The high-level wastes from the process are not flammable.

3 In accordance with 10 CFR Part 1021, the Department of Energy prepared an environmental assessment for the electrometallurgical treatment demonstration project to assist with agency planning and decision making. On the basis of the environmental assessment, the Department of Energy will decide whether to prepare a Finding of No Significant Impact or an environmental impact statement. See Chapter One of this Appendix for a discussion on the level of National Environmental Policy Act Review.

4 The commentor is correct in that the average enrichment of the Experimental Breeder Reactor-II spent nuclear fuel is approximately 65%. However, this is classified as highly-enriched uranium, not weapons-grade uranium, which is enriched to 93% or greater. By removing and then blending down the highly-enriched uranium, the project supports the goal of the United States to seek to eliminate where possible the accumulation of stockpiles of highly-enriched uranium or plutonium. As a result, the proposed demonstration project is consistent with the policy of the United States on nonproliferation. An additional response to comments regarding nonproliferation concerns is provided in Chapter One of this Appendix.

5 The Department of Energy acknowledges the commentor's concerns regarding sensitive nuclear technology. During the Integral Fast Reactor Program, the Department of Energy conducted appropriate reviews of related technologies for recycling spent nuclear fuel in fast reactors before entering into a technology exchange agreement with Japan. Any nuclear technology which is a candidate for export is subject to sensitive nuclear technology review in accordance with 10 CFR Part 810. The Department of Energy has been designated to implement this regulation by an interagency task force representing the Department of State, the Arms Control and Disarmament Agency, the Nuclear Regulatory Commission, and the Department of Energy. The Department of Energy has established an Export Control Working Group to make sensitive nuclear technology determinations according to specific guidelines. Any future consideration of exporting electrometallurgical spent nuclear fuel treatment technology would be reviewed according to the Department of Energy's export control procedure.

I'm Pete Dirkmaat. I work for the Department of Energy here in Idaho Falls. I'm not really associated with the Argonne-West activities, but I'm aware of them. I'm been a nuclear engineer for the last 28 years, and I'm presently responsible for the spent fuel program at the INEL.

With the recent settlement that was signed between the State of Idaho, the Department of the Navy and the Department of Energy, I have a responsibility to prepare the fuel that we have on the site and get it ready to leave the State of Idaho.

There's a -- we have over 80 types of fuel here at the site to take to -- to take care of. A majority of that fuel can be put into dry storage fairly easily, and put into canisters that will then be ready to go over the road to wherever the National repository or interim storage facility will be.

However, there's a number of problem fuels, I'll call them, that you cannot do this with for a number of reasons. Perhaps some of them have sodium bonding, as you've already heard. Perhaps there's other reasons why a repository would not take those fuels. They have to be treated somehow, conditioned to be prepared to leave the State of Idaho.

1 | It is important from my perspective that we have some technology that will do this kind of treatment. I'm aware of all the things going on at the site with respect to spent fuel. There is no treatment or conditioning process being developed anywhere else on the site.

We're awaiting the results of this demonstration project, the electrometallurgical process, to see if it will work for not just the EBR-II fuels, but for some of the other fuels that may be problems in leaving the State of Idaho.

2 | That's our primary objective. We have made a commitment with the State to move that stuff out of here, and we need demonstrations like this, and many others in the future, that will indeed move the fuel from the State of Idaho.

3 | That's my only objective in the program I'm running, and I support the proceeding with the demonstration of this effort. Thank you.

Responses to Document D031

1, 2 The commentor's statement of a need for a technology of this type is acknowledged.

The Department of Energy is determined to meet its commitments with the State of Idaho to remove spent nuclear fuel from the State by the year 2035. Electrometallurgical treatment is a promising technology for treating Experimental Breeder Reactor-II spent nuclear fuel. If the demonstration were successful, application of the technology could help the Department of Energy to meet this obligation.

3 The commentor's statement on the demonstration is acknowledged.

My name is James Boland. My address is 6150 West 33rd South, Idaho Falls, Idaho 83402. I'm a private citizen. I am not here as a member of any association, organization or special interest group.

My comments are somewhat different than I have heard previously. The thing that bothers me about this environmental impact assessment and the proposed environmental impact statement is one that relates to risk in perspective.

No matter what state the materials come out of this process, you can look and find hundreds or thousands or tens of thousands of times the quantities in storage in this country and around the world.

1 | What happens in this process is just totally insignificant. Do any -- anything that people are worried about. You cannot prevent knowledge from being spread. You cannot prevent technology from being developed. And to think that you can goes against all historic records.

We classified very highly the Manhattan Project data. It didn't take too long for other people to have the bomb. We classified very highly the hydrogen bomb technology. It did not take very long before that technology was out.

2 | The technology that's proposing to be demonstrated here appears to have been available for many years in somewhat different forms used in somewhat different places. And the concept of risk in perspective is one that's starting to come to the fore in many, many areas in this country today.

A rather new society exists called the Society for Risk Assessment -- or Risk Analysis. There is a Center for Risk Analysis at Harvard University. These people are working on risk analysis in perspective.

To my knowledge, they have not addressed at all any nuclear issues. The center is -- is in the Department of Public Health. They have published recently various assessments of the cost benefit of various medical practices, the risks of certain diseases, the relative benefit of certain treatments for very common diseases.

3 | Yet, in the area of nuclear -- or, I mean, environmental impact statements related to nuclear activity, we are using methodology that's 30 years old. We do not look at risk in perspective.

4 | And when you spend hundreds or thousands or millions of dollar of taxpayer money analyzing something that amounts to a quart of water in the ocean, I object as a taxpayer. Thank you.

Responses to Document D032

1 The environmental impacts associated with the proposed demonstration project are analyzed in the environmental assessment and were found to be minimal.

2 Electrometallurgical treatment is a new application of a well-established metallurgical technology. If the proposed demonstration is successful it will give the Department necessary data on which to determine the future use of this technology.

3 Information has been added to the environmental assessment to better put the risk of the demonstration in comparison with other risks.

4 This environmental assessment complies with the requirements of the National Environmental Policy Act for specific analysis.

I'm Bob Skinner. I reside at 2909 Troy here in Idaho Falls 83402. I, with others, would like to basically congratulate the writers of this environmental assessment. Again, it was very clear, very easy too read. By the way, I represent myself, I don't represent any organization. 1

I strongly support this environmental assessment for several reasons. A demonstration of new technology under development, we would basically need to remove the sodium from the spent fuel so it can be taken to a repository. 2

I have heard several remarks about this being a hidden reprocessing agenda. I would strongly disagree with that. Basically, it is a fuel technology that prepares to send material to a national repository. We have to prepare this spent fuel for disposal by the year 2035. 3 4

A lot of people disagree that -- and say that we shouldn't -- shouldn't be sending it to repository, all kinds of things out there. But, basically, you can't wrap this spent fuel in M & M chocolate and send it somewhere to be disposed of. It just doesn't work.

Basically, this environmental assessment -- they are following the recommendation of the National Research Council and demonstrate the feasibility of this technology. So, we need to get on with that. 5

No one has said anything about the people at EBR-II who have been safely handing spent fuel and these types of materials for over 30 years with basically no impact to anybody or the environment.

The environmental assessment meets the requirements and actually exceeds those requirements. And as a taxpayer, I would strongly object to an environmental impact statement which typically in these days costs anywhere from 1.5 to 3 million. I think we could take that money, if somebody thinks we should spend it on an environmental impact statement, and better spend it elsewhere. 6 7

The last major point I'd like to make is I would encourage the panel to take special care in examining the statements of -- for lack of a better word, I'll call them detractors. They are only promoting a self-serving interest. They are parasites on the INEL programs and technologies. 8

If they support something, the support dies. And if they don't talk about any alternatives or suggested solutions, they only make complaints. They don't want to support WIPP because that would mean some waste might leave Idaho. They don't want to support Yucca Mountain characterization; again, that means waste would leave Idaho. And if they don't support anything, it's because they don't want to support things, like any type of technology that basically does anything. They're sort of like leeches. They don't want to have any solution, because if their host dies, then they die. So, there's an agenda out there like fleas that fall off a dog. So, I would encourage you to only evaluate testimony and comments from people on its technical merit. You might find that the detractors have little technical merit when the bottom line is looked at.

I'd like to close by saying full speed ahead with demonstration of this technology. I know you can do it, and I know you can do it without adverse impacts on the workers, people, the aquifer or the environment. Thank you. 9

Responses to Document D033

1,2 The commentor's statement on the environmental assessment is acknowledged. The environmental assessment was prepared using the *Recommendations for the Preparation of Environmental Assessments and Environmental Impact Statements*, which was written to improve the clarity of the Department of Energy's National Environmental Policy Act documents. The Department of Energy welcomes feedback from stakeholders on the clarity of its National Environmental Policy Act documents so that it can more effectively communicate with the public.

3,4 This demonstration is for application of the technology to the treatment of Experimental Breeder Reactor-II spent nuclear fuel in order to make it acceptable for long-term disposal.

5 This demonstration will address the questions raised by the National Research Council.

6 The Council on Environmental Quality's National Environmental Policy Act regulations (49 CFR Parts 1500-1508) require that an environmental assessment briefly describe the purpose and need for the proposed action; list alternatives, including no action; and describe the affected environment and the environmental consequences associated with the proposed action and alternatives. The environmental assessment meets these requirements.

7 In accordance with 10 CFR Part 1021, the Department of Energy prepared an environmental assessment for the electrometallurgical treatment demonstration project to assist with agency planning and decision making. On the basis of the environmental assessment, the Department of Energy will decide whether to prepare a Finding of No Significant Impact or an environmental impact statement. If the environmental impacts of the electrometallurgical treatment demonstration project are found to be insignificant, then a Finding of No Significant Impact will be prepared; if not, then an environmental impact statement will be prepared.

8 The Department of Energy recognizes the value of all stakeholders' comments, the importance of public involvement as a decision making tool, and the right of individuals, agencies, and groups to express their opinions as an integral part of the National Environmental Policy Act process.

9 The environmental assessment analyzed potential impacts to workers, the public, the Snake River plain aquifer, and the environment, and the impacts were found to be very small.

1 My name is John Ochi. I live at 275 Chamberlain in Idaho Falls. And I am speaking as a private citizen. I am speaking in support of finding the feasibility of whether or not this technology can work for us. In looking over the document, I find that there is the potential for great success with the possibility of little risk.

The arguments I have heard have dealt with issues that are larger than the question of this EA, which we are supposedly commenting tonight. However, let me comment just as a layman examining the rationale of some of these arguments briefly.

2 I've heard the argument of proliferation risks. And my question is: Is the proliferation risk existent anyway? And if there are spent nuclear fuels and highly-enriched uranium and plutonium products alive in the world, is it better for us to try to find the technology of solving them -- this problem, or is it better for us to leave that solution to people in Kazakhstan or the people who are working with the Phoenix system or the Monju system?

It seems to me there's a timidity of the exploration of the knowledge that is in front of us. The cat is out of the bag. It is not unlike the Internet, which is a wonderful tool, but is also something that has potential for abuse.

But the fact is, someone has to deal with this knowledge. And is it better for us to have firsthand experience in dealing with these -- this problem, or is it better to leave it to people in other parts of the world?

I don't know whether this is a reprocessing technology, as I've been told, in disguise. But I would like to say that I have a very strong concern with environmental issues. And I am concerned with the fact that we, in this country, have used energy in abundance, and now 20 percent of our electricity is nuclear. There are over 100 nuclear reactors producing fuel.

We are people who have created this. And to continue to ignore this problem is similar to another issue I've been working on with Salmon, in which you think you can continue to put off the problem forever. But at some point, there's a drought, there's a catastrophic event, and you're forced to deal with it when you do not have adequate knowledge of the situation.

I'm told that we will live to regret this technology. It seems to me that decision was made in 1945, when the nuclear bomb was exploded. This is not a question any longer. The question is how are we going to deal with the situation that we have in front of us today.

3 And to continue to ignore this problem seems to me to be burying our heads in the sand and not really addressing the issue. Ultimately, we have to deal with this problem. This seems like a very small-scale effort to try to understand the nature of spent nuclear fuel and how some of the solutions in the future might occur.

4 I would like to thank the DOE for holding these hearings. I think the spirit of public debate is the best thing that could happen for this program or any other program.

But, again, I guess I would leave with the thought that I personally would rather have this information in hands of people who I trust in this country than in hands -- in the hands of people who will explore this technology somewhere else in the world.

5 | And I think we have an obligation to stay ahead of the knowledge curve. And it's one of the prices that you pay for being considered the leader of the free world. Thank you.

Responses to Document D034

1,3,4 The commentor's statement that there is little risk associated with the demonstration, and the commentor's statement on the public hearing are acknowledged. The results of this demonstration will provide the Department of Energy with the information it needs to decide whether to apply the technology to the remainder of Experimental Breeder Reactor-II spent nuclear fuel or other spent nuclear fuels in the Department of Energy inventory.

2 As discussed in the environmental assessment (Section 4.7), the Department of Energy has reviewed the proposed action and the alternatives for compliance with the nonproliferation policy of the United States and has concluded that the proposed action and alternatives are consistent with the policy. The nonproliferation aspects of the demonstration are discussed in Chapter One of this Appendix.

5 Although the general topic of technology development is not within the scope of this environmental assessment, the Department of Energy emphasizes ongoing programs for technology development, especially to solve national problems, such as the treatment of spent nuclear fuel. The demonstration of the electrometallurgical technology is a crucial step in solving some of the difficult problems of spent nuclear fuel management.

Thank you. My name is Charles Solbrig. My address is 2175 Briarcliff in Idaho Falls. I am here representing myself.

I would like to point out that nuclear energy is a very important form of energy in our country, in our world. And from a risk-based analysis, it is the safest form of energy. It is very incumbent upon us for the future generations to develop this form of energy. I believe that adversaries to this process are basically adversaries to nuclear energy.

1 This fuel from the EBR-II reactor should be put in an adequate storage and put in a safe form. And this process does provide this storage, provides it in long-term storage, and it is the process -- it is a process which should be fostered.

2 A couple statements have been made about the proliferation issue, that it is easy to produce -- or to engage in this process, that this process can be done in a facility the size of a bathtub. Of course, that's a misrepresentation.

This bathtub is surrounded by a large volume of other processes and a 5-foot thick concrete wall, and this building is a very large building. So, this process could not be done in a bathtub without any radiation protection. And anybody that would engage in such a process would die from the radiation.

3 There was also a statement made that we're talking about a reduction of 2.5 cubic meters in the waste form. And, of course, this is an overstatement, too, because you must include in this reduction the size of all of the material that is around these -- the stored reprocessed fuel, the insulation, the rock. This material cannot just be put in 2.5 cubic meters. That is just the volume of the material -- of the particular material.

4 I would also like to point out that this technology is not a secret-based technology. It is based upon chemistry and electrochemistry, known well around the world. Perhaps Argonne is applying it in a clever way, but this information is not secret. It is not anything like the secret type of activity that surrounded the nuclear bomb development.

5 Just because Argonne would go ahead and store this fuel or turn it into a safe form does not really increase the technology base that's available to the world. So, this really does not increase the proliferation issue or danger in the world at all.

There are many other methods of obtaining weapons-grade material. It would be very silly to try to engage in this process -- in the particular process to obtain a weapons-grade material.

Also, a discussion was made about the reactors in the world and -- the fast reactors of the world and how problematic they are. And, unfortunately, the most successful one, the EBR-II reactor, was not mentioned at all, the EBR-II reactor which operated for 30 years until it was recently shut down.

6 | The waste form that is going to be produced in this process is safe. It is not a flammable material. The only time that it is a possible flammable material is when it is in the Argonne cell. When it is surrounded by Argonne, it is not flammable. By the time it comes out in the waste form, it is not flammable at all.

7 | The process is very safe. The EA shows the very conservative accident analyses that are in it. It shows -- those analyses show that the process is very safe. This material is useless in nuclear bombs, although, as pointed out before, HEU is produced in the cell, that this material is not taken out of the cell.

Anyone that has seen the cell would understand that it could not be taken out. The number of people that are involved in the process would not allow this to happen.

The blending down of the material takes place within the cell. It does not come out of the cell. It is not -- not done at some other time. It is not stored where it would be easily accessible at some other time.

This is a low-risk technology. We must realize that it is a low-risk technology. And as Dr. Boland pointed out before, risk analysis is something that our world is going to have to wake up and listen to.

A risk-based regulation is something that is going to come in in the future, because that is the only way we can really evaluate the processes that we are involved in in this world. This activity does not in any way approach the risk that everybody takes in taking an airplane flight.

8 | In conclusion, I would like to say that the environmental assessment document is a very clearly written
9 | document. I urge the Department of Energy to approve this EA and proceed with the process with all deliberate speed.

10 | I think that producing an EIS would be a waste of money, and I would again urge the DOE to approve the EA. I thank you for this opportunity to speak.

Responses to Document D035

1 As stated in the environmental assessment Section 1.0, treating a sample of the Experimental Breeder Reactor-II spent nuclear fuel so that it is suitable for long-term storage is a major objective of this demonstration.

2,4,5 The Department of Energy acknowledges the commentor's comments on proliferation, process size, and that the demonstration does not increase the proliferation risk. See Chapter One of this Appendix for more information on the nonproliferation aspects of this demonstration.

3 The 2.5 cubic meters cited in the environmental assessment is the volume of the storage containers. The same type of container is used for storage in the Radioactive Scrap and Waste Facility at Argonne National Laboratory regardless of what is inside. The comparison between storage of the untreated spent nuclear fuel and the waste and by-products from spent nuclear fuel treatment is equitable. The same surrounding container materials are present whether spent nuclear fuel elements or waste form cylinders are inside the waste can.

6-10 The commentor's statements on the overall demonstration project are acknowledged. The development of a safe waste form and the safety associated with the process is the Department of Energy's highest concern. The Department of Energy notes the commentor's statements that the environmental assessment was clearly written and adequate National Environmental Policy Act work for this action. It is the Department of Energy's intent with this demonstration to provide an important option for dealing with spent nuclear fuel and protecting the environment.

1392 Lavina Drive
Pocatello, Idaho 83201
February 19, 1996

Mr. Greg Bass, EA Document Manager
U.S. Department of Energy
Argonne Group-West
PO Box 2528
Idaho Falls, ID 83403

Dear Mr. Bass:

I am writing to urge that Argonne be authorized to go ahead with electrometallurgical refining as proposed in the Draft Environmental Assessment.

1 I agree with the goals of Argonne's demonstration, both in aiding waste disposal and in developing fuel reprocessing techniques that may become commercially important in future decades.

I would like to comment on one of the opponents' arguments, that this technology will abet the proliferation of nuclear weapons. The opponents are trying to lock a barn from which the horse has long been stolen. Israel, South Africa, Pakistan, and North Korea did not need electrometallurgical technology to pursue weapons development. They had several cheaper, easier, and more direct paths to follow to obtain weapons material.

The situation might be compared to a factory for building Cadillacs. An opponent might claim that the Cadillac factory could be converted to building military jeeps -- but anyone who wanted to build jeeps would certainly not begin by building a Cadillac factory.

2 I join the opponents in wanting the proliferation of nuclear weapons to be stopped. But trying to do it their way, by mindlessly opposing any development of peaceful nuclear technology, would land us in the worst of all possible worlds, where weapons proliferation goes forward but peaceful development is stopped.

Yours truly,

Adrian E. Allen

Adrian E. Allen

Responses to Document D036

1 The commentor's statement on the demonstration is acknowledged. It is the Department of Energy's intent with this demonstration to provide an important option for dealing with spent nuclear fuel and protecting the environment.

2 The commentor's statement in support of nonproliferation objectives and the development of nuclear technology is acknowledged. Additional information on the nonproliferation aspects is provided in Chapter One of this Appendix.

MICHAEL D. CRAPO
2d District, Idaho
HOUSE REPUBLICAN LEADERSHIP
1030 CLASS LEADER
DEPUTY WHIP
WESTERN UNITED STATES
REPUBLICAN POLICY COMMITTEE
BEEF CAUCUS, CO-CHAIRMAN
CONGRESSIONAL RURAL CAUCUS
CONGRESSIONAL SPORTSMEN'S CAUCUS
CONGRESSIONAL WATER CAUCUS

Congress of the United States
House of Representatives
Washington, DC 20515-1202

COMMERCE COMMITTEE
SUBCOMMITTEES:
COMMERCE, TRADE, AND HAZARDOUS MATERIALS
ENERGY AND POWER
OVERSIGHT AND INVESTIGATIONS

AGRICULTURE COMMITTEE
SUBCOMMITTEES:
RESOURCE CONSERVATION, RESEARCH, AND FORESTRY
DEPARTMENT OPERATIONS, NUTRITION, AND FOREIGN AGRICULTURE

Representative Michael Crapo
Statement on
Draft Environmental Assessment
for the Electrometallurgical Treatment
Research and Demonstration Project
at Argonne National Laboratory - West

1 I appreciate the opportunity to comment on this important subject, and commend the Department of Energy for pursuing this project.

Since the beginning of my service in the Congress, I have been involved in seeking solutions to our nation's problems associated with nuclear waste. As a member of the Nuclear Waste Task Force I have been able to confer with my colleagues from around the nation about nuclear waste issues. While we in Idaho have distinct and extensive experience with these issues, they truly are both national and international in scope.

I also am co-sponsor of HR 1020, which seeks to accelerate the schedule by which we deal with these problems and to define some solutions.

And lastly, but certainly foremost in my experience with this issue, I have conferred frequently and often with the great scientists here in Idaho about what the science says can and cannot be done.

2 It is because of the work of these scientists that we are here today. In Electrometallurgical Treatment as proposed for Argonne National Laboratory, we have a firm, concrete opportunity to make real progress. This project has come to where it is ready to answer difficult questions and show true results. It should go forward as proposed.

3 I would ask everyone to keep in mind two important considerations. First, by treating the fuel from Experimental Breeder Reactor-II to remove the sodium and by preparing a leach-resistant ceramic waste form, the spent nuclear fuel will be made to be less of an environmental problem.

☐ WASHINGTON, DC
437 CANNON BUILDING
WASHINGTON, DC 20515
(202) 225-6611

☐ 304 NORTH 8th STREET
ROOM 325
BOISE, ID 83702
(208) 334-1953

☐ 2538 CHANNING WAY
SUITE 330
IDAHO FALLS, ID 83404
(208) 523-6701

☐ FEDERAL BUILDING
250 SOUTH 4th, ROOM 276
POCATELLO, ID 83201
(208) 236-6734

☐ 626 BLUE LAKES BLVD., NORTH
TWIN FALLS, ID 83301
(208) 734-7219

Page Two
ANL-W/DOE Hearing

Second, and very importantly, this action is necessary to meet the provisions of the waste removal agreement between Governor Batt and the Department of Energy. In order for EBR-II fuel to be able to leave the state, it must be treated and prepared for permanent disposal. Electrometallurgical treatment is necessary for this. I'm sure we all can agree that we want to see this waste material leave our borders. 4

Again I commend the Department for taking positive steps toward finding real solutions to difficult problems. I support the proposed action and encourage its timely completion. 5

Responses to Document D037

1,2,3,5 The Department of Energy actively seeks and considers public comments and considers the views of stakeholders in making decisions. This demonstration will provide concrete information for future decisions for the treatment of Experimental Breeder Reactor-II and other spent nuclear fuel.

4 It is hoped that the information resulting from this demonstration project will assist the Department of Energy in keeping the commitments it made in the October 17, 1995, settlement agreement and consent order in the case of Public Service Co. v. Batt, No. C 91-0035-S-EJL (D. Id.) and United States v. Batt, No. C 91-0054-S-EJL (D. Id.).

Under the terms of the settlement agreement, the Department of Energy is legally obligated to remove spent nuclear fuel (including Experimental Breeder Reactor-II spent nuclear fuel) from the State of Idaho by the year 2035. Electrometallurgical treatment is a promising technology for treating Experimental Breeder Reactor-II spent nuclear fuel and blanket assemblies. If the demonstration were successful, application of the technology could assist the Department of Energy to meet this obligation.

Senator Kempthorne's
Statement on the Department of Energy's Environmental Assessment
for the Electrometallurgical Treatment Demonstration Project
at Argonne National Laboratory-West
February 21, 1996

I very much want to thank the Department of Energy for this opportunity to set the record straight on the electrometallurgical treatment technology program currently being demonstrated at Argonne National Laboratory. I also want to congratulate the
1 Department of Energy and employees at Argonne National Laboratory for their timely completion of a very thorough environmental assessment of the electrometallurgical
2 research and demonstration project. This assessment supports and further documents the environmental benefits of this exciting new technology. A similar conclusion was drawn from a 1990 DOE environmental assessment and the 1995 INEL sitewide environmental impact statement, both of which analyzed more ambitious applications of electrometallurgical technology.

By moving ahead with electrometallurgical treatment technology, DOE is taking positive action toward resolving one key facet of the spent nuclear fuel problem in
3 Idaho. Just as significantly at the national level, DOE is addressing one of the major criticisms of the Galvin report--the need to apply more innovative technical solutions to its own waste management and environmental problems. I, for one, am very pleased to
4 see DOE initiate a more forward-looking approach to spent fuel management. Needless to say, I wholeheartedly support the DOE effort to investigate new spent fuel

4 treatment technologies and I strongly endorse development of the electrometallurgical
5 treatment technology at Argonne National laboratory.

The Department of Energy has taken very positive steps to meet its commitment
6 to remove all spent nuclear fuel from the State of Idaho by 2035. New technologies are needed to implement this court-enforceable obligation and that is why this demonstration program is so important. To the critics of the electrometallurgical technology I would ask, "If not this technology, how do you propose to prepare EBR-II spent nuclear fuel for final disposition?" I have not seen the critics offer a solution that
7 would allow this fuel to leave Idaho. That is why this technology demonstration program is so important to our state.

Unfortunately, all this is not to say that the U.S. is finally moving ahead with progress in a nuclear technology without controversy. Individuals representing groups with an interest in blocking any progress in nuclear disposal technology have
8 challenged even this modest demonstration. You will notice that the critics do not really challenge the environmental impacts, because there are none.

Instead, the critics assert that this technology demonstration would constitute operation of a reprocessing facility, and therefore DOE's procedures require preparation
9 of a full environmental impact statement. Never mind that there are no negative environmental impacts, which is supposed to be the focus of an Environmental Assessment, opponents of this project want DOE to needlessly spend million of dollars of the taxpayer's money and delay any real work for a year or so. Further, so they have
10 said, this project can't go forward because reprocessing would violate U.S. nuclear

nonproliferation policy. DOE is to be commended for standing up to these hollow objections and setting the record straight. According to the DOE Office of Nonproliferation and National Security as well as the DOE General Counsel's Office, this new technology is not reprocessing; it represents an advanced alternative approach for the Department of Energy to manage its spent nuclear fuel responsibly.

(10)

11

The United States cannot provide effective international leadership if it does not demonstrate sound, constructive alternatives. No country in the world is yet operating a geologic repository. Indefinite storage of spent fuel is not an option that we would accept in Idaho. Likewise, this is not an option we should push on other countries without so much as showing that we are trying to find a better solution. Conducting this advanced spent fuel treatment demonstration will show that this Congress, this Administration, and this DOE are committed to appropriate progress in nuclear disposal technology. Such action can only strengthen our national position in attempting to influence the course of other sovereign countries that are attempting to deal with their own legitimate spent nuclear fuel issues. This demonstration of advanced nuclear technology not only supports our nonproliferation objectives, it may someday be recognized as an important building block in our efforts to help curb the accumulation of separated plutonium in the international civilian nuclear fuel cycle.

12

13

Lofty international policy issues aside, the electrometallurgical treatment project is good for Idaho. The EBR-II spent fuel, and perhaps other fuel that wasn't designed for long-term unsupervised storage, isn't going to leave our state without treatment. DOE's willingness to face this issue and deal with it constructively has earned my commendation, and it deserves the support of Idaho's citizens.

14

I strongly support continued development of this important technology.

Thank you.

Responses to Document D038

1,2,5,14 The commentor's support for the proposed demonstration and completion of the environmental assessment is acknowledged.

3,4 Although the general topic of technology development is not within the scope of this environmental assessment, the Department of Energy is committed to pursue the research and development of technologies to assist it in the management and eventual disposal of its spent nuclear fuel. The demonstration of the electrometallurgical technology in treating Experimental Breeder Reactor-II spent nuclear fuel could be a crucial step in providing options to solve some of the problems associated with spent nuclear fuel management.

6,7 Under the terms of the settlement agreement, the Department of Energy is legally obligated to remove spent nuclear fuel (including Experimental Breeder Reactor-II spent nuclear fuel) from the State of Idaho by the year 2035. Electrometallurgical treatment is a promising technology for treating Experimental Breeder Reactor-II spent nuclear fuel and blanket assemblies. If the demonstration were successful, application of the technology could assist the Department of Energy to meet this obligation.

8,9 The potential environmental impacts associated with the proposed demonstration project are detailed in Section 4.0 of the environmental assessment. As detailed in the environmental assessment, these potential impacts are small.

10,13 As discussed in the environmental assessment (Section 4.7), the Department of Energy has reviewed the proposed action and the alternatives for compliance with the nonproliferation policy of the United States and has concluded that the proposed action and alternatives are consistent with the nonproliferation policy of the United States. Consistent with the nuclear nonproliferation goals of the United States, plutonium is not separated and highly-enriched uranium is blended with depleted uranium. More detailed information concerning nonproliferation is provided in Chapter One of this Appendix.

11,12 The demonstration of the electrometallurgical technology could provide an important option for the Department's management and eventual disposal of its spent nuclear fuel.

SENATOR PAUL SIMON
STATEMENT ON DOE'S RECENT
DRAFT ENVIRONMENTAL ASSESSMENT FOR THE ELECTROMETALLURGICAL
TREATMENT RESEARCH AND DEMONSTRATION PROJECT

FEBRUARY 21, 1996

1 I endorse the Department of Energy's proposed demonstration of an advanced spent nuclear fuel management technology in Idaho. This research project will treat 125 spent nuclear fuel assemblies from the Experimental breeder Reactor-II for safe long-term storage and eventual geologic disposal. The extensive analysis
2 in DOE's recently published *Draft Environmental Assessment for the Electrometallurgical Treatment Research and Demonstration Project in the Fuel Conditioning Facility at Argonne National Laboratory-West* confirms that the project can be conducted without negative environmental impact. Moving forward will help cut the eventual cost of cleanup and waste management for at
3 least one DOE site, and holds promise that the Department is serious about examining "better, cheaper, faster" ways to deal with its nuclear waste issues.

Electrometallurgical technology for the treatment of spent nuclear fuel was invented in Illinois, and was recognized in 1991 with a prestigious R&D Award as one of the 100 best technology developments in the nation that year. Scientists at Argonne National Laboratory's main site near Chicago are carrying out research to determine how this technology can be adapted to solve spent nuclear fuel problems. Application of this technology in
4 the Idaho project will allow them to demonstrate the viability of the waste reduction and stabilization process that potentially will be used for all types of spent nuclear fuel.

Our nation faces a waste disposal problem that has reached crisis
5 proportions. This process may provide the answer to what has been an unsolvable problem. The Department of Energy and Argonne are to be congratulated for taking a big step toward dealing with the nuclear waste issue.

Responses to Document D039

1-5 The commentor's statements on the project are acknowledged. The demonstration will result in limited environmental impacts and represents the Department of Energy's commitment to develop innovative solutions to the problems of spent nuclear fuel management and nuclear waste issues. Completion of the demonstration will provide the data needed to decide whether to apply this technology to the remaining Experimental Breeder Reactor-II spent nuclear fuel or other spent nuclear fuel types in the Department of Energy inventory.

IANS Statement Re: Electrometallurgical Treatment Research and Demonstration Project in the Fuel Conditioning Facility at the Argonne National Laboratory-West.

My name is John Commander. I am Chair - Elect of the Idaho Section of the American Nuclear Society, and represent some 900 members located predominately in Southeast Idaho. On behalf of the section,I would like to make a statement concerning our endorsement of the Draft Environmental Assessment for the Electrometallurgical Treatment Research and Demonstration (ETR&D) Project proposed for Argonne National Laboratory-West (ANL-W). This project has been primarily designed to deal with the Spent Nuclear Fuel (SNF) from the Experimental Breeder Reactor-II (EBR-II) at ANL-W. 1

The proposed action will comply with the National Research Council recommendation which was: To demonstrate the feasibility of Electrometallurgical Treatment technology by treating a limited quantity of EBR-II SNF assemblies. 2

The Draft EA describes the Electrometallurgical Treatment process, which is a new application of an established technology. The process has been proven with unirradiated material at the ANL-W Fuel Conditioning Facility (FCF), where extensive renovation has been recently completed. The FCF now complies with all applicable standards for safety, including seismic standards, and has passed all technical and safety reviews since the upgrades. 3

The potential environmental consequences of the proposed action have been studied extensively, and the Draft EA concludes there would be no significant impacts from operation of the process equipment in the FCF; therefore, the NEPA process has been more than adequately addressed. 4

The DOE will achieve several significant results from completing the proposed action. These include: 5

- Removal of reactive sodium from the EBR-II SNF.

- Recovery of uranium product at the end of the process.

- Immobilization of fission products and transuranic elements into a waste form acceptable for disposal in a geological repository, and

- Reduction in the storage volume for the waste as compared to the volume required for untreated SNF.

The proposed action is consistent with the United States Nonproliferation Policy, since the ETR&D process yields waste as a mix of transuranic actinides and fission products immobilized in a leach-resistant ceramic waste form. 6

DOE has committed to remove SNF from Idaho by the year 2035. Without treatment, EBR-II SNF would not be acceptable for geologic disposal. Therefore, DOE should move ahead with this proposed action to demonstrate the capability to treat problem SNFs, while the ANL-W EBR-II facility and personnel infrastructure still exists. 7

In summary, IANS believes that the ETR&D Project should be supported for demonstration in the FCF at ANL-W. Use of the existing infrastructure at ANL-W will be the most cost effective option for demonstration of a valuable SNF treatment technology. In addition, the proposed action is necessary for compliance with DOE's nuclear waste agreement with the State of Idaho. 8 9 10

Sincerely,

John Commander

John Commander

Responses to Document D040

1-10 The commentor's statement on this demonstration is acknowledged. The questions raised by the National Research Council provide a strong basis for completing the demonstration. The Fuel Conditioning Facility has been verified to be ready for operation as the result of the Department of Energy's Operational Readiness Review. As described in the environmental assessment, there are limited environmental impacts from the demonstration. It is important that the Experimental Breeder Reactor-II spent nuclear fuel be treated for long-term storage and that commitments with the State of Idaho to remove spent nuclear fuel from Idaho by the year 2035 be met. Information regarding the compliance of this project with the nonproliferation policy of the United is available in Chapter One of this Appendix. Using the current infrastructure at Argonne National Laboratory to accomplish these goals is an effective way of proceeding.

MO-1 Robert W. McLaughlin USCG Ret.
P. O. Box 122
Lava Hot Springs, ID 83246

7 February 1996

Mr. Greg Bass
U.S. Dept of Energy
Argonne Group-West
Box 2528
Idaho Falls, ID. 83403

Dear Sir;

1 I am in favor of using the Electrorefiner to process spent fuel.

2 Sodium and Sodium mixed material is a very highly dangerious product to contain and store and increases the probability of an explosion which in this case would lead to probable dispersal of radioactive material into the atmosphere. Separate disposal of sodium is easier than mixed with another product.

3 The Snake River Alliance believes that this process will lead to proliferation. From what I have read in some of my professional journals, this process is already in place in some foreign countries some of whom are not very friendly to U.S. interests. So their argument to me based on proliferation is in error.

4 Since this is an experemental process, I am in favor of proceeding. This is as they say in the military "A Solution" it may not be the only one, but it is with trying.

Robert W. McLaughlin

Responses to Document D041

1 The commentor's support on this demonstration is acknowledged by the Department of Energy.

2 Sodium can present a hazard when in uncontrolled storage, but is presently safely stored under controlled conditions at Argonne National Laboratory and other locations. When sodium-bearing items are no longer needed, converting the sodium to a stable salt is an appropriate safety precaution that reduces risk and cost. Electrometallurgical treatment would safely neutralize the sodium in the Experimental Breeder Reactor-II spent nuclear fuel.

3 Although the commentor does not specifically mention the separation of plutonium or highly-enriched uranium, separation of these materials is typically the proliferation concern in this context. The proposed demonstration project does not separate plutonium. Moreover, the technology employed is not capable of separating plutonium and is consistent with the nonproliferation policy of the United States, which does not encourage the civil use of plutonium. Accordingly, the United States does not engage in plutonium reprocessing. Further, by removing and then blending down the highly-enriched uranium, the project supports the goal of the United States to seek to eliminate where possible the accumulation of stockpiles of highly-enriched uranium or plutonium. As a result, the proposed demonstration project is consistent with the nonproliferation policy of the United States. An additional response to comments regarding nonproliferation concerns is provided in Chapter One of this Appendix.

4 The commentor's statement on proceeding with the demonstration is noted. The results of this demonstration will provide the Department of Energy with the information it needs to judge the value of applying the technology to the treatment of the balance of Experimental Breeder Reactor-II spent nuclear fuel or other Department of Energy spent nuclear fuel.

Charles M. Rice

Statement on the
Department of Energy's Environmental Assessment
for the
Electrometallurgical Treatment Demonstration Project
at
Argonne National Laboratory-West

February 21, 1996

As a member of the INEL Citizen's Advisory Board I am quite familiar with current spent fuel and waste management issues facing Idaho Falls and the INEL. Based on my prior experience as President and General Manager of the INEL site contractor, Idaho Nuclear Corporation and Aerojet Nuclear Company, and subsequent experience in the commercial nuclear power field, I have very strong feelings about having the Department of Energy actually begin to do something positive and constructive about spent fuel management, particularly at the INEL. Argonne's Electrometallurgical Treatment Demonstration Project is important to this process because it does not simply move waste around from one location to another. It directly addresses a solution to a specific problem; that is, how to treat the EBR-II fuel so the products can be stored safely while at the INEL. 1

I have reviewed the draft environmental assessment document and am convinced that the environmental impact of this project is negligible. There is basically no surface water impact. Since the land used will be the Argonne National Laboratory which is already dedicated to such activities there is no land use impact. There is no impact on threatened or endangered species. As far as air quality is concerned, the potential release of refrigerant gas is 1/400th of the Idaho regulatory threshold for "significant" release of volatile organic compounds. The only other non-radioactive releases to the atmosphere would be small amounts of cleaning solvents. 2

(2) Regarding radioactive emissions, the off-site doses are insignificant. The Maximum Exposed Individual would receive a dose of 1/10,000th of the National Emission Standards for Hazardous Air Pollutants and even farther below radioactive background. Radiation exposure to workers in all ANL-West activities are well controlled utilizing ALARA concepts, careful training and rigid controls.

3 Regardless of opposition by some people to any treatment of spent fuel, it is obvious that INEL and this nation must put spent nuclear fuel into as stable a condition as possible. In order to do this, research activities must be conducted and the electrometallurgical treatment process is a possible technology to support the treatment of SNF. If the demonstration is successful, DOE will have a powerful technology option for dealing with its much larger spent fuel problems.

Electrometallurgical Treatment technology has been under development at Argonne for more than a decade. The key to this technology is a technique called electrorefining; a common industry process used to produce pure metals from impure metal feed stock. The electrorefining of EBR-II SNF would stabilize the reactive sodium contaminating the fuel, allow the fission products to be collected, concentrated and stabilized together with the transuranic elements (e.g., plutonium) for disposal leaving pure uranium metal. The uranium would then be stored with other uranium metal in existing authorized storage facilities. All of this results in significantly decreased volumes of highly radioactive materials and the resulting ability to store uranium essentially as a mildly radioactive metal. The uranium also would be reduced in enrichment from 65% to 20% which is considered to be a safe level of enrichment for use in research reactors or other reactors without having any weapons capability or proliferation concerns.

4 This project does not involve bringing new spent fuel into the INEL, it will use in the demonstration process only SNF that is

(4) already at the ANL-West site and incidentally supports DOE's designation of the INEL as the lead laboratory in the country for spent fuel treatment.

5

In conclusion, it is time to stop talking about reducing the hazards of spent nuclear fuel and start doing something about the problem. It should be clear to everyone that this project is a sound step in that direction. Let's get on with it!

6

Responses to Document D042

1,2,3,4,6 The commentor's statement on the demonstration is acknowledged. The Department of Energy's intent is to move in a timely manner to develop concrete solutions to the problems of spent nuclear fuel management. This demonstration is an important step in that direction.

The Department of Energy acknowledges the commentor's observation that the environmental impact of the proposed demonstration is negligible. As the commentor correctly states, there is basically no surface water impact, there is no land use impact, no impact to threatened or endangered species, and the impact on air quality is exceptionally small.

5 Although the general topic of technology development is not within the scope of this environmental assessment, the Department of Energy emphasizes ongoing programs for technology development, especially to solve national problems, such as the treatment of spent nuclear fuel. If successful, the demonstration of the electrometallurgical technology could be a crucial step in solving some of the difficult problems of spent nuclear fuel management.

Responses to Document D042

1,2,3,4,6 The commentor's statement on the demonstration is acknowledged. The Department of Energy's intent is to move in a timely manner to develop concrete solutions to the problems of spent nuclear fuel management. This demonstration is an important step in that direction.

The Department of Energy acknowledges the commentor's observation that the environmental impact of the proposed demonstration is negligible. As the commentor correctly states, there is basically no surface water impact, there is no land use impact, no impact to threatened or endangered species, and the impact on air quality is exceptionally small.

5 Although the general topic of technology development is not within the scope of this environmental assessment, the Department of Energy emphasizes ongoing programs for technology development, especially to solve national problems, such as the treatment of spent nuclear fuel. If successful, the demonstration of the electrometallurgical technology could be a crucial step in solving some of the difficult problems of spent nuclear fuel management.

Scott Ploger
305 7th St.
Idaho Falls, ID 83401
Feb. 22, 1996

Mr. Greg Bass, EA Document Manager
U.S. Department of Energy
Argonne Group-West
P.O. Box 2528
Idaho Falls, ID 83403

Dear Sir:

Thank you for the sending me a copy of the Draft EA for the Electrometallurgical Treatment and Demonstration Project in the Fuel Conditioning Facility at Argonne National Laboratory-West.

1 I wish to call to your attention a problem concerning the definition of "high-level radioactive waste" used in this document and to some related confusion introduced in the process. According to your glossary, high-level radioactive waste is "Highly radioactive waste material containing a significant concentration of fission products." This is in conflict with the definition in the Nuclear Waste Policy Act, which is closely followed in the Programmatic Spent Nuclear Fuel Management and INEL Environmental Restoration and Waste Management Programs Final EIS (on which I worked as a consultant). Per the SNF PEIS glossary (Appendix H to Volume 1), high-level waste is "The highly radioactive material that results from the reprocessing of spent nuclear fuel, including liquid waste produced directly from reprocessing and any solid waste derived from the liquid that contains a combination of transuranic and fission product nuclides in quantities that require permanent isolation. High-level waste may include other highly radioactive material that the U.S. Nuclear Regulatory Commission, consistent with existing law, determines by rule requires permanent isolation."

While there may be no significant difference in the chemical composition and fission product concentrations according to these definitions, for DOE-owned SNF the PEIS definition clearly ties high-level waste to reprocessing activities. Meanwhile, using the first definition above, the subject EA refers to both the metallic and ceramic waste forms as high-level waste. As a consequence, an EA reader more familiar with the traditional definition would be tempted to conclude that uranium extracted by the electrometallurgical process would always be intended for recycling (in accordance with the definition of reprocessing on page 113 of the EA, which does match the SNF PEIS wording).

However, my understanding is that the blended down U-235 from EBR II more likely would be stored for eventual disposal in a suitable geologic repository, given: (1) the small amount of SNF at issue in this demonstration; (2) current surpluses of low-enriched uranium for federal purposes; and (3) established policies against employing federal uranium for commercial purposes. If so, the metallic and ceramic waste forms would not necessarily be high-level waste and would not automatically have to satisfy waste acceptance criteria for geologic disposal.

Pragmatically, I suggest that adopting a clear stance that uranium from this small demonstration would not be intended for recycling might defuse some of the proliferation-related controversy surrounding this EA. This tactic might streamline EA approval at Headquarters and might decrease the likelihood of having to prepare a full-blown EIS (right on the heels of the $50 million PEIS off which this EA should be tiered.) Of course, the technology being investigated by this demonstration could someday be employed to recycle U-235, but that matter is outside the scope of this particular NEPA proceeding.

2 At a minimum (besides correcting the high-level waste definition), I recommend adding the PEIS definitions of both SNF processing and reprocessing to the EA glossary, plus adding a brief discussion of the difference early in the document. As is, reprocessing is not introduced until nearly the end of the EA, and the fact that SNF can be processed for storage, transport, or eventual disposal without being reprocessed is not mentioned at all.

Thank you for your attention.

Scott P. Ploger

Responses to Document D043

1,2 The definition of high-level waste in the environmental assessment has been changed to be consistent with the Nuclear Waste Policy Act. The definitions of spent nuclear fuel processing and reprocessing have been added to the glossary. The definition of high-level radioactive waste as defined in the Nuclear Waste Policy Act is " (A) the highly radioactive material resulting from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations; and (B) other highly radioactive material that the Commission, consistent with existing law, determines by rule requires permanent isolation." The waste forms given in Table 4-4 of the environmental assessment that are categorized as high-level waste will be qualified as such because they contain large quantities of fission products and are highly radioactive. These materials are therefore assumed to require permanent isolation. For the purposes of meeting the agreement between the State of Idaho and the Department of Energy to remove spent nuclear fuel from the State of Idaho, these materials will be treated as spent nuclear fuel.

The Department of Energy will store the by-product low-enriched uranium from the demonstration along with the more than 200 metric tons of uranium already in storage at Argonne National Laboratory-West.

February 24, 1996
984 Syringa Dr.
Idaho Falls, ID 83401
208-529-9425

Mr. Greg Bass, EA Document Manager
U.S. Department of Energy
Argonne Group-West
P.O. Box 2528
Idaho Falls, Idaho 83403

Dear Sir:

After attending the 2/21/96 afternoon public hearing on the EA regarding the proposed fuel treatment work at ANL-W, I was very impressed with the clear and concise presentation. Additionally, since I had never before participated in a public hearing, it was an informative and interesting experience. Mr. Hughes and Mr. Lawson were very impressive with their presentation and moderation. 1

However, please allow me to proceed with my comments on the subject.

1. I am in favor of the spent fuel conditioning test as proposed in the EA. It seems to be a very reasonable and effective way to remove the bond sodium, and thus very likely to allow storage in a permanent repository. I do understand that there are many unknown factors that must be unraveled and resolved before final storage can be accomplished. However, this test will certainly prove or disprove the practicality of the proposed process and should furnish suitable initial conditions for permanent storage of the several materials involved. 2

2. I agree that the resulting low-enrichment uranium should be retained by the Department for future use or sale. It is fuel, worth considerable money and should not be wasted. Future energy requirements can make good use of this fuel. It is certainly not waste. 3

3. Use of the existing equipment in the Fuel Conditioning Facility to perform this test makes sense. Why build new facilities at great cost if the proposed process is effective and efficient? Determination of these questions is one of the reasons for performance of the demonstration in FCF. 4

As a personal observation, I did not agree with many of the comments made during the afternoon meeting, both pro and con. It seemed to me that some of the people have become so program-oriented that they can no longer express rational and logical opinions. I do sympathize with the personnel that must formulate the answers to some of these comments. However, the comment by Mr. Lawroski (Sp.?) about seeking new knowledge was most appropriate. It is unfortunate that research programs have become such a political football that they are no longer evaluated on their basic merits. 5

As a matter of background, I am a retired mechanical engineer who formerly worked at the INEL.

Sincerely yours,

Russell L. Crawford

Responses to Document D044

1 The commentor's statement on the public comment process is acknowledged by the Department of Energy.

2 The Department of Energy acknowledges that there may be many benefits of electrometallurgical treatment of spent nuclear fuel. The demonstration will provide the data by which application of this technology to the balance of Experimental Breeder Reactor-II spent nuclear fuel and, potentially, other spent nuclear fuels, can be decided.

3 The Department of Energy is appreciative for the opinions expressed by the members of the public and other stakeholders during the National Environmental Policy Act process. However, the final disposition of the uranium is beyond the scope of the environmental assessment.

4 The commentor's statement that the proposed demonstration would make effective use of existing facilities and equipment is acknowledged.

5 The Department of Energy recognizes the value of all stakeholders' comments, the importance of public involvement as a decision making tool, and the right of individuals, agencies, and groups to express their opinions as an integral part of the National Environmental Policy Act process.

DATE: 26 FEB 96

TO: Mr. Greg Bass, EA Document Manager
U.S. Department of Energy
Argonne Group-West
P.O.Box 2528
Idaho Falls, ID 83403

1 I wish to express my strong support for the Electrometallurgical Treatment and Demonstration Project in the Fuel Conditioning Facility at Argonne National Laboratory-West

Signed Joanna G. Wallin
print

Signature Joanna G. Wallin

Address 645 Lincoln Dr.
Idaho Falls, ID 83401

Responses to Document D045

1 The Department of Energy acknowledges the commentor's statement on the proposed demonstration project.

DATE: Feb. 23, 1996

TO: Mr. Greg Bass, EA Document Manager
U.S. Department of Energy
Argonne Group-West
P.O.Box 2528
Idaho Falls, ID 83403

1 I wish to express my strong support for the Electrometallurgical Treatment and Demonstration Project in the Fuel Conditioning Facility at Argonne National Laboratory-West

Signed Ellen J. Schuman
print

Signature Ellen J. Schuman

Address 751 Masters Dr.
Idaho Falls, Idaho 83401

Responses to Document D046

1 The Department of Energy acknowledges the commentor's statement on the proposed demonstration project.

DATE: 2/23/96

TO: Mr. Greg Bass, EA Document Manager
U.S. Department of Energy
Argonne Group-West
P.O.Box 2528
Idaho Falls, ID 83403

1 I wish to express my strong support for the Electrometallurgical Treatment and Demonstration Project in the Fuel Conditioning Facility at Argonne National Laboratory-West

Signed EDITH M STANGER
print

Signature Edith M Stanger

Address 115 [illegible]
Idaho Falls, Idaho 83402

Responses to Document D047

1 The Department of Energy acknowledges the commentor's statement on the proposed demonstration project.

DATE: 2/22/96

TO: Mr. Greg Bass, EA Document Manager
U.S. Department of Energy
Argonne Group-West
P.O.Box 2528
Idaho Falls, ID 83403

1 I wish to express my strong support for the Electrometallurgical Treatment and Demonstration Project in the Fuel Conditioning Facility at Argonne National Laboratory-West

Signed CATHERINE E. NELSON
print

Signature Catherine E. Nelson

Address 2173 Caldwell
Idaho Falls, Idaho 83402

Responses to Document D048

1 The Department of Energy acknowledges the commentor's statement on the proposed demonstration project.

DATE: 2-22-96

TO: Mr. Greg Bass, EA Document Manager
U.S. Department of Energy
Argonne Group-West
P.O.Box 2528
Idaho Falls, ID 83403

1 I wish to express my strong support for the Electrometallurgical Treatment and Demonstration Project in the Fuel Conditioning Facility at Argonne National Laboratory-West

Signed FRED W. WALLIN
print
Signature Fred W. Wallin
Address 2301 STACE #4
IDAHO FALLS, ID. 83401

Responses to Document D049

1 The Department of Energy acknowledges the commentor's statement on the proposed demonstration project.

DATE: Feb. 23, 1996

TO: Mr. Greg Bass, EA Document Manager
U.S. Department of Energy
Argonne Group-West
P.O.Box 2528
Idaho Falls, ID 83403

1 I wish to express my strong support for the Electrometallurgical Treatment and Demonstration Project in the Fuel Conditioning Facility at Argonne National Laboratory-West

Signed MARY MASTERSON
print

Signature Mary Masterson

Address 1465 Scorpius Dr.
Idaho Falls, Id 83402

Responses to Document D050

1 The Department of Energy acknowledges the commentor's statement on the proposed demonstration project.

DATE: Feb. 23, 1996

TO: Mr. Greg Bass, EA Document Manager
U.S. Department of Energy
Argonne Group-West
P.O.Box 2528
Idaho Falls, ID 83403

1 I wish to express my strong support for the Electrometallurgical Treatment and Demonstration Project in the Fuel Conditioning Facility at Argonne National Laboratory-West

Signed Robert P. Schuman
print

Signature Robert P. Schuman

Address 751 Masters Dr
Idaho Falls ID 83401

Responses to Document D051

1 The Department of Energy acknowledges the commentor's statement on the proposed demonstration project.

BRADY'S

C.A. Brady II
Owner
1930 N. Woodruff Ave.
Idaho Falls, Idaho 83401

Telephone (208)522-6763
Fax (208)522-6787

February 29, 1996

W. Gregory Bass, EA Document Manager
Argonne Area Office - West
P.O. Box 2528
Idaho Falls, ID 83403-2528

Dear Mr. Bass:

1 I am writing this letter in support of The Electrometallugical Treatment Research & Development Project, conducted by Argonne at the I.N.E.L.. It seems to me that we have lost our courage as Americans dedicated to taking advantage of the technology that is made available to us by entities such as Argonne and their people. Why have we allowed the nay sayers and fear mongers to have a more than equal say as to our technological future particularly as regards anything nuclear.

I think the answer is that the common ordinary citizen is just a very quiet person and doesn't run around making a lot of emotional noise for or against something. He still has faith and doesn't need constant reaffirmation of every detail of every technological event taking place.

2 The skilled work in technology for the treatment of spent nuclear fuel by Argonne should have everyone's support whether you are for or against nuclear so that we can move forward in moving this fuel into a repository. This is important because other fuel types may require such treatment and it also supports DOE's designation of the I.N.E.L. as the lead laboratory for spent nuclear fuel treatment, using only the spent fuel already at the Argonne West site.

3 I also support it because it has the potential to play an important role in meeting the terms of Governor Batt's Nuclear Waste Agreement.

Respectfully,

Cliff Brady
Owner

sds
GREGBASS.WPS

Responses to Document D052

1 The Department of Energy acknowledges the commentor's statement on the proposed demonstration project.

2 Although the general topic of technology development is not within the scope of this environmental assessment, the commentor correctly observes that the proposed demonstration is necessary to determine this technology's potential use in addressing some of the difficult problems of spent nuclear fuel management. Though limited in scope, the proposed demonstration project will provide the data necessary for future decisions.

3 Under the terms of the settlement agreement, the Department of Energy is legally obligated to remove spent nuclear fuel (including Experimental Breeder Reactor-II spent nuclear fuel) from the State of Idaho by the year 2035. Electrometallurgical treatment is a promising technology for treating Experimental Breeder Reactor-II spent nuclear fuel and blanket assemblies. If the demonstration were successful, the Department of Energy would have the data necessary to determine the appropriate use of this technology for meeting the terms of the agreement between the State of Idaho and the Department of Energy.

2-29-92

To those in DOE who may be Concerned: The Hanford Education Action League was a successful campaign in 1990 to end reprocessing at Hanford. Nothing has changed. The development of ANY reprocessing technology should be halted because of dubious environmental benefits. The funding now going to pyroprocessing should be directed, instead, to address genuine environmental threats. It has been demonstrated that PUREX's remaining spent fuel could be stored in dry casks without any processing at all!

Wm Delaney

1

2

3

Responses to Document D053

1 Electrometallurgical treatment is a new application of an existing technology under development for the purpose of preparing spent nuclear fuel and associated waste forms for disposition. It is not reprocessing. More information on reprocessing is included in Chapter One of this Appendix.

The limited scope demonstration project being considered in this document would show, among other things, the benefits which could be realized by using this technology. The environmental benefits to be gained by treating Experimental Breeder Reactor-II spent nuclear fuel will be among those things shown. The potential for significant effects on the environment by doing the demonstration project itself is the subject of this environmental assessment.

2 Funding ultimately provided for Department of Energy projects is determined by Congress and the President through processes that are outside the scope of this environmental assessment. However, the Department has supported funding for this project because it believes the technology is a promising one for dealing with some of the Department's spent fuel problems.

3 The disposition of spent nuclear fuel from reactors other than Experimental Breeder Reactor-II, as well as the by-products of processes other than electrometallurgical treatment are beyond the scope of this environmental assessment. It should be noted, however, that this technology bears no resemblance to Plutonium-Uranium Extraction (PUREX) reprocessing and produces neither the volume nor the type of waste products the Plutonium-Uranium Extraction (PUREX) process produces. It is likely that disposal of Experimental Breeder Reactor-II spent nuclear fuel in a geologic repository will require that the spent nuclear fuel be treated to remove sodium first.

2/28/96

Dear Mr. Bass,

1 Development of ANY reprocessing technology should be halted because of its dubious environmental benefits.

2 The funding now going to pyroprocessing should be redirected to address genuine environmental threats. Lets do something right for a change! Sincerely,

Charles F Cox

Responses to Document D054

1 Electrometallurgical treatment is a new application of an existing technology under development for the purpose of preparing spent nuclear fuel and associated waste forms for disposition. The Department of Energy does not regard electrometallurgical treatment as "reprocessing" as that term has been used historically. More information on reprocessing is included in Chapter One of this Appendix.

The limited scope demonstration project being considered in this document would show, among other things, the benefits which could be realized by using this technology. The environmental benefits to be gained by treating Experimental Breeder Reactor-II spent nuclear fuel will be among those things shown. The potential for significant effects on the environment by doing the demonstration project itself is the subject of this environmental assessment.

2 Funding ultimately provided for Department of Energy projects is determined by Congress and the President through processes that are outside the scope of this environmental assessment. However, the Department has supported funding for this project because it believes the technology is a promising one for dealing with some of the Department's spent fuel problems.

3·1·96

Mr. W. Gregory Bass, EA Document Manager
Argonne West
FAX # 533-7422 Re: Electrometallurgical Project

We have developed the following points in our INEL Committee of the Idaho Falls Chamber of Commerce. I have had many years involvement in the Nuclear area, from Frenchman Flat to Jackass Flats to INEL and civilian Nuclear Power. I subscribe to the following completely.

DRAFT ENVIRONMENTAL ASSESSMENT
FOR
THE ELECTROMETALLUGICAL TREATMENT RESEARCH & DEVELOPMENT PROJECT

1) THE ELECTROMETALLURGICAL PROJECT IS RESEARCH ON A NEW WAY TO TREAT SPENT NUCLEAR FUEL. THIS PROJECT SHOULD BE SUPPORTED AND ALLOWED TO MOVE FORWARD BECAUSE IT'S EXPERIMENTAL AND WE ALL WANT TO FIND OUT IF THE TECHNOLOGY WILL WORK PROPERLY.

2) WE AGREE WITH THE CONCLUSION OF THE ENVIRONMENTAL ASSESSMENT DOCUMENT, THAT THERE WOULD BE NO SIGNIFICANT AFFECT ON THE ENVIRONMENT.

3) IT'S IMPORTANT TO COMPLETE SUCH TECHNOLOGY IN ORDER TO BE ABLE TO PLACE FUEL IN THE REPOSITORY; ESPECIALLY FUEL THAT WOULD BE A MIXED HAZARDOUS WASTE, SUCH AS THE EBR II FUEL.

4) THIS IS IMPORTANT BECAUSE OTHER FUEL TYPES MADE REQUIRE SUCH TREATMENT.

5) IT SUPPORTS DOE'S DESIGNATION OF THE INEL AS THE LEAD LABORATORY FOR SPENT NUCLEAR FUEL TREATMENT, USING ONLY THE SPENT FUEL ALREADY AT THE ARGONNE WEST SITE.

6) IT IS GOOD FOR THE ECONOMY OF THE STATE OF IDAHO.

7) IT HAS THE POTENTIAL TO PLAY AN IMPORTANT ROLE IN MEETING THE TERMS OF THE GOVERNOR'S NUCLEAR WASTE AGREEMENT.

Charles E. White, Jr.
P.O. Box 50516
Idaho Falls, ID 83405-0616

Responses to Document D055

1 The Department of Energy acknowledges the commentor's statements on the proposed demonstration project. As the commentor notes, this limited scope demonstration is necessary to determine whether electrometallurgical treatment will work as expected.

2 As described in the environmental assessment, the impacts of the proposed action and the alternatives were found to be extremely small.

3, 4, 5 The Department of Energy acknowledges that there may be many benefits of electrometallurgical treatment of spent nuclear fuel. However, the scope of this environmental assessment is the electrometallurgical treatment of 100 Experimental Breeder Reactor-II spent nuclear fuel assemblies and 25 blanket assemblies for the purpose of demonstrating this technology and gathering data on its use. Any proposal to apply the technology beyond the scope considered in this environmental assessment would follow successful demonstration and would be subject to all applicable laws and regulations. It is the Department of Energy Office of Civilian Radioactive Waste Management policy that hazardous wastes will not be accepted for disposal in a geologic repository for spent nuclear fuel.

6 The Department of Energy acknowledges the commentor's comment on the benefits of this project to the Idaho economy. The socioeconomic effects of the proposed action are analyzed in Section 4.1.4 of the environmental assessment. Adverse impacts were found to be small.

7 Under the terms of the settlement agreement, the Department of Energy is legally obligated to remove spent nuclear fuel (including Experimental Breeder Reactor-II spent nuclear fuel) from the State of Idaho by the year 2035. Electrometallurgical treatment is a promising technology for treating Experimental Breeder Reactor-II spent nuclear fuel and blanket assemblies. If the demonstration were successful, application of the technology could help the Department of Energy to meet this obligation.

Mrs Marie Neil
P O Box 1384
Deep Lake, WA 98851
March 1, 1996

~~Dear Mr. Boas:~~

Upon reading my latest HEAL newsletter, I am reminded of a story taken from the Readers Digest years ago. There was a hill named Billy Goat Hill soon more & more people moved to Billy Goat Hill and they didn't like to live on a hill known as such a distasteful name as Billy Goat Hill - so they renamed it Angora Heights. Same identical hill - just more so-called pleasing.

Now I refer to the DOE changing the name of "reprocessing" to other no-nos & terminology to make the same thing sound pleasing - and therefore be slipped by unaware.

It's my understanding that DOE also has ignored its own regulation requiring an environmental impact statement for the IFR program.

Please halt any reprocessing (by any name) and redirect funds to address environmental threats.

Sincerely
Mrs Marie Neil

Responses to Document D056

1 Electrometallurgical treatment is a new application of an existing technology which currently is under research and development. The use of the name electrometallurgical treatment is simply a descriptive name being applied to a new application of an existing technology. The Department of Energy does not regard electrometallurgical treatment as "reprocessing" as that term has been used historically, but a method by which spent nuclear fuel and associated waste forms may be prepared for disposition. More information on reprocessing is included in Chapter One of this Appendix.

2 The Integral Fast Reactor Program was terminated in October 1994.

3 As noted above, electrometallurgical treatment is not considered to be "reprocessing" and any other projects would be outside the scope of this environmental assessment. Funding ultimately provided for Department of Energy projects is determined by Congress and the President through processes that are outside the scope of this environmental assessment. However, the Department has supported funding for this project because it believes the technology is a promising one for dealing with some of the Department's spent fuel problems.

Dr. Bass: March 5, 1996

I'm writing to urge DOE to halt development of any reprocessing technology because it is dubious & unreasonable. 1

I'd like to see this funding diverted to address real environmental threats which are currently defined and of great concern. 2

Sincerely,

Mary M. Bragg

Responses to Document D057

1 Electrometallurgical treatment is a new application of an existing technology under development for the purpose of preparing spent nuclear fuel and associated waste forms for disposition. It is not reprocessing. More information on reprocessing is included in Chapter One of this Appendix.

The limited scope demonstration project being considered in this document would show, among other things, the benefits which could be realized by using this technology. The environmental benefits to be gained by treating Experimental Breeder Reactor-II spent nuclear fuel will be among those things shown. The potential for significant effects on the environment by doing the demonstration project itself is the subject of this environmental assessment.

2 Funding ultimately provided for Department of Energy projects is determined by Congress and the President through processes that are outside the scope of this environmental assessment. However, the Department has supported funding for this project because it believes the technology is a promising one for dealing with some of the Department's spent fuel problems.

March 6, 1996

W. Gregory Bass
EA Document Manager
Argonne Area Office - West
P.O. Box 2528
Idaho Falls, ID 83403-2528

Re: Electrometallugical Treatment Research & Development Project

Dear Mr. Bass:

1 Please accept this letter as my support for the above referenced project. It is my opinion
2 that Argonne has the experienced management and personnel to oversee this project. Their record in providing quality research activities at the Idaho National Engineering Laboratory is impeccable.

3 The environmental assessment document has concluded that there would be no
4 significant affect on the environment. The project also supports DOE's designation of the
5 INEL as the lead laboratory for spent nuclear fuel treatment, using only the spent fuel already at the Argonne West site. The project would also be good for the economy of the State of Idaho, while meeting the terms of the Governor Batt's nuclear waste agreement.

Sincerely,

Jeffrey E. Jones
925 Summerset Ct.
Idaho Falls, ID 83404

Responses to Document D058

1,2 The Department of Energy acknowledges the commentor's statement on the proposed action, as well as the comments regarding the personnel of Argonne National Laboratory.

3 The commentor's statements on the impacts of the proposed action and the alternatives, including the limited treatment alternative, are acknowledged by the Department of Energy.

4 Though other spent nuclear fuel management activities at the Idaho National Engineering Laboratory are outside the scope of this environmental assessment, the commentor is correct that the proposed action is consistent with the Idaho National Engineering Laboratory's designation as lead laboratory for spent nuclear fuel management.

5 The socioeconomic impacts of the proposed action were analyzed in the environmental assessment and found to be minimal (see Section 4.1.4). If the proposed demonstration project proves successful, electrometallurgical treatment would then be an option for the Department of Energy to consider in its work to meet the terms of its agreement with Governor Batt and the State of Idaho. Of course, any proposal to apply this technology beyond the scope proposed in this environmental assessment would be done in compliance with all applicable laws and regulations, including any appropriate National Environmental Policy Act review.

March 6, 1996

W. Gregory Bass
EA Document Manager
Argonne Area Office - West
P.O. Box 2528
Idaho Falls, ID 83403-2528

Re: Electrometallugical Treatment Research & Development Project

Dear Mr. Bass:

1 2 Please accept this letter as my support for the above referenced project. It is my opinion that Argonne has the experienced management and personnel to oversee this project. Their record in providing quality research activities at the Idaho National Engineering Laboratory is impeccable.

3 4 5 The environmental assessment document has concluded that there would be no significant affect on the environment. The project also supports DOE's designation of the INEL as the lead laboratory for spent nuclear fuel treatment, using only the spent fuel already at the Argonne West site. The project would also be good for the economy of the State of Idaho, while meeting the terms of the Governor Batt's nuclear waste agreement.

Sincerely,

Robert W. Barnes
381 Gustafson Dr.
Idaho Falls, ID 83402

Responses to Document D059

1,2 The Department of Energy acknowledges the commentor's statement on the proposed action, as well as the comments regarding the personnel of Argonne National Laboratory.

3 The commentor's statements on the impacts of the proposed action and the alternatives, including the limited treatment alternative, are acknowledge by the Department of Energy.

4 Though other spent nuclear fuel management activities at the Idaho National Engineering Laboratory are outside the scope of this environmental assessment, the commentor is correct that the proposed action is consistent with the Idaho National Engineering Laboratory's designation as lead laboratory for spent nuclear fuel management.

5 The socioeconomic impacts of the proposed action were analyzed in the environmental assessment, and found to be minimal (see Section 4.1.4). If the proposed demonstration project proves successful, electrometallurgical treatment would then be an option for the Department of Energy to consider in its work to meet the terms of its agreement with Governor Batt and the State of Idaho. Of course, any proposal to apply this technology beyond the scope proposed in this environmental assessment would be done in compliance with all applicable laws and regulations, including any appropriate National Environmental Policy Act review.

March 6, 1996

W. Gregory Bass
EA Document Manager
Argonne Area Office - West
P.O. Box 2528
Idaho Falls, ID 83403-2528

Re: Electrometallugical Treatment Research & Development Project

Dear Mr. Bass:

1 | Please accept this letter as my support for the above referenced project. It is my opinion
2 | that Argonne has the experienced management and personnel to oversee this project.
Their record in providing quality research activities at the Idaho National Engineering
Laboratory is impeccable.

3 | The environmental assessment document has concluded that there would be no
4 | significant affect on the environment. The project also supports DOE's designation of the
5 | INEL as the lead laboratory for spent nuclear fuel treatment, using only the spent fuel
already at the Argonne West site. The project would also be good for the economy of the
State of Idaho, while meeting the terms of the Governor Batt's nuclear waste agreement.

Sincerely,

R. Scott Nadauld
1630 Irving
Idaho Falls, ID 83402

Responses to Document D060

1,2 The Department of Energy acknowledges the commentor's statement concerning the proposed action, as well as the comments regarding the personnel of Argonne National Laboratory.

3 The commentor's statements on the impacts of the proposed action and the alternatives, including the limited treatment alternative, are acknowledged by the Department of Energy.

4 Though other spent nuclear fuel management activities at the Idaho National Engineering Laboratory are outside the scope of this environmental assessment, the commentor is correct that the proposed action is consistent with the Idaho National Engineering Laboratory's designation as lead laboratory for spent nuclear fuel management.

5 The socioeconomic impacts of the proposed action were analyzed in the environmental assessment, and found to be minimal (see Section 4.1.4). If the proposed demonstration project proves successful, electrometallurgical treatment would then be an option for the Department of Energy to consider in its work to meet the terms of its agreement with Governor Batt and the State of Idaho. Of course, any proposal to apply this technology beyond the scope proposed in this environmental assessment would be done in compliance with all applicable laws and regulations, including any appropriate National Environmental Policy Act review.

Good afternoon. I'm Jeffrey Loveng. I'm with the office of Congressman Mike Crapo, who represents the Second District of Idaho, which the Argonne-West facility is located in, and I would like to read a statement on his behalf.

1 I appreciate the opportunity to comment on this important subject and commend the Department of Energy for pursuing this project. Since the beginning of my service in the Congress, I have been involved in seeking solutions to our nation's problems associated with nuclear waste.

As a member of the Nuclear Waste Task Force, I have been able to confer with my colleagues from around the nation about nuclear waste issues. While we in Idaho have distinct and extensive experience with these issues, they truly are both national and international in scope.

I am also a co-sponsor of H.R. 1020, which seeks to accelerate the schedule by which we deal with these problems, and it defines some solutions. And lastly, but certainly foremost in my experience with this issue, I have conferred frequently and often with the great scientists in Idaho about what the science says can and cannot be done.

2 It is because of the work of these scientists that we are here today. In electrometallurgical treatment, as proposed for Argonne National Laboratory, we have a firm, concrete opportunity to make real progress. This project has come to where it is ready to go answer difficult questions and show true results. It should go forward as proposed.

To those who question or even oppose this action, I encourage them to look with an open mind toward two important considerations.

3 First, there is no significant import or threat to the environment from this project. On the contrary, by treating the fuel from experimental breeder reactor II to remove the sodium and preparing a leach resistant ceramic waste form, the spent nuclear fuel will be made to be less of an environmental problem.

4 Second, and very importantly, this action is necessary to meet the provisions of the waste removal agreement between Governor Batt of Idaho and the Department of Energy. In order for EBR-II fuel to be able to leave the state, it must be treated and prepared for permanent disposal. Electrometallurgical treatment is necessary for this.

I am sure we all can agree that we want to see this waste material leave the State of Idaho.

5 Again, I comment the Department for taking positive steps towards finding real solutions to difficult problems. I support the proposed action and encourage its timely completion.

Thank you.

Responses to Document D061

1,2,3,5 The commentor's statement on the demonstration is acknowledged. The Department of Energy actively seeks and considers public comments, and considers the views of stakeholders in making decisions. This demonstration poses no significant environmental threat and will provide concrete information for later decisions for the treatment of spent nuclear fuel. The commentor's statements on the importance of this demonstration for resolving spent nuclear fuel issues in Idaho are noted.

4 Under the terms of the settlement agreement, the Department of Energy is legally obligated to remove spent nuclear fuel (including Experimental Breeder Reactor-II spent nuclear fuel) from the State of Idaho by the year 2035. Electrometallurgical treatment is a promising technology for treating Experimental Breeder Reactor-II spent nuclear fuel and blanket assemblies. If the demonstration were successful, application of the technology could help the Department of Energy to meet this obligation.

I appreciate your flexibility. Mary Olson with Nuclear Information and Resource Service. Just very briefly, we are a national organization with over 1,000 grassroots citizens organizations in our membership nationwide, and we're very concerned with nuclear technology, particularly nuclear power and its radioactive waste, and I'm here largely because of the intersection we see between this proposal and that industry. 1

But taking the moment that we're at of an environmental assessment and the question of whether to do an environmental impact statement as the focus of this comment, and we will be submitting written comments, and we concur that an extension given the basis of the information in written form that's still coming out is appropriate. I walked into this room with two questions in my mind, and the question and answer period have helped me to formulate this comment. 2 3

One question was: is this reprocessing? And the other question was: is this a demonstration? And my answers to those questions, based on what I've heard in the question and answer period, is, yes, this is reprocessing technology. This is a demonstration of reprocessing technology, but, in fact, the activities that you're engaged in are not a demonstration. You're basing the size of the equipment that you want based on future activities that you hope to carry on that are far beyond the scope of the demonstration activity. 4 5

Under NEPA, National Environmental Policy Act, this is a segmentation of the intent of the Department's activities. I believe that a full-scale environmental impact statement is required if this is either reprocessing or a full-scale implementation of a new program. Based on what I've heard today, it's both of those things. 6 7

If the basis for deciding that it is not a -- what's the word? I'm sorry I'm not in this world -- sensitive nuclear technology, if the interactions with Japan are judged because Japan already has reprocessing technology, that right there says to me: okay. This swims through on the basis of the fact that it is a reprocessing technology, and Japan already has it. Okay? 8

I hear you talking about the next refiner that you have already on the pike to come in. I'm just reflecting what I hear. I'm not inventing anything, and I think it's only a fair and honest assessment, therefore, that we are on the brink of a major federal action. 9

One hundred twenty-five million dollars over five years is a major federal action, and to bring in the vernacular from my world, melting nuclear fuel is something we try and avoid in all circumstances. You're about to take it on on an everyday basis. 10

So we do definitely see this as a major federal action. (9)

Now, in terms of the whole question of reprocessing, from our point of view it is exactly the wrong message to be sending in the world at this time, and this technology as a demonstration in the broader context, not in the context of it's only this many fuel assemblies, but in the broader context of this is the first time this is being done, has to be assessed for the full-scale impact that it will have in the full world arena, and I believe the people on the panel and in this room know that. 11

12 Now, just a couple of other quick comments. I find it very curious that at a time when we do not have a repository, we are making decisions about waste forms. I find it very curious that volume is a major consideration upon which to spend a lot of money right now when, in fact, conservation of mass tells us that we're going to have the same amount of waste and possibly more from these activities.

13 I find it very disturbing when we take highly concentrated waste forms and trap door them into what we call so-called low level waste and start disposing of them in unlined trenches at other locations, calling that a solution to a problem.

14 So, therefore, I am calling for what my organization has been calling for all along. Before this program proceeds, you should go ahead and do the environmental impact statement probably, but concurrent with that,
15 I would like to see a full, independent review of all of the programs and policies that the Department is engaged in and in the civilian sector as well.

16 We've heard one political reference today from Representative Crapo. Well, I oppose and my organization opposes H.R. 1020 and S. 1271 and are calling for this independent review before there's any legislative activity and, indeed, before we launch into any major new policy shift, which this program definitely constitutes.

17 It may well be that the answers of such an independent review that would stop having one agency have one classification system, a different agency having a different classification system, would look at the full gamut of all of the different wastes that we have to deal with, start addressing this issue of waste form comprehensively from the point of view of isolation of the material rather than an assumption of a facility which hasn't even been approved, such a Yucca Mountain.

18 So what I'm suggesting to you is that we might all come out on the same map together, with a lot of the same goals, but today we're not on that same map together, and we don't have a lot of the same goals because somebody is in a hurry, and that hurry is going to put the foot in the door on a program that has no business happening without a full-scale review and ventilation.

Thank you.

Responses to Document D062

1 The Department of Energy acknowledges the commentor's concern about nuclear technology, nuclear power, and their waste. The Department of Energy's research and development efforts are attempting to address these concerns and the difficulties associated with spent nuclear fuel management and nuclear waste disposal. However, this environmental assessment addresses only the proposed demonstration project. Any further application of the technology, as well as issues relating to the nuclear power industry, are beyond the scope of this environmental assessment.

2,14,18 The Department of Energy prepared the environmental assessment for the electrometallurgical treatment demonstration project to assist with agency planning and decision making. On the basis of the environmental assessment, the Department of Energy will decide whether to prepare a Finding of No Significant Impact or an environmental impact statement. Chapter One of this Appendix provides additional discussion of this issue.

3 The comment period for the environmental assessment was reopened until May 3, 1996. This was announced in a *Federal Register* notice, Monday, April 15, 1996 (61 Federal Register 16471).

4, 11 The proposed demonstration project is not considered to be "reprocessing." For further discussion of this issue, see Chapter One of this Appendix.

5 The proposed action is limited to treatment of 100 spent nuclear fuel assemblies and 25 blanket assemblies. Any proposal to apply this technology beyond this scope would be undertaken in compliance with all applicable laws and regulations, including appropriate National Environmental Policy Act review. The purpose of this proposed demonstration project is to determine if the technology will perform as projected. Electrometallurgical technology has never been used to treat radioactive spent nuclear fuel assemblies in a remote, heavily shielded, inert environment. No radioactive waste-form samples have been produced or characterized. Process crucibles have not been tested under actual operating conditions. Operating parameters for electrometallurgical equipment have not

been established. Collecting data for each of these items is among the reasons for the demonstration project. The size and configuration of the equipment to be tested are not conducive to production-scale activities.

6 The proposed action includes development of operating data for test equipment and a limited application demonstration. The Department of Energy would review the data and decide whether to propose future applications of the technology. Any such future proposals would be made in accordance with all applicable laws and regulations, and will include appropriate National Environmental Policy Act analysis. For further discussion of this issue, see Chapter One of this Appendix.

7 As discussed above, the Department of Energy does not consider the proposed demonstration project to be either reprocessing or full-scale implementation of a new program. It is a limited demonstration of a new treatment for spent nuclear fuel and waste preparation technology. This environmental assessment is the appropriate first step to determine whether an environmental impact statement is necessary or whether a Finding of No Significant Impact is appropriate.

8 The Department of Energy acknowledges the commentor's concerns regarding sensitive nuclear technology. During the Integral Fast Reactor Program, the Department of Energy conducted appropriate reviews of related technologies for recycling spent nuclear fuel in fast reactors before entering into a technology exchange agreement with Japan. Any nuclear technology which is a candidate for export is subject to sensitive nuclear technology review in accordance with 10 CFR Part 810. The Department of Energy has been designated to implement this regulation by an interagency task force representing the Department of State, the Arms Control and Disarmament Agency, the Nuclear Regulatory Commission, and the Department of Energy. The Department of Energy has established an Export Control Working Group to make sensitive nuclear technology determinations according to specific guidelines. Any future consideration of exporting electrometallurgical spent nuclear fuel treatment technology would be reviewed according to the Department of Energy's export control procedure.

9 The environmental assessment has been prepared, in part, to assist the Department of Energy in deciding whether the proposed project is a major Federal action, significantly affecting the quality of the human environment. For further discussion of this issue, see Chapter One of this Appendix.

10 As part of the proposed demonstration, the Experimental Breeder Reactor-II spent nuclear fuel pins would be put into solution in the process fluids by a chemical oxidation reaction to form chloride salts, not by melting. Stainless steel hardware and electrorefined uranium would be melted separately and consolidated into metal ingots for safe storage.

12 The essence of the proposed research and demonstration program is to develop the typical waste and by-product streams of the electrometallurgical technique in order to quantify these streams, to characterize them, and to answer the very questions posed by the National Research Council and other responsible scientists and engineers.

As stated in Section 5.0 of the environmental assessment, the impact of the reduction in volume is relatively minor for the small amount of spent nuclear fuel that would be treated in the demonstration. However, any volume reduction is unique to the electrometallurgical treatment technology relative to previously used spent nuclear fuel management technologies, such as reprocessing.

13 As described in the environmental assessment, Section 4.5, the fission products from the treatment process are incorporated into the metal and ceramic waste forms, which are high-level wastes. These wastes will require permanent isolation in a geologic repository. The low-level wastes are materials that have been combined with low-levels of radioactive material from normal hot cell operations.

The means by which low-level wastes are treated at Argonne National Laboratory are described in Section 4.5 of the environmental assessment. These materials have been routinely handled, packaged, and shipped for disposal to the Radioactive Waste Management Complex at the Idaho National Engineering Laboratory for the past thirty years. The impact of the quantity (provided in Table 4-6 of the environmental assessment) of low-level wastes produced from the proposed action is examined in this

environmental assessment. They are 0.2% of the total low-level waste at the Idaho National Engineering Laboratory. Low-level wastes produced from the proposed action will be packaged and disposed of according to the standards and practices of the Radioactive Waste Management Complex. These standards and practices are beyond the scope of this environmental assessment. Future issues concerning low-level waste management practices within Department of Energy are addressed in the *Draft Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste* (August 1995).

15,16,17 This environmental assessment considers only the environmental impacts of the proposed demonstration project. Other programs and policies of the Department of Energy are outside the scope of this document, as are bills before Congress and waste classification systems used by various Federal agencies.

My name is Anna Aurilio. I work for the U.S. Public Interest Research Group. We're an environmental and consumer watchdog group. We have been watching this process very carefully because we are quite concerned, particularly about the environmental implications of this project. We will be submitting additional and much more extensive written comments, and like others who I'm sure will follow me, we ask that the comment period be extended for an additional month. I sent my assistant to DOE's public reading room yesterday and he was not able to get any of the background documents on the environmental assessment. So we formally request that it be extended for a month, and that actually we be provided with a list of where those documents can be found in a timely manner.

Real briefly. First of all we believe that an EIS is needed for this project. We do not think an environmental assessment is adequate. Second, we hope that the environmental assessment would be changed to reflect some of the questions and answers that we've done here, specifically, a more accurate characterization of the waste that would be produced and the comparison of those wastes. And that is all that we have for now. I expect that my additional comments will reflect some concern for potential for water contamination, and again that's why I'm interested in getting some of those additional documents.

Responses to Document D063

1 The commentor's concerns about the proposed demonstration are noted. The environmental impacts of the proposed demonstration project were analyzed in the environmental assessment and were found to be small.

2 The references cited in the environmental assessment have been placed in the Department of Energy public reading rooms. Additional information on this issue is provided in Chapter One of this Appendix.

3 The Department of Energy prepared this environmental assessment for the proposed electrometallurgical treatment demonstration project to assist with agency planning and decision making. On the basis of the environmental assessment, the Department of Energy will decide whether to prepare a Finding of No Significant Impact or an environmental impact statement.

4 The proposed research and demonstration project would produce the typical waste and by-product streams of the electrometallurgical technique in order to quantify these streams, to characterize them, and to answer the very questions posed by the commentor, the National Research Council, other peer review committees, and involved scientists and engineers.

5 All materials used in the electrometallurgical treatment demonstration project are solids at room temperature. Therefore, there would be no liquid effluent from the electrometallurgical treatment demonstration project to contaminate ground water. All wastes would be isolated and stored in containers, thus avoiding the possibility of ground water or surface water contamination by leachates. Experimental Breeder Reactor-II spent nuclear fuel assemblies would be washed in a moisturized argon mix to remove sodium from the outside of the assembly. This wash liquid would be solidified in a process described in Section 2.2 of the environmental assessment.

The first thing I wanted to reiterate the request I made earlier. I'll start again. Daniel Horner, Nuclear Control Institute, 1000 Connecticut Avenue, N.W., Suite 804, Washington, D.C. 20036.

1 I want to reiterate the request for a 30 day extension of the common period based on the lack of documents cited in the EA which are not available in the public reading rooms.

I want to say that I'm pleased that you're holding this meeting, but I have to add three caveats to that.

2 One is that until my organization and six other groups wrote a letter on last August 25th, DOE was not planning to undertake any NEPA analysis on this facility beyond what's already in place, which is a five year old EA on the facility in a different form.

3 Secondly, in our letter we had called for an environmental impact statement rather than an environmental assessment, and we continue to believe that only an EIS will bring DOE into compliance with the law.

4 And finally, the point of having a NEPA process is to bring information before the public so that DOE's assessment can be verified or at least defended, but the value of such a process obviously is greatly diminished if full and accurate information is not provided.

DOE's claims on technical matters have proved to be overstated in the past, and the debate over the parent program for this project, the advanced liquid metal reactor, DOE claimed that it was not a breeder and could not readily be converted to one, and that subsequently was proved not to be so. And if further claimed that prior processing, the ALMR reprocessing technology, could not be used to produce material usable in a

5 nuclear weapon, and that similarly was proved not to be true.

There was a claim also, an immediate need to process the EBR-II spent fuel, and that delaying prior processing would necessarily delay defueling of the EBR-II.

Now all these claims as I said were at one point made my DOE, and later either refuted by independent experts or retracted by DOE. So I would suggest that a lot of the information on the technical claims have to be taken with a grain of salt.

6 One of my principal concerns about the EA in this point as I already stated in the question and answer period is the definition of reprocessing. It's unnecessarily restrictive, but on its terms they said it excludes commercial reprocessing, which I think is not sensible, and also stipulates that unless there's recycling involved this is not reprocessing. They said earlier as well, it does not make sense to tie the definition of a process to what end use ultimately is made of the product of that process, because the end use can change.

7 And secondly, under an assessment like this what we need to look at is the process and the product.

And finally, on this question of reprocessing we would like to read into the record a section of the National Academy of Sciences report that's been referred to quite extensively. It's on page 30 of the report, under proliferations resistance considerations. It says,

8 "Although the developers of the electrometallurgical technique argue that the technology is proliferation resistant, any SNF, that is spent nuclear fuel, processing approach that is capable of separating fissile

materials from associated fission products and transuranic elements could be redirected to produce material with nuclear detonation capability."

And then, a few sentences later it says,

(8)

"Demonstration of this process could however add to the risk that a nation intent on weapons production might consider adapting this technology for possible production of fissile material, although such material would be a poor quality for a weapon."

9

So I think that's a pretty good statement on the capabilities of this technology. And again, it's on the capabilities, not the intents, and the ease to which the current incarnation of this can be converted or modified back to previous ones, which can have this separation capability.

10

On the proliferation concerns that have been raised. We've had several proliferation concerns. One of them was the use and storage -- the proliferation and safety risks that are attended on the transuranic and uranium streams, and this is also a problem that was highlighted in the National Academy of Sciences report.

Some of those concerns, and I say some of those concerns, have been addressed by the modifications that have been referred to, that is combining the transuranic stream with the salt waste, and not separating out the transuranic stream in this form. However, there's still a separation of highly enriched uranium as part of this process, and secondly, as I just stated, there's still the possibility of converting it back to the original state in which the proliferation risks are a problem.

Now beyond that there are additional proliferation risks.

11

One is in terms of the exports -- and we talked about this earlier with regard to the exporting of this technology to other countries. If it's defined as not a reprocessing technology, in fact not defined as a sensitive nuclear technology under the NNPA, Nuclear Non-Proliferation Act, then it can be exported without the kind of rigorous control that should attend a reprocessing technology. And therefore that's one of

12

the reasons I'm concerned that it be addressed that way. Alternatively, if it's not classified as a sensitive nuclear technology, then all the information on it should be publicly available. So I look to see how DOE is going to resolve that aspect of the problem.

13

The third element of the proliferation risks is the U.S. policy on not reprocessing and on attempting to discourage other countries from pursuing reprocessing programs of their own. Now this is a separation technology. It has its origins as part of a closed fuel cycle, so I think most countries would find the modifications that have been made unconvincing as an argument that this is not in fact a reprocessing technology; simply a waste management technology. I think it's fairly easy to predict that countries could then pursue reprocessing, claiming they too need it as waste management technology, rather than a technology to produce plutonium for a closed fuel cycle.

And I guess I will leave at that and I'll submit more extensive comments. I just want to make an additional point with regard to the NEPA process that I alluded to earlier. The whole point of the National Environmental Policy Act analysis is to look carefully at a process at the outset, so as not to go forward and create the momentum for a process to go forward, at which time it's too late to stop it.

All the analyses of the potential impact, environmental and the proliferation and other impact, should be done at the outset. And that to me is clearly being evaded in the way this process is now splintered off into an EA, and only at some subsequent point will there be an EIS, and as we've heard today it's not even clear there would ever be an EIS at any point. There's no clear boundary that I can see as to when that would be required. Thank you. 14

Responses to Document D064

1, 4 The references cited in the environmental assessment have been placed in the Department of Energy public reading rooms. Additional information on this issue is provided in Chapter One of this Appendix.

2 The environmental assessment prepared in 1990 supported modification of the Fuel Conditioning Facility (then called the Hot Fuel Examination Facility-South) to accommodate the now canceled Integral Fast Reactor Program of recycling spent nuclear fuel. Based on a new purpose and need for agency action associated with the Fuel Conditioning Facility. the Department of Energy prepared this environmental assessment.

3, 4 In accordance with 10 CFR Part 1021, the Department of Energy prepared an environmental assessment for the electrometallurgical treatment demonstration project to assist with agency planning and decision making. On the basis of the environmental assessment, the Department of Energy will decide whether to prepare a Finding of No Significant Impact or an environmental impact statement. After issuing the draft environmental assessment, the Department of Energy held public meetings in both Idaho Falls, Idaho, and Washington, D.C. to receive public comments on the environmental assessment. Public comments were also sought in writing, via electronic mail, and over the phone. This public comment period originally was scheduled to conclude March 22, 1996, but was reopened until May 3, 1996. When it was brought to the attention of the Department of Energy that some of the materials referred to in the environmental assessment were not available in the public reading rooms, full sets of these references were distributed. A total of 89 days have been made available for public review and comment. The Department of Energy believes it has met both the letter and the intent of all rules and regulations regarding public involvement in the National Environmental Policy Act process. Additional information on this issue is provided in Chapter One of this Appendix.

5 In the initial development phases of the Advanced Liquid Metal Reactor, the reactor was designed to produce plutonium at a rate equal to its consumption. With the end of the cold war, the Department of Energy determined excess plutonium existed and the

Advanced Liquid Metal Reactor core design was changed so the reactor would be a net plutonium consumer. The commentor is referring to this version of the Advanced Liquid Metal Reactor core design, which could not readily be converted to a plutonium producer. The advanced liquid metal reactor process technology was not capable of producing material suitable for a nuclear weapons program. Lawrence Livermore National Laboratory has independently confirmed this fact. Nonproliferation is further discussed in Chapter One of this Appendix.

The Department of Energy has asked the National Research Council to continue to evaluate the electrometallurgical treatment so that independent analysis will be available.

6 The reprocessing issue is discussed in Chapter One of this Appendix.

7,9 The potential environmental impacts of the proposed demonstration, including its by-product and waste streams, are analyzed in Section 4 of the environmental assessment.

8,9,10 The proposed demonstration project does not separate plutonium. Moreover, the technology employed is not capable of separating plutonium. It is consistent with the nonproliferation policy of the United States, which does not encourage the civil use of plutonium. Accordingly, the United States does not engage in plutonium reprocessing. Further, by removing and then blending down the highly-enriched uranium, the project supports the goal of the United States to seek to eliminate where possible the accumulation of stockpiles of highly-enriched uranium or plutonium. As a result, the proposed demonstration project is consistent with the nonproliferation policy of the United States. An additional response to comments regarding nonproliferation concerns is provided in Chapter One of this Appendix.

11,12 The Department of Energy acknowledges the commentor's concerns regarding sensitive nuclear technology. During the Integral Fast Reactor Program, the Department of Energy conducted appropriate reviews of related technologies for recycling spent nuclear fuel in fast reactors before entering into a technology exchange agreement with Japan. Any nuclear technology which is a candidate for export is subject to sensitive nuclear technology review in accordance with 10 CFR Part 810. The Department of Energy has

been designated to implement this regulation by an interagency task force representing the Department of State, the Arms Control and Disarmament Agency, the Nuclear Regulatory Commission, and the Department of Energy. The Department of Energy has established an Export Control Working Group to make sensitive nuclear technology determinations according to specific guidelines. Any future consideration of exporting electrometallurgical spent nuclear fuel treatment technology would be reviewed according to the Department of Energy's export control procedure.

13 The commentor suggests that the proposed demonstration project is contrary to the current policy of the United States regarding reprocessing and nonproliferation. A detailed discussion of the issues of reprocessing and nonproliferation is found in Chapter One of this Appendix.

14 In accordance with 10 CFR Part 1021, the Department of Energy prepared an environmental assessment for the electrometallurgical treatment demonstration project to assist with agency planning and decision making. On the basis of the environmental assessment, the Department of Energy will decide whether to prepare a Finding of No Significant Impact or an environmental impact statement. For additional discussion of comments related to concerns regarding appropriate level of National Environmental Policy Act review, please see Chapter One of this Appendix.

Thank you. My name is Nils Johnson, and I'm senior legislative assistant for Senator Larry Craig from Idaho. Senator Craig has asked that I read a statement into the record at this time, and that is what my statement will be, which will be in behalf of the Senator, and I'll give you a written copy when I finish.

1 "I would like to express my support for the Department's proposed action to demonstrate electrometallurgical treatment technology for spent nuclear fuel from Experimental Breeder Reactor-II.

"In the past I have been at odds with the Department of Energy over some of its actions and designs, but in this case I am in full agreement. Our country has a serious problem with its spent nuclear fuel. It is a
2 problem that will not go away by itself. It needs creative innovative thinking and new approaches. This is exactly what is found at Argonne National Laboratory in the Electrometallurgical Treatment program.

"As Vice Chairman of the Energy Research and Development Subcommittee of the Senate Energy and Natural Resources Committee, I am faced with the oversight of nuclear fuel cycle technology and research and development of new technologies. The Committee works directly with the questions and problems Argonne's program is trying to answer. It is clear that in the early days of the nuclear era not enough consideration was given to the tail end fuel cycle; what to do with the waste.

"It is equally clear that the need for sound alternatives for treatment and disposition of spent nuclear fuels is growing daily. This program shows great promise that it will provide such an alternative while
3 significantly reducing disposal costs for the numerous fuel types that DOE manages. This should be pursued vigorously and expeditiously.

"This is especially important to the people of Idaho. In the agreement between Governor Batt and the Department of Energy strict dates were established for removing spent fuel and other nuclear wastes from the
4 state. Fuel from EBR-II contains metallurgical sodium, and is not suitable for disposal without treatment. Electrometallurgical treatment of EBR-II fuel is necessary in order for it to leave the state of Idaho and allow the Department to meet its obligation to Governor Batt. Completing this project therefore would be a significant step in fulfilling the agreement and getting nuclear wastes out of Idaho.

"If there are legitimate concerns about the electrometallurgical treatment posing a threat to the
5 environment I would not support it. However there is clearly no significant impact on the environment from the treatment. For the purpose of an environmental assessment these questions have been examined thoroughly and found it posed no problem.

6 "I think it's very important the Department of Energy continue with research and development to allow for treatment of the numerous fuels that will require a disposition and currently within DOE's charge. It is also vitally important that we move forward with a final disposition facility for all of these fuels. That is why I've introduced legislation providing for both interim and final disposal of these fuels and materials.

7 "Again, I would like to commend the Department on its proposal to move forward with this important work. It's exactly the kind of progress I hope and expect from the Department of Energy, and I look forward to seeing the results of this work." Thank you very much.

Responses to Document D065

1,2,3,7 The commentor's statements concerning the demonstration are acknowledged. This demonstration takes advantage of previous research to apply the electrometallurgical technologies in an innovative way for the treatment of Experimental Breeder Reactor-II spent nuclear fuel. Successful demonstration will provide the Department of Energy with important options for dealing with the remaining Experimental Breeder Reactor-II spent nuclear fuel and possibly other types of spent nuclear fuel.

4 Under the terms of the settlement agreement, the Department of Energy is legally obligated to remove spent nuclear fuel (including Experimental Breeder Reactor-II spent nuclear fuel) from the State of Idaho by the year 2035. Without treatment it is unlikely that Experimental Breeder Reactor-II spent nuclear fuel would be suitable for permanent geologic disposal because it contains sodium, a reactive metal. Electrometallurgical treatment is a promising technology for treating Experimental Breeder Reactor-II spent nuclear fuel. If the demonstration were successful, application of the technology could help the Department of Energy to meet this obligation.

5 The environmental assessment analyzed the potential impacts on the environment from completing the proposed demonstration project and found them to be minimal.

6 The proposed demonstration project is for 100 driver spent nuclear fuel assemblies and 25 blanket assemblies. Use of the technology for other types of spent nuclear fuels is beyond the scope of this environmental assessment. If this demonstration is successful, however, it will give the Department the data necessary to decide whether to propose additional application of the technology. Of course, any proposed use of electrometallurgical treatment would be subject to all applicable laws and regulations, including appropriate National Environmental Policy Act review. The proposed action would demonstrate the treatment of Experimental Breeder Reactor-II spent nuclear fuel to make it likely to be suitable for a geologic repository.

My name is Glen Tait, and I'm here as a private citizen, not in my capacity as a legislative assistant to Senator Dirk Kempthorne or Idaho.

To begin with, the NEPA process, as I understand it, is suppose to ensure that the federal government understands the environmental impact of major federal actions. NEPA is not a substitute for decision-making. NEPA is supposed to be an aid in the decision-making process, not a substitute for the process itself. If we look at the proposed actions at Argonne we see the environmental impacts are minimal, are non-existent. They are certainly not a justification to stop the process.

1

The opponents of nuclear power and nuclear weapons have successfully used the NEPA process to tie up decision-making at DOE. We need to return to the congressional intent behind the NEPA law, which is environmental impacts, not debates over non-proliferation and reprocessing, or Congress will change the Act. If we leave policy to the policy arena, instead of allowing putative environmental arguments to skew policy decisions, we see that the Electrometallurgical Treatment Technology Development Program is perfectly legal policy.

2

Some may not like the policy, but they should not be allowed to use untrue allegations about environmental impacts to stop policy decisions they do not agree with. In keeping with the intent of the NEPA law I ask you to consider the environmental impacts of the electrometallurgical demonstration and leave the policies to policymakers. I also urge the DOE to consider the justice of the proposed action.

3

As I understand it environmental justice is now a part of the NEPA process. Well if this is the case consider justice for Idaho.

4

Under the foreign spent fuel final EIS and record of decision, Idaho will receive one ton of foreign spent nuclear fuel for interim storage to help prevent nuclear non-proliferation. Indeed the foreign fuel EIS and the record of decision signed by the Secretary, recommends work on the electrometallurgical process as a way to treat the foreign spent nuclear fuel for final disposition.

5

At the same time critics of the electrometallurgical demonstration projects say, we can't do this work because it is a nuclear non-proliferation threat. In other words, according to the critics, Idaho gets the waste to promote non-proliferation but it can't have the tools to deal with this waste because the tool is erroneously labeled a proliferation threat. Where is the environmental justice in this line of reasoning?" And I'd ask the members to consider that in the Department.

6

The bigger issue facing DOE and the nation is the anti-nuclear effort to terminate nuclear power and ultimately the nuclear weapons complex. As the opponents of nuclear energy know, if they can cripple efforts to handle the waste stream generated by nuclear power they can kill this clean source of energy. To date their record is quite good.

For example, reprocessing of spent fuel is on its last legs at the Savannah River site. The integral fast reactor program's been terminated. The electrometallurgical demonstration process is being challenged here today.

Yucca Mountain is not much more than a repository for ratepayers cash. WIPP is behind schedule and lawsuits loom on the horizon.

Look at Ward Valley. Even a low level radioactive waste disposal site, supported by the state government is under attack by the anti-nuclear activists. The nation has a problem here. The nuclear energy and weapons complex is under siege. If DOE gives in here another nail in the coffin will be hammered in. The point is, we all know the agenda of the opponents of this project. It's not electrometallurgical processing, it's nuclear energy. Let's not let bogus claims about non-proliferation distract from the real issue here. Is there a need for this technology? Yes. Can the work be done in a way that protects the environment? Yes. Is the program consistent with non-proliferation policies? Yes.

7

I urge the Department to look at what is at stake here. Are we going to let anti-nuclear activists stop every effort to address the problems left over from the Cold War and the production of nuclear energy? Are we going to deny the people of Idaho the tools to deal with the waste our nation is asking them to store on an interim basis? Are we going to let non-environmental issues interfere in an environmental assessment?

Our nation needs this technology. We need to show the world there's a better way to deal with spent nuclear fuel. We need to show the anti-nuclear activists that we know they are trying to tie our hands so that we as a nation drown in nuclear waste, and we won't let them. I urge the DOE to complete the EA and issue of finding of no significant impact. That is what all the environmental data indicates."

8

9

And I think just to kind of conclude and to clear where I'm coming from, that they're not challenging essentially the environmental problems here, they're raising it's reprocessing; it's a non-proliferation threat. But if you look at the people who say it's not, and this Department of Energy who have taken very strong strides to prevent nuclear proliferation, Hazel O'Leary's Department of Energy; Ken Luongo, Union of Concern Scientists, Robert Nordhaus.

The people at that Department -- when you acknowledge that they agree this is not a threat, and you go to the spectrum of Larry Craig and Dirk Kempthorne of Idaho, from that conservative perspective, and the Clinton Administration perspective, if in that spectrum there's agreement, the people who are criticizing this, I think one can safely say, if they're not in that broad spectrum they're really not in the mainstream here, and I really think if you look at what their objectives are you'll see it's not electrometallurgical processing, it's choking the nation with the waste stream.

And look, they don't want us to ship. They don't want us to move it. They don't want us to treat it. They want it sitting in every site so that every community eventually gets fed up that we've become a repository, so kill the reactor. And it's pretty obvious that that's what they're doing it seems to me, and I hope you all would take a look at that and let this project go forward.

10

Thank you.

Responses to Document D066

1,9 The commentor's statement on this demonstration is noted. The environmental assessment analyzed three alternatives in detail and considered several other process alternatives which were eliminated from detailed evaluation. In general, the excluded alternatives had not reached a level of development that would allow a detailed evaluation. Evaluation of alternative processes that were identified in the public comment period have been added to the environmental assessment, Section 2.1. The potential environmental impacts that would result from implementing a conceptual treatment process cannot be analyzed in equal detail relative to the impacts that can be quantified for a process that has reached an adequate level of technical maturity. As described in the environmental assessment, the impacts of the proposed action and the alternatives, including the limited treatment alternative, were found to be extremely small.

2 The Department of Energy is pleased to pursue full public participation in its decision-making process from all interested parties representing a variety of views. Of course, the potential impacts a project would hold for the environment are a major consideration when making a decision.

3 Public participation is a central component of the National Environmental Policy Act process and the Department of Energy values the participation of all stakeholders. In deciding its next step, the Department of Energy will consider strongly the impacts on the environment which reasonably could be expected. As described in the environmental assessment, the impacts of the proposed action and the alternatives were found to be small.

4,6 Executive Order 12898 requires Federal agencies to identify and address "disproportionately high and adverse human health or environmental effects" of programs, policies, and activities on minority or low-income communities. The analysis in the environmental assessment, which incorporates the analysis prepared for the *Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management*

Programs Environmental Impact Statement (DOE/EIS-0203-F), indicates that the potential environmental impacts of the proposed action to any segment of the public or the environment are very small. As a result, the potential environmental impacts on minority or low-income populations do not appear to be disproportionally high and adverse within the meaning of Executive Order 12898. The analysis contained in the environmental assessment is consistent with the Council on Environmental Quality's *Draft Guidance for Addressing Environmental Justice Under the National Environmental Policy Act*, dated April 15, 1996. Implementation of the Order by the Department of Energy may change subject to the issuance of future guidance from the Council on Environmental Quality, the Environmental Protection Agency, or the final Department of Energy Guidance. Section 4.6 of the environmental assessment has been reviewed for clarification.

5,8 The Department of Energy acknowledges that there may be many benefits of electrometallurgical treatment of spent nuclear fuel. However, the scope of this environmental assessment is the electrometallurgical treatment of 100 Experimental Breeder Reactor-II spent nuclear fuel assemblies and 25 blanket assemblies; other benefits realized through electrometallurgical treatment are beyond the scope of the environmental assessment. The Record of Decision referred to by the commentor did not exist as of May 7, 1996.

7,10 The Department of Energy acknowledges the commentor's statement on electrometallurgical treatment technology, as well as the commentor's understanding that it poses a minimal threat to the environment and is consistent with the nonproliferation policy and goals of the United States.

Best Western STARDUST MOTOR LODGE

Charles D. Marshall
General Manager

700 Lindsay Boulevard • Idaho Falls, Idaho 83402
(800) 527-0274 • (208) 522-2910 • Fax (208) 529-8361

STARDUST MOTOR LODGE

March 8, 1996

W. Gregory Bass, EA Document Manager
Argonne Area Office - West
P.O. Box 2528
Idaho Falls, Idaho 83403-2528

Dear Mr. W. Gregory Bass:

1 As a business person in the community, I feel it is imperative to the entire state that we embrace the economic opportunity of the Electrometallugical Treatment Research and Development Project with open arms. Over the last three years we have seen a major down turn in our economic growth with the downsizing of INEL.

2 I vigorously endorse the Electrometallugical Treatment Research and Development
3 Project. This is a great opportunity to stimulate and enhance the economic community of Idaho Falls.

Sincerely,

Chuck Marshall
General Manager
Best Western Stardust

700 Lindsay Blvd. • Idaho Falls, ID 83402
1-(800) 527-0274 • (208) 522-2910

Responses to Document D067

1,3 The socioeconomic impacts of the proposed demonstration project were analyzed in the environmental assessment, and adverse impacts were found to be minimal.

2 The Department of Energy acknowledges the commentor's statement on the proposed demonstration project.

State of Idaho

PHILIP E. BATT
Governor

OVERSIGHT PROGRAM
IDAHO NATIONAL ENGINEERING LABORATORY • 800/232-4635

ROBERT N. FERGUSON
Coordinator/Administrator

900 N. Skyline, Suite C • Idaho Falls, ID 83402 • 208/528-2600 • (FAX) 208/528-2605
1410 N. Hilton • Boise, ID 83706 • 208/373-0498 • (FAX) 208/373-0429

March 14, 1996

Mr. Greg Bass, EA Document Manager
U.S. DOE, Argonne Group-West
PO Box 2528
Idaho Falls, ID 83403

RE: State of Idaho Comments: Draft Environmental Assessment for the Electrometallurgical Treatment Research and Demonstration Project in the Fuel Conditioning Facility at Argonne National Laboratory-West, DOE/EA-1148

Dear Mr Bass:

Thank you for the opportunity to comment on the above referenced document. Our comments are both general and specific in nature.

GENERAL COMMENTS

1 The document is not entirely clear nor concise on the facility/equipment to be utilized, nor the waste forms that would be generated. For example, the description of the proposed action, page 27 and following, states that both driver and blanket assemblies are to be processed, but does not clearly state that two electrorefining cells are to be used. The

2 description of the 'higher efficiency' refining process almost sounds like it is an optional activity involving a reconfiguration of the same device. This could be clarified by stating in the opening paragraph of the section 'Description of proposed action' that electrorefining and 'higher efficiency' electrorefining are essentially the same process using two slightly different apparatus. Further clarification could be gained by stating concisely what the waste types are (or

3 products, however one cares to describe them). It is clear that ingots of uranium (blended with depleted uranium or not), ceramic logs of salt and transuranic wastes, and metal waste forms are to be produced (pg 29), but pg 42 mentions casting metal waste forms. This needs clarification.

4 In general, the sections of the document dealing with wastes and waste management would be improved by rewriting them to clarify what the waste streams are, how they are generated and in what quantities and how they will be stored, treated and disposed of.

5 What is the purity of the HEU derived from this process? Will any of the fission products present in the EBR-II fuel

Investigate • Evaluate • Report

(5) be present in the HEU collected from this process? If so, which radionuclides? What will the activity of the HEU be before and after blending?

6 Throughout the document fissile material, transuranic, and other radioactive wastes are discussed of in terms of mass and volume, but not curie content. Better understanding of the process would be gained by reporting in terms of activity, also.

7 The document needs to identify the computer code (name and version) used to calculate impacts from accidents to both the workers and the public. This includes both fixed facility and transportation accidents.

8 The document cites CAP 88 as its computer model and states that (on page 73) "several consecutive years worth of atmospheric data" were used as input; however none on this input data is tabulated or referenced so that the reader can reproduce their results (or at least verify that the input makes sense).

9 According to Recommendations for the Preparation of Environmental Assessments and Environmental Impact Statements, May 1993 , Section 6.2, page 21, second bullet "Consider all routes of exposure, not just the obvious route." Listed below are some locations where this may be applied:

Page 82, Table 4-1, doses for the MEI should include Ground Surface and Ingestion pathways since the individual is off-site.

Page 84, para 2, ground surface and ingestion pathways should be evaluated even though an individual is evacuated during plume passage at site boundary locations. Individuals who reside at the site boundary will return to their homes after the plume has passed and deposition has occurred.

Page 87, Table 4-2, and Page 91, Table 4-3, doses calculated should include ground surface and ingestion pathways as individuals off-site will return after plume passage and reside in affected areas.

Pages 117-120, Tables 5-1, 5-2, 5-3, 5-4, dose equivalents listed should include all pathways for off-site personnel.

10 The range of alternatives evaluated seems rather narrow. Perhaps some of the other technologies (p. 6,7) should have been given further consideration. Also, the alternative of processing at TAN doesn't seem viable; an alternate methodology would seem like

11 more of a real alternative than an alternate location on the INEL.

SPECIFIC COMMENTS

Glossary of Terms

12 Because the electrorefining process is being used to stabilize, rather than reprocess, sodium-bearing EBR-II fuel, the term "high-level waste" as applied to the highly radioactive product of the process is inappropriate and should not be used. The State considers the highly radioactive product of the electrorefining process to be stabilized spent fuel (see definition of stabilization at page E-33, Volume 2, part B of the Programmatic Spent Nuclear Fuel Management and INEL Environmental Restoration and Waste Management Final EIS). The definition of spent fuel should be changed accordingly.

Page 1, footnote 1

13 "Seventeen metric tons of disassembled EBR-II spent nuclear fuel are in storage at the Savannah River Site."

Is this included in the 25.5 metric tons mentioned in the first paragraph? Why is it mentioned at all?

Page 4, section 2.1 Alternatives Considered But Not Analyzed in This Environmental Assessment

14 Are there any other methods that could possibly be used to remove the sodium from EBR-II fuel?

Page 5, para 2

15 "...DOE's chosen method for stabilizing the EBR-II blanket fuel..."

Could this Savannah River reprocessing facility also take the fuel in Idaho as well?

Page 7, para 2

16 "Treatment at a location outside of the INEL is not a reasonable alternative because, with the exception of six assemblies located at the Hanford Reservation in Washington, all the sodium bonded fuel in the DOE inventory is located at the INEL."

Please explain why sodium bonded fuel could not be transported to another location. According to the EA (pg 1), seventeen metric tons of EBR-II fuel has been moved to SRS in the past and disassembled.

Page 25, para 3

17 "...in the context of a larger, global waste management plan..."

What does "global" mean in this context?

Page 54, section 2.5, Demonstration at an Alternative Facility and Location

18 This section discusses conducting the technology demonstration at Test Area North on the INEL and seems to be little more that a "straw man" alternative set up to show why it should be done at ANL-W. Nowhere in the EA is a reason given why the necessary amount of fuel could not be moved to an off INEL location for the demonstration.

Page 64, para 4

19 "Neither the INEL nor the surrounding counties are designated as a nonattainment area..."

Portions of nearby Bannock and Power counties (within 50 miles of the INEL) are nonattainment areas for PM 10.

Page 65, last para.

20 "Essentially no surface water bodies drain onto the INEL..." is inconsistent with "Streams entering the INEL include the Big Lost River, Little Lost River, and Birch Creek." These statements should be clarified.

Page 79, Sec. 4.2

21 None of the accident scenarios evaluated are specific to electrorefiner operation and, therefore, do little to distinguish between alternatives.

Page 84, first para.

22 Since the access road and parking lot at ANL-W are open to the public, it could be argued that the MEI should be located at the facility parking lot rather than at the intersection of U.S. 20 and the site boundary.

Page 84, para 1

23 "Because most accidents evolve slowly, the radiation dose to involved and uninvolved would be the same in most cases. This is a conservative approach because it represents the highest concentrations of workers."

It may be conservative for the worker population dose, but there is no documentation or references to support this. Further, it clearly is not conservative for an individual worker directly involved in the accident (say 5 meters away).

(23)

In addition it would be extremely useful to document the claim that "most accidents (from these types of facilities) evolve slowly,...." and to define "slowly". It is with respect to the time it takes an individual to evacuate to the bus staging area? Is it with respect to the 15 minute exposure time of the document's assessment?

Page 95, para 2

24 "The reduction in low-level waste volumes is offset by a net increase in the amount of transuranic waste."

Will this waste be transportable to WIPP as is or will additional treatment be necessary?

Page 96, Sec. 4.4.2

25 The discussion of possible designation of metallic sodium bonded fuel as a RCRA waste appears inconsistent with "The Proposed Action will not require additional RCRA permits." Does this statement remain true if SNF is determined to be a solid waste?

Page 97, para 5 & Page 103, para 2

26 "...would be treated under a Generator Treatment Permit before the material is shipped off the ANL-W site."

Please describe what a generator treatment permit is. What facility would the material be treated at and when would it be treated?

Page 99, Table 4-4.

27 "(Process Wastes) Fuel Assembly Hardware - (final disposal) GR"

If GTCC, would the waste be ready to go to Yucca Mountain or some other GR for disposal? GR doesn't necessarily mean Yucca Mountain does it?

Page 99, Table 4-4.

28 "(Incidental Wastes) <100 nCi/g- (final disposal) RWMC"

Wastes containing greater than 10 nCi/g of TRU radionuclides are prohibited from disposal in the RWMC. Current planning at the INEL is that >10 to <100 nCi/g TRU contaminated wastes will be

(28) treated along with actual TRU wastes at the Advanced Mixed Waste Treatment Facility and codisposed with it at WIPP.

Page 99, Table 4-4.

29 "(Incidental Wastes) >100 nCi/g - (final disposal) WIPP"

This waste (and all other wastes slated for WIPP disposal) will have to meet WIPP WAC.

Page 99, Table 4-4.

30 "(Decommissioning Wastes) Electrorefiner Cadmium - (waste category) MW - (interim storage) RSWF - (final disposal) WIPP" "Cd contaminated - (waste category) MW - (interim storage) RSWF - (final disposal) WIPP"

Is this material a TRU waste? If not it cannot go to WIPP.

Page 100, para 1

31 "...and such materials must be disposed of in a geologic repository...strategy."

Is this "strategy" still current thinking?

Page 100, para 2

32 This paragraph, beginning "Therefore, some treatment of spent fuels..." appears to be misplaced. Does it belong on page 97 following the quote from the Director of OCRWM?

Page 102, para 3

33 Presumably industrial and sanitary waste are synonymous. If so, a single term should be used.

Page 103, para 2

34 "This equipment is very similar to the cadmium plated bolts and tools that were sold in hardware stores for uses where a protective coating was required."

This statement does not appear to be totally accurate.

Page 103, para 2

35 "...until the treatment is completed..."

Is this statement accurate?

Page 108, Table 4-7.

36 "DOE Inventory" and "DOE/INEL Inventory"

How were the numbers in this table arrived at? They do not compare well with those in the recent Draft Programmatic Waste Management EIS.

Page 112, para 2

37 "Further, this technique does not yield separated plutonium byproducts, and is incapable of yielding a pure separated plutonium stream."

Can the process be modified (changes in salt solutions, different anodes and/or cathodes, changes of electrical current, pretreatment of feed materials, etc) to extract plutonium?

Should you have any questions regarding the State's comments you may contact Alan Merritt of this office at (208) 528-2600.

Sincerely

Robert N. Ferguson
Administrator

cc: Ann Dold, Manager
Alan Merritt, Environmental Scientist
Jerry Downs, Environmental Scientist
Flint Hall, Environmental Scientist
Richard Durante, Sr. Health Physicist
Kathleen Trever, Deputy Attorney General
Jeff Schrade, Special Assistant to the Governor
Senator Larry Craig
Senator Dirk Kempthorne
Representative Mike Crapo
Representative Helen Chenowith
Delbert Farmer, Chairman, Ft. Hall Business Council
Roger Twitchell, DOE-ID NEPA Compliance Officer
File- 20.0 NEPA-EA miscellaneous

7

Responses to Document D068

1 The equipment is described in Section 2.3 of the environmental assessment. The quantity of each waste type is summarized in Table 4-6 of the environmental assessment. Clarifications were added to the environmental assessment text.

2 The second electrorefiner is described as the High Efficiency Electrorefiner in the environmental assessment Section 2.3. Clarifications were added to the environmental assessment text in Section 2.2 and 2.3.

3 The metal waste forms as well as the low-enriched uranium ingots for storage are produced in the casting furnace, as described in Section 2.3 of the environmental assessment. Clarifications were added to the environmental assessment text in Section 2.3.

4 Tables 4-4 and 4-6 and Section 4.5 of the environmental assessment summarize waste types, categories, interim storage locations, and final disposal locations. The waste information is summarized in Figure 4-2 of the environmental assessment. Sections 4.5 and 2.3 were edited to improve clarity.

5 There is no known accurate method for predicting the uranium contamination under actual operating conditions. However, the uranium is expected to be contaminated with zirconium and other trace impurities. The impurity levels and radionuclide activities would be determined when the materials become available.

6 The curie content for the blankets (3400 curies) and driver (30,900 curies) assemblies were added to the environmental assessment Section 2.2. The curie content per volume and principal isotopes for the ceramic and metal waste forms have been added to the environmental assessment in Section 4.5. Curie content will change with time due to radioactive decay. For consistency, curie content was calculated for 15 months after reactor shutdown. The actual curie content will be smaller because the decay period of all the spent nuclear fuel is already greater than 15 months.

7 ORIGEN-II and RSAC Version 5.2 computer codes were used in accident analyses. The information was added to Section 4.2 of the environmental assessment.

8 The detailed air emission calculations used the same methodology that is used to report the Idaho National Engineering Laboratory annual emissions. The environmental assessment was changed to include a reference to the Department of Energy's *1994 Idaho National Engineering Laboratory National Emission Standard for Hazardous Air Pollutants-Radionuclides*, DOE/ID-103342 (94), June 1995.

9 Section 6.2 of the document titled *Recommendations for the Preparation of Environmental Assessments and Environmental Impact Statements* refers to releases from normal operations. Section 6.4 deals with accident analysis. The accident analysis in the environmental assessment follows standard practice and conforms to the recommendations in Section 6.4 of the reference cited. This includes consideration of the ground surface and ingestion pathways for all off-site population doses.

10,11,14 The environmental assessment analyzed three alternatives in detail and considered several other alternatives which were eliminated from detailed evaluation. Other options that were identified during the comment period have been added to Section 2.1. In general, the excluded alternatives had not reached a level of development that would allow a detailed evaluation and would require significant speculation.

The Department of Energy commissioned an independent study to evaluate TAN and other Idaho National Engineering Laboratory facilities for a mission to treat remote handled wastes. As a result, the Department of Energy believes that the TAN facility is a reasonable alternative for evaluation.

12 The definition of high-level radioactive waste as employed in the environmental assessment comes from the Nuclear Waste Policy Act which states " (A) the highly radioactive material resulting from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations; and (B) other highly radioactive material that the Commission, consistent with existing law, determines by

rule requires permanent isolation." The waste forms given in Table 4-4 of the environmental assessment that are categorized as high-level waste will be qualified as such because they contain large quantities of fission products and are highly radioactive. These materials are therefore assumed to require permanent isolation. For the purposes of meeting the agreement between the State of Idaho and the Department of Energy to remove spent nuclear fuel from the State, these materials will be treated as spent nuclear fuel.

13 The 17 metric tons of Experimental Breeder Reactor-II spent blanket elements at Savannah River are not included in the 25.5 metric tons cited in the table as the inventory at the Idaho National Engineering Laboratory. The decladded Experimental Breeder Reactor-II blanket spent nuclear fuel stored at the Savannah River Site is mentioned for completeness.

15 In principle, the Savannah River spent nuclear fuel reprocessing plants could handle the Experimental Breeder Reactor-II spent nuclear fuel. At this time, F Canyon is the only operating spent nuclear fuel processing facility at Savannah River and is handling only solutions in process and "at risk" spent nuclear fuels. If Savannah River were to process Experimental Breeder Reactor-II spent nuclear fuel, the old electrolytic dissolver would have to be refurbished or a new chop-leach facility would have to be built to handle the dissolution from stainless steel cladding. The current process is used for aluminum clad spent nuclear fuel. Stainless steel spent nuclear fuels are more compatible with the process at the Idaho Chemical Processing Plant (ICPP). The ICPP option was discussed in Section 2.1. The F Canyon at Savannah River currently does not process highly-enriched uranium, so would have to be modified in order to process the driver spent nuclear fuel.

16,18 In principle, it would be possible to ship the Experimental Breeder Reactor-II spent nuclear fuel off the Idaho National Engineering Laboratory, but would be contrary to the Records of Decision for the *Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Environmental Impact Statement*. However, for purposes of this environmental assessment and the proposed limited demonstration, an

alternative requiring the transportation of sufficient spent nuclear fuel to conduct a demonstration, the removal and decontamination of the existing electrorefiner and associated equipment, the transportation of that equipment to another location, and the construction of a new hot cell is an unreasonable alternative because of a larger impact on geology and soil and water resources due to the required construction, extensive waste generated from required facility modifications and relocation of the nuclear materials presently stored in the facility, and offsite transportation impacts. This information was added to Section 2.1 of the environmental assessment.

17 The term "global waste management" was from the National Research Council's evaluation of the electrometallurgical process. The National Research Council was referring to spent nuclear fuel management throughout the Department of Energy complex.

19 The statement in Section 3.2 of the environmental assessment has been revised.

20 The statement in Section 3.3 of the environmental assessment has been revised.

21 The breach in argon cell accident (Design Basis Metal Fire as a Result of a Design Basis Earthquake) is considered the design basis accident for the facility. In the metal fire caused by this accident, the chopped spent nuclear fuels, solid cathode products, and other pyrophoric materials which are outside of defense-in-depth containers are assumed to burn. Since the burning material is part of the treatment operation, this accident would not exist for the No Action alternative.

22 The access road and parking lot are open only to (and frequented only by) those members of the public on official business. As a result, the maximally exposed individual was assumed to be at the nearest uncontrolled location regularly frequented by members of the general public, which is near the intersection of the public highway and the access road to Argonne National Laboratory-West.

23 The release to the environment in all but three of the design basis accidents analyzed for the environmental assessment is from the 61-meter stack. The beyond design basis

accident events and the remaining three design basis accident events include some release into the facility. In the stack-release events, the involved worker (individuals within Fuel Conditioning Facility) and the uninvolved worker (all Argonne National Laboratory workers not in Fuel Conditioning Facility) receive the calculated doses during the evacuation process (calculated at the bus staging area). Therefore, the dose to the involved and uninvolved workers (as shown in Table 4-1) is the same for these accidents. For those design basis accident accidents which involve a release into the Fuel Conditioning Facility (Argon Cell Cooling Fails Off, Normal Power Fails, and Air Cell Exhaust System Flow Reversal), an incremental dose to the involved worker is noted in Table 4.1. For the beyond design basis accident events it was conservatively assumed that all workers received a dose calculated for an involved worker. The statement quoted in the comment ("Because most accidents evolve slowly...") was in reference to the total time of the event, including plume travel. The environmental assessment Section 4.2.1 has been revised to clarify this point.

24 Before transport to the Waste Isolation Pilot Plant, transuranic waste will be packaged according to current Waste Isolation Pilot Plant Waste Acceptance Criteria (Waste Acceptance Criteria for Waste Isolation Pilot Plant - DOE/WIPP-069 Rev. 5, April 1996).

25 To date, there has been no official designation by the Department of Energy, the State of Idaho, or the United States Environmental Protection Agency that spent nuclear fuel is a regulated material under the Resource Conservation and Recovery Act. Should the regulatory status of the material change, the Department of Energy would comply with all applicable laws and regulations.

26 The Draft environmental assessment should have referred to a "generator treatment plan" rather than a "generator treatment permit." The generator treatment plan conforms to 40 CFR Part 268.7(a)(4) and IDAPA Section 16.01.5011. The mixed waste would be treated in Fuel Conditioning Facility or Hot Fuel Examination Facility. The environmental assessment has been corrected.

27 There are no criteria for packaging Greater Than Class C waste for a geologic repository. "Geologic repository" does not refer specifically to Yucca Mountain, but to a geologic repository wherever located.

28 Argonne National Laboratory segregates alpha low-level (<100 and >10 nCi/g transuranic) wastes from transuranic and low-level wastes. Alpha low-level waste is shipped to Radioactive Waste Management Complex for storage prior to final disposition. This practice would not change under any alternatives analyzed in the environmental assessment.

29 Waste eligible for disposal at Waste Isolation Pilot Plant will be packaged to meet Waste Isolation Pilot Plant waste acceptance criteria.

30 All waste generated at Argonne National Laboratory-West is characterized, packaged, and shipped appropriately. Determination of whether a waste is transuranic waste will be made after completion of analysis by the analytical laboratory at Argonne National Laboratory-West.

31 The Department of Energy is developing the strategy for Greater Than Class C (Department of Energy Special Case) waste. Section 4.5 describes the current Department of Energy activities in evaluating management options for these wastes. That activity is outside the scope of the proposed action or any of the alternatives.

32 The paragraph was misplaced and the environmental assessment has been revised.

33 Industrial and sanitary wastes are the same. The environmental assessment has been revised.

34,35 These statements in the environmental assessment are accurate.

36 The reference for the numbers in Table 4-7 is given in the environmental assessment in Section 4.5. Using numbers from the *Draft Programmatic Waste Management Environmental Impact Statement* would not change the conclusions.

37 To separate plutonium and transuranics, a different cathode (liquid cadmium) would be required. Such a cathode is not part of this demonstration but was being developed as part of the now terminated Integral Fast Reactor program. There is no change to the proposed demonstration project that could be made to extract pure plutonium. See Chapter One of this Appendix for a discussion of proliferation aspects.

March 11, 1996

Gregg Bass
Argonne Area Office - West
P.O. Box 2528
Idaho Falls, Idaho 83403-2528

Subject: Environmental Assessment (EA) for the Electrometallurgical Treatment Research and Demonstration Project

Dear Mr. Bass

I attended one session of the public hearings that were held at the Shilo Inn in Idaho Falls on February 21st. I have also read the EA documentation and would like to make the following written comments for the record.

1 2 3 4 *I support the demonstration project and encourage you to proceed with approval. After reviewing the proposed project and its impact on the environment, I am comfortable with the assessments conclusion of negligible impact.* It seems reasonable and necessary to take this step at this time in order to provide needed information prior to making any decision on large scale stabilization and storage of reactor fuel and byproducts. I realize that this is only one of several viable alternatives and hope that you are actively pursuing other attractive processes, so that future choices have the best options to pick from.

5 At the hearing almost all of the opposition and support appeared to be either "anti-nuclear or pro-nuclear in general" with arguments that were not relevant to this specific EA. I felt that the moderator and the Department of Energy were too accommodating in allowing each side to diverge outside of the hearing's scope. There is a proper time and place for all arguments, and I believe that the public should be encouraged to voice appropriate arguments at the appropriate time.

Sincerely,

Kim Davies

Kim Davies
Moore, Idaho 83255

Responses to Document D069

1,2,3,4 The commentor's statement concerning the demonstration is acknowledged. Completion of the demonstration will provide the Department of Energy with the data needed to decide whether to apply it to the remainder of Experimental Breeder Reactor-II spent nuclear fuel or other Department of Energy spent nuclear fuel.

5 The Department of Energy recognizes the value of all stakeholders' comments, the importance of public involvement as a decision making tool, and the right of individuals, agencies, and groups to express their opinions as an integral part of the National Environmental Policy Act process.

WALLACE B. BEHNKE, P.E.
Consulting Engineer
323 Glen Eagle
Kiawah Island, SC 29455

Office Phone
(803) 768-1590

FAX
(803) 768-2063

March 9, 1996

Mr. Greg Bass. EA Document Manager
U.S. Department of Energy
Argonne Group-West
P.O. Box 2528
Idaho Falls, Idaho 83403

Dear Mr. Bass

The following is in response to the request I received from Dr. Terry R. Lash, Director, Office of Nuclear Energy, Science and Technology for comments of the Draft Environmental Assessment for the Electrometallurgical Treatment Research and Demonstration Project in the Fuel Conditioning Facility at Argonne National Laboratory - West (the draft).

My comments derive from the knowledge and experience gained from a life-long career in the energy field and more than 25 years of service on various independent review committees for EBR II and related facilities, service as a member of the Board of Governors for Argonne National Laboratory from 1982 through 1990 and the University of Chicago Scientific and Technical Advisory Committee from 1991 through 1995. I am familiar with the technology which this project is intended to demonstrate as well as the environmental characteristics of the site and the environmental, health and safety culture at Argonne-West. My comments follow:

1. I believe that the draft provides an accurate summary description of the project as well as identification of alternatives and assessment of the environmental impacts of each. 1

2. I agree with the recommendations of the National Research Council report entitled "An Assessment of Continued R&D into an Electrometallurgical Approach for Treating DOE Spent Nuclear Fuel" and especially the desirability of pursuing this alternative through a meaningful demonstration. Only in this way can a legitimate assessment be made of the relative merits of this process for addressing the vexing problem of disposing of the sodium saturated spent nuclear fuel in the DOE inventory. 2

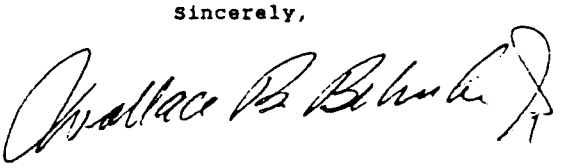
3. In my judgement, the electrometallurgical treatment of up to 100 EBR II spend fuel driver assemblies and 25 spend fuel blanket assemblies represents the minimum demonstration effort required to confirm the technical feasibility of this process and provide the through-put necessary to complete the research and testing of resulting waste forms so as to provide the information DOE needs to determine whether to propose applying this technology to the remainder of the EBR II spent nuclear fuel or other such other sodium saturated fuels. 3

4. The draft makes a compelling case in favor of the proposed demonstration over other alternatives. It is hard to conceive of a legitimate argument that could be advanced at this point to justify delaying this demonstration pending further study of alternatives.

5. The draft and supporting documents make a clear case that there would be only a negligible impact on the environment resulting from conduct of this demonstration and further that the draft provides an adequate basis for a finding of no significant impact by DOE upon completion of the public comment period.

In summary, DOE has a substantial inventory of sodium saturated spent nuclear fuel at INEL and Argonne-West. While this fuel is relatively stable and constitutes no immediate threat to the environment, these materials will deteriorate over time. In my view, there is an urgent need to complete the development of an environmentally benign and proliferation resistant process for placing these materials in a form suitable for long-term geological internment. The electrometallurgical process appears to have the highest potential of the alternatives available for satisfying this requirement. Proceeding with this demonstration will have no significant environmental impact. Failure to proceed promptly will result in considerable delay cost, undermine staff morale and make it increasingly difficult to retain the high competence required to see the demonstration through to a successful conclusion. Argonne-West has been ready to start-up the demonstration since last September. For all the reasons stated in the draft, further unnecessary delay should be avoided.

Sincerely,



Responses to Document D070

1 The Council on Environmental Quality's National Environmental Policy Act regulations (49 CFR Parts 1500-1508) require that an environmental assessment briefly describe the purpose and need for the proposed action; list alternatives, including no action; and describe the affected environment and the environmental consequences associated with the proposed action and alternatives. The environmental assessment meets these requirements. In the environmental assessment, Section 1 describes the purpose and need for the proposed action; Section 2 describes the alternatives being considered; Section 3 describes the affected environment; and Sections 4 and 5 describe the environmental consequences of the proposed action and alternatives.

2,3 The commentor's statements that this demonstration is needed to make a meaningful determination of the capabilities of this technology are acknowledged. The proposed demonstration is sized to meet the objectives outlined by the National Research Council.

4, 5 The environmental assessment analyzed three alternatives in detail and considered several other process alternatives which were eliminated from detailed evaluation. In general, the excluded alternatives had not reached a level of development that would allow a detailed evaluation. Evaluation of alternative processes that were identified during the public comment period have been added to the environmental assessment, Section 2.1. The potential environmental impacts that would result from implementing a conceptual treatment process cannot be analyzed in equal detail relative to the impacts that can be quantified for a process that has reached an adequate level of technical maturity.

6,9 The commentor's statement on the demonstration is acknowledged.

7,8 The Department of Energy acknowledges that there may be many benefits of electrometallurgical treatment of spent nuclear fuel. However, the scope of this environmental assessment is the electrometallurgical treatment of 100 Experimental Breeder Reactor-II spent nuclear fuel assemblies and 25 blanket assemblies; other benefits realized through electrometallurgical treatment are beyond the scope of the environmental assessment.

March 11, 1996

Dear Mr Bane

I am writing to oppose any plan
1 to reprocess spent nuclear fuel.
Reprocessing only creates more
nuclear pollution and consumes
large amounts of money needed
2 instead to clean up the nuclear
environmental problems created in
the past.

Before a single step is taken in
3 the direction of reprocessing an EIS
must be performed (or EA would
not be sufficient. Phyllis Clausen, 317 Stella Rd.
Post Falls, ID 83854

Responses to Document D071

1,2 The commentor's statement on the demonstration is noted. This project would treat a portion of the Experimental Breeder Reactor-II spent nuclear fuel inventory. It would not "reprocess" spent nuclear fuel, as that term is usually understood. Reprocessing typically recovers plutonium, whereas this technology places the plutonium in a viable waste form along with the fission products. The treatment of the sodium-bonded spent nuclear fuel is required because its reactive characteristics will likely not allow its disposal in a geologic repository in the present form (see Section 4.4.2 of the environmental assessment). The information from this project would allow the Department of Energy to make decisions on effective and economic methods to address its environmental problems with spent nuclear fuel disposal. More detailed information on reprocessing is provided in Chapter One of this Appendix.

3 In accordance with 10 CFR Part 1021, the Department of Energy prepared an environmental assessment for the electrometallurgical treatment demonstration project to assist with agency planning and decision making. On the basis of the environmental assessment, the Department of Energy will decide whether to prepare a Finding of No Significant Impact or an environmental impact statement.

LEONARD J. KOCH
1 E 16 DESERT SKY ROAD
TUCSON, AZ 85737-7689

PHONE
(520) 742-5807
(520)

March 13, 1996.

Mr. Greg Bass, EA Document Mgr.
U.S. Dept. of Energy.
Argonne Group-West.

Dear Mr. Bass:

Thank you for providing an opportunity to comment on the Electrometallurgical Treatment Project in the FCF at ANL west. I am not in a position to comment on the details of the evaluation of the Environmental Assessment of the Project, but I believe I am qualified to comment on the importance of the Project, particularly the long range Technical significance of this work. I assume that this is a very important aspect of the evaluation.

In 1945 I attended a Seminar by Enrico Fermi in which he described the long term potential of nuclear power. I was convinced, and devoted the balance of my professional career dedicated to bringing his predictions to fruition. The application of nuclear power around the world have confirmed Fermi's assessment of its vast potential except for the management of "high level nuclear waste" (more correctly: the management of nuclear reactor spent fuel).

The Department of Energy inherited a reasonably broad and well developed technology base for a variety of nuclear reactor types (research, power, production, special purpose, etc) and a variety of nuclear fuels (metal,

ceramics, shapes, structural materials, etc.). There was not, however, a similar technology base for management of spent fuel. Simultaneously, DOE has been under tremendous pressure to do "something" about the "waste" from military operations, from R&D programs and from Civilian Nuclear Power Programs. Because of the limited Technological Base for Spent Fuel Management, the near term options were essentially limited to "disposal as is." Other countries have made some (limited) progress toward extracting some value from the spent fuel and improving its storageability, but they have simultaneously increased concern about nuclear weapons proliferation.

Although its primary effort has been directed to near term management of spent fuel, DOE has continued to develop long term potential options. The Electrometallurgical R&D offers an opportunity to provide a further option to significantly improve spent fuel management. The National Research Council Review Committee strongly endorsed the continued development of this technology until a clear determination of feasibility can be made.

I believe that the technical justification for the continuation of this program has been well established. As to the question of whether DOE is pursuing it properly and prudently, I offer the following:

-3-

1. The Fuel Conditioning Facility (FCF) is a one-of-a-kind, unique facility designed to perform the developmental and demonstrational activities that are required to support the Electrometallurgical Project.

2. The FCF has been operational for more than 25 years and has been used very successfully to perform very similar operations as are required in support of the Project.

3. DOE has made a significant investment (time, money, equipment, manpower) to upgrade this facility to current standards and to improve its capabilities.

4. An experienced and superbly qualified staff of people is available to operate this facility safely and efficiently.

5. This facility is unique in the entire world. This program cannot be conducted anywhere else without a significant (greater) investment than has already been made at the FCF.

6. The FCF is ideally located at the Idaho site which is equipped to support this.....

-4-

(8) type of developmental activity.

7. Because of the basic characteristics of the processes involved in the Electrometallurgical
9 process and the design of the facilities and the way they are operated, diversion of nuclear materials is virtually impossible.

8. The Electrometallurgical Project has the potential to develop and demonstrate the technology applicable to a variety
10 of reactor spent fuels. Although the primary objective is to provide effective management of EBR-II spent fuel, it can be applied also to the management of spent fuel from other DOE reactors; including the spent fuel for which a management strategy is not yet available.

In addition to the investment that DOE has made in the FCF facility and the process equipment which has been installed, the DOE has made a major investment in the development of the basic technology which provides the technical foundation for this program. Although this has been a broadly

- 5 -

based development effort and may have application in other areas, it was closely coordinated with the Project activities and was aimed at development of equipment for use and demonstration in the FCF. This coordinated technical support will significantly enhance the effectiveness of the Project.

Finally, the DOE Electrometallurgical Demonstration Project may provide extremely important benefits for us to the future; for my grandchildren and their grandchildren. We do not know what future energy demand will be or the options which will be available to satisfy the demand. We do know that nuclear power provides a huge untapped potential that we should have available even though we do not know that it will be needed. We do know that if it is needed (on a large scale), effective spent fuel management will be imperative. The Electrometallurgical Treatment Program provides an opportunity toward this objective; we should not lose that opportunity. 11

I am enclosing a reprint of an article* in which I attempted to describe the very long range potential of nuclear power. I would be pleased to have it made a part of the record of this assessment.

Respectfully submitted

Bernard L. Koch

*"OUR INEXHAUSTIBLE ENERGY SUPPLY"

Responses to Document D072

1,10,11 The commentor's statement on the proposed demonstration is noted. The Department of Energy acknowledges that the electrometallurgical treatment of spent nuclear fuel is a promising potential technology for effective fuel management. The proposed demonstration action would help to qualify the benefits and weaknesses of this technology so that future decisions can be made on the cost effectiveness and environmental consequences of the application of this technology to Department of Energy spent nuclear fuel.

2 The Department of Energy acknowledges the commentor's statement on technical justification for the continuation of the program. In addition, the National Research Council has performed a review of the electrometallurgical process and has stated that a demonstration of the process with irradiated spent nuclear fuel is necessary to complete the evaluation. The proposed action is a vital step in developing alternatives for spent nuclear fuel management.

3,4,5,6,7,8 The Department of Energy acknowledges the capabilities of the Fuel Conditioning Facility and its staff. These unique capabilities have been extensively reviewed in a Final Safety Analysis Report and Operational Readiness Review. The proposed action utilizes these unique capabilities.

9 The Department of Energy acknowledges the commentor's statements on characteristics of the electrometallurgical process and the Fuel Conditioning Facility. These features, which will prevent the diversion of nuclear materials, are recognized and are consistent with the nonproliferation policy of the United States.

March 19, 1996

Mr. Greg Bass, EA Document Manager
U.S. Department of Energy
Argonne Group-West
P.O. Box 2528
Idaho Falls, Idaho 83403

Dear Mr. Bass:

Attached to this letter is a tabulation of our comments on the Draft Environmental Assessment (EA) for the Electrometallurgical Treatment and Demonstration Project in the Fuel Conditioning Facility at Argonne National Laboratory-West.

We are available to discuss these comments further, should you so desire.

Sincerely,

Vincent G. Aquino

Harold F. Gallagher

COMMENTS ON DRAFT ENVIRONMENTAL ASSESSMENT ELECTROMETALLURGICAL TREATMENT RESEARCH AND DEMONSTRATION PROJECT IN THE FUEL CONDITIONING FACILITY AT ARGONNE NATIONAL LABORATORY-WEST, DOE/EA-1148 JANUARY 29, 1996

TECHNICAL COMMENTS

1. Pg. 19, para. 2, "It is expected that electrorefining EBR-II SNF would stabilize the reactive metallic sodium..." This aspect of the process should have been demonstrated in the laboratory research efforts. The whole purpose of this "demonstration" is to show, on a pilot scale, the effective functioning of the process. There should be no question that electrorefining stabilizes the sodium. 1

2. Pg.24, para. 1 states that zirconium is combined with the stainless steel waste and "...melted to form a stable metal ingot." The volume of the waste is therby increased by 15%. Since stainless steel is itself a "stable" alloy, it is not clear why the zirconium addition is required. Such an addition should be explained: how is the alloy better, what undesirable consequences would be prevented, etc. 2

3. Pg. 26, The first of the National Research Council's recommendations was for "Demonstration of batch operation of an electrorefiner and a cathode processor with a capacity of approximately 200 kg/day of radioactive EBR-II spent fuel without failure for about 30 days." Neither the processing of the 100 EBR-II driver assemblies, nor the processing of 25 blanket assemblies meet the stated requirements.
Assuming an electrorefiner batch would take 3 days (pg 36 of EA), a 30-day electrorefiner run should process 2,000kg, or 2 mt, of spent fuel. (The NRC recommendation, however, is for a 200 kg/day electrorefiner throughput.) The 100 drivers and 25 blankets to be processed over 3 years represent about 1.6 mt of spent fuel. This does not meet the "optimistic" interpretation of the NRC recommendations as to quantities to be processed. Equally as important, a processing campaign spread over three years can hardly be considered the equivalent of one month of continuous batch processing in terms of stress to process equipment and probability of breakdowns. . 3

4. Pg. 26, The second of the National Research Council's recommendations was for "Quantification (for both composition and mass) of recycle, waste, and product streams that demonstrate projected material balance with no significant deviations." What the NRC asked for is commonly termed a "process flow sheet". There is no such document included in the EA. The "flowsheet" of Figure 2-10 provides no information on input, output, interstage quantities, or concentrations of materials. Such a "quantified" flowsheet would render the entire process much more understandable. 4

5. Pg. 36, The final paragraph states: "Uranium essentially free of contaminants..." What does this mean? The word "essentially" should be quantified as a percent purity or parts per million of contaminants. 5

6

6. Pg. 45, The penultimate sentence of the first paragraph states: "This equates to a total volume of about 2.3 liters (2.4 quarts) per can of ceramic waste." The value stated is the volume of a single waste cylinder. It is not the total of anything. This sentence, as worded, is confusing and can be misconstrued.

7

7. Pg. 58, second para., DOE's ability to remove spent fuel from Idaho is not a technical issue, it is a political issue and should not be used as a "justification" for the conduct of the demonstration. The use of such a justification weakens the technical justifications.

8

8. Pg. 68, Paragraph 3.5 refers to measured doses "only slightly higher than background levels". Quantified values would be more meaningful and professional.

9

9. Pg. 71, The first paragraph states there will be no impact to surface waters or groundwater. No mention is made of the RSWF, groundwater inleakage to storage tubes, and cathodic protection.

10

10. Pg. 72, The first paragraph of 4.1.1.2 states that offsite doses would be "quite small". The value should be quantified.

11

11. Pg. 75, Are the numbers for latent cancers correct? It would seem "logically" that non-fatal cancers would exceed fatal cancers.

12

12. Pg. 79, The final paragraph discusses releases which do not stem from breaches in confinement. There may not be a "hole" in the cell, but a leak means that a confinement boundary **has been** breached. The sentence is misleading, and is playing on words.

13

13. Pg. 83, penultimate para., The use of "more realistic exposure conditions" (less conservative) should be justified. It is not clear why the FSAR accident wouldn't also be the EA accident.

14

14. Pg. 94, first para., The "negligible" increment to water usage should be quantified.

15

15. Pg. 110, second para., Is it appropriate to conclude that because there is no impact on the population as a whole there will be no impact on minority and low-income populations? These populations are more likely to have poorer housing, nutrition, and medical care than the population as a whole. Will that cause them to be more susceptible to adverse impacts from accident conditions? Furthermore, nothing has been said about the location and distribution of low income and minority populations. They may not be uniformly distributed throughout the population.

16

16. Pg. 112, first para., The claim has been made that the blending down step of the process will result in no additional cost. This action will result in additional processing time for handling and transferring of the depleted uranium stock, additional materials accountability record keeping,

(16) and additional handling of the electrorefiner uranium product. Indeed, the entire blending down step, and probably the ingot casting, would not be necessary if the electrorefiner uranium product were stored as-is. Any additional action increases costs. One of the major thrusts of the TQM movement is process simplification: removed process steps save money in addition to making the process more efficient. Every action costs money, without exception.

17 17. Pg. 113, The third paragraph states the "...byproducts of the electrometallurgical technology demonstration would be unsuitable for weapons use." While this may be true of the final blended-down product, the statement ignores the fact that there will be weapons-suitable material available inprocess. In fact, the EA is silent on how long, and under what conditions, the uranium from the cathode is held prior to the blending process.

18 18. Pg. 113, The comparison of facility sizes of reprocessing plants is inappropriate. There is an implication that "reprocessing" is somehow connected with facility square meters of floor space. Such material does not belong in this EA.

19 19. Pg 113, The final paragraph states: "No separated plutonium or highly enriched uranium byproducts would be produced in the process." This is not true. The electrorefiner does in fact produce just such material "in the process". It may not exist at the end of the process, but it most certainly exists within the process.

20 20. Pg. 115, final para. ff., Remote maintenance and repair of equipment should generate "little or no waste" according to the EA. This statement implies a lack of understanding of maintenance processes. Any maintenance or repair will result in waste, whether it be soiled wipes, empty lubricant containers, failed parts, left-over materials, or discarded tools. In-cell maintenance is no exception. Since much in-cell maintenance is via modular replacements, there may be substantial amounts of waste, depending upon what has been replaced.

21 21. Pg. 122, first paragraph, This paragraph makes reference to testing the electrorefiner under "near-prototypic conditions". Exactly what does this mean? If this is a "demonstration" project, one would expect that the process would replicate actual operating conditions and environment. That is the function of the pilot stage in the normal evolution of processes. Words such as "near-prototypic" invite all manner of speculation as to how the demonstration differs from the "real world" of full scale electrorefiner operations. They can also lead to challenges of the validity of the proposed demonstration.

22 22. Pg. 122, second para., The No-Action Alternative has been converted into a sort of "deduct option" for the Proposed Action. The No-Action case should be the baseline (current condition) against which the Proposed Action is compared and evaluated. The EA presupposes that the Proposed Action will occur and the other "alternatives", including No Action are briefly considered and dismissed. The continued use of the "Governor's Agreement" as a justification

(22) for theProposed Action accomplishes nothing so much as a diminuition of the technical justifications for the Proposed Action set forth in the EA It also offers the opponents of electrorefining another avenue of attack..

23 23. Pg. 131, The statement that "no outside agencies or individuals have been consulted during the preparation of this EA" is rather curious. Besides bespeaking an attitude bordering on arrogant, it also raises the question as to the commitment to producing the best EA possible. The number of EA's produced by Argonne West is not too large, and experience in that area is limited. Outside help may have been very productive.

EDITORIAL COMMENTS

24 1. Pg. 15, first para., Delete the words "are used" in the second sentence.

25 2. Pg 19, first para. The final sentence should be divided in two with a period after "1994".

26 3. Pg. 29, final para., The sentence "The spent fuel assemblies to be treated would come directly from EBR-II in order to reduce worker radiation exposures due to cask handling operations." can be misconstrued that cask handling operations will be eliminated. There should be a clear statement that cask handling will be reduced which will result in reduced worker exposures.

27 4. Pg. 45, second para., The sentence "The Waste Acceptance System Requirements Document (WA-SRD), DOE/RW-0351P, specifications define the physical characteristics and consistency of a waste form." seems to be garbled. The referred to document, or documents, do not appear in the list of references.

28 5. Pg. 57, second para., References to U.S. Highways 33 and 28 are erroneous. Both are Idaho State Highways.

29 6. Pg. 75, final para., "INEL Fire Rescue/Station" should be "INEL Fire/Rescue Station"

30 7. Pg 93, final para., In the first sentence the verb is "are" and not "is".

31 8. Pg 97, second para., "ro 19% by volume" should be "or 19%...". Was a spell check run on this document?

32 9. Pg 109, second para., The collection of 44 words beginning with "Census tracts within the zone..." does not contain a verb.

-5-

33 10. Pg 109, final para., A population count down to the last person (172,366) is hardly "approximate".

Submitted by:

Vincent G. Aquino

Harold F. Gallagher

Responses to Document D073

1 There is no question that the sodium introduced into the electrorefiner salt will be reacted and stabilized. One purpose of this project is to demonstrate that the spent nuclear fuel saturated with sodium would be completely dissolved in the salt.

2 The reasons for the addition of zirconium are addressed in Section 2.2 of the environmental assessment. The volume of metal waste form is so small (only 0.1 cubic meter for the entire demonstration) that a 15% increase in volume of the waste form is insignificant if superior technical attributes can be attained. The selection of 15 weight-percent zirconium was based on several technical considerations, including a eutectic temperature of the stainless-steel/zirconium alloy that is 200°C lower than the melting temperature of pure stainless steel, thereby greatly relaxing the design requirements for the equipment. Eutectic is related to the lowest solidification temperature for any mixture of specified constituents.

3 As stated in Section 2.2 of the environmental assessment, the National Research Council's recommendation was based on the assumption that all the Experimental Breeder Reactor-II spent nuclear fuel would be treated. The proposed demonstration does not conform exactly to the National Research Council recommendation. The Fuel Conditioning Facility is not a production facility and could not approach the continuous throughput assumed by the National Research Council recommendation. The proposed demonstration, however, is sufficient to demonstrate technical feasibility of a nearly 200 kilogram/day capacity for the electrorefiner for a single batch.

4 Detailed flowsheets are produced for internal technical planning purposes. These have been summarized for the environmental assessment, a document that is meant to be understood by the general public. A simplified, top-level, quantified flowsheet is presented in Figure 4-2 of the environmental assessment. However, the National Research Council recommendation quoted in the comment actually refers to quantification by measurements to be taken during the demonstration, rather than projections developed for a flowsheet.

5 As stated in the title of the environmental assessment, the proposed action includes research as well as a demonstration. There is no known accurate method for predicting the uranium contamination under actual operating conditions. The impurity levels will be measured as a part of the research program.

6 The word "total" has been removed from the environmental assessment discussion of waste form production in Section 2.3.

7 The Department of Energy had committed to remove spent nuclear fuel from the State of Idaho by the year 2035. The Department is exploring technologies, such as electrometallurgical treatment, to assist it in managing its spent nuclear fuel and making spent nuclear fuel ready for disposal in a geologic repository.

8 The annual doses measured ranged from 87% to 176% of the background measurement, which is 6.3×10^{-2} rem. The higher doses are caused by radioactive materials stored next to the monitoring device. This clarification has been added to the environmental assessment.

9 The Radioactive Scrap and Waste Facility, including cathodic protection, is described in Section 2.2 of the environmental assessment. No intrusion of water would be expected under any credible scenario during the three-year period described for the proposed action. The environmental consequences of the proposed demonstration and alternatives are discussed in Section 5.0 of the environmental assessment.

10 The sentence cited is a summary/introduction statement for Section 4.1.1.2. The value for offsite releases is given in the third paragraph of this section.

11 The values cited for the probabilities of cancer effects are correct. Standard, accepted coefficients are used for the expected effect per unit of radiation dose. The coefficients used in the environmental assessment are the same as those used in the *Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Environmental Impact Statement* (DOE/EIS-0203-F).

12 The discussion cited in Section 4.2.1 focuses on failures in facility systems that regulate pressure of the atmosphere in the process (argon) cell, and consequently result in a release (venting) of cell argon, including part of the fission gases that have accumulated in the argon cell atmosphere. The paragraph clarifies the point that "These accidents do not result in breach of the process cell confinement."

13 Beyond design basis accidents, while analyzed for purposes of environmental assessment, are not required to be analyzed in a Final Safety Analysis Report. The other accidents in the environmental assessment correspond to the accidents analyzed in the Final Safety Analysis Report. However, assumptions for meteorological conditions differ for these two documents. In the case of a Final Safety Analysis Report, the maximally conservative meteorological conditions are chosen in order to consider the appropriateness of facility siting. In the case of a National Environmental Policy Act document, average conditions are chosen in order to estimate the probable consequences of an event.

14 The term "negligible" is used as a summary statement on page 94, first paragraph, and is appropriate to be used for incremental water usage.

15 In this case, because there would be little or no impact to the general population, there would be no "disproportionately high or adverse" impact to minority and low-income populations. Section 4.6 discusses the location and distribution of low-income and minority populations within the 50 mile radius of the Argonne National Laboratory-West site.

16 Special nuclear materials are categorized for security according to a number of physical and chemical characteristics. Some materials are more expensive to manage. If the uranium were left as relatively pure highly-enriched uranium, security upgrades costing on the order of half a million dollars would be required for the Fuel Conditioning Facility. Annual costs for increased security personnel would be on the order of several hundred thousand dollars. By comparison, the blended-down uranium falls into one of the lowest special materials categories. There is comparatively little cost to manage this material. No additional handling of the electrorefiner cathode product is required. The cathode

processing step is necessary to remove the electrorefiner salts from the uranium metal. The casting step is needed to produce representative samples. Since these steps would be required for the process, the addition of the blending operation would not complicate the process, except for loading the materials in the crucible. The cost of scheduling operations to accommodate the depleted uranium addition would be negligible. The environmental assessment has been modified to clarify this point.

17 Uranium in-process during treatment of the Experimental Breeder Reactor-II driver spent nuclear fuel will have an average enrichment of approximately 65%. This is classified as highly-enriched uranium. The uranium would be maintained under secure conditions at all times. The uranium by-product will be less than 20% enriched. This is classified as low-enriched uranium. At no point is the uranium "weapons-grade." Additional information relevant to nonproliferation is found in Chapter One of this Appendix.

18 The comparison of the proposed demonstration with "reprocessing" facilities within the Department of Energy's historical experience is appropriate to explain the meaning and intent of the Department of Energy's National Environmental Policy Act regulations thought to be applicable to the proposed demonstration. See Chapter One for further explanation. The intent of the statement in the environmental assessment is to compare the size of a production facility with a research and development facility.

19 Materials "in-process" are not considered by-products.

20 Remote maintenance and repair of equipment would be carried out in a contaminated environment. The discarding of an equipment part adds insignificantly to the volume of waste generated from the normal operation of a nuclear facility. The wastes from these operations have been included in the operational waste that are detailed in Section 4.3.9. The referenced sentence in the environmental assessment has been revised to clarify this point.

21 The existing Fuel Conditioning Facility electrometallurgical treatment equipment design does not reflect progress in the technology during the past six years. Neither the facility nor the equipment are designed for integrated operations, so the Fuel Conditioning

Facility is not a true "pilot plant." The proposed action is a research and demonstration project, as indicated by the title of the environmental assessment. The demonstration would be a feasibility demonstration. Prototypic conditions would include the use of real spent nuclear fuel, batch size, remote operation and maintenance, inert cell environment, nuclear materials accounting, and the accumulation of a significant quantity of the full spectrum of impurities in the process fluids of the electrorefiner. Aprototypic conditions would include throughput, process step linkage, extensive measurements for process control and optimization, and various facility features such as layout and impurity levels in the argon atmosphere.

22 The "current condition" is the storage of spent nuclear fuel in the Radioactive Scrap and Waste Facility and the Hot Fuel Examination Facility and the operation of the Fuel Conditioning Facility as a multipurpose hot cell in support of Department of Energy programs. That is the basis of the No Action alternative. Clarifying language has been added to the environmental assessment. As shown in the environmental assessment, the proposed demonstration and three reasonable alternatives are analyzed in detail. No specific action is presupposed.

23 "Outside agencies" is a reference to Federal or state agencies other than the Department of Energy and its contractors. Several different organizations within the Department contributed to production and review of the environmental assessment. Further, the public comment process has resulted in significant input for the purpose of preparing a final environmental assessment.

24,25,26,27,28,29,30,31,32,33 The environmental assessment has been revised as appropriate to reflect editorial comments as described below:

- Original Comment: **D-073/C-24** (Pg. 15, first para., Delete the words "are used" in the second sentence.)
- Original Comment: **D-073/C-25** (Pg. 19, first para. The final sentence should be divided in two with a period after "1994")
- Original Comment: **D-073/C-26** (Pg. 29, final para., The sentence "The spent nuclear fuel assemblies to be treated would come directly from Experimental Breeder Reactor-II

in order to reduce worker radiation exposures due to cask handling operations." can be misconstrued that cask handling operations will be eliminated. There should be a clear statement that cask handling will be reduced which will result in reduced worker exposures.) A clarification sentence was added explaining that direct transfer from Experimental Breeder Reactor-II involves one cask transfer operation, whereas transfer from other facilities requires two or more cask transfer operations.

- Original Comment: **D-073/C-27** (Pg. 45, second para., The sentence "The Waste Acceptance System Requirements Document (WA-SRD), DOE/RW-0351P, specifications define the physical characteristics and consistency of a waste form." seems to be garbled. The referred to document, or documents, do not appear in the list of references.)
- Original Comment: **D-073/C-28** (Pg. 57, second para., References to United States Highways 33 and 28 are erroneous. Both are Idaho State Highways.)
- Original Comment: **D-073/C-29** (Pg. 75, final para., "Idaho National Engineering Laboratory Fire Rescue/Station" should be "Idaho National Engineering Laboratory Fire/Rescue Station")
- Original Comment: **D-073/C-30** (Pg. 93, final para., In the first sentence the verb is "are" and not "is".)
- Original Comment: **D-073/C-31** (Pg. 97, second para., "ro 19 percent by volume" should be "or 19 percent..... Was a spell check run on this document?) Yes, a spell check was run, but errors do occur.
- Original Comment: **D-073/C-32** (Pg. 109, second para., The collection of 44 words beginning with "Census tracts within the zone..." does not contain a verb.)
- Original Comment: **D-073/C-33** (Pg. 109, final para., A population count down to the last person (172,366) is hardly "approximate".) The paragraph has been changed to read "approximately 172,000."

Dr. W. P. Poenitz
1368 Gale Mt. Rd.
Pocatello, Id. 83204

Pocatello, March 15 th., 1996

Mr. Greg Bass
EA Document Manager
U.S. Department of Energy
Argonne Group-West
P.O. Box 2528
Idaho Falls, Id. 83403

Dear Sir,

with interest I noted the Draft Environmental Assessment on the Electrometallurgical Treatment Research and Demonstration Project in the Fuel Conditioning Facility at Argonne National Laboratory - West, DOE Document DOE,EA - 1148 from January 29, 1996. I am a retired Senior Physicist, living in Pocatello, Idaho, and would like to comment on this document.

1 I appreciate that the opportunity exists to research the treatment of the liquid metal reactor fuel present in the country at this time. The alternative of taking no action is not viable in view of the agreement between the Department of Energy and the State of Idaho that all spent nuclear fuel is to be removed from the state by the year 2035. Delay of action, in my opinion, would greatly increase costs for several reasons. The interim storage (and guarding) of the DOE spent nuclear fuel is not cost free. The knowledgeable personal capable of developing appropriate treatment techniques cannot be expected to be available in 30 to 40 years from now and such expertise would have to be rebuilt at substantial costs. To take no action would be burdening future generations with the problem, an issue much in the public debate at the present time.

2

3

4 Conducting the research and demonstration as proposed is certainly preferable compared to treating a lesser number of fuel assemblies. More experience will be gained and statistically more meaningful data obtained. Conducting the research and demonstration at an alternative facility appears not sensible as transportation of fuel would be involved and additional costs would result from the preparation of such facility. Another treatment suggestion made by antinuclear groups would convert the uranium metal to its oxide using steam after removal of the bonding sodium. This suggestion is dangerous as its adaptation would result in fire and reaction, possibly of an explosive nature, between the sodium inside of cavities in the fuel.

5

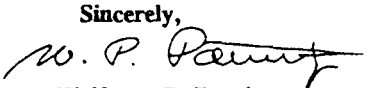
6 Denaturing the enriched Uranium to below 20% ^{235}U helps to resolves the proliferation danger. It not only complies with the DOE definition for low enriched Uranium (i. e.,

non-weapons grade material) but also agrees with the International Atomic Energy Agency (IAEA) definition of such material. Antinuclear groups sometimes make dark hints at criticality tables, implying that weapons could be built with such material. Sure - reactors built in Canada prove that nuclear systems can be operated with much less (6) enrichment. However, a nuclear weapon requires other parameters to be met besides achieving criticality. I believe one can rely on the experts at DOE and the IAEA to define non-weapons grade enrichment material of Uranium. The treatment of the transuranium isotopes mixed together with the highly radioactive fission products to form a selfprotective material should further reduce proliferation fears. If I would be worried about proliferation, I would rather worry about the tons of military Plutonium which is rather pure and of low radioactivity levels.

7 The risks associated with the proposed action appear to me to be minimal. This is specifically the case as the estimates are based on very conservative assumptions. For example, estimating the increased risk of cancer for a maximally exposed individual living in that location for 72 years exceeds the possible time span based on the agreement between DOE and the State of Idaho. The assumption of a cooldown time of one year is already exceeded by the shutdown of EBR-II. The estimation of the increased risk of cancer caused by the crash of a large commercial jet would have to be considered together with the likelihood for such event. After all, a commercial jet is not a laser guided missile.

In summery, I support the proposed action.

Sincerely,



Wolfgang P. Poenitz

Responses to Document D074

1 The commentor's statement on the demonstration is acknowledged. Under the terms of the settlement agreement, the Department of Energy is legally obligated to remove spent nuclear fuel (including Experimental Breeder Reactor-II spent nuclear fuel) from the State of Idaho by the year 2035. Electrometallurgical treatment is a promising technology for treating Experimental Breeder Reactor-II spent nuclear fuel and blanket assemblies. If the demonstration were successful, application of the technology could help the Department of Energy to meet this obligation with the State of Idaho.

2 Funding ultimately provided for Department of Energy projects is determined by Congress and the President through processes that are outside the scope of this environmental assessment. However, the Department has supported funding for this project because it believes the technology is a promising one for dealing with some of the Department's spent fuel problems.

3 The Department of Energy recognizes the importance of a strong scientific, technical, and operational infrastructure in conducting research involving promising new technologies.

4 The proposed demonstration would provide sufficient data to address questions raised by the National Research Council. Treatment of a smaller number of subassemblies may not provide sufficient data.

5 The proposed process of treating the spent nuclear fuel with hot, water-saturated carbon dioxide would have the following technical problems and would require extensive development before implementation. Because of the high radiation level of the spent nuclear fuel, any processing would have to be carried out in a shielded inert atmosphere cell, not in a simple reaction chamber as described. Based on extensive experience with reacting sodium to form sodium carbonate, these reactions would have to be controlled very closely. History has shown that the potential for accidents involving reacting sodium is very high. Exposure of the hot uranium fuel to oxygen and water vapor is similar to metal fire accident conditions described in the environmental assessment (Section 4.2). Also, the use of water for treatment of highly-enriched spent nuclear fuel

would require stringent criticality hazards control measures because aqueous processes have lower fissile material limits than metallic processes. The products from the proposed process may include pyrophoric uranium hydride in addition to the compounds cited in the comment. Additional process steps would, therefore, be required to stabilize the pyrophoric nature of the product.

6 The Department of Energy's low-enriched uranium definition (i.e., non-weapons grade) agrees with the International Atomic Energy Agency definition. The proposed demonstration project does not separate plutonium. Moreover, the technology employed is not capable of separating plutonium. It is consistent with the nonproliferation policy of the United States, which does not encourage the civil use of plutonium. Accordingly, the United States does not engage in plutonium reprocessing. Further, by removing and then blending down the highly-enriched uranium, the project supports the goal of the United States to seek to eliminate where possible the accumulation of stockpiles of highly-enriched uranium or plutonium. As a result, the proposed demonstration project is consistent with the nonproliferation policy of the United States. An additional response to comments regarding nonproliferation concerns is provided in Chapter One of this Appendix.

7 The Department of Energy agrees that the environmental assessment used conservative assumptions for the location and duration of the maximally exposed individual, the cool-down time of one year, and a large commercial jet crash in the facility. These assumptions allow a conservative estimate of potential impacts without taking credit for probability of events.

G. Ross Darnell, 339 East 49th South, Idaho Falls, Idaho 83404

March 19, 1996

Mr. W. Gregory Bass, EA Document Manager
Argonne Area Office - West
PO Box 2528
Idaho Falls, ID 83403-2528

Dear Mr. Bass:

This letter is in reference to the *DRAFT ENVIRONMENTAL ASSESSMENT FOR THE ELECTROMETALLUGICAL TREATMENT RESEARCH & DEVELOPMENT PROJECT.*

Whether we like it or not, nuclear power will expand world-wide well into the next century. To ensure that proper advancements and enhancements are achieved here and abroad, America must retain its technological leadership. No laboratory in the world has a better claim to superior nuclear technology than Argonne National Laboratory.

1 The Electrometallurgical Project is an exciting advancement on
2 ths treatment of spent nuclear fuel. To discontinue the research would not be in the best interests of America or the world.

3 The environment would not be damaged by continued research, and
4 the project promises to improve the spent nuclear fuel scenario. As a retired engineer who never worked for Argonne National
5 Laboratory, I recommend that the project be fully funded and fully supported by all applicable agencies.

Sincerely,

G. Ross Darnell
(208) 529-8699, or 456-2729

Responses to Document D075

1 The commentor's statement on this demonstration is acknowledged.

2 The Department of Energy recognizes the need to continue research in the area of spent nuclear fuel treatment technology. Although the general topic of technology development is not within the scope of this environmental assessment, the Department of Energy emphasizes ongoing programs for technology development, especially to solve national problems, such as the treatment of spent nuclear fuel. The demonstration of the electrometallurgical technology could be a crucial step in solving some of the difficult problems of spent nuclear fuel management.

3 The environmental assessment analyzed three alternatives in detail and considered several other process alternatives which were eliminated from detailed evaluation. In general, the excluded alternatives had not reached a level of development that would allow a detailed evaluation. Evaluation of alternative processes that were identified in the public comment period have been added to the environmental assessment, Section 2.1. The potential environmental impacts that would result from implementing a conceptual treatment process cannot be analyzed in equal detail relative to the impacts that can be quantified for a process that has reached an adequate level of technical maturity. As described in the environmental assessment, the impacts of the proposed action and the alternatives, including the limited treatment alternative, were found to be small.

4 The proposed action includes research on a new application of an established technology, development of operating data for test equipment, and a limited application demonstration. As summarized in the National Research Council's report on this technology, without this demonstration and the data to be gained from it, there can be no meaningful analysis of the technology's use or application. The Department of Energy will review the data and decide whether to propose future applications of the technology. That decision will be made in accordance with all applicable laws and regulations, and will include appropriate National Environmental Policy Act analysis.

5 Funding ultimately provided for Department of Energy projects is determined by Congress and the President through processes that are outside the scope of this environmental assessment. However, the Department has supported funding for this project because it believes the technology is a promising one for dealing with some of the Department's spent fuel problems.

14469 N. 55th E.
Idaho Falls, ID 83401
March 20, 1996

Mr. Greg Bass, EA Doc. Mgr.
U.S. Department of Energy
Argonne Group-West
P.O. Box 2528
Idaho Falls, ID 83403

re: EA Electrometallurgical Treatment & Demo Project

Dear Sir:

1 2 3 4 My evaluation of the DEA is that it is a reasonable and necessary part of the total systems solution to our national Spent Nuclear Fuel (SNF) problem. Altho sodium-bonded EBR-II SNF is a special and somewhat limited part of the overall SNF problem, sound engineering approach justifies this project. It would use equipment, personnel, and material similar to that used on the IFR project and thus would be the most cost-effective use of shrinking federal funds to solve a problem that has been building up for 50 years without the federal government addressing the need to really solve the SNF problem. The most important aspect of this project would be its potential use for handling other SNF in the DOE's total inventory, and even the world's.

5 6 7 The relatively small number of steps and size equipment necessary plus keeping end products all in solid form is a definite advantage over aqueous processing in my view. I see no justification for burying HEU (or even Pu if a reactor such as IFR was available). To merely convert SNF to a form suitable for permanent storage is illogical, immoral, and a symptom of the worst of our modern day throw-away culture. Thus the recovery of HEU (still 65%) from EBR-II SNF plus blending down to LEU with existing U-238 to meet the non-proliferation policy of the White House is reasonable. However, the White House's non-proliferation so-called Fact Sheet (for the public) is really a policy statement sheet that contains some facts but mostly opinion-driven administration policy statements. It is inconsistent in stopping Pu reprocessing in the U.S. while supporting it in Western Europe and Japan; also seeking to eliminate accumulation of HEU or Pu, yet stopping further development of newer, safer nuclear power reactors such as IFR, which would reduce the available stockpiles and the amount of radioactive byproducts to go to a final repository.

8 9 10 11 The Proposed Action has an advantage over the Equipment Performance Verification Alternative in giving much more usable information for only 1/2 year additional effort. The No-Action Alternative indicates failure to solve any problem by burying one's head in the sand, originally a major criticism by environmentalists, yet sustained now by some of their fringe groups. Critics of the EA should specify what should be included to meet any requirements of an EA or EIS, or submit a positive, constructive alternative. Prof. Werf was the only person to submit the latter. I would agree with one other critic that important reference material ought to be available to the general public (which I also could not find even in the DOE reading room in Idaho Falls).

Respectfully submitted,

Lowell A. Jobe

Responses to Document D076

1,2,4 The commentor's statement on this demonstration is acknowledged. The Department of Energy recognizes the potential value of the electrometallurgical treatment process. The proposed action includes research on a new application of an established technology, development of operating data for test equipment, and a limited application demonstration. As summarized in the National Research Council's report on this technology, without this demonstration and the data to be gained from it, there can be no meaningful analysis of the technology's use or application. The Department of Energy will review the data and decide whether to propose future applications of the technology. That decision will be made in accordance with all applicable laws and regulations and will include appropriate National Environmental Policy Act analysis.

3 Although the general topic of technology development is not within the scope of this environmental assessment, the Department of Energy emphasizes ongoing programs for technology development, especially to solve national problems, such as the treatment of spent nuclear fuel. The demonstration of the electrometallurgical technology could be a crucial step in solving some of the difficult problems of spent nuclear fuel management.

5 The Department of Energy is appreciative for the opinions expressed by the members of the public and other stakeholders during the National Environmental Policy Act process. However, the final disposition of the uranium is beyond the scope of the environmental assessment.

6 The proposed demonstration project does not separate plutonium. Moreover, the technology employed is not capable of separating plutonium. It is consistent with the nonproliferation policy of the United States, which does not encourage the civil use of plutonium. Accordingly, the United States does not engage in plutonium reprocessing. Further, by removing and then blending down the highly-enriched uranium, the project supports the goal of the United States to seek to eliminate where possible the accumulation of stockpiles of highly-enriched uranium or plutonium. As a result, the proposed demonstration project is consistent with the nonproliferation policy of the

United States. An additional response to comments regarding nonproliferation concerns is provided in Chapter One of this Appendix.

7 The Department of Energy is appreciative of the opinions expressed by the members of the public and other stakeholders during this National Environmental Policy Act process. However, it is beyond the scope of this environmental assessment to address issues that are not directly related to the research and demonstration project described in the environmental assessment. The White House's nonproliferation fact sheet and its basis are beyond the scope of this environmental assessment.

8 The environmental assessment has analyzed the impacts of the proposed action and the alternatives, and found that the impacts were very small. Since the proposed demonstration will provide sufficient information for decision making while the Equipment Performance alternative may not, the former has been identified as the preferred alternative.

9 The Department of Energy does recognize the necessity to develop new spent nuclear fuel treatment technology and has prepared this environmental assessment to help meet this need.

10 The Department of Energy recognizes the value of all stakeholders' comments, the importance of public involvement as a decision making tool, and the right of individuals, agencies, and groups to express their opinions as an integral part of the National Environmental Policy Act process.

11 Complete sets of the references cited in the environmental assessment were placed in Department of Energy Public Reading Rooms by April 8, 1996; transcripts of public meetings are available by request. More detailed information on this issued is provided in Chapter One of this Appendix.

3-18-96

Dear Greg,

I would like to put my two cents worth in on the EA for the Electrometallurgical treatment and Vitrification Project in the FCF at ANL West

The DOE has spent a considerable amount of money upgrading the FCF. The FCF is in compliance with the latest rules and regulation the people doing the work have a thirty year background in spent fuel reprocessing. To have the work done at TAN only makes sense if you are on TAN contractor or employee

To only do 50 drawer assemblies and 10 blanket assemblies after all the bugs are worked out of the equipment and process doesn't make much sense from an economic or practical point of view

1

2

3

4

Storing of the untreated
fuel, to me, is the ostrich approach.
the fuel has to be dealt with someday.
Since the process is almost ready
to go now is the time.

Enclosing a newspaper
article about liquid radioactive
waste. After 50 years something is
finally being done.

Thanks for your time.

Sincerely,
Ralph L Martell
Box 6
BASALT ID 83216

Responses to Document D077

1 The commentor's statement on the demonstration is acknowledged. The Department of Energy completed an extensive Operational Readiness Review which established the readiness of the facility to accept the demonstration and to operate within defined safety and environmental constraints.

2 As described in the environmental assessment, the impacts of the proposed action and the alternatives, including the alternative of conducting the electrometallurgical treatment demonstration project at the Test Area North, were found to be small. The Department of Energy commissioned an independent study to evaluate Test Area North and other Idaho National Engineering Laboratory facilities for a similar mission. The Department of Energy considers that the Test Area North facility is a reasonable alternative for evaluation.

3,4 The Department of Energy is committed to providing timely solutions to the management of spent nuclear fuel. Successful completion of this demonstration will provide options for dealing with the balance of Experimental Breeder Reactor-II spent nuclear fuel as well as other types of spent nuclear fuel in the Department of Energy inventory.

OCAW
Oil, Chemical & Atomic Workers
International Union, AFL-CIO

Nolan Hancock, Director,
Citizenship-Legislative Department
2722 Merrilee Drive, Suite 250
Fairfax, VA 22031
Telephone: 703-876-9300
Facsimile: 703-876-8952
Toll Free: 800-432-6229

March 21, 1996

Mr. Greg Bass, EA Document Manager
U. S. Department of Energy
Argonne Group-West
P. O. Box 2528
Idaho Falls, ID 83403

Dear Mr. Bass:

Thank you for the opportunity to review the *Environmental Assessment for the Electrometallurgical Treatment Research and Demonstration Project in the Fuel Conditioning Facility at Argonne National Laboratory-West.* Because of the large number of workers OCAW represents at the Idaho National Engineering Laboratory, we have an interest in the safety and the quality of jobs associated with projects proposed for the site. This proposed project seems to pass muster on all counts. 1

It is clear from the analysis presented in the assessment that the environmental effects of the project will be insignificant in short term, and beneficial in the longer term. It is particularly impressive that the amount of waste will be cut in half by treating the spent fuel rather than simply packaging it. A great deal of attention seems to have been paid to upgrading the facility to assure the safety of the workers. The proposed action should actually reduce the overall risk, a feature that I hope to see in more of DOE's projects. 2 3 (2)

I am pleased that some OCAW members will have the opportunity to participate in this advanced technology project. Without a doubt, it is important to getting the spent nuclear fuel out of Idaho. If the demonstration is successful, broader application of the technology may lead to more high-quality jobs, at least in Idaho, and possibly elsewhere. This project should be a winner for the Department. It has OCAW's endorsement. DOE should proceed expeditiously to get the fuel treatment started and demonstrate the Department's commitment to technology advancement and to Idaho. 4 5 6

Sincerely,

Nolan W. Hancock, Director
Citizenship-Legislative Department

NWH:cdf

Responses to Document D078

1,2 The commentor's statements on the demonstration are acknowledged.

3 Although the volume reduction has a relatively small beneficial impact for the proposed demonstration, it is one feature that could make the electrometallurgical technique an attractive technology to develop for potential broader application.

4 Under the terms of the settlement agreement, the Department of Energy is legally obligated to remove spent nuclear fuel (including Experimental Breeder Reactor-II spent nuclear fuel) from the State of Idaho by the year 2035. Electrometallurgical treatment is a promising technology for treating Experimental Breeder Reactor-II spent nuclear fuel and blanket assemblies. Application of the technology could help the Department of Energy to meet this obligation.

5 The primary purpose of an environmental assessment is to give the decision maker a complete picture of the potential environmental consequences of the proposed action and alternatives; in this context, the issue of whether the electrometallurgical treatment demonstration project is good or not good for the State of Idaho is beyond the scope of this environmental assessment. However, the project could demonstrate key technology for the treatment of spent nuclear fuel, a national problem, and would help the Department of Energy meet its obligations under the settlement agreement with the State of Idaho. In addition, the environmental assessment shows that the proposed action and alternatives would have minimal environmental impacts and would be conducted in compliance with all applicable Federal and state regulations.

6 The Department of Energy actively seeks and considers public comments and considers the views of stakeholders in making decisions.

298 Call Avenue
Idaho Falls, Idaho 83402

March 22, 1996

Mr. W. Greg Bass
EA Document Coordinator
U. S. Department of Energy
Argonne National Laboratory - West
P.O. Box 2568
Idaho Falls, Idaho 83403

Dear Mr. Bass:

Subject: Comments on FCF Environmental Assessment

Although I made an oral statement at the hearing in Idaho Falls on February 21, I would like to expand upon those comments in the light of other comments made at the hearing and in light of further research I have done since the hearing.

1 First, I would like to reiterate the point that the treatment of sodium-containing fuel is necessary before the fuel can be placed in a permanent geological repository. Any metallic sodium remaining in the fuel when placed in the geological repository could react with ground water, generating hydrogen gas and pressure within the fuel containers. The treatment proposed at the FCF is one way to fully remove that sodium.

2 A demand was voiced at the hearing that an Environmental Impact Statement be prepared rather that the Environmental Assessment. It should be pointed out that the FCF is an existing facility which has operated in the past and which is now being readied for a slightly different mission. As such, this use of the FCF is not a major federal action requiring a full EIS. I might add, that I have personally participated in the preparation of required environmental documentation for an entirely new facility for fusion research at the Princeton Plasma Physics Laboratory. The required documentation for that facility, which was to cost over $500 million, use radioactive tritium and produce radioactive neutron activation products in a populated area, was an EA. Surely the restart of an existing facility, at less cost and in a sparsely-populated area should require no more.

3 I have done some research on the process proposed by Prof. James C. Warf of the University of Southern California to use moist carbon dioxide, then steam and finally water to react the sodium contained within the spent fuel. The difficulty with his proposed process is that the sodium is encapsulated within the uranium-plutonium-zirconium metallic fuel and would not be entirely reacted in the above process.

4 Another question was raised at the hearing about the assumed release fraction for plutonium in a fire at the FCF and the potential danger to workers. In the EA the assumed release fraction was 0.05%. I have found an excellent review of the dangers of plutonium by Sutcliffe, et.al.[1] They cite a field experiment in Australia in 1959 in which 200 grams of plutonium were burned in the open desert to study the formation and dispersal of plutonium particles. Analysis of the data, normalized to 1 kilogram of plutonium burned, showed that at 200 meters from the burning plutonium source, no person would have

[1] W. G. Sutcliffe, R. H. Condit, W. G. Mansfield, D. S. Myers, D. W. Layton and P. W. Murphy, "A Perspective on the Dangers of Plutonium," Lawrence Livermore National Laboratory, UCRL-JC-118825, April 14, 1995.

inhaled more than 0.0001 milligram of plutonium.[2] Inhalation of 0.0001 milligram of plutonium would increase a person's overall lifetime risk of cancer from the natural rate of 20% to 20.1%. Recent analysis of the Australian tests indicated that about 0.05% of the plutonium oxidized was converted to respirable particles.[3] It should be pointed out that all plutonium at the FCF would be contained in hot cells within massive buildings. Thus far less would be released than during combustion in the open air. (4)

In conclusion, I believe that the EA has shown that the use of the FCF for the treatment of sodium-containing metallic fuel is a needed part of the program to remove spent fuel from Idaho and that such a use for the FCF will have a minimal short-term impact on the environment. In the long-term, the impact on the environment will be positive. 5 6

If there are further questions on these comments I can be reached at 208-524-1875 or via e-mail at drjsh@srv.net,

Thank you,

Dr. J. Stephen Herring

The following people have read this letter in draft and wish to support its conclusions:

Dr. Harry Lawroski, President of American Nuclear Society 1980-81

Karen Cornwell

George A Freund

C. Gordon Lewis

Marty Hvelon

---

2 R. H. Condit, "Plutonium Dispersal in Fires, a Review of What was Known as of 1986," Lawrence Livermore National Laboratory, UCRL-ID-114164 (1993).

3 R. E. Luna, "A New Analysis of the Vixen A Trials," Sandia National Laboratory, Albuquerque, NM, SAND93-2628, TTC1285 (1994).

Responses to Document D079

1,6 The commentor's statement on this demonstration is acknowledged. Removal of the sodium from the spent nuclear fuel is an objective of this demonstration.

2 In accordance with 10 CFR Part 1021, the Department of Energy prepared an environmental assessment for the electrometallurgical treatment demonstration project to assist with agency planning and decision making. On the basis of the environmental assessment, the Department of Energy will decide whether to prepare a Finding of No Significant Impact or an environmental impact statement.

3 The proposed process of treating the spent nuclear fuel with hot, water-saturated carbon dioxide would have the following technical problems and would require extensive development before implementation. Because of the high radiation level of the spent nuclear fuel, any processing would have to be carried out in a shielded, inert atmosphere cell, not in a simple reaction chamber as described in the comment. Based on extensive experience with reacting sodium to form sodium carbonate, these reactions would have to be controlled very closely. History has shown that the potential for accidents involving reacting sodium is very high. Exposure of the hot uranium fuel to oxygen and water vapor is similar to metal fire accident conditions described in the environmental assessment (Section 4.2). Also, the use of water for treatment of highly-enriched spent nuclear fuel would require stringent criticality hazards control measures because aqueous processes have lower fissile material limits than metallic processes. The products from the proposed process may include pyrophoric uranium hydride in addition to the compounds cited in the comment. Additional process steps would, therefore, be required to stabilize the pyrophoric nature of the product.

4 The available data on plutonium combustion products support a release fraction of 0.05% or less.

5 Under the terms of the settlement agreement, the Department of Energy is legally obligated to remove spent nuclear fuel (including Experimental Breeder Reactor-II spent nuclear fuel) from the State of Idaho by the year 2035. Electrometallurgical treatment is a

promising technology for treating Experimental Breeder Reactor-II spent nuclear fuel and blanket assemblies. Application of the technology could help the Department of Energy to meet this obligation.

1995-1996
Member Clubs

American Wildlands- *Englewood, CO*
Argent Hiking Club- *Astoria, OR*
Bonneville County Sportsmen Assn.- *Idaho Falls, ID*
California Alpine Club- *San Francisco, CA*
Cascadians- *Bellevue, WA*
Cherokeeans- *Salem, OR*
Chinook Trail Association- *Vancouver, WA*
Columbia Gorge Audubon Society- *Hood River, OR*
Contra Costa Hills Club- *Oakland, CA*
Friends of the Three Sisters Wilderness- *Eugene, OR*
Desperados Club- *Los Angeles, CA*
Hobnailers- *Spokane, WA*
Idaho Alpine Club- *Idaho Falls, ID*
Klahhane Club- *Port Angeles, WA*
Mazamas- *Portland, OR*
Montana Wilderness Association- *Helena, MT*
Mt. Baker Hiking Club- *Bellingham, WA*
Mt. St. Helens Club- *Longview, WA*
Obsidians- *Eugene, OR*
Pacific Crest Trail Conference- *Eugene, OR*
Preserve Area Ridgelands Committee- *Livermore, CA*
Ptarmigans- *Vancouver, WA*
Rancheria Conservation Society- *Victoria, B.C.*
Regional Parks Association- *Berkeley, CA*
Santiam Alpine Club- *Salem, OR*
Seattle Audubon Society *Seattle, WA*
Sierra Club- *San Francisco, CA*
Sierra Club Los Angeles Chapter- *Los Angeles, CA*
Sierra Club Mother Lode Chapter- *Sacramento, CA*
Sierra Club-Spokane- *Spokane, WA*
Sierra Club of British Columbia- *Victoria, B.C.*
Tahoma Audubon Society- *Tacoma, WA*
Tamalpais Conservation Club- *San Francisco, CA*
Trails Club of Oregon- *Portland, OR*
Washington Alpine Club- *Seattle, WA*
Willapa Audubon Society- *Longview, WA*
Women Climbers Northwest- *Seattle, WA*

President: Marian Huebner
1995 McKinne Drive
Idaho Falls, ID 83404

Vice President: Winchell Hayward
208 Willard No.
San Francisco, CA 94118

Past President: Jack Walker
431 Green Glen Way
Mill Valley, CA 94941

Secretary: Wendy Walsh
18010 Bear Creek Rd
Woodinville, WA 98072

Treasurer: Robert Haage
9541 Tudor Ave.
Montclair, CA 91703

State Vice Presidents:
North California: Laurence Mendon
South California: Robert Hauge
Colorado: Sally Ramsey
Idaho: Marian Huebner
Montana: Chrissi Morris
East Montana: Kenneth Baldwin
West Montana: Janet Kate
Oregon: Margaret Forsythe
NW Washington: Anne Kinnerdonk
Western Washington: Paula Hoffman
Western Canada: Sharon Chew

Editor, OUTDOORS WEST: Hazel Wolf
512 Boylston Ave. E. #106
Seattle, WA 98102

Washington D.C. Rep.: Brock Evans
National Audubon Society
666 Pennsylvania Ave. S.E.
Washington, D.C. 20003

FEDERATION OF WESTERN OUTDOOR CLUBS

Established in 1932 for Mutual Service and for the Promotion of the Proper Use, Enjoyment and Protection of America's Scenic Wilderness and Outdoor Recreation Resources.

Mr. Greg Bass
Department of Energy
Argonne Group-West
PO Box 2528
Idaho Falls, Idaho 83403-2528

March 22, 1996

Subject: Formal Comments on DOE/EA-1148 "Environmental Assessment (Draft) Electrochemical Treatment Research and Demonstration Project in the Fuel Conditioning Facility at Argonne National Laboratory-West "

This statement is a follow-on to the oral comments I provided at the EA hearing on this subject in Idaho Falls on February 21.

At that time, I made a presentation on behalf of the Federation of Western Outdoor Clubs. Although this is a venerable outdoor recreation/environmental organization, it is relatively unknown in Idaho, and I spent some time in credentializing* the Federation as a *bona fide* environmental organization. Documents I conveyed to Mr. Lawson, the Hearing Officer, included a copy of our publication, Outdoors West, a brochure describing the aims and purposes of the Federation, and a complete copy of formal Resolutions passed in the Federation's 1995 Annual Meeting. At this Federation meeting, a formal Resolution in support of nuclear power (and nuclear fuel reprocessing in general) was passed by the FWOC that related to the Federation's concerns about global warming. I conveyed a copy of this Resolution to Mr. Lawson, along with a copy of a copy of a letter written to Secretary O'Leary (copy enclosed). This letter also conveyed the same Resolution in support of nuclear power/nuclear fuel reprocessing, conveyed another Resolution advocating environmental protection of the Hanford Reach, and castigated the DOE for what is felt to be an expensive and poorly thought-out plan for dealing with the remaining N-Reactor fuel. (This corroding-away fuel - an environmental time-bomb- was shown in a televised PBS "New Explorer" segment in recent weeks.

My written comments about the N-Reactor fuel were sanctioned by the Board of Directors of the FWOC as of March 9th..

---

* As one whose been active in true-life environmental issues in Idaho in the past thirty years, I get irate when I see such journalistic perversions as the enclosed copy of an article from the Idaho Falls Post Register illustrates. I have, in the past, contributed to Greenpeace (but not joined it) in support of certain environmental projects, even though (per the FWOC Resolution on global warming), Greenpeace is grossly in error for its knee-jerk opposition to nuclear power. The other (Continued)

-2-

The FWOC also sanctioned my remarks made in the February 21 hearing. These remarks were somewhat truncated with respect to the EA because of time constraints imposed at the hearing. The following are the Federations formal comments on the subject document. Please include them also in the Hearing Record on this matter.

1 With the exception of a few minor discrepancies that others at the 2/21 Hearing pointed out, the EA Document clearly describes the heretofore intractable problem of disposing of EXISTING highly enriched/irradiated fuel modules that contain elemental sodium as a heat transfer medium. The sodium prohibits underground disposal, for the fuel/sodium combination is a hazardous mixed waste. That rules out some of the other "solutions" for disposal of "spent" nuclear fuel.

2 Note that "solutions" in the previous sentence is in quotes. It is not a solution to bury valuable special nuclear material that the US taxpayers have supported the manufacture of at an estimated cost of nearly a trillion dollars. This "solution" makes no sense to anyone but a politician or anti-nuclear activist. "Spent" in this context is also a nonsense word, for over 99% of the potential energy in the original nuclear fuel would still be usable as a power source after reprocessing. The use of the word "spent" is as illogical and hypocritical as if I were to buy a new pair of expensive shoes, wear them twice, and then declare them as "spent" shoes, and be forbidden by political fiat to reuse them.

3 To continue. As discussed in the subject document and presented by senior DOE/Argonne officials in the 2/21 hearing, the research demonstration project appears to have good prospects for dealing with the special type of sodium-bonded reactor fuel that has been used so successfully in the EBR-II project at the ANL site for many (30+) years. The electro-metallurgical process has been confirmed to work on a laboratory scale with metallic fuel, and on a semi-works scale, with depleted uranium.

As a former chemical engineer, I see no impediments to the process functioning appropriately with an irradiated metal fuel input, with the end results listed on page 29 of the subject document being readily achievable.

---

organizations mentioned can be dismissed as non-environmental. The "Institute" referred is a group (?) I've never even heard of, and in attending over a hundred hearings on local natural resource/environmental hearings, I've never even once seen a member of the "Alliance" participating in such a hearing!

I plan to have early discussions with the Post Register's editorial staff to give them specific guidance on how to discriminate between the real environmentalists and the pseudo-environmentalists.

4 The EA's Safety Analysis appears to have covered the potential facility accidents that could occur. The permits required to support proposed activities have been obtained.

5 The National Research Council (NRC) concerns about remote operation of equipment in a radiation environment (Pg 25) are not warranted. ANL-W has a long history of being a successful innovator in remote system design and operation in inert atmosphere hot cells, and also via leadership in the Remote System Technology Division of the American Nuclear Society.

6 The most important issue (albeit a false one) raised by others at the 2/21 hearing was that of proliferation. There is absolutely no reason for any terrorist group to try to steal irradiated nuclear material and try to manufacture it into nuclear weapons when there are hundreds of tons of weapons-grade material in present-day Russia or China. Any enterprising terrorist group with adequate funds could acquire some of this materials for their own nefarious purposes.

7 The "proliferation paranoids" that infest the federal government, the DOE, anti- nuclear groups ,have stifled the development of our country's nuclear technology, and eliminated any chance for fuel reprocessing. They have stopped the use of advanced sodium-cooled reactor technology with the cancellation of the Clinch River Demonstration plant by surreptitious persuasions of some sort. They ignore that the only large-scale safe source of energy that is environmentally most-benign, as well as not producing CO2, is the nuclear option.

The successful actions of the proliferation paranoids, and the resulting poor economics of commercial nuclear power, has the rest of the world laughing at these illogical and hurtful-to-our country antics.

8 To continue. It is plain to see that ANL's demonstration's once-through process that results in diluting high-enriched fuel to a much lower enriched nuclear material is anything but a proliferation issue. Only those with a deplorable lack of understanding or those whose mental insights are blinded by self-serving political interests could try to pin the "proliferation" label on this project. The exact opposite of proliferation concerns is the deliberate end product of this process.

9 I do wholly agree with the Proposed Action as described in the EA and also with NRC's overall recommendation on page 25 to proceed with the development plan in support of the EBR-2 fuel demonstration, and if successful, make a positive revisitation of the program and proceed to a continuance of the program to process the rest of the inventory of EBR-2 metallic fuel. To do otherwise 10 would be an enormous loss of taxpayer investment in the liquid metal cooled reactor technology, a technology that can be predicted that the U.S. could have to buy back some day from the French or the Japanese to meet our country's future needs.

11 To support the continued economic health and technical adequacy that this country requires just to maintain our standard of living, and to mitigate the appalling increase in global warming caused by fossils fuels, this country must keep nuclear technology as a viable option. To let the budget cutters and

(11) the proliferation paranoids squander this incredible technological resource would be a traitorous act of the very worst!

12 With the processing of the EBR-2 fuel accomplished, the DOE should proceed forthwith to support
13 an R&D program to determine the suitability of the electro-metallurgical process to mixed-oxide PWR fuel. It make much more sense to reprocess PWR fuel than bury the enormous potential energy remaining in the misnamed "spent" fuel.

This concludes the comments provided by me on behalf of the Federation of Western Outdoor Clubs.

Martin F. Huebner
President
Federation of Western Outdoor Clubs
1995 McKinzie Drive
Idaho Falls, Idaho 83404
(208) 522-6475

Responses to Document D080

1 The commentor's statement on this demonstration is acknowledged and the Department agrees with the comment that the Experimental Breeder Reactor-II spent nuclear fuel represents a special disposal problem. It is for this reason that the proposed action is being considered as a means to determine the technical feasibility of electrometallurgical treatment process as a potential solution.

2 The commercial value of this material is not considered to be within the scope of this environmental assessment.

3 The Department of Energy acknowledges that the electrometallurgical process has been shown to "work on a laboratory scale" with unirradiated, depleted uranium. For this reason, the Department is considering the proposed action for further evaluation of the process potential.

4 The Department of Energy acknowledges the commentor's statement that, as required in an environmental assessment, accidents were properly evaluated based on the Department of Energy publication, *Recommendations for the Preparation of Environmental Assessments and Environmental Impact Statements*, using conservative assumptions, in order to bound potential environmental impacts.

5 The Department of Energy acknowledges that Argonne has a long history of successful operation of remote equipment in a radiation environment.

6,7,8 The Department of Energy acknowledges the commentor's statements that this process is not a proliferation concern. The Department of Energy has determined that electrometallurgical treatment is consistent with the nonproliferation policy of the United States. The proposed demonstration project does not separate plutonium. Moreover, the technology employed is not capable of separating plutonium. It is consistent with the nonproliferation policy of the United States, which does not encourage the civil use of plutonium. Accordingly, the United States does not engage in plutonium reprocessing. Further, by removing and then blending down the highly-enriched uranium, the project

supports the goal of the United States to seek to eliminate where possible the accumulation of stockpiles of highly-enriched uranium or plutonium. As a result, the proposed demonstration project is consistent with the nonproliferation policy of the United States. An additional response to comments regarding nonproliferation concerns is provided in Chapter One of this Appendix.

9 The Department of Energy acknowledges the commentor's statement on the proposed action.

10,11 The Department of Energy acknowledges the commentor's statement on nuclear technology and the liquid metal cooled reactor technology. However, this issue is beyond the scope of this environmental assessment.

12 Electrometallurgical processing of mixed oxide and the Pressurized Waste Reactor spent nuclear fuel is not within the scope of this environmental assessment. The Department of Energy does, however, recognize the commentor's statement on the use of the electrometallurgical process in this application. Decisions of this nature are premature and would depend on evaluation of the data from this proposed action.

13 The Department of Energy acknowledges the commentor's statement. However, this question is not within the scope of this environmental assessment.

Responses to Document D081

1 The Department of Energy acknowledges the commentor's statement on the technical feasibility demonstration of electrometallurgical treatment for Experimental Breeder Reactor-II spent nuclear fuel. The decision to proceed or not will be made after careful consideration of all comments and in accordance with all applicable laws and regulations including appropriate National Environmental Policy Act analysis.

2, 3 The Department of Energy acknowledges that there may be many benefits of electrometallurgical treatment of spent nuclear fuel. It is for this reason that this demonstration of technological feasibility is being proposed. However, the scope of this environmental assessment is treatment of 100 Experimental Breeder Reactor-II spent nuclear fuel assemblies and 25 blanket assemblies. The Department of Energy believes that this demonstration will provide the data necessary for a decision regarding whether to propose future application of the technology, including treatment of the remaining Experimental Breeder Reactor-II spent nuclear fuel. That decision will be made in accordance with all applicable laws and regulations including appropriate National Environmental Policy Act analysis.

4 The comment that it would not be economical to conduct this demonstration in an alternate facility is consistent with the information provided in the environmental assessment.

5,6 The Department of Energy acknowledges the commentor's conclusion that treatment of less than the proposed 100 driver spent nuclear fuel assemblies and 25 blanket assemblies will not provide the data needed to assess application of the technology. However, a decision regarding processing of more than the amount specified in the proposed action is premature, as indicated in the response to comments 2 & 3.

①

March 21, 1996

Mr. & Mrs. Ralph E. Rice
Box 569 4555 S. Mission Road
Tucson, AZ 85746

Mr. Greg Bass, EA Document Mgr.
U.S. Department of Energy
Argonne Group - West
P.O. Box 2528
Idaho Falls, Idaho 83403

Subject: Comments on the Draft Environmental Assessment for the Electrometallurgical Treatment Research and Demonstration Project in the Fuel Conditioning Facility at Argonne National Laboratory - West.

Gentlemen:

We strongly urge that the DOE proposal to demonstrate the technical feasibility of electrometallurgical technology for treating EBR-II sodium-bonded spent nuclear fuel and the uranium blanket assemblies be approved.

In fact, we believe that the proposal to treat only a limited quantity should be changed to processing of all the EBR-II spent fuel and blanket assemblies. Complete preparation for eventual, safe burial in a geologic depository is the most responsible environmental policy. This treatment and disposal should not be left for future generations to accomplish.

We have the following comments on the three alternative actions considered:

1. "To perform the work in a different facility in another location."

This action could only be politically motivated. The logical and more economic approach is the use of the existing facilities and

(2)

(4) equipment already developed and tested, and also to use the trained personnel and management already existing at the ANL-W FCF.

2. "To treat only 50 driver assemblies and 10 blanket assemblies."

5 As already discussed, the most responsible environmental and economic action would be processing and disposal-by-geologic-burial, of all the fuel and blanket assemblies with the existing facilities and personnel

3. "To store untreated fuel in the Radioactive Scrap and Waste Facility at Argonne-West."

6 Again, we consider it environmentally, economically and morally irresponsible to defer proper reprocessing and disposal of all of the fuel and blanket assemblies for future generations to accomplish.

We thank you for the opportunity to comment on this draft environmental assessment.

Ralph E. Rice

Hallie M. Rice

CHEMISTRY DEPARTMENT
SEELEY G. MUDD 415
(213) 740-7056
FAX (213) 740-2701

USC

March 20, 1996

Mr. Greg Bass, EA Document Manager
U.S. Department of Energy, Argonne Group-West
P.O. Box 2528
Idaho Falls, ID 83403

Dear Mr. Bass:

Enclosed please find a my comments on the Draft EA pertaining to the Experimental Breeder Reactor and its related procedures, stemming from the meeting of February 21.

Sincerely,

James C. Warf

James C. Warf
Professor Emeritus of Chemistry

UNIVERSITY OF SOUTHERN CALIFORNIA, LOS ANGELES, CALIFORNIA 90089-1062

CHEMISTRY DEPARTMENT
SELLEY G. MUDD 108
(213) 740-7036
FAX (213) 740-2701

USC

Supplemental Comments on the Draft Environmental Assessment for the Electrometallurgical Treatment and Demonstration Project in the Fuel Conditioning Facility at Argonne National Laboratory-West

A CRITIQUE OF THE ARGONNE - WEST PYROMETALLURICAL PROCESS

CONTENTS:

1. A Suggested Alternative to the Electrometallurgical Technique
2. The Problem of Sodium in the Pins
3. Decommissioning of the EBR
4. Conversion of the Argonne West Pyroelectrolytic Procedure to Production of Weapons-Grade TRU Metals

Note: Items 1 and 4 above were briefly presented at the February 21, 1996, meeting in Idaho Falls devoted to a Draft Environmental Assessment.

1. A Suggested Alternative to the Pyroelctrolytic Technique

The procedure used to treat the spent fuel at the EBR II Fuel Conditioning Facility involves chopping up the pins and removing the uranium selectively by electrolysis in a molten bath consisting of the chlorides of potassium and lithium. The weapons-usable uranium metal separated is subsequently blended down in uranium-235 content by melting with depleted uranium; the fission products and TRU metals are removed from the molten salt using ion exchange with zeolite. These steps are expensive in that an argon cell is needed, lithium chloride is not really a cheap substance, labor costs are high, and for other reasons. A certain amount of sodium metal serves as a heat-transfer medium between the uranium fuel pins and the stainless steel tubing of the fuel elements, and this sodium is described as something of a problem in disposing of the spent fuel. Among other matters, it eventually contaminates the potassium chloride/lithium chloride bath. The supposed problem presented by the presence of the metallic sodium hardly warrants adopting a procedure which amounts to reprocessing. There might be an alternative, non-electrolytic procedure which is very different from the current one. 1

In brief, the following procedure is suggested. The spent fuel pins are chopped as usual and a substance which contains uranium-238 is added. This might be depleted uranium in the form of metal or oxide, miscellaneous scrap materials low in uranium-235 from a number of processing steps such as isotope-separation facilities, or even pitchblende or related ore. The

UNIVERSITY OF SOUTHERN CALIFORNIA, LOS ANGELES, CALIFORNIA 90089-1062

proportions are selected to make the overall uranium-235 content below 20%. The mixture is transferred to a simple reaction chamber which can be heated to about 450°C (heating by combustion of gas or oil would be satisfactory). Starting at a slightly elevated temperature, carbon dioxide (or other gas containing CO_2) saturated with water vapor is passed through the reaction chamber. The temperature is slowly raised to around 450°C while injecting steam into the gas stream. This treatment converts all the metallic sodium into sodium carbonate. Water vapor readily reacts with uranium metal under these conditions to form uranium dioxide and hydrogen. Stainless steel would probably be a satisfactory material of construction for the reaction chamber; if not, nickel is sure to be. An argon cell is not needed for any of these steps. (1)

At this stage the mixture consists of sodium carbonate (mixed with some bicarbonate), uranium dioxide, and whatever substance contains the uranium-238, generally uranium dioxide. The cesium-137, strontium-90, and barium-140 have been converted to their carbonates. TRU metals, zirconium and rare earths are oxides. Krypton-85 has been vented in the exhaust gases. It might be that some of the iodine-129 would enter the exhaust gases as the element or hydrogen iodide, and would need to be trapped. In any case, the solid mixture resembles spent fuel from commercial reactors, and after packing in suitable canisters, could be ready for geological disposal.

The simplicity of the process outlined is appealing. It is especially inviting in that no separation of uranium of any grade is carried out.

2. The Problem of Sodium in the Pins

Several EBR II scientists expressed the concern that metallic sodium in the pins presented a problem. Yet I heard no suggestion that it could just be distilled out. Its boiling point at one atmosphere is 883°C, and at 430°C, its vapor pressure is about 1 torr. Under vacuum, sodium could be distilled out of chopped pins. The cesium-137 in it would follow along (cesium is even more volatile than sodium). 2

3. Decommissioning of EBR

Ultimately, the useful life of all nuclear facilities will end, and the plants will have to be decommissioned and disposed of. I heard no discussion of this aspect. There are bound to be metals in the EBR rendered radioactive by neutron activation, and probably parts contaminated by other radionuclides. Perhaps information on decommissioning should be made more prominent. 3

4. Possible Conversion of the Argonne West Pyroelectrolytic Procedure to Production of Weapons-Grade TRU Metals

One of the major concerns of the Argonne West electrometallurgical process stems from the probability that once the new technology becomes known worldwide, it could accelerate the nuclear weapons programs of some developing nations. As proposed now in the demonstration requested for the Environmental Assessment, separation of TRU metals is said to be neither the objective nor a possibility: it is designed to recover pure uranium for either reuse or disposal. 4

But work in the TRUMP-S and Integral Fast Reactor programs have demonstrated that by changing one of the electrodes to liquid cadmium, TRUs can indeed be electrolyzed out of a

potassium chloride/lithium chloride melt. In fact, the original purpose of the TRUMP-S research was to design electrorefining equipment and procedures to separate not only uranium but also to electroplate the TRU metals in various degrees of purity from each other and from fission products. The ostensible motivation was to employ the separated metals as reactor fuel, in particular breeder reactors. The reduction potentials are shifted so that after removal of the uranium, a mixture of plutonium, americium, curium, and certain rare-earth metals separate together.

All transuranic elements are susceptible to fission by fast neutrons, and since the major component is plutonium, which is fissile, weapons-grade material could be prepared. Thus by suitable modification of the Argonne electrorefining method, including sensitive adjustment of the reduction potentials, plutonium pure enough for weapons use could be manufactured; this might require several stages of separation. Partition of the remaining TRUs and the rare-earth metals would become increasingly difficult, but this is of little consequence from the weapons viewpoint since reasonably pure plutonium could be prepared. (4)

Thus one concern is that facilities based on the electrometallurgical technique would be small enough to conceal underground. Thus efforts to impede proliferation would be handicapped. It might be too late already to thwart such a development, but on the other hand maybe it is not. There seems to be no easy solution to this dilemma.

James C. Warf
Professor Emeritus of Chemistry

March 20, 1996

Responses to Document D082

1 The proposed process of treating the spent nuclear fuel with hot, water-saturated carbon dioxide would have the following technical problems and would require extensive development before implementation. Because of the high radiation level of the spent nuclear fuel, any processing would have to be carried out in a shielded, inert atmosphere cell, not in a simple reaction chamber as described in the comment. Based on extensive experience with reacting sodium to form sodium carbonate, these reactions would have to be controlled very closely. History has shown that the potential for accidents involving reacting sodium is very high. Exposure of the hot uranium fuel to oxygen and water vapor is similar to metal fire accident conditions described in the environmental assessment (Section 4.2). Also, the use of water for treatment of highly-enriched spent nuclear fuel would require stringent criticality hazards control measures because aqueous processes have lower fissile material limits than metallic processes. The products from the proposed process may include pyrophoric uranium hydride in addition to the compounds cited in the comment. Additional process steps would, therefore, be required to stabilize the pyrophoric nature of the product.

2 The distillation technique would be an incomplete process. The cesium and the sodium would need to be stabilized into a waste form. In any event, such a technique would only be applicable to blanket assemblies since the metallic sodium has not been infused into the blanket assemblies as it has in the drivers. As explained in the environmental assessment in Section 2.1, sodium is inseparable from the irradiated driver spent nuclear fuel unless the fuel is melted or dissolved. The fuel-encapsulated sodium would not be removed by a vacuum distillation process operated at the suggested temperature, so the remaining spent nuclear fuel would remain reactive. If the spent nuclear fuel were melted at 1300-1400°C, many different radioactive elements would be volatilized. A system has not been developed to efficiently capture and collect these volatile elements or to immobilize them in one or more waste forms.

3 The decommissioning and disposal of the Experimental Breeder Reactor-II is beyond the scope of this environmental assessment and will be the subject of future National Environmental Policy Act analysis.

4 The basic electrometallurgical technology of the proposed action is not new, as noted in the comment. Electrometallurgical methods have been in use in the metals industry to purify various metals for decades. Nations with interest in weapons development could, therefore, apply the technology regardless of the proposed action.

Even if a liquid-cadmium cathode were developed and added, the technology could concentrate plutonium but could not fully separate it from uranium and transuranic elements, such as americium and curium. This characteristic leaves the material unattractive for weapons fabrication. Because of the availability of processes which produce much more attractive weapons fabrication materials, or the relative availability of such materials to those willing to illegally obtain them, it is unlikely that developing nations would consider this process. Additional information on the nonproliferation aspects of the electrometallurgical process is given in Chapter One of this Appendix.

SCHOOL OF
ENGINEERING & APPLIED SCIENCE
NUCLEAR REACTOR FACILITY
Department of Mechanical, Aerospace & Nuclear Engineering
University of Virginia
Charlottesville, VA 22903-2442
804-982-5440 FAX: 804-982-5473

Mr. Greg Bass, EA Document Manager
U.S. Department of Energy
Argonne Group-West
P.O. Box 2528
Idaho Falls, Idaho 83403

March 21, 1996

Dear Mr. Bass,

I have had the opportunity to read the draft Environmental Assessment for the Electrometallurgical Treatment Research and Demonstration Project in the Fuel Conditioning Facility at Argonne National Laboratory-West (for brevity in this letter I shall use acronyms that are defined in the draft EA without including their explanation). Although I am writing as a private citizen, I do have some preliminary familiarity with this project as a consequence of having served as a member of the University of Chicago's Review Committee for the Technology Development Division (and its predecessor) of ANL.

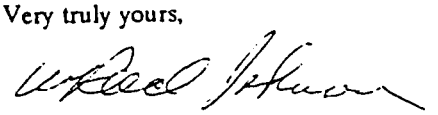
1 I strongly advise that the Proposed Action (the full electrometallurgical fuel treatment demonstration project) be carried out. The environmental impacts of the project, as summarized in the draft, are truly negligible. On the other hand, the information obtained by engaging in a full demonstration of the electrometallurgical technique using highly radioactive fuel will be a significant addition to the country's technological base. As I understand it the equipment and facilities required to carry out
2 the Proposed Action are in place and essentially ready-to-go. It would be technical, and economic, folly not to proceed with the demonstration. As the EA points out, if the only result is to determine a way of treating used EBR II fuel for eventual disposition, the Proposed Action will have served a significant purpose.

3 The radiation doses resulting from routine operations and projected accident scenarios presented in the EA are quite low even using conservative assumptions. I would note, however, that the EA uses the Linear Model to estimate radiation-induced latent health effects (cancers). While this approach is appropriately in conformance with current national policy and regulations with respect to radiation effects, it probably adds
4 another layer of conservatism to these estimates. An increasingly large body of data shows that the Linear Model seriously overpredicts the effects of low radiation doses (see Nuclear News, September 1995, pp. 26-34). Would it not be reasonable in assessments of this type to indicate the likely additional conservatism, or at least the uncertainty, introduced by using the Linear Model?

Finally, a confusing DOE definition of the word "reprocessing" is quoted on page 113 of the EA. It includes the phrase "*..in order to recycle such materials primarily for defense programs.*" As I understand the term reprocessing, it applies equally well to the recovery of fissile materials for civil use, and in fact in today's world that is the primary purpose for reprocessing. 5

I appreciate this opportunity to comment on the EA for the fuel conditioning demonstration project and hope my comments will be of use. If there are any questions with respect to my remarks I will be glad to attempt to answer them. 6

Very truly yours,



W. Reed Johnson
Professor Emeritus

Responses to Document D083

1 The Department of Energy acknowledges the commentor's statement on the proposed demonstration project.

2 The commentor correctly notes that completion of the proposed demonstration project is necessary to determine its capabilities, and that doing so would add significantly to technological knowledge.

3 As discussed in the environmental assessment, the radiation doses associated with the electrometallurgical treatment demonstration project would be extremely low.

4 There is a growing body of evidence that the linear model significantly overestimates the effects of low doses of radiation. Application of one of the replacement models that have been suggested would result in a prediction of no cancer effects from even the worst accidents analyzed in the environmental assessment. However, one could draw basically the same conclusion from the data presented using the conservative linear model. Until new guidelines are issued, the Department of Energy will continue to use the conservative linear model for National Environmental Policy Act analysis and safety analysis.

5 The definition of reprocessing used in the environmental assessment includes a reference to defense program use of the resulting material as a recognition that this is the primary traditional use of the technology and meaning of the word. The commentor correctly observes that reprocessing can also refer to material recovery for civil use. The definition did not intend to preclude this understanding. However, neither use of the term applies to electrometallurgical treatment. This technology does not and cannot separate pure plutonium and is fundamentally not related to Plutonium-Uranium Extraction (PUREX), the normally-recognized reprocessing technology. In addition, it should be noted that electrometallurgical treatment produces no liquid waste stream and is of a much smaller scale than a Plutonium-Uranium Extraction (PUREX) process. The low-enriched uranium by-product of the demonstration may eventually be sold for use in commercial reactors, but that decision is beyond the scope of this demonstration. To be clear, electrometallurgical technology is a spent nuclear fuel treatment and waste preparation

technology and does not constitute reprocessing. More detailed information on the aspects of reprocessing is provided in Chapter One of this Appendix.

6 The Department of Energy values the participation of all stakeholders in the National Environmental Policy Act process. Public participation is a fundamental component of the National Environmental Policy Act process, and the Department of Energy actively seeks and considers public comments and incorporates the views of stakeholders in making decisions.

IN[illegible] Research Bureau

.O. Box 220
[illegible], Idaho 83871
08-835-6182 Tele & Fax

Project of
Environmental
Defense Institute, Inc

dvisory Members

itizens for
nvironmental
uality
St. Maries
Idaho

nvironmental
efense
nstitute
Troy, Idaho

ocus on Peace
nd Justice
Burley, Idaho

overnment
ccountability
Project
Seattle, WA

reater
ellowstone
oalition
Bozeman, MT

reenpeace
SA
Washington, DC

oscow Chapter
daho
onservation
eague
Moscow, ID

ood River
hapter
daho
onservation
eague
Ketchum, ID

rinted on
ecycled paper

Mr. Greg Bass
EA Document Manager
Argonne Group-West
P.O. Box 2528
Idaho Falls, ID 83403

March 15, 1996

Dear Sir,

RE: Comments on the Draft Environmental Assessment for the Electrometallurgical Treatment and Demonstration Project in the Fuel Conditioning Facility at Argonne National Laboratory-West

The INEL Research Bureau (IRB) joined the Nuclear Control Institute, Greenpeace International, Public Citizen Safe Energy Communications Council, Snake River Alliance and U.S. Public Interest Research Group in the original challenge to the Department of Energy's (DOE) violation of the National Environmental Policy Act (NEPA). The specific charges are fully articulated in the joint letter to DOE Secretary O'Leary dated August 25, 1995 and in subsequent joint correspondence to DOE. Additionally, the IRB fully supports Committee to Bridge the Gap's challenges to Argonne National Laboratory-West (ANL-W) Fuel Conditioning Facility (FCF) pyroprocessing offered on February 21, 1996 in Idaho Falls as oral testimony. Changing the name from spent nuclear fuel reprocessing to electrometallurgical treatment does not change the fundamental outcome. It is still reprocessing. 1

The IRB finds that DOE is continuing to violate NEPA by not conducting the required Environmental Impact Statement (EIS). The Environmental Assessment (EA) does not legally fulfill NEPA requirements. Without prejudicing the IRB's finding the EA inadequate, the IRB supports the third alternative; "taking no action, placing all the EBR-II SNF in interim storage, and not demonstrating the electrometallurgical treatment technology". 2

Idahoans are outraged at DOE's subterfuge of using waste management as a guise to rebuild its special nuclear materials production capacity. No credible scientific analysis has been offered by DOE to show that EBR-II spent nuclear fuel (SNF) cannot be safely stored in interim monitored storage facilities or in long-term repositories. 3

DOE's own Spent Nuclear Fuel Vulnerability study shows no hazards related to EBR-II fuel storage other than decrepit facilities that are operating beyond their design life. Long-term underwater storage of any SNF will result in cladding failure. Even after DOE knew that a geologic repository was not going to be available for decades, the Department failed to move SNF from the wet storage to dry storage. 4

Fuel cladding failure in inadequate storage facilities like CPP-603 was not unique to EBR-II fuel. SNF cladding failures are an indictment of DOE's own mismanagement of its wastes.

ANL-W has a twenty year history of safe dry storage of EBR-II fuel at Hot Fuel Examination Facility (HFEF). ANL-W claims that "only a few" elements are stored at HFEF and that they do not represent a "statistically significant sample". DOE's Spent Fuel Working Group Report[1] cites 90 EBR-II assemblies in storage at HFEF which is a statistically significant sample. This same report states that EBR-II stainless steel clad fuel stored at the Radioactive Scrap and Waste Facility (RSWF) "are not breached". Vulnerabilities cited in the report were related to inadequate storage areas including the RSWF. Idaho Division of Environmental Quality issued a Notice of Violation on the RSWF October 20, 1995. ANL-W has cut corners with its underground fuel storage. The RSWF is a crude soil vault that lacks the corrosion control and essential monitoring features of above ground dry casks. Therefore, DOE's claims of EBR-II SNF vulnerabilities that are greater than many other fuel types is unsubstantiated. The EA claims an inventory of only 330 blanket assemblies where as the Spent Nuclear Fuel Working Group Report acknowledges 500 currently being stored. This is a significant discrepancy.

The EA fails to fully characterize the ongoing project's waste streams. With decades of operating experience and presumably continuous data collection and record keeping, ANL-W is remiss in not fully disclosing this information. The EA acknowledges reprocessing over 570 EBR-II assemblies since 1964 [@36]. For instance, a breakdown of air emissions would show significant volitized radionuclides that HEPA filters are not designed to control. ANL-W's unwillingness to provide wet caustic scrubbers to reduce volitized nuclide releases is unacceptable. With the potential of 203,000 curies available for release in any single process batch this represents a significant hazard.

ANL-W deserves due credit for initiating for the first time in the history of the AEC/-ERDA/DOE the classification of SNF parts and assemblies as Greater Than Class C waste requiring final disposal in a geologic repository. Unfortunately, this change follows EDI's exposing DOE's practice of shallow land burial and showing the public DOE's own shocking data gained through a Freedom of Information Act request. This policy represents a significant move toward responsible waste management that hopefully will be adopted throughout the DOE Complex

The EA inadequately addresses the non-proliferation compliance issues. Indeed, ANL-W's comparison of PUREX type SNF reprocessing "footprints" (600,000 sq. ft.) with the pyroprocessing (16,000 sq. ft.) "small footprint" literally clinches the argument. This proliferation prone technology is so compact that it would be extremely difficult if not impossible to detect in a non-compliant country. Moreover, diversion of throughput after the "cathode processing" stage would be undetectable even in this country. Therefore, even the American public would have no assurance that DOE itself was not producing weapons grade material at this facility.

. The EA's environmental impact calculations assumed a low 10% burnup. [@73] Yet when trying to justify EBR-II SNF vulnerabilities, the EA characterizes EBR-II SNF as high burnup [@122] which means high quantities of fission products that will be released during reprocessing. If the high burnup characterization is correct then the source term assumptions are wrong and the environmental-releases may be grossly understated.

[1] Spent Fuel Working Group Report on Inventory and Storage of the Department's Spent Nuclear Fuel and other Reactor Irradiated Nuclear Materials and Their Environmental Safety and Health Vulnerabilities, Volume I November 1993, U.S. Department of Energy, page 24.

This EA further violates NEPA by its own admittance because it is retrospective. The Department has committed funds for many years (acknowledged in the EA) toward construction of the pyroprocessing facility at ANL-W.

The whole thrust of NEPA is to force agencies to conduct an EIS prior to committing resources so that expenditures will not prejudice the decision making process. The EA's 12 proposal to defer any EIS until after the "demonstration project" technology is proven ignores NEPA's mandate that an EIS be prepared in advance of the stage where a program "has reached a stage of investment or commitment to implementation likely to determine subsequent development or restrict later alternatives".[2]

The fact that ANL-W's pyroprocessor is already complete only highlights the need for an immediate EIS, and does not provide a rationale for deferral of full NEPA compliance. The 13 pattern of "phased" EA's improperly segments the NEPA process, and obfuscates the need to prepare an EIS prior to any irretrievable commitment of resources. The EA reflects that detailed planning and substantial federal resources have been advanced toward a full scale electrometallurgical processing facility.[3]

Sincerely,

Chuck Broscious
INEL Research Bureau Coordinator

cc:
Hazel O'Leary, Secretary U.S. Department of Energy
Dean Nygard, Idaho Division of Environmental Quality
Wayne Pierre, U.S. Environmental Protection Agency Region X
INEL Research Bureau member organizations
Daniel Horner, Nuclear Control Institute
James Adams, Safe Energy Communication Council
Anna Aurilio, U.S. Public Interest Research Group
Beatrice Brailsford, Snake River Alliance
Thomas Clements, Greenpeace International
Bill Magavern, Public Citizen

---

[2] 40 CFR ss 1502.4(c)(3); also see 42 U.S.C. ss 4332(C)(v)

[3] See Western States Legal Foundation December 11, 1991 Notice of Intent to Sue U.S. Department of Energy submitted by Michael J. Verluva, J.D. and Andrew M. Lichterman, J.D.

Responses to Document D084

1 The Department of Energy does not regard electrometallurgical treatment as "reprocessing" as that term has been used historically. See Chapter One of this Appendix for more information. The National Academy of Sciences reports refer to the electrometallurgical process as spent nuclear fuel treatment or processing. The *Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Environmental Impact Statement* (DOE/EIS-0203-F) has defined processing as "applying a chemical or physical process designed to alter the characteristics of the spent fuel nuclear material." The electrometallurgical process meets this definition. In addition, the National Academy of Sciences report on treating Department of Energy spent nuclear fuel stated, "The committee recommended that such research and development should be conducted exclusively to evaluate the electrometallurgical technology's effectiveness for treating Department of Energy spent nuclear fuel, and funding decisions about electrometallurgical research and development for Department of Energy spent nuclear fuel treatment should be independent of issues related to the Integral Fast Reactor Program." Department of Energy regulations do not preclude the preparation of an environmental assessment to determine if an environmental impact statement is required. For further discussion, please refer to Chapter One of this Appendix.

2 In accordance with 10 CFR Part 1021, the Department of Energy prepared an environmental assessment for the electrometallurgical treatment demonstration project to assist with agency planning and decision making. Based on the analysis contained in the environmental assessment and public comments, the Department will determine whether to issue a Finding of No Significant Impact or to prepare an environmental impact statement.

3 Under the terms of the settlement agreement and consent order, the Department of Energy is legally obligated to remove spent nuclear fuel (including Experimental Breeder Reactor-II spent nuclear fuel) from the State of Idaho by the year 2035. Electrometallurgical treatment is a promising technology for treating Experimental Breeder Reactor-II spent driver fuel and blanket assemblies in order to make them eligible

for disposal in a geologic repository. Following a successful demonstration, application of the technology could assist the Department of Energy in meeting this obligation. The demonstration of this technology is timely; the research of the technology is sufficiently mature, making the demonstration the next logical step; the facilities, equipment, and infrastructure are available, and Congress has appropriated the necessary funds.

4 Some Experimental Breeder Reactor-II spent nuclear fuel has been stored without incident since 1964. As indicated in the environmental assessment, continued storage of this spent nuclear fuel is analyzed under the no action alternative. Also, as noted in the environmental assessment, once sodium has been washed from the external surfaces of the spent nuclear fuel assemblies, they are subject to stress corrosion cracking, making long term storage potentially problematic.

5 The 90 spent nuclear fuel assemblies in storage at the Hot Fuel Examination Facility have been recently unloaded from Experimental Breeder Reactor-II. They have not been stored long enough to provide significant data regarding potential long-term storage problems. As explained in Section 2.2 of the environmental assessment, the Radioactive Scrap and Waste Facility has an ongoing project to upgrade corrosion protection of the steel liners in which waste cans are placed. Characterization of the Radioactive Scrap and Waste Facility as "a crude soil vault" is not accurate. Waste or spent nuclear fuel stored in the Radioactive Scrap and Waste Facility is placed within a minimum of three steel and stainless steel engineered barriers. The Notice of Violation issued in 1995 by the Idaho Department of Environmental Quality cited one existing document for the Radioactive Scrap and Waste Facility that could not be found during the State's inspection because the manager of the Radioactive Scrap and Waste Facility was not on site that particular day. A copy of the document was sent to the Department of Environmental Quality, satisfying the item in the Notice of Violation. The Notice of Violation had nothing to do with the actual physical storage conditions in the Radioactive Scrap and Waste Facility.

6 The numbers cited are consistent. The number of blanket assemblies in Experimental Breeder Reactor-II when it was shut down was 330. Five hundred is the approximate number of blanket assemblies, including those in storage that had been previously removed from the reactor.

7 Operational waste streams described in the environmental assessment have been estimated based on historical operating data for the two main Argonne National Laboratory-West hot cell facilities. The proposed research and demonstration project would produce the typical waste and by-product streams of the electrometallurgical technique in order to quantify these streams, to characterize them, and to answer the very questions posed by the commentor, the National Research Council, and others.

8 Reprocessing at the Idaho Chemical Processing Plant is briefly discussed in Section 2.1 of the environmental assessment. Some six metric tons (approximately 1300 fuel assemblies) of Experimental Breeder Reactor-II spent nuclear fuel was processed between 1969 and 1987. The environmental assessment (Section 2.2) mentions the recycling of spent nuclear fuel assemblies back into Experimental Breeder Reactor-II using an incomplete pyrometallurgical process in Fuel Cycle Facility. The number of spent nuclear fuel assemblies processed is 700, rather than 570, and the environmental assessment has been revised to make this correction. The volatile emissions were captured in filters on the equipment. Air emissions have been recorded since the start of the Fuel Cycle Facility operations, but were not reported to the State until required in 1990. These data are, however, accessible to any interested member of the public. There is no credible combination of events that could release 203,000 curies of radionuclides from the Fuel Conditioning Facility into the atmosphere. High efficiency particulate air filters are designed for small (sub-micron size) particles. The impact analyses in the environmental assessment take account of volatile radionuclides and are conservative. That is, they tend to overstate the consequences of possible releases under routine or accident conditions. The emission control technology was described in the application for the air permit after public hearings and review by Idaho Department of Environmental Quality Division. The State of Idaho issued an air permit which stated the required emission control technology. Scrubbers were not required and no need for them has been identified. The required stack monitors would detect any unexpected releases.

9 Classification of the fuel assembly hardware as Department of Energy special case (potential Greater Than Class C) waste is based on calculations by Argonne National Laboratory staff using assumptions about the trace element constituents of the stainless

steel. Chemical analysis has not been able to confirm that the hardware is actually Department of Energy special case waste.

10 As discussed in the environmental assessment, the Department of Energy has reviewed the proposed action and the alternatives for compliance with the nonproliferation policy of the United States and has concluded the proposed action and alternatives are consistent with that policy. The proposed demonstration project does not separate plutonium. Moreover, the technology employed is not capable of separating plutonium. It is consistent with the nonproliferation policy of the United States, which does not encourage the civil use of plutonium. Accordingly, the United States does not engage in plutonium reprocessing. Further, by removing and then blending down the highly-enriched uranium, the project supports the goal of the United States to seek to eliminate where possible the accumulation of stockpiles of highly-enriched uranium or plutonium. As a result, the proposed demonstration project is consistent with the nonproliferation policy of the United States. An additional response to comments regarding nonproliferation concerns is provided in Chapter One of this Appendix.

11 The average burnup of Experimental Breeder Reactor-II spent nuclear fuel assemblies is somewhat less than 10%. Experimental Breeder Reactor-II driver fuel was limited to a 10% burnup by the technical specifications. A few experimental fuel elements were taken to higher burnup (e.g., 12-20%). For a comparison, typical burnup for commercial reactor fuel is approximately 3%. The environmental impact analyses contained in the environmental assessment are appropriately conservative.

12 Upgrading the Fuel Conditioning Facility to its present condition was accomplished as a result, in part, of the 1990 environmental assessment for the Hot Fuel Examination Facility-South and a Finding of No Significant Impact issued on 14 May 1990.

This initial work was funded as part of the now terminated Advanced Liquid Metal Reactor/Integral Fast Reactor project. After this program was terminated, the Department of Energy requested that the National Research Council perform an independent evaluation of electrometallurgical treatment. After termination of the Advanced Liquid Metal Reactor/Integral Fast Reactor project, Congress has been clear that it intends the

Department of Energy to continue the development of electrometallurgical technology and has continued to fund this work. In the Conference Report for the Fiscal Year 1995 Energy and Water Appropriation, the Department of Energy was instructed "to maximize the research on actinide recycle, and, as proposed by the Administration, should also retain such facilities as necessary, especially the pyroprocessing facilities." The following year, in the Conference Report for the Fiscal Year 1996 Energy and Water Appropriation, Congress gave the Department of Energy the following instruction: "As recommended by the National Academy of Sciences' assessment of the electrometallurgical approach for treating spent nuclear fuel, the conferees expect the Department of Energy to develop a plan to support the EBRFF09II demonstration using this technology. If this is successful, the Department of Energy should review the program for application to other types of spent nuclear fuel and waste management issues." This environmental assessment was prepared to analyze the potential environmental impacts of this demonstration, which serves to carry out the congressional intent and instructions given to Department of Energy.

An environmental assessment is used to determine whether a Finding of No Significant Impact is appropriate or an environmental impact statement is required. Only after the results of the environmental assessment have been analyzed and public comments have been received and considered will the Department of Energy decide whether the environmental assessment can support a Finding of No Significant Impact or an environmental impact statement should be prepared. At the present time, there is no proposal to apply electrometallurgical treatment technology beyond the demonstration project. Indeed, no broader application of the technology will be proposed until data resulting from the proposed demonstration are analyzed. There has been no commitment of resources beyond the proposed demonstration that would prejudice the alternatives, including no action, to any future proposal for a broader application of this technology.

13 The proposed action includes research on a new application of an existing technology, development of operating data for test equipment, and a limited application demonstration. As summarized in the National Research Council's report on this technology, without this demonstration and the data to be gained from it, there can be no meaningful analysis of the technology's use or application. If the demonstration project

is successful, the Department of Energy will review the data and decide whether to propose future applications of the technology. That decision will be made in accordance with all applicable laws and regulations, and will include appropriate National Environmental Policy Act analysis. There are no plans for production scale activities. Neither the equipment used for this demonstration nor the facility are designed for or capable of sustained production-scale application. Additional information regarding compliance with the National Environmental Policy Act regulations is found in Chapter One of this Appendix.

Anna Aurilio
Staff Scientist
U.S. Public Interest Research Group
218 D St. SE
Washington, DC 20003

(202)546-9707

VIA FAX AND MAIL

April 4, 1996

Mr. Greg Bass
EA Document Manager
U.S. Department of Energy
Argonne Group - West
P.O. Box 2528
Idaho Falls, ID 83403

Dear Mr. Bass:

Enclosed are our comments regarding the Draft Environmental Assessment (EA) for Electrometallurgical Treatment Research and Demonstration Project in the Fuel Conditioning Facility at Argonne National Laboratory - West, January 29, 1996, which we received by mail on February 5, 1996.

As you may know, the U.S. Public Interest Research Group (U.S. PIRG) is the national lobbying office for the state PIRGs which are non-partisan, non-profit consumer and environmental advocacy groups active across the country. We are particularly concerned about this project because we believe that it will cause significant environmental harm, as discussed below. We also believe that this project will have significant nuclear proliferation and fiscal impacts. We believe these impacts have been downplayed, omitted or misrepresented in the EA, and that both the public participation process and the EA itself are completely inadequate for the formation of an informed policy decision on this project. Therefore, we urge that a full Environmental Impact Statement be developed. 1 2

THE PUBLIC COMMENT PROCESS WAS FLAWED

While we welcome the opportunity to comment on this document, we and several other groups found it very difficult to prepare these comments because of a number of reasons including: less than one month time between receipt of the documents and the public hearings, supporting documents unavailable until well after the public hearing, and several supporting documents unavailable as late as March 26. We appreciated the assistance of DOE's office of General Counsel in making most of the requested documents available and extending the comment deadline by two weeks. Nonetheless, this process was nearly unworkable and did nothing to encourage public participation. Rather it seemed driven by an unrealistic timetable. We urge the Department to consider re-opening the comment period and ensure that all supporting documents are publicly available. 3

THE PROPOSED PROJECT HAS SIGNIFICANT ENVIRONMENTAL IMPACTS WHICH ARE NOT ADEQUATELY ADDRESSED IN THE ENVIRONMENTAL ASSESSMENT (EA)

As a whole this EA tends to downplay, and in some cases, entirely omit environmental impacts associated with the Proposed Action. Radioactive air emissions and radioactive waste
4 generation would all significantly increase under the Proposed Action, as one would expect from a process which breaks open fuel pins, releasing radioactive gases, then reprocesses the material in several steps, contaminating additional materials used in the reprocessing operation.
5 Further, while we question the estimates of wastes generated in the reprocessing steps, the assessment of decommissioning wastes omits entirely the second electrorefiner which would be used under the Proposed Action.

1. AIR EMISSIONS

As described in the EA, radioactive air emissions would pass through filters which, according to Argonne's annual air monitoring reports (1994 INEL NESHAPs annual report), are efficient at removing particulates that are 0.3 microns in diameter. Radioactive gases, such as tritium, and isotopes of iodine, krypton and xenon, pass through these filters and are released into the atmosphere. Any adequate comparison of environmental impacts would describe and quantify
6 the gases which would be released under the proposed action. These emissions would approach 100% of the radioactive gases contained in the fuel assemblies reprocessed versus the hopefully neglible air emissions expected under the no action alternative. Also, it is unclear what the air emissions are limited to in terms of blanket versus driver fuel assembly radioactive gas content. The air permit must have been based on some quantity of radioisotope release, which was then translated into "90 fuel assemblies" per year. Thus we cannot determine if the Proposed Action will violate the air permit.

2. OTHER WASTE GENERATION

We are dismayed to find that the analysis of waste generated under each alternative suffers from a persistent omission of important waste streams, and no description of actual data from previous reprocessing operations.

7 First, as outlined in the public hearing held in Washington, DC on February 27, the decommissioning wastes from the Proposed Action cannot possibly equal the decommissioning wastes from the No Action Alternative. In addition to the second electrorefiner which would be utilized under the Porposed Action, several other pieces of equipment, such as the hot isostatic press, filtering equipment for the cadmium and waste streams, the vacuum furnace and the cadmium and salt themselves would add to the total decommissioning burden under the Proposed Action. It is this type of cursory (and incomplete) analysis of environmental impacts which gives the appearance that this document is a mere formality rather than a serious assessment of the environmental risks associated with this reprocessing project.

8 Second, the uranium rececovered from this reprocessing operation may not be of sufficient purity to be easily classified as "not waste," or to be stored and handled as implied in the photagraphs in the EA. Even low concentrations of fission products in the uranium may prove problematic for its ultimate disposition.

9 Third, there is no explanation as to the estimates of so-called "Low Level" Radioactive Waste, particularly no explanation as to the much higher level of "Incidental Wastes" generated under the No Action Alternative.

10 Fourth, while the EA claims that the volume of wastes needing storage will be lower, even this flawed analysis shows that the mass of radioactive waste generated will be greater under the Proposed Action. Assumptions about volumes used for comparison are not clearly stated, and, of course, significant wastestreams such as the second electrorefiner and the uranium have been omitted.

11 Fifth, the EA mentions the reprocessing activities which have already occurred at the facility, yet contains no description of wastes generated. Such as description might provide a "reality check" on some of the waste generation estimates in the EA since the historical reprocessing activities also apparently involved electrometallurgical treatment.

3. OTHER ENVIRONMENTAL IMPACTS ARE NOT ADEQUATELY ADDRESSED

12 While it appears that the dry geography at the INEL would minimize water contamination, environmental monitoring reports show that there has been some migration of radioactive contaminants to local groundwater. The Snake River Aquifer is a significant groundwater resource for the region. The potential for additional contamination through accidental release of materials during reprocessing has not been addressed in the EA.

ALTERNATIVES TO REPROCESSING ARE NOT ADEQUATELY EXPLORED

13 As discussed briefly at the public hearing, other alternatives to removing the sodium bond material from the EBR-II irradiated fuels are not adequately explored. If such removal is indeed necessary, processes such as vacuum distillation should be given more than cursory mention.

REPROCESSING OF IRRADIATED FUELS IS NOT JUSTIFIED

Spent nuclear fuel contains some of the most dangerous substances produced by human activities. Unshielded exposure of less than five minutes may deliver a lethal dose. While no one has, unfortunately, solved the problem of what to do with these lethal wastes, generating additional wastes through reprocessing fuels which have been stored safely onsite for decades defies common sense.

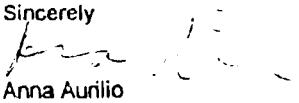
14 The Proposed Action would increase both the amounts of radioactive waste and the complexity of the wastes generated. The EA tries to justify the Proposed Action by claiming that reprocessing will generate wastes which are more suitable for disposal in a geologic repository, yet the criteria for such wastes has not been finalized, nor has such a repository been approved. Furthermore, the National Academy of Sciences notes that pyroprocessing wastes may not be suitable, and the EA itself describes additional waste streams (metal ingots and uranium) whose final disposition is uncertain. In essence, the Proposed Action would generate at least four uncharacterized waste forms (ceramic, metal, separated uranium of unknown purity, and "incidental" TRU wastes) from two original irradiated fuels.

ENVIRONMENTAL HARM WILL OCCUR AT ANY LEVEL OF REPROCESSING

15 In its haste to begin reprocessing EBR-II irradiated fuels, DOE tries downplay the environmental impacts by emphasizing the proportion of fuels to be reprocessed. Reprocessing proponents claim that this is a "demonstration" project and therefore should not be subject to a full Environmental Impact Statement. However, the environment will be harmed whether this is called a "demonstration" project or not. The startup of this project represents a significant step in the wrong direction regardless of the number of fuel assemblies ultimately reprocessed, and should be subject to a full EIS.

16 We also support the concerns of other groups regarding nuclear non-proliferation.

Sincerely



Anna Aurilio
Staff Scientist

Responses to Document D085

1 The commentor's concerns about the proposed demonstration are noted. The environmental impacts of the proposed demonstration project were analyzed in the environmental assessment and found to be small.

2 The environmental assessment was prepared, in part, to assist the Department of Energy in determining whether to prepare an environmental impact statement or issue a Finding of No Significant Impact. Only after the results of the environmental assessment have been analyzed and public comments have been received and considered will the Department of Energy decide whether the environmental assessment can support a Finding of No Significant Impact or an environmental impact statement should be prepared.

3 The references cited in the environmental assessment were placed in Department of Energy Public Reading Rooms. The comment period for the environmental assessment was reopened and extended to May 3, 1996. Additional information on this issue is provided in Chapter One of this Appendix.

4 Section 4.1.1 of the environmental assessment details the amounts and types of potential radioactive emissions and wastes resulting from the proposed project. This section acknowledges that these potential emissions and wastes exceed those generated by the no action alternative. As described in Section 4.1.1.2 of the environmental assessment, even under the most conservative assumptions, radioactive air emissions would increase the annual radiation exposure of the maximally exposed individual by only 0.0003% above the natural background radiation, or approximately 0.01% of the National Emission Standards for Hazardous Air Pollutants regulatory limit. Such an increase would have no measurable effect on human health.

5, 7 The commentor is correct regarding differences in decommissioning waste volumes between the action and no action alternatives. The ceramic and metal waste forms would be produced in the proposed action and would not be produced in the no action alternative. However, the radioactive materials would still be present in the spent nuclear

fuel, which would require more storage volume. Testing of existing electrometallurgical treatment equipment using depleted uranium as a surrogate for spent nuclear fuel has been an ongoing effort conducted in the Fuel Conditioning Facility. Under the no action alternative, the second electrorefiner would not be placed in the Fuel Conditioning Facility argon cell, and, as a result would not have to be decontaminated during decommissioning. This would potentially decrease the volume of decommissioning waste by 18 cubic meters, or 11%, in the no action alternative. The environmental assessment (Table 4.6) has been changed to correct this error. However, because the other equipment (referred to by the commentor) is currently located in the Fuel Conditioning Facility and is contaminated, the decontamination and decommissioning wastes under the no action alternative properly include this equipment.

6 As described in the environmental assessment on page 36 and page 73, 100% release of gaseous fission products is assumed for each of the alternatives as suggested by the commentor. A blanket spent nuclear fuel assembly contains less than 10% of the gaseous fission product inventory of a driver assembly. The environmental assessment has been changed to clarify this difference. Assuming, as the environmental assessment did, a 100% release of these gases, there would be no violation of the air permit for Fuel Conditioning Facility operations under the proposed action or any of the action alternatives.

8 The commentor is correct in noting that potential impurities in the by-product uranium may require additional care or storage considerations. In any event, however, the small volume of by-product uranium can be readily accommodated by existing facilities at Argonne National Laboratory. If some or all of the uranium proves to be more radioactive than anticipated, it will be stored in the Radioactive Scrap and Waste Facility. The volume of stored uranium is included in the comparison of required storage volumes for the Radioactive Scrap and Waste Facility described in Section 5.0 of the environmental assessment. As stated in the title of the environmental assessment, the proposed action includes research as well as a demonstration. Since there is no known accurate method for predicting the uranium contamination under actual operating conditions, information on the amount of contamination or levels of impurities would be collected as part of the proposed project.

9 The estimates of low-level radioactive waste are extrapolated from years of data accumulated for operation of the two Argonne National Laboratory hot cell facilities. Under the no action alternative, incidental low-level waste generated by normal operation of the Fuel Conditioning Facility as a multipurpose hot cell as directed in support of the Department of Energy programs other than the proposed action are assumed not to contain a high enough level of transuranic elements to be classified as transuranic wastes. Under the proposed action, some of the incidental waste items are assumed to become sufficiently contaminated with transuranic elements to be classified as transuranic wastes, and hence are identified in a different waste stream.

10 The volume estimates in the environmental assessment are based on data gathered during the development of electrometallurgical technology and such fundamental physical parameters as the density of stainless steel and uranium. As stated in Section 5.0 of the environmental assessment, the impact of the reduction in volume is relatively minor for the small amount of spent nuclear fuel that would be treated in the demonstration. However, any volume reduction is unique to the electrometallurgical treatment technology relative to previously used spent nuclear fuel management technologies, such as reprocessing.

11 Data from recycling some 700 Experimental Breeder Reactor-II spent nuclear fuel assemblies with an incomplete pyrometallurgical process from 1965 through 1969 have limited relevance to the proposed action. Those operations involved fuel with a burnup of about 1%, compared to almost 10% for the modern Experimental Breeder Reactor-II spent nuclear fuel; there was incomplete separation of the fission products; and the principal activity in terms of waste generation was fabricating recycled metallic fuel for the reactor. The radioactive waste residues of that early demonstration are stored in the Radioactive Scrap and Waste Facility, occupying 12 storage liners of transuranic waste and 264 liners of low level waste. These waste residues will require additional processing or treatment prior to disposal. There are another 238 Radioactive Scrap and Waste Facility storage liners containing scrap spent nuclear fuel elements and partial elements that were not recycled.

The present categorization of transuranic, low-level, and high-level waste was not in existence during the 1960 operation. Changes in waste management nomenclature would make comparison to proposed operations difficult or meaningless.

12 Section 4.2 of the environmental assessment discusses a broad range of accident scenarios, including the accidental release of radioactive materials during the operation of the electrorefiner. The environmental assessment shows that the accident risks are extremely small. Further, most accidents apply to all alternatives, not just the proposed action. Because all the materials are solids at room temperature, the risk of groundwater contamination would be small event in the event of an accident.

13 The environmental assessment analyzed three alternatives in detail and considered several other process alternatives which were eliminated from detailed evaluation. In general, the excluded alternatives had not reached a level of development that would allow a detailed evaluation. Evaluation of alternative processes such as vacuum distillation that were identified in the public comment period have been added to the environmental assessment, Section 2.1. The potential environmental impacts that would result from implementing a conceptual treatment process cannot be analyzed in equal detail relative to the impacts that can be quantified for a process that has reached an adequate level of technical maturity.

14 The proposed research and demonstration project would produce the typical waste and by-product streams of the electrometallurgical technique in order to quantify these streams, to characterize them, and to answer the very questions posed by the commentor, the National Research Council, other peer review committees, and involved scientists and engineers.

15 Only after public comments have been received and considered will the Department of Energy decide whether the environmental assessment can support a Finding of No Significant Impact or if an environmental impact statement should be prepared. 10 CFR Part 1021, Appendix D to Subpart D, "Classes of Actions That Normally Require Environmental Impact Statements" lists a set of actions that ***normally*** require an environmental impact statement (emphasis added). This does not foreclose the case-by-

case assessment of the appropriate level of National Environmental Policy Act documentation.

16 The proposed demonstration project does not separate plutonium. Moreover, the technology employed is not capable of separating plutonium. It is consistent with the nonproliferation policy of the United States, which does not encourage the civil use of plutonium. Accordingly, the United States does not engage in plutonium reprocessing. Further, by removing and then blending down the highly-enriched uranium, the project supports the goal of the United States to seek to eliminate where possible the accumulation of stockpiles of highly-enriched uranium or plutonium. As a result, the proposed demonstration project is consistent with the nonproliferation policy of the United States. An additional response to comments regarding nonproliferation concerns is provided in Chapter One of this Appendix.

Com. ..ttee to Bridge the Gap • Energy ...search Foundation.
Military Production Network • Nuclear Control Institute • Public Citizen
Snake River Alliance, Idaho • Southwest Research & Information Center

4 April 1996

The Honorable Hazel O'Leary
Secretary
U. S. Department of Energy
1000 Independence Avenue, S.W.
Washington DC 20585

by facsimile and mail

Dear Secretary O'Leary:

We write to express concern about the manner in which the Department of Energy is handling its obligations under the National Environmental Policy Act (NEPA) regarding the proposed start-up in Idaho of a new reprocessing technology known variously as "pyro-processing" or "electrometallurgical treatment." Departmental conduct of the NEPA review appears to run counter to your initiatives to get DOE to rigorously comply with NEPA and your openness policy. These concerns are in addition to the substantive questions of the project itself, including contravening of Administration non-proliferation policy. 1

DOE proposes to commence operation of an entirely new nuclear reprocessing technology, involving placing irradiated fuel assemblies in a molten salt, heated to a high temperature, and running an electric current through the molten solution to "plate out" weapons-usable nuclear material, separating it from the other constituents of the spent fuel. (That DOE asserts it will subsequently blend down the highly enriched uranium does not alter the fact that this new technology is reprocessing. Furthermore, the technology can, and in fact was designed to, separate out the transuranics after removing the uranium.) For two decades, U.S. policy has been opposed to reprocessing of non-military fuels, for sound non-proliferation reasons. Now, for reasons that are less than convincing, DOE proposes to break that long-standing non-proliferation barrier, and to do so utilizing a new technology that could exacerbate proliferation problems because it is arguably more compact (and thus more readily concealed), and easier and cheaper than conventional solvent extraction reprocessing techniques. 2 3

The proposed project is thus one that is extremely controversial; it can have major impacts on the human environment. This is particularly troubling given that DOE's NEPA regulations require an Environmental Impact Statement (EIS) for reprocessing projects. Yet DOE has to date chosen not to prepare an EIS but rather a far more limited Environmental Assessment (EA). We believe this to run counter to your efforts to get DOE to conscientiously comply with NEPA. We therefore urge your direct involvement to assure that a full EIS is performed prior to any decision whether to begin down this very slippery slope. 4

Additionally, the Department's conduct of the EA process itself has been disconcerting, to say the least. The EA is a very conclusory document, summarizing conclusions about supposed environmental impacts without providing the basis for those conclusions. The reader is instead referred to a large number of specific documents incorporated by reference into the EA, documents in which the detailed analysis is supposed to be found. However, the Department failed to make the referenced documents available in its public reading rooms in advance of the EA hearings held in Idaho and Washington, D.C. This failure resulted in making the EA hearings something of a farce, as the basis for the EA was not available to the public for review before the hearings. 5

Numerous groups complained about this at the hearings and requested that DOE make available the documents incorporated by reference in the EA and extend the comment period by an

(5) equivalent period once the full set of documents was available. DOE promised to make the documents available, but the promised deadlines came and went and the full set of documents referenced in the EA were still missing from the public document rooms. We understand they are still missing today.

The public had been told, via a Federal Register notice and through mailings of the EA, that the deadline for comments was to be 22 March. As indicated above, repeated requests were made in February at the EA hearings that the documents be made available and the comment period extended accordingly. Prompt response by DOE was promised.

6 However, despite numerous inquiries, as of 21 March, the day before the purported deadline, DOE still had failed to indicate whether the deadline would be extended. At a meeting on 22 March, the deadline date, the DOE General Counsel informally informed three members of the public that the deadline would be extended two weeks. After the close of business on the day comments would otherwise have been due, one of these individuals was faxed a letter formally notifying him of the extension of the comment period. To our knowledge, no other member of the public has received formal notification of the extension. No notice has been mailed out to people who requested the EA, nor has any notice been published in the Federal Register.

Extending the public comment period without notifying the public of the extension is inexplicable. Failing to make available the full set of documents incorporated by reference into a NEPA document being circulated for public comment is unacceptable. And conducting a hearing into the NEPA document and a written comment period thereon prior to the documents being made available runs counter to your oft-repeated policies of DOE full compliance with NEPA and your openness initiative. The NEPA process has fallen apart.

7 We urge that you take immediate steps to rectify this situation by: (1) assuring that all documents incorporated by reference in the EA are available in the DOE public reading rooms; (2)
8 when that is accomplished, publishing notice in the Federal Register and mailing out notification to all who had requested the EA of the availability of the documents and that new hearings and a new comment period on the EA are being scheduled so that meaningful comments, based on the EA and the documents incorporated by reference therein, can be submitted in a timely fashion.

9 We also urge that you personally review both the procedural question of whether an EIS should in fact be performed and the substantive questions associated with this worrisome project prior to any decision to approve it. We further ask that this letter be included in the formal comments received on the Draft EA.

Sincerely,

Daniel Hirsch Committee to Bridge the Gap	Brian Costner Energy Research Foundation	Maureen Eldredge Military Production Network
Dan Horner Nuclear Control Institute	Bill Magavern Public Citizen	Beatrice Brailsford Snake River Alliance - Idaho

Don Hancock
Southwest Research & Information Center

cc: Terry Lash
Greg Bass ✓

2

Responses to Document D086

1,4, 9 The commentors' concerns about proceeding with this demonstration are acknowledged. The Department of Energy decided to prepare an environmental assessment for this demonstration to determine whether an environmental impact statement is required. It is appropriate to note that the Department of Energy has taken several steps to enhance public participation in the process, including:

- early public notice of the Department of Energy's intent to prepare an environmental assessment
- opportunities for interested parties to review and comment on the environmental assessment before Department of Energy approval
- public comment meetings in Idaho Falls and Washington, D.C.
- extension of the public comment period until May 3, 1996 in response to public requests.

The Department of Energy does not regard electrometallurgical treatment as "reprocessing" as that term has been used historically. The National Academy of Sciences reports refer to the electrometallurgical process as spent nuclear fuel treatment or processing. The *Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Environmental Impact Statement* (DOE/EIS-0203-F) has defined processing as "applying a chemical or physical process designed to alter the characteristics of the spent fuel nuclear material." The electrometallurgical process meets this definition. In addition, the National Academy of Sciences report on treating Department of Energy spent nuclear fuel stated, "The committee recommended that such research and development should be conducted exclusively to evaluate the electrometallurgical technology's effectiveness for treating Department of Energy spent nuclear fuel, and funding decisions about electrometallurgical research and development for Department of Energy spent nuclear fuel treatment should be independent of issues related to the Integral Fast Reactor Program." Department of Energy regulations do not preclude the preparation of an environmental assessment to determine if an

environmental impact statement is required. For further discussion, please refer to Chapter One of this Appendix.

2,3 The proposed demonstration project does not separate plutonium. Moreover, the technology employed is not capable of separating plutonium. It is consistent with the nonproliferation policy of the United States, which does not encourage the civil use of plutonium. Accordingly, the United States does not engage in plutonium reprocessing. Further, by removing and then blending down the highly-enriched uranium, the project supports the goal of the United States to seek to eliminate where possible the accumulation of stockpiles of highly-enriched uranium or plutonium. As a result, the proposed demonstration project is consistent with the nonproliferation policy of the United States. An additional response to comments regarding nonproliferation concerns is provided in Chapter One of this Appendix.

5,6,7,8 The references cited in the environmental assessment have been placed in the Department of Energy public reading rooms. Additional information on this issue is provided in Chapter One of this Appendix.

Public Citizen

Buyers Up • Congress Watch • Critical Mass • Global Trade Watch • Health Research Group • Litigation Group
Joan Claybrook, President

April 5, 1996

Greg Bass
EA Document Manager
U.S. Department of Energy
Argonne Group-West
P.O Box 2528
Idaho Falls, ID 83403

Re: Comments on Draft Environmental Assessment for Electrometallurgical Treatment Research and Demonstration Project in the Fuel Conditioning Facility at Argonne National Laboratory-West

Dear Mr. Bass:

1 Public Citizen believes the draft EA constitutes an insufficient consideration of the
2 environmental and proliferation consequences of the proposed pyroprocessing program. We joined other groups in an August 25, 1995, letter to Secretary O'Leary calling for an environmental impact statement before any startup of pyroprocessing, and we here reiterate that call.

3 The EA represents an *ex post facto* attempt to rationalize DOE's political decision to keep pyroprocessing -- a relic of the cancelled Advanced Liquid Metal Reactor program -- alive as a jobs program. DOE has offered no credible scientific proof that irradiated fuel from EBR-II (another vestige of the ALMR) can not be safely stored rather than processed.

4 DOE justifies pyroprocessing on the grounds of treatment of irradiated fuel. However, according to a panel of the National Academy of Sciences, the treatment would produce uncharacterized waste forms that are not likely to be suitable for emplacement in a repository, which is the ostensible long-term destination of the waste. The draft EA does not address that problem.

5 DOE's characterization of the proposed action as a "limited demonstration" is a subterfuge, and runs contrary to the intent of the National Environmental Policy Act. Before starting up the new electrorefiner, DOE must analyze the consequences of full-scale pyroprocessing. Instead, DOE is trying to use the demonstration to avoid an EIS and build up

Ralph Nader, Founder
215 Pennsylvania Avenue SE • Washington, D.C. 20003 • (202) 546-4996
Printed on Recycled Paper

(5) an irretrievable commitment of federal resources to the electrometallurgical treatment route.

For very good reasons, U.S. policy has opposed reprocessing of non-military fuels for two decades. Pyroprocessing is a reprocessing technology, despite DOE's denials, and the 6 National Academy of Sciences has said that the technology "could be used by another country to obtain plutonium for a weapons program." U.S. efforts to persuade other countries to shun reprocessing will be undermined by a U.S. pyroprocessing program.

Furthermore, the EA has been undermined by a process stacked against citizens 7 groups. Rather than fairly considering the different options, the EA states conclusions not 8 supported by evidence. Many of the documents referenced by the EA were not available to citizens during the comment period.

Before implementing the pyroprocessing proposal, DOE should conduct an 9 environmental impact statement with a fair process in which relevant documents are made available in a timely fashion.

Respectfully Submitted,

Bill Magavern

Bill Magavern
Director
Critical Mass Energy Project

Responses to Document D087

1, 7 The commentor's concerns about the environmental assessment are noted. In order to provide the public an opportunity to review the proposed project, a public comment period was provided and public meetings were held. In accordance with 10 CFR Part 1021, the Department of Energy prepared an environmental assessment for the electrometallurgical treatment demonstration project to assist with agency planning and decision making. On the basis of the environmental assessment, the Department of Energy will decide whether to prepare a Finding of No Significant Impact or an environmental impact statement. For more information see Chapter One of this Appendix.

6 The commentor asserts that electrometallurgical treatment technology is reprocessing and the demonstration project would violate the nonproliferation policy of the United States. The Department of Energy does not regard electrometallurgical treatment as "reprocessing" as that term has been used historically. The National Academy of Sciences reports refer to the electrometallurgical process as spent nuclear fuel treatment or processing. The *Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Environmental Impact Statement* (DOE/EIS-0203-F) has defined processing as "applying a chemical or physical process designed to alter the characteristics of the spent fuel nuclear material." The electrometallurgical process meets this definition. In addition, the National Academy of Sciences report on treating Department of Energy spent nuclear fuel stated, "The committee recommended that such research and development should be conducted exclusively to evaluate the electrometallurgical technology's effectiveness for treating Department of Energy spent nuclear fuel, and funding decisions about electrometallurgical research and development for Department of Energy spent nuclear fuel treatment should be independent of issues related to the Integral Fast Reactor Program." Department of Energy regulations do not preclude the preparation of an environmental assessment to determine if an environmental impact statement is required. For further discussion, please refer to Chapter One of this Appendix. The Department of Energy has considered the possibility

of the use of this technology and its impact on the nonproliferation policy of the United States in Section 4.7 of the environmental assessment.

2,9 The Department of Energy has prepared this environmental assessment for the electrometallurgical treatment demonstration project to assist with agency planning and decision making. On the basis of the environmental assessment, the Department of Energy will decide whether to prepare a Finding of No Significant Impact or an environmental impact statement.

3 As stated in Section 5.0 of the environmental assessment, the majority of Experimental Breeder Reactor-II spent nuclear fuel will be stored under any of the alternatives analyzed. In fact, as acknowledged in Section 5.0, Experimental Breeder Reactor-II spent nuclear fuel has been safely stored for a number of years. However, the spent nuclear fuel is susceptible to stress corrosion cracking. As Section 4.4.2 discusses, the Experimental Breeder Reactor spent nuclear fuel is likely not eligible for disposal in a geologic repository without treatment because of the presence of sodium. As a result, the Department of Energy is exploring technologies that will not only continue to ensure safe storage, but will also condition the spent nuclear fuel into a form that will allow its disposal in a geologic repository.

4 The proposed research and demonstration project would produce the typical waste and by-product streams of the electrometallurgical technique in order to quantify these streams, to characterize them, and to answer the very questions posed by the commentor, the National Research Council, other peer review committees, and involved scientists and engineers.

5 The proposed action is a limited demonstration of a potential treatment technology for Experimental Breeder Reactor-II spent nuclear fuel. A successful demonstration would provide data on the basis of which a decision can be made for its application to the remainder of Experimental Breeder Reactor-II spent nuclear fuel and possibly other types of spent nuclear fuel. Any such proposal will be considered within all applicable laws and regulations, including appropriate National Environmental Policy Act analysis.

Additional discussion of the appropriate level of National Environmental Policy Act review is provided in Chapter One of this Appendix.

7,8,9 The references cited in the environmental assessment have been placed in the Department of Energy public reading rooms. Additional information on this issue is provided in Chapter One of this Appendix.

Snake River Alliance

P.O. Box 1731 · Boise ID 83701 · 208/344-9161
P.O. Box 4090 · Ketchum ID 83340 · 208/726-7271
310 E. Center · Pocatello ID 83201 · 208/234-4762

April 5, 1996

Mr. Greg Bass
EA Document Manager
US Department of Energy
Box 2528
Idaho Falls, ID 83403
By FAX: 208/533-7422

Dear Mr. Bass:

The Snake River Alliance is an Idaho-based citizens organization that has served as the citizen monitor of activities at the Idaho National Engineering Laboratory for the past 17 years. We have 1,200 individual, family, and business members, most of whom live in southern Idaho. On their behalf, I offer the following comments on the Electrometallurgical Treatment, Research, and Demonstration Project in the Fuel Conditioning Facility at Argonne National Laboratory-West draft environmental assessment.

The Snake River Alliance's primary concerns are:

Proliferation Impacts
Reprocessing is the separation of uranium or plutonium from spent nuclear fuel. Once highly-enriched uranium and plutonium are isolated, they are no longer protected from potential proliferation by spent fuel's intense radioactivity and can be used either to make fresh reactor fuel or nuclear bombs. Reprocessing is therefore a proliferation risk.

As a matter of policy, the US has been backing away from reprocessing since the 1970s, though the DOE continued to reprocess spent fuel until at least the late 1980s. President Ford said in 1976 that "reprocessing should be deferred until there is a sound reason to conclude that the world community can effectively overcome the risks of proliferation." President Carter ended civilian reprocessing in 1977. In 1992 President Bush formally ended military reprocessing as part of a "set of principles to guide our non-proliferation efforts in the years ahead." President Clinton's Presidential Decision Directive No. 13 reaffirmed his predecessors' positions in 1993. More recently, in a DOE analysis attached to the US-EURATOM agreement, our country's position was described thus: "The United States, for its part, does not engage in reprocessing for any purpose" [emphasis added].

In the pyroprocessing draft EA, the DOE attempts--vainly--to 1) redefine reprocessing and 2) tweak the application of the pyroprocessing technology contemplated here. These efforts are made to obscure the fact that development of the pyroprocessing technology runs counter to the US's own long-established opposition to reprocessing.

The EA's definition of reprocessing is: "Processing of reactor-irradiated nuclear material (primarily spent nuclear fuel) to recover fissile and fertile material, in order to recycle such materials primarily for defense programs." 1
This rendering suggests that the recovered material has to be recycled in order for the recovery process to qualify as reprocessing. This limitation is not sound. There is, for instance, HEU stored at the Idaho Chemical Processing Plant that has not (yet) been recycled, but there is no question that it was produced by reprocessing spent nuclear fuel. Moreover, to try to further restrict reprocessing by making it applicable primarily to defense programs ignores the US's official opposition to reprocessing in nations that use it in their civilian programs.

A rose by any other name.... The DOE should abandon efforts it makes here and elsewhere to obscure reprocessing proposals by naming them something else.

And let there be no mistake. The proposed action in this EA is to develop a technology that can separate both highly enriched uranium and plutonium from spent fuel. At the Idaho Falls hearing (February 21, 1996), an Argonne representative stated: "There is a moment when HEU is separate." That would be a moment of some interest to anyone interested in obtaining HEU--for civilian or military use, here or abroad.

Plutonium can also be recovered with the pyroprocessing technology. In fact, the National Academy of Sciences and the Secretary of Energy are among those who have stressed that plutonium separation was the intended use of the technology when it was part of the Integral Fast Reactor. Though the demonstration project contemplated here would not separate pure plutonium, an Argonne representative explained during a February 22 tour of the Fuel Conditioning Facility how, with slight modification, the facility could again be used to demonstrate a plutonium separation technology. 2

Since pyroprocessing is in fact a reprocessing technology, the DOE should abandon its development. At the very least, the DOE must prepare a full environmental impact statement on its pyroprocessing plans to comport with its own National Environmental Policy Act regulations, which require an EIS on the operation of any new reprocessing facility. 3 4

(At the Idaho Falls draft EA hearing, an Argonne representative asserted that the DOE Office of Arms Control and Nonproliferation had determined that the pyroprocessing technology does not pose proliferation risks. Though not certain that that determination had been put in writing [!], the Argonne representative promised to make any written

determination available. If one exists, the Alliance would very much appreciate a copy.)

Environmental Impacts

Development of the pyroprocessing technology is ostensibly aimed at preparing Experimental Breeder Reactor-II spent fuel (at least) for final disposition, though the draft EA does not explain why HEU must be separated to accomplish 5 that goal. Nor does the draft EA explain why EBR-II spent fuel must be pyroprocessed before other alternatives are fully explored, since the DOE acknowledges "near-term storage of EBR-II spent fuel presents no compelling environmental, safety or health concern." In fact, the push to pyroprocess may prove worse than useless in the long run since, according to the NAS, "the major limitation of the electrometallurgical process...is its present inability to produce waste forms with behavior that is well understood." The NAS also concluded that "the fate of the 6 cladding-metal waste form is a major open question and qualifying the zeolite waste form for burial could present major challenges." These uncertainties, added to our nation's uncertainty about the ultimate fate of most nuclear waste, should lead the DOE to accept Sandia National Laboratories' recommendation that ***"most decisions on*** [spent fuel] ***treatment or conditioning should wait until a repository type and site are known"*** [bold italics in original].

In what might be an attempt to tread lightly past environmental uncertainties, the draft EA provides 7 inadequate, often obfuscated information about the pyroprocessing technology demonstration's waste streams. For instance, the process produces transuranic waste. The EA fails to discuss any impacts of TRUwaste storage or disposal. The most serious gaps appear in the discussion of the uranium stream. Uranium is separated, blended-down to an enrichment that has no particular use, and set on a shelf at ANL-W until the DOE decides what to do with it next. Somehow this scenario led the EA's authors to conclude that 1) the uranium stream is not waste (though it may be later) and 2) its impacts need not be analyzed. This approach is 8 even more problematic when compared with the EA's listing of spent fuel as a waste (which does not match the DOE's categorization but certainly matches ours) because it requires interim storage and disposal. The uranium requires interim storage and may require disposal, unless of course, it is recycled (which would mean that it had been reprocessed).

All this is to say that getting the uranium to the strange mid-point envisaged in this EA and then taking the next step (blend-down further and recycle or dispose) have environmental impacts that must be analyzed. And they must be analyzed next to some kind of environmental benefit, which this draft EA fails to demonstrate.

NEPA Process

A fundamental principle of NEPA is that connected actions and cumulative actions should be analyzed in a single environmental study. Agencies must avoid segmentation, which might obscure the significance of the environmental impacts of an action as a whole if component parts are analyzed separately.

The pyroprocessing EA--and in fact the entire effort to salvage a "mission" from the canceled IFR program--is a study in segmentation.

9 Pyroprocessing is the reprocessing portion of the IFR program transformed imperfectly into a spent fuel "management" program. Since it was in large part spent fuel reprocessing that led to cancellation of the IFR, Argonne has been trying to mask the program ever since.

To mollify proliferation concerns, Argonne tweaked its original plan and now proposes variations on its process to leave plutonium in one of the waste streams so that it will
10 be less than ideal for bombmaking and to blend-down the HEU so it can't be used in bombs. But other nations may not find those modifications sufficient, since they are neither irreversible nor verifiable under the current proposal.

The scope of the pyroprocessing proposal has shifted with time and by audience. One Argonne study suggests that pyroprocessing could be used on all commercial spent fuel, a
11 suggestion echoed in the spent fuel EIS. The spent fuel EIS asserts that nuclear navy spent fuel, which would be a ready feedstock for an INEL pyroprocessor, "could also be electrometallurgically processed," even though the same study describes nuclear navy spent fuel as "well-suited for direct storage...without additional stabilization."

The DOE's intent was to start the pyroprocessing technology proposed for demonstration here based on a 1990 EA on the IFR program. The process was to have begun early last fall, but that schedule ignored the DOE's own NEPA regulations. Seven public interest organizations, including the Alliance, objected to startup without an EIS in August 1995.

Since the case for an EIS is irrefutable but politically inconvenient, the sands have continued to shift. The latest, written-down-in-the-EA-so-who-could-doubt-it! proposed action is to demonstrate the pyroprocessing technology on .4 MT uranium of EBR-II driver fuel and 1.2 MT
12 uranium of EBR-II blanket fuel. These amounts were evidently chosen based on some notion that reprocessing a little bit of spent fuel isn't really reprocessing. (And a little bit pregnant....) Perhaps because the entire project has been recut to fit so often, the chosen numbers are evidently hard for Argonne to remember.

When asked at the Idaho Falls draft EA hearing why a new, uncontaminated high-throughput electrorefiner was being
13 installed for the so-called demonstration, an Argonne official said, "And we're looking at something on the order of 50 tons of material which would go through the high

throughput electrorefiner." No, in this draft EA we're looking at 1.2 tons of blanket fuel, remember?

(13) And there it is. Segmentation. The DOE intends to slide right through this EA to a finding of no significant impact, right through the demonstration, some more, unspecified NEPA analysis with a preordained result, and on to production. That is a violation of NEPA.

Conclusion

Overall, the analysis in this environmental assessment is cursory at best and misleading at worst. It mirrors the attempts to salvage a part of the IFR project: the purported need for pyroprocessing is contradicted by the DOE

14 itself, its purported benefits are nothing more than bald assertions, and its risks are summarily dismissed. An EA that asserts (though does not show) analysis of an airplane crash into a nuclear facility and then observes that "most accidents evolve slowly" should be dismissed as well. This is a poor attempt indeed to justify a project that has no justification.

The Snake River Alliance's commitment to peace is as abiding as our commitment to the protection of our land and people. The Alliance therefore advocates that development of the pyroprocessing technology be halted because of its

15 dubious environmental benefits and its clear proliferation

16 risks. The funding now going to the project should be redirected to address genuine environmental threats. For

17 the interim, it is more prudent in every sense to store the spent fuel slated for pyroprocessing as safely as possible.

However, if the Department of Energy finds politics more compelling than proliferation, it must at the very

18 least prepare an environmental impact statement on the pyroprocessing technology.

Submitted by

Beatrice Brailsford

Beatrice Brailsford
Program director

Responses to Document D088

1,3,12 For clarity and consistency, the Department of Energy used the same definition of reprocessing in the environmental assessment that was used in the *Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Environmental Impact Statement* (DOE/EIS-0203-F), which has undergone extensive public review. Electrometallurgical treatment is a new application of an established metallurgical technology which is being explored to prepare spent nuclear fuel and its associated waste forms for disposition.

The Department of Energy does not regard electrometallurgical treatment as "reprocessing" as that term has been used historically. The National Academy of Sciences reports refer to the electrometallurgical process as spent nuclear fuel treatment or processing. The *Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Environmental Impact Statement* (DOE/EIS-0203-F) has defined processing as "applying a chemical or physical process designed to alter the characteristics of the spent fuel nuclear material." The electrometallurgical process meets this definition. In addition, the National Academy of Sciences report on treating Department of Energy spent nuclear fuel stated, "The committee recommended that such research and development should be conducted exclusively to evaluate the electrometallurgical technology's effectiveness for treating Department of Energy spent nuclear fuel, and funding decisions about electrometallurgical research and development for Department of Energy spent nuclear fuel treatment should be independent of issues related to the Integral Fast Reactor Program." Department of Energy regulations do not preclude the preparation of an environmental assessment to determine if an environmental impact statement is required. For further discussion, please refer to Chapter One of this Appendix.

2 Electrometallurgical treatment technology does not and cannot separate pure plutonium. Neither is it a uranium enrichment process; its uranium product would reflect the enrichment level of the feed stock spent nuclear fuel. In the case of Experimental Breeder

Reactor-II spent nuclear fuel, and the proposed demonstration project, the average enrichment is approximately 65%. As is stated in the environmental assessment, this uranium will be blended with depleted uranium to achieve an enrichment level of less than 20%. At no time will highly-enriched uranium leave the protection of the hot cell.

In the proposed demonstration, plutonium would not be separated and would always be contaminated with fission products and other actinide elements.

It is incorrect to assert that this demonstration or a modification of it could result in plutonium separation even if, as other commentors have suggested, the operating voltage were adjusted.

Regardless of whether the liquid cadmium cathode is used, electrometallurgical technology does not, cannot, and never has been able to separate pure plutonium. It simply is not a plutonium separation technology. In the configuration proposed to be used in the demonstration, this technology is not even capable of removing the actinides from the fission products. The presence of these materials make the plutonium both non-weapons grade and self-protecting against theft or diversion because of high radiation levels. See Chapter One of this Appendix for more information.

4,12 As noted above, the Department of Energy does not regard electrometallurgical treatment as "reprocessing" as that term has been used historically. See Chapter One of this Appendix for more information.

5 The comment is correct that a primary purpose of the proposed action is to demonstrate a technology that may help the Department of Energy prepare spent nuclear fuel for disposal. Although the purpose is not to extract uranium, doing so may be beneficial. The commentor also suggests that electrometallurgical technology could be used with the goal of simply disposing the uranium along with the fission products and plutonium in the ceramic waste stream. The Department of Energy does not support this approach, in part because the low-enriched uranium by-product of the proposed action is not a waste. Further, the suggested approach would significantly increase both the cost of processing and the volume of waste generated. Considerably more salt and cadmium would be

required because the suggested approach would involve chemical oxidation rather than electrotransport of the uranium. Leaving the uranium in the waste stream to be adsorbed in the zeolite, with subsequent conversion to the ceramic waste form, would increase the waste volume by at least a factor of 25. However, the uranium would have to be blended down to a low enrichment to control nuclear criticality. If the uranium were blended down to less than 1% enrichment for disposal, the increase in waste volume would be on the order of 1000. By removing the uranium, the storage volume for both uranium and high-level waste can be kept low.

6 The proposed research and demonstration project would produce the typical waste and by-product streams of the electrometallurgical technique in order to quantify these streams, to characterize them, and to answer the very questions posed by the commentor, the National Research Council, other peer review committees, and involved scientists and engineers.

The characteristics of the candidate waste forms and the characteristics of the repository are both used to develop acceptance criteria. Development of appropriate waste forms should proceed in parallel with repository site selection. This is the approach being taken by the Department with the various borosilicate glass waste forms.

7 Section 4.5 of the environmental assessment indicates that transuranic wastes are currently generated in other Argonne National Laboratory-West hot cell operations and are packaged according to Radioactive Waste Management Complex waste acceptance criteria. The Department of Energy is currently preparing a *Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste*. The waste from the proposed action or any of the alternatives would be disposed of according to decisions made in that National Environmental Policy Act review. The environmental assessment shows that the impacts of managing these waste streams for the proposed action would be small.

8 As described in the environmental assessment Section 2.3, the low-enriched uranium by-product would be stored at Argonne National Laboratory-West until a decision is made regarding its ultimate disposition. The quantity of highly-enriched uranium

(410 kilograms) resulting from the demonstration is a small fraction of the 5600 kilograms that are currently stored on the site. After blending down, the resultant product of low-enriched uranium (1400 kilograms) and depleted uranium (1200 kilograms) resulting from the treatment of the blanket spent fuel is a small fraction of the depleted uranium (200,000 kilograms) that are presently at the Argonne National Laboratory site. These data in Section 2.3 were used to analyze the potential environmental impacts. The uranium is not considered as waste, as noted in Table 4-6 of the environmental assessment. The environmental assessment has been changed to avoid confusion.

9 The proposed action includes research on a new application of this technology, development of operating data for test equipment, and a limited application demonstration. If the demonstration project is successful, the Department of Energy will review the data and decide whether to propose future applications of the technology. For further discussion of issues related to the appropriate level of National Environmental Policy Act review, see Chapter One of this Appendix.

10,11 Electrometallurgical treatment is a research and development project which has been the subject of changing national policy as directed by the Congress. As such, it has undergone changes to reflect both the results of experimentation and changes in policy. One of the strengths of this technology is its ability to accommodate these changes. This environmental assessment considers only the proposed demonstration project; any other proposal would be outside the scope of this environmental assessment. For further discussion of issues related to proliferation, see Chapter One of this Appendix.

13 The second electrorefiner would be developed in response to a recommendation of the National Research Council that a 200 kilogram/day capacity be demonstrated. It would use a spare vessel from the current electrorefiner, but with a different cathode design. Because the equipment is not capable of continuous production, the demonstration will be made with a batch operation approaching 160 kilograms and would require depleted uranium because of criticality concerns. Any proposal to apply electrometallurgical treatment more broadly than the proposed action in this document would be the subject of further appropriate National Environmental Policy Act analysis. See Chapter One of this Appendix for a more detailed discussion of these issues.

14 This environmental assessment was prepared following Department of Energy and Council of Environmental Quality guidance. Every attempt has been made to insure that the document is complete and accurate.

15,17 The environmental assessment analyzed three alternatives in detail and considered several other process alternatives which were eliminated from detailed evaluation. In general, the excluded alternatives had not reached a level of development that would allow a detailed evaluation. Evaluation of alternative processes that were identified in the public comment period have been added to the environmental assessment, Section 2.1. The potential environmental impacts that would result from implementing a conceptual treatment process cannot be analyzed in equal detail relative to the impacts that can be quantified for a process that has reached an adequate level of technical maturity. As described in the environmental assessment, the impacts of the proposed action and the alternatives were found to be extremely small. For a further discussion of issues related to proliferation, see Chapter One of this Appendix.

16 Funding ultimately provided for Department of Energy projects is determined by Congress and the President through processes that are outside the scope of this environmental assessment. However, the Department has supported funding for this project because it believes the technology is a promising one for dealing with some of the Department's spent fuel problems.

18 In accordance with 10 CFR Part 1021, the Department of Energy prepared an environmental assessment for the electrometallurgical treatment demonstration project to assist with agency planning and decision making. On the basis of the environmental assessment, the Department of Energy will decide whether to prepare a Finding of No Significant Impact or an environmental impact statement.

CAROL MOSELEY-BRAUN
ILLINOIS

COMMITTEES:
BANKING, HOUSING, AND URBAN AFFAIRS
FINANCE
SPECIAL AGING

United States Senate
WASHINGTON, DC 20510-1303

March 20, 1996

The Honorable Hazel R. O'Leary
Secretary
United States Department of Energy
James Forrestal Building
1000 Independence Avenue SW
Washington, D.C. 20585

Dear Secretary O'Leary:

1 It is my understanding that the Department of Energy recently held hearings regarding the proposed demonstration of an advanced spent nuclear fuel management technology. I would like to add my support for this project.

2 This research project will treat 125 spent nuclear fuel assemblies from the EBR-II test reactor for safe long-term storage and eventual geologic disposal. As outlined in the *Draft Environmental Assessment for the Electrometallurigal Treatment Research and Demonstration Project in the Fuel Conditioning Facility at Argonne National Laboratory - West*, this research can be conduced without negative environmental impact. Moving forward with the project quickly will help cut the eventual cost of cleanup and waste management for at least one DoE site, and holds promise that DoE is serious about examining "better, cheaper, and faster" ways to deal with its nuclear waste issues.

3 Electrometallurgical technology for the treatment of spent nuclear fuel was invented in Illinois, and was recognized in 1991 with a prestigious R&D 100 Award as one of the 100 best technology developments in the nation that year. Scientists at Argonne National Laboratory's main site near Chicago are currently carrying out research to determine how this technology can be adapted to solve the worst spent nuclear fuel problems throughout the DoE complex. Application of electrometallurgical technology in the Idaho project will allow scientists to demonstrate the viability of the waste reduction and stabilization process that potentially can be used for all types of spent nuclear fuel.

Development of advanced technologies for the betterment of humankind is what we expect of our national laboratory system. The Department of Energy and Argonne National Laboratory are taking a big step toward dealing with the nuclear waste issue, and I urge your continued support of this project.

Sincerely,

Carol Moseley-Braun
United States Senator

Responses to Document D089

1 The Department of Energy acknowledges the commentor's statement on this proposed action.

2 The Department of Energy also acknowledges that moving forward with this proposed action may help cut the cost of nuclear spent nuclear fuel management.

3 Although the general topic of technology development is not within the scope of this environmental assessment, the Department of Energy emphasizes ongoing programs for technology development, especially to solve national problems, such as the treatment of spent nuclear fuel. The demonstration of the electrometallurgical technology could be a crucial step in solving some of the difficult problems of spent nuclear fuel management.

COMMITTEE TO BRIDGE THE GAP
1637 BUTLER AVENUE, SUITE 203
LOS ANGELES, CALIFORNIA 90025
(310) 478-0829

28 March 1996

Terry R. Lash, Ph.D.
Director
Office of Nuclear Energy
U. S. Department of Energy
NE-1, 5A-143
1000 Independence Avenue, S.W.
Washington DC 20585

by facsimile and mail

Dear Director Lash:

On 30 January, 1996, you wrote to us, transmitting a copy of and soliciting comments on the Draft Environmental Assessment for the Electro-Metallurgical Spent Nuclear Fuel Treatment Project proposed to be conducted at the Argonne National Lab-West facility based at the Idaho National Energy Lab. You also informed us of hearings to be held in Idaho and in Washington, D.C. in February on the draft EA.

Subsequent thereto, three colleagues and I traveled a thousand miles in part to review, in preparation for the hearings, the documents included by reference in the EA. As you know, the EA is in many places merely a summary document, referring the reader instead to more than a score of more detailed documents that are incorporated into the EA by reference. 1

We were, therefore, surprised to find none of the referenced documents available in the DOE public reading room in Idaho Falls. I understand that other groups tried to review the referenced documents at the DOE public reading room in Washington, D.C., in advance of their hearing, with the same result--none of the documents incorporated by reference into the EA were available for public review.

I raised this matter at the Idaho hearing and made a formal request that the documents incorporated by reference be made available to the public and that the deadline for comments be extended by two months from the time the full documents are available. I was promised a prompt reply, and, despite repeated inquiries, I have still yet to be informed about the extension request. At the Idaho hearing on 21 February, I stated as follows:

> There are large numbers of documents that are included in the environmental assessment by reference. The documents are not in the EA itself, but are included by reference, incorporated by reference.

Unfortunately, those documents are not publicly available. The public reading room here in Idaho Falls indicates they do not have them. The technical library says they do not have them. And even if they did, since October you've now closed off the technical library to members of the public.

So, there is no way for the public in a public hearing, or in a comment process, to be able to meaningfully respond to the substance of this environmental assessment, because the underlying documentation that's been incorporated by reference has been closed off to them. I believe this is a violation of NEPA. It's also a violation of the openness policies of the Secretary of Energy.

And I make a formal request here on the record that you now make available all of the documents included in the references to the EA and that are included by reference in the text, make those available and extend the public comment [period] by two months from the time you publicly announce that those documents are available.

I think this is necessary both for compliance ... [with] the law and also for the process. There's no way to respond if we only have conclusions and do not have the material from which those conclusions are based.

(1) Later in the hearing, Ernie Hughes, DOE director for ANL-West and a member of the hearing panel, responded to my request as follows: "This afternoon during the session, it was brought up that the references were not in the public reading rooms. We certainly have no intention of not making the references available. We have every intention of making them available."

He went on to say, "In response, however, to this afternoon's comment, I would advise you that this week we will collect up all the references and they will be made available at the various reading rooms. So, if anybody needs those references, please avail yourselves of them in the reading rooms."

In response to my further inquiry about our request for an extension of the comment period because of the unavailability of the material incorporated by reference into the EA, Mr. Hughes said that the request would be reviewed and responded to promptly. As to the documents, he said that all the documents would be in all the public reading rooms within the next week, i.e., by March 1.

On 23 February, W. Gregory Bass, the EA Document Manager for DOE's Argonne Area Office-West, sent out a letter to "stakeholders." It stated, in part, "In response to a request from members of the public, DOE will make reference materials which were used in preparing the subject draft Environmental Assessment (EA) available for public review. These reference documents will be available in DOE public reading rooms in Idaho and Washington, D.C. by March 1, 1996." (emphasis added)

Had we, on the basis of that notice, traveled substantial distance again on 1 March to review the documents, we would again have been disappointed. At the 27 February hearing in Washington, D.C.--at which there were numerous complaints about the absence of the referenced documents and requests for extensions due thereto--DOE stated that the documents would be available on 4 March, not 1 March as promised at the Idaho hearing and in Mr. Bass's letter of 23 February.

However, even that turned out not to be the case. On 7 March, Mr. Bass wrote to specified DOE public reading rooms, transmitting a number of documents that had been incorporated by reference into the EA. These documents were thus not available until 8 March at the earliest:

anyone who traveled to a public reading room before then would not have been able to review them.

But even then the full set of incorporated-by-reference documents were not available for public review--and were not available in the Washington, D.C., reading room at DOE HQ as late as last Friday, 22 March, the supposed end of the comment period. A few examples of key documents or portions of documents incorporated into the EA and critical to any serious response to the EA that remain missing from the public reading room are:

- "Accident Assessments for Idaho National Engineering Laboratory Facilities." A portion of this document is in the reading room, but only every other page (i.e., only the odd-numbered pages). Presumably the document original was double-sided and only one side of each page was copied. The result is that the copy available for inspection is useless, with every other page missing. This is a critical document, for it is in this document apparently that the details of one of the two major accident sequences are analyzed, with the EA merely reporting the results.

(1)

- "Pyrochemical Processing of DOE Spent Nuclear Fuels." Only the first page of this paper is available in the reading room--the rest of the article was not provided. [One cannot claim that the factual assertion in the EA for which this paper was cited is found only on this first page and therefore the full paper was not provided. First of all, the public has the right to see the full paper to see the context. But, more importantly, the claim made in the EA for which this paper is referenced is found nowhere on the page of the article produced. The EA cites it for the proposition that "The waste forms (ceramic cylinders and metal alloy ingots) resulting from electrometallurgical treatment are expected to be at least as durable as those made with borosilicate glass." The page of the article made available does not address that issue.]

- The EA refers (p. 16) to DOE's Technology Integration Plan. I particularly called this referenced document to the attention of Mr. Hughes and Mr. Bass at the Idaho hearing and asked that they make sure it is included in the documents available at the reading rooms, and was assured it would be. It is not.[1]

- The document "Submittal of the Spent Nuclear (Fuel) Program Technology Prioritization Results" appears to be incomplete. It refers to Appendices D and E, but these appendices are not included (indeed, no appendices are). The few pages of the "Submittal" document that are available merely summarize conclusions, saying the detailed information upon which the conclusions are based is to be found in the appendices. But unfortunately, the appendices are nowhere to be found.

It is my understanding that Anna Aurilio of the U.S. Public Interest Research Group has notified DOE of other documents that appear to not have been provided to the public reading room I will not repeat those here, but I incorporate her notification by reference.[2]

Let us summarize the situation. Despite the requirement in NEPA that any documents incorporated by reference into NEPA documents be made publicly available, DOE failed to do so

[1] Part of a proposed insert to the Technology Integration Plan is included in the Peterson memo, but the Plan itself is not.

[2] I note that one of the documents, the Winberg and Allred "DOE Special Case Waste...", does not appear to be in the collection of EA referenced documents at the reading room. I understand DOE now claims the document can be found in the INEL .SNF PEIS or supporting documents for it--but the public has no way of knowing that. It is not cited in the EA that way. It is not found in the reading room EA documents.

when it announced the availability of the EA and solicited public comments thereon. Furthermore, DOE failed to make the documents available in advance of the hearings the Department held on the EA, making those hearings something of an empty shell. The EA is a conclusory document, with the supporting data and analyses in incorporated-by-reference documents that were improperly shielded from the public. The public was thus effectively precluded from its right to comment at the hearings. People who traveled substantial distances to review the documents in advance of the hearings were blocked in their effort to analyze and comment on the bases for the EA's conclusions by the failure to make the referenced documents available.

Subsequently, DOE promised to rectify the situation by making the referenced documents available. The public was told--at the Idaho hearing and by letter from Mr. Bass--that all the documents would be available by 1 March. They weren't. Then it was promised to be 4 March, but some of the documents were not provided until at least 8 March--a mere two weeks before the comments were supposed to be due, and long after both public hearings. Anyone who traveled to Washington or Idaho to review the documents in advance of the hearing would find none; who then went to the document room on 1 March found none; who went between 4 March and 7 March found that a number of the documents had still not arrived. But even one who went as late as the purported deadline for comments, 22 March, still found key documents or portions thereof not available. The right to comment meaningfully has been effectively abrogated.

Now we come to the matter of the repeated requests for extension of the comment deadline in recognition of DOE's failure to produced the incorporated-by-reference documents in a timely fashion. I first made this request on 21 February. I was promised a prompt reply. A week or so later, having heard nothing, I contacted Ernie Hughes, who once again promised an answer shortly. Still none came. I made repeated additional calls to Mr. Hughes, who said he understood that one must notify the public substantially in advance if the due date is indeed 22 March or sometime later. He promised to contact your office to find out if the extension was granted, and if so, for how long. I understand he made a number of calls to the NE office on this matter. By the week of 18 March, a few days before the due date for comments if there was no extension, I still had had no response. I spoke again and again with Mr. Hughes, who made additional inquiries. I tried to reach Ray Hunter in your office directly; my call was not returned. (1)

I have been informed indirectly that finally, at a meeting on Friday, 22 March, the date on which the comments would otherwise have been due, Robert Nordhaus, DOE General Counsel, informed Dan Horner of the Nuclear Control Institute and others that a two week extension was granted. By letter faxed (after close of business on the 22nd) to Mr. Horner--but apparently to no one else--General Counsel Nordhaus stated that "the Department has decided to treat any comments postmarked by April 5, 1996 as submitted in a timely manner."

Despite my formal requests for an extension based on DOE's failure to provide the referenced documents in a timely fashion, I to this date still have received no communication from DOE on this matter. Furthermore, to my knowledge DOE has failed to either publish in the Federal Register or mail out to recipients of the EA notice of the extension. DOE published the original deadline in the Federal Register and in the original mailing of the EA; when it purportedly granted the request to make the referenced documents available, it mailed out notice thereon to recipients of the EA. Yet DOE has now extended the comment period, due to the failure to produce the referenced documents, but apparently has failed to provide formal notice to anyone except Dan Horner of the Nuclear Control Institute.

In this critical pyroprocessing matter, DOE has violated fundamental NEPA requirements. Documents incorporated by reference in the EA were not made publicly available; when DOE purports to correct the failure, the full set of documents never become available. The basic set of documents that are made available become so on 8 March, five weeks after you wrote soliciting comments on the EA. Yet, rather than making the full documents available and extending the

comment period by the time delay involved in so doing, DOE never makes all the referenced documents available and extends the comment period by only two weeks. Then, to compound matters, DOE fails to notify the public of the extension.

Perhaps the most frustrating aspect of this has been DOE's failure to respond in a timely fashion to my request for the extension in light of the absence of the referenced documents. I was promised a prompt response. By the purported due date of 22 March, I still had received none. This is not only an affront to due process and to the public's rights under NEPA, it is simply unprofessional. I was promised and promised and promised a response long before the due date of 22 March, and received none.

It is also inexplicable that DOE would apparently decide--on the very day comments were to be due--to extend the comment, and yet fail to notify the public of this decision. DOE appears to think that Dan Horner of the Nuclear Control Institute, the only person to my knowledge who has received written notification of the extension, is somehow an agent of DOE and can notify all other interested members of the public of DOE's decision. That is DOE's job, not Mr. Horner's. He has no way of knowing who has requested a copy of the EA and should therefore be notified of the extension of the period for commenting on it. DOE should follow the normal procedure for announcing extensions of comment periods for NEPA documents--publish notice in the Federal Register, where the original deadline was noticed, and/or mail out the extension notice to all who had received the EA originally. It makes no sense to grant an extension of a public comment period without informing the public one has done so.

(1) In light of all these violations of basic NEPA process--a public hearing held when the incorporated documents are not available, failure to provide the full set even now, failure to notify the public of the minimal extension DOE has granted--I make the following requests:

- At long last, provide to all the public reading rooms a full and complete set of all the documents incorporated by reference in the EA.
- Because I have now traveled twice long distances to Idaho and Washington to review these documents, which were not fully available at either time, send to me the documents that are missing.
- Once a full set of the documents is finally publicly available, publish a notice to that effect in the Federal Register and mail a notice to all who received the EA. In that notice, announce that because of the failure of the Department to make any of the referenced documents available before the public hearings, new public hearings will be scheduled with at least a month's notice. Furthermore, because of the failure to make all of the referenced documents available in a timely manner, a new public comment period will be scheduled, with comments due two months after issuance of the notice.

The way DOE has handled this EA process is abysmal. Referenced documents are not made available, requests for extensions are not responded to in a timely fashion, and when granted, the public is not told. If you will pardon the expression, "this is no way to run a railroad."

The National Environmental Policy Act, as I am sure you know, is a public participation statute. It is designed to ensure that the public and policymakers are fully informed of critical environmental information before decisions are made. As is stated in 40 CFR §1500.1(b), "NEPA procedures must insure that environmental information is available to public officials and citizens *before decisions made and before actions are taken.*" (emphasis added). The policy requirement is to "[e]ncourage and facilitate public involvement in decisions which affect the quality of the human environment." 40 CFR §1500.2(d). With regards environmental assessments, "The agency shall

involve environmental agencies, applicants, and the public, to the extent practicable, in preparing assessments. . . ." 40 CFR §1501.4(b). It appears that, far from complying with these requirements, DOE is deliberately subverting NEPA on this important proposed project.

(1)

I urge you to take immediate steps to get this NEPA process back on track. I look forward to your prompt reply.

Sincerely,

Daniel Hirsch
President

cc: Secretary Hazel O'Leary
Dan Horner, NCI
Tom Clements, Greenpeace
Joel Reynolds, Esq., NRDC
Anna Aurilio, US PIRG
Beatrice Brailsford, Snake River Alliance
Bill Magavern, Esq., Public Citizen
Chuck Broscius, EDF
Eldon Greenberg, Esq.

Responses to Document D090

1 The references cited in the environmental assessment have been placed in the Department of Energy public reading rooms. Additional information on this issue is provided in Chapter One of this Appendix.

Department of Energy
Argonne Group - West
P.O. Box 2528
Idaho Falls, Idaho 83403-2528

April 10, 1996

NOTE TO: Administrative Record file for DOE/EA-1148

FROM: W. Gregory Bass, DOE ARG-W

SUBJECT: TELEPHONED COMMENTS ON DRAFT EA FROM MS. DEBRA WILCOX OF SAIC, INC., YUCCA MOUNTAIN PROJECT

Debra Wilcox called on March 19, 1996. She had reviewed the draft EA and had the following comments:

1 The Waste Acceptance Criteria for the Geologic Repository is being developed for High Level Waste and Spent Nuclear Fuel. The Nuclear Regulatory Commission (NRC) definition of HLW is the one being used in developing the waste acceptance criteria. The waste streams in the proposed action described in EA-1148 that are intended for geologic disposal should meet the NRC definition of High Level Waste or Spent Nuclear Fuel.

2 Page 96, 4th paragraph, 2nd sentence should read, "The working group in charge of researching this issue has issued an interim report, which draws the following preliminary conclusions:".

3 Page 97, 3rd paragraph should read, "The Director of DOE Office of Civilian Radioactive Waste Management recently issued a policy of not accepting SNF containing RCRA components for the geologic repository.".

Ms. Wilcox's address is:

Ms. Debra Wilcox
1241 Town Center Drive
Building 5
Las Vegas, Nevada 89134

Responses to Document D091

1 The definition of high-level radioactive waste as employed in the environmental assessment comes from the Nuclear Waste Policy Act which states " (A) the highly radioactive material resulting from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations; and (B) other highly radioactive material that the Commission, consistent with existing law, determines by rule requires permanent isolation." The waste forms given in Table 4-4 of the environmental assessment that are categorized as high-level waste will be qualified as such because they contain large quantities of fission products and are highly radioactive. These materials are therefore assumed to require permanent isolation. For the purposes of meeting the agreement between the State of Idaho and the Department of Energy to remove spent nuclear fuel from the State, these materials will be treated as spent nuclear fuel.

2,3 The environmental assessment has been revised to reflect this comment.

COMMITTEE TO BRIDGE THE GAP
1637 BUTLER AVENUE, SUITE 203
LOS ANGELES, CALIFORNIA 90025
(310) 478-0829

5 April 1996

Mr. Greg Bass
EA Document Manager
U.S. Department of Energy
Argonne Group-West
P.O. Box 2528
Idaho Falls, Idaho 83403

Re: Written Comments on Draft Environmental Assessment "Electrometallurgical Treatment Research and Demonstration Project in the Fuel Conditioning Facility at Argonne National Laboratory - West"

Dear Mr. Bass:

Herewith please find the written comments by the Committee to Bridge the Gap (CBG) regarding the U.S. Department of Energy (DOE) proposal to commence reprocessing of more than a ton of spent nuclear reactor fuel at Argonne National Laboratory - West (ANL-West) in Idaho. These written comments supplement oral testimony presented at the hearing on the Draft Environmental Assessment (EA) held in Idaho Falls on 21 February 1996.

Before we commence our response to the specific contents of the Draft EA, mention of certain process concerns is in order (although these matters touch on substantive defects in the EA as well). We have previously complained that the Draft EA is largely a conclusory document, with the substantive basis for the conclusions contained not in the EA but in a number of other documents incorporated by reference into the EA and which were not made available for public review prior to the EA hearings.[1] We requested at that time, and numerous times subsequently, that the full set of incorporated documents be made publicly available, and that the time for comments be extended by two months. DOE originally provided about two months from the time the EA was available, but having failed to provide the incorporated documents, the due date should be two months from the time the Department finally met its obligations to make available all the documents incorporated by reference into the EA. We requested and were promised a prompt response to both the request that the full set of documents be made available and the request that the

1

2

[1] See, e.g., my comments during the 21 February hearing, my letter to Terry Lash of 28 March 1996, and the 4 April 1996 letter to Secretary O'Leary from CBG and a number of other organizations. The letter to Director Lash is attached hereto. The letter to Secretary O'Leary was provided to your previously.

time for comment be extended accordingly. A number of other organizations made similar requests.[2]

The Department's failure to deal adequately with either request is discussed in detail in CBG's 28 March letter to Director Lash and the 4 April group letter to Secretary O'Leary. Rather than repeat the material therein, we hereby incorporate both by reference. Certain matters merit being updated, however.

We have received no written response to any of our requests. However, a couple of days ago, we received a phone call from Matt Urey and Shane Johnston of DOE. They indicated they had been asked to respond to a narrow portion of my 28 March letter to Terry Lash, that portion which identified four documents as among the documents incorporated by reference in the EA but missing from the DOE public reading rooms. Mr. Urey and Mr. Johnston indicated that DOE would attempt to get those documents to me by yesterday or today. I indicated that that would do little good, since comments are due today and there would be no opportunity to review the documents and prepare substantive comments based on them. Indeed, the documents arrived yesterday, providing no reasonable opportunity to review them, check them against other sources, and comment meaningfully upon them. When I asked regarding DOE response to the rest of my (2) letter, I was told there was none at present. Today, 5 April, the date we understand indirectly is the extended comment deadline, has come and gone with no response, one way or the other, to most of our requests, dating back to February.

As indicated above, there is no way in which to meaningfully review the documents received only yesterday. A main purpose of the National Environmental Policy Act (NEPA) is to provide a reasonable period of time for review of NEPA documents in advance of public comment. Our cursory review for completeness, however, indicates DOE still hasn't even provided the full documents in question. My 28 March letter indicated that among the documents missing were appendices D and E referred to but not included in the document "Submittal of the Spent Nuclear Program Technology Prioritization Results." That "Spent Nuclear Program Technology Prioritization" document was incorporated by reference into the EA at p. 16. As I wrote in my letter to Director Lash:

> The document "Submittal of the Spent Nuclear (Fuel) Program Technology Prioritization Results" appears to be incomplete. It refers to Appendices D and E, but these appendices are not included (indeed, no appendices are). The few pages of the "Submittal" document that are available merely summarize conclusions, saying the detailed information upon which the conclusions are based is to be found in the appendices. But unfortunately, the appendices are nowhere to be found.

However, the documents received from DOE yesterday do not contain the requested Appendices. Instead, we have merely been provided a second copy of the incomplete version of the "Spent Nuclear Program Technology Prioritization" document, still missing the appendices. Since the portion of the document provided is just a summary of conclusions, with the reader referred to the detailed appendices for the basis for the conclusions, there is no way a member of the public can meaningfully comment on the document or the EA's reliance on it.[3]

---

[2] See, e.g., transcript of Washington, D.C. EA hearing, 27 February.

[3] A separate document provided, the Technology Integration Plan, does have an Appendix D and E, but it is clear that those appendices are not the ones referred to in the "Submittal" document. The Plan's Appendix D is entitled "Two Examples for Prioritization," whereas the "Submittal" document refers (at p. 5-7) to "38 new technology activity sheets identified in Appendix D, 37 of which were included in the prioritization analysis." These 38 technology activity sheets are not found in or identified in the

The EA relies heavily on the "Spent Nuclear Program Technology Prioritization" document. At p. 16, the EA asserts that the proposed electrometallurgical technology is the best of all alternative technologies, citing to this document as its basis. Three competing technologies--glass material oxidation and dissolution, plasma arc process, and chloride volatility--are mentioned and dismissed in a single sentence, based on the referenced document. At p. 6-7, the EA gives a mere sentence to each of these three alternatives, dismissing them without further analysis. Without access to the full description and analysis of these alternatives contained in the referenced
3 document, there is nothing in the public record of the EA to substantively address these alternatives or any supposed high ranking of the electrometallurgical approach compared to alternatives. The EA is completely devoid of analysis of alternatives besides the proposed electrometallurgical approach and the no action alternative. Failure to make available the full "Spent Nuclear Program Technology Prioritization," with its detailed description of the alternatives and basis for ranking, impermissibly cripples the EA and shields from the public major portions of the basis on which it purportedly rests.

The EA is equally conclusory when it comes to assessment of environmental impacts from accidents. It provides results, but no analysis on which those results assertedly are based,
4 referring the reader instead to certain documents incorporated by reference. One of those key documents is "Accident Assessments for Idaho National Engineering Laboratory Facilities," which we were provided only yesterday. It is hundreds of pages long. We obviously cannot in a single day analyze it and check it against the claims made regarding it in the EA.

We note that other documents not included in the materials available in the DOE public reading rooms have not been made available to us either. For example, in our letter to Director Lash, we noted that Anna Aurilio of the U.S. Public Interest Research Group (US PIRG) had presented DOE with a list of other incorporated-by-reference documents that were not in the DOE public reading room, and that we incorporated by reference her request into ours. My understanding is that DOE has provided to Ms. Aurilio at least some of the documents she identified as missing, but they have not been provided to us.

This leads to a central due process issue. Public comment was solicited by DOE, both in the form of public testimony at scheduled hearings and in written comments to be submitted to the agency thereafter, on the Draft EA. Documents incorporated by reference into the EA, however,
(2) were not made available to the public prior to the hearings. After the lack of availability of the documents was pointed out at the hearings by members of the public, DOE subsequently mailed out notice to all recipients of the EA that the documents would be made available by 1 March. However, even that deadline was not met. Indeed, a number of the documents were not available even when the published deadline for comments (22 March) passed. Some are still not available today.

When DOE was notified separately by US PIRG and CBG that documents were still missing, DOE's response was to provide some of those documents to US PIRG and CBG alone. There is no evidence that the documents were placed in the public reading rooms. Certainly, no notice was provided to the public that the full set of documents were not in the reading rooms as of 1 March as promised and that additional documents were still missing as late as a couple of days

---

Plan's Appendix D. Similarly, the Plan's Appendix E is merely a glossary of terms, whereas the "Submittal" document says "The four new processes were ranked based upon the detailed formation given in the activity sheets in Appendix E." There are obviously no activity sheets whatsoever in the glossary appendix of the Technology Integration Plan. The Appendices D and E of the "Submittal" document are simply missing.

before the (extended) comment deadline of 5 April. And, as we have pointed out in our letters to Secretary O'Leary and Director Lash, the public has never been informed of the two-week comment extension, an extraordinary situation. Nor have we received a response to our request for an extension that would start when the documents are finally available in full and continuing for a period comparable to that initially announced when the EA availability was noticed. We think the NEPA process has gotten totally out of hand and DOE should just start over.

(2)

5

A couple of other process comments remain to be made. At the 21 February Idaho hearing, DOE promised to provide us certain information, information which we have not received. The EA and the presentations by DOE at the hearing only gave figures for the amount of material to be processed and waste to be produced in terms of volume. The amount of radioactivity (i.e., the number of curies for individual radioactive species and the total number of curies for all radioisotopes) was not disclosed. As we pointed out at the hearing, the volume of waste (whether it is 5 cubic meters or 2) is largely irrelevant in terms of environmental impact. It is the radioactivity that matters. And one cannot assess impacts without knowing how much radioactivity will be involved. We were promised that information and told it could be provided "fairly quickly." (TR 44). We have never received the promised information.

6

Secondly, Ernie Hughes, DOE Director of ANL-West, stated at the 21 February hearing:

> The [federal government's nonproliferation] policy has been reviewed at headquarters by the Office of Nuclear Energy, by the Office of Nonproliferation and National Security, the General Counsel's Office, and so on , and all have determined that this project is -- falls within the guidelines of the nonproliferation policy.
>
> TR 187

Later (TR 218-219), we asked for copies of the nonproliferation reviews of this project by the DOE offices identified by Mr. Hughes as having conducted such reviews. He promised, "I will check that and respond, certainly." TR 219. We have received no written response. We eventually called Mr. Hughes and inquired about the promised response. He said it was his understanding that there had, in fact, been no formal nonproliferation review of this project by any DOE office, as had been implied in his statement at the hearing, but that rather several offices had been provided the Draft EA and none raised objections. This is, of course, a far cry from having conducted a formal nonproliferation review. He also indicated it was his understanding there was nothing in writing about any review by these offices. We asked him to memorialize his verbal representations on this matter in a letter, which he promised to do. We have, however, not received that promised letter either.

7

Apparently there has been no formal nonproliferation review of this project, one with potentially severe nonproliferation impacts. That disclosure alone cripples the Draft EA.

To conclude, DOE's handling of the NEPA *process* aspects of this NEPA review has been remarkably violative of the intent of NEPA. Documents incorporated by reference into the EA were not made available in advance of the hearings on the EA, and a number of the documents have not been made available to the public even to this date. Requests for extensions have never been formally responded to; the current two-week extension was apparently granted the day the previous comment period was to expire, yet only one member of the public has received written notice of the extension of the public comment period. To our knowledge, no notice has been published in the Federal Register. Information promised to be provided to the public never has been. DOE's performance in this regard suggests that the decision to commence reprocessing of spent nuclear fuel using the new electrometallurgical technique is already made and that the NEPA

(1)

8

process is merely an irritating institutional "hoop" to jump through to get to that foregone conclusion. This flies in the face of NEPA, which is at its heart a public participation statute.[4] Moreover, at the core of NEPA is the requirement that agencies not make major decisions without taking into account a hard look at potential environmental impacts and alternatives. DOE has failed in all these regards. (8)

The Draft EA

A few preliminary comments are in order about the EA itself.

Inaccurate and Inadequate Project Description

A core requirement of NEPA is that the proposed project be accurately and adequately described. In this case, DOE has acted in a rather disingenuous fashion about what the real project is.

This misrepresentation begins with the EA title itself: "Electrometallurgical Treatment Research and Demonstration Project in the Fuel Conditioning Facility at Argonne National Laboratory-West." That simply is not what is proposed here. ANL has been carrying out a research and demonstration project on electrometallurgical reprocessing of spent fuel for years. What is now proposed is to commence actual reprocessing of spent fuel--no longer research, but actual reprocessing. And the reprocessing of significant amounts of the Experimental Breeder Reactor II (EBR II) irradiated fuel is clearly only the first step in DOE's plans to use this reprocessing technology on a wide range of fuels, but it has artificially segmented the NEPA review in an effort to get the project started, based only on an EA and with no consideration of the implications of the larger program. 9

Additionally, the EA completely fails to disclose (indeed, works hard to obscure) the actual origins of this project. The so-called "electrometallurgical treatment" project is simply the latest incarnation of the electrometallurgical reprocessing or "pyroprocessing" component of the breeder reactor program. Known variously as the Integral Fast Reactor (IFR) Program, the Advanced 10

[4] DOE's performance in this process has made genuine public participation almost impossible. For example, we traveled a thousand miles to Idaho to review documents in advance of the hearings. Before undertaking this trip, we inquired of DOE/ANL-West, via Beatrice Brailsford of the Snake River Alliance, whether there was a DOE public reading room in Idaho Falls, whether it would be open to the public, and whether the documents referred to in the EA would be available there. Paul Pugmire of ANL-West assured her that we would be able to review the referenced documents at the public reading room. When we arrived at the public reading room, however, none of the referenced documents were indeed available there. Additionally, DOE has had pending before it for a year discovery requests from CBG related to the pyroprocessing in Idaho. We went to Idaho to review the requested documents, but such review was denied, saying more time would be needed to assemble the documents. We were then told to go to Idaho the week of 1 April (a few days before the extended comment deadline) to review the documents; then were told there was no need to travel to Idaho, that the documents would be shipped to us. Today is the deadline for comments, and none of those promised documents has yet arrived. Clearly, review of the documents associated with this pyroprocessing project will not be possible until after the deadline for comments has passed. Additionally, we traveled three thousand miles to Washington DC to review documents in the DOE public reading room at DOE headquarters, after DOE had promised to supply the referenced documents, only to find that the full set were still missing. This is no way to arrange for effective public participation in the NEPA process.

(10) Liquid Metal Reactor (ALMR) Program, the Actinide Recycle Program, the Partitioning-Transmutation (P-T) Program, the Separations and Transmutation (STATS) Program, among other names, this program is designed to develop and apply new technologies to separate uranium, plutonium, and other transuranic elements from spent nuclear fuel and other radioactive wastes for recycling in breeder reactors and similar devices.

This is the so-called "closed nuclear fuel cycle" that has long been a dream of some nuclear proponents and the nightmare for nonproliferation experts. The latter have opposed "actinide recycle" (e.g., separating out uranium and plutonium from nuclear waste for potential reuse) because the separated fissile materials can be used for nuclear weapons purposes.[5] Commerce in these separated materials would vastly increase the risk of theft or diversion for atomic bombs, and make more difficult our efforts internationally to restrain other countries from developing reprocessing capabilities that could be used to develop weapons.

11 This program, headed by ANL, worked on both aspects of separations and transmutation, collectively called the IFR program. The breeder reactor, was being developed at ANL-West via operation of the Experimental Breeder Reactor II. (The original Experimental Breeder Reactor, EBR-I, melted down on 5 October 1966, a few miles away from the site of EBR II.) The reprocessing technology being developed for the IFR was electrometallurgical treatment or pyroprocessing. It involves chopping up spent fuel, placing it into a molten salt solution heated to high temperatures, and running an electric current through the solution to plate out the uranium and subsequently the transuranics onto electric poles. The separated material would then be available for "recycle" in the IFR, creating the "fuel cycle" dreamed of by proponents of reprocessing and breeder reactors.

In 1994, Congress decided--in part for proliferation reasons--to terminate the IFR program. ANL and the Senators representing the states in which ANL-West and ANL-East were located (Idaho and Illinois respectively) fought hard but unsuccessfully against the termination. DOE had supported the termination effort, indeed raising serious proliferation concerns about the program.

However, in the midst of the Congressional fight over termination, DOE proposed to the Idaho and Illinois Senatorial delegation a compromise--if the Senators would agree to terminate the breeder reactor program, DOE would agree to an "Argonne redirection package" that would redirect funds to ANL to keep jobs that would otherwise be lost from a complete termination of the program. Part of this redirection would involve keeping the reprocessing component of the IFR--the electrometallurgical separations project--alive under a different name, keeping jobs alive as well.

12 The Illinois and Idaho Senators rejected the proposed compromise, apparently thinking they had the votes to defeat the IFR termination. They lost, and the IFR program was put in a termination mode, a process that was to take several years.

ANL proposed an "Argonne Redirection Package" along the lines of the compromise that the Senators had rejected, trying to keep as much of the program alive (and maintaining as many of the jobs) as possible under new names. Indeed, it was clear that the breeder reactor's proponents hoped that they could someday reverse the Congress' decision and wanted to keep going as much as possible of the program--particularly the electrometallurgical reprocessing--in hopes of resurrection of the full program.

---

[5] Actinides are those elements from actinium (atomic number 89) through lawrencium (actinic number 103). The term is frequently used to apply to uranium and the transuranic elements (i.e., those of atomic number higher than uranium), particularly plutonium.

After prevailing in the Congressional vote to terminate the IFR program, DOE inexplicably agreed to the compromise it had offered the Illinois and Idaho Senators before the Congressional vote and which they had rejected. Core parts of the IFR program, particularly the electrometallurgical reprocessing, would be kept alive as a jobs program.

Out of this background--none of which is disclosed in the EA--arose the current plan to use the IFR's reprocessing technology to reprocess the EBR II's fuel. This is almost identical to the plan before IFR termination, but with cosmetic changes to name and stated purpose. The true purpose remains the same, but the EA attempts to present a fiction in order to get around the Congressional mandate to terminate IFR. (12)

Even the name of the facility in which the reprocessing is to be done has been changed to try to move forward this facade. Situated right next to EBR-II (because it was always conceived of as the reprocessing building for the EBR-II), it is now called the "Fuel *Conditioning* Facility" (emphasis added. Until a year ago, it was known as the "Fuel *Cycle* Facility" (emphasis added). The purpose of the facility--reprocessing, that is, separating fissile materials from nuclear fuel so it can be *recycled*--remains the same. And the proliferation risk remains unchanged, because the reprocessing technology to separate out fissile materials to be recycled in reactors can also be used to make fissile materials for nuclear weapons.

The EA is seriously deficient for failing to accurately describe the project and for having failed to disclose this history.

13 **Failure to Identify and Address Adequately Alternatives.** This is discussed in more detail below; in short, the EA simply fails to analyze any alternatives at all for removing the sodium from the fuel other than reprocessing. This is completely unacceptable.

14 **Failure to Identify and Address Adequately Environmental Impacts.** The true environmental impacts are not disclosed. Minute fractions of the potential radioactive releases are assumed. An EIS is essential to fully address the potential impacts.

(10) **Artificial Segmentation of Review.** DOE is evading its NEPA responsibility by artificially segmenting the program into small components and trying to avoid performing an EIS at any early stage, as required by NEPA to prevent irreversible commitments of resources.

15 **An EIS Must Be done--The Project is Plagued by Controversy; and EIS is Mandatory for Reprocessing Under DOE's Own NEPA Regulations; The Project is a Major Federal Action; There Are Potentially Very Significant Environmental Impacts.** These matters are discussed in some detail in what follows. Let us point out here merely that this is reprocessing involving real, highly irradiated nuclear fuel; capable of giving a lethal dose in a few minutes; utilizing more than a ton of irradiated fuel; with major impacts of crossing a two-decades-old nonproliferation barrier, U.S. policy against reprocessing of non-military reactor fuel.

<u>Discussion of Draft EA, Page by Page</u>

16 Glossary. The sources of individual definitions are not given. Rather, a footnote says the
17 definitions come "in part" from one of four sources. The reader does not know which definition came from where. This is particularly important given the unique definition given for reprocessing--a torturous definition used nowhere in the technical or academic literature on the

subject, designed apparently to evade DOE's clear NEPA regulations which require an EIS for a reprocessing project. See 10 CFR §1021.400(c) and Appendix D at D2.

The reprocessing definition given in the EA's glossary is as follows:

> Processing of reactor-irradiated nuclear material (primarily spent nuclear fuel) to recover fissile and fertile material, *in order to recycle such materials primarily for defense programs*. Historically, reprocessing has involved aqueous chemical separations of elements (typically uranium or plutonium) from undesired elements in the fuel.
>
> (emphasis added)

Note that the EA's definition has added a unique concept to the definition or reprocessing: intent. Under the EA's proposed definition, reprocessing is defined neither by the technology or the act involved (separating fissile and fertile materials like uranium and plutonium from nuclear fuel), but rather by its stated *purpose*. Thus, under this remarkable definition, recovering and stockpiling vast quantities of plutonium from spent fuel would not be considered reprocessing unless the persons doing the separating stated that they *intended* to recycle the material. This is of course ludicrous. Recovering uranium and/or plutonium from irradiated reactor fuel is reprocessing, no matter what the claimed intent is for using the recovered materials. (17)

Secondly, note that the EA has added a slippery additional component to the traditionally accepted definition of reprocessing. It is not just that recovering uranium and/or plutonium from spent fuel is not reprocessing unless one *intends* to recycle the material, it is not reprocessing unless the intended recycling is "primarily for defense purposes." This is remarkable. Under such a definition there would be no such thing as "civilian reprocessing," i.e., reprocessing that is used primarily for recycling uranium and/or plutonium back into civilian reactors. Of course civilian reprocessing is reprocessing; indeed, the U.S. has had a policy since the Administrations of Carter and Ford opposed to civilian reprocessing, because of nonproliferation concerns. Is DOE now trying to say U.S. policy against civilian reprocessing is void because, by DOE's new definition there is no such thing as reprocessing when done in the civil sector?

Reprocessing is defined by what it is, not what the intention is of the people engaged in it. Reprocessing is reprocessing when uranium and/or plutonium is separated from other materials in spent nuclear fuel or other irradiated materials. It is reprocessing when the purpose is to use the material in weapons; when the purpose is to recycle it in reactors; and when any other purpose is involved. It is the separation of the uranium and/or plutonium that makes it reprocessing, not what is in the heads of those doing the separation. Indeed, the fundamental nonproliferation concern is that, whatever the stated purpose for acquiring the separated uranium and plutonium, the material can be stolen or diverted for use in weapons. It is for that reason that we have for decades had a policy against separating plutonium and/or uranium from spent fuel for non-military purposes, because the materials can be stolen or diverted from civil uses to weapons purposes. 18

Let us compare for a moment the definition of reprocessing in the EA with the definition it gives for the activity proposed in the EA, "electrometallurgical treatment." The latter is defined in the EA as follows:

> A technique to collect, concentrate, and immobilize fission products and transuranic elements from metallic spent nuclear fuel *by removing the uranium in the spent fuel* with an electrochemical cell. The treatment alters the chemical and physical nature of spent nuclear fuel to reduce its toxicity, volume, and mobility to render it amenable [sic] to transport, storage, or disposal. (17)

What we see, aside from diversionary language once again about the supposed *intended purpose* of the application of the technology, is that electrometallurgical treatment is, by the EA's own admission, removing uranium from spent nuclear fuel.[6] That is exactly what reprocessing is. There is no difference in the definitions given in the EA for reprocessing and electrometallurgical treatment except one of stated intent. And even that, as we shall show below, is no difference, in that DOE now admits that the purpose of extracting the uranium is for potential recycle, fitting even its EA definition of reprocessing.[7]

Let us examine one remaining awkward definition in the EA glossary. PUREX (Plutonium Uranium Extraction) is defined therein as follows:

> A chemical separation process that has been used for recovering uranium and plutonium from irradiated fuel in a form usable as reactor fuel or for weapons. The process uses aqueous solvent extraction to perform the separation. This technology can also be used to treat spent nuclear fuel for disposal.

One sees immediately that PUREX is a reprocessing technology, and that it is no different than electrometallurgical treatment in that regard except by the details of the technique. The EA's definition of reprocessing makes clear that in the past, reprocessing has relied on aqueous chemical separations, which is PUREX. Electrometallurgical treatment is also, by its own definition, a chemical separation; it just also employs electric current rather than solvents.

(17)

The EA should be honest about these definitions, using definitions that are accepted in the scholarly community and which aren't designed to pretend the electrometallurgical project is anything other than what it clearly is--reprocessing. Reprocessing is the separation of materials such as uranium and plutonium from spent nuclear fuel and other irradiated materials. PUREX is the solvent extraction technique for reprocessing that has been historically used to date. Electrometallurgical treatment (frequently called pyroprocessing because it involves high temperatures) is a new technology for reprocessing, using electrochemical techniques. It is reprocessing, and the EA should not try to evade that fundamental reality.

Why is the EA so desperate not to use the term "reprocessing" to describe what is proposed to be conducted in the Fuel Conditioning (nee Cycle) Facility? (One almost has the impression that a "search and replace" function in a word-processing program was run over the EA to remove all references to reprocessing and recycle with regards this project.) The answer can be found in DOE's own NEPA regulations. 10 CFR §1021.400(c) and Appendix D at D2 make clear that DOE *must* perform a EIS for a project if it is a reprocessing project. This is a reprocessing project; DOE is attempting to start it up with only an EA; and to do that it must twist and torture even its own definitions of reprocessing.

---

[6]Note that the definition leaves out separation of plutonium or other transuranics. The electrometallurgical treatment contemplated for IFR would separate the uranium out first and then the transuranics, including plutonium. The modified technique for this individual use involves only the separation of the uranium. A correct definition of electrometallurgical treatment would make clear it is reprocessing to remove uranium and/or plutonium and/or other transuranics.

[7]Note that the EA definition of reprocessing says it is for the purpose of recycle "primarily for defense purposes." It does not say exclusively for defense purposes. Indeed, to date, reprocessing in the U.S. has been primarily in the defense sector. But reprocessing for recycle for other purposes would still be within even the EA's rather tortured definition.

What is the source for the reprocessing "definition" given in the EA? As indicated above, DOE does not explicitly give a source in the glossary. However, at p. 113, the EA repeats the definition of reprocessing given in its Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final EIS of the previous year. That definition is identical to the one used in the EA. This is not surprising, as the INEL EIS had initially been hoped by DOE to be shoe-horned into providing NEPA coverage for the electrometallurgical reprocessing to be conducted at INEL. When DOE determined the INEL Site-Wide EIS wasn't adequate for that purpose, it prepared this EA. Both use the same reprocessing definition. But that is no source for the definition--reliance on this definition is circular. Where did it come from?

Let us compare the definition DOE now proposes to rely upon with DOE's own previous definitions of reprocessing. The Final EIS on Disposal of Hanford High-Level, Transuranic, and Tank Wastes (DOE/EIS-0113, 1987, Vol. I, p. 8.16) defines reprocessing as "chemical processing of irradiated nuclear reactor fuels to remove desired constituents." Under DOE's own definition, then, what is to be done at ANL-West is reprocessing. It is certainly chemical processing of irradiated nuclear fuels--the Laidler paper cited at p. 24 of the EA describes the process as "pyro*chemical* processing of DOE spent nuclear fuels" (emphasis added). And it certainly is "to remove desired constituents"--in this case, uranium.

(17)

DOE's Draft EIS on Proposed Nuclear Weapons Nonproliferation Policy Concerning Foreign Research Reactor Spent Nuclear Fuel (DOE/EIS-0218D, 1995, Vol. I, p. G-2) defines reprocessing as chemical separation: "A process for extracting uranium and plutonium from dissolved spent nuclear fuel and irradiated targets. The fission products that are left behind are high level wastes. Chemical separation is also known as reprocessing." As indicated above, the EA concedes that the proposed project involves extracting uranium from dissolved spent nuclear fuel using a chemical separation process. In this case, it is a pyrochemical technique, in which the fuel is dissolved in a molten salt solution at high temperature.

DOE's Draft Programmatic EIS on Storage and Disposition of Weapons-Usable Fissile Materials (DOE/EIS-0229-D, 1996, Vol II, p. 7-25) defines reprocessing as the "chemical separation of spent reactor fuel into uranium, transuranic elements, and fission products." Note that there is no claim in any of these official DOE definitions about intent or purpose for the separation--any technique that separates uranium and/or transuranics like plutonium from fission products in spent fuel is reprocessing, irrespective of purpose

DOE's Environmental Restoration and Waste Management Five-Year Plan for FY 1992-1996 (DOE/S-0078P, 1990, p. 620) also defines reprocessing as the "dissolution of spent reactor fuel and separation of uranium, transuranic elements, and fission products." Again, there is no inclusion of intent or purpose in the definition.

Finally, in DOE's publication "Closing the Circle on the Splitting of the Atom: The Environmental Legacy of Nuclear Weapons Production in the United States and What the Department of Energy is Doing About It," (January 1995, Office of Environmental Management, a p. 93), reprocessing is defined as chemical separations, which in turn is defined as a "process for extracting uranium and plutonium from dissolved spent nuclear fuel and irradiated targets. The fission products that are left behind are high level wastes. Chemical separation is also known as reprocessing "

The definition of reprocessing employed in the EA at question is contradicted by DOE's own definitions of reprocessing. It is clear that the electrometallurgical processing proposed for Idaho is reprocessing. It was the breeder reactor's reprocessing program. It is designed to separate out uranium for possible reuse. It can also separate out plutonium: indeed, in its previous

incarnation, the uranium would be separated out first and then the plutonium and other transuranics. It is reprocessing; it requires an EIS under DOE's own regulations and definitions.

(17) Even given the EA's own definition, the project is reprocessing. Reprocessing is defined there as separating out fissile or fertile materials such as uranium from spent nuclear fuel for recycle in defense programs or other uses. At the 21 February EA hearings, we asked the DOE officials present what was the intended use of the uranium that would be separated out of the fuel using the electrometallurgical technique. We were told it would be stored for possible reuse as nuclear fuel in research reactors or other reactors. This is precisely the closed nuclear fuel cycle for which reprocessing was in part designed--separating out fissile material and recycling it in reactors. And with it come all sorts of worrisome implications for nuclear weapons proliferation.

19 We need to make one further point at this juncture. The EA makes much of the claim that the electrometallurgical technique does not supposedly separate out weapons-usable material. That simply is not true. Hidden in the EA at p. 30 and conceded at the Idaho hearings is the revelation that the electrorefining process, which dissolves the spent fuel in the molten salt solution and separates out the uranium, discharges uranium that is about 60% enriched. Anything over 20% is agreed to be usable in nuclear weapons, and one can make a nuclear explosive even below 20% enrichment. But highly enriched uranium goes into the electrorefiner, mixed with all the rest of the high level waste; what comes out is pure, highly enriched uranium, weapons-usable. DOE tries to get around this unpleasant fact by saying it will *subsequently* mix the weapons-grade uranium with low-enriched uranium to get it to about 20% (it is not clear whether 20% or below). But this does not permit DOE to escape the reality that it is separating out weapons-usable material.

20 Furthermore, the technology is capable of separating out both weapons-usable uranium and weapons-usable plutonium. It is precisely its capability of permitting easier acquisition of weapons-usable materials through a new, advanced technology that produces the central risk that is unanalyzed in the EA and which merits a full EIS--the breaching of a longstanding nonproliferation barrier, prohibiting reprocessing of non-military fuels in the U.S. (EBR II was part of the civilian reactor development program), and doing so with a new technology that, if others learn of it, could result in far more nations acquiring nuclear weapons and greater risk of subnational groups stealing separated nuclear materials for weapons purposes. The impacts here and abroad of us crossing that nonproliferation threshold, and of this new technology being dispersed to others, is simply not addressed in the EA.

21 At p. 1 of the EA, DOE tries to argue that its purpose in starting up the reprocessing at Idaho has something to do with a commitment to remove spent nuclear fuel from Idaho by 2035. However, that is forty years from now, and provides no argument for commencing reprocessing next month, as proposed. DOE argues that "without *some* form of treatment, EBR-II fuel is unlikely to be suitable for disposal in a geologic repository because the fuel is saturated with sodium, a reactive material." (emphasis added). We do not believe the EA has made the case for even that proposition. However, the central question is not whether "some" form of treatment is needed to remove the sodium, but whether full reprocessing makes any sense at all, removing not just the sodium but separating out the uranium as well. The plan to do reprocessing--separating the uranium from the rest of the radioactive waste--in addition to removal of the sodium, puts the lie to 22 DOE's statement of intent for this project. It is really just a jobs program, to keep alive a reprocessing technology that was part of the breeder program Congress killed. If the motivation were, as DOE claims, removal of the sodium, then all that would be needed to be done is remove the sodium. The fact that DOE proposes to go way beyond sodium removal to separating out the uranium--reprocessing--shows that the sodium rationale is just a facade.

23 We also note a point made by one of the INEL employees at the 21 February hearing--no one knows what acceptance criteria will be for any geologic repository that might eventually accept INEL waste. There is no such repository at present, one is decades away at best, and, as the speaker pointed out, acceptance criteria for waste will change a dozen times between now and

when waste is finally accepted. It makes no sense whatsoever to convert the EBR II fuel into an entirely new waste form or forms when one has no idea whether those forms will meet acceptance criteria for a repository that does not yet even exist. One is likely to have to try to find ways of converting the new waste forms into other forms to make them eventually acceptable; one could readily be making matters worse. These are issues that are not examined in the EA. (23)

The EA's discussion of the review(s) by the National Research Council is inaccurate and misleading. DOE should discuss all the Research Council reviews of electrometallurgical treatment, which have been largely very critical. In addition, even the one recommendation to which the EA obliquely refers is for a demonstration very different than that which is proposed in the EA. One cannot rely on the Council for support for the project as proposed.

More importantly, it is extremely distressing, and at variance with NEPA, that DOE has been so committed to its separations and transmutation program, of which the electrometallurgical technology is a key component, that it has asked the National Research Council to perform several major reviews of the program, including a three-year study chaired by Norman Rasmussen. It has asked for--and paid for--extensive input from the National Research Council about whether DOE should move forward with its separations and transmutation program and the electrometallurgical component thereof, but has failed to permit public input on those decisions via an EIS. The whole purpose of NEPA is to provide decisionmakers at an early stage with information about the potential environmental implications of their decisions, with opportunity for meaningful input by the public. DOE appears to be acknowledging that it is making major decisions about its program, significant enough to contract with the National Research Council for detailed advice as to how and whether to proceed, but refuses to prepare an EIS to permit formal public input on the potential environmental impacts of the very decisions DOE is making. 24

At p. 3 DOE presents a trivial set of alternatives: do the project as proposed where proposed; do it somewhere else; do half the project; or don't do it at all. The EA fails to formally analyze genuine alternatives--for example, techniques such as those presented by Professor Warf for removing the sodium without separating out the uranium. (13)

Furthermore, we note that the amounts of spent fuel to be reprocessed are substantial--over a ton of highly irradiated nuclear fuel in a flammable form to be treated in a high temperature operation. If this is not a major federal action, one that could significantly affect the human environment, it is not clear what is. (15)

Additionally, it is clear that DOE is artificially segmenting its program in order to evade NEPA's clear requirement that environmental impacts be assessed at the earliest possible time. It is clear that DOE is contemplating using the electrometallurgical reprocessing technology on a wide range of nuclear fuels. By focusing this environmental review only on EBR II fuel, and only a portion of that fuel, DOE hopes to avoid its NEPA obligation of conducting an EIS rather than an EA and of reviewing the impacts of all the contemplated connected actions. This is an unacceptable avoidance of NEPA obligations. (10)

NEPA is designed to have environmental considerations brought into the decisionmaking picture at an early time, in part to avoid significant commitment of resources that would improperly alter the balancing of alternatives later. But that is exactly what DOE has done. Indeed, it argues in the EA that other alternatives for treating the EBR II fuel are not worthy of consideration in the EA because they are less advanced in their development. But the decision as to which technology to develop and which not to is DOE's--and it is in essence saying electrometallurgical treatment is a foregone conclusion, with no other alternative going to be considered, for the circular reason that DOE has previously decided to push this technology rather than alternatives. This violates NEPA's core. 25

This circular reasoning and breach of NEPA's requirement that one perform a NEPA review sufficiently early to avoid an irreversible commitment of resources that interferes with consideration of alternatives is made clear at p. 4. The EA states, "Demonstration of an alternative technology has not been analyzed because there are no other SNF treatment technologies being developed that have reached a stage of development to warrant testing by DOE with irradiated fuel." This is astonishing reasoning. We are going to test it because it is ready to be tested. DOE is saying. We are not going to consider any alternative because we have failed to adequately consider those alternatives in the past. DOE continues. This flies in the face of NEPA.

(25)

This irrational line of argument continues on the next two pages. PUREX will not be considered as an alternative, the EA says, because there is "no plan" to restart the PUREX facility. The issue is not whether there is a plan, but whether there should be. (We would oppose such a plan, do not think it is a good alternative, but DOE's circular criteria for dismissing alternatives is remarkable.)

The decision not to consider mechanical processing follows the same pattern. The alternative of removing the sodium by washing with a solvent or by vacuum evaporation and collection is mentioned and then DOE refuses to consider it in the EA, in part because the processes are "not now available" for radioactively contaminated sodium. But DOE claims the purpose of this project is not actual treatment of its sodium-contaminated EBR II fuel, but rather a "research and demonstration" project to provide information to help DOE decide whether to use this technique for the rest of the EBR II fuel and perhaps others. (We, as indicated above, believe that is a false description of the project purpose, which we think is in fact to start up a new reprocessing technology.) If the purpose of this project is research and demonstration, to provide information necessary to make a decision about how to treat sodium-contaminated fuel, then other alternatives should not be rejected from consideration because DOE had previously made decisions that put more resources into this technology and less into others, leaving the others purportedly less developed. (The case that this alternative technique is not sufficiently developed is not made in the EA, just asserted. No proof is provided.)

One other reason given for refusing to consider mechanical alternatives for removing the sodium is the claim that for some of the fuel, the driver fuel, some of the sodium is absorbed within the fuel. This case is not made in the EA. Supposedly the purpose of the treatment of this fuel is because sodium is a reactive material. The mechanical treatment removes the sodium by reacting with it, as in an alcohol wash. The EA now claims that some of the sodium is inside the fuel matrix, where such a wash could no react with the sodium to remove it. But if the sodium is trapped inside the fuel so firmly that it cannot react with the very reactive materials used in the wash, then it doesn't pose a reactive risk in the first place. That sodium that has entered cracks in the fuel will be removed by washing with reactive substances that penetrate the same cracks.

26

When we asked the DOE representatives about this at the 21 February hearing, we were told that much of the sodium inside the fuel meat would react under these wash conditions. Some tiny amounts of the sodium that entered micro-cracks, however, it was asserted, would become trapped in dead-end pores that had sealed up after being originally opened to the surface. In other words, some tiny fraction of the sodium would have penetrated into microcracks that subsequently sealed them off from the surface. We asked what risk that sodium could possibly pose, then, if it was sealed off and then couldn't be exposed to air or water from the surface of the fuel. The only answer given was that some undefined tiny fraction of these sealed off pores might eventually open again and a tiny amount of sodium might then react with air. No one could give any real estimate of the amounts involved, or the consequences of such a hypothetical, tiny problem. Nor is it analyzed in the EA.

But, taking this latest attempt at creating a problem as though its proponents were in fact serious about it, we then asked if the spent fuel didn't have cesium inside it. We were told, of

course, yes. We asked if the cesium wasn't reactive. They said, yes. But no one proposes to remove cesium from nuclear reactor fuels because it might possibly one day reach the surface of the fuel and be reactive.

There is no analysis in the EA to support the refusal to consider mechanical means of simply removing the sodium from the fuel, without reprocessing to separate out uranium.

(26)

The brief discussion of why the EA refused to consider as alternatives other technologies that are advanced and that could be used is equally inadequate. A single sentence is given to each of three technologies. Again, the EA refuses to consider them for the sole reason that they require additional developmental work. But that is precisely the supposed purpose of the electrometallurgical process--development. Going forward with the electrometallurgical project will further commit agency funds and further eliminate reasonable alternatives from consideration. in clear contradiction of NEPA.

The discussion at p. 9 is less than honest about the FCF. It plays down its original purpose--indeed, its only purpose until last year. This was reprocessing for the EBR II breeder

27 reactor. Indeed, the EA claims the facility it calls the Fuel "Conditioning" Facility has been operating for 30 years. But for 29 of those years, it was the Fuel "Cycle" Facility, indicative of its role in recycling separated fissile materials back into the breeder. The same is true in the discussion at p. 12 of the EBR II de-emphasizing the fact that it was a breeder reactor.

The EBR II discussion mentions the supposed problem of sodium loaded in between the

(26) cladding and the fuel meat. Why wasn't that problem thought of before DOE and its predecessor agency approved the EBR II in the first place. DOE now tells us it has to do this very dangerous reprocessing of EBR II fuel to deal with a problem that it itself created.

P. 15 points out that sodium in tiny amounts gets into tiny pores, with some closed off from the fuel pin surface. But nowhere is it addressed, as indicated above, why that sealed-off sodium is any problem, or if it is, and if it is, why it is any different than reactor cesium fission products also in the fuel meat, for which no one argues treatment is necessary. No quantification whatsoever of the sodium that could be removed by washing and that which would remain trapped is provided, and no analysis whether the tiny amount trapped inside is a problem, since it is by definition trapped inside.

If the purpose is truly to deal with the sodium, as claimed in the EA, then why not chop the

28 fuel, heat with chloride, converting the sodium metal to sodium chloride, <u>without reprocessing to remove the uranium?</u> Indeed, even if one wanted to use the molten salt technique, why not simply react the sodium in the molten salt, <u>without reprocessing to remove the uranium?</u> The answer appears clear: the sodium is just a transparent rationale for attempting to go forward with a reprocessing technology that was part of the terminated IFR breeder reactor, actinide recycle program.

No real evidence is presented in the EA that the sodium is a pressing problem. Indeed, no claim to that effect has been made. As one of the INEL/ANL employees stated at the 21 February hearing, there has been no problem with the storage of the EBR II fuel. It can be safely stored for decades more. The EA carefully doesn't claim to the contrary. Indeed, it makes clear that the fuel is going to be placed in dry storage where any potential reaction with water will be eliminated. Nowhere does the EA claim any problem with dry storage in any time period that would require starting up this reprocessing next month--or for that matter, next year or the next decade.

29 Also on p. 16, DOE admits there is a national program that has among its components new technologies for separation. This program includes a Technology Integration Plan, and among the new technologies are electrometallurgical, glass material oxidation and dissolution, plasma arc

process, and chloride volatility. No detail is provided about any of them, and no basis for analyzing the alternatives. Indeed, the EA declines to analyze them as alternatives. We note that DOE clearly has a program, has a technology integration plan, and has a decision making process about which technologies to emphasize--all of this without NEPA compliance to insure public input and consideration of environmental impacts as DOE makes these decisions about commitments of resources and which alternatives to deploy. (29)

At p. 19 again the nature of and origin of the electrometallurgical technology is not honestly disclosed. It was reprocessing for the breeder; Congress killed the breeder program, and ANL is now trying to go forward with the reprocessing part of the program under a different name and purported rationale. At the bottom of the page it is mentioned that the electrorefiner is very small--9 feet high and 3 feet across. Nowhere is there an analysis of the proliferation risks of a reprocessing technology that can be done in little larger than a bathtub. Current PUREX reprocessing takes facilities that are football-field in size. They are called "canyons" and for good reason. A reprocessing technology that is compact, as the electrometallurgical technique is, poses serious proliferation problems, because it would be vastly more difficult to detect, vastly easier to conceal. The electrometallurgical technique would be easier, cheaper, and more compact than traditional reprocessing, all of which would reduce the barriers to acquisition of weapons-usable materials and make proliferation risks greater. Furthermore, development of this technology by the U.S., whether used for weapons purposes by us or not, would disseminate information about the technology and stimulate others to use it, without profound effects. None of this is analyzed in the EA. 30

Mr. Laidler at the 21 February hearing belatedly made clear that the technology could be used to separate out transuranics in addition to uranium, that indeed that was its original mission, and that the details of the technology are so sensitive that some aspects of it cannot be published or otherwise disclosed, including information helpful in making the process operate economically. We were told on our tour of the facility on 22 February by Richard Lindsay, Director of ANL-West Information, that representatives of the Japanese nuclear establishment were at the facility as recently as the previous month, but that now the technical exchange with the Japanese, at least in terms of actual physical presence of their representatives at the electrometallurgical facility, was terminated, in part because of the sensitive nature of the information. We were not able to get a clear answer whether other forms of exchange were still permitted, e.g., exchange of information about the technology at international meetings, transfer of technical reports, etc. The EA should make this clear. 31

If there is no proliferation risk associated with this technology, as claimed in the EA, why are there restrictions on publishing sensitive aspects of the technical information? Similarly, if this is not Sensitive Nuclear Technology, why has technical exchange with the Japanese now been terminated, at least with regards physical presence at ANL-West? Precisely what is the dividing line between what information can be published and what cannot? Clearly, aspects of this technology pose proliferation risks or these restrictions would not be in place. Yet, the restrictions are not defined, so there is no way of assessing whether they are effective in preventing sensitive aspects of the technology from being transferred, making this new reprocessing technology potentially available to other countries and increasing ability to obtain weapons-usable nuclear materials and increasing proliferation risks thereby.

Page 19 also makes clear that the separated uranium would be stored. At the hearing, it was made clear that the uranium was not being considered necessarily a waste, that the option was kept open of recycling it in reactors because it had economic value. Separating fissile material out of spent fuel for possible recycle in reactors, because it has economic value, is reprocessing, and there is no getting around that. (17)

Page 21 indicates that the process takes place at 932 degrees F. The risks involved in such a high temperature operation with highly radioactive material--in flammable form--just aren't disclosed or adequately addressed in the EA. Whatever the minimal risks are with possible sodium
32 reactions in the fuel pale in comparison when one thinks of cutting up the fuel, heating it to nearly a thousand degrees, melting and dissolving it in a molten salt solution in a situation that requires complete inerting--no air can be permitted to get in--and running electric currents through the whole mixture.

Page 21 says that in the first stage of this project, the voltages would be set to optimize the collection of uranium. Again, this is reprocessing and unnecessary if the concern really is the
(17) sodium. But it also makes clear what we have said, that by carefully setting the voltage potentials (and using a different cathode of the sort used in the original design for the IFR), one can separate out transuranics and, for that matter, a pure plutonium stream. This new technology is therefore extremely dangerous, can make proliferation much worse.

The same page says the uranium would be stored "until DOE determines its ultimate disposition." It makes no sense to go through this complex and risky manipulation of the fuel and create products for which DOE has no plan for ultimate disposition.

On p. 23, the EA makes the fundamentally misleading assertion that the proposed action reduces the *volume* of high-level radioactive waste (because the uranium is taken out). But volume isn't what produces environmental effects, it is radioactivity. And at the hearing, the DOE
33 representatives upon questioning reluctantly conceded that this process in way reduces the radioactivity of the waste. We were told the process would reduce the *volume* of high level waste from about 4 cubic meters to about 2--but a couple of cubic meters makes no environmental difference at all. The same amount of radioactivity is in the waste as before. Furthermore, the total amount of volume, when one includes all the waste streams (not just the high level), is the same or larger in the proposed action than in the no action alternative. Indeed, one is taking metallic fuel, a very compact materials, putting it into a salt form, and then manipulating it further into other materials, and in the process further contaminating equipment. The total volume of waste will thus markedly increase compared to not starting the new process at all.

P. 23 also indicates the salt will be disposed of as low-level waste. This is illegal. All wastes from reprocessing are legally defined as high-level waste. Furthermore, there is no analysis of the environmental impact of separating out some waste from high-level waste, all of which would have to go to geologic repository, and sending some instead, as proposed in this EA,
34 to shallow-land-burial reserved for low-level waste. In other words, this process, as conceded in the EA, results in some of the radioactive waste that would normally have to be sent to deep geologic isolation being dumped instead in unlined shallow trenches set aside for low-level waste. The net result from this enterprise is greater environmental risk--radioactive waste that would otherwise have been geologically isolated as high level waste will have been redefined low-level and dumped in surface dumps. This is unanalyzed in the EA.

At p. 24, the EA is far too gentle about the National Research Council's findings. The Council was very concerned that the waste forms that result from this novel electrometallurgical
(23) process are unique and may not be appropriate for final disposition as waste. Essentially, this project converts waste from a form we know into forms we have no experience with and which may exacerbate environmental risks substantially. The suitability of these waste forms is clearly unknown, and therefore it is quite improper for the matter to be dismissed in an EA. An EIS, with consideration of the waste form issue in more than a paragraph or two, is essential.

(10) At p. 25 the EA lets slide that the Research Council's recommendations do not match at all the current Proposed Action. P. 26 makes clear that DOE really is artificially segmenting its action

(10) so as to evade NEPA's requirement to the contrary--it is postponing NEPA consideration until subsequent stages of its project, when NEPA requires consideration at the earliest possible stage.

35 At p. 28 it is disclosed that a second, higher efficiency electrorefiner will be installed. It obviously would become contaminated, increasing the amount of radioactive waste resulting from the enterprise. This is apparently not considered in the EA, which disingenuously claims that the amount of decommissioning waste from this project would not be larger than in the no action alternative.

(19) P. 29 says the uranium would eventually be reduced in enrichment from 65% to 20%. 20% is still above the normal threshold for weapons-usable. Even if what is meant is less than 20%--and the EA doesn't specify that--in the real world 19.9% is as much a risk as 20%. The EA talks about where the various new waste forms would be stored. But where will they be disposed of? And what are the acceptance criteria for such disposal? Will these forms meet those criteria? The fact that these questions cannot be answered indicates that the project may produce major environmental impacts not analyzed. What if the project produces new waste forms that are unacceptable for disposal--they will become orphan wastes, making disposal far more difficult because these forms will be unique.

36 Criticality issues are not analyzed in the EA. P. 36 talks about 10 kilogram of 65% enriched pure uranium collecting at each cathode. These are very large amounts of materials that, under certain circumstances, can go critical. And what are the controls to assure that no more than 10 kilograms collects? Or that assemblies of fuel in excess of critical limits never form?

(6) P. 39 talks a bout 38 pounds of fission products dissolved in the salt. But nowhere do we get curie figures, either total or by key isotope. One cannot analyze environmental risks without such data. At the hearing, we asked what the dose rate is from the fuel. We were told several hundred rads per hour at three feet, enough to produce a lethal dose in an hour. On our tour, however, Mr. Lindsay told us that the actual contact dose rate was an extraordinary million rad per (15) hour! The risks involved in handling these kinds of materials are immense and certainly inappropriate for an EA; they represent a major federal action with potentially significant impacts on the human environment.

(36) P. 42 refers to storage of large amounts of uranium. Criticality risks are again ignored, be they from unmoderated or moderated situation. π. 44 says that the "metal waste form *may be* (23) eligible for disposal in a geologic repository." (emphasis added) It makes no sense to be creating a new waste form that may not be eligible for disposal. One is worsening an already bad situation. There is no analysis of what to do if the metal waste form is not eligible for disposal.

(10) P. 45 is further evidence of the artificial segmentation of this Program. It is indicated that the ceramic waste won't meet current product consistency tests. It is proposed to "demonstrate" the appropriateness of the test for ceramic waste and that a different test "may" be used. Evaluation of the ceramic and metal waste forms "will be conducted as a separate research program"--separate from the matters addressed in this EA. It is all tied together, yet the NEPA review is all separate, or non-existent. By cutting the program up into tiny pieces, each of which assertedly does not rise to the level of an EIS, DOE is evading the purpose of NEPA, which would require an EIS on the overall program.

We note that there are a number of other fuels and nuclear materials for which DOE is considering electrometallurgical treatment. We also note that there are other separations and

transmutation technologies DOE has underway.[8] There is no discussion in the EA of these connected actions, their cumulative effects, or the overall program. There should be a programmatic EIS dealing with the overall program. And this EA should address the connected
(10) actions and their cumulative effects.

P. 57 finally discloses the true purpose of this project--to avoid losing jobs at ANL-West. It is put more indirectly in the EA: "risk of losing critical infrastruoture--experienced personnel...." This is not an appropriate purpose for a very dangerous project in terms of environmental impacts.

P. 73 estimates offsite dose to the maximally exposed individual (MEI) as someone who is
37 5 kilometers away. However, there is no exclusion zone of 5 kilometers--the physical exclusion zone from the facility is a few hundred feet. Dose would be orders of magnitude greater at the closer distance. Additionally, members of the public are frequently given tours, as we were: their doses would be even higher. This is not analyzed in the EA.

P. 79 begins the discussion of accidents. We here were handicapped by the late availability of the referenced FSAR and the receipt only yesterday of the other major source incorporated by reference in this section, "Accident Assessments for INEL Facilities." The latter we have not been able to review at all. A few comments on this section based on the review we have been able to conduct follow.

38 The accident analysis reduces the quantity of hazardous particles released to the environment by a factor of 10,000. This is quite inappropriate. In a real accident, such as a fire or earthquake, the integrity of the filters can be lost and direct release unfiltered into the environment must be presumed. The filters can catch on fire. Breaches in structures can occur, resulting in pathways which bypass the filters. Explosions can rupture them. Even if the filters initially perform their function, trapping 99.99% of the radioactive particles that approaches them, that very act can cause the filters to fail. They can become loaded and blocked and then blow out or otherwise fail completely. The loaded radioactivity is both radioactively and thermally hot: the loaded filters can thus melt or burn. An accident analysis must assume failure of the filters. This would increase consequence estimates by at least 10,000.

It is inconceivable that the earthquake analysis assumes such minor breaches of the argon cell and other features, and assumes proper function of the filters. A real earthquake-induced fire roulade produce consequences many, many orders of magnitude greater than that estimated.

39 The analyses once again presume the pubic is at the site boundary, far from the facility. This inappropriately reduces the dose by additional orders of magnitude. Furthermore, the FSAR doesn't even address beyond-design-basis accidents.

For the beyond-design-basis accident analyses, a completely inappropriate release fraction was used. It is orders of magnitude below what the technical literature reports for fires involving release of plutonium and similar materials. DOE has apparently taken a release fraction for small

---

[8] See, e.g., the National Research Council studies prepared for DOE on electrometallurgical processes, including the report on its uses for treatment of excess weapons plutonium and the large study, Nuclear Wastes: Technologies for Separations and Transmutation. See also, for example, DOE's Efficient Separations and Processing Integrated Program Technology Summary, and DOE's Amended Response to Interrogatories: Partitioning Projects and Transmutation Studies Being Conducted Within the United States Known to DOE, and DOE's Amended Index to Partitioning and Transmutation Projects/Studies for Document Production, produced by DOE in *Energy Resource Advocates v. Quitorano*. These documents, among many others also already in DOE's possession, detail dozens of separation and actinide recycling projects part of DOE's overall separation and transmutation program.

amounts of plutonium metal where there is no major external heat source or driving force when it should use the release fraction for a fire in which there are external heat sources and/or driving forces (e.g., fire involving gas fire.) For these, a release fraction of 50% or more is reasonable.

(39) The discussion of the potential effects of beyond-design-basis accidents is conclusory, merely reporting conclusions, without any way to check the calculations upon which they are supposedly based. The EA says the INEL EIS methodology was employed, but gives no citation to any page in that multi-thousand page document. But then the methodology is applied to the FCF situation proposed here, and no calculations are provided to see if it is done correctly; only results are reported. P. 87 concedes that the fire scenario presumes only a small breach of the argon cell--which unacceptably limits the event to a small fraction of what is reasonable. No consideration appears in the EA of fire by arson or of a sabotage event.

(36) At p. 89, the EA declines to consider a nuclear criticality event, saying its likelihood "has been judged to be less than 10^{-7} per year." No support for this conclusion is given whatsoever. Indeed, it is completely contradicted by the actual evidence. If that figure were correct, there would be one criticality event in 10 million years of operation at INEL. Yet, in just the few decades it has existed, there have been at least two such events. Nationally, there have been several dozen criticality accidents since the nuclear era begin in the forties--on average one every year or two. The failure to consider criticality accidents, particularly when dealing with large amounts of highly enriched material, in inexplicable.

40 p. 92 The cumulative impacts section fails to discuss the cumulative impacts of connected actions and the overall program.

(33) p. 95 repeats the claim that the volume of high-level waste would go down. As indicated before, the overall volume of all waste forms would go up, and the hazardousness would either remain the same (number of curies will be the same) or increase because it will be converted into waste forms that will be disposed of in less geologically isolated fashions.

41 p. 96-7 discusses RCRA. That section and the referenced document indicate evaluation is needed to determine the extent of reactivity of the sodium. In the absence of that evaluation, there is no basis for determining that there is a problem with the sodium-bonded fuel, or that the risks from the proposed action are not greater than whatever risks may exist with the reactivity of the sodium.

42 The figures given from p. 103 to 106 make no sense. It is claimed that the no action alternative, keeping the spent fuel in its current form, would produce 70 cubic meters of low level waste. If the spent fuel is kept in its current form, no low level waste is generated. The data suggest that an additional 50 cubic meters of transuranic waste is created from the proposed action compared to the no-action alternative. Given the fact that no facility exists at present to take transuranic waste, the creation of 50 cubic meters more is a worrisome environmental impact not analyzed.

(31) The nonproliferation discussion at p. 110-113 is grossly inadequate, in large part for the reasons discussed earlier regarding the definition of reprocessing. There is no discussion of Sensitive Nuclear Technology (SNT) matters or risks associated with transferring any part of this technology. The impacts on the international community of the U.S. breaking a two-decade long prohibition on reprocessing fuels from the non-military sector is nowhere considered. The cumulative impact of this reprocessing along with the proposed restart of military reprocessing at Savannah River is not analyzed. We have tried to get everyone to stop reprocessing because of the proliferation risks. If we start up, including using an exotic new technology that will make it easier, the impacts will be significant.

The technique is said on p. 112 to be incapable of yielding a pure separted plutonium stream. First of all, that is irrelevant; one can make nuclear weapons with a mix of transuranics as proposed to be extracted using this technique during the IFR program. Secondly, by adjusting the voltage potentials, one can indeed extract a pure plutonium stream. These issues are not addressed at all--just an unsupported assertion is found.

The byproducts of electrometallurgical processing can be weapons-usable. The uranium separated will be weapons-grade--so dangerous, in fact, DOE proposes to subsequently blend it down. Additionally, as indicated before, the purpose of the technology originally and its capability today is to extract transuranics such as plutonium, which can also be used in weapons.

(31) The fundamental point not addressed in this section is that the knowledge of this technology itself has impacts. Just as the secrets of the PUREX process published at the Geneva conferences in the fifties gave other nations much of the information necessary to use that technique to acquire weapons-usable materials, the demonstration of this new, more advanced reprocessing technology will have immense impacts. Particularly because PUREX is so complex, expensive, capital intensive, and difficult to conceal, the new electrometallurgical reprocessing technology will reduce the barriers to acquisition of weapons and thus severely impact the human environment. If the information is so dangerous and sensitive that DOE must prohibit publication of some of it, then it clearly represents a proliferation hazard, which the EA fails to address.

The small "footprint" of the electrometallurgical facility cited at p. 113 is precisely one of its major problems--it will be easy to conceal such a facility if the technology is spread.

(10) P. 126 claims to discuss the relationship to other NEPA documents. First of fall, it fails to discuss numerous NEPA documents that are related, for example the EA for TRUMP-S, a similar electrometallurgical reprocessing technology. Secondly, by mentioning them, it fail to discuss the true relationship or analyze any cumulative impacts of these connected actions. Additionally, by segmenting its review of these connected actions, DOE has flown in the face of NEPA.

43 P. 131 indicates that no outside agencies or individuals were consulted during the preparation of this EA. This is remarkable. Given the potential significant proliferation implications, the Arms Control and Disarmament Agency and the nonproliferation offices of the State Department, Defense Department, NRC, and National Security Council should have been consulted. Given the significant environmental impacts possible, EPA should have been consulted.

Sincerely,

Daniel Hirsch
President

enclosure: ltr to Lash

Responses to Document D092

1-5 The references cited in the environmental assessment have been placed in the Department of Energy public reading rooms. Additional information on this issue is provided in Chapter One of this Appendix.

6 In order to avoid confusion, the reference, "Spent Nuclear Fuel Program Prioritization," has been eliminated from the environmental assessment. The information in that document played no part in the proposed demonstration, which is specific to Experimental Breeder Reactor-II spent nuclear fuel. Further, the specific reference was only to a memorandum transferring draft information for use in the "Spent Nuclear Fuel Program Prioritization" report that has not yet been issued.

In response to the comment requesting information on the amount of curies associated with the materials involved in the proposed demonstration, additional material has been provided in Sections 2.2 and 4.5 of the environmental assessment. The curie content decreases over time. Activity of a typical driver spent nuclear fuel assembly 15 months after discharge from Experimental Breeder Reactor-II is on the order of 30,900 curies (~7500 curies/kilogram heavy metal) and a typical blanket spent nuclear fuel assembly 500 days after discharge is on the order of 3410 curies (~73 curies/kilogram heavy metal). The curies from this material are subdivided into the various products and waste streams. Curies of individual radioactive isotopes, along with their energy, are the basis for calculation of emissions and environmental impacts (Section 4).

7 This environmental assessment was reviewed and approved by all interested offices within the Department of Energy, including the Office of Nonproliferation and National Security, prior to its release to the public. More detailed information concerning the aspects of nonproliferation is provided in Chapter One of this Appendix.

8 The National Environmental Policy Act regulations require evaluation of reasonable alternatives to the proposed action. Alternatives are evaluated in Section 2.0 of the environmental assessment. The environmental assessment analyzed three alternatives in detail and considered several other process alternatives which were eliminated from

detailed evaluation. In general, the excluded alternatives had not reached a level of development that would allow a detailed evaluation. Evaluation of alternative processes that were identified in the public comment period have been added to the environmental assessment, Section 2.1. The potential environmental impacts that would result from implementing a conceptual treatment process cannot be analyzed in equal detail relative to the impacts that can be quantified for a process that has reached an adequate level of technical maturity.

9 The Department of Energy notes the commentor's opinion regarding the proposed demonstration project. This proposed action would treat a limited amount (13% of the driver assemblies and 5% of the blanket assemblies) of the Experimental Breeder Reactor-II spent nuclear fuel in order to produce data related to the technical feasibility of the electrorefining process for conditioning the remaining Experimental Breeder Reactor-II spent nuclear fuel or other spent nuclear fuel. The demonstration of this technology is necessary to address questions raised by the National Research Council and should occur before any proposal is made for its broader application. The existing and high-throughput electrorefiners would be adequate to provide these data. Their support equipment is not adequate for full-scale Department of Energy or commercial production application. Also, in the Fuel Conditioning Facility, there are several steps in the process primarily associated with material handling systems that would limit the total output of the facility.

10 Prior to 1994 when the program was canceled, all of the technology development for modern electrometallurgical treatment of Experimental Breeder Reactor-II spent nuclear fuel was conducted within the framework of the Integral Fast Reactor program. The Integral Fast Reactor program began in 1984. The Advanced Liquid Metal Reactor program was a Department of Energy-sponsored program in which private industry worked on conceptual plant designs for commercial application of Integral Fast Reactor technology. There was no development of electrometallurgical technology or equipment in this program. The Actinide Recycle Program was a research program for investigation the feasibility of processing commercial light water reactor spent nuclear fuel for the purpose of reducing the volume and toxicity of high-level waste and recycling the actinides, including the plutonium and uranium, in liquid metal reactors. The Actinide Recycle program emphasized research on technology to reduce oxide fuel to metallic

form so that electrometallurgical technology could be applied. There has been no research or development of electrometallurgical technology for a partitioning program or a separation and transmutation program.

The Department of Energy does not agree with the commentor's statement that it has artificially segmented its National Environmental Policy Act review of the demonstration project. The environmental assessment process is an appropriate means to determine if an environmental impact statement is needed. The proposed action includes only research on electrometallurgical technology, development of operating data for test equipment, and a limited application demonstration specifically for treatment of Experimental Breeder Reactor-II spent nuclear fuel for disposal. As summarized in the National Research Council's report on this technology, without this demonstration and the data to be gained from it, there can be no meaningful analysis of the technology's use or application. If the demonstration project were successful, the Department of Energy would review the data and decide whether to propose future applications of the technology. That decision will be made in accordance with all applicable laws and regulations, and will include appropriate National Environmental Policy Act analysis. For additional information on the appropriate level of National Environmental Policy Act review, see Chapter One of this Appendix.

11,12 The commentor suggests that the proposed demonstration project is contrary to the current policy of the United States regarding nonproliferation. A detailed discussion of this issue of nonproliferation is found in Chapter One of this Appendix.

Section 1 of the environmental assessment, *Purpose and Need*, presents the rationale for pursuing the demonstration project. Based in part upon the urging of the Secretary of Energy, the Integral Fast Reactor Program was terminated in 1994 after extensive debate in both houses of Congress. The issues raised during debate were varied, complex, and did not focus solely on the issue of proliferation. Congress has been clear, however, that it intends the Department of Energy to continue development of electrometallurgical technology. In the Conference Report for the Fiscal Year 1995 Energy and Water Appropriation, the Department of Energy was instructed "to maximize the research on actinide recycle, and, as proposed by the Administration, should also retain such facilities

as necessary, especially the pyroprocessing facilities." The following year, in the Conference Report for the Fiscal Year 1996 Energy and Water Appropriation, Congress gave the Department of Energy the following instruction: "As recommended by the National Academy of Sciences' assessment of the electrometallurgical approach for treating spent nuclear fuel, the conferees expect the Department of Energy to develop a plan to support the EBRFF09II demonstration using this technology. If this is successful, the Department of Energy should review the program for application to other types of spent nuclear fuel and waste management issues." The proposed demonstration project analyzed in the environmental assessment would carry out that congressional intent.

The commentor is correct that the electrometallurgical treatment equipment to be demonstrated under the proposed demonstration evolved from the now terminated Integral Fast Reactor Program.

From 1964 to 1969, the building currently named the "Fuel Conditioning Facility" was called the "Fuel Cycle Facility" because the mission at that time was to demonstrate the refining and refabrication of Experimental Breeder Reactor-II spent nuclear fuel by an incomplete pyrometallurgical process. During the next 20 years, the building was known as the "Hot Fuel Examination Facility/South" to reflect the revised mission of the facility. When the facility was modified to recycle and refabricate Experimental Breeder Reactor-II spent nuclear fuel for the Integral Fast Reactor Program, the building's name was changed back to the "Fuel Cycle Facility." With termination of the Integral Fast Reactor Program and removal of the refabrication equipment, the name was changed to the "Fuel Conditioning Facility" to reflect the present-day research, which has resulted in the proposed action.

This demonstration would produce data related to the technical feasibility of the electrorefining process for conditioning Experimental Breeder Reactor-II spent nuclear fuel for safe long-term storage or disposal. Unlike reprocessing plants, this project does not separate plutonium. The proposed demonstration project does not include any equipment or any processes that could separate transuranic elements at any level of purity for weapons production. It will not and cannot separate plutonium. All plutonium is directed to the ceramic waste form without separation from fission products.

Regardless of the origins of the process, the proposed demonstration addresses a specific application for spent nuclear fuel management. It is not a part of any effort to recycle spent nuclear fuel into fuel for breeder reactors. The equipment necessary for recycle has been removed from the Fuel Conditioning Facility and is not a part of this demonstration.

13 The National Environmental Policy Act regulations require evaluation of reasonable alternatives to the proposed action. Alternatives are evaluated in Section 2.0 of the environmental assessment. The environmental assessment analyzed three alternatives in detail and considered several other process alternatives which were eliminated from detailed evaluation. In general, the excluded alternatives had not reached a level of development that would allow a detailed evaluation. Evaluation of alternative processes that were identified in the public comment period have been added to the environmental assessment, Section 2.1. The potential environmental impacts that would result from implementing a conceptual treatment process cannot be analyzed in equal detail relative to the impacts that can be quantified for a process that has reached an adequate level of technical maturity.

14 The commentor's opinion that the environmental assessment fails to identify and adequately address environmental impacts is noted. The Council on Environmental Quality's National Environmental Policy Act regulations (49 CFR Parts 1500-1508) require that an environmental assessment describe the affected environment and the environmental consequences associated with the proposed action and alternatives. The environmental assessment meets these requirements. Chapters 4 and 5 describe the environmental consequences of the proposed action and alternatives.

The release fractions used in the accident analysis are correct and are consistent with normal practice throughout the Department of Energy complex. Subsequent to more of the accident analysis in the environmental assessment, the Department published recommended release fraction guidelines in DOE-3010-94, "Airborne Release Fraction/Rates and Respirable Fractions for Non-Reactor Nuclear Facilities." The accident analysis in the environmental assessment are consistent with these guidelines.

15 The environmental assessment has been prepared to determine whether the proposed demonstration is a major Federal action significantly affecting the quality of the human environment, and as a result, whether an environmental impact statement should be prepared. See Chapter 1 of this Appendix for a more detailed response to concerns raised regarding reprocessing and nonproliferation.

16 The definition of reprocessing is the same as that used in the *Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Environmental Impact Statement* (DOE/EIS-0203-F), April 1995.

17 The Department of Energy acknowledges the commentor's statements on the definition and application of reprocessing to the demonstration. Since the proposed demonstration involves a technology which may be useful in the management and disposal of spent nuclear fuel, the definition of "reprocessing" was taken from the *Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Environmental Impact Statement* (DOE/EIS-0203-F), April 1995, as stated in Section 4.7 of the environmental assessment.

The particular provision of Appendix D at issue originated in 1990, when the Department of Energy issued a Notice of Proposed Rulemaking (55 Federal Register 46444, November 2, 1990) that eventually was promulgated in 1992 as 10 CFR Part 1021. Among the new classes of actions proposed as "normally requiring EISs" was the "siting, construction, operation, and decommissioning of reprocessing facilities." The preamble to the proposed rule described this provision's intended scope as one of several new classes of activity "related to the siting, construction and operation of *major nuclear facilities*" (emphasis added). It is apparent from this preamble language that the Department regarded the important factor in establishing the need for an environmental impact statement as the scale of the proposed activity and its potential for significant impacts, not the designation of an activity as "reprocessing." For further response regarding concerns about "reprocessing," see Chapter One of this Appendix.

18,19 The basic electrometallurgical technology of the proposed action is not new, as noted in the comment. Electrometallurgical methods have been in use in the metals industry to purify various metals for decades. Nations with interest in weapons development could, therefore, apply the technology regardless of the proposed action. However, because of the availability of processes which produce much more attractive weapons fabrication materials, it is unlikely that developing nations would consider electrometallurgical treatment technology an attractive process for a weapons program. The process does not enrich uranium; it can only recover what exists in the spent nuclear fuel. There are more attractive technologies with more attractive end products for weapons use. Weapons grade uranium is 93% enriched and while lower enrichment could potentially be used in a weapons program, the difficulties would increase significantly.

Objectives of the proposed action include demonstration of the economic feasibility of the process and characterization of the waste products for potential future acceptance for repository disposal. Additional information on the nonproliferation aspects of the electrometallurgical process is provided in Chapter One of this Appendix.

20,30 The commentor's opinion that this technology is capable of separating out both weapons-usable uranium and weapons-usable plutonium is noted. In response to the comment, statements were added to the environmental assessment to clarify that the proposed demonstration project does not include any equipment or any processes that could separate plutonium or other transuranic elements at any level of purity. All plutonium is directed to the ceramic waste form without separation from fission products. Therefore, the plutonium could not possibly be used in a nuclear explosive. Uranium would be separated at the enrichment level of the spent fuel, which is 30% below weapons-grade. All uranium would be blended to a low-enriched level, rendering it unusable for any type of nuclear explosive.

The basic electrometallurgical technology of the proposed action is not new, as noted in response to comments 18 and 19 above.

Additional information relative to the possibility of misusing the electrometallurgical technique to produce relatively pure plutonium is found in Chapter One of this Appendix.

21 Under the terms of the settlement agreement and consent order, the Department of Energy is legally obligated to remove spent nuclear fuel (including Experimental Breeder Reactor-II spent nuclear fuel) from the State of Idaho by the year 2035. Electrometallurgical treatment is a promising technology for treating Experimental Breeder Reactor-II spent driver fuel and blanket assemblies in order to make them eligible for disposal in a geologic repository. Following a successful demonstration, application of the technology could assist the Department of Energy in meeting this obligation. The demonstration of this technology is timely: the research of the technology is sufficiently mature, making the demonstration the next logical step; the facilities, equipment, and infrastructure are available and Congress has appropriated the necessary funds.

22 Current processes other than the proposed action for removal of sodium from the spent nuclear fuel would be incomplete or create other technical problems. For example, two processes proposed for the removal of sodium are treating with hot, water-saturated carbon dioxide and a distillation technique.

The proposed process of treating the spent nuclear fuel with hot, water-saturated carbon dioxide would have the following technical problems and would require extensive development before implementation. Because of the high radiation level of the spent nuclear fuel, any processing would have to be carried out in a shielded, inert atmosphere cell, not in a simple reaction chamber as described in the comment. Based on extensive experience with reacting sodium to form sodium carbonate, these reactions would have to be controlled very closely. History has shown that the potential for accidents involving reacting sodium is very high. Exposure of the hot uranium fuel to oxygen and water vapor is similar to metal fire accident conditions described in the environmental assessment (Section 4.2). Also, the use of water for treatment of highly-enriched spent nuclear fuel would require stringent criticality hazards control measures because aqueous processes have lower fissile material limits than metallic processes. The products from the proposed process may include pyrophoric uranium hydride in addition to the compounds cited in the comment. Additional process steps would, therefore, be required to stabilize the pyrophoric nature of the product.

The distillation technique would be an incomplete process. The cesium and the sodium would need to be stabilized into a waste form. In any event, such a technique would only be applicable to blanket assemblies since the metallic sodium has not been infused into the blanket assemblies as it has in the drivers. As explained in the environmental assessment in Section 2.1, sodium is inseparable from the irradiated driver spent nuclear fuel unless the fuel is melted or dissolved. The fuel-encapsulated sodium would not be removed by a vacuum distillation process operated at the suggested temperature, so the remaining spent nuclear fuel would remain reactive. If the spent nuclear fuel were melted at 1300-1400°C, many different radioactive elements would be volatilized. A system has not been developed to efficiently capture and collect these volatile elements or to immobilize them in one or more waste forms.

The National Environmental Policy Act regulations require evaluation of reasonable alternatives to the proposed action. Alternatives are evaluated in Section 2.0 of the environmental assessment. The environmental assessment analyzed three alternatives in detail and considered several other process alternatives which were eliminated from detailed evaluation. In general, the excluded alternatives had not reached a level of development that would allow a detailed evaluation. Evaluation of alternative processes that were identified in the public comment period have been added to the environmental assessment, Section 2.1. The potential environmental impacts that would result from implementing a conceptual treatment process cannot be analyzed in equal detail relative to the impacts that can be quantified for a process that has reached an adequate level of technical maturity.

23 The proposed research and demonstration project would produce the typical waste and by-product streams of the electrometallurgical technique in order to quantify these streams, to characterize them, and to answer the very questions posed by the commentor, the National Research Council, other peer review committees, and involved scientists and engineers. As noted by the commentor, the criteria for repository acceptance have not been determined and may change. However, the proposed action would characterize the waste so that these characteristics can be compared to the criteria that are eventually accepted. This process, however, has the benefit of removing the reactive sodium component from the radioactive constituents. See also the response to Comment # 24.

24 The Department of Energy asked the National Research Council to review electrometallurgical technology as it might apply to management of Department of Energy spent nuclear fuel. The National Research Council report was issued in June, 1995. The National Research Council committee is continuing to advise Department of Energy on the development of this technology. More recently, in April, 1996, the National Research Council committee reported to DOE after consideration of whether electrometallurgical technology should be included as a viable option for application to the disposition of surplus plutonium. The conclusion of that report is that electrometallurgical technology cannot be considered a viable plutonium disposition option until the demonstration with Experimental Breeder Reactor-II spent nuclear fuel is completed. The Integral Fast Reactor recycle technology has been considered as an element of other National Research Council reviews for other purposes. These reviews have not favored application of electrometallurgical technology for potential solution of global-scale problems because of the relatively immature state of the technology's development and proof of concept. Additional peer review committees (consisting of National Academy of Science and National Academy of Engineering members, a Nobel laureate, and other respected scientists and engineers) are administered by the University of Chicago to conduct much more thorough and detailed reviews of electrometallurgical research and development, including facility operations, safeguards, security, and nonproliferation aspects of the technology, annual progress, safety, and economics. Overall, these reviews of the technology development for spent nuclear fuel treatment have been very encouraging. The Department of Energy considered the University of Chicago peer review committee reports, as well as the National Research Council committee reports, in its evaluation of its electrometallurgical technology program.

25,26 The environmental assessment analyzed three alternatives in detail and considered several other process alternatives which were eliminated from detailed evaluation. In general, the excluded alternatives had not reached a level of development that would allow a detailed evaluation. Evaluation of alternative processes that were identified in the public comment period have been added to the environmental assessment, Section 2.1. The potential environmental impacts that would result from implementing a conceptual treatment process cannot be analyzed in equal detail relative to the impacts that can be quantified for a process that has reached an adequate level of technical maturity.

The proposed action to demonstrate this technology does not affect the continuation of other research and development technologies for spent nuclear fuel management which may be conducted at other laboratories within the Department of Energy complex.

As explained in Section 2.1 of the environmental assessment, mechanical processing would not remove the sodium from inside the Experimental Breeder Reactor-II driver fuel, because it would not melt or dissolve the fuel to release the sodium. The Department of Energy's experience with mechanical processing of Experimental Breeder Reactor-II blankets has not been favorable. The demonstration of remote operation of a decladding device was successful. However, the process resulted in substantial radioactive contamination of the facility, which would not necessarily occur with a process which reacted the sodium and cesium to stabilize them. Further, the depleted uranium fuel rods removed from the blanket assemblies still require further disposition. One canister of these rods is planned to be processed at Savannah River. Because of these inherent problems and the lack of applicability to driver fuel, the Department of Energy does not consider mechanical processing to be a reasonable alternative.

As explained in Section 4.4.2 of the environmental assessment, the Department of Energy national spent nuclear fuel program group is considering the potential implications of 40 CFR 261.23 constituent materials in Department of Energy spent nuclear fuel. This group is considering sodium-bonded fuel independent of the electrometallurgical treatment activities at Argonne National Laboratory-West. The group has also considered potential impacts from reactive fission products such as cesium. This is a continuing activity to support the potential direct disposal of appropriate categories of Department of Energy spent nuclear fuel.

27 From 1964 to 1969, the building currently named the "Fuel Conditioning Facility" was called the "Fuel Cycle Facility" because the mission at that time was to demonstrate the refining and refabrication of Experimental Breeder Reactor-II spent nuclear fuel by an incomplete pyrometallurgical process. During the next 20 years, the building was known as the "Hot Fuel Examination Facility/South" to reflect the revised mission of the facility. When the facility was modified to recycle and refabricate Experimental Breeder Reactor-II spent nuclear fuel for the Integral Fast Reactor Program, the building's name was

changed back to the "Fuel Cycle Facility." With termination of the Integral Fast Reactor Program and removal of the refabrication equipment, the name was changed to the "Fuel Conditioning Facility" to reflect the present-day research which has resulted in the proposed action.

A breeding experiment was conducted at the Experimental Breeder Reactor-II in the 1960s, but it would have been impractical to operate the reactor as a true breeder reactor because of its small size. Breeding experiments were completed in the late sixties, and the Experimental Breeder Reactor-II was converted to an irradiation and testing facility. As part of this conversion, the inner blanket surrounding the core was replaced with a stainless-steel reflector. The Experimental Breeder Reactor-II consumed far more fissile material than it produced.

28 The commentor also suggests that electrometallurgical technology could be used with the goal of simply disposing the uranium along with the fission products and plutonium in the ceramic waste stream. The suggested approach would significantly increase the cost of processing and the volume of waste generated. Considerably more salt and cadmium would be required because the suggested approach would involve chemical oxidation rather than electrotransport of the uranium. Leaving the uranium in the waste stream to be adsorbed in the zeolite, with subsequent conversion to the ceramic waste form, would increase the waste volume by at least a factor of 25. However, the uranium would have to be blended down to a low enrichment to control nuclear criticality. If the uranium were blended down to less than 1% enrichment for disposal, the increase in waste volume would be on the order of 1000. By removing the uranium, the storage volume for both uranium and high-level waste can be kept low.

Because of the reactive nature of the sodium, it is unlikely that Experimental Breeder Reactor-II spent nuclear fuel would be eligible for placement in a geologic repository without some form of treatment to remove the sodium. In addition, the environmental assessment Section 5.0 discusses potential failure of the spent nuclear fuel during storage. Failures of the cladding by stress corrosion cracking have occurred during water storage. The potential for similar failure during dry storage has not been determined but could occur if water comes in contact with the spent nuclear fuel.

29 As stated in Section 6.0 of the environmental assessment, the Department of Energy National Spent Nuclear Fuel Program has been conducting a study of spent nuclear fuel management options. The electrometallurgical technology and other management technologies, including dry storage technologies, were reviewed in Volume 2 of the *Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Environmental Impact Statement* (DOE/EIS-0203-F). As proposals are made to demonstrate or implement these technologies, appropriate National Environmental Policy Act documents will be prepared. The alternative of dry storage for the Experimental Breeder Reactor-II spent nuclear fuel is analyzed under the no action alternative. Other technologies were reviewed in the environmental assessment as alternatives to the proposed project, but were not and could not be subject to detailed analysis because of their relatively immature state of development. In addition, some would be screened out because they would not be reasonable alternatives.

31 The Department of Energy acknowledges the commentor's concerns regarding sensitive nuclear technology. During the Integral Fast Reactor Program, the Department of Energy conducted appropriate reviews of related technologies for recycling spent nuclear fuel in fast reactors before entering into a technology exchange agreement with Japan. Any nuclear technology which is a candidate for export is subject to sensitive nuclear technology review in accordance with 10 CFR Part 810. The Department of Energy has been designated to implement this regulation by an interagency task force representing the Department of State, the Arms Control and Disarmament Agency, the Nuclear Regulatory Commission, and the Department of Energy. The Department of Energy has established an Export Control Working Group to make sensitive nuclear technology determinations according to specific guidelines. Any future consideration of exporting electrometallurgical spent nuclear fuel treatment technology would be reviewed according to the Department of Energy's export control procedure. Also see Responses 18 and 19 above.

32 There are hazards associated with spent nuclear fuel management, including any treatment option. Concern over potential fires involving the spent nuclear fuel materials is one reason that all electrometallurgical process operations would be carried out in an

inert (fire suppressant) atmosphere, and any potentially pyrophoric materials not in use would be stored in fire-safe containers. In addition, chloride salts are used as a fire extinguisher agent for metal fires. Therefore, all of the fuel material dissolved in the electrorefiner is inherently protected from combustion. The risk of metal fire is analyzed in Section 4.2 of the environmental assessment. The risks and impact of operating the electrorefining equipment as proposed in the demonstration project are analyzed in the environmental assessment in Section 4.1. The environmental assessment also analyzes the risk and consequences of credible accidents in Section 4.2.

33 The proposed research and demonstration project would produce the typical waste and by-product streams of the electrometallurgical technique in order to quantify these streams, to characterize them, and to answer the very questions posed by the commentor, the National Research Council, other peer review committees, and involved scientists and engineers.

It is correct that the process does not reduce the total radioactivity (a physical impossibility). Separation of uranium from the waste stream would reduce the volume of the high-level waste by concentration of the radioactive isotopes and stabilizing this material for long-term storage/disposal. This is beneficial because the isotopes of particular concern can be more economically and safely managed due to lower volume and more inert nature of the waste form itself. See Response # 28 above.

34 The environmental assessment has been revised to correct the incomplete and inconsistent statement in Section 2.2. The statement refers to the disposition of the salt when the electrorefiner would be ultimately decommissioned. In Section 4.5, the decommissioning salt waste, expected to contain few fission products, is listed as transuranic waste, which is the expected characterization of this waste stream based on analytical samples that would be taken at the time of decommissioning. During the demonstration, some of the salt would be occluded in the zeolite, and not recycled to the electrorefiner. This salt would become a part of the high-level waste stream and is included in the high-level waste discussed in Section 4.5.

35 Under the no action alternative, the second electrorefiner would not be installed in the Fuel Conditioning Facility and would not be part of the decommissioning waste. The appropriate revision to the environmental assessment (Table 4.6) has been made.

36 Criticality controls are an integral part of the operational basis for Fuel Conditioning Facility operation. The Fuel Conditioning Facility safety analysis report referenced by the environmental assessment discusses criticality controls and concludes that a criticality accident is beyond the design basis for the facility, i.e., a nuclear criticality accident would not be a credible event. Also, the exhaustive Department of Energy readiness review process carefully and independently reviewed the Fuel Conditioning Facility criticality safety analysis and controls and concurred that the facility meets the applicable criticality control requirements. Criticality potential in nonaqueous processes such as proposed in the environmental assessment are fundamentally different (aqueous processes have lower fissile material limits than metallic processes) than in the aqueous processes, which have resulted in some accidental criticality events.

37 The access road and parking lot are open only to those members of the public on official business, including tours. Therefore, these locations are not places of general public access. Although there are no fences along the main highway, there are signs indicating that the area is restricted access only. The maximum exposed individual was appropriately analyzed at the nearest uncontrolled location, which is near the intersection of the public highway with the access road to Argonne National Laboratory-West.

38 The accident analysis in the environmental assessment and the referenced Fuel Conditioning Facility Final Safety Analysis Report is conservative in all aspects, including the mitigation by filtration. By design and analysis, the filters for which any mitigation credit is taken, would survive intact through any credible earthquake. The exhaust path for the process cell would be through the safety exhaust system. This system includes two sets of high-efficiency particulate air filters that are tested to assure that the quantity of potentially hazardous particles passing through them is reduced by a factor of 1×10^{-6}. Flow through this system would be sufficient to keep the process cell interior at a lower pressure than the environment under all design basis conditions (including the design basis earthquake) and assure that all exhaust passes through the

safety exhaust system. Analysis also shows that the possible metal fires which could occur under severe accident situations do not produce sufficient particulate material to cause failure of the filters by excessive loading or by combustion. However, in spite of the fact that the filters will remain effective, as tested, only a reduction factor of 1×10^{-4} was assumed. In addition, the environmental assessment included analysis of two beyond design basis accidents for which no filtration credit was taken. The environmental impact of these events were also small.

39 A detailed dynamic analysis of the Fuel Conditioning Facility was conducted and reported in the Fuel Conditioning Facility Final Safety Analysis Report. This analysis received detailed peer and independent review. The analysis supports the conclusion that the design basis earthquake results in very minor (if any) breach in the process cell (argon cell) containment. This is primarily due to the five-foot-thick shielding walls. The filters for which any mitigation credit is assumed were specifically designed to assure continued functionality following a design basis earthquake. Methodology used for the calculations in the environmental assessment followed the *Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Environmental Impact Statement* as specified in the Department of Energy's *Accident Assessments for Idaho National Engineering Laboratory Facilities* (DOE/ID-10471, March 1995). The environmental assessment Section 4.2.1.1 addresses beyond design basis accidents including the hypothetical crash of a commercial airline into Fuel Conditioning Facility. The effect of the airplane fuel was considered in calculation of the consequences of that event. The environmental impact, however, would be small. This event is comparable to an arson or sabotage event as proposed by the commentor.

40 The proposed action includes only research on a new application of an established technology, development of operating data for test equipment, and a limited application demonstration. It is not part of a broader program or connected to other research and development activities which would require analysis in this environmental assessment. As indicated in Section 4.3 of the environmental assessment, the cumulative impacts of other activities at Argonne National Laboratory and the Idaho National Engineering

Laboratory were accounted for. Chapter One of this Appendix contains more information relevant to this subject.

41 The reactivity of sodium is well known. Sodium is listed as a reactive metal under 40 CFR Part 261.23. This clarification was added to the environmental assessment in Section 4.4.2.

42 In the no action alternative, as discussed in Section 2.6 of the environmental assessment, the Fuel Conditioning Facility will remain operational as a multipurpose hot cell as directed in support of the Department of Energy's programs other than the proposed action. The total quantity of operational wastes produced in the facility is independent of the type of material treated. A footnote has been added to Table 4-6 of the environmental assessment to clarify this point.

The transuranic wastes produced as part of the demonstration would be treated under currently existing practices at Argonne National Laboratory. As noted in Section 4.5 of the environmental assessment, the quantity produced would be 0.09% of the current inventory at the Idaho National Engineering Laboratory. This waste would be subject to interim storage at the Radioactive Waste Management Complex before final disposal at the Waste Isolation Pilot Plant.

43 "Outside agencies" is a reference to Federal or state agencies other than the Department of Energy and its contractors. Several different organizations within the Department contributed to production and review of the environmental assessment.

In addition, the draft environmental assessment was distributed to interested members of the public, the State of Idaho and affected Native American Tribes. All comments received during the public comment period will be considered in the decisions made as a result of the National Environmental Policy Act process. As stated in Chapter One of this Appendix, this action is consistent with the national nonproliferation policy and, therefore, agencies such as those mentioned in the comment were not consulted.

NUCLEAR CONTROL
INSTITUTE

1000 CONNECTICUT AVE. NW, SUITE 804 WASHINGTON DC 20036 202-822-8444 FAX 202-452-0892
e-mail nci@access.digex.net Web http://www.nci.org/nci.htm

April 5, 1996

Mr. Greg Bass
EA Document Manager
U.S. Department of Energy
P.O. Box 2528
Idaho Falls, Idaho 83403

Dear Mr. Bass:

I am writing to provide the comments of the Nuclear Control Institute on the *Draft Environmental Assessment for the Electrometallurgical Treatment Research and Demonstration Project in the Fuel Conditioning Facility at Argonne National Laboratory-West* ("draft EA"). Pursuant to the March 22 letter to me from Department of Energy ("DOE") General Counsel Robert Nordhaus, I understand these comments will be treated "as submitted in a timely manner" and "given the same consideration as those submitted during the published comment period of February 5 to March 22."[1]

Chronology and Summary

DOE had planned to begin "pyroprocessing"[2] spent fuel from the Experimental Breeder Reactor II ("EBR-II") in the electrorefiner at Argonne National Laboratory-West ("Argonne-West") in the latter half of 1995, without any additional analysis under the National Environmental Policy Act ("NEPA"). DOE's claim that it was in compliance with NEPA rested primarily on a 1990 Environmental Assessment and Finding of No Significant Impact ("FONSI") and secondarily on a very limited discussion in a 1995 Programmatic Environmental Impact Statement ("PEIS").[3]

---

[1] Mr. Nordhaus' letter was in response to a formal request I and others made at the public meetings for an extension of the published comment period because of DOE's failure to provide to public reading rooms the reference documents cited in the draft EA.

[2] The term "pyroprocessing" is often used interchangeably with the terms "electrometallurgical treatment" and "electrorefining."

[3] DOE, Environmental Assessment: Hot Fuel Examination Facility South, 1990 (DOE/EA-0377); DOE, Finding of No Significant Impact for Hot Fuel Examination Facility/South, May 1990; Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement, April 1995 (DOE/EIS-0203-F).

Strategies for stopping the spread and reversing the growth of nuclear arms

Paul L. Leventhal, President; Peter A. Bradford, David Cohen, Irwin A. Hoven, Julian Kevorkian, Sharon Tanzer, Roger Richter, Dr. Theodore B. Taylor
BOARD OF DIRECTORS

On August 25, 1995, the Nuclear Control Institute and six other public-interest organizations wrote a letter to Secretary O'Leary stating that the existing NEPA analysis was not sufficient and that DOE, in fact, was required to prepare a separate EIS before it could begin operation of the electrorefiner. DOE responded with a December 12 letter acknowledging that "additional environmental analysis of the potential impacts associated with the proposed operation of the electrorefiner is required." However, the letter asserted that an EA, rather than the more rigorous EIS, would be sufficient because, as outlined in the letter, DOE had scaled back its plan for operation of the electrorefiner, at least initially, to a "limited demonstration" or "feasibility demonstration." In a December 22 response, Nuclear Control Institute and two other public-interest organizations that had signed the August 25 letter said, "Contrary to the statement in your [December 12] letter, our view [that an EIS is required] is not based on the amount of material to be pyroprocessed and, therefore, is not altered by the reduced throughput envisioned under the revised DOE plan" (emphasis in original). The letter cited five arguments in support of that assertion.

On January 29, 1996 DOE issued the draft EA which is the subject of these comments. The draft EA fails to address the concerns that prompted the August 25 letter and the subsequent correspondence and meetings with DOE officials. Among the key defects of the EA are the following:

1 • Since DOE's NEPA regulations require an EIS for reprocessing facilities, the draft EA attempts to define "reprocessing" very narrowly so that the electrorefining campaign does not fall within that definition. But the two reports on pyroprocessing by a special panel of the National Academy of Sciences -- as well as the origins of the electrorefiner as the reprocessing component of the Advanced Liquid Metal Reactor -- make clear that the Proposed Action involves reprocessing. DOE, therefore, is under obligation to prepare an EIS.

2 • A closely related point is that pyroprocessing carries proliferation risks that are not adequately examined in the draft EA. A recent study by the National Academy of Sciences noted that the technology "could be used by another country to obtain plutonium for a weapons program." This problem is exacerbated by DOE's failure to require appropriately strict controls on the export of pyroprocessing technology. Furthermore, development of a reprocessing technology will undermine the Clinton administration's efforts to dissuade other countries from pursuing reprocessing.

3 • Pyroprocessing would produce uncharacterized waste forms that are not likely to be suitable for emplacement in a repository -- a fundamental concern that the draft EA does not address. It also fails to discuss the disposition options for, and thus the environmental impacts of, the separated uranium stream.

4 • In an attempt to strengthen its claim that the environmental impacts of the proposed action will be minimal, and therefore require only an EA rather than an EIS, DOE has scaled down its initial pyroprocessing plans to encompass only a "limited demonstration." This scaled-down action, while commendable, does note relieve DOE of its obligations to undertake the full analysis required by an EIS.

5 • The draft EA does not consider all reasonable alternatives, although such consideration is a fundamental requirement of NEPA. In particular, the EA does not examine the possibility of storing the EBR-II spent fuel and exploring non-reprocessing technologies. This defect is particularly serious because DOE has acknowledged in writing that near-term storage of EBR-II spent fuel presents no compelling environmental, safety, or health concern.

6 • Perhaps most fundamentally, the entire process to this point has been marred by biased and misleading statements from DOE representatives. A statement from Argonne reported in the trade press indicated that a FONSI was a foregone conclusion. Such an approach constitutes a clear violation of the NEPA process, the fundamental purpose of which is to inform agency decisionmaking. In addition, DOE statements at the public meetings have been contradicted by independent analyses and internal DOE documents. The problem here is not merely one of public perception of objectivity -- although that is quite important -- but the more crucial question of the validity of the information upon which DOE policymakers will base their decisions.

In short, to meet the requirements of NEPA, DOE must not only undertake the more extensive analysis under an EIS, but also must ensure that the information made available to decision-makers (and the public) is reliable. Otherwise, the public cannot have be expected to have confidence in the soundness of the decisions.

Background

7 Pyroprocessing is summarized as follows in a 1995 report by the National Academy of Sciences:

> The electrometallurgical technology under development at ANL [Argonne National Laboratory] is derived from many years of R&D on molten salt systems for the production of materials for nuclear reactors and weapons....The heart of the process is the electrorefining step, which employs a metallic feed, molten alkali metal salts as the reaction medium, and two cathodes, one steel and the other an immiscible pool of molten cadmium, to separate actinides from fission products and other nuclear reactor fuel materials.[4]

The electrorefiner was originally designed to serve as the reprocessing component of DOE's Advanced Liquid Metal Reactor ("ALMR") program. The ALMR (also known as the "Integral Fast Reactor" or "IFR") is a special type of nuclear reactor, known as a "breeder," capable of producing more plutonium than it consumes. In conjunction with the electrorefiner, it formed a so-called "closed fuel cycle." The spent fuel produced by

[4] Basolo, Fred, et al., *An Assessment of Continued R&D Into an Electrometallurgical Approach for Treating DOE Spent Nuclear Fuel*, National Research Council, 1995 ("Basolo"), S-2. There have been some modifications made in the process that make it vary slightly from this definition. The modifications are discussed below.

operation of the ALMR was to be reprocessed in the electrorefiner, and the separated uranium and actinides were then to be fabricated into fresh fuel, and returned to the ALMR to continue the cycle.

In 1994 Congress, with the support of DOE, terminated the ALMR program. A paramount reason, along with the budgetary one, for terminating the program was its inconsistency with U.S. nuclear non-proliferation policy -- a point that the Department emphasized in its communications with Congress and other public statements.

At about the same time, ANL began to suggest other applications for the electrorefiner. A key current mission of DOE is to reduce the environmental hazards of certain types of its spent nuclear fuel ("SNF"); DOE contends that the electrorefiner could be applied to this mission. That application is the principal basis for DOE's seeking to start up the electrorefiner. DOE also is exploring the use of pyroprocessing as a method of disposition of plutonium from dismantled U.S. nuclear weapons. (7)

This history is important in countering DOE claims that pyroprocessing is not a reprocessing technology and cannot be readily converted into one. While the process apparently has been modified so that the transuranic elements no longer form a separate stream, the basic technology remains the same. In a paper presented at a March 1995 meeting, two Argonne scientists wrote, "Given the recent drastic changes in the U.S. advanced reactor development program, the demonstration program described in this paper is a remarkedly [sic] similar, but truncated version of the program plan of a year ago."[5] A more recent internal DOE draft memo made a similar point: "The basic functions performed in the Fuel Conditioning Facility during driver and blanket fuel treatment will be the same as under the reprocessing mission. The outputs of the electrometallurgical process will essentially be the same; the difference is that the uranium, plutonium, and transuranics will now be prepared for storage and disposal instead of being cast into new fuel."[6]

Pyroprocessing as Reprocessing: Implications Under NEPA

DOE's own NEPA regulations specifically require an EIS for proposals to operate reprocessing facilities, unless there exist extraordinary circumstances that serve to lessen the environmental impacts of this operation.[7] No such circumstances exist in this case. DOE has contended that the Proposed Action is not bound by this requirement because its 8

[5] H.F. McFarlane and M.J. Lineberry, "Spent fuel pyroprocessing demonstration," in *Fuel management and handling: Proceedings of the international conference organized by the British Nuclear Energy Society and held in Edinburgh on 20-22 March 1995*, British Nuclear Energy Society, London, 149.

[6] The draft memo carries no identification (signature or letterhead) or date. However, it must have been written after August 25, 1995 since it makes reference to the public-interest-organization letter of that date.

[7] See 10 C.F.R. § 1021.400(c) and Appendix D at D2.

facilities are smaller than the reprocessing facilities that DOE has previously used [113][8] and have lower outputs.[9] These claims are unfounded. If the regulations had intended to exclude facilities below a certain size, they would have so stipulated. This is an issue that clearly could have been anticipated (i.e., not an extraordinary circumstance). The fact that the regulations do not specify a minimum facility size is indicative of the fact that reprocessing of even relatively small quantities of material poses serious environmental and non-proliferation hazards.

(8)

In another attempt to evade its NEPA responsibilities, DOE makes the following claim: "[T]he NEPA process does recognize R&D projects and demonstration projects, and as we've stated from the beginning, that we need this information that would be derived from this demonstration to go on to the next steps now."[10] The implication of this comment -- that the Proposed Action does not require an EIS because it is an R&D project -- is plainly wrong. NEPA case law has clearly established that R&D projects are subject to the requirement for an EIS.[11]

The draft EA's most audacious attempt to evade the NEPA requirement, however, is its contrived, exceedingly narrow definition of "reprocessing," crafted to exclude pyroprocessing. The draft EA's glossary contains the following entry:

9

> **Reprocessing (of spent nuclear fuel):** Processing of reactor-irradiated nuclear material (primarily spent nuclear fuel) to recover fissile and fertile material, in order to recycle such materials primarily for defense programs. Historically, reprocessing has involved aqueous chemical separations of elements (typically uranium or plutonium) from undesired elements in the fuel.

This definition is inappropriate in its suggestion that a process is not reprocessing

---

[8] References to the draft EA will be designated by bracketed page numbers within the text of these comments, rather than in footnotes.

[9] See *Public Meeting on the Electrometallurgical Treatment Research and Demonstration Project in the Fuel Conditioning Facility at Argonne National Laboratory-West, Tuesday, February 27, 1996, Washington, D.C.* ("D.C. transcript"), 103: "I know that you would like to call this reprocessing because it is then a path to an EIS, but in fact, the NEPA requirements on an environmental impact statement for a new reprocessing plant are really historically tied to the conventional PUREX plant, which are huge plants which generate incredible amounts of both high level and low level waste" (Jim Laidler).

[10] D.C. transcript, 112. See also 42, 97-98.

[11] See Scientists Institute for Public Information v. Atomic Energy Commission, 156 U.S. App. D.C. 395, 481 F. 2d 1079, 1086-87 (1973).

unless it involves recycling of the separated material.[12] The operations to separate plutonium from spent fuel, mix it with uranium to fabricate new fuel, and reinsert it into a reactor are generally referred to as "reprocessing and recycle." As the terminology indicates, the reprocessing of the spent fuel and the recycling of fuel into a reactor are discrete elements of the procedure -- as evidenced by DOE's current program of reprocessing at the Savannah River Site, under which the separated plutonium would not be recycled into a reactor or weapons.

Furthermore, one cannot classify such a process on the basis of the use of its products since decisions about the end use can change. The Proposed Action provides an excellent example; the uranium that will be separated may be recycled into a reactor (in the form of blended-down low-enriched uranium fuel) or disposed of as waste, but that decision will not be made until DOE makes the broader decision on the disposition of its highly-enriched uranium. In addition, whatever the end use of the products might be, the initial products of reprocessing pose environmental and proliferation hazards. These hazards should be examined under a NEPA analysis.

(9) As one would expect from the foregoing, other definitions of reprocessing do not include recycling. For example, the Office of Technology Assessment defined "reprocessing" as "Chemical treatment of spent reactor fuel to separate the plutonium and uranium from fission products and (under present plans) from each other."[13] Leonard S. Spector and Jacqueline R. Smith of the Carnegie Endowment for International Peace defined it as "Chemical treatment of spent reactor fuel to separate the plutonium and uranium from the unwanted radioactive waste by-products and (under present plans) from each other."[14] Indeed, even DOE, in another recent NEPA analysis, defined reprocessing as identical to "chemical separation," which was in turn defined as "A process for extracting uranium and plutonium from dissolved spent nuclear fuel and irradiated targets. The fission products that are left behind are high level wastes. Chemical separation is also known as reprocessing."[15]

(It should be emphasized that the term "chemical separation" is to be understood as establishing a contrast between chemical and physical separation. In other words, there are

---

[12] The definition also is misleading in implying that reprocessing takes place primarily in defense programs. In fact, by the year 2010 more plutonium will have been reprocessed from civilian spent fuel than exists in the arsenals of the United States and Russia.

[13] Office of Technology Assessment, Congress of the United States, *Nuclear Proliferation and Safeguards* (New York: Praeger Publishers), 1977, 262.

[14] Leonard S. Spector and Jacqueline R. Smith, Nuclear Ambitions: *The Spread of Nuclear Weapons 1989-1990*, (Boulder, Colorado: Westview Press), 1990, 441.

[15] U.S. Department of Energy, *Final Environmental Impact Statement on a Proposed Nuclear Weapons Nonproliferation Policy Concerning Foreign Research Reactor Spent Nuclear Fuel* (DOE/EIS-0218F), February 1996 ("Research Reactor EIS"), Volume 1, 9-2.

chemical separation methods other than aqueous chemical separation -- including pyrochemical separation. Indeed, one of the documents cited in the draft EA describing the process involved in the Proposed Action is entitled, "Pyrochemical Processing of DOE Spent Nuclear Fuels."[16] Furthermore, the original incarnation of pyroprocessing as part of the ALMR system -- which obviously was non-aqueous -- was routinely referred to as reprocessing in DOE documents.[17])

DOE claims the current version of the technology is not reprocessing because it has been modified so that the transuranic stream is not separated from the salt waste. But, as noted above, the fundamental underlying technology has not changed.

(9) With regard to separation of highly enriched uranium ("HEU"), DOE's argument is perhaps even weaker. Although Argonne has made some modifications in this aspect of the process as well, HEU -- a material directly usable in nuclear weapons -- will be separated when EBR-II driver fuel is pyroprocessed. The draft EA asserts, "The electrometallurgical technique, as modified for SNF treatment, would not result in any highly enriched uranium" [112] because the HEU will be blended down to low enriched uranium ("LEU"). But even if HEU is not a final result of the process, it is an intermediate result; there is a point in the process in which HEU is separated from the spent fuel and removed from the electrorefiner [23, 36].

In the absence of a statutory definition of reprocessing, it is incumbent upon DOE to provide a definition that bears some relation to the issues that the draft EA purports to be addressing. The definition in the draft EA manifestly fails that test. An example of a more reasonable alternative would be the following: "The processing of a weapons-usable material or materials from a form in which they meet the spent-fuel standard to a form in which they do not."

Proliferation Impacts

10 The fact that pyroprocessing is a reprocessing technology has direct implications for U.S. nuclear non-proliferation policy. The most recent report by a National Academy of Sciences (NAS) panel that is conducting an ongoing assessment of pyroprocessing describes the problem succinctly:

---

[16] Draft EA, 24, n. 10. See also the discussion of "Pyrometallurgical Processes" and "Pyrochemical Processes" (in a section entitled "History of Reprocessing" in the chapter "Fuel Reprocessing") in Manson Benedict, Thomas H. Pigford, and Hans Wolfgang Levi, *Nuclear Chemical Engineering*, 2nd ed., McGraw-Hill, Inc. (New York, 1981), 462-64.

[17] See, for example, Supplemental Agreement No.1 Between the United States Department of Energy and Central Research Institute of Electric Power Industry of Japan and the Japan Atomic Power Company for a Joint Program on IFR Technology (Contract No. DE-AC02-89CH10424, Modification No. 1) and Prepared Remarks of Secretary O'Leary to the Lawyers Alliance for World Security, March 15, 1994 (quoted below).

> Developing technology that effectively extracts the plutonium from mixtures could facilitate decommissioning of former weapons manufacturing facilities and mitigate some of the problems found at these facilities, such as corroding fuel. However, such efficient technology also raises concerns about proliferation; what the United States might use to assist in the cleanup of a contaminated facility such as Rocky Flats could be used by another country to obtain plutonium for a weapons program.[18]

This concern reinforces a point that the NAS made in its earlier study of pyroprocessing:

(10)

> Although the developers of the electrometallurgical technique argue that the technology is proliferation resistant, any SNF processing approach that is capable of separating fissionable materials from associated fission products and transuranic elements could be redirected to produce material with nuclear detonation capability....Demonstration of the process could, however, add to the risk that a nation intent on weapons production might consider adapting this technology for possible production of fissile material, although such material would be of poor quality for a weapon.[19]

The draft EA's assertion that "the demonstration of electrometallurgical technology for SNF treatment would not constitute reprocessing" [113] cannot be squared with these findings by the NAS.

The NAS statements make clear the dangers inherent in dissemination of this technology. If DOE refuses to acknowledge these dangers of pyroprocessing, the technology is likely to be exported without the control appropriate to a technology capable of producing weapons-usable nuclear material. As part of the NEPA process, DOE should articulate the conditions and controls under which pyroprocessing would be shared with other countries.

11

When this issue was raised one of the public meetings, a DOE representative responded:

> ...The Japanese had been involved in the development of the process. That involvement was terminated in 1994, I believe.
>
> The contract, which involved their participation, had gone through a sensitive nuclear technology review by the Department of Energy, and it was found not to be a sensitive subject or at least as far as it related to the involvement of the Japanese because they already have reprocessing

---

[18] Gregory R. Choppin, et al., *An Evaluation of the Electrometallurgical Approach for Treatment of Excess Weapons Plutonium*, National Research Council, 1996 ("Choppin."), 27.

[19] Basolo, 30-31.

technology.[20]

This comment illustrates several important points. First, it provides further evidence that pyroprocessing is a reprocessing technology -- since the stated basis for approving its export to Japan was the fact that Japan already had reprocessing technology.

Second, the comment makes clear the principal defect of the current DOE guidelines governing the export of "sensitive nuclear technology" ("SNT"): the term "important" (as used in the statutory definition of SNT[21]) has been interpreted as being dependent upon the level of technological sophistication of the recipient. In other comments, the Nuclear Control Institute has vigorously contested that approach as contrary to the intention of the statute.[22] With regard to the draft EA, DOE should indicate what restrictions would be applied to export of the technology if the recipient did not have the reprocessing capability that Japan does.

(11)

Our concerns on the last point were exacerbated by the following statement made by the DOE representative:

> The Secretary of Energy has under her openness policy recently proposed that we would not withhold any sensitive nuclear technology, in particular, reprocessing technologies from anybody. We have not seen that policy put into place yet, and therefore, we are adhering to the guidelines of DOE.[23]

As part of its NEPA analysis, DOE should explain both this general policy and its particular application to pyroprocessing.

* * *

The Clinton administration's nuclear non-proliferation policy was enunciated in a September 27, 1993 statement: "The United States does not encourage the civil use of plutonium and accordingly, does not itself engage in plutonium reprocessing for either nuclear power or nuclear explosive purposes."[24] The administration also has stated its

12

---

[20] D.C. transcript, 69 (emphasis supplied).

[21] Section 4(a)(6) of the Nuclear Non-Proliferation Act of 1978.

[22] Letter of August 24, 1995 from Nuclear Control Institute and Greenpeace International (Sensitive Nuclear Technology: NN-43/SNT ANOPR/Docket No. [NN-RM-810]).

[23] D.C. transcript, 69.

[24] Fact Sheet, "Nonproliferation and Export Control Policy," the White House, September 27, 1993.

policy more recently and more sweepingly, in an attachment to the U.S.-EURATOM agreement: "The United States, for its part, does not engage in reprocessing for any purpose..."[25] Operation of the electrorefiner would, therefore, contradict U.S. policy.

Indeed, these proliferation concerns formed the principal basis for Secretary O'Leary's decision to terminate the Integral Fast Reactor, the parent program of pyroprocessing, in 1994. As Secretary O'Leary wrote to Representative Bevill on June 18, 1994, "Because it is based on plutonium reprocessing and recycle, continued development of the Integral Fast Reactor would undercut our efforts to discourage other countries from plutonium reprocessing and recycle." In a more detailed explication of DOE's position, Secretary O'Leary said:

(12)

> ...The Integral Fast Reactor program is inconsistent with the President's non-proliferation priorities for three basic reasons. First, employing the reprocessing technology associated with the IFR would require that the U.S. separate plutonium from spent nuclear fuel, an activity we are not now engaged in and which we seek to discourage worldwide....
>
> We cannot credibly urge that others not use technologies for separating and using plutonium if we are pursuing those same technologies ourselves. Such actions could provide an excuse for rogue nations to oppose international efforts to end their plutonium separation efforts....[26]

As demonstrated by the NAS statements cited above, the current version of pyroprocessing retains the material-separation capability that made it inconsistent with U.S. non-proliferation policy when it was part of the IFR program.

It also must be emphasized that the proliferation impacts of pyroprocessing are largely independent of the amount of material that is treated. Countries that are pursuing or contemplating reprocessing -- for whom the U.S. no-reprocessing policy is intended to serve as an example -- can hardly be expected to take seriously the argument that the Proposed Action does not constitute reprocessing because only small amounts are involved. Similarly, if the technology is exported, the proliferation impact of its dissemination will not be tied to the amount of material on which it has been used in the United States.

13

The proliferation implications are perhaps even more direct with regard to HEU. The draft EA dismisses these proliferation concerns by noting that the HEU would be "blended down to low enrichment with no additional process steps and at no additional cost using depleted uranium already in storage at the ANL-W site." The DOE presentations at the public meetings suggested that the separated HEU would be blended down almost immediately.[27] But in its description of the electrorefining process, the EA says, "The

---

[25] House Document 104-138, 165.

[26] LAWS remarks, 16-17.

[27] See, for example, Idaho transcript, 20.

uranium deposit would be mechanically stripped from the cathode and temporarily stored in a canister" [36] -- suggesting that the separated uranium exists as HEU for some period of time. The defects of the draft EA's non-proliferation analysis is exacerbated by the complete absence of any discussion of the safeguards that would be implemented in connection with pyroprocessing.

(13) In its failure to appreciate the impact of pyroprocessing on U.S. non-proliferation policy, the draft EA stands in stark contrast to the Research Reactor EIS. Although that EIS is not without flaws of its own, it is far more sensitive to the need to avoid reprocessing. Its preferred alternative "establishes a prescribed set of circumstances that would have to be met before reprocessing would be used"[28] such that "DOE maintains a presumption that spent nuclear fuel would not be chemically separated unless there is an imminent health and safety risk, or other programmatic conditions, that cannot be addressed during the time period when no feasible alternative to chemical separation is available."[29] These conditions are to be addressed by an "independent study of the nonproliferation and other (e.g., cost and timing) implications of reprocessing spent nuclear fuel from foreign research reactors."[30] (This contrast is explored further in the discussion of the draft EA's failure to consider alternatives, below.)

14 Rather than denying the proliferation impacts and treating the issue dismissively (four pages out of a document that runs well over 100), DOE should acknowledge the proliferation drawbacks of pyroprocessing and explain (1) how it plans to minimize them and (2) why the alleged benefits of pyroprocessing outweigh these drawbacks.

Environmental Impacts

15 The draft EA fails to analyze adequately the potential environmental impacts of the Proposed Action. The premise of the draft EA appears to be that because operations have been scaled back from the original plan, the environmental impacts are "negligible" [123]. This line of reasoning fails to take into account the fact that pyroprocessing would produce uncharacterized waste forms -- a metal waste form and a zeolite waste form -- that are not likely to be suitable for emplacement in a repository.

Three NAS studies have highlighted this concern. The most recent of these, which focused on the use of pyroprocessing for plutonium disposition, said:

> • "The committee is concerned with the potentially long development period that may be necessary for the iterative testing and optimization of the GBZ

[28] Research Reactor EIS, S-24.

[29] Research Reactor EIS, S-57.

[30] Research Reactor EIS, S-23.

[glass-bonded zeolite] fabrication process."[31]

• "Criticality concerns related to the long-term post-closure repository performance of the GBZ waste form cannot be addressed readily, because the exact composition of the waste forms is still undetermined. The resulting technical concerns are exacerbated by the expected concentration of plutonium at the front end of the loading columns during processing....
"The development of the GBZ waste form is viewed by the committee as less mature than that of glass or ceramic waste forms and represents a major technical and programmatic uncertainty...."[32]

• "Introduction of WPu [weapons plutonium] in the electrometallurgical process increases significantly the demands on the technology to meet the performance requirements for waste forms relative to the use of waste forms for ultimate disposal of fission products from SNF processing."[33]

(15) The earlier report by that NAS panel had said:

> The major limitation of the electrometallurgical process (whether applied to N-reactor fuels or other SNF) is its present inability to produce waste forms with behavior that is well understood (in comparison, for example, to the degree to which glass forms have been studied)....
> The committee recommends that the DOE include in its evaluation of the electrometallurgical process the added costs and delays expected for the development of new waste forms, especially if there are other waste management approaches that might involve lesser hurdles.[34]

One of its conclusions was, "The fate of the cladding-metal waste form is a major open question, and qualifying the zeolite waste form for burial could present major challenges."[35]

Yet another NAS study -- this one examining a broad range of options for disposition of weapons plutonium -- rejected pyroprocessing, in large part because "it would produce a waste from that has not yet been characterized at all for long-term disposition

---

[31] Choppin, 23.

[32] Choppin, 24-25.

[33] Choppin, 29.

[34] Basolo, 30.

[35] Basolo, 38.

and would probably be unsuitable for placement in Yucca Mountain."[36]

In short, the NAS saw serious problems raised by the waste forms in the spent-fuel management application and even more serious problems in the plutonium-disposition application. The draft EA alludes to these concerns [25]. But in its earlier discussion of the pyroprocessing waste forms, the only comparative statement it makes is, "The waste forms (ceramic cylinders and metal alloy ingots) resulting from electrometallurgical treatment are expected to be at least as durable as those made with borosilicate glass" [24] -- suggesting that the pyroprocessing waste forms were in fact more desirable than borosilicate glass.

(15)

The concerns of the NAS were not brought out at all by the DOE representatives in the public meetings, even in response to direct questioning. The Washington, D.C. meeting included the following exchange:

> MR. HORNER: So [the zeolite waste form] would be as good as the glass or better, both for the spent fuel treatment application and the for the plutonium disposition?
>
> DR. LAIDLER: Yes.[37]

As detailed above, that was not the conclusion of the NAS.

* * *

Another example of the defects of the analysis in the Proposed Action in the draft EA is its failure to discuss and analyze the options for final disposition of the separated uranium stream. The two options under consideration are to dispose of it as a waste or blend it down to LEU and use it as reactor fuel. With regard to the first option, one of the NAS reports said, "If the uranium product were to be a waste stream but not acceptable for geologic disposal, the additional processing steps (e.g., oxidation) would bring into question the usefulness of the proposed electrometallurgical technology."[38] The additional processing would entail additional time and financial costs. Even if the uranium stream were suitable for such disposal, DOE would have to revise upward the numbers in the draft EA for waste produced by the proposed action, since the uranium stream is not included in

16

---

[36] John P. Holdren, et al. *Management and Disposition of Excess Weapons Plutonium: Reactor-Related Options*, National Academy Press (Washington, D.C., 1995), 412. For more detail, see 219-221.

[37] D.C. transcript, 115. See also the preceding exchange on 114-115, and the one in Idaho transcript, 58-59.

[38] Basolo, 37.

those numbers.[39]

If, on the other hand, the uranium is blended down to a lower enrichment level for use as fuel in a reactor, then there are likely to be a number of environmental and non-proliferation issues, as well as financial costs, connected with the processing, transportation, use, and physical security of this material. Furthermore, if HEU -- a weapons-usable fissile material -- were separated from spent fuel and then, after blend-down, used in a reactor, the process would fit even DOE's unacceptably narrow definition of reprocessing. (16)

DOE avoids addressing the troublesome realities of either of these options. Since the final disposition of the uranium has not been decided, DOE does not consider the impacts of either option. The effect is to create the false impression that there are no environmental impacts from either of the options. To remedy this defect, DOE should revise the draft EA to discuss the environmental impacts under each of the two scenarios (uranium as waste and uranium as fuel).

Finally, the draft EA should explain why DOE is departing from the position articulated in the Research Reactor EIS: "Chemical separation of foreign research reactor spent nuclear fuel in existing facilities is not preferred by DOE as a technology for routine management of spent nuclear fuel in the United States because of the additional waste streams that would be generated when these activities are conducted."[40] In particular, DOE should explain why, in the case of pyroprocessing, it is not troubled by the additional waste streams. 17

Segmentation and Related NEPA Issues

The draft EA violates NEPA in a number of important ways. First, it fails to meet the NEPA requirement to analyze impacts at the earliest possible point in the decision process. In drafting and enacting NEPA, Congress recognized that large projects develop a bureaucratic momentum that can heavily tilt decision-making toward continuation of the project -- a problem that could be addressed only by examining them in their entirety at the outset before this momentum became irresistible. In the case of the Proposed Action, DOE is violating this precept by requiring only an EA, rather than the more comprehensive EIS. If the current draft EA results in a FONSI, and DOE decides to undertake larger-scale processing, the program's advocates at Argonne and within DOE undoubtedly will cite the precedent of the first FONSI and claim pyroprocessing is inherently benign. 18

Second, the draft EA constitutes illegal segmentation under NEPA. Although the "limited demonstration," if successful, is likely to lead to full-scale pyroprocessing, DOE contends that an EA is sufficient because the environmental impacts of this demonstration 19

[39] See draft EA, 105, n. 52: "Uranium recovered as part of the Proposed Action is not waste and is not shown in the table." For a statement that the uranium may be disposed of as a (low-level) waste see Idaho transcript, 51.

[40] Research Reactor EIS, 19, n. 1.

are very limited. However, at the Washington public meeting, a DOE representative refused to commit to an EIS for the further processing, promising only additional unspecified NEPA analysis.[41] Thus, the pyroprocessing program could proceed by means of a succession of EAs, without ever being subjected to the more rigorous analysis of an EIS. As the case law makes clear, this is precisely the type of situation that NEPA was designed to prevent.[42]

The general weakness of DOE's position in these respects is exacerbated by the specifics of its Proposed Action. If there were any reasonable dividing line once the limited demonstration began -- a premise that DOE has not by any means established -- it would be at the use of the new electrorefiner. The current electrorefiner already is contaminated and has a smaller throughput; the new electrorefiner that would be installed -- and is included in the Proposed Action -- is not contaminated and has a much larger throughput. In fact, the new electrorefiner is the equipment that would be used for full-scale pyroprocessing of the EBR-II spent fuel once DOE made the decision to proceed that way.

(19) Typically, demonstration facilities are smaller than the ones that would used for full-scale operations. Often, the full-scale facilities are not even constructed until the demonstration proves successful. For DOE to use the high-throughput electrorefiner as part of this "limited demonstration" would strongly prejudice the outcome of the EA and DOE's subsequent decision on full-scale processing.

It also must be emphasized that the high-throughput electrorefiner is not necessary to demonstrate the technical feasibility of pyroprocessing. Many of these key points are captured in the following exchange:

> MR. HUGHES: ...it's a larger machine. It's on the order of 170 kilograms per batch, and so it would be much more efficient to treat the blanket material.
>
> BEATRICE BRAILSFORD: Well, but all this EA is covering is a demonstration to see whether the technology works. So, if you had to chunk along a little less efficiently, what difference would that make?
> ...
>
> MR. LAIDLER: It's simply a matter of cost. If we use the higher throughput electrorefiner for treating the blanket elements, then it can be done at a much more reasonable cost.
>
> And this is something that would be necessary if it is decided to

[41] D.C. transcript, 111.

[42] See Indian Lookout Alliance v. Volpe, 484 F.2d 11, 14 (8th Cir. 1973) and City of Rochester v. United States Postal Service 541 F.2d 967 (2d Cir. 1976).

(19)

> proceed with the treatment of other materials. And we're looking at something on the order of 50 tons of material which would go through the high throughput electrorefiner. Much more economical to treat it at that rate.[43]

The Proposed Action crosses any reasonable threshold for a "feasibility demonstration."

Failure to Consider Alternatives

20 The draft EA's cursory assessment of the alternatives to the proposed action does not "[r]igorously explore and objectively evaluate all reasonable alternatives," as required by the NEPA regulations.[44]

21 First, the draft EA assumes, without providing any quantitative data, that direct disposal of the EBR-II spent fuel is not an option. DOE should explain why this spent fuel could not, by means of suitable packaging, be made equivalent to other spent fuel that is designated for direct disposal.

Second, with regard to the alternatives it does consider, the draft EA open its analysis by saying, "Demonstration of an alternative technology has not been analyzed because there are no other SNF treatment technologies being developed that have reached a stage of development to warrant testing by DOE with irradiated fuel" [4]. Similarly, in discussing these alternative technologies -- chloride volatility, glass material oxidation and dissolution and the plasma arc process -- the draft EA says:

22

> In contrast with electrometallurgical technology these technologies are at a relatively immature state of development and would require preparation of a facility and equipment before a demonstration with actual SNF could be carried out. To date, there has been no specific development of these processes for treatment of the EBR-II SNF, which requires removal of reactive sodium from inside the fuel matrix." [7].

These statements imply that the alternative processes will be tested and developed in the future, and then measured against pyroprocessing. Indeed, that is the impression created at the outset, in the section "Purpose and Need for Agency Action," which says, "DOE has identified electrometallurgical treatment as a promising technology to treat EBR-II SNF..." [1, emphasis supplied].

If that were the case -- i.e., if pyroprocessing were one of several technologies under serious consideration for treatment of EBR-II spent fuel -- then DOE might have some grounds for its argument that the other alternatives need not be examined in this NEPA

---

[43] Idaho transcript, 195-96. See also draft EA, 53 and Idaho transcript, 239.

[44] 40 C.F.R. §1502.14(d).

analysis. That argument might be acceptable if there were a plan and a commitment to analyze these options fully once they were more mature. Under this scenario DOE would decide which of them should be used to treat EBR-II spent fuel only after these analyses had been conducted.

(22)

But that is not the case. Pyroprocessing is, in fact, the only option that DOE is seriously pursuing for treatment of the EBR-II spent fuel. After the limited demonstration of this technology -- and this technology alone -- DOE will make a decision as to whether it should be applied to the larger inventory of EBR-II spent fuel.

If there were an urgent environmental, safety, or health need to treat the EBR-II spent fuel, DOE might have a somewhat firmer basis for pursuing one technology to exclusion of alternatives. But there is no such need. DOE has acknowledged that the "near-term storage of EBR-II spent fuel presents no compelling environmental, safety or health concern."[45] Therefore, the EBR-II spent fuel can be temporarily stored while DOE explores alternative methods of treating the EBR-II spent fuel that are less injurious to the environment and to U.S. non-proliferation efforts. Further support for this "store and explore" option comes from the fact that for the past 30 years, storage has been the interim disposition method for EBR-II spent fuel.

23

The need for alternatives is particularly acute with regard to the blanket assemblies. DOE's principal justification for pyroprocessing of the EBR-II spent fuel is that sodium is imbedded in the fuel. But since the driver assemblies are of much higher burn-up than the blankets, the problem is correspondingly more severe in the blankets. One of the DOE representatives at the Washington, D.C. meeting said:

> I might also explain that there is a difference between the blanket assemblies and the fuel elements. As Mr. Hughes said, the fuel elements reach a point of burn-up, that they open porosity in the fuel. The sodium saturates that, and then with continued irradiation those pores are actually closed off. So the sodium becomes an integral part of the fuel matrix.
>
> For the blanket assemblies, they do not reach that level of burn-up. So the sodium remains in the bond at largely the exterior of the elements. The problem is what may exist in any crevices or cracks on the surface, but generally those can be treated differently than you would driver fuel.[46]

24

This response led to the following exchange later in the meeting:

> MR. HORNER: One of the panelists drew the distinction between the sodium problem in the blankets, on the one hand, and in the driver assemblies, on the other. Is pyroprocessing equally needed in both cases,

[45] Letter from Ray A. Hunter (for Terry Lash, Director of the Office of Nuclear Energy, Science, and Technology) to Daniel Horner, June 28, 1995.

[46] D.C. transcript, 65 (Dr. Sackett); emphasis supplied.

given the discrepancy between the two, or are there other possible technologies that might be applicable to the blankets since they are lower burn-up and, therefore, have less of a problem of the imbedding of the sodium?

DR. LAIDLER: Let me just take one shot at it, kind of a smart aleck answer maybe, but the one thing that you always want to do as a technologist, a scientist, is not do anything stupid that does any harm, and when you go into an alternative treatment, such as was suggested of melting the fuel, boiling off the sodium, and somehow disposing of things that way, in fact, what you do is create a bigger mess than you had to begin with because one of the constituents in the sodium, in both the driver fuel and the blankets, is cesium, which is higher volatility, more volatile material than the sodium itself.

So what you wind up with is spreading cesium all over the system in which you are trying to do the treatment....

(24) MR. HORNER: So the answer to that was, no, it's equally needed for both, both the blankets and --

DR. LAIDLER: Yes. To answer your question, yes, it's equally.[47]

This view, however, is not universally shared, even within DOE. An internal DOE memo said:

> It is possible that other processes for the removal of the sodium bond could be developed. For instance, it has been suggested that the sodium could be removed from the EBR-II driver fuel and blankets by removing the cladding from the fuel and then distilling or otherwise removing the sodium from the surface of the fuel. In the case of the driver fuel, some of the sodium essentially becomes absorbed into the fuel during irradiation so such a process would not be acceptable for the driver fuel because it would not remove the sodium from inside the fuel. It may be possible to remove the bond sodium from the blankets in this way, because the sodium may not get absorbed into the blanket fuel in meaningful quantities. [48]

---

[47] D.C. transcript, 92-93.

[48] See n. 5; emphasis supplied. The memo does say, in the next sentence, "In any case, the development of a new process to remove the bond sodium could take years, and could delay the defueling of EBR-II for reasons explained below." The point about delaying the defueling, however, is refuted by other evidence. DOE officials have said on more than one occasion that the defueling of the EBR-II is independent of the start-up of pyroprocessing. Indeed, the draft EA supports this point when it says that under the No-Action Alternative "DOE would continue defueling EBR-II" [57].

In its consideration of the mechanical processing alternatives, the draft EA explains why these techniques cannot be used for the driver fuel, but does not explain why they cannot be used for the blankets [6].

On a related point, DOE has not offered a convincing explanation as to why uranium as well as sodium must be separated from the spent fuel. The arguments advanced by the DOE representatives at the public meetings seem to apply only to HEU. If so, these arguments would not apply to the blankets, which do not contain HEU. (24)

The two points made above make clear that the rationale for the use of the new, high-throughput electrorefiner is even more untenable than the rationale for the general pyroprocessing campaign. The processing of the blankets -- which will constitute two-thirds of the heavy metal to be processed under the proposed action -- creates the alleged need for the this new equipment, but this processing is the least defensible part of the undertaking. As noted above, the use of the new electrorefiner further undermines the DOE claim that the proposed action does not constitute segmentation under NEPA.

Once again, the Research Reactor EIS provides a noteworthy contrast to the draft EA:

> DOE would embark immediately on an accelerated program at the Savannah River Site to identify, develop, and demonstrate one or more non-reprocessing, cost-effective treatment and/or packaging technologies to address potential health and safety issues that may develop and to prepare the foreign research reactor spent fuel for ultimate disposal....Examples of technologies that would be considered include: *can-in-canister, chop and dilute/poison, melt and dilute/poison, plasma arc treatment, electrometallurgical treatment, glass material oxidation and dissolution, chloride volatility, dissolve and vitrify, direct disposal in small packages,* etc. In conjunction with the examination of new technologies, variations of conventional direct disposal methods would be explored...[49] (25)

The important point here is not the particular list of candidate technologies. (In fact, one aspect of the Research Reactor EIS with which the Nuclear Control Institute strongly disagree is its categorization of electrometallurgical treatment as a non-reprocessing technology.) Rather, it is the range of alternatives under consideration -- including direct-disposal options -- and the general approach of exploring alternatives before committing to one of them.

Fairness and Objectivity of the Process

The NEPA process to this point has been marred by misrepresentation and bias. A (6)

---

[49] Research Reactor EIS, 22-23; italics in original.

November trade press article quoted an Argonne official as saying that the conclusion of the EA will have "to be a finding of no significant impact [FONSI], because it's a scaled down version of the original EA which had a FONSI."[50] Such a statement shows DOE to be in blatant violation of NEPA. A fundamental purpose of NEPA is to inform the decisionmaking process.[51] But that purpose obviously cannot be achieved if the outcome has been predetermined. (6)

After seeing such comments one cannot help wondering if the whole EA process is merely so much window dressing. When such concerns were expressed, DOE responded that Argonne is an advocate of one view, and that the ultimate decision will be made by senior DOE officials. But neither the EA nor the public meetings have given any indication that the information Argonne provides is being treated with the appropriate skepticism.

The purpose of the public meetings, and the NEPA process generally, is to stimulate an informed exchange of views on the Proposed Action. If DOE presents a single, biased view, and promulgates incomplete information to support its bias, then the value of the exchanges is diminished and the whole purpose of the process is frustrated. But the problem extends even further. If, as stated, the key decisions on pyroprocessing will be made by senior DOE policymakers, they will be doing so largely or entirely on the basis of information that has been supplied by advocates of the program.

At the Washington public meeting, four past instances were cited of "technical" claims made by Argonne and DOE advocates of pyroprocessing and its parent program, the Advanced Liquid Metal Reactor, that later either were refuted by independent experts or retracted by DOE.[52] Since the meeting, it has become clear that the views on at least two key technical points presented there were biased and misleading: alternative methods for sodium removal, particularly for the blanket assemblies (discussed above, under "Failure to Consider Alternatives"; and the viability of the zeolite waste form, particularly with regard to plutonium disposition (discussed above under "Environmental Impacts"). Furthermore, a statement of a proposed DOE policy [69] was made that no DOE official with whom I have spoken since then can explain. One can only wonder what other, as yet undiscovered, misrepresentations of technical data or DOE policy were promulgated at the public meetings. 26

DOE must repair the damage that has been done to the credibility of this NEPA analysis. First, it must ensure that all the documents cited in the draft EA are available in the DOE public reading rooms. Second, once the documents are available, DOE should 27

[50] "Former IFR Facility EA Started by Argonne West; Move Opposed by Non-Proliferation Groups; Positive Outcome Appears Predetermined," *Weapons Complex Monitor*, November 22, 1995.

[51] See Calvert Cliffs Coordinating Committee v. Atomic Energy Commission, 449 F.2d 1109 (D.C. Cir. 1971).

[52] D.C. transcript, 127-28.

reopen the comment period and hold new hearings. Third, DOE should correct the misstatements that were made by its representatives at the previous public meetings. Fourth, key technical information should be verified by an independent entity such as the NAS. Only in this way can an informed public debate take place, and only in this way can DOE make an informed decision in which the public can have confidence.

28

Conclusion

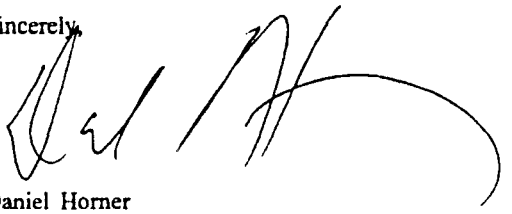
Events over the last seven months have reinforced and exacerbated the concerns expressed in the August 25 letter from the Nuclear Control Institute and other public-interest organizations. DOE must prepare an EIS before start-up of the electrorefiner. But even an EIS will not fulfill DOE's obligations if the Department does not make a greater effort to ensure that the process includes a thorough and objective analysis of the issues raised above.

Finally, if DOE decides -- contrary to its obligation under NEPA and to its stakeholders -- to issue a FONSI, the Department should include in that document the minimum and the anticipated amount of time from the date of publication that will be required to begin pyroprocessing spent fuel in the electrorefiner.

29

Thank you for the opportunity to provide these comments.

Sincerely,



Daniel Horner

Responses to Document D093

1 The Department of Energy does not agree that the proposed action involves "reprocessing" with the meaning and intent of the Department of Energy's National Environmental Policy Act regulations. The National Academy of Sciences reports refer to the electrometallurgical process as spent nuclear fuel treatment or processing. The *Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Environmental Impact Statement* (DOE/EIS-0203-F) has defined processing as "applying a chemical or physical process designed to alter the characteristics of the spent fuel nuclear material." The electrometallurgical process meets this definition. In addition, the National Academy of Sciences report on treating Department of Energy spent nuclear fuel stated, "The committee recommended that such research and development should be conducted exclusively to evaluate the electrometallurgical technology's effectiveness for treating Department of Energy spent nuclear fuel, and funding decisions about electrometallurgical research and development for Department of Energy spent nuclear fuel treatment should be independent of issues related to the Integral Fast Reactor Program." Department of Energy regulations do not preclude the preparation of an environmental assessment to determine if an environmental impact statement is required. For further discussion, please refer to Chapter One of this Appendix.

2,10,11,12,13 The nonproliferation policy implications are discussed in Section 4.7 of the environmental assessment. The commentor provided a partial quote from a National Academy of Science report that is more completely understood in its entirely: "Although the developers of the electrometallurgical technique argue that the technology is proliferation resistant, any SNF processing approach that is capable of separating fissionable materials from associated fission products and transuranic elements could be redirected to produce material with nuclear detonation capability. The committee believes, therefore, that proliferation aspects of the electrometallurgical process and its processing alternatives are not a determining factor for differentiating among these processes. The electrometallurgical process could be operated to produce a relatively poor separation of spent fuel into fission products, actinides including plutonium, and uranium. The electrometallurgical technology is not as effective as some other

processing alternatives in accomplishing these separations. The high radioactivity of the TRU fraction containing the plutonium would reduce the likelihood of theft of this material. Demonstration of the process, could, however, add to the risk that a nation intent on weapons production might consider adapting this technology for possible production of fissile material, although such material would be of poor quality for a weapon. A full review of the proliferation risks associated with closely related processing techniques proposed for the Integral Fast Reactor was published recently. That report concluded that 'the intrinsic radioactivity of the recycle plutonium product and the requirement of remote recycle operations in inert-atmosphere hot cells are favorable safeguard factors ... [but] inspectability and material accountability for verification purposed are relatively more difficult' than for a Purex plant."

As stated above, the National Research Council committee does not consider proliferation aspects to be a distinguishing characteristic. The committee did not pursue the matter further, and did not consider the more recent and more definitive Lawrence Livermore National Laboratory review that is discussed in Chapter One of this Appendix.

Section 4.7 of the environmental assessment discussed the proposed demonstration project in terms of the nonproliferation policy of the United States. In response to the comment, the Department of Energy has added a discussion of the potential for converting the electrometallurgical treatment technology to attempt to produce weapons-suitable plutonium even though the proposed demonstration project does not include any equipment or any processes that could separate transuranic elements. All plutonium would be directed to the ceramic waste form without separation from fission products. This issue was considered by the Department of Energy as indicated in Section 4.7 of the environmental assessment.

The Department of Energy acknowledges the commentor's concerns regarding sensitive nuclear technology. During the Integral Fast Reactor Program, the Department of Energy conducted appropriate reviews of related technologies for recycling spent nuclear fuel in fast reactors before entering into a technology exchange agreement with Japan. Any nuclear technology which is a candidate for export is subject to sensitive nuclear technology review in accordance with 10 CFR Part 810. The Department of Energy has

been designated to implement this regulation by an interagency task force representing the Department of State, the Arms Control and Disarmament Agency, the Nuclear Regulatory Commission, and the Department of Energy. The Department of Energy has established an Export Control Working Group to make sensitive nuclear technology determinations according to specific guidelines. Any future consideration of exporting electrometallurgical spent nuclear fuel treatment technology would be reviewed according to the Department of Energy's export control procedure. Additional discussion of the nonproliferation considerations is provided in Chapter One of this Appendix.

3,17 The proposed research and demonstration project would produce the typical waste and by-product streams of the electrometallurgical technique in order to quantify these streams, to characterize them, and to answer the very questions posed by the commentor, the National Research Council, other peer review committees, and involved scientists and engineers.

The low-enriched uranium by-product, as described in Section 2.3 of the environmental assessment, would be stored at Argonne National Laboratory until a decision is made regarding its ultimate disposition.

This by-product results from the blending down of highly-enriched uranium (410 kilograms) present in the driver spent nuclear fuel assemblies. The resultant product of low-enriched uranium (1400 kilograms) and depleted uranium (1200 kilograms) present in the blanket assemblies is a small fraction of the depleted uranium (200,000 kilograms) that is presently stored at the Argonne National Laboratory site. At Argonne National Laboratory, uranium resulting from this demonstration would be less than 1% of the uranium currently managed on site. The Department of Energy has made no decision on whether the uranium would be sold to commercial interests or eventually discarded as waste. The Department of Energy notes that the preferred alternative in the *Disposition of Surplus Highly-enriched Uranium Draft Environmental Impact Statement* (DOE/EIS-0240-D) is to sell surplus high-enriched uranium, which has been blended down to low-enriched uranium, to commercial interests.

4,20 The Department of Energy has prepared this environmental assessment to assist in determining whether to prepare an environmental impact statement or issue a Finding of No Significant Impact.

An objective of the proposed project would be to produce data sufficient to allow the Department to determine the technical feasibility of applying this electrorefining technology for Experimental Breeder Reactor-II or other types of spent nuclear fuel for safe long-term storage or disposal. It is necessary to address questions raised by the National Research Council review of this technology before any realistic proposal can be made for its application. The existing and high efficiency electrorefiners are needed to provide these data. The equipment associated with the proposed demonstration is not of adequate size or configuration for Department of Energy or commercial production-scale activities. Also, in the Fuel Conditioning Facility, there are several steps in the process primarily associated with material handling systems that would limit the total output of the facility. If the demonstration project were successful, the Department of Energy would review the data and decide whether to propose future applications of the technology. Such a proposal would be made in accordance with all applicable laws and regulations, and would include appropriate National Environmental Policy Act analysis, including alternatives to electrometallurgical treatment.

The second electrorefiner is necessary to answer a specific question raised by the National Research Council review, namely whether a 200 kilogram per day throughput could be achieved. While such a throughput could not be approached except in a single batch operation over a 24-hour period, it would provide data necessary to establish feasibility. Because of criticality constraints, a batch of this size could only be electrorefined with low-enriched or depleted uranium, for which the blankets will be used.

Additional discussion on the appropriate level of National Environmental Policy Act review is given in Chapter One of this Appendix.

5 The Department of Energy analyzed the spent nuclear fuel storage alternative suggested by the commentor under the no action alternative, which assumes that the Department of Energy would continue to store Experimental Breeder Reactor-II spent nuclear fuel. The

Department of Energy has revised the environmental assessment to clarify that under this alternative, the Department would continue to operate the Fuel Conditioning Facility as a hot cell facility in support of the Department's programs. Separately, the Department of Energy will continue to explore technologies that do not involve electrometallurgical treatment. Section 4.4.2 of the environmental assessment discusses the reasons why the Experimental Breeder Reactor-II spent nuclear fuel would likely be unacceptable for disposal in a geologic repository without treatment. While the fuel is acceptable for interim storage, it is likely unacceptable for permanent disposal without treatment.

The environmental assessment analyzed three alternatives in detail and considered several other process alternatives which were eliminated from detailed evaluation. In general, the excluded alternatives had not reached a level of development that would allow a detailed evaluation. Evaluation of alternative processes that were identified in the public comment period have been added to the environmental assessment, Section 2.1. The potential environmental impacts that would result from implementing a conceptual treatment process cannot be analyzed in equal detail relative to the impacts that can be quantified for a process that has reached an adequate level of technical maturity.

6 An environmental assessment is used to determine whether a Finding of No Significant Impact or an environmental impact statement is requried. The Department of Energy has carefully considered public comments and analyses brought to its attention during the National Environmental Policy Act process before, making any decision on the proposed action. The Argonne employee statement referred to by the commentor was incorrect.

7 The statement from Reference 5 of the commentor's letter should be quoted more completely to avoid losing the important context in which the statement was made. The actual quotation is:

"Given the recent drastic changes in the United States advanced reactor development program, the demonstration program described in this paper is a remarkedly similar, but truncated version of the program plan of a year ago. Argonne National Laboratory is on the brink of demonstrating an innovative, unique, electrochemical technology for treating metallic spent nuclear fuel. The basic technology was developed for the Integral Fast

Reactor Program, which, until recently canceled, was the United States nuclear research and development program for Advanced Liquid Metal Reactors. The roots of the treatment technology lie in a primitive melt-refining metal fuel cycle demonstrated from 1965 to 1969 as part of initial operation of the Experimental Breeder Reactor-II. Originally developed as a closed fuel cycle, appropriate elements of the current technology are being carried forward to treat the accumulated spent Experimental Breeder Reactor-II fuel to meet existing United States environmental law and to process the high-level waste residue into a form suitable for storage and subsequent geologic disposal.

"The metallic Experimental Breeder Reactor-II fuel contains a sodium thermal bond between the fuel pin and the cladding. During irradiation, much of the sodium logs in fission gas pores within the fuel. Sodium is a reactive metal that by law cannot be buried for disposal. Further, an end-of-life enrichment exceeding 50% and a potential for long-term pyrophoric hydride formation following cladding breach eliminate the Experimental Breeder Reactor-II fuel as a candidate for direct geologic disposal. By the time the last of the Experimental Breeder Reactor-II spent nuclear fuel is treated, a throughput rate and unit cost should be established that will allow economic evaluation of this technology as a waste disposal option."

Based in part upon the urging of the Secretary of Energy, the Integral Fast Reactor Program was terminated in 1994 after extensive debate in both houses of Congress. The issues raised during debate were varied, complex, and did not focus solely on the issue of proliferation. Congress has been clear, however, that it intends the Department of Energy to continue development of electrometallurgical technology. In the Conference Report for the Fiscal Year 1995 Energy and Water Appropriation, the Department of Energy was instructed "to maximize the research on actinide recycle, and, as proposed by the Administration, should also retain such facilities as necessary, especially the pyroprocessing facilities." The following year, in the Conference Report for Fiscal Year 1996 Energy and Water Appropriation, Congress gave the Department of Energy the following instruction: "As recommended by the National Academy of Sciences' assessment of the electrometallurgical approach for treating spent nuclear fuel, the conferees expect the Department of Energy to develop a plan to support the EBRFF09II demonstration using this technology. If this is successful, the Department of Energy

should review the program for application to other types of spent nuclear fuel and waste management issues." The proposed demonstration project analyzed in the environmental assessment would carry out that congressional intent.

8 Information on the appropriate level of National Environmental Policy Act analysis is provided in Chapter One of this Appendix.

9 The proposed demonstration project's primary objective is to demonstrate a possible treatment technology to prepare Experimental Breeder Reactor-II spent nuclear fuel for disposal. Contrary to the commentor's assertion, the underlying technology has been modified in a significant way. Without the liquid cadmium cathode, it is not possible to separate plutonium; it is instead combined with fission products in the waste form. Although uranium is separated and recovered, the Department of Energy does not consider the process "reprocessing" within the meaning and intent of the Department of Energy's National Environmental Policy Act regulations, which do not preclude an environmental assessment for the purpose of deciding whether an environmental impact statement should be prepared.

Please refer to Response # 1 above and Chapter One of this Appendix for details on the appropriate level of National Environmental Policy Act review. If the commentor's suggestion that the definition of reprocessing be restated as "The processing of a weapons-usable material or materials from a form in which they meet the spent-fuel standard to a form in which they do not" was followed, this demonstration would not be considered reprocessing. Fission products are concentrated with the plutonium, enhancing its self-protection. The highly-enriched uranium is blended down to low-enriched uranium, a much more effective diversion-resistant action than simply meeting a spent nuclear fuel standard.

9,14 The commentor has raised questions about the highly-enriched uranium vulnerability. When the uranium is removed from the electrorefiner, the deposits are covered with salt which contains fission products. These electrorefiner deposits are considered pyrophoric (which means they may burn when exposed to air). The salt coating and pyrophorocity make this material unattractive for diversion.

After cathode processing, the uranium would be consolidated into a uranium ingot in the argon cell to await introduction within a few days into the casting furnace. This material would be unattractive for diversion for several reasons, including the presence of unknown quantities of impurities, non-homogeneous composition, and unknown quality. The Fuel Conditioning Facility has the necessary security measures to meet any diversion concerns for this material. The potential vulnerability of this material has been considered during recent audits of the facility and the Department of Energy has decided adequate safeguards are provided. The Department of Energy has not made a decision regarding the disposition of low-enriched uranium.

The blending operation was chosen based on economic and accounting costs. If the uranium were left as relatively pure, highly-enriched uranium, security upgrades costing on the order of half a million dollars would be required for the Fuel Conditioning Facility. Annual costs for increased security personnel would be on the order of several hundred thousand dollars. By comparison, the blended-down uranium falls into one of the lowest categories for safeguarding special materials. There is comparatively little additional cost to manage this material. No additional handling of the electrorefiner cathode product would be required. The uranium would be maintained under secure conditions at all times.

15 Section 4.7 of the environmental assessment has been revised to more fully discuss nonproliferation concerns expressed by commentors. The Department of Energy has considered such concerns as well as the benefits of the electrometallurgical treatment program. For more information on the proliferation aspects of the proposed demonstration, see Chapter One of this Appendix.

16 The proposed research and demonstration project would produce the typical waste and by-product streams of the electrometallurgical technique in order to quantify these streams, to characterize them, and to answer the very questions posed by the commentor, the National Research Council, other peer review committees, and involved scientists and engineers. The questions raised by the National Research Council refer to the production and testing of actual waste forms. Unless the proposed demonstration is conducted, questions about the waste forms will remain unanswered.

18 The Department of Energy is considering the use of electrometallurgical treatment for Experimental Breeder Reactor-II spent nuclear fuel because the fuel probably is not suitable for direct disposal due to its reactive characteristics. The proposed action is research and development, rather than routine management of spent nuclear fuel. The waste streams for the proposed demonstration project have been considered in this environmental assessment (Section 4.5). The impacts associated with their management would be small. The Department of Energy would consider the impacts of managing such larger waste streams in evaluating any proposal to apply the technology more broadly.

19 The Department of Energy does not agree with the commentor's assertion that the environmental assessment constitutes improper segmentation of the National Environmental Policy Act process. The proposed action includes research on a new application of an established technology, development of operating data for test equipment, and a limited application demonstration. As summarized in the National Research Council's report on this technology, without this demonstration and the data to be gained from it, there can be no meaningful analysis of the technology's potential use or application. Please refer to Chapter One of this Appendix for further discussion of the appropriate level of National Environmental Policy Act review.

21,23 The commentor's concern that the environmental assessment failed to consider alternatives is noted. The environmental assessment analyzed three alternatives in detail and considered several other process alternatives which were eliminated from detailed evaluation. In general, the excluded alternatives had not reached a level of development that would allow a detailed evaluation. Evaluation of alternative processes that were identified in the public comment period have been added to the environmental assessment, Section 2.1. The potential environmental impacts that would result from implementing a conceptual treatment process cannot be analyzed in equal detail relative to the impacts that can be quantified for a process that has reached an adequate level of technical maturity. See Response #5 above.

22 The discussion of interim storage of Experimental Breeder Reactor-II spent nuclear fuel under the no action alternative in Section 4.4.2 explains why this spent nuclear fuel likely

cannot be directly disposed of in a repository because of bond sodium. Section 5.0 summarizes the impacts of the no action alternative.

24 As noted in Response #5 above, the Department of Energy would continue to explore other treatment technologies, but that does not foreclose the appropriateness of a demonstration to determine whether this technology is viable.

25 Presently, there is no other developed technique for treating the Experimental Breeder Reactor-II blanket assemblies, and electrometallurgical technology could be an attractive option if the demonstration were successful. However, the main purpose of treating 25 blanket assemblies is to test the throughput capability of electrorefining, which could not be done with the highly-enriched uranium of the driver spent nuclear fuel. The mechanical treatment alternative for the blankets is addressed in Section 2.1 of the environmental assessment.

26 The Department of Energy is currently investigating the electrometallurgical processing of spent research reactor nuclear fuel. The commentor correctly notes that the *Final Environmental Impact Statement on a Proposed Nuclear Weapons Nonproliferation Policy Concerning Foreign Research Reactor Spent Nuclear Fuel* (DOE/EIS-0218F, Feb. 1996) contains an alternative involving accelerated research on a range of potential spent nuclear fuel treatment alternatives that do not involve reprocessing, including electrometallurgical treatment.

27 The references cited in the environmental assessment have been placed in the Department of Energy public reading rooms. Additional information on this issue is provided in Chapter One of this Appendix. The Department of Energy has considered and incorporated public comment and independent assessment during the preparation of this environmental assessment. Alternatives that were identified in the public review process have been added to the environmental assessment Section 2.1.

28 The questions about the viability of the zeolite waste form is recognized, and the Department of Energy has asked the National Academy of Science to continue independent oversight on this issue and other aspects of the demonstration. As stated in

Section 2.2 of the environmental assessment, the National Research Council committee would observe Argonne's research and demonstration activities to provide the Department of Energy with an independent evaluation of any technical progress.

29 An environmental assessment is developed and used as a basis for determining whether a Finding of No Significant Impact can be supported or an environmental impact statement is necessary. Only after the results of the environmental assessment have been analyzed and public comments have been received and considered will the Department of Energy make a final decision. In the event that a Finding of No Significant Impact determination is made for this environmental assessment, an appropriate period of time will be allowed between the determination and the start of the electrometallurgical treatment project to notify interested members of the public. The date that fuel conditioning operations would begin would be established by the Department of Energy only after such a determination is made.

Greenpeace International • Nuclear Control Institute

April 8, 1996

Dr. Terry Lash, Director
Office of Nuclear Energy
U.S. Department of Energy
1000 Independence Ave., NW
Washington, D.C. 20585

Dear Dr. Lash:

We are writing in regard to the Department of Energy's policy on sensitive nuclear technology (SNT) – and, in particular, in regard to comments that DOE has made in the course of its analysis of pyroprocessing under the National Environmental Policy Act.

At the February 27 public meeting on the draft Environmental Assessment on pyroprocessing, one of the DOE representatives said:

> ...The Japanese had been involved in the development of the process. That involvement was terminated in 1994, I believe.
>
> The contract, which involved their participation, had gone through a sensitive nuclear technology review by the Department of Energy, and it was found not to be a sensitive subject or at least as far as it related to the involvement of the Japanese because they already have reprocessing technology (transcript, pp. 68-69).

1

This response suggests that the pyroprocessing technology would constitute SNT if it were exported to a country that did not have a reprocessing capability. Is that in fact the case? For example, if South Korea tomorrow requested the technology that had been cleared for export to Japan, would be it classified as SNT? (We emphasize, as we have elsewhere, that DOE's notion of country-by-country SNT determinations, rather than a technology-based determination, is contrary to the intent of the Nuclear Non-Proliferation Act and that the ongoing DOE assessment should revise the current guidelines to reflect the intent of the Act.)

2

Also at the February 27 meeting, the same DOE representative said

> The Secretary of Energy has under her openness policy recently proposed that we would not withhold any sensitive nuclear technology, in particular, reprocessing technologies from anybody. We have not seen that policy put into place yet, and therefore, we are adhering to the guidelines of DOE (p. 69).

3

Neither we nor the other DOE officials with whom we have spoken were familiar with this proposal. We would appreciate information on the details and current status of it.

Thank you very much for your prompt attention to our request.

Sincerely,

Tom Clements
Greenpeace

Daniel Horner
Nuclear Control Institute

Responses to Document D094

1 The Department of Energy acknowledges the commentors' concerns regarding sensitive nuclear technology. During the Integral Fast Reactor Program, the Department of Energy conducted appropriate reviews of related technologies for recycling spent nuclear fuel in fast reactors before entering into a technology exchange agreement with Japan. Any nuclear technology which is a candidate for export is subject to sensitive nuclear technology review in accordance with 10 CFR Part 810. The Department of Energy has been designated to implement this regulation by an interagency task force representing the Department of State, the Arms Control and Disarmament Agency, the Nuclear Regulatory Commission, and the Department of Energy. The Department of Energy has established an Export Control Working Group to make sensitive nuclear technology determinations according to specific guidelines. Any future consideration of exporting electrometallurgical spent nuclear fuel treatment technology would be reviewed according to the Department of Energy's export control procedure.

2 Revision of the guidelines for making sensitive nuclear technology determinations is beyond the scope of this environmental assessment.

3 The reference to a change in the Department of Energy position on sensitive nuclear technologies was incorrectly stated by a panel member and does not reflect the official Department of Energy policy (see answer to Comment #1).

April 5, 1996

Mr. Greg Bass
EA Document Manager
U.S. Department of Energy
P.O. Box 2528
Idaho Falls, Idaho 83403

Dear Mr. Bass:

We are writing to provide our comments on the *Draft Environmental Assessment for the Electrometallurgical Treatment Research and Demonstration Project in the Fuel Conditioning Facility at Argonne National Laboratory-West* ("draft EA").

1 We believe that plans by the Department of Energy (DOE) to begin pyroprocessing do not take into account the serious environmental and non-proliferation drawbacks of that approach. DOE's misguided policy is reflected in the draft EA, which suffers from the following key defects:

2 • Since DOE's National Environmental Policy Act regulations require an Environmental Impact Statement (EIS) for reprocessing facilities, the draft EA attempts to define "reprocessing" very narrowly so that the pyroprocessing campaign does not fall within that definition. But the two reports on pyroprocessing by a special panel of the National Academy of Sciences (NAS) -- as well as the origins of the electrorefiner as the reprocessing component of the Advanced Liquid Metal Reactor -- make clear that pyroprocessing is reprocessing, and, therefore, carries with it the obligation to prepare an EIS.

3 • A closely related point is that pyroprocessing carries proliferation risks that are not adequately examined in the draft EA. The most recent NAS study noted that the technology "could be used by another country to obtain plutonium for a weapons program." This problem is exacerbated by DOE's failure to require appropriately strict controls on the export of pyroprocessing technology. Furthermore, development of a reprocessing technology will undermine the Clinton administration's efforts to dissuade other countries from pursuing reprocessing.

4 • Pyroprocessing would produce uncharacterized waste forms that are not likely to be suitable for emplacement in a repository -- a fundamental concern that the draft EA does not address. It also fails to discuss the disposition options, and thus the environmental impacts of those options, for the separated uranium stream.

5 • In an attempt to strengthen its claim that the environmental impacts of the proposed action will be minimal, and therefore require only an EA rather than an EIS, DOE has scaled back its initial pyroprocessing plans to encompass only a "limited demonstration." This contravenes the clear intent of NEPA to require thorough analysis of

6 major federal actions at the earliest possible time, before bureaucratic momentum can develop. It also constitutes illegal segmentation under NEPA. A key point here is that

under the "limited demonstration," DOE would use not only the existing electrorefiner, but also the new high-throughput electrorefiner that would later be used for full-scale pyroprocessing, thereby undermining any credible claims that the "limited demonstration" is in any meaningful way separable from full-scale pyroprocessing. (6)

• The draft EA does not consider all reasonable alternatives, although such consideration is a fundamental requirement of NEPA. In particular, the EA does not examine the possibility of storing the Experimental Breeder Reactor-II (EBR-II) spent fuel and exploring non-reprocessing technologies. This defect is particularly serious because DOE has acknowledged in writing that "near-term storage of EBR-II spent fuel presents no compelling environmental, safety, or health concern." 7 8

• Perhaps most fundamentally, the entire process to this point has been marred by biased and misleading statements from DOE representatives. For example, a statement from Argonne reported in the trade press indicated that a Finding of No Significant Impact was a foregone conclusion. The problem here is not merely one of public perception of objectivity -- although that is quite important -- but the more crucial question of the validity of the information upon which DOE policymakers will base their decisions. 9

In short, to meet the requirements of NEPA, DOE must not only undertake the more extensive analysis under an EIS, but also must ensure that the information made available to decisionmakers (and the public) is reliable. Otherwise, the public cannot be expected to have confidence in the soundness of the decisions.

If you would like further detail on the above points, please contact Daniel Horner of the Nuclear Control Institute at 202 822-8444.

Sincerely,

James Adams, Safe Energy Communication Council
Mavis Belisle, Peace Farm
Beatrice Brailsford, Snake River Alliance
Tom Clements, Greenpeace International
Brian Costner, Energy Research Foundation
Maureen Eldredge, Military Production Network
Beverly Gattis, STAND
Don Hancock, Southwest Research and Information Center
Daniel Hirsch, Committee to Bridge the Gap
Daniel Horner, Nuclear Control Institute
Lance Hughes, Native Americans for a Clean Environment
Daryl Kimball, Physicians for Social Responsibility
Ralph Hutchison, Oak Ridge Environmental Peace Alliance
Bill Magavern, Public Citizen
Arjun Makhijani, Institute for Energy and Environmental Research
Michael Mariotte, Nuclear Information and Resource Service
Rick Nielsen, Citizen Alert
Christopher Paine, Natural Resources Defense Council
Janice Tilton, National Peace Action

Responses to Document D095

1,3 The proposed demonstration project does not separate plutonium. Moreover, the technology employed is not capable of separating plutonium. It is consistent with the nonproliferation policy of the United States, which does not encourage the civil use of plutonium. Accordingly, the United States does not engage in plutonium reprocessing. Further, by removing and then blending down the highly-enriched uranium, the project supports the goal of the United States to seek to eliminate where possible the accumulation of stockpiles of highly-enriched uranium or plutonium. As a result, the proposed demonstration project is consistent with the nonproliferation policy of the United States. An additional response to comments regarding nonproliferation concerns is provided in Chapter One of this Appendix.

2 The Department of Energy does not regard electrometallurgical treatment as "reprocessing" as that term has been used historically. See Chapter One of this Appendix for more information. The National Academy of Sciences reports refer to the electrometallurgical process as spent nuclear fuel treatment or processing. The *Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Environmental Impact Statement* (DOE/EIS-0203-F) has defined processing as "applying a chemical or physical process designed to alter the characteristics of the spent fuel nuclear material." The electrometallurgical process meets this definition. In addition, the National Academy of Sciences report on treating Department of Energy spent nuclear fuel stated, "The committee recommended that such research and development should be conducted exclusively to evaluate the electrometallurgical technology's effectiveness for treating Department of Energy spent nuclear fuel, and funding decisions about electrometallurgical research and development for Department of Energy spent nuclear fuel treatment should be independent of issues related to the Integral Fast Reactor Program." Department of Energy regulations do not preclude the preparation of an environmental assessment to determine if an environmental impact statement is required. For further discussion, please refer to Chapter One of this Appendix.

4 The proposed research and demonstration project would produce the typical waste and by-product streams of the electrometallurgical technique in order to quantify these streams, to characterize them, and to answer the very questions posed by the commentor, the National Research Council, other peer review committees, and involved scientists and engineers.

5,6 An objective of the proposed project would be to produce data sufficient to allow the Department to determine the technical feasibility of using the electrorefining technology for treatment of Experimental Breeder Reactor-II or other spent nuclear fuel for safe long-term storage or disposal. It is necessary to address questions raised by the National Research Council review of this technology before any proposal can be made for its application.

An environmental assessment is used to determine whether a Finding of No Significant Impact or an environmental impact statement is required. Only after the results of the environmental assessment have been analyzed and public comments have been received and considered will the Department of Energy decide whether the environmental assessment can support a Finding of No Significant Impact or an environmental impact statement should be prepared.

6 The proposed action includes research on a new technology, development of operating data for test equipment, and a limited application demonstration. If the demonstration project were successful, the Department of Energy would review the data and decide whether to propose future applications of the technology. Any such proposal will be subject to appropriate National Environmental Policy Act analysis. See Chapter One of this document for a discussion of the appropriate level of National Environmental Policy Act review.

7 The alternatives addressed in this environmental assessment are those considered reasonable for this demonstration. Discussions of the alternatives suggested during the public comment period have been added to Section 2.1 of the environmental assessment.

8 The no action alternative considers storage without treatment of Experimental Breeder Reactor-II spent nuclear fuel. While the Experimental Breeder Reactor-II spent nuclear

fuel could be safely stored in the Radioactive Scrap and Waste Facility for the duration of its 30-year design life, it will eventually require treatment for disposal. The environmental assessment, Section 5.0, states that monitoring of stored Experimental Breeder Reactor-II SNF would be required independent of the proposed action and all alternatives.

9 The reported statement concerning the National Environmental Policy Act process by an Argonne employee is noted by the Department of Energy. The individual who made that statement does not represent the Department and has no role in the decision making process.

The environmental assessment was prepared, in part, to assist the Department of Energy in determining whether to prepare an environmental impact statement or issue a Finding of No Significant Impact. Only after the results of the environmental assessment have been analyzed and public comments have been received and considered will the Department of Energy decide whether the environmental assessment can support a Finding of No Significant Impact or an environmental impact statement should be prepared.

My name is Dallas Gudgell. I am from the Snake River Alliance in Idaho. My comments today -- I do have another meeting. So I appreciate the ability to be able to comment on this. I'm just a citizen, just a citizen. But, anyway, I'm very honored to be here, and I thank the DOE for the opportunity to be able to comment. We very appreciate to be able. In the process, we have been stumbling around on the Hill up here for about three days. And we do this once a year.

My comments are relative to one overall comment. It seems to me that the whole PEIS process seems to be somewhat fragmented and convoluted and sort of hard to follow for some of us. So with respect to surplus plutonium, it's the same way. And then, of course, with respect to that, with respect to reprocessing, it also seems to be sort of fragmented, which is what my main comments are about.

Reprocessing is not, as I can tell so far from the EIS process with all the different PEISes, completely or comprehensively addressed in any one of them or the sum of all of the PEISes.

Particularly, the electrometallurgical treatment, which I am more comfortable calling the pyro processing because that's what we kick around at the Idaho National Engineering Laboratory, same process, separation of fissile materials it's reprocessing. And that's the process that's in this current PEIS that we're commenting on today. 1

One of our other problems with that is that it's a major federal action. And it's currently the metallurgical process or the pyro processing is currently being looked at as an EA. For us this sets up two NEPA violations: first of all, that the pyro processing ought to be an EIS, instead of an EA; and, secondly, that because this is a major ongoing process, the electrometallurgical and the pyro processing ought to be comprehensively addressed. And we feel that it's not at the current time. 2

I just have two final comments. And it may be tempting, I suppose, in reviewing these comments to say that they might be out of scope, but I don't, I personally don't, think that they are.

The first one is that I believe the DOE

Responses to Document D096

1 The Department of Energy does not regard electrometallurgical treatment as "reprocessing" as that term has been used historically. See Chapter One of this Appendix for more information. The National Academy of Sciences reports refer to the electrometallurgical process as spent nuclear fuel treatment or processing. The *Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Environmental Impact Statement* (DOE/EIS-0203-F) has defined processing as "applying a chemical or physical process designed to alter the characteristics of the spent fuel nuclear material." The electrometallurgical process meets this definition. In addition, the National Academy of Sciences report on treating Department of Energy spent nuclear fuel stated, "The committee recommended that such research and development should be conducted exclusively to evaluate the electrometallurgical technology's effectiveness for treating Department of Energy spent nuclear fuel, and funding decisions about electrometallurgical research and development for Department of Energy spent nuclear fuel treatment should be independent of issues related to the Integral Fast Reactor Program." Department of Energy regulations do not preclude the preparation of an environmental assessment to determine if an environmental impact statement is required. For further discussion, please refer to Chapter One of this Appendix.

2 The Department of Energy has prepared this environmental assessment to assist in determining whether to prepare an environmental impact statement or issue a Finding of No Significant Impact.

U.S. Public Interest Research Group

National Association of State PIRGs

Board of Directors
Alaska PIRG
California PIRG
Colorado PIRG
Connecticut PIRG
Florida PIRG
Illinois PIRG
Maryland PIRG
Massachusetts PIRG
PIRG in Michigan
Missouri PIRG
Montana PIRG
New Jersey PIRG
New Mexico PIRG
New York PIRG
Ohio PIRG
Oregon State PIRG
Pennsylvania PIRG
Vermont PIRG
Washington PIRG
Wisconsin PIRG

May 3, 1996

Mr. Greg Bass
NEPA Document Manager
Argonne Group - West
U.S. DOE
P.O. Box 2528
Idaho Falls, ID 83403

VIA FAX AND MAIL

Dear Mr. Bass:

After obtaining an additional document, we have the following additional comment on the Draft Environmental Assessment for Electrometallurgical Treatment Research and Demonstration Project in the Fuel Conditioning Facility at Argonne National Laboratory - West.

1 The Environmental Assessment does not describe the cost of the proposed action. This is especially relevant to the environmental impact of this program since it was partially funded last year in the portion of the Energy and Water Appropriations bill which funds environmental clean-up of DOE sites. Based on a document entitled "Appendix E", New Processing Technologies Activity Sheets" received by a member of our coalition on April 29, it appears that the proposed action will squander taxpayer dollars until at least 2005. Again, since it is likely that the proposed action will compete with environmental cleanup funds constrained by extremely tight budget limits, the costs of the proposed action should be described.

Thank you for the opportunity to provide additional comments.

Sincerely,

Anna Aurilio
Staff Scientist

S. PIRG 218 D Street, SE Washington, DC 20003 (202) 546-9707

Responses to Document D097

1 The approximate cost for the proposed demonstration is $25 M per year. Assuming that three years are required, the total cost would be $75 M. Processing the EBR-II SNF is funded as part of the IFR termination program. With regard to the "New Processing Technologies Activity Sheets" referenced by the commentor, it is the usual practice in preparing budgets to project what a particular activity would cost if continued into the future. Such projections are prepared by Department of Energy contractors and do not imply any agreement by either the Department of Energy or the Congress to fund the activity in the current or any future years. Actual funding and the associated scope of a given activity are embodied in legislation enacted by the Congress and signed by the President.

NUCLEAR CONTROL
INSTITUTE

1000 CONNECTICUT AVE NW SUITE 804 WASHINGTON DC 20036 202•822•8444 FAX 202•452•0892
E-mail nci@access.digex.net Web http://www.nci.org/nci/

May 3, 1996

Mr. Greg Bass
EA Document Manager
U.S. Department of Energy
P.O. Box 2528
Idaho Falls, Idaho 83403

Dear Mr. Bass:

I am writing to provide comments of the Nuclear Control Institute on the *Draft Environmental Assessment for the Electrometallurgical Treatment Research and Demonstration Project in the Fuel Conditioning Facility at Argonne National Laboratory-West* ("draft EA"). We appreciate the decision by the Department of Energy ("DOE"), published in the *Federal Register* of April 15 (61 Fed. Reg. 16471) to reopen the comment period on the draft EA, a decision apparently reached in response to requests by members of the public to reopen the comment period because of DOE's failure to provide to public reading rooms the reference documents cited in the draft EA. As detailed below, however, there were still several lapses in DOE's attempts to rectify its previous errors. In light of these irregularities, DOE cannot be considered to have fulfilled its obligations under the National Environmental Policy Act ("NEPA"). Moreover, serious defects remain in DOE's NEPA analysis.

These comments supplement the comments submitted by the Nuclear Control Institute on April 5, 1996 ("April 5 comments").

The Newly Available Documents

The newly available documents confirm and exacerbate many of the concerns expressed in our April 5 comments.

1 The paper cited on page 24 (n. 10) of the draft EA, "Pyrochemical Processing of DOE Spent Nuclear Fuels," provides abundant evidence in support of the argument that pyroprocessing/electrometallurgical treatment is reprocessing. (The detailed argument can be found on pp. 4-7 of the April 5 comments and will not be repeated here.) This evidence is particularly significant because the author of the paper is a developer and leading advocate of pyroprocessing and has, in the public hearings on the draft EA, contended that pyroprocessing does not constitute reprocessing.

Among the key passages in the paper are the following:

"The pyroprocessing system has been under development for nearly ten years in an application involving the recycle of spent metallic fuel in a liquid metal cooled fast reactor, the EBR-II" (p. 188).

"The transuranic elements can be recovered and stored in a secure surface repository for future use as a fuel material..." (p. 189).

"Pyrochemical processing, or pyroprocessing, refers to the complete set of unit operations required to separate the actinide elements from fission products present in spent fuel and to place the waste products in stable forms suitable for disposal" (p. 189).

"The salt is then pumped into a second, smaller electrorefiner that maintains a critically-safe geometry, and the transuranics are recovered by electrotransporting them to a liquid cadmium cathode. The transuranic deposit will typically contain 30% uranium, 1% lanthanide fission products, and the balance of the transuranic elements Np, Pu, Am, and Cm" (p. 193).

1

"The use of pyroprocessing for DOE spent fuel management has a number of benefits: (1) the recovery of actinide elements, such as highly-enriched uranium, for subsequent re-use in power generation;" (p. 194).

All these passages confirm, in one way or another, that pyroprocessing has its origins as, and continues to be, a technology for the separation of actinides from spent nuclear fuel and, therefore, must be considered reprocessing. The final confirmation of this point comes from the titles of two articles cited in the end notes, "Pyrochemical Recovery of Actinides" (n. 6) and "Chemical Basis for Pyrochemical Reprocessing of Nuclear Fuel."

* * *

Another important document is "Appendix E, New Processing Technologies Activities Sheets."[1] There were several procedural irregularities in connection with this document.

First, when I visited the Washington, D.C. DOE reading room on April 29, the document was not available although it had been specifically cited in written requests from Daniel Hirsch of the Committee to Bridge the Gap. When I inquired about it, the document was provided to me by a DOE representative. But the document provided was dated April 26, 1996, and, therefore, clearly was not the document submitted with the Peterson letter (see n. 1 of these comments), since that letter was dated November 10, 1995.

2

As for the document itself, the more noteworthy passages include the following:

[1] This document is part of the material included with R.J. Peterson, "Memorandum to Distribution, Submittal of the Spent Nuclear (Fuel) Program Technology Prioritization Results," November 10, 1995, which is cited on p. 16 (n. 8) of the draft EA.

3 The comparison of the pyroprocessing waste form with borosilicate glass (p. E-5) is highly optimistic and does not address the reservations expressed by various National Academy of Sciences ("NAS") reports. (See April 5 comments, pp. 11-13 for a discussion of those reservations.)

4 The statement that "demonstration [of pyroprocessing] is required for mandated shutdown of EBR-II" (E-7) is erroneous. DOE officials have said on more than one occasion that the defueling of the EBR-II is independent of the start-up of pyroprocessing. Indeed, as noted in our April 5 comments (p. 18), the draft EA supports this point when it says that under the No-Action Alternative "DOE would continue defueling the EBR-II" (p. 57).

5 The budget chart on pp. E-7 and E-8 does not comport with DOE's budget requests for Fiscal Years 1996 and 1997. DOE's revised budget request for FY 1996 under Nuclear Technology R&D was $25 million -- a figure which does not include the additional $25 million for pyroprocessing under the EBR-II termination account. Thus, DOE requested and received $50 million for pyroprocessing in FY 1996 while the document suggests that the program required only $17 million. The DOE request for FY 1997 was once again $25 million in each of the two categories, for a total of $50 million, while the document indicates that the required amount is $17.7 million. DOE should account for this discrepancy.

6 The budget tables also reveal that DOE has spent vastly more on pyroprocessing than on any of the alternatives. Therefore, the statements in the draft EA that "there are no other SNF treatment technologies being developed that have reached a stage of development to warrant testing by DOE with irradiated fuel" (p. 4) and that "[i]n contrast with electrometallurgical treatment these technologies are at a relatively immature state of development and would require preparation of a facility and equipment before a demonstration with actual SNF could be carried out" (p. 7) are all but meaningless. The relative immaturity of the alternative technologies can be attributed entirely to their lower level of funding.

7 Since the EBR-II spent fuel was to have been pyroprocessed and recycled into the Advanced Liquid Metal Reactor ("ALMR"), DOE had not developed a plan for treatment of the spent fuel. Once the ALMR was terminated and the EBR-II shut down, DOE should have begun seriously exploring disposition options for the EBR-II spent fuel. Instead, it simply continued to develop the ALMR's pyroprocessing technology, adapting the technology slightly so that it could be labeled a spent-fuel management option. Under these circumstances, it is hardly surprising that pyroprocessing is the most developed of the options.

8 This skewed approach cannot be regarded as fulfilling the NEPA requirement to "rigorously explore and objectively evaluate all reasonable alternatives." (40 C.F.R. §1502.14(d).) DOE has invested heavily in one approach, to the exclusion of others, and then, on the basis of this lopsided investment, declared this approach to be the winner. This is precisely the "irreversible commitment of resources" prior to environmental review that NEPA is designed to prevent.

3

Finally, it is not at all clear from Appendix E -- or from or from any of the materials attached to the Peterson letter -- why pyroprocessing has "consistently ranked first among new process technologies," as stated in the draft EA (p. 16). All of the other technologies evaluated[2] in Appendix E cost substantially less than pyroprocessing, or produce a known waste form, or both. The high cost of pyroprocessing and the uncharacterized waste form the process produces clearly are major disadvantages. 9

In short, this document provides further evidence that DOE's analysis is based on misleading and erroneous statements.

Other Developments Since April 5

In response to a question from Senator Kempthorne during an April 16 hearing of the Senate Armed Services Committee, Secretary O'Leary said that DOE will decide by May 15 on its course of action with regard to pyroprocessing.[3] Since the comment period is open until May 3, DOE is allowing itself, in practice, slightly more than one week to analyze and respond to comments before making a decision. It strains credulity to assert that comments will inform the decisionmaking process -- as NEPA requires -- in any meaningful way if they must be considered under such a tight deadline. 10

Secretary O'Leary's statement on April 16 that there would be a decision by May 15, in spite of the May 3 comment deadline, amounts to a prediction that the comments received between April 16 and May 3 will be so slight in number and content that DOE can dispense with them and prepare its decision document in less than two weeks. The statement strongly suggests that the outcome of the decision process is a foregone conclusion. Added to the overwhelming evidence of bias in the decision process (see April 5 comments, especially pp. 19-21), this commitment to a hasty decision by Secretary O'Leary makes clear that DOE has completely frustrated the intent of NEPA to establish a fair-minded and well-informed decision process.

New information also has emerged with regard to the non-proliferation reviews that were mentioned during the public hearings.[4] These reviews, we recently learned, were conducted two years ago and, therefore, did not address the proliferation concerns that a special panel of the NAS raised in two recent analyses of pyroprocessing: 11

---

[2] It should be noted that the list of technologies evaluated in Appendix E includes two -- Dissolution and Vitrification, and Melt-Dilution -- that are not included in the list on p. 16 of the draft EA.

[3] "Secretary O'Leary Commits to Decision on Electrorefiner Demo," *Weapons Complex Monitor*, April 19, 1996, 3.

[4] *Public Meetings on the Draft Environmental Assessment, Electrometallurgical Research and Demonstration Project in the Fuel Conditioning Facility at Argonne Nation [sic] Laboratory-West*, Wednesday, February 21, 1996, 218-219.

12

> Developing technology that effectively extracts the plutonium from mixtures could facilitate decommissioning of former weapons manufacturing facilities and mitigate some of the problems found at these facilities, such as corroding fuel. However, such efficient technology also raises concerns about proliferation; what the United States might use to assist in the cleanup of a contaminated facility such as Rocky Flats could be used by another country to obtain plutonium for a weapons program.[5]

This concern reinforces a point that the NAS made in its earlier study of pyroprocessing:

13

> Although the developers of the electrometallurgical technique argue that the technology is proliferation resistant, any SNF processing approach that is capable of separating fissionable materials from associated fission products and transuranic elements could be redirected to produce material with nuclear detonation capability....Demonstration of the process could, however, add to the risk that a nation intent on weapons production might consider adapting this technology for possible production of fissile material, although such material would be of poor quality for a weapon.[6]

(11) Moreover, there is no documentation of the two-year-old DOE review. Before reaching a decision its NEPA analysis, DOE should prepare a written non-proliferation assessment that includes a response to the issues raised by the two cited passages from the NAS studies.

14 Indeed, this point illustrates a broader problem with DOE's analysis of pyroprocessing. Although DOE has commissioned a National Academy of Sciences panel to assess the technology, the panel's conclusions have been effectively ignored in DOE's analysis. As noted above -- and in more detail in the April 5 comments -- the panel's concerns regarding the proliferation risks of pyroprocessing and the environmental problems posed by the uncharacterized waste forms simply were not addressed in the draft EA. Given the history of erroneous and misleading information in connection with pyroprocessing and its parent program, the ALMR, all of DOE's technical assessments should be submitted for verification to an independent entity such as the NAS before DOE makes any policy decisions based on those assessments.

Conclusion

15 The newly available documents and other developments since April 5 only add to the evidence detailed in the April 5 comments that the draft EA falls far short of fulfilling

---

[5] Gregory R. Choppin, et al., *An Evaluation of the Electrometallurgical Approach for Treatment of Excess Weapons Plutonium*, National Research Council, 1996, 27.

[6] Fred Basolo, et al., *An Assessment of Continued R&D Into an Electrometallurgical Approach for Treating DOE Spent Nuclear Fuel*, National Research Council, 1995, 30-31.

(15) DOE's obligations under NEPA. DOE must prepare an Environmental Impact Statement ("EIS"). The EIS must be based on full and accurate information, and that information must be made available to the public.

Thank you for the opportunity to provide these comments.

Sincerely,

Daniel Horner

Responses to Document D098

1 The Department of Energy does not agree that the proposed action involves "reprocessing" as the term is used in the Department of Energy's National Environmental Policy Act regulations because neither the purpose nor the effect of the action is to extract plutonium or highly-enriched uranium. For further discussion, please refer to Chapter One of this Appendix.

Section 2.1 of the environmental assessment makes it clear that the origins of the development of electrometallurgical technology was in the development of a closed fuel cycle for the Integral Fast Reactor. Consistent with the passage cited by the commentor, the technology in not capable of separating plutonium from uranium, transuranic elements, and fission products. As modified for the treatment of spent nuclear fuel, electrometallurgical technology would not employ a cadmium cathode for the recovery of a transuranic product. All plutonium and other transuranic elements would be immobilized with the fission products in the ceramic waste form.

2 The information in the "Spent Nuclear Fuel Program Prioritization" has no direct bearing on the proposed demonstration or the alternatives which are specific to Experimental Breeder Reactor-II spent nuclear fuel. Accordingly, the reference which was to a memorandum transmitting a draft section for use in the "Spent Nuclear Fuel Prioritization Report" has been eliminated.

3 The proposed research and demonstration project would produce the typical waste and byproduct streams of the electrometallurgical technique in order to quantify these streams, to characterize them, and to answer the very questions posed by the commentor, the National Research Council, other peer review committees, and involved scientists and engineers. Any definitive comparison of this waste to any of the borosilicate glass waste forms have to be based upon actual radioactive samples.

4 The commentor is correct that under all alternatives analyzed in the environmental assessment, the EBR-II would continue to be defueled.

5, 6 The Department notes the commentor's observation. This project is funded under the IFR termination account. The proposed demonstration leverages investments made for the IFR program, taking advantage of an upgraded hot-cell facility (FCF) and equipment already developed.

7 The Department of Energy notes the commentor's opinion.

8 The National Environmental Policy Act regulations require evaluation of reasonable alternatives to the proposed action. Alternatives are evaluated in Section 2.0 of the environmental assessment. The environmental assessment analyzed three alternatives in detail and considered several other process alternatives which were eliminated from detailed evaluation. In general, the excluded alternatives had not reached a level of development that would allow a detailed evaluation. Any attempt at such a detailed evaluation would have required an unacceptable level of speculation. Evaluation of alternative processes that were identified in the public comment period have been added to the environmental assessment, Section 2.1. The potential environmental impacts that would result from implementing a conceptual treatment process cannot be analyzed in equal detail relative to the impacts that can be quantified for a process that has reached a greater level of technical maturity.

9 The relative ranking of electrometallurgical technology in the national spent fuel program played no role in DOE's decision to demonstrate this technology with Experimental Breeder Reactor-II spent nuclear fuel. The data cited in Appendix E are preliminary invalidated, partial cost data. Electrometallurgical technology is the lowest cost technology with the highest probability of success for the proposed demonstration with EBR-II fuel.

10 The Department attempted to involve interested members of the public early in the NEPA process through individual meetings, public meetings and the active solicitation of comments. All comments were considered by the decision makers. The commentor's statements regarding the appearance of a predetermined outcome of the environmental assessment process and the reason for reopening the public comment period are noted. In response to other comments that not all documents had been found in the public reading rooms, an inventory of each of the reading rooms was taken, and all documents were personally verified to be in place by Department of Energy or Argonne National Laboratory

personnel on April 8. On April 15, 1996, the public comment period was reopened until May 3. This brought to 89 the number of days available for public comment. The comment period was reopened to afford those who may not have had an opportunity to review certain referenced documents to do so. The period from May 3 until May 15 was considered to provide adequate time to evaluate and give full consideration to any additional comments that may have been received during the comment period. The Department has considered all comments post-marked by May 3; no late comments have been received. Responses to the comments made by the author in his April 5 letter are contained in document # D093 in this Appendix.

11 The comments regarding the existence of a Department of Energy written determination regarding the proliferation risks posed by the proposed action are acknowledged. No previously written determination exists. However, the Department's Office of Nonproliferation and National Security has reviewed the environmental assessment and has concurred in its release to the public. That office was also consulted during the decision making process. Please see Chapter One of this Appendix for more information regarding the nonproliferation aspects of the proposed action.

12,13 The proposed demonstration project does not separate plutonium. Moreover, the technology employed is not capable of separating plutonium. It is consistent with the nonproliferation policy of the United States, which does not encourage the civil use of plutonium. Accordingly, the United States does not engage in plutonium reprocessing. Further, by removing and then blending down the highly-enriched uranium, the project supports the goal of the United States to seek to eliminate where possible the accumulation of stockpiles of highly-enriched uranium or plutonium. As a result, the proposed demonstration project is consistent with the policy of the United States on nonproliferation. An additional response to comments regarding nonproliferation concerns is provided in Chapter One of this Appendix.

14 The proposed research and demonstration project would produce the typical waste and by-product streams of the electrometallurgical technique in order to quantify and characterize these waste streams and to answer the very questions posed by the National Research Council, other peer review groups, and involved scientists and engineers. Many of the questions raised refer to the production and testing of actual waste forms and will remain

unanswered if the proposed demonstration does not proceed. The potential environmental impacts associated with the creation of this waste and its storage until final disposition were analyzed in Section 4.0 of the environmental assessment.

In developing technical assessments, making program decisions, or establishing policy related to accomplishing its missions, the Department of Energy actively seeks participation and input from technical experts within and outside the Department, interested members of the public, and other stakeholders. Where it is appropriate to do so, specific organizations, such as the National Academy of Sciences and the National Research Council, are requested and chartered to provide focused analyses to provide information, advice and recommendations to assist the Department in performing these activities. However, the ultimate decision authority rests with the Department of Energy.

15 Information on the appropriate level of National Environmental Policy Act analysis is provided in Chapter One of this Appendix.

Snake River Alliance

☐ Box 1731 · Boise ID 83701 · 208/344-9161
☐ Box 4090 · Ketchum ID 83340 · 208/726-7271
☒ 310 E. Center · Pocatello ID 83201 · 208/234-4762

May 3, 1996

Mr. Greg Bass
EA Document Manager
US Department of Energy
Box 2528
Idaho Falls, ID 83403

Dear Mr. Bass:

On behalf of the members of the Snake River Alliance, I offer the following comments on the Electrometallurgical Treatment, Research, and Demonstration Project in the Fuel Conditioning Facility at Argonne National Laboratory-West draft environmental assessment. These comments are in addition to those we submitted April 5, 1996.

In our April 5 comments, I repeated my request from the Idaho Falls hearing for any written determination the Department of Energy has made regarding the proliferation risks posed by the pyroprocessing technology. I have since met with Terry Lash and Joan Rohlfing and both asserted that no such written determination exists. They both explained that the determination was made fairly informally two years ago by Mr. Lash and Ken Luongo. The US nonproliferation policy is important, not only in this country, but throughout the world. For it to be coherent and effective, its advancement must not depend on the kind of informal decisionmaking that may have taken place two years ago. This is particularly true given the constant shifts in the pyroprocessing proposal and the proliferation questions raised by the National Academy of Sciences since Mr. Lash and Mr. Luongo visited with one another. The Department of Energy must evaluate the proliferation perils of the pyroprocessing technology with at least the same rigor as the NAS's evaluations and must make that evaluation available before any decision is made. Further, it must explain any differences between its conclusions and those of the NAS. 1

Sincerely,

Beatrice Brailsford
Program director

Responses to Document D099

1 The comments regarding the existence of a Department of Energy written determination regarding the proliferation risks posed by the proposed action are acknowledged. No previous written determination exists. However, the Department's Office of Nonproliferation and National Security has reviewed the environmental assessment and has concurred in its release to the public. That office was also consulted during the decision making process. Please see Chapter One of this Appendix for more information regarding the nonproliferation aspects of the proposed action.

The proposed action includes research on a new technology, development of operating data for test equipment, and a limited application demonstration. One of the objectives of the proposed demonstration is to answer the questions raised by the National Research Council in its report.

COMMITTEE TO BRIDGE THE GAP
1637 BUTLER AVENUE, SUITE 203
LOS ANGELES, CALIFORNIA 90025
(310) 478-0829

3 May 1996

Mr. Greg Bass
EA Document Manager
U.S. Department of Energy
Argonne Group-West
P.O. Box 2528
Idaho Falls, Idaho 83403

Re: Draft Environmental Assessment
"Electrometallurgical Treatment Research and
Demonstration Project in the Fuel Conditioning Facility at
Argonne National Laboratory - West"

Dear Mr. Bass:

In early February of this year, DOE published notice in the Federal Register of availability of the above-referenced Environmental Assessment (EA) and solicited public testimony thereon at hearings to be held later that month and written comments to be postmarked by 22 March.

However, DOE failed to make publicly available any of the documents incorporated by reference in the EA. Public testimony at the two hearings was thus held without the public having had access to that information. Despite repeated public requests, the comment deadline of 22 March passed without either the full documents being made available or a formal response to requests for extension of the comment period until all the refereniced documents were available and sufficient time had occurred for people to review them.

On the 22nd itself, DOE notified three groups informally that it was extending the comment period two weeks. The Committee to Bridge the Gap (CBG) was not among those groups. After the close of business on that deadline day, DOE sent a letter confirming this two week extension to one of those three groups. 1

No notice of the extension was published in the Federal Register, nor any notice that documents had failed to be placed in the reading rooms and would be in advance of the new deadline. As of the day before the new comment deadline, documents referenced in the EA were still not in the reading rooms, making effective comment impossible. The new deadline passed without response to written requests that DOE rectify this situation and start the process over when the full documentation was finally available for public review. No indication that there would even be an extension of the comment period was provided, once again, until after the second deadline passed. Parties were forced to submit comments based on the incomplete documentation by either the 22 March published deadline or, for the few who knew of the 5 April extended deadline, by that date.

On 8 April, two and a half weeks after the deadline published in the Federal Register and three days after the informal extended deadline, DOE provided to the public reading rooms what it purported to be a complete set of the documents incorporated by reference in the EA. Please note that this was *after* expiration of the announced public review and comment periods. Furthermore, as will be discussed below, documents were *still* missing. Note that the DOE notice attesting to the availability of the full set of documents supposed to be in the Washington, D.C. reading room, is unsigned by the reading room librarian, who apparently declined to attest that the documents were complete even then. (See attached DOE notice from reading room in Washington, D.C.)

On 16 April, DOE published in the Federal Register notice of the reopening of the public comment period on the EA, until 3 May. Nowhere in the announcement did DOE disclose that it was reopening the comment period because documents referenced in the EA had not been available for public review during the previous comment period, nor did it announce that the documents were supposedly now available. The public was thus not on notice of the new supposed availability of the missing documentation, and had no reason to submit additional comments beyond what they had submitted previously based on the EA itself. (1)

This performance by DOE has continued a rather remarkable pattern of consistent failure to comply with the public disclosure/public right to review requirements of NEPA. Despite repeatedly having the failures called to its attention by CBG and others, DOE still seems unable to comply with the appropriate procedures. (Note that the hearings convened by DOE on this matter were held prior to *any* of the documents incorporated by reference into the EA being made publicly available, and that to this date DOE has still not responded to my request to reschedule the hearings so that public testimony would be based on access to the EA and its incorporated documents.)

We now turn to whether the referenced documents were even available as of the 16 April Federal Register notice reopening the comment period.

Document Availability As of 16 April

The day before the 5 April deadline, I received from DOE two packages purportedly containing four documents that had been missing from the reading room. I indicated in my response the following day that even then at least one of the four documents was incomplete. I was sent a memorandum that was already in the public reading rooms; I had, however, pointed out that it was incomplete, referring in the text to appendices D and E for the bases for the conclusions, but the appendices were not available in the reading room. The document sent me on 4 April still was missing the appendices. 2

On 19 April I received a letter from Terry Lash at DOE saying that on 6 April (i.e., after both the originally published 22 March comment deadline and the informally extended 5 April deadline) a supposedly complete set of documents had been placed in the library at the University of California, Irvine. (It is not clear if this was designed to assist primarily CBG or the general public. If the former, UC Irvine is a somewhat strange choice, a three hour roundtrip drive from our office, whereas UCLA is five minutes away. If for the general public, it is surprising that the Federal Register notice did not let the public know that the documents had been supposedly made available in that library.)

On 24 and 25 April, I contacted librarians at the Government Publications section of the UC Irvine library in an effort to ascertain whether they indeed did have complete sets of the documents. I had, after all, traveled a long distance to Idaho to attempt to review documents there in February, only to discover none of the documents were available for review; and I had

traveled to Washington, D.C. in March to review documents, only to find key documents had not been made fully available there either. I did not wish to take a day out to travel to Irvine only to find once again that the full set of documents was not there.

I spoke with librarian Kay Collins, who kindly agreed to check for a sample document to see if it was complete and included in the set provided UC Irvine. I asked her to look for the appendices D and E of the "Prioritization" memo. When she got back to me she informed me the "Prioritization" memo her office had been provided by DOE was indeed incomplete; had I gone down to the library at that time, I would have once again found an incomplete set of documents. She offered to contact you to see if you could rectify the situation.

(I was informed by Ms. Collins that you had flown down to Southern California around 8 April and brought the documents to UC Irvine personally, not having first made an appointment with her, just arriving unannounced, staying five minutes, not helping them check to see if the documents were complete, just leaving a few minutes after arriving. I am rather surprised that, given government budget problems, you would fly with the documents rather than just ship them, and that once you were present with the documents, you would not stay with the librarians, familiarize them with the documents and help them assure that they were indeed complete.)

On Friday 26 April, I received a telephone call from Ernie Hughes, DOE manager of ANL-West, saying DOE had had an inquiry from the UC Irvine library about the missing sections of the "Prioritization" memorandum. He said they would be sent to me. I asked if they would also be sent to the public reading rooms. He said they would be sent to UC Irvine, but not the other reading rooms, to which I objected. He said the appendices were only in draft and had not been relied upon in the EA. I indicated that the latter point was clearly in error, as they were part of the memo referenced in the EA and the basis for it. Without the basis, there were only conclusions and no way for DOE to claim any factual basis for the matter at issue. And if they were only draft, then the conclusions in the memo reached thereby were also not conclusions that could be relied upon in the EA.

(2) On Monday, 29 April, I received the appendices. The same day I was informed by the librarian at UC Irvine that she had also received the appendices. I asked if I could send a list of other documents that had been missing and have them checked to see if there were now a complete set before undertaking the trip to Irvine. I was told yes, which I did by email the following day. Unfortunately, I still have not received a response (although I should make clear this is not really the responsibility of UC Irvine; DOE should have taken measures to assure a complete set at the reading rooms at the outset.)

One of the documents I asked to have checked to see if it were complete is the Laidler paper, "Pyrochemical Processing of DOE Spent Nuclear Fuels." The document was originally not in the public reading rooms at all, then only the top page was provided. On 4 April, DOE sent to me what it purported to be a complete copy. Upon review, it turned out that the supposedly now-complete copy ends in mid-sentence on p. 194; obviously p. 195 and who knows how much more is still missing. Unfortunately, the missing sections appear to include critical information, as the article up to p. 194 does not contain the information the EA claims to rely on it for--the stability of the waste form. One cannot evaluate the validity of the EA claim without the full Laidler paper, which still has not been provided.

In short, DOE has completely frustrated the intent of NEPA--the responsibility of making publicly available for review material incorporated by reference into environmental documents for which public comment is solicited. I must say that frustrated is the appropriate word. I have gone to DOE public reading rooms in Idaho and Washington, D.C., attempting to review the full incorporated documentation, only to find it not there. My inquiry to the new Irvine repository

(2) resulted in finding that they too did not have a complete set, even after DOE had claimed to have rectified the problems. A review of an EA, particularly one of this importance, cannot be done without the full referenced documents, and cannot be done piecemeal.

Nonetheless, here I will try to provide some comments on two of the documents DOE has belatedly made available, although neither of them appears complete.

The portion of the Laidler article that is provided is fascinating in demonstrating the true purpose of the project, a purpose denied in the EA. Thus it demonstrates an inaccurate and indeed misleading project description in the EA.

Laidler--who was one of the hearing officers or panelists at both the Idaho and Washington, D.C., EA hearings--says in this article that one of the three "benefits" of the use of pyroprocessing or electrometallurgical treatment of DOE spent fuel is "the recovery of actinide elements, such as highly-enriched uranium, for subsequent re-use in power generation." p. 194. This is precisely what the critics of the project have maintained and which DOE has denied in the EA claiming that no reprocessing, no extraction of actinides for subsequent reuse in power generation, is contemplated. Note that Laidler is not referring only to uranium, but also to other actinides, and that he clearly concedes that the process will recover highly enriched (i.e., weapons-grade) uranium.

The reinforce the former point, Laider (p. 190) says, "The key element of the pyroprocess is the electrorefining step where the actinide elements are separated form the fission products 3 present in the spent fuel." The EA has denied any intent, now or in the future, to use pyroprocessing to separate out actinides other than uranium; Laidler, a key part of the EA process, here confirms it is.

Indeed, on the same page, Laidler states that the process yields *three* process streams: a mineral waste form with the fission products, a pure uranium stream, and a waste stream containing the transuranic elements. The EA has claimed the process will produce only two waste streams--pure uranium, and a mineral form with fission products and transuranics.

Laidler on p. 189 goes further:

> This process is applicable in its current stage of development to 99% of the DOE spent fuel inventory and offers the advantages of a simple, compact system that is both economical and technically sound. The pyrochemical process produces a separation of the fission products present in spent fuel from the transuranic elements that represent the greatest threat to public health and safety. Pure uranium is separated form the transuranic elements and can be disposed of as a low-level waste, being free of fission products. The transuranic elements can be recovered and stored in a secure repository for future use as a fuel material, or they can be alloyed with the structural materials present in the spent fuel elements and placed in ultra-long life containers for repository disposal.

This is an extraordinary passage. (If one were to wonder if the failure of DOE to place in the reading rooms other than the first page of this paper were other than accidental, these sections might suggest that the omission was to prevent disclosure of the far broader intent of this program.) Laidler says first of all that this process *in its current stage of development*--is 4 applicable to 99% of the spent fuel in the DOE inventory. The EA talks only of contemplated use for EBR-II fuel, and only a small percentage of it. This is clear evidence of a bait-and-switch game, artificially segmenting the program so as to keep NEPA reviews below the EIS threshold, using EAs and the like, and not examining (at least at the early stage required by NEPA) the potential impact of the whole contemplated endeavor.

Laidler also makes clear that the separation of the transuranics (e.g., plutonium) is at the core of the process, while the EA claims they are not contemplated to be separated. And then the big disclosure--that the separated transuranics could be recovered and stored "for future use as a fuel material." This is precisely what critics have feared was the intent of the program, and what DOE has denied in the EA. (3)

(I note that the discussion of disposing of the uranium as waste is expanded on on p. 190, making clear that the uranium could also be recycled "to commercial light water reactor fuel fabricators." Again this proves the intent is reprocessing--separation and recycle in reactors.) 5

As to Appendices D and E of the "Prioritization" memo: they appear to call into question claims made in the EA based supposedly upon the memo. The memorandum was from R.H. Peterson, and is entitled "Submittal of the Spent Nuclear (Fuel) Program Technology Prioritization Results." The EA makes it sound as though this SNF Program Technology Prioritization Working Group had identified electrometallurgical treatment as the best alternative for treating spent nuclear fuel. The Appendix E information identifies two technologies that do not require reprocessing and would produce a waste form that is borosilicate glass that meets repository requirements. Electro refining produces a new waste form that cannot yet be characterized as to its ability to be as good as borosilicate glass.

One of the technologies, Dissolution and Vitrification (see E-15), is not even listed in the EA discussion. Perhaps this is because it is largely not a new technology, but a proven technology that is far more mature and proven than electro-metallurgical treatment. This technology involves dissolving the spent fuel and converting it into a glass--without any reprocessing. This is an alternative not examined in the EA.

The Appendix E discussion of the electrometallurgical process makes clear that work has already occurred on EBR-II fuel, as well as on plutonium separation using the technique, with actual plutonium in kilogram quantities. It also make clear the plan is to use the technique on many fuels other than EBR-II. These documents clearly demonstrate that this project is far larger in scope than described in the EA, and the full implications of what is contemplated need to be assessed in an EIS. DOE is artificially segmenting its NEPA review and failing to accurately describe the project. 6

A few other comments. The version of the Appendices sent to me is dated 26 April 1996. Clearly these are not the appendices referred to in the Peterson memorandum, which is itself dated 10 November 1995. Why I am sent a document that is not the one relied upon is unclear. Nor is it clear how the document has been changed from the relevant one--I do not material whited out on page E-30 and new material inartfully added in a different typeface. Why is there the reluctance to provide the Appendices of the Peterson memo as is? What changes have been made and why? And how can these appendices possibly be dated 26 April 1996--the date DOE sent them to me, in response to an inquiry from UC Irvine of 25 April. What is going on here?

This whole process has gotten out of hand and I respectfully urge once again that DOE make a complete set, fully complete set, of the referenced documents available; notify the public of the full availability via publication in the Federal Register; reschedule the hearings so that testimony is based upon access to all the documents; and set an appropriate date thereafter for comments based on the EA and its incorporated documents--all of those documents, provided in complete form, without missing or altered portions sections. (1)

I must also note considerable dismay in the public statements made by senior DOE officials about what appears to be predetermined to be an inevitable outcome of this EA process 7

(7)

--a finding of no significant impact and an approval to proceed. At a Congressional hearing in the last couple of weeks, in response to questions from Idaho Senator Kempthorne, DOE Secretary O'Leary apparently defended the extension of the comment period to 3 May because of a need to defend against lawsuits, but promised a decision on approving the project by 15 May, just twelve days later. Obviously DOE is not contemplating taking those comments particularly seriously, reviewing them in any depth, if a decision has already been made that final review of the issues will be completed within days of receiving the comments--no matter how many comments are received or how detailed or potentially troubling. NEPA is not supposed to be a procedural hoop to jump through to get to a pre-ordained conclusion. It is supposed to be considered review of public concerns and information in order to make the environmentally appropriate decision. DOE seems to have forgotten the purpose of NEPA, and the troubles (e.g., immense contamination, extremely expensive to remediate) it has gotten into when in the past it has made the same mistake.

I enclosed herein, in addition to these comments, a revised set of our 5 April comments, correcting certain editorial errors.

Sincerely,

Daniel Hirsch

Daniel Hirsch
President

Responses to Document D100

1 The references cited in the environmental assessment have been placed in the Department of Energy public reading rooms. Additional information on this issue is provided in Chapter One of this Appendix.

2 Appendices D and E were not included in the reference material as they were not referenced directly nor were they used in the preparation of the environmental assessment as they were and still are in draft form. The information in the "Spent Nuclear Fuel Program Prioritization" has no direct bearing on the proposed demonstration or the alternatives which are specific to the Experimental Breeder Reactor-II spent nuclear fuel. Accordingly, the reference, which was to a memorandum transmitting a draft section for use in the "Spent Nuclear Fuel Prioritization Report," has been eliminated from the environmental assessment.

A complete set of the reference documents was made available at the University of California at Irvine for the general public. This location was selected as it is a designated government information center. The documents were received at the main library on April 5, as arranged through a series of conversations with the library staff in the government documents section. A DOE representative went to the library on April 8 in accordance with an appointment established with the library staff on April 5. The purpose of the visit was to ensure complete delivery and placement of the reference documents on the shelves. Upon arrival, the documents were all found to have been placed in the reference section and were available to the public at that time. Following a discussion concerning the content of the reference material with two members of the library staff, the documents were fully inventoried and found to be complete. Appendices D and E were sent to the library upon request of the librarian.

The Laidler document, an eight-page paper prepared for a presentation to the American Nuclear Society meeting, was put into all the reading rooms in its entirety. The copy specifically sent to the commentor was complete to the knowledge of DOE. No notification to the contrary was received by DOE from the commentor or at that time.

3 As stated in Environmental Assessment Section 2.3, the intent of the proposed action is to blend the highly-enriched uranium which would be extracted to low-enriched uranium. This material would be stored in the existing Fuel Assembly and Storage Building vault to await a decision by the Department of Energy on the disposition of its surplus uranium materials. Any such proposed decision will be the subject of appropriate NEPA analysis. One of the options that are being considered is the sale of this material to commercial interests who may use it for the manufacture of nuclear fuel. The decisions on the disposition of this material are beyond the scope of this Environmental Assessment.

Clarification of the separation capabilities of electrometallurgical technology has been added to Section 4.7 of the environmental assessment and Chapter 1 of this Appendix.

The commentor has stated that electrometallurgical treatment produces two waste streams--pure uranium, and a mineral form. Section 4.5 of the environmental assessment states that two process waste streams are produced from the electrorefiner operations, a metal waste form and a ceramic waste form. The footnote to the environmental assessment Table 4-6 states that uranium recovered as part of the proposed actions would not be waste and is not shown in the Table. Section 2.3 discusses the production of the low-enriched uranium product.

4 The reference paper is a public document that is available to anybody by requesting the Proceedings of DOE Spent Nuclear Fuel Challenges and Initiatives. These proceedings were published by the American Nuclear Society and are in some technical libraries. The Department of Energy has recognized and acknowledged potential application of electrometallurgical technology to other spent fuels and materials, and has asked the National Research Council to independently review the potential applications of this technology. The National Research Council's reports have been referenced in the environmental assessment and the public review process. An objective of the proposed project would be to produce data sufficient to allow the Department to determine the technical feasibility of the electrorefining technology for Experimental Breeder Reactor-II or other spent nuclear fuel for safe long-term storage or disposal. Before any proposal can be made for its broader application, however, it is necessary to address questions raised by the National Research Council review of this technology. The existing and high efficiency electrorefiners are needed to provide these data. The equipment associated with the proposed demonstration is not of adequate size or configuration for Department of Energy

or commercial production-scale activities. Also, with regard to the Fuel Conditioning Facility, there are several steps in the process primarily associated with material handling systems that would limit the total output of the facility. If the demonstration project were successful, the Department of Energy would review the data and decide whether to propose future applications of the technology. Such a proposal would be made in accordance with all applicable laws and regulations, and would include appropriate National Environmental Policy Act analysis.

5 As noted in the response to comment 3, disposition of the byproduct uranium would be decided by the Department of Energy after appropriate NEPA analysis. Both disposition as waste and use in commercial light water reactor fuel are options being considered. The policy on disposition of surplus uranium is beyond the scope of this environmental assessment.

6 The commentor's suggestion that Dissolution and Vitrification should be considered as a option is noted. The dissolution and vitrification process requires an electrolytic dissolver similar to those in the Savannah River Site H-Canyon. Because Experimental Breeder Reactor-II driver fuel contains highly-enriched uranium, glass composition and melter design would have to be modified from currently established technology. This technology is being considered for further research and development, but is not ready for a demonstration with actual highly-enriched spent nuclear fuel.

The National Environmental Policy Act requires evaluation of reasonable alternatives to the proposed action. Alternatives are evaluated in Section 2.1 of the environmental assessment. The environmental assessment analyzed three alternatives in detail and considered several other process alternatives which were eliminated from detailed evaluation. In general, the excluded alternatives had not reached a level of development that would allow a detailed evaluation. Any attempt at such a detailed evaluation would have required an unacceptable level of speculation. Evaluation of alternative processes including the dissolution and vitrification alternative that were identified in the public comment period have been added to the environmental assessment, Section 2.1. The potential environmental impacts that would result from implementing a conceptual treatment process cannot be analyzed equitably relative to the impacts that can be quantified for a process that has reached an adequate level of technical maturity.

In order to avoid confusion, the reference, "Spent Nuclear Fuel Program Prioritization," has been eliminated from the environmental assessment. Further, the information in that document played no part in the proposed demonstration, which is specific to Experimental Breeder Reactor-II spent nuclear fuel. It was improperly included; the specific reference was to a memorandum transferring draft information for use in the "Spent Nuclear Fuel Prioritization Report" that has not yet been issued.

7 The Department attempted to involve interested members of the public early in the NEPA process through individual meetings, public meetings and the actual solicitation of comments. All comments were considered by the decision makers. The commentor's statements regarding the appearance of a predetermined outcome of the environmental assessment process and the reason for reopening the public comment period are noted. In response to other comments that not all documents had been found in the public reading rooms, an inventory of each of the reading rooms was taken, and all documents were personally verified to be in place by Department of Energy or Argonne National Laboratory personnel on April 8. On April 15, 1996, the public comment period was reopened until May 3. This brought to 89 the number of days available for public comment. The comment period was reopened to afford those who may not have had an opportunity to review certain referenced documents to do so. The period from May 3 until May 15 was considered to provide adequate time to evaluate and give full consideration to any additional comments that may have been received during the comment extension period.

An environmental assessment is used to determine whether a Finding of No Significant Impact or an environmental impact statement is requried. Only after the results of the environmental assessment have been analyzed and public comments have been received and considered will the Department of Energy decide whether the environmental assessment can support a Finding of No Significant Impact or an environmental impact statement should be prepared.