7 COST-BENEFIT ANALYSIS

The potential environmental impacts of constructing and operating the proposed Idaho Spent Fuel Facility at the Idaho National Engineering and Environmental Laboratory (INEEL) are discussed in Section 4 of this environmental impact statement (EIS). This section summarizes other costs and benefits associated with the proposed action and the no-action alternatives. The economic costs and benefits provided by Foster Wheeler Environmental Corporation (FWENC) in its license application and environmental report (FWENC, 2001a,b) and the U.S. Department of Energy (DOE)[1] are presented and supplemented as necessary with additional assessments by the U.S. Nuclear Regulatory Commission (NRC) and Center for Nuclear Waste Regulatory Analyses staffs. In addition, this section summarizes the results of a generic analysis for a Dry Fuel Storage, Fuel Receiving, Canning/Characterization and Shipping Facility presented in the DOE programmatic spent nuclear fuel (SNF) EIS (DOE, 1995, Volume 2, Part B, Appendix C, Alternative B).

7.1 Costs Associated with the Proposed Idaho Spent Fuel Facility

An estimate of costs for construction and operation of the proposed Idaho Spent Fuel Facility is provided by FWENC as part of its license application (FWENC, 2001a). The estimate is based on the assumption the proposed facility will be constructed on a 3.2-ha [8-acre] site adjacent to the Idaho Nuclear Technology and Engineering Center (INTEC). In the FWENC analysis, construction of the proposed Idaho Spent Fuel Facility was assumed to begin in July 2003, with operations scheduled to commence in June 2005. Using the current schedule, construction would begin later than these assumed dates. The differences in estimated costs, however, would likely be small, and the FWENC estimates are suitable to evaluate cost and benefit of the proposed action.

7.1.1 Costs Associated with Construction Activities

FWENC would design, construct, and initially operate the proposed Idaho Spent Fuel Facility per contract with DOE. In accordance with the terms of the contract, after an initial payment by DOE, FWENC would be responsible for funding the construction and initial operation of the proposed Idaho Spent Fuel Facility. FWENC estimates construction costs associated with the proposed facility will be $119.6 million (2001 dollars) (FWENC, 2001a).

7.1.2 Costs Associated with Operational Activities

After the proposed Idaho Spent Fuel Facility is operational, DOE would make payments to FWENC during the transfer and storage of the first 800 fuel-handling units of SNF. As defined in the contract, one fuel-handling unit is equal to one fuel element for intact SNF. These amortized capital costs total approximately $119.6 million (2001 dollars). In addition to the amortizing payments, DOE would also make payments for the transfer and storage of the remaining SNF at specific unit prices for each SNF type. The total payments inclusive of all fuel types could be nearly $32.5 million (2001 dollars).

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[1]DOE. DOE–ID–11003, "Moving INEEL Spent Nuclear Fuel to the Repository." Idaho Falls, Idaho: DOE, Idaho Operations Office. Predecisional Draft. 2002.

In accordance with the contract, poststorage operation and maintenance of the facility by FWENC would be at the option of DOE. Pending the necessary transfer of the NRC license from FWENC, DOE would have the contractual option to assume responsibility for the facility after the initial fuel-handling, packaging, and storage operations. Should DOE desire that FWENC continue as the licensee during the poststorage operations phase of the project, DOE would pay FWENC almost $1.94 million (2001 dollars) per year.

7.1.3 Costs Associated with Decontamination and Decommissioning

As part of the contract with FWENC, DOE retains ownership of the SNF and remains financially responsible for the eventual decontamination and decommissioning of the proposed Idaho Spent Fuel Facility. FWENC provided a proposed decommissioning plan (FWENC, 2001a, Appendix C) that presents the estimated cost of dismantling, decontaminating, and decommissioning the site in 2018 at $22.6 million (2001 dollars) for radiological decommissioning activities and $13.2 million (2001 dollars) for the nonradiological activities associated with site restoration. The decommissioning cost estimates were derived using approaches from industry and DOE guidance (TLG Engineering, 1986; DOE, 1994). Unit cost factors incorporating site-specific considerations were used whenever practicable, and quantities and volumes of the equipment and material expected to be removed during decommissioning were estimated using proposed facility drawings. The cost estimate also includes peripheral costs such as preparing work plans and writing procedures, and waste costs as described in DOE (1994). These costs are summarized in Table 7-1 and described in more detail next.

7.1.3.1 Radiological Decommissioning Costs

The radiological decommissioning cost estimate provided by FWENC for the proposed Idaho Spent Fuel Facility considers radiological decommissioning costs to be only those costs associated with normal decommissioning activities necessary for the release of the site for unrestricted use in accordance with the NRC radiological criteria for license termination in 10 CFR Part 20, Subpart E. The radiological decommissioning cost estimate does not include those costs associated with SNF management or the disposal of nonradioactive structures and materials.

Burial costs were derived from FWENC modeling and analysis of low-level radioactive waste disposal costs. Contingencies were applied to each area of the cost estimate (i.e., decontamination and dismantlement, waste disposal, final survey). No credit was taken for equipment salvage value.

7.1.3.2 Nonradiological Decommissioning Costs

Although not required by the NRC regulations, FWENC included cost estimates for nonradiological decommissioning activities conducted as part of site restoration. The cost estimates considered nonradiological decommissioning costs to be those costs associated with site remediation and demolition and removal of uncontaminated structures.

Table 7-1. Estimated Decommissioning Costs[a]

Activity	Estimated Cost (2001 Dollars)
Dismantlement, decontamination, and remediation	$12,500,000
Waste disposal[b]	$6,300,000
Final survey	$3,800,000
Subtotal (radiological decommissioning costs)	$22,600,000
Site-restoration total (nonradiological decommissioning)	$13,200,000
Total Decommissioning Costs	**$35,800,000**

FWENC = Foster Wheeler Environmental Corporation

[a] FWENC. "License Application, Idaho Spent Fuel Facility." NRC Docket No. 72-25. ISF–FW–RPT–0127. Morris Plains, New Jersey: FWENC. 2001.
[b] Waste disposal estimate based on construction debris landfill at $18–$24 per metric ton [$16–$22 per ton]; low-level waste at $1,500–$60,625 per metric ton [$1,360–$55,000 per ton]; and special materials at $41,335 per metric ton [$37,500 per ton].

7.1.4 Other Costs Associated with the Proposed Action

Materials required for construction and operation of the proposed Idaho Spent Fuel Facility will be similar to those for an industrial construction project. In the DOE programmatic SNF EIS (DOE, 1995, Volume 2, Part B, Appendix C, Alternative B), DOE provides generic estimates for the costs of a facility similar to the FWENC design. These estimates are summarized for the construction and operation phases in Table 7-2.

Construction of the proposed Idaho Spent Fuel Facility would result in physical changes to the 3.2-ha [8-acre] tract for the proposed facility and the contiguous 4.1-ha [10-acre] construction laydown tract. Because these areas are small compared with the 2,305 km^2 [890 mi^2] INEEL, the physical changes would be minor. These changes would restrict land use and access, but this restriction would not affect the value of the land, because access to the property is currently restricted.

The proposed Idaho Spent Fuel Facility would be constructed on federal reserve land under the jurisdiction of the DOE Idaho Operations Office. Therefore, there would be no costs associated with purchase of the land. Construction materials will include gravel, sand, concrete, steel, aluminum, copper, plastics, and lumber, at costs comparable to those for a similar size industrial facility. Other than special purpose items such as construction steel, SNF storage containers, and other dedicated special equipment, materials are available regionally.

The proposed Idaho Spent Fuel Facility operation would likely have little effect on regional economy. Transfer of SNF into new storage containers and placement in the vault would require consumable materials such as filters, welding supplies, and other housekeeping materials. Storage operations will require materials such as high efficiency particulate air filter media and other housekeeping materials.

Table 7-2. Costs Associated with a Generic Dry Fuel Storage Facility/Fuel Receiving, Canning/Characterization, and Shipping Project[a]

	Construction	Operation
Dry Fuel Storage		
Electrical	20 Megawatt hr/yr	200 Megawatt hr/yr
Fuel	Diesel: 6,400 L [1,690 gal]	0[b]
Solid Waste Generation	Total: 37.5 m^3 [49.0 yd^3]	Industrial: 10 m^3/yr [13.1 yd^3/yr] Low-Level Waste: 5 m^3/yr [6.5 yd^3/yr]
Canning/Characterization Facility		
Electrical	30 Megawatt hr/yr	1,800 Megawatt hr/yr
Fuel	Diesel: 10,000 L [2,640 gal]	Fuel Oil: 300,000 L [79,260 gal]
Solid Waste Generation	Total: 37.5 m^3 [49.0 yd^3]	Industrial: 490 m^3/yr [640 yd^3/yr] Low-Level Waste: 220 m^3/yr [290 yd^3/yr]

DOE = U.S. Department of Energy
EIS = environmental impact statement

[a] DOE. DOE/EIS–0203–F, "Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement." Vol. 2, Part B, Appendix C, Alternative B. Idaho Falls, Idaho: DOE. 1995.
[b] Normal operations. Backup diesel generators may require diesel fuel.

After SNF is transferred from the proposed Idaho Spent Fuel Facility to a national high-level waste (HLW) repository, the proposed Idaho Spent Fuel Facility would be decommissioned. A small portion of the materials used in construction would not be available for release and would require disposal at a radioactive waste site. The rest of the materials would be recycled. Therefore, most proposed Idaho Spent Fuel Facility construction materials would be available for reuse or recycling.

Because the proposed Idaho Spent Fuel Facility would be located more than 17 km [10.5 mi] from the nearest community (Atomic City), there would be minimal impact on regional communities. The distances of communities from the construction site would also limit impacts from noise and other construction disturbances. Construction and operation would use regional labor resources, and an influx of workers is not anticipated. Impacts to housing availability and cost, transportation, or community infrastructures are expected to be small.

Because the proposed Idaho Spent Fuel Facility site is within INEEL, public access is controlled by DOE and limited to the highways (US 20/26). The proposed Idaho Spent Fuel Facility would not restrict public access to these rights of way or to archeological, cultural, or recreational sites.

7.1.5 Impact of the Proposed Idaho Spent Fuel Facility on the Programmatic Costs of SNF Management at INEEL

DOE estimated the programmatic costs of SNF management both with and without the construction and operation of the proposed Idaho Spent Fuel Facility (FWENC, 2003). Taking into account the strategy of employing the DOE standard storage container and the core capability of the proposed Idaho Spent Fuel Facility (FWENC, 2001c), the current life-cycle cost estimate for sending all SNF managed by DOE at INEEL to a national HLW repository is $2.815 billion (2001 dollars). This life-cycle cost considers the costs of the current contract between DOE and FWENC for construction and operation of the proposed Idaho Spent Fuel Facility, plus the predicted cost of implementing any future modifications or enhancements to the facility necessary to prepare the SNF for shipment to a national HLW repository. The estimates of costs associated with modification, enhancement, or both includes obtaining appropriate amendments to any NRC license for the facility.

If the strategy of repackaging SNF in a DOE standard storage container is not implemented and the proposed Idaho Spent Fuel Facility is not constructed, the life-cycle cost estimate for sending all DOE-managed SNF from INEEL to a national HLW repository is estimated to be $3.069 billion (2001 dollars). This estimate assumes alternative facility approaches (essentially making major modification to and extending the life of existing facilities) will be used in lieu of the proposed Idaho Spent Fuel Facility.

The assumptions used to develop this programmatic life-cycle cost/benefit estimate include

- The national HLW geological repository will open and shipments of SNF will begin in fiscal year 2010.
- Shipments to the repository will be complete by January 1, 2035.
- Certain facilities will be open and operational longer than planned if the proposed Idaho Spent Fuel Facility is not built to meet the previous assumptions.
- The INTEC Irradiated Spent Fuel Storage Facility (CPP–603) would be modified to expand the hot cell and add a load-out facility in lieu of the availability of the proposed Idaho Spent Fuel Facility.
- Standard rail casks and cost of transportation to the repository are provided by the Office of Civilian Radioactive Waste Management at no charge to INEEL.
- The full cost of fuel characterization programs deemed necessary for shipment of bare fuel to the geologic repository, though potentially significant, is not factored into this programmatic cost-benefit analysis.

Thus, the current estimate of programmatic cost-benefit to the government of employing the use of the DOE standard storage container and the proposed Idaho Spent Fuel Facility is, at a minimum, $251 million (2001 dollars) (FWENC, 2003).

7.2 Benefits Associated with the Proposed Idaho Spent Fuel Facility

Construction and operation of the proposed Idaho Spent Fuel Facility would have a minor positive effect on the regional economy. Socioeconomic benefits include using regional workers for construction of the proposed facility and increasing sales of materials for regional suppliers throughout construction. Because the work force would be small relative to the number of employees at INEEL, the proposed action would not result in a regional growth spurt, and the infrastructure of public services and transportation systems would not be adversely affected (see Section 4.10).

The proposed action is designed to support the INEEL mission and comply with agreements and commitments negotiated by DOE. Currently, most SNF to be received by the proposed Idaho Spent Fuel Facility is stored at INTEC. The 1995 Settlement Agreement among the DOE, the State of Idaho, and the U.S. Navy established specific activities required to remove SNF from Idaho by 2035. Although the current storage configuration has worked well, it does not prepare the SNF for shipment from INEEL to a national HLW repository. The proposed Idaho Spent Fuel Facility would provide the ability to remove the SNF from existing storage locations, place it in specially designed storage containers, then seal and place the loaded containers in interim storage. The new containers would be designed for compatibility with transportation systems and with the eventual permanent disposal systems. After the SNF is placed in the containers, it would not need to be repackaged for shipment to a national HLW repository when one becomes available.

7.3 References

DOE. DOE/EIS–0203–F, “Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement.” Idaho Falls, Idaho: DOE, Idaho Operations Office. 1995.

———. DOE/EM–0142P, *Decommissioning Handbook*. Washington, DC: DOE. 1994.

FWENC. “Foster Wheeler Environmental Corporation Idaho Spent Fuel Facility Response to NRC Request for Additional Information Related to Environmental Review.” NRC Docket No. 72-25, TAC No. L20768. Letter (March 7) from R.D. Izatt to NRC. FW–NRC–ISF–03–0048. Richland, Washington: FWENC. 2003. [The preceding document is available for public review through the NRC electronic reading room at http://www.nrc.gov/reading-rm/adams.html.]

———. “License Application, Idaho Spent Fuel Facility.” NRC Docket No. 72-25. ISF–FW–RPT–0127. Morris Plains, New Jersey: FWENC. 2001a.

———. “Environmental Report, Idaho Spent Fuel Facility.” NRC Docket No. 72-25. ISF–FW–RPT–0032. Morris Plains, New Jersey: FWENC. 2001b.

———. “Safety Analysis Report, Idaho Spent Fuel Facility.” NRC Docket No. 72-25. ISF–FW–RPT–0033.” Morris Plains, New Jersey: FWENC. 2001c.

TLG Engineering. “Guidelines for Producing Commercial Nuclear Power Plan Decommissioning Cost Estimates.” AIF/NESP–036. Bridgewater, Connecticut: TLG Services, Inc. 1986.