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Draft
SUPPLEMENT ANALYSIS

TWO PROPOSED SHIPMENTS OF COMMERCIAL SPENT NUCLEAR FUEL TO IDAHO NATIONAL LABORATORY FOR RESEARCH AND DEVELOPMENT PURPOSES

Idaho Operations Office
U.S. DEPARTMENT OF ENERGY

June 2015

CONVERSION FACTORS

Metric to English			English to Metric		
Multiply	by	To get	Multiply	by	To get
Area					
Square kilometers	247.1	Acres	Acres	0.0040469	Square kilometers
Square kilometers	0.3861	Square miles	Square miles	2.59	Square kilometers
Square meters	10.764	Square feet	Square feet	0.092903	Square meters
Concentration					
Kilograms/sq. meter	0.16667	Tons/acre	Tons/acre	0.5999	Kilograms/sq. meter
Milligrams/liter	1[a]	Parts/million	Parts/million	1[a]	Milligrams/liter
Micrograms/liter	1[a]	Parts/billion	Parts/billion	1[a]	Micrograms/liter
Micrograms/cu. meter	1[a]	Parts/trillion	Parts/trillion	1[a]	Micrograms/cu. meter
Density					
Grams/cu. centimeter	62.428	Pounds/cu. ft.	Pounds/cu. ft.	0.016018	Grams/cu. centimeter
Grams/cu. meter	0.0000624	Pounds/cu. ft.	Pounds/cu. ft.	16,025.6	Grams/cu. meter
Length					
Centimeters	0.3937	Inches	Inches	2.54	Centimeters
Meters	3.2808	Feet	Feet	0.3048	Meters
Micrometers	0.00003937	Inches	Inches	25,400	Micrometers
Millimeters	0.03937	Inches	Inches	25.40	Millimeters
Kilometers	0.62137	Miles	Miles	1.6093	Kilometers
Temperature					
Absolute					
Degrees C + 17.78	1.8	Degrees F	Degrees F − 32	0.55556	Degrees C
Relative					
Degrees C	1.8	Degrees F	Degrees F	0.55556	Degrees C
Velocity/Rate					
Cu. meters/second	2,118.9	Cu. feet/minute	Cu. feet/minute	0.00047195	Cu. meters/second
Meters/second	2.237	Miles/hour	Miles/hour	0.44704	Meters/second
Volume					
Cubic meters	264.17	Gallons	Gallons	0.0037854	Cubic meters
Cubic meters	35.314	Cubic feet	Cubic feet	0.028317	Cubic meters
Cubic meters	1.3079	Cubic yards	Cubic yards	0.76456	Cubic meters
Cubic meters	0.0008107	Acre-feet	Acre-feet	1,233.49	Cubic meters
Liters	0.26418	Gallons	Gallons	3.78533	Liters
Liters	0.035316	Cubic feet	Cubic feet	28.316	Liters
Liters	0.001308	Cubic yards	Cubic yards	764.54	Liters
Weight/Mass					
Grams	0.035274	Ounces	Ounces	28.35	Grams
Kilograms	2.2046	Pounds	Pounds	0.45359	Kilograms
Kilograms	0.0011023	Tons (short)	Tons (short)	907.18	Kilograms
Metric tons	1.1023	Tons (short)	Tons (short)	0.90718	Metric tons
English to English					
Acre-feet	325,850.7	Gallons	Gallons	0.000003046	Acre-feet
Acres	43,560	Square feet	Square feet	0.000022957	Acres
Square miles	640	Acres	Acres	0.0015625	Square miles

a. This conversion factor is only valid for concentrations of contaminants (or other materials) in water.

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ACRONYMS AND ABBREVIATIONS

ALARA	as low as reasonably achievable
CEQ	Council on Environmental Quality
CFA	Central Facilities Area
CFR	*Code of Federal Regulations*
CRADA	Cooperative Research and Development Agreement
DOE	U.S. Department of Energy
EA	environmental assessment
EBR	Experimental Breeder Reactor
EIS	environmental impact statement
EPRI	Electric Power Research Institute
FR	*Federal Register*
GHG	greenhouse gas
GWd/MTU	gigawatt-days per metric ton of uranium
HFEF	Hot Fuels Examination Facility
I	Interstate (highway system)
ICP	Idaho Cleanup Project
INL	Idaho National Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
LLW	low-level radioactive waste
MEI	maximally exposed individual
MFC	Materials and Fuels Complex
MOA	Memorandum of Agreement
MTHM	metric tons of heavy metal
NEPA	*National Environmental Policy Act*
NESHAP	National Emission Standards for Hazardous Air Pollutants
NNSA	National Nuclear Security Administration
NNSS	Nevada National Security Site
PEIS	programmatic environmental impact statement
PIE	post-irradiation examination
ROD	Record of Decision
RWMC	Radioactive Waste Management Complex
SA	supplement analysis
SEIS	supplemental environmental impact statement
SNF	spent nuclear fuel
SWEIS	site-wide environmental impact statement
TRU	transuranic (waste)
U.S.C.	*United States Code*
WIPP	Waste Isolation Pilot Plant

UNDERSTANDING SCIENTIFIC NOTATION

DOE has used scientific notation in this Supplement Analysis to express numbers that are so large or so small that they can be difficult to read or write. Scientific notation is based on the use of positive and negative powers of 10. The number written in scientific notation is expressed as the product of a number between 1 and 10 and a positive or negative power of 10. Examples include the following:

Positive powers of 10	Negative powers of 10
$10^1 = 10 \times 1 = 10$	$10^{-1} = 1/10 = 0.1$
$10^2 = 10 \times 10 = 100$	$10^{-2} = 1/100 = 0.01$
and so on, therefore,	and so on, therefore,
$10^6 = 1{,}000{,}000$ (or 1 million)	$10^{-6} = 0.000001$ (or 1 in 1 million)

1 INTRODUCTION

1.1 PROPOSED ACTION

The U.S. Department of Energy (DOE) is proposing to transport, in two separate truck shipments, small quantities of commercial power spent nuclear fuel (SNF) to the Idaho National Laboratory (INL) Site for research purposes consistent with the mission of the DOE Office of Nuclear Energy. The first shipment, which could take place as early as August 2015, would come from the Byron Nuclear Power Station in Illinois, and would consist of one cask of 25 SNF rods, totaling approximately 0.04 to 0.05 metric ton of heavy metal (MTHM),[1] or approximately 40 to 50 kilograms (88 to 110 pounds) of heavy metal. The second shipment, which could take place as early as January 2016, would come from the North Anna Nuclear Power Station in Virginia, and, likewise, would consist of one cask of 25 SNF rods, totaling approximately 0.04 to 0.05 MTHM. Each SNF rod is approximately the diameter of a pencil and approximately 13 feet long. Upon receipt, the SNF rods would be transferred directly into a hot cell in the Materials and Fuels Complex (MFC)[2] to begin the research activities. The MFC is the center for fuel fabrication and post irradiation examination (PIE) at the INL Site. Major MFC facilities include the Hot Fuel Examination Facility (HFEF), Fuel Conditioning Facility, Fuel Manufacturing Facility, and Analytical Laboratory. The MFC currently conducts operations that are similar to the operations associated with the proposed action evaluated in this Supplement Analysis (SA). The research activities at the INL Site would occur within an approximately 12-year period.

The proposed research using the SNF rods from the Byron Nuclear Power Station would include the following types of activities: Up to seven of the rods would be used to conduct PIE studies for the nuclear industry. The remaining rods would be used for: (1) determining the viability of electrometallurgical processing[3] on SNF from light water reactors; (2) using the separated nuclides from electrometallurgical processing for fabrication of small-scale test specimens; (3) irradiation and PIE of these test specimens; and (4) identification and characterization of waste forms associated with SNF recycling (INL 2014a).

The proposed activities with the SNF rods from the North Anna Nuclear Power Station would involve research and development activities related to high burn-up[4] SNF. Over the course of the 12-year research timeframe, the SNF rods from the North Anna Nuclear Power Station would undergo PIE and would provide a baseline against which future testing and observations would be compared (DOE 2012).[5]

[1] SNF inventories are generally described in terms of metric tons of heavy metal. Heavy metal refers to the mass of actinide elements (elements with atomic numbers greater than 89) in the SNF.
[2] The MFC, which became operational in 1949, was referred to as the Argonne National Laboratory-West in the 1995 PEIS. The 1995 PEIS specifically addresses operations in several facilities that are currently part of the MFC; notably, the Hot Fuels Examination Facility and Fuel Cycle Facility (see Appendix B of DOE 1995).
[3] Electrometallurgical processing in this SA refers to the use of a laboratory-scale system for the recovery of reusable materials.
[4] "Burn-up" is a way to measure the amount of uranium fuel used in a reactor.
[5] In 2017, North Anna Nuclear Power Station SNF rods, similar to the 25 rods (also known as "sister" rods) DOE is proposing to receive at the INL Site, would be placed in a Transnuclear, Inc. TN-32B cask and stored at the North Anna site. Sometime after 2027, the TN-32B cask would be shipped to a facility where it can be opened in a dry environment, and a representative sample

1.2 PURPOSE AND NEED FOR THE PROPOSED AGENCY ACTION

In order to perform the research at the INL Site, the 25 SNF rods from the Byron Nuclear Power Station must be transported to the INL Site because this specific material does not currently exist at MFC and is not readily accessible at the INL Site or in the DOE complex (INL 2014a). DOE has on-going cooperation in fuel cycle technologies with international partners, including China, France, Japan, Republic of Korea, and the United Kingdom, to maintain awareness of global technology trends and to leverage U.S. resources. This research is intended to explore the technical, economic, and non-proliferation aspects of electrometallurgical processing of commercial light water reactor fuels, which would be important for discussions with the 48 country members of the Nuclear Suppliers Group and the International Atomic Energy Agency. Electrometallurgical processing technology has potential benefits nationally and internationally as a means of dealing with SNF inventories. It is important for DOE to conduct these studies to maintain U.S. expertise in this area and ensure that if or when the technology is implemented, it is implemented responsibly with appropriate safeguards in place. Several of these rods would also be used for fuel performance studies (INL 2014a).

Research on the 25 SNF rods from the North Anna Nuclear Power Station would be used to support a joint DOE and Electric Power Research Institute (EPRI) High Burn-up Dry Storage Cask Research and Development project. This research with EPRI supports critical ongoing work by the commercial nuclear power industry to maintain safe storage of SNF for extended periods at utility locations in the United States. None of the existing SNF in storage at the MFC or on the INL Site could be used for that purpose (DOE 2012).

1.3 SCOPE OF THIS SUPPLEMENT ANALYSIS

This SA has been prepared in accordance with DOE *National Environmental Policy Act* (NEPA) Implementing Regulations at 10 *Code of Federal Regulations* (CFR) 1021.314(c) and *Recommendations for the Supplement Analysis Process* (DOE 2005). This SA evaluates whether the proposed action warrants preparing a supplemental environmental impact statement (EIS), a new EIS, or no further NEPA documentation. In this SA, DOE considers if there are substantial changes to the proposal or significant new circumstances or information relevant to environmental concerns. To aid in understanding the evaluation in this SA, a brief discussion of the notable historic events related to SNF operations at the INL Site follows.

In April 1995, DOE completed the *Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement (DOE/EIS-0203)* (hereafter, 1995 PEIS) (DOE 1995a). The 1995 PEIS contains an analysis of the potential environmental impacts associated with

of the SNF rods (on the order of 15 to 25 rods) would be removed from the cask and examined. The results of that examination would be compared with the results of the examination of the 25 North Anna Power Station SNF rods that are the subject of this SA. DOE has not yet proposed a facility for the post-2027 activities. (While such a facility currently exists at DOE's Savannah River Site, one does not currently exist at the INL Site.) However, prior to shipment, DOE will identify candidate sites with facilities capable of performing the work and prepare an appropriate NEPA analysis.

managing DOE's complex-wide SNF Program from 1995 until 2035, and includes an analysis of a broad spectrum of fuel element designs (including both DOE and commercial SNF).

In the June 1995 Record of Decision (ROD) for the 1995 PEIS, DOE selected Alternative 4a (Regionalization by Fuel Type), DOE decided to transport 165 MTHM in 1,940 planned shipments of SNF (including 575 Navy shipments) to the INL Site through the year 2035 [60 *Federal Register* (FR) 28680, June 1, 1995]. The ROD also states that "[e]xcept for some special-case commercial fuel, these decisions do not apply to the management of spent nuclear fuel from commercial power plants." The category of special-case commercial nuclear fuel described in the 1995 PEIS (Volume 1, Section 1.1.2.5) includes: "SNF from development reactors (Shipping Port and Peach Bottom Unit); SNF used for destructive and nondestructive examination and testing, SNF remaining at the West Valley Demonstration Project; SNF from fuel performance testing at Babcock and Wilcox Research Center; and special case SNF debris (Three-mile Island Unit 2)." The fuel being considered for the proposed research falls within the category of special case commercial fuel contemplated in the ROD.

In October 1995, the State of Idaho, U.S. Navy, and DOE entered into a Settlement Agreement (included as Appendix A of this SA), settling a lawsuit filed by the State of Idaho. The Settlement Agreement includes the following statements:

- "After December 31, 2000, DOE may transport shipments of spent fuel to INEL [INL Site] constituting a total of no more than 55 metric tons of DOE spent fuel (equivalent to approximately 497 truck shipments)" (Section D.2.c of DOE 1995b) … and "no more than 20 truck shipments of spent fuel in any calendar year" (Section D.2.f of DOE 1995b); and

- "DOE shall remove all spent fuel, including naval spent fuel and Three Mile Island spent fuel from Idaho by January 1, 2035" (Section C.1 of DOE 1995b).

The Settlement Agreement also includes a provision that DOE "will make no shipments of spent fuel from commercial nuclear power plants" to the INL Site (Section D.2.e of DOE 1995b). Following the Settlement Agreement, DOE issued an amended ROD in June 1996 for the 1995 PEIS, which lowered the number of planned shipments of SNF to the INL Site to 1,133 (575 shipments for the Navy and 558 planned shipments for DOE) (61 FR 9441, March 8, 1996).

On January 6, 2011, the State of Idaho and DOE signed a Memorandum of Agreement (MOA) (included as Appendix B of this SA), establishing conditions under which the INL Site could receive limited research quantities of commercial SNF for examination, testing, and storage (DOE 2011). Key provisions of the MOA include the following:

- "INL may receive for the purpose of research and examinations conducted at the INL research quantities of Commercial Power SNF" (Section 3.(a) of DOE 2011);

- "… not more than 400 kilograms total heavy metal content of Commercial Power SNF may be received in any calendar year" (Section 3.(b) of DOE 2011);

- "Nothing in this Agreement shall be construed to allow DOE to exceed the 55 MTHM limit for SNF allowed by the 1995 Agreement" (Section 3.(f) of DOE 2011); and

- "All Commercial Power SNF shipped to Idaho pursuant to this Agreement and stored at the INL for any reason shall be removed from Idaho in accordance with the deadline set forth in Section C.1 of the 1995 Agreement" (Section 8 of DOE 2011).

Currently, approximately 308 MTHM of SNF are stored at the INL Site, mostly from foreign and domestic research reactors (DOE 2015a).[6] Of the 308 MTHM of SNF, approximately 28 MTHM have been shipped to the INL Site since the 1995 PEIS was completed (DOE 2015b). The material is stored in licensed and safe facilities primarily at the Idaho Nuclear Technology and Engineering Center (INTEC), the Naval Reactors Facility, and the MFC. Storage facilities consist of dry vaults, dry storage casks, air and inert atmosphere hot cells, and spent fuel pools. Based on current planning, DOE anticipates the INL Site would receive less than 21 MTHM of additional SNF before 2035. Therefore, DOE would not exceed the 55 MTHM limit imposed through the Settlement Agreement by receiving the additional 0.10 MTHM if the proposed action was implemented.

1.4 RELEVANT NATIONAL ENVIRONMENTAL POLICY ACT DOCUMENTS

The following NEPA documents are relevant to the proposed agency action described in Section 1.1. The discussions that follow describe the relevance of these NEPA documents to the proposed action and explain how DOE used these documents to help determine whether there are any significant new circumstances or information relevant to environmental concerns.

- ***Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement, DOE/EIS-0203*** **(DOE 1995a).** As discussed in Section 1.3 of this SA, the 1995 PEIS contains an analysis of the potential environmental impacts associated with managing DOE's complex-wide SNF Program from 1995 until 2035. The 1995 PEIS, ROD, and amended ROD provide the NEPA analysis for:

[6] On December 31, 2014, the Secretary of Energy requested an indication of support from the State of Idaho related to the research projects that would require the receipt of two shipments of commercial SNF at the INL Site (DOE 2014a). In reply to this request, on January 8, 2015, the Governor of Idaho and the Attorney General stated that, "Idaho remains supportive of the type of research DOE proposes to conduct and will grant a one-time, conditional waiver to allow receipt of the proposed SNF shipments at the INL Site if DOE and Idaho are able to agree upon an enforceable commitment and timeframe for timely resolving the 1995 Settlement Agreement noncompliance issues" (Idaho 2015). On March 3, 2015, DOE and the State of Idaho signed such an agreement. These shipments would be conducted under the processes and procedures of the 2011 MOA. Necessary State approvals would be in place prior to shipment.

- Shipments of SNF, such as those proposed in this SA, to the INL Site (see specifically Appendix I of the 1995 PEIS; Section 3.1 and 3.2.1 of the ROD; and Tables 1.1 and 1.2 of the amended ROD).

- Research and operations involving SNF, such as those proposed in this SA, at INL (see specifically Section 3.1.4.4 of Appendix B of the 1995 PEIS). As discussed in that section, DOE assumes that electrometallurgical processing would be conducted at the INL Site with SNF. Specifically, that section states that "this alternative [the selected Alternative 4a] would include the continuation of activities related to the treatment of spent nuclear fuel, including research and development (e.g., Electrometallurgical Process Demonstration Project), and the construction of the Dry Fuels Storage Facility. DOE would initiate pilot programs as needed to support future decisions on spent nuclear fuel management and disposition. DOE would use historic data on spent nuclear fuel to provide the bounding case for a determination of the impacts associated with potential pilot program activities."

The 1995 PEIS provides a baseline against which the potential impacts of the proposed action in this SA can be compared and evaluated. Specifically, this SA evaluates: (1) the potential transportation impacts of the proposed action against the transportation analysis in Appendix I of the 1995 PEIS; and (2) the potential impacts associated with research and operations at the INL Site related to the treatment of SNF (including research and development such as electrometallurgical processing), against the analysis in the 1995 PEIS.

- ***Final Environmental Assessment (EA) on Electrometallurgical Treatment Research and Demonstration Project in the Fuel Conditioning Facility at Argonne National Laboratory West [Now the Materials and Fuels Complex], DOE/EA-1148 (DOE 1996).*** In May 1996, DOE completed this EA, which provides an analysis of the potential environmental impacts of demonstration-scale electrometallurgical processing on SNF rods from Experimental Breeder Reactor (EBR)-II containing 1.6 MTHM of which 0.4 MTHM was highly enriched driver fuel. This EA provides detailed analyses of the potential environmental impacts related to air emissions and human health from processing the EBR-II Fuel (see specifically Sections 4.1.1.2 and 4.1.2 of the EA). Subsequent to the Final EA, DOE published a Finding of No Significant Impact for the proposed action (61 FR 25647, May 22, 1996). This SA evaluates the potential impacts of the proposed action in the areas of air emissions/human health and waste management against the impacts presented in the EA.

- ***Waste Isolation Pilot Plant (WIPP) Disposal Phase Final Supplemental Environmental Impact Statement (SEIS), DOE/EIS-0026-S-2*** **(DOE 1997)**. In September 1997, DOE completed the WIPP SEIS, which provides an analysis of the potential environmental impacts associated with disposing of TRU waste from defense activities and programs of the U.S. government. The WIPP SEIS includes an analysis of the transportation of TRU

waste from the INL Site to WIPP, as well as the disposal of TRU waste at WIPP, such as waste that may result from the proposed action evaluated in this SA. As such, the WIPP SEIS provides a baseline against which the potential impacts of TRU waste transportation and disposal from the proposed action in this SA can be compared and evaluated.

- ***Final Site-Wide Environmental Impact Statement (SWEIS) for the Continued Operation of the Department of Energy/National Nuclear Security Administration (NNSA) Nevada National Security Site (NNSS) and Offsite Locations in the State of Nevada, DOE/EIS-0426*** **(DOE 2013)**. In October 2013, DOE/NNSA completed the NNSS SWEIS, which provides an analysis of the potential environmental impacts associated with continued operation of the NNSS. The SWEIS includes an analysis of the transportation of LLW waste from the INL Site to NNSS, as well as the disposal of LLW at NNSS, such as waste that may result from the proposed action evaluated in this SA. As such, the SWEIS provides a baseline against which the potential impacts of LLW transportation and disposal from the proposed action in this SA can be compared and evaluated.

- ***Final Supplemental Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada*****, DOE/EIS-0250F-S1 (DOE 2008).** In June 2008, DOE completed the Yucca Mountain SEIS, which provides an analysis of the potential environmental impacts associated with constructing, operating, monitoring, and eventually closing a geologic repository at Yucca Mountain for the disposal of SNF and high-level radioactive waste. The SEIS also evaluates the potential impacts of transporting SNF, including SNF associated with the proposed action evaluated in this SA. The SEIS provides a baseline against which the potential impacts of SNF transportation from the proposed action in this SA can be compared and evaluated.

2 AFFECTED ENVIRONMENT

2.1 RESOURCE AREAS CONSIDERED IN THIS SUPPLEMENT ANALYSIS

Because the proposed action involves the transport of SNF from commercial reactors to the INL Site, this SA evaluates transportation activities and associated potential environmental impacts. Following receipt of the SNF at the INL Site, subsequent research activities could result in radiological emissions, which could impact human health, as well as generate wastes. Additionally, because water quality is a resource of particular interest to the State and stakeholders, it is also specifically addressed in this SA. Therefore, this SA evaluates the potential impacts to air quality/human health, environmental justice, the disposition of wastes, and water quality. An update to the environmental conditions for the resource areas evaluated in detail, including a discussion of changes to the environment that have occurred since 1995, follows.

Transportation. The likely shipment route from the Byron Nuclear Power Station overlaps the representative route used for the analysis of shipments of SNF from West Valley, New York, to the INL Site [primarily along Interstate 80 (I-80)]. The route from West Valley to the INL Site, which is approximately 1,990 miles, was one of the many routes analyzed in the 1995 PEIS. Only about 80 miles of the likely route from the Byron Nuclear Power Station to the INL Site were not covered in the analysis conducted for West Valley SNF shipments. The route from the Byron Nuclear Power Station to the INL Site (Figure 2-1) is approximately 1,400 miles, or approximately 590 miles shorter than that used in the analysis for the West Valley shipments (DOE 2015a).

The likely shipment route from the North Anna Nuclear Power Station overlaps the representative route (I-95 to I-80) that was analyzed in the 1995 PEIS for shipments of SNF from Hampton Roads, Virginia, to the INL Site. The distance from Hampton Roads, Virginia, to the INL Site is approximately 2,340 miles. Only 30 miles of the likely route from the North Anna Nuclear Power Station were not covered in the analysis conducted for the Hampton Roads shipments. The route from the North Anna Nuclear Power Station to the INL Site (Figure 2-1) is approximately 2,225 miles, or approximately 115 miles shorter than that used in the analysis for shipments of SNF from Hampton Roads (DOE 2015a).

The population along the representative transportation routes has changed since the 1995 PEIS was prepared. Given that the transportation routes extend across much of the length of the Continental United States, the analysis in this SA assumes that the population along the transportation routes has changed in a manner consistent with the overall population change for the United States. Since approximately 1995, the U.S. population has increased by approximately 20 percent; from 265 million people to approximately 320 million people (Census 2015). The transportation analysis in this SA factors in this increase.

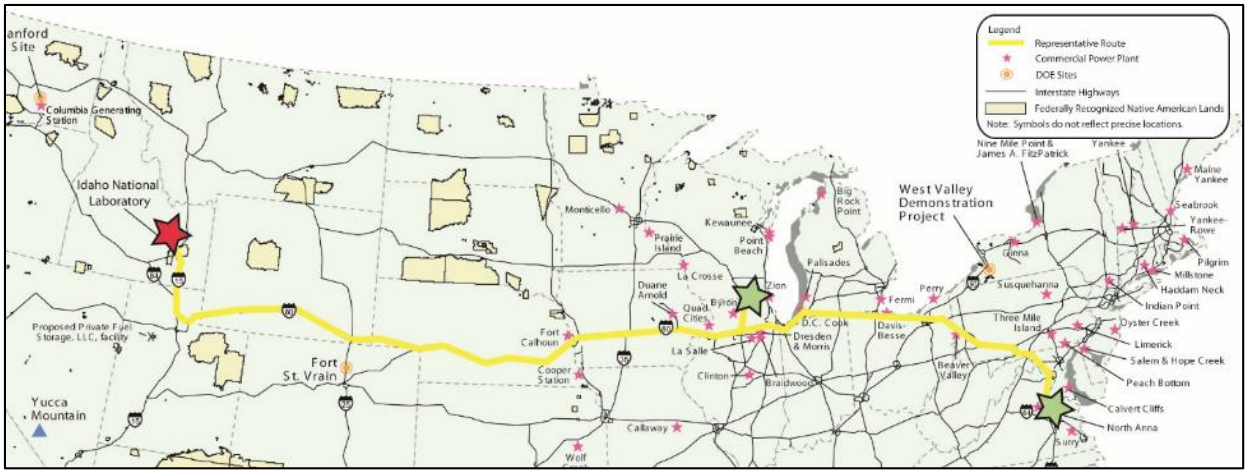

Figure 2-1. Representative Transportation Routes Associated with the Proposed Action (Source: DOE 2008, modified)

Commercial SNF is transported in specially designed casks (Figure 2-2) certified by the U.S. Nuclear Regulatory Commission (NRC). Casks must meet the following requirements (NRC 2015):

- Prevent the loss of radioactive contents;
- Provide shielding and heat dissipation; and
- Prevent nuclear criticality (a self-sustaining nuclear chain reaction).

To show that it can withstand accident conditions, a cask must pass impact, puncture, fire, and water immersion tests. Casks must survive these tests in sequence, including a 30-foot drop onto a rigid surface followed by a fully engulfed fire of 1,475 degrees Fahrenheit for 30 minutes. The test sequence encompasses more than 99 percent of vehicle accidents (NRC 2015). The cask that would be used to transport the SNF evaluated in this SA would be in an NRC-licensed cask.

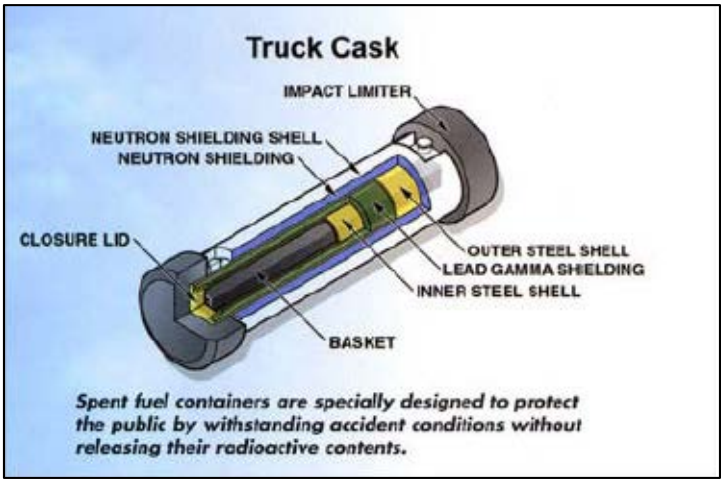

Figure 2-2. Typical Commercial SNF Cask (Source: NRC 2015, modified)

Air Quality/Human Health. Radiological operations at the INL Site have the potential to impact the health of the public and workers. The affected environment for air quality/human health is best described by the estimated annual radiological doses projected in the 1995 PEIS and the recent estimated doses from current INL Site operations. The analysis in the 1995 PEIS provides an estimate of the annual cumulative doses to the maximally exposed worker, offsite maximally exposed individual (MEI), and the collective population from DOE's decision to implement the preferred alternative for environmental restoration and waste management and the SNF Regionalization Alternative 4a (DOE 1995a, Volume 2, Table 5.7-4). The annual dose to the maximally exposed worker was estimated to be 0.46 millirem per year; the annual dose to the MEI was estimated to be 0.63 millirem per year; and the dose to the collective population was estimated to be 2.9 person-rem per year. The effective dose equivalent to the offsite MEI from all operations at the INL Site in 2013 was reported as 0.03 millirem (INL 2014c). The total population dose (50-mile radius around the site) from existing operations at the INL Site is estimated to be approximately 0.499 person-rem per year (INL 2014b).

Environmental Justice. The region of influence for the environmental justice analysis is defined as an area within a 50-mile radius around the INL Site that encompasses parts of 11 counties in Idaho. In 2010, minorities made up approximately 18 percent of the population of the 11-county area surrounding INL (Census 2012a). Approximately 12 percent of the population residing within the 11-county area around the INL Site reported incomes below the poverty threshold for a family of three with one related child under 18 years of age (Census 2012b). Table 2-1 presents the data related to minority and low-income populations from 1995 and based on current information for the INL Site.

Table 2-1. Minority and Low-Income Populations Surrounding the INL Site

	1995 Estimate	Current Estimate
Minority Population Percentage	10.1	17.5
Low-income Population Percentage	12.6	12.0

Source: DOE 2000, Census 2012a, Census 2012b.

Waste Management. In addition to waste management conditions at INL, this section updates the waste management conditions at WIPP and NNSS because those two sites would receive radiological wastes as a result of the proposed action.

***Idaho National Laboratory*.** Existing activities at the INL Site generate both radioactive and non-radioactive wastes.[7] When the 1995 PEIS was prepared, DOE disposed of LLW on site. Through 1991, DOE disposed of approximately 5,130,000 cubic feet of LLW at the Radioactive Waste Management Complex (RWMC), and the projected 1995 baseline for LLW generation was approximately 150,000 cubic feet annually (DOE 1995a). Today, DOE disposes of the majority of INL Site LLW at the NNSS. INL's Integrated Waste Tracking System shows that

[7] This SA presents waste information as follows: (1) LLW quantities are presented in cubic feet, which is the unit of measurement used in the NNSS SWEIS; (2) TRU waste quantities are presented in cubic meters, as that is the unit of measurement used in the 1995 Settlement Agreement and the WIPP SEIS.

approximately 18,500 cubic feet of LLW was generated at the INL Site in 2013, and approximately 73,000 cubic feet of LLW (which includes approximately 54,500 cubic feet of legacy LLW) was shipped to the NNSS for either treatment or disposal (DOE 2015a).

When the 1995 PEIS was prepared, about 65,000 cubic meters of TRU waste was in retrievable storage, 62,000 cubic meters of TRU waste had been buried at the RWMC, and there were no disposal facilities at the INL Site for TRU waste. Since then, DOE opened WIPP, to which TRU waste from the INL Site has been transported for disposal. DOE has shipped approximately 42,000 cubic meters of TRU waste to WIPP. INL's Integrated Waste Tracking System shows that approximately 5 cubic meters of TRU waste was generated at the INL Site in 2013 from activities other than the processing of existing buried or retrievable TRU and alpha-contaminated waste. Approximately 2,954 cubic meters of TRU waste was shipped to WIPP from the INL Site in 2013 (DOE 2014b). No TRU waste shipments to WIPP have occurred since February 2014 due to the suspension of shipments to WIPP as a result of a fire and radiological event.

Waste Isolation Pilot Plant. The WIPP SEIS evaluated the disposal of approximately 88,360 cubic meters of TRU waste from the INL Site at WIPP by 2033 (35 years of operations) (DOE 1997). As discussed above, WIPP has received approximately 42,000 cubic meters of TRU waste from the INL Site through February 2014. The WIPP SEIS includes an evaluation of the transportation impacts associated with TRU waste disposal from the INL Site at WIPP.

Nevada National Security Site. The NNSS SWEIS evaluated the disposal of up to 48 million cubic feet of LLW at the NNSS. Of this total, only 1.3 million cubic feet of LLW would result from NNSS activities. The majority of LLW (46.7 million cubic feet) would come from activities at sites other than those at the NNSS, including those at the INL Site (DOE 2013). The NNSS SWEIS includes an evaluation of the transportation impacts associated with LLW disposal from the INL Site to the NNSS.

Water Quality. The INL contractor and the Idaho Cleanup Project (ICP) contractor monitor drinking water, liquid effluent, surface water runoff, and groundwater that could be impacted by the INL Site operations and activities. This monitoring is conducted to comply with applicable State and local laws and wastewater reuse permit requirements. During 2013, permitted facilities were (INL 2014b):

- Central Facilities Area (CFA) Sewage Treatment Plant,
- INTEC New Percolation Ponds,
- Advanced Test Reactor Complex Cold Waste Pond, and
- MFC Industrial Waste Ditch and Industrial Waste Pond

These facilities are sampled for parameters required by their facility-specific permits. Based on this sampling, no permit limits were exceeded in 2013, and all parameters were below applicable health-based standards (INL 2014b).

The INL Site contractor monitored nine drinking water systems in 2013 for parameters required by Idaho Rules for Public Drinking Water Systems (Idaho Administrative Code 58.01.08). Water samples collected from drinking water systems were well below safe drinking water limits for all relevant regulatory parameters. Because workers are potentially impacted from radionuclides in the CFA distribution system, the collected water samples also calculated the dose of tritium ingested by a CFA worker. The dose was estimated to be 0.20 millirem for 2013. This is below the U.S. Environmental Protection Agency standard of 4 millirem per year for public drinking water (INL 2014b).

The ICP contractor sampled surface water runoff from the Subsurface Disposal Area of the RWMC in 2013 for radionuclides in compliance with all regulatory standards. Results were within historical measurements, with americium-241, plutonium-239/240, and strontium-90 similar to the previous years' results and well below standards (INL 2014b).

2.2 RESOURCE AREAS ELIMINATED FROM DETAILED ANALYSIS

Resource areas that would be unaffected by the proposed action evaluated in this SA or any impacts that would be minimal and clearly bounded by analyses in prior NEPA documents were eliminated from detailed analysis in this SA. For example, because the proposed action would not result in any land disturbance, there would be no potential to impact land, cultural, soil, or geologic resources at the INL Site. Consequently, the environmental conditions for these resource areas are not further discussed. Table 2-2 identifies the resource areas and provides the rationale for eliminating these resources from detailed analysis.

Table 2-2. Resource Areas Eliminated from Detailed Analysis

Resource Area Eliminated from Detailed Analysis	Rationale
Land	Proposed action would not disturb land and would not change land uses.
Cultural and Paleontological	Proposed action would not disturb land and would not impact cultural or paleontological resources.
Soil	Proposed action would not disturb land and would not impact soils.
Geology	Proposed action would not disturb land and would not impact geological resources.
Visual	Proposed action would not require new construction and would not change visual characteristics.
Noise	Proposed action would not introduce new noise sources and would not change background noise levels.
Ecological	Proposed action would not disturb ecological habitats and would not result in impacts that could affect ecological resources.
Socioeconomics	Proposed action would not change workforce requirements and would not notably impact socioeconomic resources in the region of influence. However, DOE has acknowledged that the funding associated with the research activities would be about $10 to 20 million annually to the INL Site through approximately the end of this decade (DOE 2014a).
Utilities	Proposed action would not result in any measurable utility changes compared to existing requirements.
Greenhouse Gas Emissions	Proposed action would not substantially increase carbon dioxide-equivalent emissions or associated climate change impacts (see Section 2.3).

2.3 NEW INFORMATION

Intentional Destructive Acts. When DOE prepared the 1995 PEIS, DOE NEPA documents did not normally include an analysis of the potential impacts of intentional destructive acts. Following the terrorist attacks of September 11, 2001, DOE has implemented measures to minimize the risk and consequences of potential terrorist attacks on its facilities and now, consistent with Council on Environmental Quality (CEQ) guidance, also analyzes the potential impacts of intentional destructive acts in NEPA documents. In this SA, DOE has evaluated security scenarios involving intentionally destructive acts to assess potential environmental impacts (see Chapter 3). The analysis addresses both the transportation of SNF and radiological wastes, as well as activities at the INL Site.

Dose Conversion Factor. When converting radiological doses to potential latent cancer fatalities, the 1995 PEIS used a factor of 5×10^{-4} fatality per rem for the public and a factor of 4×10^{-4} fatality per rem for workers. The value for workers was lower due to the absence of children and the elderly, who were considered to be more radiosensitive (DOE 2000). Since publication of the 1995 PEIS, DOE guidance (DOE 2003) recommends the use of a conversion factor of 6×10^{-4} fatality per rem for both workers and members of the public. The DOE guidance recommends use of factors developed by the Interagency Steering Committee on Radiation Standards (ISCORS 2002). Using the higher conversion factor increases the potential

radiological impacts presented in the 1995 PEIS by 50 percent for workers and 20 percent for the public. Chapter 3 of this SA presents the results of this change.

LATENT CANCER FATALITY

A latent cancer fatality is a death from a cancer that results from, and occurs an appreciable time after, exposure to ionizing radiation. Death from radiation-induced cancers can occur any time after the exposure. However, latent cancers generally occur from 1 year to many years after exposure. Using a conversion factor of 0.0006 latent cancer fatality per rem of radiation exposure (ISCORS 2002), the result is the increased lifetime probability of developing a latent fatal cancer. For example, if a person received a dose of 0.033 rem, that person's risk of latent cancer fatality from that dose over a lifetime would be 0.00002. This risk corresponds to 1 chance in 50,000 of a latent cancer fatality during that person's lifetime. Because estimates of latent cancer fatalities are statistical, the results often indicate less than 1 latent cancer fatality for cases that involve low doses or small populations. For instance, if a population collectively received a dose of 500 person-rem, the number of potential latent cancer fatalities would be 0.3.

Greenhouse Gas Analysis. In December 2014, the CEQ provided revised draft guidance for public consideration and comment on the ways in which federal agencies can improve their consideration of the effects of greenhouse gas (GHG) emissions and climate change in evaluating proposals for federal actions under NEPA (CEQ 2014). Where appropriate, DOE NEPA documents consider the potential impacts associated with GHG emissions. Under the CEQ revised draft guidance, if a proposed action would be reasonably anticipated to cause emissions of 25,000 metric tons or more of carbon dioxide-equivalent GHG emissions on an annual basis, agencies should consider this an indicator that a quantitative and qualitative assessment may be meaningful to decisionmakers and the public. The proposed action evaluated in this SA would emit approximately 4.5 metric tons of carbon dioxide-equivalent GHG emissions in transporting the SNF to the INL Site (DOE 2015a). Because the GHG emissions associated with the proposed action would be minimal, a detailed GHG analysis is not required for this SA.

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3 COMPARISON OF IMPACTS

3.1 INTRODUCTION

Figure 3-1 illustrates the impact assessment process DOE used in this SA. As this figure indicates, DOE conducted an initial screening review to determine if there were new circumstances or information relevant to environmental concerns or impacts associated with the proposed action evaluated in this SA that would warrant additional NEPA analysis.

As part of the initial screening review, DOE identified the resource areas the proposed action could affect, as described in Section 2.1 of this SA. The following section contains further analysis of these resource areas.

3.2 ENVIRONMENTAL IMPACTS

3.2.1 Spent Nuclear Fuel Transportation Impacts

The 1995 PEIS addressed the impacts of transporting approximately 2,700 SNF shipments to the INL Site (see Figure 3-4 of DOE 1995a). For shipments of DOE SNF (which includes special-case commercial SNF), the 1995 PEIS addressed the transportation impacts associated with 1,551 truck shipments (DOE 1995a, Volume 1, Table I-2 of Appendix I). For the alternative selected in the 1995 PEIS ROD (Regionalization by Fuel Type), the potential impacts associated with the incident-free[8] truck transportation of DOE SNF were estimated for the population along the routes across the United States as follows (DOE 1995a, Table I-8 of Appendix I):

- 0.060 radiation-related latent cancer fatality for transportation workers,
- 0.17 radiation-related latent cancer fatality for the general population, and
- 0.0098 non-radiological fatality from vehicular emissions.

These fatalities were estimated over the 40-year period from 1995 through 2035 and were based on an assumption that each SNF cask would contain 5 MTHM and that external dose rates would be the maximum allowed by regulation [10 millirem per hour at any point 2 meters from the transport vehicle (10 CFR 71.47)]. The impacts per shipment for DOE SNF would be:

- 3.9×10^{-5} radiation-related latent cancer fatality for transportation workers,
- 1.1×10^{-4} radiation-related latent cancer fatality for the general population, and
- 6.2×10^{-6} non-radiological fatality from vehicular emissions.

In contrast, the proposed action evaluated in this SA would involve two SNF truck shipments, with each shipment containing 25 SNF rods totaling approximately 0.04 to 0.05 MTHM. Based on this much smaller cask loading (a maximum of 0.05 MTHM per shipment for the proposed

[8] "Incident-free" refers to transportation activities without accidents or other unexpected or unusual occurrences.

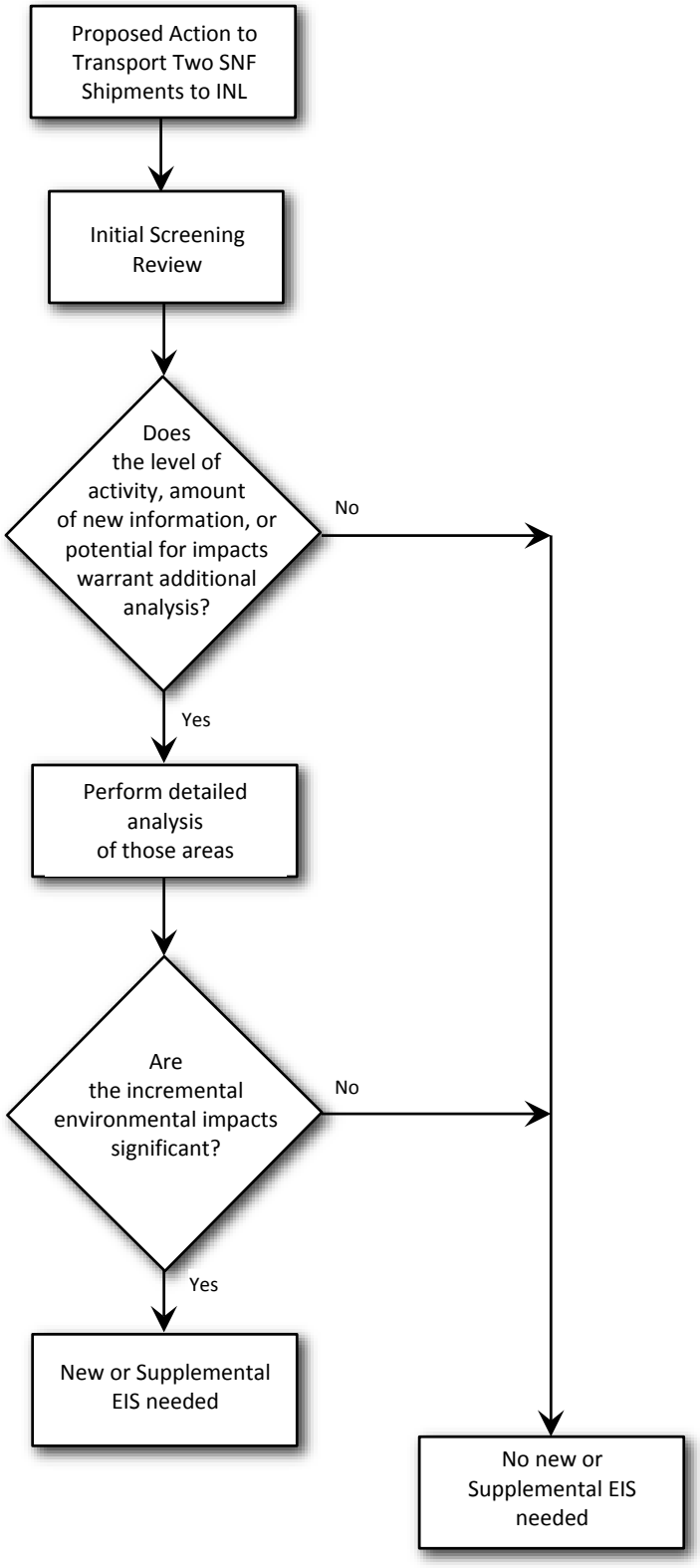

Figure 3-1. Assessment Process Used in this Supplement Analysis

action versus 5 MTHM for the fully loaded cask analyzed in the 1995 PEIS), the potential incident-free radiological impacts of the two SNF shipments would be expected to be a fraction (approximately 1 percent) of the potential radiological impacts presented in the 1995 PEIS, assuming no other differences. However, to be conservative, this SA assumes that the external dose from the SNF would not be reduced, but instead would be the maximum allowed by regulation. When taking into account other changes that have occurred since the 1995 PEIS was issued [e.g., a 20-percent increase in the population along the transportation routes (see Section 2.1) and changes in the dose conversion factor (see Section 2.3)], the potential impacts associated with the incident-free truck transportation of the two shipments of SNF for the proposed action is estimated as follows:

- 1.4×10^{-4} radiation-related latent cancer fatality for transportation workers;
- 3.8×10^{-4} radiation-related latent cancer fatality for the general population; and
- 1.5×10^{-5} non-radiological fatality from vehicular emissions.

The potential impacts associated with the incident-free truck transportation of the two truck shipments of SNF for the proposed action evaluated in this SA would be small and are bounded by the impacts presented in the 1995 PEIS for shipments of DOE SNF.

The 1995 PEIS contains a detailed analysis of the potential impacts associated with transportation accidents involving SNF (see Section I-5 of Appendix I). For the alternative selected in the 1995 PEIS ROD (Regionalization by Fuel Type), the total accident risk[9] (from 1995 to 2035) for truck transportation was estimated to be:

- 0.0010 latent cancer fatality and 0.26 traffic fatality (see Table I-34 of Appendix I in the PEIS).

With regard to the proposed action evaluated in this SA, the material in each shipment would be approximately 1 percent as much as that analyzed in each shipment in the 1995 PEIS. Although release fractions associated with accidents would not change, the source term (i.e., the quantity of radiological material released in a given accident) would be approximately 1 percent as much as was analyzed in the 1995 PEIS. Taking into account all of the factors that would affect the accident risk (e.g., 2 shipments versus 1,551; 1 percent as much material at risk per shipment; a 20-percent increase in the population along the transportation routes; and changes in the dose conversion factor[10]), the total accident risk for truck transportation from the proposed action would be:

- 2.3×10^{-8} latent cancer fatality and 0.0004 traffic fatality.

[9] Risk is calculated by multiplying the consequence of an accident times the probability that the accident would occur. The total accident risk is the compilation of all risks.
[10] The 1995 PEIS does not present accident risk separately for the public and workers. Consequently, the accident analysis in this SA conservatively assumes a 50-percent increase in impacts from the dose conversion factor.

Table 3-1 summarizes the potential transportation impacts of the proposed action evaluated in this SA and the impacts presented in the 1995 PEIS. As can be seen, the potential accident impacts associated with the transport of the two shipments of SNF for the proposed action evaluated in this SA would be smaller than and are bounded by the impacts presented in the 1995 PEIS. To date, only approximately 28 MTHM of SNF have been shipped to the INL Site since the 1995 PEIS was issued, and the addition of 0.08 to 0.10 MTHM of SNF (e.g., the quantity associated with the proposed action in this SA) is much less than that analyzed in the 1995 PEIS, selected in the amended ROD, and identified in the Settlement Agreement (i.e., 55 MTHM).

Table 3-1. Summary of Potential Transportation Impacts

	SA Proposed Action	1995 PEIS[a]
Number of SNF shipments	2	1,551
Incident-free impacts		
Number of radiation-related latent cancer fatalities for transportation workers	1.4×10^{-4}	0.060
Number of radiation-related latent cancer fatalities for the general population	3.8×10^{-4}	0.17
Number of non-radiological fatalities from vehicular emissions	1.5×10^{-5}	0.0098
Total accident risk		
Number of latent cancer fatalities	2.3×10^{-8}	0.0010
Number of traffic fatalities	0.0004	0.26

a. Based on shipments of DOE SNF (which includes special-case commercial SNF).

3.2.2 Research and Operations at the Materials and Fuels Complex

Specific to the proposed action evaluated in this SA, research and operations at the MFC would have the potential to generate air pollutants, including but not limited to radionuclides, chemical and combustion emissions, and ozone-depleting substances. The types of air emissions associated with operations under the proposed action are the same as those analyzed in the 1995 PEIS and DOE/EA-1148 (DOE 1996).

The 1995 PEIS states that "[a]s with Alternative 3, this alternative [the selected Alternative 4a] would include the continuation of activities related to the treatment of spent nuclear fuel, including research and development (e.g., Electrometallurgical Process Demonstration Project) (DOE 1995a). For the alternative selected in the 1995 PEIS ROD (Alternative B, which includes Regionalization by Fuel Type), the potential impacts from annual radiological emissions at the INL Site were estimated as follows (DOE 1995a, Volume 2, Table 5.7-4):

- 0.46 millirem to the maximally exposed worker,
- 0.63 millirem to the MEI offsite, and
- 2.9 person-rem to the 50-mile population surrounding the INL Site.[11]

[11] For comparative purposes, in 2013, the dose to the hypothetical MEI was estimated to be 0.03 millirem, and the maximum potential population dose (to the approximately 314,069 people residing within a 50-mile radius of any INL Site facility) was estimated to be 0.499 person-rem (INL 2014a).

Additionally, DOE/EA-1148 includes an analysis of the potential impacts of radiological emissions from electrometallurgical treatment of SNF. The analysis in DOE/EA-1148 is based on much higher quantities of SNF than those associated with the proposed action in this SA. For example, DOE/EA-1148 analyzed operations consisting of seven batches, with a throughput of approximately 160 kilograms (353 pounds) of SNF per batch. As summarized in Section 4.1.1.2 of that EA, the potential offsite radiological doses from routine operations were "quite small" (less than 1.1×10^{-6} rem per year to the MEI). This is more than a factor of 9,000 less than the 0.01 rem per year annual dose limit imposed by the National Emission Standards for Hazardous Air Pollutants (NESHAP). No increased radiation levels, above background, would be detectable at the INL Site boundary (DOE 1996).

For the proposed action evaluated in this SA, DOE has estimated air emissions to be minor, and concentrations would not exceed the existing monitored air emissions from HFEF. Small quantities of volatilized fission products and fission gas emissions would be released to the HFEF Main Cell environment, and the potential radiological releases to the Main Cell would be consistent with other in-cell processes. Facility operations would control particulate emissions via high-efficiency particulate air filtration and would monitor emissions using a continuous emissions monitoring system (INL 2014). DOE calculated the estimated MEI that may result from implementing the proposed action to be 3.4×10^{-3} millirem per year (3.4×10^{-6}rem per year) (DOE 2015a). The doses calculated for both DOE/EA-1148 and the proposed action are very conservative, in that DOE assumed the receptor was a person living approximately 5 kilometers from the MFC facility (the nearest highway). In addition, the dose for the proposed action was assumed to occur in a single year and not each year for the duration of the project. For the proposed action, the dose to the MEI at the location used for INL Site-wide NESHAPs reporting would be 9.55×10^{-4} millirem. That additional increment would not change the total 2013 site-wide MEI dose (0.03millirem).

With respect to worker doses, DOE controls worker doses to as low as reasonably achievable (ALARA). The proposed action would not affect this approach (DOE 2015a).

Because there would be no special pathways that could result in disproportionately high and adverse impacts on minority or low-income populations, there would be no environmental justice impacts.

According to the analysis in this section, the potential air emissions and human health impacts associated with the proposed action evaluated in this SA would be smaller than and are bounded by the impacts presented in the 1995 PEIS and DOE/EA-1148.

The proposed action evaluated in this SA would not use measurable quantities of water and would not release pollutants to surface water or groundwater (DOE 2012; INL 2014a). Consequently, no impacts to water resources are expected under normal operations.

The proposed action evaluated in this SA would not introduce any new processes or new types of materials into the MFC than currently exist, and would not increase the quantities of materials to

change the accident analyses presented in the 1995 PEIS (DOE 1995a; see specifically Table 5.15-11) or DOE/EA-1148 (DOE 1996; see specifically Tables 4-1 and 4-2). The analyses in those documents considered the potential impacts from accidents involving significantly greater quantities of material than are associated with the proposed action evaluated in this SA. Consequently, the accident risks and consequences presented in those documents would bound any potential impacts associated with the proposed action evaluated in this SA.

3.2.3 Waste and Spent Nuclear Fuel Management

Radiological waste types associated with the proposed action evaluated in this SA would include TRU waste and LLW (INL 2014a; DOE 2012). The total projected waste volume is estimated to be as follows (DOE 2015a):

- LLW: approximately 212 cubic feet, as less than 5 percent of the initial heavy metal inventory is expected to be contained in LLW in its final form;

- TRU waste: approximately 8 cubic meters, as approximately 90 percent of the initial heavy metal inventory is anticipated to end up as TRU waste in its final form after research;

After the proposed destructive examinations, DOE anticipates that no SNF would remain, with the exception that no more than 0.010 MTHM of SNF (10 kilograms of heavy metal) may be selected and saved in a fuel library to enable future research activities into issues of fuel safety or performance.

The types of wastes associated with the proposed action are consistent with operations analyzed in the 1995 PEIS and DOE/EA-1148 for electrometallurgical treatment (DOE 1996).

For the alternative selected in the 1995 PEIS ROD (Regionalization by Fuel Type), the potential increases in operational wastes from selected SNF management activities were as follows (DOE 1995a, Table 5.14-1 of Appendix B):

- LLW: 7,060 cubic feet per year, and
- TRU waste: 32 cubic meters per year.

With respect to the operations analyzed in DOE/EA-1148 for electrometallurgical treatment, the potential increases in operational wastes were as follows (Table 5.1 of DOE 1996):

- LLW: 750 cubic feet, and
- TRU waste: 50 cubic meters.

The wastes that would result from the proposed action evaluated in this SA would be managed and disposed of in accordance with current waste management practices. Currently, DOE disposes of the majority of INL Site LLW at the NNSS. The LLW that would be generated as a result of the proposed action (approximately 212 cubic feet) would account for much less than 1

percent of the LLW generated by current INL Site operations and shipped to the NNSS for disposal. Additionally, as discussed in Section 2.1, the quantity of LLW that would be generated as a result of the proposed action would be inconsequential in comparison with the 46.7 million cubic feet NNSS would receive from the activities at other DOE sites (as evaluated in DOE 2013).

With regard to TRU wastes, the proposed action evaluated in this SA would require the use of the HFEF Hot Cell, which contains both defense- and nondefense-related materials and contamination. Because it would be impractical to clean out any defense-related contamination, wastes associated with the proposed action could be eligible for disposal at WIPP (DOE 2012). Therefore, this SA assumes the TRU wastes from the proposed action would be disposed of at WIPP. The TRU waste that would be generated as a result of the proposed action (approximately 7.4 cubic meters) would account for much less than 1 percent of the TRU waste expected to be shipped from the INL Site to WIPP for disposal (once WIPP resumes operations). Additionally, as discussed in Section 2.1, the quantity of TRU waste that would be generated from the proposed action would be inconsequential in comparison with the remaining approximately 23,000 cubic meters of TRU waste that DOE intends to ship from the INL Site to WIPP by 2018. Until shipment to WIPP, TRU waste from the proposed action evaluated in this SA would be stored in the MFC.

With regard to the 0.010 MTHM of SNF (10 kilograms of heavy metal) that may be selected and saved in a fuel library, that quantity of SNF would constitute a 0.0003-percent increase in the quantity of SNF that is currently stored at the INL Site (i.e., 308 MTHM) and would be well within the quantities selected in the amended ROD and the limits established by the 1995 Settlement Agreement and the MOA. The SNF would be safely stored in the MFC in a dry vault, a dry storage cask, or a hot cell. Table 3-2 summarizes the potential quantities of wastes and SNF for the proposed action evaluated in this SA, the 1995 EIS, and DOE/EA-1148.

Table 3-2. Summary of Waste and Spent Nuclear Fuel Quantities

	SA Proposed Action	1995 PEIS	DOE/EA-1148
LLW Generated (cubic feet)	212	7,060/year[a]	750
TRU Waste Generated (cubic meters)	8	32/year[a]	50
SNF R&D Library Storage (MTHM)	0.010	120[b]	(c)

a. The 1995 PEIS presented annual quantities of LLW and TRU waste. Total quantities of waste can be determined by multiplying the values above by 40 based on the planning period (1995 until 2035) considered in that PEIS.
b. Table 1.2 of the amended ROD identifies a 120 MTHM increase in SNF (from 261 MTHM in 1995 to 381 MTHM in 2035). The 1995 Settlement Agreement states that shipments of naval SNF and DOE SNF shall not exceed 55 MTHM each (for a total of 110 MTHM).
c. The amount of SNF associated with the proposed action in DOE/EA-1148 was 1.6 MTHM. Per Table 4-6 of that EA, approximately 2.3 cubic meters (1,200 kilograms) of spent fuel elements were expected to be generated following electrometallurgical processing.

3.2.4 Intentional Destructive Acts

When the 1995 PEIS was prepared, DOE NEPA documents did not normally include an analysis of intentional destructive acts. Following the events of September 11, 2001, DOE has implemented measures to minimize the risk and consequences of potential intentional destructive acts on its facilities. Consistent with CEQ guidance, DOE currently analyzes the potential impacts of intentional destructive acts in NEPA documents. DOE guidance for this analysis is provided in *Recommendations for Analyzing Accidents under the National Environmental Policy Act* (DOE 2002b).

It is not possible to predict whether intentional destructive attacks would occur, or the nature or types of such attacks. Nevertheless, DOE has evaluated security scenarios involving intentionally destructive acts to assess potential vulnerabilities and identify improvements to security procedures and response measures. Security at its facilities is a critical priority for DOE. Therefore, DOE continues to identify and implement measures to defend and deter attacks. DOE maintains a system of regulations, orders, programs, guidance, and training that form the basis for maintaining, updating, and testing site security to preclude and mitigate any potential intentional destructive attacks.

The conservative assumptions inherent in the accidents analyzed in the 1995 PEIS assumed initiation by natural events, equipment failure, or inadvertent worker actions. The accidents evaluated in the 1995 PEIS included earthquakes, fires, criticalities, and airplane crashes, all of which could cause a release of radiological materials to the environment (DOE 1995a, Section 5.15 of Appendix B). Intentional destructive acts could also potentially cause a release of radiological materials to the environment. If that were to occur, the resulting radiological release and consequences to workers and the public would be similar to those occurring from natural or man-caused events (DOE 2015a). Notwithstanding the remote risk of an intentional destructive act that could affect operations at the INL Site, in the unlikely event that a terrorist attack did successfully breach the physical and other safeguards at DOE facilities resulting in the release of radionuclides, the potential consequences would be no worse than those of the highest consequence accident analyzed in the 1995 PEIS.

There is also a potential for an intentional destructive act during SNF transport from the Byron or North Anna nuclear power stations to the INL Site. In the Yucca Mountain SEIS, DOE examined the potential impacts associated with intentional destructive acts involving SNF transportation (DOE 2008). That analysis conservatively estimated (that is, tended to overstate the risk) the potential impacts of an intentional destructive act in which a high energy density device penetrated a rail or truck cask of SNF. DOE estimated that there would be 28 latent cancer fatalities in the exposed population if the intentional destructive act occurred in an urban area. If the intentional destructive act took place in a rural area, DOE estimated that the probability of a single latent cancer fatality in the exposed population would be 0.055 (i.e., 1 chance in 20) (DOE 2008).

The quantity of SNF that would be transported under the proposed action evaluated in this SA would be significantly lower than the quantities of the materials used for the analysis in the Yucca Mountain SEIS (DOE 2008). For example, a typical SNF legal-weight truck cask contains approximately 5 MTHM of SNF, while the maximum quantity of SNF that would be transported for the proposed action would be approximately 0.05 MTHM per shipment (two shipments of 25 SNF rods). Therefore, the above estimates of risk identified in the Yucca Mountain SEIS bound the risks from an intentional destructive act involving the SNF transported for the proposed action.

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4 CUMULATIVE IMPACTS

CEQ regulations at 40 CFR 1508.7 define cumulative impacts as "the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." Implementation of the proposed action evaluated in this SA would not require any new construction and would be conducted in the MFC, which currently conducts operations that are similar in nature to the proposed action. The impacts on transportation, worker health, waste management, water resources, and environmental justice concerns are not significant and cumulative effects are anticipated to be minimal. The only resource area where cumulative impacts may be slightly affected is related to the radiological dose to the offsite MEI.

In February 2014, DOE completed a cumulative impacts analysis for the INL Site that included potential doses from past, present, and reasonably foreseeable future actions for both private and public entities as part of the Environmental Assessment for the Resumption of Transient Testing of Nuclear Fuels and Materials (DOE 2014c). DOE estimated the cumulative dose to the MEI to be 1.5 millirem per year. The addition of the estimated dose from the proposed action of 3.4×10^{-3} millirem per year constitutes a very small change in the estimated cumulative dose.

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5 CONCLUSION

The 1995 PEIS, DOE/EA-1148, and the other relevant NEPA documents identified in this SA evaluated the potential impacts of transporting SNF to the INL Site, the subsequent research and operations at the INL Site involving the SNF, and the management and disposition of SNF and waste from the research and operations at the INL Site. DOE prepared this SA in accordance with 10 CFR 1021.314(c), which requires a supplemental EIS be issued when "there are substantial changes to the proposal" or there are "significant new circumstances or information relevant to environmental concerns." In accordance with DOE regulations, this SA provides sufficient information to enable DOE to determine whether the 1995 PEIS and other relevant NEPA documents identified in this SA should be supplemented, a new EIS be prepared, or no further NEPA documentation is required.

The analysis in this Draft SA indicates that the identified and projected environmental impacts of the proposed action would be bounded by the impacts analyzed in the 1995 PEIS and the relevant NEPA documents.

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APPENDIX A:

1995 SETTLEMENT AGREEMENT

1995 Settlement Agreement

The State of Idaho, through the Attorney General, and Governor Philip E. Batt in his official capacity; the Department of Energy, through the General Counsel and Assistant Secretary for Environmental Management; and the Department of the Navy, through the General Counsel and Director, Naval Nuclear Propulsion Program, hereby agree on this 16th day of October, 1995, to the following terms and conditions to fully resolve all issues in the actions Public Service Co. of Colorado v. Batt, No. CV 91-0035-S-EJL (D. Id.) and United States v. Batt, No. CV-91-0065-S-EJL (D. Id.):

A. Definitions

For purposes of this Agreement, the following definitions shall apply:

1. The "State" shall mean the State of Idaho and shall include the Governor of the State of Idaho and the Idaho State Attorney General.

2. The "federal parties" means U.S. Department of Energy (DOE) and the U.S. Department of the Navy (the Navy), including any successor agencies.

3. "Treat" shall be defined, as applied to a waste or spent fuel, as any method, technique, or process designed to change the physical or chemical character of the waste or fuel to render it less hazardous; safer to transport, store, dispose of; or reduce in volume.

4. "Transuranic waste" shall be defined as set forth in the EIS, Volume 2, Appendix E.

5. "One shipment of spent fuel" shall be defined as the transporting of a single shipping container of spent fuel.

6. "High-level waste" shall be defined as set forth in the EIS, Volume 2, Appendix E.

7. "DOE spent fuel" shall be defined as any spent fuel which DOE has the responsibility for managing with the exception of naval spent fuel and commercial spent fuel which DOE has accepted or will take title to pursuant to the Nuclear Waste Policy Act of 1982, 42 U.S.C. 10101 et seq. or comparable statute.

8. "Naval spent fuel" shall be defined as any spent fuel removed from naval reactors as a result of refueling overhauls (refueling) or defueling inactivations (defueling).

9. "Metric ton of spent fuel" shall be defined as a metric ton of heavy metal of spent fuel.

10. "Naval reactors" shall be defined as nuclear reactors used aboard naval warships (submarines, aircraft carriers, or cruisers), naval research or training vessels, or at land-based naval prototype facilities operated by the Naval Nuclear Propulsion Program for the purposes of research, development, or training.

11. "Calendar year" shall be defined as the year beginning on January 1, and ending on December 31.

12. "Mixed Waste" shall be defined as set forth in the EIS, Volume 2, Appendix E.

13. "EIS" shall be defined as the Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Program Final Environmental Impact Statement issued April, 1995.

14. "ROD" shall be defined as the Record of Decision issued by DOE on June 1, 1995, concerning the EIS.

15. "INEL" shall be defined as the Idaho National Engineering Laboratory.

16. "Running Average" shall mean the total number of shipments of naval spent fuel to INEL, or transuranic waste from INEL, over any period of three years, divided by three.

17. The "Court" shall mean the United States District Court for the District of Idaho before which is pending Public Service Company of Colorado v. Batt, No. CV 91-0036-S-EJL and United States v. Batt, No. CV 91-0054-S-EJL, and any appellate court to which an appeal may be taken, or with which an application for a writ of certiorari may be filed, under applicable law.

B. Transuranic Waste Shipments Leaving Idaho

1. DOE shall ship all transuranic waste now located at INEL, currently estimated at 65,000 cubic meters in volume, to the Waste Isolation Pilot Plant (WIPP) or other such facility designated by DOE, by a target date of December 31, 2015, and in no event later than December 31, 2018. DOE shall meet the following interim deadlines:

   a. The first shipments of transuranic waste from INEL to WIPP or other such facility designated by DOE shall begin by April 30, 1999.

   b. By December 31, 2002, no fewer than 3,100 cubic meters (15,000 drum-equivalents) of transuranic waste shall have been shipped out of the State of Idaho.

   c. After January 1, 2003, a running average of no fewer than 2,000 cubic meters per year shall be shipped out of the State of Idaho.

2. The sole remedy for failure by DOE to meet any of these deadlines or requirements shall be the suspension of DOE spent fuel shipments to INEL as set forth in Section K.1.

C. Spent Fuel and High-Level Waste Shipments Leaving Idaho

1. DOE shall remove all spent fuel, including naval spent fuel and Three Mile Island spent fuel from Idaho by January 1, 2035. Spent fuel being maintained for purposes of testing shall be excepted from removal, subject to the limitations of Section F.1 of this Agreement.

2. Until all of the aluminum-clad spent fuel then stored at INEL has been shipped to the Savannah River Site, the cumulative number of shipments of spent fuel from the Savannah River Site to INEL under Section D as of the end of any calendar year shall

not exceed the cumulative number of shipments of aluminum-clad spent fuel from INEL to the Savannah River Site for the same period.

3. DOE shall treat all high-level waste currently at INEL so that it is ready to be moved out of Idaho for disposal by a target date of 2035.

D. Shipments of Spent Fuel to INEL

The federal parties may transport shipments of spent fuel to INEL only in accordance with the following terms and conditions.

1. Shipments of naval spent fuel to INEL shall take place as follows:

   a. The Navy may make only those shipments of naval spent fuel to INEL that are necessary to meet national security requirements to defuel or refuel nuclear powered submarines, surface warships, or naval prototype or training reactors, or to ensure examination of naval spent fuel from these sources. The Secretary of Defense, upon notice to the Governor of the State of Idaho, shall certify the total number of such shipments of naval spent fuel required to be made through the year 2035.

   b. The Navy shall not ship more than twenty four (24) shipments to INEL from the date of this Agreement through the end of 1995, no more than thirty six (36) shipments in 1996, and no more than twenty (20) shipments per year in calendar years 1997 through 2000. From calendar year 2001 through 2035, the Navy may ship a running average of no more than twenty (20) shipments per year to INEL. The total number of shipments of naval spent fuel to INEL through 2035 shall not exceed 575. Shipments of naval spent fuel to INEL through 2035 shall not exceed 55 metric tons of spent fuel.

   c. Prior to January 1 of each calendar year through the year 2035, the Navy shall provide to Idaho an estimate of the number of shipments and the number of metric tons of naval spent fuel to be shipped during the following calendar year.

   d. By January 31 of each calendar year, the Navy shall provide to Idaho the actual number of shipments and actual number of metric tons of naval spent fuel shipped during the preceding calendar year.

   e. The naval spent fuel stored at INEL on the date of the opening of a permanent repository of interim storage facility shall be among the early shipments of spent fuel to the first permanent repository or interim storage facility.

   f. The sole remedy for the Navy's failure to meet any of the deadlines or requirements set forth in this section shall be suspension of naval spent fuel shipments to INEL as set forth in Section K.1.

2. Shipments of DOE spent fuel to INEL shall take place as follows:

   a. If DOE and the U.S. Department of State adopt a policy to accept spent fuel from foreign research reactors into the United States, DOE may send to INEL a maximum of 61 shipments of spent fuel from foreign research reactors during the period

beginning on the date such a policy is adopted and ending on December 31, 2000. The Secretary of Energy, upon notice to the Governor of the State of Idaho, must certify that these shipments are necessary to meet national security and nonproliferation requirements. Upon such certification, DOE may ship not more than 10 such shipments from the date such policy is adopted through December 31, 1996, not more than 20 such shipments from the date the policy is adopted through December 31, 1997, and not more than 40 such shipments from the date the policy is adopted through December 31, 1998.

b. Until such time as a permanent repository or interim storage facility for storage or disposal of spent fuel, located outside of Idaho, is operating and accepting shipments of spent fuel from INEL, DOE shall be limited to shipments of spent fuel to INEL as set forth in Sections D.2.a., c., d., e., and (f). After a permanent repository of interim storage facility is operating and accepting shipments of spent fuel from INEL, the State of Idaho and DOE may negotiate and reach agreement concerning the timing and number of shipments of DOE spent fuel that may be sent to INEL, in addition to those otherwise permitted under this Section D.2., for preparation for storage or disposal outside the State of Idaho.

c. After December 31, 2000, DOE may transport shipments of spent fuel to INEL constituting a total of no more than 55 metric tons of DOE spent fuel (equivalent to approximately 497 truck shipments) and subject to the limitations set forth in Sections D.2.e., f., g., and h. below, except that the limitations of Section D.2.a. above will not apply.

d. No shipments of spent fuel shall be made to INEL from Fort St. Vrain, unless a permanent repository or interim storage facility for spent fuel located outside of Idaho has opened and is accepting spent fuel from INEL, in which case such shipments may be made for the purpose of treating spent fuel to make it suitable for disposal or storage in such a repository or facility. Shipments of spent fuel from Fort St. Vrain shall remain at INEL only for a period of time sufficient to allow treatment for disposal or storage in such a repository or facility. The total number of Fort St. Vrain shipments shall not exceed 244, constituting no more than sixteen (16) metric tons of spent fuel, and shall be in addition to those allowed under Section D.2.c. above.

e. Except as set forth in Section D.2.d. above, DOE will make no shipments of spent fuel from commercial nuclear power plants to INEL.

f. After December 31, 2000, and until an interim storage facility or permanent repository is opened and accepting spent fuel from INEL, DOE shall not ship to INEL more than 20 truck shipments of spent fuel in any calendar year, except that:

   (i) In one calendar year only, DOE may make not more than 83 truck shipments of spent fuel to INEL from the West Valley Demonstration Project;

   (ii) DOE may not make more than 13 truck shipments in any of the nine calendar years succeeding the shipment of the West Valley Demonstration Project spent fuel to INEL; and

(iii) Shipments DOE is entitled to make to INEL in any calendar year, but has not made, may be shipped in any subsequent calendar year, notwithstanding the limitations in this Section D.2.f. on the number of shipments per year.

For purposes of this section and Section D.2.c., in determining the number of truck shipments, one rail shipment shall be deemed equivalent to 10 truck shipments, except that in the case of shipments from West Valley Demonstration Project, seven rail shipments shall be deemed to be equal to 83 truck shipments. DOE may elect to make rail shipments in lieu of truck shipments, in accordance with this conversion formula and subject to other limitations of this section.

g. Prior to January 1 of each calendar year through the year 2035, DOE shall provide to Idaho an estimate of the number of shipments and the number of metric tons of DOE spent fuel to be shipped during the following calendar year.

h. No later than January 31st of each calendar year, DOE shall provide to Idaho the actual number of shipments and actual number of metric tons of DOE spent fuel shipped during the preceding year.

i. The sole remedy for DOE's failure to meet any of the deadlines or requirements set forth in this section shall be the suspension of DOE spent fuel shipments to INEL as set forth in Section K.1.

E. Treatment and Transfer of Existing Wastes at INEL

1. **Treatment Commitment**. DOE agrees to treat spent fuel, high-level waste, and transuranic wastes in Idaho requiring treatment so as to permit ultimate disposal outside the State of Idaho.

2. **Mixed Waste Treatment Facility**. DOE shall, as soon as practicable, commence the procurement of a treatment facility ("Facility") at INEL for the treatment of mixed waste, transuranic waste and alpha-emitting mixed low-level waste ("Treatable Waste"). DOE shall execute a procurement contract for the Facility by June 1, 1997, complete construction of the Facility by December 31, 2002, and commence operation of the Facility by March 31, 2003. Commencement of construction is contingent upon Idaho approving necessary permits.

a. **Treatment of Non-INEL Wastes**. Any and all Treatable Waste shipped into the State of Idaho for treatment at the Facility shall be treated within six months of receipt at the Facility, with the exception of two cubic meters of low-level mixed waste from the Mare Island Naval Shipyard which will complete base closure for nuclear work in 1996. DOE may request an exception to the six month time period on a case-by-case basis, considering factors at the shipping site such as health and safety concerns, insufficient permitted storage capacity, and base or site closures. Any transuranic waste received from another site for treatment at the INEL shall be shipped outside of Idaho for storage or disposal within six months following treatment. DOE shall continue to use the Federal Facility Compliance Act process, as facilitated by the National Governors' Association, to determine what locations are suitable for mixed low-level waste treatment and storage.

3. **Operation of High-Level Waste Evaporator**. DOE shall commence operation of the high-level waste evaporator by October 31, 1996, and operate the evaporator in such a manner as to reduce the tank farm liquid waste volume by no fewer than 330,000 gallons by December 31, 1997. Efforts will continue to reduce the remaining volume of the tank farm liquid waste by operation of the high-level waste evaporator.

4. **Calcination of Remaining Non-Sodium Bearing Liquid Wastes**. DOE shall complete the process of calcining all remaining non-sodium bearing liquid high-level wastes currently located at INEL by June 30, 1998.

5. **Calcination of Sodium-Bearing Wastes**. DOE shall commence calcination of sodium-bearing liquid high-level wastes by June 1, 2001. DOE shall complete calcination of sodium-bearing liquid high-level wastes by December 31, 2012.

6. **Treatment of Calcined Wastes**. DOE shall accelerate efforts to evaluate alternatives for the treatment of calcined waste so as to put it into a form suitable for transport to a permanent repository or interim storage facility outside Idaho. To support this effort, DOE shall solicit proposals for feasibility studies by July 1, 1997. By December 31, 1999, DOE shall commence negotiating a plan and schedule with the State of Idaho for calcined waste treatment. The plan and schedule shall provide for completion of the treatment of all calcined waste located at INEL by a date established by the Record of Decision for the Environmental Impact Statement that analyzes the alternatives for treatment of such waste. Such Record of Decision shall be issued not later than December 31, 2009. It is presently contemplated by DOE that the plan and schedule shall provide for the completion of the treatment of all calcined waste located at INEL by a target date of December 31, 2035. The State expressly reserves its right to seek appropriate relief from the Court in the event that the date established in the Record of Decision for the Environmental Impact Statement that analyzes the alternatives for treatment of such waste is significantly later than DOE's target date. In support of the effort to treat such waste, DOE shall submit to the State of Idaho its application for a RCRA (or statutory equivalent) Part B permit by December 1, 2012.

7. **Transfer of Three Mile Island Fuel**. DOE shall complete construction of the Three Mile Island dry storage facility by December 31, 1998. DOE shall commence moving fuel into the facility by March 31, 1999, and shall complete moving fuel into the facility by June 1, 2001.

8. **Transfer Out of Wet Storage**. By December 31, 1999, DOE shall commence negotiating a schedule with the State of Idaho for the transfer of all spent fuel at INEL out of wet storage facilities. DOE shall complete the transfer of all spent fuel from wet storage facilities at INEL by December 31, 2023. If DOE determines that transfer to dry storage of any portion of such spent fuel is technically infeasible, or that transfer to such dry storage presents significantly greater safety or environmental risks than keeping the fuel in wet storage, DOE shall inform the State and propose a later date or alternative action. If the State does not agree to such later date or alternative action, DOE may apply to the Court for appropriate relief. DOE shall, after consultation with the State of Idaho, determine the location of the dry storage facilities within INEL, which shall, to the extent technically feasible, be at a point removed from above the Snake River Plain Aquifer ("Aquifer").

9. The sole remedy for DOE's failure to meet any of the deadlines or requirements set forth in this section shall be the suspension of DOE spent fuel shipment to INEL as set forth in Section K.1.

F. Spent Fuel Program

1. **Establishment of INEL as DOE Spent Fuel Lead Laboratory**. DOE shall, within thirty days of entry of this Agreement as a court order, designate INEL as the Department's lead laboratory for spent fuel. DOE shall direct the research, development and testing of treatment, shipment and disposal technologies for all DOE spent fuel, and all such DOE activities shall be coordinated and integrated under the direction of the Manager, DOE-Idaho Operations Office. Such designation shall not permit the shipment to INEL of any spent fuel beyond that permitted by this Agreement with the exception that quantities of spent fuel brought to INEL for testing in excess of those permitted by this Agreement shall leave the State of Idaho within five years of the date of receipt at INEL.

2. **Construction of Dry Storage**. DOE shall include in its appropriation request for federal fiscal year 1998 to the Executive Office of the President funds necessary for DOE to initiate the procurement of dry storage at INEL to replace wet, below ground facilities. Spent fuel loading into dry storage shall commence by July 1, 2003.

3. **Funding for Dry Cell Expansion Project**. The Naval Nuclear Propulsion Program shall include in its appropriation request to the Executive Office of the President for federal fiscal year 1997 funds necessary for the Dry Cell Expansion Project ("Project") at the Expended Core Facility at the Naval Reactors Facility to accommodate removal of excess material and examination of naval spent fuel in a dry condition. The Project shall commence as soon as Idaho issues the required permit under the Clean Air Act and funding is appropriated. Completion of this project shall result in the expenditure of approximately $26 million dollars over the next five years.

4. **Multi-Purpose Canisters**. DOE and the Navy shall employ Multi-Purpose Canisters ("MPCs") or comparable systems to prepare spent fuel located at INEL for shipment and ultimate disposal of such fuel outside Idaho. Procurement shall be performed in accordance with the Federal Acquisition Regulation which ensures that companies in Idaho will have opportunity to bid on and obtain any competitive contracts for such work. The Record of Decision on the NEPA analysis shall be completed by April 30, 1999.

5. **ECF Hot Cell Facility Upgrade**. The Naval Nuclear Propulsion Program shall include in its appropriation request for federal fiscal year 1997 to the Executive Office of the President funds necessary to proceed with upgrades which shall require approximately $12 million of expenditures during the next three years.

6. **ECF Dry Storage Container Loading Station**. The Naval Nuclear Propulsion Program shall include in its appropriation request for federal fiscal year 1997 to the Executive Office of the President funds necessary to proceed with design and construction of a dry storage container loading station at ECF. This project shall require no less than $20 million of expenditures during the next five years.

7. **Funding for Discretionary Environmental Remediation Work at the Naval Reactors Facility**. The Naval Nuclear Propulsion Program shall undertake environmental remediation efforts at the Naval Reactors Facility totaling approximately $45 million over the next five years.

8. **Water Pool Reracking**. DOE may proceed with installing new racks into the water pool in the building at the Idaho Chemical Processing Plant Facility currently holding naval spent fuel to provide enhanced capability for spent fuel storage in the existing water pool space until dry storage can be made available. Installation of the new racks may commence as soon as Idaho issues the necessary permit under the Clean Air Act. Idaho shall issue said permit within 180 days after DOE re-submits its application to Idaho.

G. INEL Environmental Restoration Program

1. **INEL Environmental Restoration Program to Continue**. DOE shall continue to implement the INEL environmental restoration program in coordination with Idaho and EPA. Such implementation shall be consistent with the schedules contained in the Federal Facilities Agreement and Consent Order (FFA/CO) entered into with the State of Idaho, EPA and DOE, and it shall include schedule requirements developed pursuant to the completed and future records of Decision under the FFA/CO. The sole remedies for failure to implement the environmental restoration activities specified in the FFA/CO shall be those specified in the FFA/CO.

H. Obtaining Timely Federal Funding for Compliance with this Order

1. **Compliance Funding**. DOE and the Naval Nuclear Propulsion Program shall share budget information concerning INEL with Idaho prior to submitting the budget request to the Executive Office of the President. Consultations with the State of Idaho shall continue throughout the budget process. The current DOE estimate for the costs of the activities and projects described in Sections A through G over the next five years is approximately $200 million above established budget targets.

I. Federal Funds for this Settlement Agreement

1. DOE shall provide to the State of Idaho beginning in federal fiscal year 1996 and continuing through 1997-2000, a total amount of $30 million for community transition purposes and any other purposes that are mutually acceptable to the parties, such as the non-Federal development of Boron Neutron Capture Therapy and Radiological Toxicology technology in Idaho.

2. **Acoustic Research Funding**. The Navy shall include in its appropriation request to the Executive Office of the President for federal fiscal year 1997 no less than $7 million for the Navy to construct a Ships Model Engineering and Support Facility at the Naval Surface Warfare Center, Carderock Division, Acoustic Research Detachment at Bayview, Idaho.

J. Good Faith Compliance and Affirmative Support

1. The federal parties and Idaho agree that the activities to be performed under this Agreement and the subsequent Consent Order are in the public interest. The federal parties and Idaho acknowledge the complexity of this Agreement and have agreed to act in good faith to effectuate its fulfillment. The federal parties and Idaho shall affirmatively support this Agreement and its terms, conditions, rights and obligations in any administrative or judicial proceeding. The federal parties and Idaho intend to seek a sense of the Congress resolution expressing support for the terms, conditions, rights and obligations contained in this Agreement and the subsequent Consent Order and recommending to future Congresses that funds requested by the President to carry out this Agreement be appropriated. In any administrative or judicial proceeding, Idaho shall support the adequacy of the EIS and ROD against any challenges by third parties. Idaho shall have the ability, in its sole discretion, to waive performance by the federal parties of any terms, conditions and obligations contained in this Agreement.

2. Idaho shall promptly issue, upon submission of legally sufficient applications, all permits, licenses or other approvals needed by the DOE, the Navy or the Naval Nuclear Propulsion Program for the performance of any of their respective obligations set forth in this Agreement.

3. No provision of this Agreement shall compel any party to act without due legal authority. Performance by every party under this Agreement shall be subject to and comply with all applicable federal statutes, regulations and orders, including the Anti-Deficiency Act. The inability of any party to comply with the provisions of this Agreement, or a delay in such compliance, as a result of any applicable federal statute, regulation or order shall not subject that party to judicial enforcement under Section K.2.a, but shall not preclude the application of Sections K.1.a. or K.1.b.

4. In the event any required NEPA analysis results in the selection after October 16, 1995, of an action which conflicts with any action identified in this Agreement, DOE or the Navy may request a modification of this Agreement to conform the action in the Agreement to that selected action. Approval of such modification shall not be unreasonably withheld. If the State refuses to accept the requested modification, DOE or the Navy may seek relief from the Court. On motion of any party, the Court may extend the time for DOE or the Navy to perform until the Court has decided whether to grant relief. If the Court determines that the State has unreasonably withheld approval, the Agreement shall be conformed to the selected action. If the Court determines that the State has reasonably withheld approval, the time for DOE or the Navy to perform the action at issue shall be as set forth in this Agreement and subject to enforcement as set forth section in Section K.1.

5. **Effect of Certain Court Orders.**

   a. **Navy.** In the event that a court order is entered in the case of Snake River Alliance Education Fund v. United States Department of Energy , No. CV-95-0331-S-EJL (D. Idaho), or in any other judicial proceeding, that prohibits in whole or in part any shipment of spent fuel to INEL by the Navy under section D, then all obligations, requirements and deadlines of the federal parties under this Agreement shall be suspended during the period of applicability of the order. Upon the vacating, dissolving or reversing of any such order, the obligations, deadlines and

requirements provided for in this Agreement shall be extended by a period that corresponds to their period of suspension.

b. **DOE**. In the event that a court order is entered in the case of Snake River Alliance Education Fund v. United States Department of Energy , No. CV-95-0331-S-EJL (D. Idaho), or in any other judicial proceeding, that prohibits in whole or in part any shipment of spent fuel to INEL by DOE under section D, then the DOE has the option to suspend all DOE shipments to INEL and suspend all of DOE's obligations, requirements and deadlines under this Agreement during the period of applicability of the order. If DOE exercises this option, then upon the vacating, dissolving, or reversing of any such order, DOE's obligations, deadlines and requirements provided for in this Agreement shall be extended by a period that corresponds to their period of suspension.

K. Enforcement

1. **Suspension of Shipments**

a. **DOE**. If DOE fails to satisfy the substantive obligations or requirements it has agreed to in this Agreement or fails to meet deadlines for satisfying such substantive obligations or requirements, shipments of DOE spent fuel to INEL shall be suspended unless and until the parties agree or the Court determines that such substantive obligations or requirements have been satisfied.

b. **Navy**. If the navy or the Naval Nuclear Propulsion Program fails to satisfy the substantive obligations or requirements it has agreed to in this Agreement or fails to meet deadlines for satisfying such substantive obligations or requirements, shipments of Navy spent fuel to INEL shall to suspended unless and until the parties agree or the Court determines that such substantive obligations or requirements have been satisfied.

2. Other Enforcement

a. **Judicial Enforcement**. The Court may enforce the rights, obligations and requirements assigned by this Agreement, other than those exclusively enforceable under Section K.1., pursuant to all legal and equitable remedies available to the courts of the United States, including, but not limited to, use of the Court's contempt powers.

b. **RCRA Enforcement**. Nothing in this Agreement shall prohibit the State of Idaho from requiring necessary remedial actions as set forth in the Resource Conservation and Recovery Act, 42 U.S.C. section 6929 ("RCRA") (or statutory equivalent), including penalty and fine procedures, the sums of which shall be payable to the State of Idaho.

c. **Payment Obligation**. In the event that the federal parties do not carry out the requirement that all spent fuel located at INEL be removed from Idaho by January 1, 2035, then subject to the availability of the appropriations provided in advance for this purpose, the federal parties shall pay to the State of Idaho $60,000 for each day such requirement has not been met.

3. **Prior Orders, Agreements and Decisions**. The terms of this Agreement shall supersede all rights, duties and obligations set forth in any prior orders, agreements or decisions entered in this litigation, captioned Public Service Company of Colorado v. Batt , and United States of America v Batt , Nos. CV 91-0035-S-EJL and CV 91-0054-S-EJL, except for the provisions of paragraph 4 of the December 22, 1993 Court Order.

4. **Dispute Resolution**. In the event that any party to this Agreement contends that any other party has violated any terms of the Agreement, the parties shall seek to resolve their differences informally before asking for resolution by the Court.

L. Consent Order

1. The parties agree they shall jointly present this Agreement to the U.S. District Court with a proposed Consent Order which will provide for the incorporation of this Agreement, continuing jurisdiction of the Court and the administrative termination of this action without prejudice to the right of the parties to reopen the proceedings for good cause shown. This Agreement and Consent Order shall not preclude any party from applying to the Court under Rule 60, of the Federal Rules of Civil Procedure, or the Court from granting relief thereunder.

2. If the Consent Order is not entered by the Court, in accordance with Section L.1 above, within 45 days of lodging with the Court, then either party to this Agreement may elect to terminate this Agreement, in which case this Agreement becomes null and void, and of no force or effect.

For the Federal Parties:

Robert R. Nordhaus
Thomas P. Grumbly
General Counsel Assistant Secretary
Department of Energy for Environmental Management

Department of Energy
Steven S. Honigman
Admiral Bruce DeMars
General Counsel Director, Naval Nuclear
Department of the Navy Propulsion Program

For the State of Idaho:

Philip E. Batt
Governor, State of Idaho

Alan G. Lance
State Attorney General, State of Idaho

APPENDIX B:

2011 MEMORANDUM OF AGREEMENT

MEMORANDUM OF AGREEMENT CONCERNING RECEIPT, STORAGE, AND HANDLING OF RESEARCH QUANTITIES OF COMMERCIAL SPENT NUCLEAR FUEL AT THE IDAHO NATIONAL LABORATORY

This Memorandum of Agreement (Agreement) is entered this 6th day of January 2011 between the United States Department of Energy (DOE) by and through the Manager and Designated Head of Contracting Activity for the DOE Idaho Operations Office and the State of Idaho by and through the Governor of the State of Idaho and the Idaho Attorney General (Idaho).

PURPOSE:

Consistent with the principles set forth in that certain Settlement Agreement and Order dated October 13, 1995 in the matter of 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.) ("1995 Agreement"), the purpose of this Agreement is to provide for efficient and safe development of research capacities at the Idaho National Laboratory (INL) related to the next generation of nuclear reactor fuels while continuing to ensure Idaho does not become a defacto repository for the Nation's spent nuclear fuel from commercial nuclear power plants. For this reason the DOE and Idaho (collectively "the Parties") agree as follows:

RECITALS

WHEREAS, the United States is pursuing energy independence and research on energy processes which will reduce the amount of carbon dioxide generated in the energy cycle and it is anticipated that, to some degree, these goals will involve increased reliance on nuclear power; and

WHEREAS, the United States' ability to increase its reliance upon nuclear energy will, in turn, be dependent upon development of the next generation of nuclear fuels which will provide greater energy efficiency, reduced lifecycle costs and the generation of less waste; and

WHEREAS, the 1995 Agreement provides in section F that the INL is designated as the DOE Spent Fuel Lead Laboratory for the "research development and testing of treatment, shipment and disposal technologies for all DOE spent fuel" and provides for the receipt of DOE spent nuclear fuel for research purposes; and

WHEREAS, in furtherance of this mission, the INL has developed and possesses unique technologies and capabilities which will further the research development and testing of new fuel types and technologies; and

WHEREAS, in 2002 the DOE designated the INL as the Nation's lead laboratory for nuclear energy research; and

WHEREAS, section D.2.e of the 1995 Agreement restricts the INL from accepting any shipments of "spent fuel from commercial nuclear power plants" (Commercial Power SNF) impeding INL from utilizing its unique capabilities and technologies to assist in the important work of research and development of the next generation of commercial fuel technology, slowing that development and making it more costly to the American public; and

WHEREAS, the Parties concur that legitimate research conducted at the INL in furtherance of safe and efficient nuclear power production, including research on commercial spent nuclear fuel, is consistent with the spirit and intent of the 1995 Agreement; and

WHEREAS, section J.1 of the 1995 Agreement provides that Idaho, in its sole discretion, may waive portions of the 1995 Agreement; and

WHEREAS, Idaho will continue to insist upon the safe management of spent nuclear fuel and nuclear waste and the ultimate disposition of such materials outside of the State of Idaho;

NOW THEREFORE IT IS HEREBY AGREED:

1. This Agreement is terminable at will in the sole and exclusive discretion of the State of Idaho upon written notice to the DOE and no implied covenant of good faith and fair dealing shall be applicable to Idaho's decision to exercise this right.

2. Pursuant to the terms and conditions of this Agreement and solely for the purpose of research conducted at the INL; Idaho in its sole and exclusive discretion, grants a conditional waiver of the section D.2.e prohibition on the shipment of spent nuclear fuel from commercial nuclear power plants to the INL.

Specific Conditions

3. Limits and Material Management:

(a) INL may receive for the purpose of research and examinations conducted at the INL research quantities of Commercial Power SNF. For purposes of this Agreement "research quantities" shall mean only those quantities of Commercial Power SNF necessary for the specific research project for which the shipment to INL is made. This will be documented pursuant to paragraph 6 below.

(b) As further limitation, not more than 400 kilograms total heavy metal content of Commercial Power SNF may be received in any calendar year. This will be documented pursuant to paragraph 6 below.

(c) A shipment of Commercial Power SNF to INL will count as a shipment of DOE SNF for purposes of the annual shipment limits contained in section D.2.f of the 1995 Agreement for each calendar year in which such shipment occurs.

(d) The amount of Commercial Power SNF, measured in fractions of metric tons heavy metal (MTHM), including the equivalent amount contained in any wastes generated during research, remaining on site at the end of each calendar year will count toward the total metric tonnage limits for DOE SNF contained in section D.2.c of the 1995 Agreement. However, equivalent amounts of MTHM contained in any wastes generated during research that are shipped off-site in subsequent years may be deducted from the total metric tonnage limits for DOE SNF contained in section D.2.c of the 1995 Agreement.

(e) The Commercial Power SNF will be stored in appropriate SNF storage and will be managed as SNF until shipped off-site in compliance with the 2035 shipment deadline of the 1995 Agreement.

(f) Nothing in this Agreement shall be construed to allow DOE to exceed the 55 MTHM limit for SNF allowed by the 1995 Agreement.

4. Management of wastes generated during examination: Wastes generated during the research activity will be managed dependent upon the nature of research conducted in the form of destructive or non-destructive examination. Material that is classified as transuranic or low level waste may be consolidated with other laboratory wastes and managed appropriately.

5. Library Storage for Future Research: DOE shall further be permitted to keep a library of spent fuel types at the INL consisting of materials brought to INL under Paragraph 3. At no time shall the library contain an amount more than ten (10) kilograms total heavy metal which shall be documented pursuant to paragraph 6 of this Agreement.

(a) Said library of materials shall be solely for the purpose of retaining existing samples for future research at the INL.

(b) All materials kept in library storage shall count towards the over-all limit established by Section D.2.c of the 1995 Settlement Agreement and nothing in this Agreement shall be construed to allow DOE to exceed that limit.

(c) Library storage of the research quantities of SNF at the INL shall be permitted only for the duration of this Agreement and only so long as INL continues to be designated as the DOE lead laboratory for nuclear energy research.

6. Notification and Reporting:

(a) Prior to January 1 of each calendar year the DOE will notify Idaho of potential receipts of Commercial Power SNF to be shipped to the INL during the following calendar year pursuant to this Agreement. Such notification will specify:

(i) the source of Commercial Power SNF,

(ii) the amount of MTHM contained in each shipment,

(iii) the research purpose for each shipment including documentation showing that a research project has been authorized, contracted or funded,

(iv) the schedule for completion of the research project,

(v) the anticipated volume of waste to be generated by the research, and

(vi) The potential disposition path for remaining SNF material.

(b) By not later than January 31 of each calendar year Idaho will be notified of the amounts of Commercial Power SNF actually received in the previous calendar year. The DOE will further provide a report updating the information concerning previous shipments and research projects including the information contained in paragraph 6.a.(i-vi) above related to each shipment.

(c) By not later than January 31 of each calendar year the DOE will provide a report on the status of the library of Commercial Power SNF kept at INL pursuant to paragraph 5 above, including the following:

(i) The total amount of material in library storage;

(ii) The source of each material in library storage;

(iii) The amount of each material in library storage specific to each source or fuel type;

(iv) The anticipated future research related to each type and amount of material in library storage; and

(v) The anticipated date upon which research related to each type and amount of material in library storage will occur.

(d) A separate copy of all reports and or notifications required by this Agreement shall be submitted to Idaho at the following addresses:

Idaho Department of Environmental Quality
Attn: Director
1410 N. Hilton
Boise Idaho 83706

Idaho Department of Environmental Quality
Attn: INL Oversight Program
1410 N. Hilton
Boise Idaho 83706

Office of the Idaho Attorney General,
Natural Resources Section
700 W. State Street
P.O. Box 83720
Boise Idaho 83720-0010

7. This Agreement reflects a conditional waiver of section D.2.e of the 1995 Agreement related to the shipment of research quantities of Commercial Power SNF to Idaho. This Agreement shall not be construed to alter or amend any provisions of the 1995 Agreement.

8. All Commercial Power SNF shipped to Idaho pursuant to this Agreement and stored at the INL for any reason shall be removed from Idaho in accordance with the deadline set forth in section C.1 of the 1995 Agreement.

9. If for any reason this Agreement is terminated by either party or if the mission of the INL is changed and it loses its lead laboratory for nuclear energy status, shipments of research quantities of Commercial Power SNF shall cease immediately and all SNF stored or otherwise located at the INL shall be removed from Idaho in accordance with the deadline set forth in section C.1 of the 1995 Agreement.

DATED this 6 day of January, 2011.

Richard B. Provencher
Manager, Idaho Operations Office
United States Department of Energy

DATED this 6 day of January, 2011.

C. L. "Butch" Otter
Governor of Idaho

DATED this 6th day of January, 2011.

Lawrence Wasden
Idaho Attorney General

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